

# Scientific Session of the 16th World Congress of Endoscopic Surgery, Jointly Hosted by Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) & Canadian Association of General Surgeons (CAGS), Seattle, Washington, USA, 11–14 April 2018: Poster Abstracts

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## P001

### Utility of Fibrin Glue in Robotic Transversus Abdominis Release (RTAR)

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**Introduction:** The use of mesh fixation devices has become a subject of increasing debate in the minimally invasive surgical community, with recent data suggesting mesh fixation devices do not afford significant intraoperative and postoperative benefits in surgical outcomes. This relationship has not been investigated with regards to robotic transversus abdominis release (RTAR) for the repair of abdominal wall defects. We report our analysis of perioperative outcomes in RTAR candidates in whom fibrin glue was both used and spared during abdominal wall reconstruction.

**Methods:** Retrospective review of a prospectively maintained hernia patient database was conducted identifying individuals who received either fibrin glue or no fixation during abdominal wall reconstruction via the RTAR technique from August 2015 to June 2017 at a single high volume hernia center. Perioperative data and postoperative outcomes between the two groups are presented with statistical analysis for comparison and quality of life measures assessed using the Carolina Comfort Scale.

**Results:** Of the 30 patients identified, 21 underwent RTAR with the use of fibrin glue for mesh fixation (RTARG) and 9 underwent RTAR without the aid of any mesh fixation device (RTARNG) with no past medical history significant for hernia recurrence. The RTARG cohort had a mean BMI, defect area, mesh area, and operative time of 32.1, 197 cm<sup>2</sup>, 844 cm<sup>2</sup> and 222 minutes, respectively, compared to 32.1, 139 cm<sup>2</sup>, 898 cm<sup>2</sup>, and 287 minutes in the RTARNG group. All cases utilized medium weight macroporous polypropylene synthetic implantable mesh materials in both the RTARG and RTARNG subgroups. There were no reported postoperative complications, including no development of hematoma, seroma, or surgical site infections. Hernia recurrence was not identified in either the RTARG or RTARNG cohorts through a mean follow up of 220 days (7 months). There were no statistically significant differences in postoperative outcomes.

**Conclusion:** Our series review suggests that the use of fibrin glue may not afford significant benefits compared to the use of no mesh fixation with the RTAR technique in the hands of an experienced surgeon. Additional expense associated with fibrin sealant may be unnecessary.

## P002

### Endoscopic-Assisted Debridement as a Definitive Treatment for Recurrent Fluid Collections After Ventral Hernia Repair

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**Introduction:** Seroma formation and subsequent mesh non-incorporation are troublesome complications after complex ventral hernia repair with synthetic mesh placement. Although many times seroma will resolve spontaneously, failure of medical management often necessitates surgical intervention.

**Case Report:** 39 year male presented with large ventral and parastomal hernia 2 years after end colostomy takedown with protective ileostomy performed after Hartmann's procedure 3 years ago. Past medical history included GERD, HTN and Morbid obesity (BMI 38.5 kg/m<sup>2</sup>). The patient was offered ileostomy takedown, as well as ventral and parastomal hernia repair using a Tranversus Abdominus Release and retro-rectus composite mesh repair. Despite surgical drain placement with routine removal at 2 weeks, the patient returned 3 months post op with seroma, which was treated with percutaneous drain. By 6 months, a deep seroma had reformed in the retro-muscular space and a portion of the mesh was non-incorporated. The patient was re-operated with endoscopic debridement of the non-incorporated mesh as well as irrigation and drainage of the seroma without violating the primary closure of the abdominal wall. A wound VAC was applied through one of the incisions, and two closed suction drains were left, being removed at around 2 and half weeks. At three months the patient demonstrated complete resolution of the seroma.

**Discussion:** Failure of seroma to respond to non-operative management represents a challenge in the post-operative management of patients undergoing complex ventral hernia repair. Open surgical intervention to explant non-incorporated mesh frequently leads to recurrence. Only very small case series are currently available to describe an endoscopic approach to this complication. We report a satisfactory outcome with endoscopic approach which combined partial mesh explantation and washout and drainage of the seroma cavity, with the benefit of avoiding alteration to the anatomy of the primary closure and avoiding recurrence.

**P003****Laparoscopic Repair of Amyand Hernia with Simultaneous Appendectomy**

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Between 5–10% of Americans experience an inguinal hernia in their lifetime, however, only 1% of these hernias contain the veriform appendix, which is termed an Amyand Hernia. Even more rare, is the 0.1% of the Amyand hernias which contain a perforated appendix. This hernia is difficult to diagnose and typically is an intraoperative finding. This rare inguinal hernia is named for Claudio Amyand, an English surgeon credited with the first successful appendectomy in 1735 when he removed the first veriform appendix from a right inguinal hernia sac from an 11-year-old boy. Though Dr. Amyand recounted this surgery as “quiet perplexing”, there are many ways in which a veriform appendix can be appreciated in the inguinal canal: adherent or non-adherent, inflamed or non-inflamed, perforated or contained. The incidence of Amyand Hernia is 0.07–0.13% regardless of the stage of presentation. In the case presented here, the patient had a non-inflamed, reducible right Amyand's Hernia, which was repaired via laparoscopic appendectomy and laparoscopic transabdominal preperitoneal right inguinal hernia repair with mesh.

**P004****Laparoscopic Preperitoneal Hernia Repair for Treatment Ventral Hernia (The Rectus Abdominal Diastasis, Flank Hernia and Recurrent Incision Hernia). Case Report**

Kin San Leong; Taiwan Far Eastern Hospital

**Background:** Rectus abdominal diastasis, flank hernia and recurrent incision hernia are kinds of ventral hernia. The totally extraperitoneal hernia repair for inguinal hernia had already performed for many years. It had benefits at post operation hospitalization, wound pain, cosmetics. We believe that we can use the same approach for treatment the ventral hernia. We want to share our early experiences with this approach. We also evaluate the feasibility and post operation results.

**Methods:** We performed the preperitoneal hernia repair with mesh for treatment ventral hernia since 2011, had already performed 37 cases. In this case of rectus abdominal diastasis patients and right flank hernia patient and left lower abdomen recurrent incision hernia status post mesh hernia repair with right lower abdomen incision hernia were performed at 2017. The demographic information and defect size were measured.

**Results:** This rectus abdominal diastasis female was 41 years old. The rectal muscle distance about 7 cm. The operation time was about 4 hours. The right flank incision hernia male was 69 years old. The fascia defect was about 10×8 cm. The operation time was about 2 hours. The left lower abdomen recurrent incision hernia status post mesh hernia repair with right lower abdomen incision hernia female was 60 years old. The left lower abdomen fascia defect about 7×5 cm and right lower abdomen fascia defect about 2×2 cm. The operation time was about 4.5 hours. The 3 cases blood loss were about 5 ml. The wound pain was VAS:4~5. They discharged from our hospital within the 24 hours postoperative period. The seroma was noted at right flank incision hernia patient.

**Conclusions:** We shared our early experience with preperitoneal hernia repair with mesh. They showed benefits at post operation hospitalization, wound pain and cosmetic to compare with open approach.

**P005****Efficacy of Single-Incision Totally Extraperitoneal Repair for Incarcerated Inguinal Hernia**

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**Purpose:** To evaluate the efficacy of single-incision laparoscopic surgery for totally extraperitoneal repair (SILS-TEP) of incarcerated inguinal hernia.

**Patients and Methods:****Clinical setting**

A retrospective analysis of 14 patients undergoing SILS-TEP for incarcerated hernia from May 2016 to August 2017 at Kinki Central Hospital was performed.

**Exclusion criteria**

SILS-TEP was contraindicated for the following conditions in our hospital: a history of radical prostatectomy; a small indirect inguinal hernia in a young patient; and unsuitable for general anesthesia.

**Surgical procedure**

Laparoscopic abdominal exploration through a single, 2.5-cm, intraumbilical incision was performed. The incarcerated hernia content was gently retracted from the hernia sac into the abdominal cavity. In some cases, simultaneous manual compression on the incarcerated hernia from the body surface was required. If no bowel resection was needed, a standard SILS-TEP using mesh was performed following laparoscopic abdominal exploration and incarcerated hernia reduction. If bowel resection was required, inguinal hernia repair using mesh was not performed to avoid postoperative mesh infection, and two-stage SILS-TEP was performed 2–3 months after the bowel resection.

**Results:** Fourteen patients (11 men, 3 women) with irreducible inguinal hernias, including 11 with unilateral hernias and 3 with bilateral hernias, underwent surgery. The patients' median age was 74 years (range, 38–83 years), and median BMI was 23.5 kg/m<sup>2</sup> (range, 18.8–30.5 kg/m<sup>2</sup>). Of the 14 patients, 7 had acute incarceration, and 7 had a chronic irreducible hernia. Seven patients with acute incarcerated hernias underwent emergency surgery, and two of the seven patients needed single-incision laparoscopic partial resection of the ileum, followed by two-stage SILS-TEP. Twelve patients, excluding two patients who required single-incision laparoscopic partial resection of the ileum, underwent laparoscopic exploration with hernia reduction followed by SILS-TEP. One case of chronic incarceration out of the twelve patients who underwent SILS-TEP after hernia reduction required conversion to Kugel patch repair. The median operative times were 102 min (range 52–204 min) for unilateral hernias and 165 min (range 83–173 min) for bilateral hernias. The median blood loss was minimal (range 0–177 ml). The median postoperative hospital stay was 1 day (range 1–3 days). The median follow-up period was 7 months (range 1–15 months). A seroma developed in 25% (3/12) of patients and was managed conservatively. No other major complications or hernia recurrence were noted during the follow-up period.

**Conclusions:** SILS-TEP, which offers good cosmetic results, could be safely performed for incarcerated inguinal hernia.

**P006****18 Months Follow Up of Incisional Hernia Repair Using P4HB in Patients After Liver Transplantation**

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**Introduction:** The challenges in hernia following liver transplantation are the types of incision, surgical site infection due to immunosuppressants and the multimorbidity these patients often present with. Therefore, patients with hernia after solid organ transplantation can be considered grade 2 according to the classification of the ventral hernia working group. The incidence for developing ventral hernia after transplantation has a wide variation according to literature. At our centre in Graz we have an incidence of 26%. Repair using mesh implantation reduces recurrence rates. Polypropylene mesh is prone to chronic contamination in immunosuppressed patients. Biomesh did not fulfill the expectations due to high recurrence rates and inflammatory reactions. P4HB bioabsorbable mesh seems to be a good alternative. It is a knitted monofilament, it degrades gradually via hydrolysis, it is fully resorbed after 18 months, while providing mechanical strength for 12 months, and it enables remodelling by host tissue. This mesh shows good results even in grade 3 morbidity wounds which we showed last year in a poster presentation at SAGES in Houston.

**Methods:** In 2016 we treated 5 patients with incisional hernia following liver transplantation with P4HB mesh in onlay technique and small bites suture.

**Results:** The follow-up period was between 10 to 20 months and still ongoing. No mesh had to be explanted, no surgical site infections, no delayed wound healing were observed. One hernia recurrence presented after 12 months with a 2.5 cm herniation along the left subcostal margin. 4 patients remained without complications and discomfort.

**Conclusion:** Treating incisional hernia of patients after liver transplantation with P4HB mesh in onlay-enforced technique is feasible and safe. Of course, more data is needed. In order to lower the incidence of incisional hernia in this group of patients we are preparing a trial for prophylactic P4HB mesh placement in patients undergoing liver transplantation.

**P008****Laparoscopic Component Separation in Complex Ventral Hernias. Initial Experience in a Hernia Clinic in Colombia**

Evelyn Dorado, MD, Jesica Correa, MD; Fundacion Valle Del Lili

**Introduction:** Complex hernias require special management, the first 12 months the relapse of primary closure is between 40–50%. Laparoscopic techniques such as the IPOM are reserved for defects of <10 cm, recurrences or major defects require techniques like components separation, which previously were only performed open but can now be done by laparoscopy. Integral management merits hernia centers, in Colombia there are no hernia centers, in Fundacion Valle del Lili we have the first specialized center for this type of patients.

**Methods and Procedures:** Descriptive, 4 patients were scheduled between December 2016 and July 2017 to eTEEP Rives Stoppa repair. 2 male and 2 female patients, mean age 40 years, 1 patient with BMI 50, 1 patient BMI 34 and 2 patients with 26, 2 of them with 2 previous repairs with failed mesh one with hepatic transplant, 1 with recurrence of IPOM and one with a defect Secondary to an intestinal resection without prior repair. Diameter of defects between 10 and 20 cm.

**Results:** All patients were studied with CT Scan to determine the size of the hernia and the contents of the sac, all were scheduled for eTEEP RS, I used a balloon for the preperitoneal, technique of 5 trocars, first step: dissection of the space, second: reduction the content of the sac, one patient required remove a composite mesh, posterior and anterior fascia closure with bearded suture and placement of polypropylene mesh 30×30 cm medium weight and fixation with fibrin sealant. All patients required drainage and 1-day hospitalization. At 7 days removed the drain and started of physical therapy for strengthening with exercise hypopresives. Control of the first two patients with CT at 3 months without relapse. No operative site infections.

**Conclusion:** The benefits of laparoscopy are recognized, the use of this technique in complex defects has proven effective and has a positive impact on the quality of life of the patient. This type of procedure requires trained personnel and a hernia clinic to ensure interdisciplinary management and follow-up to ensure results.

**P009****An Analysis of the Interval Between Major Abdominal Operations and Hernia Repair**

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**Introduction:** Patients undergoing major abdominal surgery have increased risk of developing incisional hernias, which can be associated with significant morbidity. This is a multi-institutional study looking at patients undergoing major abdominal operations, defined as colectomy, hepatectomy, pancreatectomy, and gastrectomy, and the incidence and duration to symptomatic hernia occurrence requiring repair within each cohort.

**Methods and Procedures:** An IRB- approved retrospective study within the MedStar Hospital database was conducted, incorporating all isolated colectomy, hepatectomy, pancreatectomy, and gastrectomy procedures performed across 11 hospitals between the years of 2002 to 2016. All patients were identified using ICD-9 and ICD-10 codes for relevant procedures. Exclusion criteria comprised of patients who had concomitant organ resection, or those undergoing organ transplant. Data validation was performed to verify the accuracy of the data set. The rate of symptomatic incisional hernia rates (IHRs) were determined for each cohort based on subsequent hernia procedural codes identified and repairs performed. Descriptive statistics and chi squared test were used to report IHRs in each group.

**Results:** During this 15-year span, a total of 7,583 major abdominal operations were performed at all 11 institutions, comprising of 4,970 colectomies, 1,122 hepatectomies, 1,165 pancreatectomies, and 326 gastrectomies. Total incidence of symptomatic incisional hernia occurrence requiring repair was 375 (4.9%). Incisional hernia rate was 297 (5.98%) in colectomies, 28 (2.5%) in hepatectomies, 41 (3.52%) in pancreatectomies, and 9 (2.76%) in gastrectomies ( $p<0.001$ ). The mean duration to hernia surgery was 804 days for coectomy, 564 days for hepatectomy, 484 days for pancreatectomy, and 840 days for gastrectomy ( $p=0.076$ ).

**Conclusion:** Symptomatic incisional hernia rates following colectomy was significantly higher than other major abdominal surgeries. However, mean duration to hernia development was not significantly different among all patients undergoing major abdominal surgery and ranged from 484 to 840 days.

**P010****Related Factors to the Presentation of Complications of Inguinal Hernia Repair with TEP Technique and Self-fixation Mesh**

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**Introduction:** Hernias are a very common pathology, which can cause severe complications associated with the defect per se to the surgical treatment. The estimated risk of developing inguinal hernias throughout life is about 27% in men and 3% in women. One of the surgical techniques used for its management is the total extra peritoneal (TEP) technique with self fixation meshes. The main purpose of making a tension-free repair, through the implantation of a mesh in the preperitoneal space is to exclude the defect and to reinforce the inguinal abdominal wall. However, the factors related to this surgical technique and the presentation of complications are unknown.

**Objective:** Identify related factors to the presentation of complications in patients that underwent laparoscopic total extra peritoneal (TEP) hernia repair with self-fixation mesh in "Fundación Santa fe de Bogotá" from 2012 to 2017.

**Methods:** A cross-sectional study was performed with secondary analysis of the database of patients with inguinal hernias who underwent an inguinal hernia repair procedure with TEP technique and self-fixation mesh. A descriptive and bivariate analysis of the patients characteristics was performed relating to the presentation of complications through a chi square for Pearson correlation.

**Results:** A sample of 77 operated patients was obtained, with a male/female ratio of 1:1. On average, the patients were 30 years old, with no significant difference between the sex. The surgical complication that showed statistical significance was postoperative pain associated with an increased hospital stay ( $p<0.005$ ). The conditions that showed a positive relationship with this complication were the hernia classification, bilaterality, grade II obesity and a surgical time greater than 40 minutes ( $p<0.005$ ).

**Conclusion:** Inguinal hernia repair with TEP technique and self-fixation mesh for this population showed only one complication. Patients who have a bilateral NYHUS IV hernia and have grade II obesity may present an increased risk of postoperative pain with this technique. More studies are needed to increase the external validity of these results.

**P011****Important Anatomical Pointer to Reduce Complications in Laparoscopic Inguinal Hernia Repair in Pediatric**

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**Objective:** Introduction of MIS in pediatric age group has been proved feasible and safe. There is considerable evolution with introduction of a number of innovation in MIS pediatric inguinal hernia repair. High ligation of sac is the basic premise of surgical repair in pediatric inguinal hernias. There are different MIS techniques broadly grouped into intracorporeal or extracorporeal with extracorporeal component namely the suturing. Every techniques has its own complications. The main objective of our study was to focus on different anatomical pointers which can lead inadvertent complications mainly bleeding and recurrence.

**Methods and Procedures:** Prospective review of 37 hernias (29 male and 2 female) (8 months–13 years) performed laparoscopically between September 2015 and June 2016. Under laparoscopic guidance, the internal ring was encircled extraperitoneally using a 2-0 non-absorbable suture and knotted extraperitoneally. Data analyzed included operating time, ease of procedure, occult patent processus vaginalis (PPV), contralateral inguinal hernia, complications, cosmesis and recurrence. **Results:** Sixteen right (52%), 14 left (45%) and 1 bilateral hernia (3%) were repaired. Five unilateral hernias (16.66%), all left, had a contralateral PPV that was repaired ( $P=0.033$ ). Mean operative time for a unilateral and bilateral repair were 13.20(8–25) and 20.66 min (17–27 min) respectively. One hernia repair still recurred (2.7%) even with all precautions and another had a post operative hydrocoele (2.7%). One case (2.7%) needed an additional port placement due to inability to reduce the contents of hernia completely, because of our technique we could not find any adherent peroperative bleedings. There were no stitch abscess/granulomas, obvious spermatic cord injuries, testicular atrophy, or nerve injuries.

**Conclusion:** The results confirm safety, efficacy and cost effectiveness of laparoscopic inguinal hernia repair. During our per-operative analysis we focus to address the anatomical landmark to minimize future recurrence and peroperative surgical complications. We identified and named a point as J. Point at the tip of triangle of "Doom". That is most important point to address peroperatively. There is high chance of recurrence if that point is not encircled well or inadequately circled because of fear of iliac vessels injury. We also concluded that 'water dissection technique' is effective techniques in un-experienced hand and in early stages of laparoscopic hernia repair to prevent inadvertent iliac vessels injury.

**P012****Where Patients Get Medical Information: Characterization of Online Search Results for Common Hernia-Related Terms**

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**Background:** It has become commonplace for patients to arrive to their appointments self-educated on their medical issues. Popular search engine algorithms are not necessarily based on validity or accuracy of information. The aim of this study is to examine Google search results focused on a top general surgery diagnosis: hernia.

**Methods:** A Google search was performed in incognito mode, examining the top 20 results for the following phrases: hernia, hernia surgery, hernia mesh, hernia repair, and hernia complications. Results were categorized into the following: medical information (i.e. WebMD, healthcare organization, or society-based pages), non-medical information (i.e. patient-driven community), medical device information, legal advertisement, medical ad, other ads, journal or news article, or links to another search engine. Results were categorized as being high or low-quality information, written by an MD, or being biased against mesh based on qualitative analysis of link content.

**Results:** Of all searches, only 33% returned medical information and the second most common result was a legal ad, at 18%. 59% of search results were judged to be high-quality and 25% were felt to be biased against use of mesh. A majority of search results for "hernia mesh" were found to be advertisements from law firms. "Hernia mesh" also yielded the highest number of results biased against mesh at 70%. "Hernia repair" yielded the most medical information at 50%.

	Hernia	Hernia surgery	Hernia mesh	Hernia repair	Hernia complication	Total
Medical info	40%	35%	5%	50%	35%	33%
Legal ad	5%	15%	55%	10%	5%	18%
Non-med info	25%	5%	10%	10%	10%	12%
Med ad	10%	15%	15%	10%	10%	12%
Search Engine	15%	10%	0%	0%	25%	10%
Med dev info	0%	15%	5%	15%	0%	7%
Other ad	5%	5%	0%	5%	5%	4%
Article	0%	0%	10%	0%	10%	4%
High qual	62%	64%	50%	64%	56%	59%
Low qual	38%	36%	50%	36%	44%	41%
Written by MD	30%	27%	25%	35%	55%	34%
Biased against Mesh	10%	20%	70%	15%	10%	25%

**Conclusions:** The results of Internet search engine queries for hernias or hernia repairs are highly variable, subject to bias and low-quality information. Notably, a search for "hernia mesh" resulted in greater than 50% of links by legal firms and links biased against hernia mesh use. Further investigation into patient education will help physicians guide their conversations and counseling of patients.

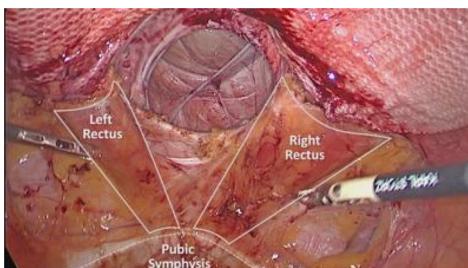
**P013****Hybrid Pre-peritoneal Approach in a Thrice Recurrent Ventral Hernia**Chintan Patel, MS, DNB, FMAS, FIAGES, FBMS<sup>1</sup>, AjayBhandarwar, MS, FMAS, FIAGES, FBMS, FICS<sup>2</sup>, Amol Wagh, MS, FMAS, FIAGES, FBMS, FICS<sup>2</sup>, Eham Arora, MS<sup>2</sup>, Shubham Gupta, MS<sup>2</sup>, Dharmesh Dhanani, MS, FNB<sup>1</sup>; <sup>1</sup>Kiran Multi Super Specialty Hospital & Research Center, Surat, India, <sup>2</sup>Grant Government Medical College & Sir JJ Group of Hospitals, Mumbai, India

**Introduction:** Incisional hernias occur at prior operative sites & their repair is one of the most common surgeries in everyday clinical practice. Recurrence after repair is related to several risk factors, some of which include uncommon hernial sites, morbid obesity, large defect sizes & prior surgery in an emergency setting.

We present the case of a 61 year old female who suffered an incisional hernia after abdominal hysterectomy in 2006. She underwent two open & one laparoscopic repair of the same, but she suffered a third recurrence for which she underwent a hybrid repair.



**Materials and Methods:** Intra-operative survey showed multiple previously inserted meshes with dense fibrotic bands & omental adhesions with the hernia recurrence occurring between the inferior border of the mesh & the pubic symphysis. A diligent adhesiolysis was performed to entirely expose the defect. An attempt at primary closure of the defect was made using a loop nylon suture, but the previously inserted meshes & dense fibrotic tissues were a barrier to the same. A hybrid approach was employed where defect closure was performed as in open surgery – this reduces the risk of post-operative seroma & abdominal bulge. A composite intra-peritoneal mesh was fixed laparoscopically, ensuring an overlap which extending beyond the pubic symphysis inferiorly.



**Result:** Hybrid approach is particularly suited to difficult, recurrent hernia cases, as it is technically less demanding, reduces operative time, allows a secure defect closure & provides an improved abdominal wall contour. Dissection in the pre-peritoneal place was performed to allow a wide overlap of a composite mesh in all directions.

Difficult, recurrent hernias are a difficult clinical entity to treat, with a successively worsening risk of recurrence with each subsequent repair. A thorough clinical & imaging evaluation with a well-planned hybrid approach would combine the advantages of both open & laparoscopic repairs.

**P014****A Prospective, Multi-center Trial of a Long-Term Bioabsorbable Mesh with Sepra Technology in Challenging Laparoscopic Ventral or Incisional Hernia Repair**

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**Objective:** The objective of this prospective, multi-center, single-arm, open-label study is to assess the safety, performance and effectiveness of Phasix™ ST in laparoscopic ventral or incisional hernia repair in subjects at high risk for Surgical Site Occurrence (SSO). Subjects at high risk for SSO are defined as having one or more of the following comorbid conditions: body mass index (BMI) between 30–40 kg/m<sup>2</sup> (inclusive), active smokers, chronic obstructive pulmonary disease (COPD), diabetes, immunosuppression, coronary artery disease, chronic corticosteroid use, low pre-operative serum albumin, advanced age, or renal insufficiency.

**Methods:** The primary endpoint is SSO requiring intervention within 45 days post-implantation, including Surgical Site Infection (SSI), seroma, hematoma, wound dehiscence, skin necrosis, mesh infection and fistula. Secondary endpoints include: surgical procedure time, length of stay, SSO>45 days post-implantation, hernia recurrence rate, device-related adverse event incidence, rate of reoperation due to the index hernia repair, and Quality of Life assessments (Surgical Pain Scale-VAS, Carolinas Comfort Scale®, and SF-12®), assessed at 1, 3, 6, 12, 18, and 24-months postoperatively.

**Results:** A total of 90 subjects (54/90, 60% male) with a mean age of 55±14.6 years and BMI of 33.4±4.4 kg/m<sup>2</sup> were implanted with Phasix™ ST Mesh. Comorbid conditions included: obesity (74/90, 82.2%), active smoker (13/90, 14.4%), COPD (5/90, 5.6%), diabetes (13/90, 14.4%), immunosuppression (3/90, 3.3%), coronary artery disease (7/90, 7.8%), chronic corticosteroid use (3/90, 3.3%), low preoperative serum albumin (1/90, 1.1%), advanced age (8/90, 8.9%), and renal insufficiency (0/90, 0.0%). and hernia types were primary ventral (42/90, 46.7%), primary incisional (32/90, 35.6%), first time recurrent ventral (6/90, 6.7%), first time recurrent incisional (7/90, 7.8%), multiply recurrent ventral (1/90, 1.1%), and multiply recurrent incisional (2/90, 2.2%). Subjects underwent laparoscopic ventral or incisional hernia repair with Phasix™ ST Mesh in laparoscopic only (48/90, 53.3%) or robotic assisted cases (42/90, 46.7%) with mean defect 9.2±11.4 cm<sup>2</sup>, 84.4±42.3 minute procedure time, and 1.2±1.7 day length of stay. There were no SSOs requiring intervention within 45 days post-implantation, including SSI, seroma, hematoma, wound dehiscence, skin necrosis, mesh infection and fistula (0/90, 0.0% in all cases).

**Conclusion:** Phasix™ ST Mesh demonstrated promising early results in subjects at high risk of SSO with no SSOs requiring intervention within 45 days post-implantation. Longer-term 24-month follow-up is ongoing.

**P015****Laparoscopic Repair of Inguinal Hernia Developed After Robot-Assisted Laparoscopic Radical Prostatectomy**

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**Background:** Inguinal hernia developed after robot-assisted laparoscopic radical prostatectomy (RALP) have usually been treated by anterior approach. We have introduced a new technique of laparoscopic transabdominal repair of inguinal hernia after RALP and evaluated the outcome.

**Surgical Procedures:** Under general anesthesia, 3 trocans was inserted at the same position as transabdominal preperitoneal approach (TAPP). Bilateral inguinal ligion was observed carefully and bilateral hernia repair was performed when the hernia was detected at the contralateral side. At first, preperitoneal space was dissected laterally and then medially enough to detect the Cooper's ligament and pubic bone. When the Cooper's ligament could not be detected, the surgery was converted to anterior approach. When the preperitoneal space was fully dissected, TAPP was performed with 14 × 10 cm mesh. When the Cooper's ligament was detected but the medial preperitoneal space could not be further dissected due to scar formation caused by dissection during RALP, parietex composition mesh was fixed to the Cooper's ligament and medial and cephalad side was directly fixed to the abdomen and the caudal side was sutured and covered with peritoneum (modified intraperitoneal onlay mesh: MIPO).

**Methods:** From April 2014 to August 2017, 15 patients with inguinal hernia developed after RALP underwent laparoscopic repair in our hospital and its short-term outcome was evaluated.

**Results:** Mean age of patients was 69 years old. There were 8 right indirect hernias, 2 left indirect hernia and 5 bilateral indirect hernias (one of which was combined with left direct hernia). Two Contralateral side hernias were diagnosed during laparoscopy. TAPP, MIPO and anterior approach were performed on 4, 7 and 4 patients, respectively. Operation time was 142 min for TAPP, 150 min for PIPO (including 2 bilateral repair) and 144 min for anterior approach. Postoperative pain was minimum and well controlled by painkiller which disappeared within a week. Hospital stay was 3.5 days. Seroma was occurred in two patients after MIPO, one of which was treated conservatively. The other was symptomatic and recurrence could not completely be denied and laparoscopy was performed. By laparoscopy, the mesh was beautifully incorporated without recurrence and the remaining hernia sac was resected by anterior approach. During the follow-up period of 26 months, there has been no recurrence.

**Conclusion:** Our new laparoscopic repair including TAPP and MIPO is safe and effective although further examination in a large number of patients and long term follow up will be needed.

**P016****Laparoscopic Abdominal Drainage in Treatment of Abdominal Wall Hernia in Cirrhotic Patients Accompanied by Ascites**

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**Background:** Management of abdominal wall hernias in cirrhotic patients accompanied by ascites is still under debate. The objective of this study was to compare the outcome in our series of urgently versus scheduled treatment of these patients.

**Methods:** In the period between 2012 and 2016, 102 patients with an abdominal wall hernia combined with liver cirrhosis and ascites were identified from our hospital database.

I group: 48 cirrhotic patients operated on urgently, including 36 (75%) - with hernia sac erupts with ascites fluid overflow and 12 (25%) with strangulated hernias. 9 (18.8%) patients was performed endoscopic hemostasis simultaneously for variceal bleeding. In 55% cases ascites fluid was present bacterial microflora.

Group II: 54 cirrhotic patients with massive ascites and spontaneous eruption risk of hernia, operated scheduled after a thorough preoperative preparation, laparoscopic drainage of abdominal ascites and abdominal cavity lavage with antibacterials. In 85% cases ascites fluid was present bacterial microflora.

Plasty method - "tension-free no mesh" with Platelet-rich fibrin application. Sealing prophylactic endoscopic variceal was performed in 29 (53.7%) patients.

**Conclusions:** Patients with liver cirrhosis with massive resistance ascites should be operated in a planned way for hernia anterior abdominal wall. In this cases its obligatory the endoscopic exam for prevention of variceal bleeding. The priority has the procedures „tension free no mesh” or „tension free no mesh” with Platelet-rich fibrin application. Laparoscopic abdominal drainage and lavage with antibacterials reduces the risk of ascites-peritonitis, improves wound healing. Drain of abdominal cavity in post operatory period decrease the risk of developing the ascites peritonitis and improve the wound healing.

**P017****Incisional Hernia Rates in Patients Undergoing Major Abdominal Operations for Benign vs Malignant Disease**

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**Introduction:** Incisional hernias following abdominal surgery can be associated with significant morbidity leading to decreased quality of life, increase in health care spending and need for repeat operations. Patients undergoing gastrointestinal and hepatobiliary surgery for malignant disease may be at higher risk for developing incisional hernias. Identifying these risk factors for incisional hernia development can help decrease occurrence. This will be the largest multi-institutional study looking at incidence of symptomatic hernia rates for major abdominal operations including colectomy, hepatectomy, pancreatectomy, and gastrectomy.

**Methods and Procedures:** An IRB-approved retrospective study within the MedStar Hospital database was conducted, incorporating all isolated colectomy, hepatectomy, pancreatectomy, and gastrectomy procedures performed across 11 hospitals between the years of 2002 to 2016. All patients were identified using ICD-9 and ICD-10 codes for relevant procedures and then subdivided into either having benign or malignant disease. Exclusion criteria comprised of patients who had concomitant organ resection, or those undergoing organ transplant. Data validation was performed to verify the accuracy of the data set. The rate of symptomatic incisional hernia rates (IHRs) were determined for each cohort based on subsequent hernia procedural codes identified and repairs performed. Descriptive statistics and chi squared test were used to report IHRs in each group.

**Results:** During this 15-year span, a total of 7,583 major abdominal operations were performed at all 11 institutions, comprising of 4,970 colectomies, 1,122 hepatectomies, 1,165 pancreatectomies, and 326 gastrectomies. Malignancy was the indication for surgery in 2,178 (43.8%) colectomies, 747 (66.6%) hepatectomies, 763 (65.5%) pancreatectomies, and 207 (63.5%) gastrectomies. IHR in each cohort for benign vs malignant etiologies, respectively, are as follows: 193 (6.9%) vs 104 (4.8%) in colectomy ( $p=0.002$ ), 12 (3.2%) vs 16 (2.1%) in hepatectomy ( $p=0.385$ ), 17 (4.2%) vs 24 (3.1%) in pancreatectomy ( $p=0.431$ ), and 4 (3.4%) vs 5 (2.4%) in gastrectomy ( $p=0.88$ ) patients.

**Conclusion:** Symptomatic incisional hernia rates following major gastrointestinal and hepatobiliary surgery ranges from 2.1 to 6.9%. There was no significant increase in hernia rates in patients undergoing surgery for malignancy. Patients undergoing colectomy for benign disease had a high incidence of symptomatic IHRs.

**P019****Laparoscopic Ventral Hernia Repair with Intra-peritoneal Suturing Technique**

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**Objective:** To evaluate laparoscopic repair of ventral hernia by intraperitoneal suturing method.

**Method:** Ten patients with a mean BMI of 31.84 kg/m<sup>2</sup> underwent a laparoscopic ventral hernia repair between 2015 to 2016. A laparoscopic approach with three trocar incisions was used to repair ventral hernia; intraperitoneal fixation of mesh was done using slow absorbing sutures and short-term follow-up results up to May 2017 are reported.

**Results:**

No	Mean Operative time	Mean Hospital Stay	Minor Complications	Major Complications	Follow up Period	Recurrence
10	100 minutes	2.0 days	20%	0	12 months	0

**Conclusion:** Laparoscopic ventral hernia repair by intra peritoneal suturing method is a easy, safe, and effective procedure in the treatment of ventral hernia in our short term experience.

Laparoscopic repair of incisional hernia and ventral hernia appears to be safe, especially with the use of Gore-Tex mesh, and is proving to be effective as it decreases pain, complications, hospital stay, and recurrences.

**P020****Correlation of Ultrasound Results with Intraoperative Findings in Primary Groin Hernias**

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**Introduction:** Studies have demonstrated wide variability in the sensitivity and specificity of ultrasound in determining the presence of groin hernias. Further, analyses of the accuracy of this modality in the diagnosis of specific types of groin hernias are lacking. In this context, we sought to investigate the correlation between ultrasound and intraoperative findings in groin hernias.

**Methods:** This is a single center retrospective chart review of 187 patients who presented to the division of Minimally Invasive Surgery and underwent repair of a primary groin hernia between 1/2014 and 4/2017. After excluding patients without preoperative ultrasound, 54 patients were left for evaluation. Accuracy of physical exam and ultrasound findings for presence of groin hernia were calculated using intraoperative findings as the gold standard and compared using McNemar's test. For each hernia type (direct, indirect, femoral), ultrasound diagnosis was compared to intraoperative findings using Fisher's exact test.

**Results:** A hernia was identified intraoperatively in all 54 patients with ultrasound results. A hernia was identified preoperatively by physical exam in 89% (n=48) of patients and by ultrasonography in 96% (n=52) of patients ( $p=0.109$ ). Intraoperative findings included 21 direct, 36 indirect, and 7 femoral hernias, with 10 patients presenting with multiple hernias identified at the time of surgery. Ultrasound correctly identified 33% (n=7) of direct, 56% (n=20) of indirect, and 14% (n=1) of femoral hernias. The total accuracy of ultrasonography for specific hernia type was 67%. Ultrasound results did not correlate with intraoperative findings for any particular hernia type. For female patients (n=8), ultrasound correctly identified 88% (n=7) hernias versus 50% (n=4) on physical exam. For patients with a BMI>30, ultrasound correctly identified 100% (n=15) of hernia vs. 80% (n=12) by physical exam.

**Conclusions:** While groin ultrasound accurately detected the presence of a hernia, specific hernia type was frequently misidentified using this imaging modality. Given that physical exam was equivalent in diagnosing the presence of a hernia, ultrasound may be redundant in the evaluation of patients with a clinically evident groin hernia. The poor sensitivity of ultrasound for hernia type also suggests the potential for misdiagnosis, which could be detrimental in the setting of a femoral hernia and could impact operative planning and execution in an open repair. Our study shows that ultrasound does not appear to have a clear benefit in the diagnosis of groin hernias and results should be viewed with caution.

**P022****Laparoscopic Spigelian Hernia with Re-recurrent Umbilical Hernia Repair with Sleeve Gastrectomy - A Rare Case Report**

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**Introduction:** Obesity is one of the important precipitating factor for occurrence and recurrence for obvious and silent ventral hernias. Review of literature shows various studies recommending concomitant repair of umbilical hernia with bariatric procedures like sleeve gastrectomy, Roux-en-Y gastric bypass. But here we report probably the *first case in world literature* where in incidentally detected left spigelian hernia and irreducible re-recurrent umbilical hernia were repaired with IPOM Plus along with concomitant sleeve gastrectomy successfully.

**Materials and Method:** A 36 years old female patient with morbid obesity (BMI – 45) presented with re-recurrent (twice operated) irreducible umbilical hernia with no co-morbid conditions. Complicated umbilical hernia being the primary pathology with obesity as the predominant etiological factor, the patient was posted for laparoscopic IPOM plus with sleeve gastrectomy. During surgery, after adhesiolysis and reducing the omental contents from 4 cm × 3 cm umbilical defect, an additional spigelian hernia with omentum as a content, was incidentally noted along the left rectus abdominis muscle. This spigelian hernia and umbilical hernia were repaired by IPOM Plus with two separate 15 × 15 cm composite meshes followed by sleeve gastrectomy.

**Discussion:** It is not uncommon for bariatric patients to also have ventral hernias, and during diagnostic laparoscopy the surgeon should not be surprised if additionally masked secondary defects or simultaneous ventral hernias are found.

Concomitant laparoscopic IPOM Plus for this spigelian hernia and re-recurrent umbilical hernia along with sleeve gastrectomy can be safely performed for following reasons

- Immediate symptomatic pain relief due to reduction of irreducible hernia.
- The chances of subsequent incarceration and strangulation were reduced.
- By performing sleeve gastrectomy, obesity, as a risk factor for recurrence of ventral hernia was significantly reduced.
- By obviating the need for second surgery, there was a cumulative decrease in cost/stress/morbidity/anaesthetic complications.

**Conclusion:** Numerous studies have shown the advantage of laparoscopic IPOM Plus with sleeve gastrectomy or other bariatric procedures and this particular case report highlights probably the first case in world literature where in laparoscopic IPOM Plus repair of spigelian hernia was done with simultaneous sleeve gastrectomy with fair and favourable outcome.

**P023****Of Mice of Mesh: Evaluating Mesh Structure on Bacterial Adherence**

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**Introduction:** Prosthetic infections, although relatively uncommon, are a major source of cost and morbidity. The study aimed to evaluate the influence of mesh structure including the polymer type and mean pore size on bacterial adherence in a mouse model.

**Methods:** Three commercially available hernia meshes were included in the study. For each mesh type, a 1 cm square was surgically placed intraabdominally in 6 mice. One mouse served as a control while an enterotomy was made in the subsequent mice to introduce a bacterial load onto the mesh. After 24 hours the meshes were harvested. The inoculated meshes were then plated on agar plates and bacterial counts were counted after 24 hours. The bacterial counts were compared between the various mesh types.

**Results:** The mean bacterial adherence was increased in the large pore mesh was 695 colonies, for the small pore mesh was 892 colonies, and in the biologic mesh group it was 504 colonies.

**Conclusions:** Through the use of a mouse model, the influence of mesh type and pore size on bacterial adherence was evaluated. Meshes that have larger pores with a lower prosthetic load and the biologic mesh interestingly had lower early bacterial colonization after 24 hours following an enterotomy. Further evaluation with a longer incubation time could be helpful to determine the effect of bacterial colonization of mesh.

**P024****Laparoscopy for Complex Groin Hernia Repair: A Single Centre Institutional Experience in an Asian Cohort**

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Laparoscopic repair of groin hernias is widely accepted approach over open due to lesser pain, faster recovery, better cosmesis and decreased morbidity. However, there is still debate on its use in large inguino-scrotal hernias, recurrent hernias and history of lower abdominal surgery anticipating adhesions and difficulty in dissecting extensive hernia sac. Retrospective analysis of prospectively collected data was done of patients undergoing laparoscopic repair of large inguino-scrotal, incarcerated groin hernia, recurrent cases after open or laparoscopic repair and history of previous lower abdominal surgery.

Between January 2013 to July 2015, 89 patients with large inguino-scrotal hernias, recurrent hernia, history of lower abdominal surgery, incarcerated femoral hernia underwent laparoscopic inguinal hernia repair. Patient characteristics, operating time, surgical technique, conversion rate, complications and recurrence up to 18 months recorded.

51 patients had large inguino-scrotal hernia, 22 recurrent hernia (17 previous open, 5 previous lap), 14 history of lower abdominal surgery (4 LSCS, 6 Appendectomy, 2 prostatectomy, 2 midline laparotomy), 1 incarcerated femoral hernia, 1 meshoma removal. 75 patients underwent total extraperitoneal (TEP) repair, 9 transabdominal pre-peritoneal (TAPP), 5 needed conversion to open. Mean operation time was 74 min for unilateral and 118 min for bilateral hernia. Seroma formation seen in 19 patients, 2 minor wound infections treated conservatively. We conclude that the laparoscopic approach can be safely employed for the treatment of complex groin hernias; surgical experience in laparoscopic hernia repair is mandatory with tailored technique in order to minimize morbidity and achieve good clinical outcomes with acceptable recurrence rates.

**P025****Learning Curve for Single-Incision Totally Extraperitoneal Inguinal Hernia Repair**

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**Purpose:**

The aim of this study was to clarify the learning curve for single-incision laparoscopic surgery for totally extraperitoneal repair (SILS-TEP).

**Patients and Methods:***Clinical setting*

A retrospective analysis of 50 consecutive patients with unilateral inguinal hernia undergoing elective SILS-TEP by a single surgeon between July 2016 and September 2017 was performed.

*Exclusion criteria*

Patients with a history of radical prostatectomy, young patients with a small indirect inguinal hernia, and patients for whom general anesthesia was contraindicated were excluded from this study.

*Surgical procedure*

A single, 2.5-cm, intraumbilical incision was made, and blunt dissection was performed between the muscle and the posterior sheath to create a preperitoneal space. After placing a Lap-Protector Mini in this space, three 5-mm trocars were inserted through a single-port access device. The preperitoneal space was dissected gradually, using straight laparoscopic instruments without a dissection balloon. Mesh was placed in this preperitoneal space, covering the inguinal floor, and was fixed with absorbable tacks. After completion of the operation, the preperitoneal space was carefully deflated to avoid displacing the mesh. The anterior rectus sheath and skin were closed with an absorbable suture.

**Results:***Clinical characteristics*

The first 25 cases were categorized into the learning period group, and the later cases were categorized into the experienced period group. There were no significant differences between the two groups in age, sex, and body mass index.

*Moving average curve*

The mean operating time for each set of 10 cases decreased continuously. The operating time gradually stabilized after 20 cases and showed a decrease after 30 cases.

*Comparison of operative outcomes*

The median operative time for a unilateral hernia in the learning period group and the experienced period group was 102 min and 75 min, respectively ( $p<0.05$ ). There were no conversions to a different operative procedure in either group. The median duration of postoperative hospital stay was 1 day in both groups. Peritoneal injury occurred in 32% (8/25) of the learning period group and 24% (6/25) of the experienced period group ( $p=0.8$ ).

*Postoperative complications*

Postoperative complications, including seroma, wound infection, and mesh infection, were seen in 24% (6/25) of patients in the learning period group and 4% (1/25) of patients in the experienced period group ( $p=0.1$ ). These complications were managed conservatively. No other major complications or hernia recurrence were noted.

**Conclusions:** The number of patients needed to become proficient in SILS-TEP might be approximately 25 cases.

**P026****Comparison of Permanent or Absorbable Tack Fixation When Used Alone or with Suture Fixation in Laparoscopic Ventral Hernia Using the Americas Hernia Society Quality Collaborative (AHSQC)**

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Mesh fixation in ventral incisional hernia is a topic of ongoing debate. Permanent and absorbable tacks are acceptable and widely used methods for mesh fixation. The purpose of this study was to compare outcomes of permanent tack fixation versus absorbable when used alone or with suture fixation in laparoscopic incisional hernia repairs.

A retrospective review of all patients undergoing laparoscopic ventral hernia using tack fixation (absorbable/permanent) alone or in conjunction with suture fixation was queried from the AHSQC database. Outcome measures included hernia recurrence rate, pain, quality of life, wound related issues, and hospital length of stay. Propensity match scoring was performed to compare patients undergoing tack only fixation versus tack and suture fixation with a p-value of  $<0.05$  considered significant.

A total of 804 patients were identified after propensity match scoring with 402 who underwent repair with permanent tacks alone or with sutures and 402 who underwent repair with absorbable tacks alone or with sutures. Following matching there were no differences in BMI, Age, Hernia Width/Length, or baseline pain/quality of life. There were no significant differences found in outcome measures including recurrence rates, pain and quality of life outcomes at 30 days, 6 months, and 1 year, surgical site infection (SSI), and postoperative length of stay ( $p>0.05$ ). There was a significant increase in any post op complication in the permanent tack fixation group compared to the absorbable tack fixation group (21% vs 14%,  $p<0.0003$ ) which is likely due to the increase in surgical site occurrences noted in the permanent tack fixation group (14% vs. 10%,  $p<0.005$ ). Based on this large data set, there are no significant differences in postoperative outcomes in permanent versus absorbable fixation in laparoscopic hernia repair except in surgical site occurrences. Further study is needed to evaluate but at the present time, there is no convincing evidence that one type of fixation is superior to another in laparoscopic ventral hernia repair.

**P027****Single Incision Laparoscopic Transabdominal Preperitoneal Mesh Hernioplasty for Inguinal Hernia in 290 Japanese Patients**

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**Introduction:** Inguinal hernia repair is the most common procedure in general and visceral surgery worldwide. Laparoscopic Transabdominal preperitoneal mesh hernioplasty (TAPP) has been also popular surgical method in Japan. Single incision laparoscopic surgery is one of the newest branches of advanced laparoscopy, and its indication has been spread to not only simple surgery such as cholecystectomy, but also complex surgery. We report our experience with single incision laparoscopic TAPP (S-TAPP) for Japanese patients with inguinal hernia.

**Case Description:** A consecutive series of 290 patients (247 male, 43 female) who underwent S-TAPP during June 2010 to September 2017 in a single institution. Twenty eight of the patients had bilateral inguinal hernia. The mean follow-up was 1192 days. The average age of the patients was  $61.2 \pm 16.5$  years.

**Establishment of the ports:** A 25-mm vertical intra-umbilical incision is made for port access. One 5-mm optical port and two 5-mm ports were placed side-by-side through the umbilical scar.

**Surgical procedure:** The procedure was carried out in the conventional fashion with a wide incision in the peritoneum to achieve broad and clear access to the preperitoneal space, and an appropriate placement of polypropylene mesh (3DMaxTM light, Bard) with fixation using the tacking device (Absorbateck®, Covidien). The hernia sac is usually reduced by blunt dissection, or is ligated and transected with ultrasound activated device. The peritoneal flap is closed by one suture with 4-0 PDS and the 6–7 tacks using Absorbateck®.

**Discussion:** In one patient, we encountered a large sliding hernia on the right side having sigmoid colon as content of the sac, which required conversion to the conventional laparoscopic procedure. There were nine recurrence cases after surgery of laparoscopic or anterior approach, and two cases after prostatectomy. There was no intra-operative complication. The mean operative time was  $87.4 \pm 31.1$  min, and blood loss was minimum in all cases. The average postoperative stay was  $5.4 \pm 2.7$  days. There was one recurrence case (0.3%) 16 months after the surgery. There was no severe complication after the surgery, but there were 15 seromas (4.7%) and one hematoma (0.3%). Two patients had blunt tactile sense in the area of the lateral femoral cutaneous nerve (0.9%), which improved in two months.

**Conclusion:** Our results suggest that S-TAPP is a safe and feasible method without additional risk. Moreover, cosmetic benefit is clear. However, further evaluation for postoperative pain and long-term complications compared to standard laparoscopic TAPP mesh hernioplasty should be required.

**P028****One-Year Histologic Behavior Assessment on GORE® Synechor®**

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**Introduction:** Prosthetic mesh use has become standard practice during ventral hernia repair to reduce the risk of recurrence. The ideal mesh is macro-porous which favors rapid cellular ingrowth and tissue integration, has limited tissue reactivity, low profile and weight, and has high tensile strength to add resilience to the repair. Additionally, the material is expected to have good handling characteristics. Currently, there is a wide variety of options for mesh. Biosynthetic material (poliglycolic acid/trimethylene carbonate – PGA/TMC) has been shown to behave well in terms of early vascularization and ingrowth as well as adequate long term tissue generation. GORE® Synechor® Biomaterial is a composite mesh including two layers of absorbable biosynthetic material (PGA/TMC) with one tridimensional non-absorbable macro-porous knit of dense PTFE mesh. It has shown good vascularization and ingrowth at 30 days in animal examination. However, there is still no evidence of long term behavior of this mesh in human tissue. We present the first histologic analysis of this mesh 1 year after placement in a human.

**Objective:** To perform a histologic analysis of the GORE® Synechor® Biomaterial one year after placement in the human body.

**Methods:** After incidentally finding incorporated GORE® Synechor® mesh in a patient with prior ventral hernia repair 1 year ago, during open bilateral inguinal hernia repair, a sample of mesh was taken and sent to pathology lab for analysis. Tissue healing, vascularization, and ingrowth of the composite mesh were analyzed.

**Results:** Histologic findings significant for a biomaterial consistent with a knitted PTFE material surrounded by mature fibrovascular tissue and foreign body inflammation consistent with expected healing response for this time frame. No evidence of any other biomaterial (PGA/TMC) or evidence of infection.

**Conclusion:** GORE® Synechor® Biomaterial has shown to be well integrated into appropriately healed tissue, with pronounced vascularization and ingrowth. The PGA/TMC layers have been seen to be completely absorbed and replaced by collagen. These findings, in a human 12 months sample, replicate what had been shown in animal specimens.

**P029****Hybrid Approach to Ventral Hernia Repair – When is it Most Beneficial?**

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**Introduction:** since the introduction of the laparoscopic approach to ventral hernia repair its advantages have been clear but it comes with limitations as well. The purpose of this study is to examine a hybrid approach that uses both open and laparoscopic techniques for ventral hernia repair, and to define the type of defect for which this approach would be most beneficial.

**Methods:** a case series of all patients who went through a hybrid ventral hernia repair in our department from 01/2015 to 6/2017. Patient selection is related to defect and sac sizes and content. Operation starts in laparoscopic exploration and adhesiolysis, then a limited incision is performed over the defect in order to achieve a safe content reduction, complete sac excision, and defect closure. A return to the laparoscopic approach allows optimal mesh placement and fixation without a need for wide undermining (short video will be presented). Data is presented as mean $\pm$ SD.

**Results:** 18 patients (10:M, 8:F) went through the procedure. All of them had post operative ventral hernia (POVH). Defect size was  $5.2\pm 1.6$  cm and sac diameter was  $8.2\pm 1.9$  cm. Operating time was  $71\pm 13$  min. LOS was  $3.5\pm 1.2$  days. Two patients had seromas that were treated conservatively. There were no small bowel injuries. Patient satisfaction was high. In  $11\pm 9$  months of follow up there was no recurrence.

**Conclusion:** for patients with small to medium size POVH with larger sacs with dense adhesions to their content, a hybrid approach allows achieving all goals of the operation safely, in a minimal invasive way and good functional outcome.

**P031****A Systematic Review of RCTs Evaluating Laparoscopic Repair of Inguinal Hernias with Self-gripping Mesh Versus Mechanically Fixed ‘Lightweight’ Mesh in the Treatment of Medium to Large Sized Defects**

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**Background:** In Laparoscopic Inguinal Hernia (LIH) surgery, the type of mesh and its fixation techniques have been long debated in context to post-operative pain, recurrence, shrinkage, and migration. The relatively new Self-gripping mesh is intended to address these shortcomings and has been shown to shorten duration of operation, with studies declaring non-inferiority in perioperative complications, chronic groin pain and recurrence rates (in open hernia repairs); also lowering the cost of the procedure by combining the functionality of mesh and fixation into one device (in laparoscopic repairs).

**Aim:** This study was designed to systematically analyse all published RCTs comparing early and long term outcomes of self-gripping mesh and ‘lightweight’ polypropylene mesh often fixed with a fixation device in the laparoscopic repair of moderate to large sized inguinal hernia defects.

**Methods:** A literature search was performed using the Cochrane Colorectal Cancer Group Controlled Trials Register, the Cochrane Central Register of Controlled Trials in the Cochrane Library, MEDLINE, Embase and Science Citation Index Expanded. RCTs comparing self-gripping mesh with standard polypropylene mesh was included.

The primary outcome measures were chronic pain after operation and hernia recurrence. Secondary outcome measures were technical success, operative time, analgesia requirement, perioperative complications, return to work, quality of life improvement and cost effectiveness of the two techniques.

**Results:** From all the studies reported in literature on the treatment of inguinal hernias and the newer self-gripping mesh, unfortunately not a single RCT was identified that compared the self-gripping mesh with the standard mesh in the laparoscopic repair of inguinal hernias. Hence meaningful outcome measures could not be compiled from the published studies which were predominantly retrospective case-series.

**Conclusion:** With the introduction of the newer self-fixating mesh (functionality of mesh and fixation combined in the same device) the hypothesis that it offers advantages of less post-operative pain and increased effectiveness of repair even in moderate to large sized hernia defects is well worth pursuing in an RCT setting. In the era of laparoscopic ‘key-hole’ surgery, evidence that a particular technique improves patient based surgical outcome measures will have a significant impact on future clinical practice.

**P030****Laparoscopic Trans-abdominal Retro-Muscular Repair for Ventral/Incisional Hernias: A Novel & Promising Technique**

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**Introduction:** There has been a need to devise a feasible, reliable and replicable Laparoscopic technique for Ventral/Incisional hernias; with Retro-muscular mesh placement. The reports of complications with Intra-peritoneal Onlay repair using composite meshes makes Retro-muscular mesh placement a safer option. This study is from a small town private hospital in South India.

**Methods and Procedures:** The aim is Laparoscopic placement of a polypropylene mesh into the retro-muscular plane with midline closure. The approach is trans-peritoneal and three techniques were devised based on hernia size & location. Technique 1 For small umbilical & infra-umbilical hernias; 3 ports are used in the upper abdomen. After adhesiolysis and reduction of sac contents; a transverse incision is taken on the peritoneum-posterior sheath complex, 6 cm proximal to the defect. A retro-muscular space is created by raising a flap of posterior sheath peritoneum complex. Intra-abdominal pressure is reduced. The Anterior sheath & Rectus muscles are approximated using no 1 Polydioxanone (PDS) sutures. A Polypropylene Mesh of desired size is parked into the space and anchored to muscles using 1-0 Polypropylene sutures. The incision and hernial defect are closed using 1-0 PDS sutures creating a natural mesh-bowel barrier. Technique 2:- For large central defects; 6 ports were used. 3 supra and 3 infra-umbilically; to create two flaps superiority and inferiorly. Next, trocars are withdrawn into retro-muscular space. The Sheath-Peritoneum flap & hernial defect are approximated followed by insertion and anchoring of mesh of required size. One or two meshes upto  $30 \times 30$  cm are used. Technique 3 Devised for large defects with wide diaphragm; uses the previous technique with addition of Posterior component separation by Transversus abdominis release to facilitate midline closure.

**Results:** Study period 2010 to present. Uncomplicated hernias with defect size 2 cm to 15 cm without large redundant skin fold were selected. Large hernias with loss of domain or excess redundant skin were offered open Rives-Stoppa repair. Total cases operated-57. Primary ventral 15 (Umbilical 14, Epigastric-1). Incisional 42 (Previous surgery C-Sect. 20; Hysterectomy- 7; Sterilisation 10; Exploratory laparotomy 3 Appendicectomy 2). Average operating time 160 minutes Complications:-Intra-operative bleeding 3. Conversion to open 2, Bowel injury nil. Mesh infection 1. Seroma 7. Bowel obstruction 0. Recurrence early nil, late 2. Mortality nil. Average length of stay 5 days.

**Conclusion:** Laparoscopic Trans-Abdominal Retro-muscular (TARM) repair using polypropylene mesh is safe, effective and inexpensive. It delivers the benefits of Rives-Stoppa repair via Laparoscopy.

**P032****Laparoscopy Utilization for Inguinal Hernia Repairs in the United States: Ambulatory and Inpatient Settings**

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**Introduction:** Inguinal hernia repairs are considered as one of the most common procedures in modern practice. Laparoscopic repairs appear to have advantages over the open approach. Relatively little information is available regarding the utilization of healthcare services for these commonly performed procedures in the United States. The redesigned Healthcare Cost and Utilization Project (HCUP) Database offers comparisons between HCUP State Ambulatory Surgery and Services databases with statistics from the HCUP State Inpatient databases (nine states participated in the most recent data collection in 2013). This new databank allows more detailed insight into ambulatory trends in utilization of healthcare services.

**Material and Methods:** The HCUP National Inpatient Sample was queried for inguinal hernia repairs performed in 2013, using ICD-9 procedure codes 17.11–17.13, 17.21–17.24 for laparoscopic and 53.00–53.17 for open inguinal hernia repairs. Ambulatory vs. inpatient settings were compared for frequency, patients' demographics and payer using chi-square statistical analysis.

**Results:** A total of 160 935 inguinal hernia repairs were identified in the referred 2013 database. 131 354 (81.6%) were done in ambulatory setting vs. 29 581 (18.4%) as an inpatient treatment. Overall, majority of repairs were done in open manner (123 349 vs 37 586 laparoscopic, 76.6% vs. 23.4%). Patients in age range between 18–44 and 45–64 had highest chance of getting laparoscopic repair (30.7% and 30%, respectively) vs. those who were younger than 18 at maximum rate of 2.8%. Laparoscopic technique was employed in 26% of cases done in ambulatory setting whereas only in 11.5% cases were performed as inpatients. Laparoscopic repair was most commonly used in patients with private insurance (30.6% in ambulatory vs 15% in the hospital setting).

**Conclusions:** In the United States, inguinal hernia repairs are performed predominantly in ambulatory settings. Despite the expected increase in its utilization, laparoscopic technique is only used in one out of four patients, usually for adults between 18–64. Laparoscopic repairs are done in ambulatory settings more than twice as inpatients. Patients with private insurance tend to have laparoscopic surgery more often than patients covered by other payers. It needs to be mentioned that the collected data is reflective of a limited sample of hernia surgery practiced in the US.

**P033****Posterior Component Separation and Transversus Abdominus Release Hernia Repair: Outcomes in an Initial Cohort**

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**Introduction:** Repair of midline incisional hernias utilizing posterior component separation and transversus abdominus release (PCS/TAR) was first described in 2006. The technique is growing in popularity for incisional hernia repair with several large series documenting its success. There are no reports demonstrating its utilization in low volume centres. Our aim was to evaluate our outcomes with PCS/TAR incisional hernia repair in the first series of patients in our institution.

**Methods and Procedures:** Following ethics board approval, patients with a history of PCS/TAR hernia repair were identified retrospectively from the health records of our institution, performed by our senior author during the period of 2009–15. Patient demographics, hernia characteristics, indications, and short term outcomes were collected. Patients were invited to undergo evaluation by a non-operative surgeon for signs of clinical recurrence. Participating patients completed a survey regarding overall satisfaction and quality of life with repair.

**Results:** A total of 18 PCS/TAR repairs were performed. Patient participation for follow-up was 61% (11/18). Average patient age was 64 years. Average operative time was 3 hrs 50 min and length of hospital stay was 5.2 days. Average mesh size was 633 cm<sup>2</sup>. Mesh was uncoated polypropylene in the majority of cases (16/18). Surgical site occurrences (SSO) occurred in 5 patients. SSO risk stratified by the Ventral hernia Working Group (VHWG) classification was: 1 (28%), 2 (50%), 3 (22%), 4 (0%). Three (11%) patients needed explantation of the mesh due to non-resolving infection. All three patients requiring mesh explantation were VHWG 3 accompanied by closure of stoma or repair in the presence of a stoma. Early recurrence rate was 18% (2/11), occurring in a patient with biologic mesh repair only, and one patient with a 2 cm recurrence inferior to the mesh requiring operative repair. Patient satisfaction was excellent (by Likard scale, mean 7/10, median 10/10) as was patients self-reported improvement in quality of life (mean 8/10, median 9/10).

**Conclusions:** PCS/TAR is associated with a low peri-operative wound morbidity when performed in patients with a low VHWG classification. Caution should be exercised when entertaining simultaneous repair of large hernias and closure of stomas due to a high risk of wound infection in our series. Short-term recurrence rates appear acceptable within the limits of the follow-up. Patient satisfaction and quality of life following this procedure appears to be high. This technique may be utilized in a low volume centre with good outcomes and low early hernia recurrence rates.

**P034****Laparoscopic Repair of Renal Paratransplant Hernia**

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**Objective:** Kidney recipients are susceptible to incisional hernia. Reports of hernia mesh repair after kidney transplantation are rare; thus the benefit of mesh hernioplasty in transplanted patients is not widely researched or published.

**Method:** From 2014 to 2017, 6 patients came to hospital with renal paratransplant hernia. They were evaluated for this study. The following data were collected from their records: age, gender, weight, age at graft rejection, surgical complications, treatment method and the treatment results with composite PTFE mesh.

**Results:** For laparoscopic repair of Incisional hernia after renal transplant, the median interval between kidney transplantation and developing of incisional hernia was 64 (range 12 to 425) days. Predisposing factors were obesity, age over fifty years, and female gender. In six patients, hernia was large, and the repair was performed with using composite PTFE mesh. One patient had developed serous collection in surgical site, which was managed successfully with multiple punctures. Hernia recurrence or infection was not noted in these patients during 3 to 36 months follow-up periods.

**Conclusion:** Incisional hernia is not a rare entity after kidney transplantation. Predisposing factors, such as obesity, age over 50 years, and female gender have a role in its development. Repeated surgeries in kidney recipients can increase the risk of incisional hernia. Managing this complication by laparoscopic approach is a safe and effective method.

Str.No.	Age(years)	Gender	Mesh Used	BMI	Mean Hospital Stay(Days)
1.	48	F	Composite PTFE	28	4
2.	64	M	Composite PTFE	32	6
3.	52	F	Composite PTFE	26	5
4.	44	F	Composite PTFE	24	4
5.	50	M	Composite PTFE	28	4
6.	54	F	Composite PTFE	30	5

**P035****Endo-Laparoscopic Approach for Repair of Femoral Hernia in an Asian Cohort**

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**Introduction:** A femoral hernia is a less common type of hernia. It is estimated to account for less than 5% of all abdominal wall hernias. Only about 1 in every 20 groin hernias are femoral hernias. They are found more commonly in females due to wider shape of pelvis. Laparoscopy by offering magnification and better vision provides us the opportunity for clear visualization of the myopectenial orifice. Laparoscopy seems to be a safe and feasible approach for femoral hernia repair in an Asian population.

**Case Description:** Between 2013 and 2016, 70 consecutive patients with femoral hernia who underwent laparoscopic hernia repair were prospectively studied. Patient demographics, hernia characteristics, operating time, conversion rate, intraoperative, postoperative complications and recurrence were measured.

**Discussion:** Total of 83 femoral hernias were repaired, 45 on right and 38 on left groin. This included 52 patients with bilateral and 18 unilateral hernia. 19 concomitant obturator hernia were found. There were 65 male and 5 female patient. No conversion was reported. One patient had injury to bowel at the 10 mm port entry site, without contamination, identified and managed immediately. 10 patients developed seroma, all were managed conservatively except one who needed aspiration. Peri-port bruising was noticed in 3 patients and 2 patients had hematoma. One patient with hematoma underwent excision of the organised hematoma. 1 of the hematoma patient was on aspirin pre-operatively. No wound infection, chronic groin pain or recurrence was documented during follow up till date.

**Conclusion:** Laparoscopic repair offers accurate diagnosis and simultaneous treatment of both inguinal and femoral hernia with minimum morbidity and good clinical outcomes. Better visualisation and magnification gives us an opportunity to identify occult hernias which can be repaired during the same setting, thereby reducing the chance of recurrence and possible need for second surgery. Laparoscopic repair has become the procedure of choice for the treatment of the majority of groin hernia at our institution.

**P036****TEP Repair that Follows the Anatomy of the Inguinal Fascia: A Method for Reaching the Preperitoneal Cavity Through Sharp Incision of the Posterior Rectus Sheath**

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**Introduction:** Totally extraperitoneal (TEP) repair that does not require peritoneal incisions is a good procedure that involves minimal visceral damage. However, balloon- or camera-assisted blunt dissections that are performed in a haphazard manner do not follow precise dissection of the fascia layer. Furthermore, they have a disadvantage in that they are difficult to understand anatomically. We therefore developed a novel preperitoneal approach to resolve this issue.

**Methods:** A 12-mm trocar is inserted into the rectus abdominis sheath cavity after a small incision is made below the umbilicus and the posterior rectus sheath is exposed. A 5-mm trocar is inserted 5 cm towards the pubic bone from the umbilicus. Using forceps from this position, narrow branches that enter the posterior rectus sheath from the inferior epigastric vessels are dissected, thereby broadly exposing the anterior surface of the posterior rectus sheath. The third 5 mm-trocar is inserted near the lateral margin of the rectus abdominis. On the outside, local anesthetic is injected beneath the posterior rectus sheath and the preperitoneal cavity is separated in fluid so that the peritoneum is not injured during posterior rectus sheath incision. A small incision is made to the posterior rectus sheath or attenuated posterior rectus sheath at one finger width higher than the expected upper margin of the prosthetic mesh. Due to the effects of local injection, a sharp incision to the fascia can be made with an electric scalpel. Utilizing this mechanism, the posterior rectus sheath aponeurosis and the lining transverse fascia and superficial preperitoneal layer are individually identified. Once the preperitoneal cavity is reached, the peritoneal margin is determined in the lateral direction, and the peritoneum that is pulled due to pneumoperitoneum is separated from the preperitoneal fascia on the outside from the cranial side towards the deep inguinal ring. On the inside, the pneumoperitoneum pressure pushes the peritoneum inferiorly, leading to enlargement and increased visibility of the posterior rectus sheath deep fascia, which is dissected one layer at a time from the outside. The umbilical prevesical fascia is dropped inferiorly, and the dissection of the preperitoneal cavity necessary for mesh deployment is performed.

**Results:** By individually dissecting each fascia using emphysema through pneumoperitoneum and enlargement through local injection, the method for reaching the preperitoneal cavity could be successfully completed by following the dissection of the fascia layer without proceeding with the operation blindly, thereby resulting in the elimination of intraoperative bleeding and postoperative hematoma.

**P037****Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair with Liquid-Injection and Gauze Dissection**

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**Introduction:** The recurrence during laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair has been reported to occur in 3.0%. To prevent the recurrence, adequate dissection of preperitoneal space was important. In this report, a novel technique for TAPP inguinal hernia repair using liquid injection and gauze dissection was described.

**Methods:** Before initial peritoneal incision, 10 ml of normal saline solution with 2 mg ropivacaine and 0.01 mg epinephrine was injected percutaneously into the preperitoneal space at three points. This liquid-injected space was effectively dissected by using the gauze, especially at the lateral and ventral side of the inguinal canal. The surgical outcome of this technique was assessed.

**Results:** Twenty-five cases (unilateral cases, except for recurrence) underwent TAPP with liquid-injection and gauze dissection. In the comparison of the cases without liquid-injection and gauze dissection (n=59), the cases who underwent TAPP with liquid-injection and gauze dissection showed shorter operation time (117 min. vs 89 min., p<0.05), no complication and recurrence.

**Conclusions:** TAPP with liquid-injection and gauze dissection assists preperitoneal dissection and contributes to better surgical outcomes. This novel technique appears to be safe and feasible.

**P039****Single Incision Endo-Laparoscopic Inguinal Hernia Repair in an Asian Cohort: Single Centre Experience**

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**Introduction:** Inguinal hernia repair is one of the most commonly performed surgical procedures. A variety of techniques have been described for the same. Recent development and advancement in MIS has focused towards reducing the access related scars and the resulting pain and morbidity in patients. Single incision surgery is a rapidly evolving field is gaining popularity among surgeons. More surgeons today readily accept and advocate Single or Reduced incision laparoscopic surgery. Single incision laparoscopic Surgery (SILS) for inguinal hernia repair is seen to be feasible and safe. The aim of our study is to evaluate our clinical experience, early and short term results and complications of single incision laparoscopic inguinal hernia repair at our centre.

**Case Description:** Between Jan 2008 to November 2016 total 88 patients underwent single incision endo-laparoscopic inguinal hernia repair (n=88). Patients underwent either TEP (n=60) or TAPP (n=28). All parameters of patients operated using SILS were collected and analyzed. Data including patient demographics, operating time, conversion if any, intra-operative and early postoperative complications were analyzed and compared.

**Discussion:** The mean age was 48.48 years (range, 20–81). The mean operating time was 72.42 (44 to 100 min). Both procedures TEP and TAPP were comparable in terms of operative time and post op results. Except 1 conversion in TEP group, no intra-operative or early post-operative complications were reported. Most patients were discharged before 23 hours and none had a pain score >2 at the time of discharge. Two patients developed seroma and one minor wound infection at port site which were managed conservatively. One patient developed recurrence after 3 years. No incisional hernia was detected during the follow-up. The operating time stabilized at around 12 cases.

**Conclusion:** Single incision laparoscopic surgery is a safe and feasible approach for inguinal hernia repair in experienced hands and at specialized centre's. Even during the initial learning period it carries a low morbidity and conversion rate. Further randomized control studies with larger patient group are required to validate the results.

**P038****Does Re-animating Laparoscopic Mesh in Local Anesthetic Confer an Antimicrobial Effect?**

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**Introduction:** Previous studies have demonstrated that local anesthetics have antimicrobial effects, but there have been none looking at these effects on hernia mesh.

**Methods:** The minimum inhibitory concentration (MIC) of lidocaine, bupivacaine, and cefazolin were determined on strains of methicillin-sensitive and methicillin-resistant *Staphylococcus aureus* and *Staphylococcus epidermidis* using a micro broth dilution method. The agents were then introduced in combination with an anti-adhesive coated polypropylene mesh to determine changes to the MIC. The fractional inhibitory concentration (FIC) index for each agent was calculated to determine whether if the changes seen were additive or synergistic.

**Results:** Lidocaine did not exert an antimicrobial effect on *S. aureus* or *S. epidermidis*. Bupivacaine and cefazolin each produced inhibitory effects on these organisms. The introduction of the coated polypropylene mesh eliminated the antimicrobial effect of bupivacaine, but the antimicrobial effect of cefazolin was unaltered. An additive effect was noted when bupivacaine and cefazolin were used together on methicillin-sensitive *S. aureus* and *S. epidermidis*. A synergistic effect was seen when bupivacaine and cefazolin were used together on methicillin-resistant *S. aureus* and *S. epidermidis*. Furthermore, these effects were preserved in the presence of mesh.

**Conclusion:** Local anesthetics exhibit varying degrees of antimicrobial activity. This effect was synergistic when used with cefazolin on methicillin-resistant organisms and was preserved when used with coated polypropylene mesh.

**P040****Comparative Study of Tacker Versus Glue Fixation of Mesh in Laparoscopic Intra-peritoneal Onlay Mesh Repair of Ventral Hernias**

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**Objective:** The dilemma always persists regarding choice of fixation technique in ventral hernia. So we conducted a comparative prospective study of laparoscopic intraperitoneal onlay mesh fixation using Tacker and Glue.

**Method:** Sample size: 60 cases, 30 cases assigned randomly in two groups for either Tacker or Glue Fixation.

**Inclusion criteria:** Patients between 18–70 years of age. Patients with ventral hernias with defect size less than 6 cm without any complications.

**Exclusion criteria:** Patients with BMI>35, Patients with recurrence after previous repair or, Patients afflicted with COPD, LUTS, Prostomatogly with complaints of nocturia, Patients unfit for general anesthesia, Patients with acute abdominal emergency.

The patients eligible for the study were selected, informed and explained regarding the above study and a proper informed, valid, written consent taken for participation in the study.

**Results:** The mean duration of surgery was 83.67 minutes in the glue fixation group, which was significantly more than the tacker fixation group where mean duration of surgery was 64.50 minutes.

There was no intraoperative and postoperative complications with glue fixation.

In tacker fixation, Seroma was seen in 4 cases (13.33%), hematoma in 1 (3%), bowel ileus in 1 (3%), whereas intra-abdominal complications, bowel obstruction, bleeding from trocar site, enterocutaneous fistula were 0 (0%). The glue fixation group did have a lesser complication rate 0/30 (0%) as compared to 6/30 (20%) in tacker group.

The post-operative pain was recorded at 24 hrs, 48 hrs and 1 month after operation by using Visual Analogue Scale (VAS) pain scoring system. The mean pain score of glue fixation and tacker fixation at 24 hrs was 1 and 2.23 respectively (p=0.00).

Median (range) post-operative hospital stay for patients with tacker fixation is 3 (2–4) days which is more as compared to 2 (1–3) in glue fixation which is statistically significant.

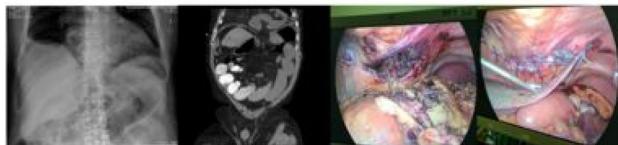
Cost of glue fixation is 50% less as compared to tacker fixation owing to the added cost of tacker.

**Conclusion:** Return to normal physical activity is earlier in patients with glue fixation.

- Length of hospital stay was less in the glue fixation group
- Cost of glue fixation is 50% less as compared to tacker fixation owing to the added cost of tacker.
- Postoperative follow up upto 1 year doesn't show any recurrence however, no data of efficiency with longer follow up are available.

**P041****Strangulated Diaphragmatic Hernia from Left Ventricular Assist Device: Plea to Close Diaphragmatic Defect at the Time of Device Explantation**

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**Case 1&2**

**Introduction:** LVAD [left ventricular assist device] has emerged as a mainstay of destination therapy or bridge to heart transplant in patients with end-stage cardiac disease. Despite the tremendous success with LVAD devices, device related and procedure related complications contribute to significant morbidity in these patients. Diaphragmatic hernia is a known complication. We report two cases of diaphragmatic hernias who underwent LVAD explantation without closure of diaphragmatic defect and orthotopic heart transplant, which resulted in strangulation of small bowel and incarceration of stomach respectively.

**Case 1:** A 70-year-old man presented to our emergency room with the chief complaint of epigastric and central abdominal pain. He denied any recent trauma to chest or abdomen. He had undergone LVAD 5 years ago followed by explantation of LVAD and orthotopic heart transplantation 4 years ago. The diaphragmatic defect for the outflow cannula was not closed at the time of LVAD explantation. An upright chest x-ray and a computed tomography showed a closed loop small bowel obstruction through a diaphragmatic defect with significant stranding of the mesentery of the herniated bowel and mass-effect on the right ventricle of the heart. Laparoscopic resection of strangulated jejunum and closure of defect with a biological mesh was successfully performed. He made an uneventful recovery and was discharged on POD#5.

**Case 2:** A 52 year old female with a history of LVAD bridge to heart transplant presented with nausea and hematemesis. An upright chest xray and CT scan showed a large diaphragmatic hernia with stomach in left hemithorax. She underwent a laparoscopic reduction of stomach. Stomach was viable. The defect was closed primarily with a composite Parietex mesh. She made an uneventful recovery and was discharged on POD#3.

**Conclusion:** Emerging technological advancements in cardiac mechanical devices is a new paradigm in the care of patients with end-stage heart failure. There is ongoing debate whether to close the diaphragmatic aperture for the inflow or outflow cannulas of LVAD device at the time of explantation. We believe closure of the diaphragmatic defect should be done, as it may prevent life threatening catastrophic complications in an immunosuppressed patient.

**P042****A Case Report of TEP Procedure by 3 mm Laparoscope for Postoperative Pain Suppression and for Economical Outcome**

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**Objective:** Using 3 mm laparoscopic TEP procedure, we describe an effectiveness of postoperative pain suppression. We usually performed the TEP procedure for inguinal hernia cases who had no post history of operation in preperitoneal space, and who had been able to undergo general anesthesia. In our standard TEP procedure, we performed it by 3 port (12.5-5 mm). We believe that TEP procedure is a very effective training system for beginner of laparoscopic surgery. For the purpose of diagnosis confirmation and operative method choice and repair confirmation, we usually added intraabdominal observation before and after TEP procedure. However, some cases had postoperative wound pain at their navel. We looked for causes of this pain, and guessed that it was caused by suturing of incisional wound of umbilical ring after intraabdominal observation. For postoperative pain suppression, we tried to prohibit incision of umbilical ring for intraabdominal observation before and after TEP procedure.

**Materials and Methods:** Without incision of umbilical ring, we performed this procedure to 3 cases by 3 mm laparoscope and 3 mm forceps in intraabdominal observation before and after TEP procedure. In this new procedure, we performed it with 3 port (5-3-3 mm) by 3 mm laparoscope and 3 mm forceps. And we used 3 mm monopolar scissors as a reusable energy device in this procedure.

**Result:** There were no technical difficulty and no complication in this procedure. Because patients had no complaint of wound pain after this procedure, they took only prophylactic sedative oral medicine between only 3 days after surgery.

**Conclusion:** Minimally invasive TEP procedure by 3 mm laparoscope and 3 mm forceps was very effective method for postoperative pain suppression and for economical outcome.

**P043****P4 HB Meshes and the First 2 Years Results of a Single Center University Hospital Experience Using it for Infected, Complex and Small Hernia Repairs**

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**Introduction:** Infected or contaminated hernia places still present very demanding and not solved surgical challenge. Biological meshes were thought to solve the problem of infected hernia situations and complex hernia in high risk patients. However, recent results were disappointing for the benefit of the use of the cost intensive material. In vitro and animal studies have demonstrated an enhanced bacterial growth and late hydrolysis, after 15 to 18 months, for P4HB meshes, and the remaining scar tissue of high strength.

**Methods and Procedures:** Between September 2015 and September 2017, 37 Patients were operated for complex, infected and small hernia, using the bio-absorbable P4 HB meshes. The meshes were placed mainly in onlay position, in some cases sublay or as a supplement enforcement onlay when a permanent mesh was placed sublay (sandwich). For groin hernia, TAPP procedure was used.

**Results:** All cases showed a primary ingrowth of the mesh, none had to be explanted. Observation period is 4–24 months (mean 12). The main complication was observed with 2 cases of seroma, one of them infected. 3 Patients were re-operated due to skin necrosis. In these cases, the meshes left in site and were seen and documented with excellent granulation activity. No hernia recurrence was observed in the first 12 months, 1 recurrence in the first 24 months.

**Conclusions:** The use of P4 HB meshes showed to be an excellent plan B for very complicated and infected hernia cases that need repair. Onlay position of these meshes is not an additive risk factor also in complicate skin situation. P4HB mesh can be considered as an alternative to permanent mesh or suture alone for small incisional and groin hernia.

**P044****The Decision to Use Closed Suction Drains in Abdominal Wall Reconstruction by Robotic Transversus Abdominis Release (RTAR): Are they Necessary?**

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**Introduction:** In the field of abdominal wall reconstruction, the utility of drain placement is of debatable value. We present outcomes evaluating drain placement vs no drain placement at the time of robotic transversus abdominis release (RTAR) technique with placement of mesh in the retromuscular position, a currently understudied subject.

**Methods:** Retrospective review of a prospectively maintained hernia patient database was conducted identifying individuals who received either drain placement or no drain placement during abdominal wall reconstruction via the RTAR technique from August 2015 to June 2017 at a single high volume hernia center. Perioperative data and postoperative outcomes between the two groups are presented with statistical analysis for comparison and quality of life (QOL) measures assessed using the Carolina Comfort Scale.

**Results:** Thirty-five patients were identified for this study, of which 9 had drains placed intraoperatively in the retromuscular position at the conclusion of RTAR (DRN) and 25 underwent RTAR without the placement of draining devices (ND). The DRN cohort had a mean BMI, defect area, mesh area, and operative time of 37.1, 247 cm<sup>2</sup>, 940 cm<sup>2</sup> and 248 minutes, respectively, compared to 31.8, 157 cm<sup>2</sup>, 822 cm<sup>2</sup>, and 305 minutes in the ND group. All cases utilized medium weight macroporous polypropylene synthetic implantable mesh materials in both the DRN and ND subgroups. There were no reported postoperative complications, including no development of hematoma, seroma, or surgical site infections in either group. Hernia recurrence was not identified in either the DRN or ND cohorts through a mean follow up of 200 days (6.7 months). There were no statistically significant differences in postoperative QOL outcomes.

**Conclusion:** Our series review suggests that the use of intraoperative drains may not afford any benefits with the RTAR technique when mesh is placed in the retromuscular position. Additional postoperative management associated with drain care may be unnecessary.

**P045****BMI Threshold for Complications After Open Ventral Hernia Repair**

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**Introduction:** While it is clear that extreme obesity is associated with increased postoperative complications after open ventral hernia repair (VHR), the threshold BMI beyond which complications increase is not certain. Predominantly single institution data has been evaluated to address this question. The aim of this study was to analyze multi-institutional perioperative outcomes of patients undergoing open VHR stratified by BMI.

**Methods and Procedures:** Patients undergoing open VHR were identified in the 2002–2015 National Surgical Quality Improvement Program (NSQIP) data sets. Patients were divided into eight groups based on BMI in kg/m<sup>2</sup>: Group 1 (<25); 2 (25–29.9); 3 (30–34.9); 4 (35–39.9); 5 (40–44.9); 6 (45–49.9); 7 (50–54.9); 8 (>=55). The primary outcome was defined as any of 18 captured postoperative complications. Multivariable, adjusted logistic regression was performed to evaluate the association between BMI categories and postoperative complications.

**Results:** 131,922 patients in the data set had undergone open VHR. Operative time increased with increasing BMI; Mean procedure time for normal weight individuals was 77.6 minutes while individuals with BMI over 35 kg/m<sup>2</sup> had mean times of 106.5 minutes, 113.4 minutes, 118.2 minutes, 118.5 minutes and 128 minutes for Groups 4 to 8 respectively. 7.6% of patients had at least one complication after VHR. While 6.4% of patients in Group 1 experienced a complication, 6% had a complication in Group 2, 6.9% in Group 3, 8.1% in Group 4, 10.2% in Group 5, 12.2% in Group 6, 13% in Group 7 and 17.5% in Group 8. The complication most frequently observed was a surgical site infection. Using the normal weight patients in Group 1 as a reference standard, the adjusted odds of experiencing any complication was 0.92 for patients in Group 2; 1.07 in Group 3; 1.30 in Group 4; 1.70 in Group 5; 2.11 in Group 6; 2.24 for Group 7 and 3.36 for Group 8.

**Conclusions:** Our results demonstrate that BMI over 35 kg/m<sup>2</sup> appears to be the threshold above which complications with open VHR begin to rise. However, the odds of complications continue to rise at the extremes of BMI. Based on these results, surgeons should consider recommending weight loss by lifestyle changes or bariatric surgery for patients with BMI over 35 kg/m<sup>2</sup> to decrease risk of complications. Delay of elective VHR until weight loss can be achieved should be strongly considered in patients with BMI above 40 kg/m<sup>2</sup>.

**P046****Short Learning Curve for Self-adhering Mesh in Laparoscopic Inguinal Hernia Repair**

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**Introduction:** One of the pitfalls in laparoscopic inguinal hernia repair is mesh fixation with tacks. Their use could cause bleeding and chronic pain. This study examines the implementation of self-adhering mesh – Lap ProGrip™ in Trans Abdominal Pre-Peritoneal (TAPP) approach of inguinal hernia repair.

**Methods:** the first patients who went through the procedure in our department from May 2016 to April 2017 were included in the study. Visual Analog Scale (VAS) pain scores were recorded at the Post Anesthesia Care Unit (PACU), one day after surgery before discharge (OD), and one week post op at the clinic (OW). Data is presented as mean±SD.

**Results:** 73 hernias were repaired in 50 (43M; 7F) patients. Time of the operation was 39±9 min for unilateral and 51±12 min for bilateral procedure. Patients were admitted for one night post op. Pain scores were 3.6±1.8, 1.7±0.6 and 0.8±0.2 at PACU, OD and OW respectively. 43 (86%) patients used analgesics for only 2 days post op. One patient had a seroma that was treated conservatively. At follow up time of 9.3±4.6 months there was no recurrence.

**Conclusion:** for surgeons with high volume of laparoscopic procedures there is a quick learning curve for the adoption of a TAPP use of self-adhering mesh. It seems that there is reduced pain after use of this type of mesh. Comparative studies are needed for further evaluation of this approach.

**P047****Laparoscopic Inguinal Hernia Repair: TAPP Versus TEP**

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**Objective:** Inguinal hernia repair is the most frequently performed operation in general surgery. The surgical technique has evolved significantly over the past few decades. The aim of this study was to compare the results of laparoscopic inguinal hernia repair using two commonly used methods: transabdominal preperitoneal (TAPP) repair and the totally extraperitoneal repair (TEP).

**Methods:** This is a retrospective study comparing the laparoscopic approach for inguinal hernia repair through transabdominal preperitoneal approach versus the totally extraperitoneal technique. 237 cases were included in this study who were electively operated from May 2012 to April 2017. The outcomes compared were intraoperative and postoperative course and complications.

Laparoscopic TAPP and TEP repair was done conforming to the standard procedural guidelines using three trocars and a 14×10 cm polypropylene mesh, anchored at the level of Cooper's ligament and to the anterior abdominal wall muscles using permanent tacks. The peritoneal opening in TAPP was closed using absorbable polyglactin suture.

Intra- and postoperative complications:

Parameters	TEP (n=96)	TAPP (n=141)
<b>Intraoperative complications:</b>		
Bleeding	1 (1.04 %)	3 (2.12 %)
Injuries (total)	1 (1.04 %)	8 (5.67 %)
Vascular	1 (1.04 %)	5 (3.54 %)
Bladder	0 (0.00 %)	1 (0.70 %)
Bowel	0 (0.00 %)	2 (1.42 %)
Nerve	0 (0.00 %)	0 (0.00 %)
<b>Postoperative complications:</b>		
Bleeding	0 (0.00 %)	1 (0.70 %)
Impaired wound healing	1 (1.04 %)	6 (4.25 %)
Seroma formation	3 (3.12 %)	6 (4.25 %)
Intestinal obstruction	0 (0.00 %)	0 (0.00 %)
Recurrence	0 (0.00 %)	0 (0.00 %)

Duration of operation and Length of stay:

	Duration of operation (minutes)			Length of stay (days)		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum
TEP	56.4	34	98	2.1	1	14
TAPP	78.6	44	168	2.7	1	22

**Conclusion:** Laparoscopic approach for inguinal hernia repair is a safe and viable option with TEP repair having a slight edge over TAPP repair, subject to the expertise and comfort of the surgeon with the procedure. The two procedures differed only in their minor complication rates and the duration of operation. No recurrences have occurred in 165 patients in the 2-year follow-up period.

**P048****Evaluation of the Operative Time for Robotic Assisted Laparoscopic Groin Hernia Repair During the Learning Curve of 125 Cases**

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**Background:** Robotic assisted laparoscopic transabdominal preperitoneal inguinal hernia repair (rTAPP) is demonstrating rapid adoption in the United States. Barriers to adopting this innovative technique in Europe include: low availability of the robotic system to general surgeons, cost of robotic instruments and perception of longer operative time.

**Methods:** Patients undergoing rTAPP in our 12 month start-up period were entered in the prospective EuraHS database. Operations were performed with the DaVinci Xi by the same surgeon. Operative time is recorded as the time from incision to complete closure of skin, thus including docking time.

**Results:** Following proctoring on the use of the robotic system for this procedure in September 2016 by US surgeons, 125 rTAPP procedures have been performed up to September 2017. Of these, 76 were unilateral and 49 were bilateral repairs.

Mean operative time for unilateral hernias was 50 min (range: 27–103). For the first 25 unilateral hernias mean operative time was 57 min, compared with 50 min for the second 25 patients and 51 min for the last 26 patients. Mean operative time for bilateral hernias was 71 min (range: 38–118). For the first 25 bilateral hernias mean operative time was 80 min, compared with 62 min for the next 24 patients.

There were no conversions to conventional laparoscopy or open surgery. The operation was performed on an outpatient basis in 83 patients (66%), with overnight stay in 37 patients (30%) and extended stay in 5 patients (4%). Urinary retention requiring urinary catheterization was the main early postoperative complication noted in 6 patients (5%). At 4 weeks follow-up, 14 patients (6%) had a seroma, but no other complications were seen.

The same surgeon performed a consecutive series of 205 conventional laparoscopic TAPP operations prospectively recorded in the EuraHS database since March 2015. Mean operative times were 49 min (range: 24–104) and 65 min (range: 40–114) for 108 unilateral hernias and 97 bilateral hernias, respectively.

**Conclusion:** Robotic TAPP was associated with a rapid reduction in operative time during our learning curve with similar operative times compared to laparoscopic TAPP after 25 cases.

**P049****Professional Fee Payments by Specialty for Open Ventral Hernia Repair: Who Gets Paid for Treating Comorbidities and Complications?**

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**Introduction:** The purpose of this study was to determine professional fee payments by specialty for the care of patients undergoing open ventral hernia repair.

**Methods and Procedures:** A retrospective review of patients undergoing open ventral hernia repairs (OVHR) at an academic medical center between October, 2011 and September, 2014. Perioperative data were selected from our NSQIP database. Follow up for wound occurrences, readmissions and other major morbidity was extended to 180 days via review of the clinic record and phone calls to the patient. Professional fee payments (PFPs) to all providers were obtained from our physician billing system for the OVHR hospitalization (OVHR), for 180 days prior (180 Prior), and for 180 days post-discharge (180 Post) and summed to 360 d PFPs.

**Results:** A total of 301 OVHRs were analyzed. Patients had mean age of 52 years; 56% were female; 18% were morbidly obese; and 60% were ASA class III or IV. Thirteen percent were emergent cases and 81% of wounds were clean. Mean 360 d PFPs were \$3,320 ± SD 3,239, comprised of: 180 Prior, 15.1% (\$501 ± 1,539); OVHR, 71.8% (\$2,383 ± 1,865); and 180 Post, 13.1% (\$436 ± 1,071). The surgical service received 62% of 360 d PFPs followed by anesthesia at 18%, medical specialties at 9%, radiology 6% and all others 5%. Patient age and creatinine levels correlated with medical specialty PFPs ( $\rho=0.30$  and  $0.15$  resp.,  $p<.05$ ) but not with surgeon PFPs. None of the other demographic or clinical risk factors available in NSQIP data correlated with surgeon or any specialty's PFPs, including ASA class, obesity, COPD, diabetes, and pre-operative open wound. Operative factors such as emergent status, operative duration, and separation of components increased surgeon PFPs (all  $p<.05$ ). Major 30-day complications such as sepsis and pneumonia increased medical specialty (\$2,800 and \$2,600 resp.,  $p<.001$ ) and radiology PFPs (\$400 for sepsis,  $p<.01$ ) but not surgeon PFPs. At 6 months, wound complications were associated with increased surgeon (\$500,  $p<.05$ ) and radiology payments (\$400,  $p<.01$ ).

**Conclusions:** Management of acute comorbid conditions and the associated higher early morbidity is unreimbursed to the surgeon, potentially pressuring busy surgeons to select against these patients. In negotiating bundled payments, surgeon groups should keep in mind that surgeon reimbursement, unlike medical and hospital reimbursement, has been bundled since the 90's with no comorbid adjustment, and vigorously defend what is an already disproportionately reduced share of reimbursement.

**P050****Clinical Comparison Between Laparoscopic Appendectomy and Open Appendectomy for Treating Complicated Appendicitis**

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**Background:** Appendectomy is one of the most common operations performed during emergency surgery. Although laparoscopic appendectomy (LA) has become the treatment of choice, there is still a debate regarding the use of LA for treating complicated appendicitis. In this retrospective analysis, we aimed to clinically compare LA and open appendectomy (OA) for treating complicated appendicitis.

**Methods:** We retrospectively identified 339 patients who underwent an operation for complicated appendicitis at our hospital; these patients were operated on between 2011 and July 2017.[Editor1] In total, 222 patients underwent conventional appendectomy and 117 patients were laparoscopically treated. Outcomes included operation time, blood loss, length of hospital stay, and postoperative complications. Logistic regression analysis was performed to analyze the concurrent effects of various factors on the rate of postoperative complications.

**Results:** The mean ± standard deviation ages of the patients in the LA and OA groups were  $46.98 \pm 26.2$  and  $49.56 \pm 22.4$  years, respectively ( $P=0.443$ ). There were no significant differences in the operation time between the patients in the LA and OA groups ( $92.83 \pm 39.5$  vs.  $90 \pm 44.3$ [Editor2] ;  $P=0.63$ ). Length of hospital stay was shorter for the patients in the LA group than for those in the OA group ( $8.5 \pm 4.64$  vs.  $12.67 \pm 9.89$ ;  $P=0.0005$ ). Return to soft diet was faster for the patients in the LA group than for those in the OA group ( $1.88 \pm 1.59$  vs.  $2.48 \pm 2.33$ ;  $P=0.04$ ). Multivariable analysis found that the rate of postoperative complications was significantly reduced among the patients in the LA group than among those in the OA group (15.2% vs. 27.5%; odds ratio, 0.455; 95% confidence interval, 0.2–0.996;  $P=0.048$ ).

**Conclusions:** Our results demonstrated that LA is a safe and effective procedure with clinically beneficial advantages. Appendectomy for treating complicated appendicitis should be attempted first laparoscopically.

**P051****A Study of Laparoscopic Repair of Small Bowel Perforation**

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**Objective:** Small bowel perforation has conventionally been dealt with open exploration, which frequently leads to many wound-related complications. Wound infection is the major reason for increasing morbidity in these patients and delay recovery. Laparoscopic surgery has various benefits over open surgery like, smaller wound, lesser pain and faster recovery. The aim of this study was to relay the advantages of minimally invasive surgery (MIS) to patients with small bowel perforation to decrease postoperative wound complications and duration of hospital stay.

**Methods:** It is a retrospective study, including 136 patients with small bowel perforation from 2013 to 2016. Of these 136, 43 had traumatic etiology, 28 had typhoid-related perforation and the remaining 65 had a duodenal perforation. 84 of them were male, and the average age was 30.4 years. Only patients who presented within 96 hours of perforation were included in the study. Laparoscopic exploration was done on introducing camera from 10-mm inframammary port after intraperitoneal carbon dioxide insufflation. The remaining two 5-mm working ports were then introduced depending on the site of perforation once identified. The perforations were then repaired using intracorporeal single-layer suturing using Polydioxanone 3–0 suture. The peritoneal cavity was given thorough lavage and abdominal drain placed in the pouch of Douglas.

**Results:**

Nature of Perforation	No. of Patients	Avg. Time of Presentation	Length of Operation (min)	Length of Hospital Stay (days)	Conversion to Open
Typhoid ileal	28	2-5	62 (47-116)	6.9 (5-14)	2 (7.14%)
Traumatic	43				
Ileal	30	1-3	66 (38-107)	6.7 (4-10)	2 (6.67%)
Jejunal	13	1-2	58 (40-73)	7.1 (4-10)	0
Duodenal	65	1-3	57 (43-78)	6.4 (4-10)	2 (3.07%)

Fecal contamination was found in all the patients. A total of 6 patients underwent conversion to open surgery due to inability to find the site of perforation laparoscopically. Of the 136 operated patients, 7 patients developed port-site infection, and there were no major postoperative complications in the 4-week follow up period.

**Conclusion:** We conclude from our study that laparoscopic intervention in early small bowel perforation is a safe approach with favorable outcomes, especially with regards to wound complications, that are a major factor in increasing the morbidity in such patients postoperatively. Laparoscopic approach leads to early discharge and recovery postoperatively. With the emerging era of laparoscopic surgery, leading to its easy accessibility, more patients can advantage from this technique when they arrive in emergency with intestinal perforation.

**P052****Intestinal Obstruction Secondary to Torsion/Diverticular Inflammation of a Meckel's Diverticulum in an Adult**

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**Background:** Acute abdominal pain caused by small bowel obstruction is amongst the most common entities facing acute care surgeons. The vast majority to these obstructions (>90%) are secondary to adhesions, hernias, and malignancy. Miscellaneous causes, such as Meckel's diverticulum (MD), make up a small (2–3%) but important sub-group of this disease process. The presence of a MD predisposes to obstruction in a number of ways. The diverticulum can serve as a lead point for intussusception, it could twist around its associated fibrous cords (volvulus), it can undergo torsion, or it could become acutely inflamed and narrow the diameter of surrounding bowel. In younger, previously healthy patients with no surgical history or hernias on physical exam it is important to keep in mind the other rarer causes of small bowel obstruction as they are rarely diagnosed pre-operatively.

**Case Presentation:** The patient is a 46-year-old Caucasian male with no significant past medical history presenting with chief complaint of excruciating abdominal pain associated with nausea and vomiting. Patient was diaphoretic with low grade tachycardia. Physical exam showed distension, diffuse tenderness, and voluntary guarding. A CT was obtained and notable for a large (>15 cm) inflamed tubular, fluid and air containing structure ending blindly in the right upper quadrant. Suspicion was raised for acute infection/inflammation of this tubular structure vs. ischemia. He was taken to the operating room for a diagnostic laparoscopy which an additional bowel segment running in parallel with normal jejunum. Procedure was converted to open exploratory laparotomy with segmental small bowel resection of the blind-ended bowel with primary anastomosis. Surgical pathology later revealed a Meckel's Diverticulum (with ectopic tissue) and necrosis/ulceration consistent with torsion/obstruction.

**Discussion:** MD is the most common congenital anomaly of the gastrointestinal tract (prevalence 1.2%). It results from incomplete obliteration of the omphalomesenteric duct during week 5–6 of gestation. It is a true diverticulum off the antimesenteric border of normal small bowel often containing metabolically active tissue. In adults, the most common presentation tends to be that of intestinal obstruction/inflammation (vs. GI bleed in children). The mechanism of obstruction includes intussusception, volvulus, torsion, incorporation into a hernia, or diverticular inflammation. The pathogenesis of MD is similar to that of appendicitis. Diverticular obstruction leads to bacterial overgrowth, venous congestion, and ischemia. The associated inflammation leads to decreased luminal diameter of adjacent small bowel which can cause obstructive pathology.

**P053****Surgical Techniques and Clinical Outcomes of Laparoscopic Management for Strangulated Small Bowel Obstruction**

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**Back ground:** While laparoscopic management have been increasingly used for small bowel obstruction (SBO), the clinical outcomes and benefits of applying laparoscopic surgery to strangulated SBO are limited. With growing experience of laparoscopy for SBO, the laparoscopic treatment for strangulated SBO has been introduced gradually into our institute. The objective of this study was to report our experience with laparoscopic management of strangulated SBO and describe our techniques.

**Methods:** Electronic medical records of patients with strangulated SBO undergoing initial laparoscopic treatment between January 2010 and March 2016 were reviewed. Medical records were reviewed to obtain data on demographics, intraoperative findings, 30-day morbidity and mortality, postoperative length of stay, and readmission. With growing experience, the definitive indication for laparoscopy was all suspected strangulated SBO regardless of the type of previous laparotomy, case difficulty, or predicted working space. The cases requiring a small incision (<5 cm) for a segmental bowel resection were considered laparoscopic treatment and not counted as a conversion. Data are expressed as n (%) and median [interquartile range]

**Results:** Of 199 consecutive patients with SBO who required emergency surgery at our institute, 92 patients with strangulated SBO were included for this study (46% male, median age 74[55; 94]). Of 38 patients that underwent initial laparoscopic management (34% male, median age 73 [54; 91]), the pneumoperitoneum was successfully created in all patients. The obstructions were relieved using various laparoscopic techniques without bowel resections in 31 (82%) patients, and 7 (19%) patients required a segmental bowel resection through a small incision after laparoscopic reliefs. The conversion rate to open was 19% (9 patients). The reasons for conversion were the lack of working space [4 (9%)], intraoperative bowel perforation [3 (6%)], unknown origin [1 (2%)] and dense bowel necrosis [1 (2%)]. One or more complications occurred in 9 patients (17%), including surgical site infection [1 (2%)], paralytic ileus [5 (10%)] and aspiration pneumonia [3 (6%)]. The mortality was 4% following the death of 2 very elderly patients (>85 years old): presented a severe aspiration pneumonia. The postoperative length of stay was 7[4; 11] days and there were no readmissions.

**Conclusions:** Initial laparoscopic management seems to be a feasible approach to patients with strangulated SBO in most cases. This approach could target the location of incision when requiring a bowel resection and may result in lower morbidity rate and a shorter hospitalization.

**P054****Penetrating Precordial Trauma in a Stable Patient, is Minimally Invasive Management Possible? Our Series of Cases**

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**Introduction:** The use of minimally invasive surgery in trauma, has more and more field in this specialty. Precordial trauma with stable patient can be approached to make the diagnosis and define the definitive route of management according to the findings.

**Material and Method:** report of 10 cases of penetrating precordial trauma, hemodynamically stable, resolved by minimally invasive surgery between July 2014 and December 2016, a pericardial window was made thoracoscopically, intervention was performed 2–5 days after admission, 7/2 with pericardial effusion, 5 without echocardiogram due to lack of resources, cardiography was performed in 2 patients, 6 pericardial wound that did not require management and 2 patients with non-bleeding myocardial wound in biological sealant management. The operative time was 30–100 minutes, the associated chest pathology was performed in the 10 patients, the hemothorax drainage was performed. Patients were discharged between 3–10 postoperative day, all of them had a post-operative transthoracic echocardiogram without findings.

**Results:** precordial trauma can be fully managed by minimally invasive surgery, the primary requirement is adequate patient selection, hemodynamic stability, video-assisted thoracoscopy and teamwork. the patients treated were solved by this route, without complications. Follow-up at 12 months without alterations.

**Conclusion:** Minimally invasive surgery gains space in handling stable patient trauma, depends on the surgeon's skills and teamwork. It is a novel subject that does not have many reports in the medical literature.

**P055****Small Bowel Obstruction Presenting with Pneumatosis Intestinalis and Portal Venous Gas**

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**Introduction:** Pneumatosis intestinalis (PI), or gas in the bowel wall, can be seen on various imaging modalities. The pathophysiology behind PI is unclear. One theory proposes a mechanical cause (e.g. small bowel obstruction) while another proposes a bacterial etiology. Management of PI in adults is difficult as often there is a benign clinical course. However, when paired with specific clinical features such as hepatic portal venous gas (HPVG) on imaging, the course of management changes as the suspicion of bowel ischemia increases. HPVG alone has been associated with a high mortality rate and a poor prognosis. Management in this case becomes surgical.

**Case Presentation:** We present a case of 59-year-old Latino male who presented to the emergency room with abdominal pain and altered mental status. Focused physical examination revealed a non-rigid abdomen, no rebound tenderness, no guarding, and diffuse tenderness only to deep palpation. CT scan of the abdomen and pelvis demonstrated moderate portal venous gas in the right and left hepatic lobes, an upper midline dilated small bowel loop with pneumatosis intestinalis, and a moderately distended stomach with gas and fluid. Laboratory studies revealed metabolic acidosis and a lactic acid level of 2.9 mmol/L. Due to these findings, bowel ischemia was suspected, and the patient was taken to the operating room for a diagnostic laparoscopy. The laparoscopy was converted to an exploratory laparotomy due to extensive adhesions. Intraoperatively, there was no small bowel compromise and no identifiable transition point. Extensive lysis of adhesions and repair of iatrogenic enterotomy were performed. Patient tolerated the procedure well, clinically improved, and was discharged from the hospital.

**Discussion:** This case illustrates the difficulty in management of a patient with pneumatosis intestinalis and, specifically, hepatic portal vein gas seen on CT imaging. HPVG has traditionally been a harbinger of morbidity and mortality, but exploratory laparotomy revealed only diffuse abdominal adhesions and the absence of bowel ischemia despite high clinical suspicion.

**P056****Paraduodenal Hernia – An Unexpected Cause for Peritonitis in the ICU**

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**Purpose:** Paraduodenal hernias are a type of uncommon congenital internal hernia. Their clinical presentation is typically nonspecific. Accurate diagnosis is critical as the risk of strangulation can be as high as 50% with an exceedingly high mortality of up to 50%.

**Methods:** We present a case of a 77 year-old woman with a history of congestive heart failure, atrial fibrillation, pulmonary fibrosis, AICD placement, hysterectomy and cholecystectomy, who was transferred from an outside hospital where she was admitted for a congestive heart failure exacerbation and sustained a traumatic femoral arterial line placement.

She became peritonitic during her hospitalization and was taken emergently to the operating room. The small bowel was found to be herniated under the inferior mesenteric vessels. She had dense adhesions extending into the pelvis. A hernia sac was identified near the fourth portion of the duodenum, consistent with a paraduodenal hernia. The hernia was reduced and the hernia space (Landzert's fossa) was closed with interrupted silk suture. There were some necrotic portions of sigmoid colon that were resected. The patient was left in discontinuity due to her critical status. The patient subsequently returned to the operating room for further resection and creation of an end ileostomy. She was ultimately closed at her fourth operation. The patient had an extended intensive care course, but showed no further signs of obstruction for the remainder of her hospitalization.

**Conclusion:** Paraduodenal hernias are a relatively uncommon cause of an acute surgical abdomen. Diagnosis is often challenging due to its vague clinical presentation and variable radiologic manifestation. Prompt surgical intervention has the potential to minimize the significant morbidity and mortality associated with a missed or delayed diagnosis.

**P058****Transversus Abdominis Muscle Release for Loss of Domain and Radiation Damaged to the Lower Anterior Abdominal Wall**

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**Background:** Ventral Hernia repair is one of the most common surgical procedures facing the general surgeon. There is little consensus as to the best surgical technique for complex scenarios. Often these patients have complicating co-morbid conditions such as radiation therapy, that has an inevitable effect in the abdominal wall structures, which can lead to non-traditional repairs.

**Case Report:** We present a case of a 62 year-old female who underwent a TAH/BSO and right hemicolectomy which was complicated by wound dehiscence. She underwent primary repair and adjuvant whole pelvis radiation for her squamous cell carcinoma. Subsequently, the patient developed acute obstructive symptoms do to a stricture within her small bowel and a large ventral hernia measuring 14 × 13 cm with non-reducible abdominal contents below the level of the fascia more prominent in the suprapubic area. The patient's BMI was 15.3.

Various considerations are important in planning a surgical repair in a previously irradiated field with loss of domain which include, minimal dissection, and the use of an atraumatic surgical technique with either external oblique release or transversus abdominis muscle release (TAR). We chose a TAR, as it provides wider myofascial release and dissection below the arcuate line towards the space of Retzius and Bogros allowing for a larger sublay mesh placement. Also it avoids the need of skin flaps reducing the risk for wound complications in under-perfused tissue. The TAR was performed successfully and there were no intraoperative and postoperative complications. Her follow-up at 6 months revealed no wound complications or hernia recurrence.

**Conclusion:** For patients with compromised tissue and loss of domain a TAR technique may be useful when reconstructing complex abdominal wall hernias. It provides the core principals of hernia repair such as primary fascial closure, wide mesh overlap, and finally it provides a reliable approach for the under-perfused tissue without need of skin and soft tissue flap creation.

**P057****A Comparison of Short-Term Outcomes Between Laparoscopic and Open Emergent Repair of Perforated Gastric Ulcers**

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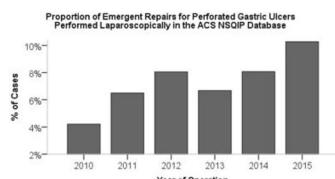
**Introduction:** We sought to compare 30-day outcomes in patients undergoing emergent open and laparoscopic repair of perforated gastric ulcers in a recent, large, multicenter cohort.

**Methods and Procedures:** A retrospective review of the prospectively obtained data in the American College of Surgeons National Surgical Quality Improvement Program public use files from 2010 through 2015. Cases were selected using ICD-9/10<sup>TM</sup> and CPT<sup>TM</sup> codes. Perioperative risks and 30-day outcomes were compared in unmatched and propensity matched groups using parametric or non-parametric statistical tests as appropriate. Significance was set at  $p < .05$ .

**Results:** A total of 3,486 procedures were identified, 265 (7.6%) laparoscopic, and 3221 (92.4%) open. Laparoscopic repairs increased from 4.2% of 2010 cases to 10.3% of 2015 cases (Figure,  $p < .001$ ). Open repair patients had higher rates of numerous clinical factors indicating more acute presentation including ASA class, hypoalbuminemia, preoperative septic shock, renal failure and mechanical ventilation (all  $p < .01$ ). The average duration of the operation was 19 minutes higher ( $p < .001$ ) in the laparoscopic group. Mortality (8.9% vs. 4.2%), median length of stay (7 vs. 5), transfusion rates, renal failure and respiratory outcomes were all worse in the unmatched open group (all  $p < .01$ ).

The propensity matching resulted in 235 laparoscopic and 437 open cases of similar age, ASA class, preoperative SIRS/sepsis, hypoalbuminemia, and wound class. The matched groups had few patients with preoperative septic shock given it was rare in the laparoscopic group. Mortality did not differ between the matched groups (4.7% Lap. vs. 5.7% Open,  $p = .720$ ), nor did most complication rates. Operative duration was 20 minutes longer in the laparoscopic group ( $p < .001$ ). Median length of stay was 1 day longer in the open group (6 [5–9] vs. 5 [4–7],  $p < .001$ ) which also had higher rates of prolonged ventilation (7.8% vs. 3.4%,  $p = .029$ ). Return to the operating room and readmission within 30 days did not differ between the two matched groups.

**Conclusions:** We have shown in a contemporary, large multicenter cohort of patients that emergent laparoscopic repair of perforated gastric ulcer is increasingly being performed, is safe relative to open repair (in patients without preoperative septic shock), and confers a modest benefit in terms of length of stay and respiratory complications.

**P059****Outcomes in the Management of Cholecystectomy Patients in the Setting of a New Acute Care Surgery Service Model: Impact on Hospital Course**

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**Introduction:** The acute care surgery (ACS) model, defined as a dedicated team of surgeons to address all emergency department, inpatient, and transfer consultations, is quickly evolving within hospitals across the United States due to demonstrated improved patient outcomes in the non-trauma setting. The traditional model of call scheduling consisted of one senior attending and one senior resident on call per 24-hour shift. Attendings were responsible for consults, previously scheduled operations, as well as clinic time. Multiple recent studies have shown statistically significant improvements in several parameters of patient care by using ACS including but not limited to 1. Time from emergency department to surgical evaluation 2. Time from surgical evaluation to operating room 3. Operative time 4. Percent laparoscopic 5. Length of hospital stay 6. Intra-operative complications (blood loss, perforation rates) 7. Post-operative complications (fever, infection, redo) 8. Cost. One study demonstrated a statistically significant cost savings for the Acute Care Surgery model with respect to appendectomies, but not cholecystectomies.

**Study Design:** A retrospective analysis of patients who underwent cholecystectomy in the setting of non-traumatic emergent cholecystitis was performed to compare data from two cohorts: the traditional model and the ACS between January 1, 2013 and Dec 1, 2016 at Ochsner Medical Center, a 600-bed acute care center in New Orleans. Parameters gathered included 1. Time from emergency department to surgical evaluation 2. Time from surgical evaluation to operating room 3. Operative time 4. Percent laparoscopic 5. Length of hospital stay 6. Intra-operative complications (blood loss, perforation rates, conversion to open) 7. Post-operative complications (fever, infection, redo). Demographics were also collected including age, weight, height, ethnicity, ASA, etc. Inclusion criteria included: Age > 18 and having undergone cholecystectomy between Jan 1, 2013 and December 1, 2016. Exclusion criteria included choledocholithiasis, gallstone pancreatitis, ascending cholangitis, gangrenous cholecystitis, septic complications precipitating further procedures and delays, or researcher discretion.

**Results:** 699 patients were initially identified as having undergone cholecystectomy within the allotted time period [2013 – 178, 2014 – 166, 2015 – 157, 2016 – 198]. 470 were excluded due to one of the reasons above. Median patient age was 53 years old and the average patient encounter was 3.9 days.

**Conclusion:** The ACS model is better suited to manage emergent non-traumatic cholecystectomies than the traditional call service at our institution, as evidenced by several parameters.

**P060****Single Incision Laparoscopic Surgery (SILS) for Emergencies**

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**Introduction:** The aim of this study is to evaluate early outcomes when performing SILS for emergency abdominal surgical conditions in our hospital.

**Methods and Procedures:** Patients who visited the emergency department and underwent a surgical abdominal emergency procedure at the University Hospital Fundación Santafé de Bogotá (Bogotá DC, Colombia) by our group using a SILS technique were included for analysis. Data was collected from July 2008 through July 2017. Outcomes regarding length of surgery, hospital stay, operative complications (classified following the Accordion Severity Grading System parameters), conversion rates and reintervention were analyzed descriptively.

**Results:** A total of 593 patients and 644 procedures from the registry met our inclusion criteria. Female patients accounted for 55.8% (331) of the sample. The most common procedures performed were appendectomies (405; 62.9%), followed by cholecystectomies (134; 20.8%), and adhesiolysis for bowel obstruction (37; 5.7%). Other procedures included emergency hernia repairs (16; 2.5%), bowel resections (15; 2.3%), and perforated ulcer repairs (3; 0.5%) amongst others. Total surgical time was under 2 hours on 90% of procedures, and 75% of procedures were discharged home on the first 24 hours. A total of 34 (5.1% of procedures) postoperative complications were reported classified as follows: 16 mild, 11 moderate, and 7 severe, 6 of which underwent surgery. Finally, we report a total of 9 (1.5%) readmissions and 6 (1%) reinterventions all within the first 30 days after surgery. Reinterventions were performed for drainage of surgical infections on 2 cases (abdominal collections), bowel obstruction on 2 cases and 2 cases of wound dehiscence. One procedure was converted to multi-port and none to open surgery. No cases of 30-day-mortality were identified on the registry.

**Conclusions:** SILS is an alternative to multiport laparoscopic surgery, but most institutions nowadays perform the SILS approach only in selected elective procedures. We analyzed the outcomes of SILS in an acute care setting showing complication rates comparable to those in standard multiport laparoscopy. It is important to emphasize how the expertise of the surgeon is critical towards obtaining appropriate results with SILS.

**P061****The Use of Laparoscopy in the Surgical Management of Small Bowel Obstruction**

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**Introduction:** The objective of our study was to determine clinical factors associated with success of laparoscopy in managing small bowel obstruction (SBO). The use of laparoscopy in the management of SBO has been shown to be a safe alternative to laparotomy with studies demonstrating reduced morbidity, mortality, postoperative length of stay, and overall decreased complications with laparoscopy. Nationally the use of laparoscopy in the management of SBO has not been fully adapted into general practice. Many studies look at laparoscopy only in the setting of SBO secondary to adhesions.

**Methods and Procedures:** A retrospective study was conducted identifying all patients who were admitted to a large tertiary academic center with a diagnosis of SBO from 2014 to 2016. The operative cases were grouped by method of surgical intervention: laparoscopy, laparoscopy converted to open, or laparotomy. Clinical data included: gender, age, body mass index (BMI), presence of medical co-morbidities, smoking history, duration of obstruction prior to surgical intervention, presence of transition point on imaging, total number of prior abdominal surgeries (laparoscopic and open), etiology of SBO, number of adhesive bands (single versus multiple), return of bowel function prior to discharge, and need for additional procedures related to SBO during the same admission. The primary outcome was successful laparoscopic procedure in the management of SBO, defined as resolution of SBO and no conversion from laparoscopic to open procedures. Student's t-test and Pearson's x<sup>2</sup> test were used to assess the association between each factor and the primary outcome.

**Results:** A total of 227 adult patients admitted with a diagnosis of SBO received operative intervention. There were 40 successful laparoscopic cases, 36 failed laparoscopic cases (laparoscopic converted to open or no resolution of SBO), and 151 open cases. With the exception of an association between success and BMI, our results demonstrated no other clinical or demographic differences among the successful laparoscopic group and the failed laparoscopic group.

**Conclusions:** Laparoscopy is effective in treating SBO due to various etiologies including single band adhesions, multiple adhesions, hernias, and masses. Other than BMI, there was no single predictor of success or failure with laparoscopy. Therefore, we conclude, that perhaps all patients requiring operative treatment for SBO deserve consideration for a diagnostic laparoscopy.

**P063****Laparoscopic Interval Appendectomy as Standard of Care**

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**Introduction:** Conservative therapy is the first choice for acute appendicitis at our department, and after several months we perform laparoscopic appendectomy. We report laparoscopic interval appendectomy.

**Subjects:** The subjects comprised 81 patients who were performed laparoscopic appendectomy at our department between October 2012 and Jun 2017.

**Results:** There were 21 cases performed interval appendectomy, and 4 of 21 patients have abdominal abscess. There were 58 patients who performed early appendectomy after hospitalization. The patients who performed early appendectomy after failure of conservative therapy is 25 of 58 patients. There were no significant differences in the mean duration of operative time between interval appendectomy and early appendectomy (71.0 vs. 71.6 min). There were no significant differences in the mean volume of blood loss between interval appendectomy and early appendectomy (3.9 vs. 6.8 mL). The mean length of postoperative hospital stay for interval appendectomy was significantly shorter than that for early appendectomy (2.6 vs. 8.1 days). Surgical site infection occurred in one patient after interval appendectomy. Other 6 postoperative complications developed after early appendectomy.

**Conclusion:** Laparoscopic interval appendectomy represents an effective surgical procedure. The duration of hospital stay was shortest in the interval appendectomy treated cases. Laparoscopic interval appendectomy decrease complications. Therefore, our departmental treatment strategy is to conservatively treat patients whenever possible and follow the laparoscopic procedure when surgery is indicated.

**P064****Mortality Predictors in Elderly Patients with Perforated Peptic Ulcer**

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**Introduction:** Surgery for perforated peptic ulcer (PPU) is associated with high mortality in elderly patients. Existing PPU mortality risk prediction models (MRPMs) lack simplicity and objectivity. We validate two widely used MRPMs. We hypothesize that more accurate mortality can be predicted in elderly PPU patients by simple preoperative variables.

**Methods:** Patients with age>70 years and operated for PPU from January 2004 to December 2012 were recruited. Preoperative, operative and postoperative data were collected. Boey's score and Mannheim peritonitis index (MPI) are commonly used and validated. Mortality predictors were obtained using odds ratios of the significant multivariate variables on mortality as weightage.

**Results:** 170 patients were eligible. 95 (55.9%) patients were male and 111 patients (65.3%) presented>24 hours after abdominal pain onset. 68 (40%) patients had co-morbidities and 95 (55.9%) showed free air on erect chest X-ray. Median length of stay was 12 days (1–128). Intra-abdominal collection, leakage, reoperation and mortality were 15.9%, 5.3%, 1.8% and 19.4% respectively. Boey's score and MPI had areas under curve (AUC) of 64.4% and 63.0% respectively for mortality prediction. On univariate analysis, preoperative shock, cardiac failure, chronic renal failure, American society of Anesthesiology (ASA) score, urea and serum creatinine were predictive of mortality. Urea>15 mg/dL ( $p=0.015$ , OR- 4.73 (95% CI 1.35–16.58)) and ASA score>2 ( $p=0.03$ , OR –10.6 (95% CI 1.3–88.4)) were identified as mortality predictors in the elderly PPU population.

**Conclusion:** Boey's score and MPI lack accuracy to predict mortality in elderly PPU patients. ASA status and elevated urea predict mortality. It remains to be explored if adding urea and ASA status enhances existing MRPMs.

**P065****He Nailed It**

**Hugo Bonatti; University of Maryland Community Medical Group**

**Background:** Nail guns are powerful tools and are widely used. Injuries with these devices may be devastating due to the significant force they can deploy.

**Patients and Methods:** We herein report a first case of a self inflicted abdominal injury with a nail gun.

**Results:** A 55 year old male with history of coronary artery disease, type 2 DM and early signs of dementia attempted to refill a nail gun. He lodged the device against his right abdomen while the air hose was still attached and then accidentally fired 2 nails into his abdomen. After he unsuccessfully tried to pull the nails out he drove himself 25 minutes to our emergency room. He was hemodynamically stable on arrival; pain control was achieved, antibiotics were given and he received tetanus immunization. CT-scan showed the two foreign bodies penetrating from the RUQ with one reaching the transverse colon. On emergency laparoscopy, the nails were found to have penetrated the thick omentum and the puncture site of one nail into the colon was identified. The omentum was resected off the colon and the right colon was completely mobilized. No additional injuries were found. The entrance area of the nails was then used to create a loop colostomy. The postoperative course was initially uneventful but the patient developed a severe posttraumatic inflammatory reaction of the fat tissue in the right upper quadrant and had to be readmitted for pain control and antibiotics were again administered. He recovered and was discharged with a plan for laparoscopically assisted colostomy closure after 6 weeks.

**Discussion:** To the best of our knowledge this is the first reported isolated colonic injury by a nail gun. Given the tremendous force of the device with unknown collateral damage to the surrounding tissue it was decided to manage the accident with a laparoscopic assisted colostomy using the entrance point of the nails for fecal diversion.

**P067****Total Repair of Obturator Hernia with a Custom-Made Mesh**

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**Introduction:** It is difficult to diagnose obturator hernias by routine physical examination. Obturator hernias are frequently complicated by ileus and the diagnosis is often first made from abdominal CT. Obturator hernias are difficult to reduce, and often necessitate emergency surgery. They are common in elderly people, and they often had bad general condition. So it was high in the death rate. At our hospital, we first attempt to reduce the hernia from the body surface under ultrasonographic guidance. After relieving the strangulation, we perform radical operation electively in patients who are for possible for surgery under the general anesthesia. We perform laparoscopic repair for obturator hernias. Obturator hernias are often complicated by other types of hernia. In these cases, we perform total repair. Herein, we present a review of the patients who underwent surgery for obturator hernia at our hospital.

**Methods:** We review the data of 9 cases of obturator hernia encountered by us from February 2012 to December 2014. We performed total repair in three of the cases. However, it is difficult to procure a mesh that would be adequate for all the defects (inner inguinal ring, femoral ring, obturator). No single mesh can fit, because the inguinal and pelvic curves present opposing curves near the obturator. Therefore, we placed two pieces of mesh available at our hospital (3D max [Bard] and onlay sheet of Kugel patch[Bard]) together in the patients. We could successfully cover all the defects using these two pieces of mesh and could fit the mesh to the pelvic shape by devising an appropriate connection between the meshes.

**Results:** We reviewed a total of 9 operated cases for obturator hernia. The hernia was bilateral in 7 cases, and complicated by other hernias in 6 cases. We first determined the appropriate approach for the repair. We performed total repair in 3 cases. There were no complications and no cases of recurrence.

**Conclusion:** Our approach to the repair of obturator hernias was very useful. We can use the exact area and shape of the mesh needed in individual patients by this method. We show the method of shaping the mesh to fit the pelvic form.

**P066****Risk Factors for Postoperative Intra-abdominal Abscess After Laparoscopic Appendectomy in Gangrenous Appendicitis**

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**Background:** Laparoscopic appendectomy (LA) has been widely performed as standard treatment of acute appendicitis (AA). Intra-abdominal abscess (IAA) is one of the refractory postoperative complications requiring antibiotics and/or drainage, resulting in prolonged hospital stay. It is generally recognized that IAA develops following appendectomy in gangrenous appendicitis rather than other type of appendicitis. However, risk factors for IAA after LA in gangrenous appendicitis still remain unclear. The aim of this study is to assess risk factors for IAA after LA.

**Methods:** 386 patients who underwent LA for AA from April 2008 to August 2017 were retrospectively reviewed. 132 patients who were diagnosed as gangrenous appendicitis by operative findings and/or pathological findings were enrolled in this study. We defined IAA as a patient who had purulent discharge from drains and/or intra-abdominal abscess detected by postoperative CT scan. Patients were divided into two groups according to presence of IAA (Group A: Postoperative intra-abdominal abscess, Group B: Without postoperative intra-abdominal abscess). Perioperative characteristics, intraoperative findings and laboratorial data were analyzed.

**Results:** Twenty patients (15.1%) were considered to suffer postoperative IAA. In univariate analysis, there was no significant difference between two groups regarding age, sex, BMI, intraoperative findings such as diameter of the appendix and presence of fecal stone. Preoperative white blood cells ( $16.4 \pm 0.98$  vs.  $13.8 \pm 0.41$  ( $\times 10^3/\mu\text{L}$ ),  $p=0.016$ ), preoperative value of serum C-reactive protein ( $11.5 \pm 1.7$  vs.  $6.2 \pm 4.8$  ( $\text{mg/dL}$ ),  $p=0.006$ ), and value of serum C-reactive protein on first postoperative day ( $19.8 \pm 1.5$  vs.  $13.8 \pm 0.65$  ( $\text{mg/dL}$ ),  $p=0.0004$ ) were significantly high in Group A. Multivariate logistic regression analysis showed that value of serum C-reactive protein on first postoperative day higher than 15.48 (OR 14, 95%CI 2.94–66.1,  $p=0.0009$ ) was an independent risk factor for postoperative IAA in gangrenous appendicitis.

**Conclusion:** Patients with value of serum C-reactive protein on first postoperative day higher than 15.5 is a likely risk for IAA after LA. Therefore, we should offer careful postoperative management to these patients.

**P068****Castleman's Disease: An Acute Care Surgeon's Perspective**

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**<sup>1</sup>University of Minnesota, <sup>2</sup>Peking University Cancer Hospital and Institute**

**Introduction:** Castleman's disease (CD) is a very rare, lymphoproliferative disorder associated with a Rhadinoviral infection of B lymphocytes and can be either unicentric or multicentric in distribution. There is an important role for a surgeon in both unicentric and multicentric types. Approximately 1000 cases have been reported to date, we present 28 unpublished cases.

**Methods:** A retrospective review of cases from two large teaching hospitals was reviewed. Baseline demographics including age, race, gender, clinical variables such as anatomical site and foci of disease, histopathological type, nature of the surgical approach (resective vs diagnostic), and outcome (disease-free survival vs death due to disease) was collected and analyzed.

**Results:** A total of 28 patient were reviewed for this study. Mean age at the time of presentation was 45.9 yrs. 64.3% of patients were female. 89.3% of the cases were unicentric and 10.7% were multicentric. 57.1% of the patients presented with an asymptomatic mass; 39.3% had local symptoms and 3.5% patients had systemic symptoms. Anatomical distribution of disease was: 42.9% intrabdominal, 32.1% retroperitoneal, 10.7% neck, 7.14% pelvis and 3.57% axilla and 3.57% in the epitrochlear region. In terms of histopathological type, hyaline vascular accounted for 57.1% of all cases, 17.9% of cases were of the plasma cell type. Complete surgical resection was performed 96% of patients with unicentric disease. Diagnostic biopsy and medical therapy were provided to all patients with multicentric disease. Overall survival rate was 92.6%.

**Conclusion:** Castleman's disease is a very rare tumor; acute care surgeons are likely to have little experience when encountering this tumor. Significant differences exist in the clinical presentation, surgical approach, and patient outcomes between unicentric and multicentric Castleman's Disease. The anatomic distribution of cases in this series emphasizes its importance to an acute care surgeon. Complete surgical resection for unicentric disease is likely to be curative. In multicentric disease, lymph node biopsy should be performed without complications, so as to avoid delay in initiating medical therapy.

**P069****Cecal Volvulus and Internal Hernia, a Rare Case Presentation in a Bariatric Patient**

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**Introduction:** Internal hernias are known complications that are well documented to involve Peter-son's defect. In bariatric patient's post gastric bypass there is a high index of suspicion for internal hernias as well as a low threshold to operate. There have been some debates around the closure of the potential Peterson's space with several studies advocating closure versus some which show that there is no difference in the rate of symptomatic internal hernias. We present a case of an unusual cause of small bowel obstruction due to internal hernia caused by a cecal volvulus. It is an atypical presentation however the patient was triaged and brought to the OR within 5 hours of admission. Although it is rare there have been reports of internal hernias caused by other structures like congenital bands or natural potential spaces. There have been reports of unusual presentations of the cecum herniating through the foramen of Winslow. The anatomical rearrangements after bypass create potential areas where an internal hernia can occur. In this case a bowel resection was undertaken due to the anatomical variation of the cecal bascule and cecal volvulus due to high rate of recurrence of this cecal pathology. Majority of internal hernias do not require bowel resection especially when detected earlier and prompt surgical exploration is undertaken. Mortality as direct consequence internal hernia is extremely rare. However late diagnosis of internal hernias can lead to catastrophic gut loss and may require lifelong TPN and/or visceral transplantation or autologous reconstruction.

**Conclusion:** Careful history and physical of our bariatric patient can elicit the signs and symptoms of internal hernias and prevent the morbidity and mortality that can come with the complications of this condition. Unusual presentations and causes are reason for prompt diagnosis and complete exploration.

**P071****Weekday or Weekend Hospital Discharge: Does it Matter for Acute Care Surgery?**

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**Background:** Hospitals usually reduce staffing levels over weekend. This raises the question of whether patients discharged over a weekend may be inadequately prepared and possibly at higher risk for adverse events post-discharge. The aim of this study was to assess the outcomes of common acute care surgery procedures for patients discharged over weekend, and identify the key predictors of early readmission.

**Methods:** This retrospective cohort study was conducted at a tertiary care hospital between January and December 2016. Surgical procedures included were cholecystectomy, appendectomy, and hernia repairs. Patients' demographic, co-morbidities, complications, readmission and follow-up details were collected from the electronic medical records. Predictors and post-operative outcomes associated with weekend discharge were identified by multivariable analysis using univariable and multivariable logistic regression models controlling for potential confounders.

**Results:** A total of 743 patients were included. Overall median age was 35 years (IQR: 22, 58). The majority of patients were female (n=397, 53.4%). 361 patients (48.6%) underwent a cholecystectomy, 288 (38.8%) an appendectomy, and 94 (12.6%) hernia repairs. Weekend discharge was 16.8% vs. 83.2% of weekday discharge. Patients discharged during weekend were younger (34.2 vs. 41, p-value <0.001, mean). Post-discharge 14-day follow-up visits were significantly lower in the weekend discharge subgroup (83.1% vs. 91.2%, p-value 0.006). Overall, 30-day readmission rate was 3.2% (n=24), and did not differ between those of weekend and weekday discharge (OR=0.28, 95% CI 0.52–9.70).

**Conclusions:** Patients discharged on weekends tended to be younger in age and less likely to have chronic diseases. Patients discharged over the weekend were less likely to follow up compared to weekday discharge patients. However, the readmissions rate did not differ between the two groups.

**P070****Laparoscopic Cholecystectomy in the Third Trimester of Pregnancy: A Case Report**

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Symptomatic cholelithiasis is common disease performed with laparoscopic cholecystectomy (LC). We will hesitate to operate if the patient is pregnant in the third trimester. Pregnant patients undergoing laparoscopic surgery have been reported increasingly. However, most case reports are confined to patients in the first and second trimester. We report a patient who underwent LC in the third trimester and review the relevant literature. A 26-year-old woman in the third trimester (34w2d) of pregnancy was seen in the emergency department of our hospital with a history of upper abdominal pain. There was no problem in the course of pregnancy. The result of the examination proved to be attack of gallstone colic. She was hospitalized the same day and underwent LC the next day. The base of pregnancy uterus was 20 cm above the navel. We needed to consider the surgical approach, for example inserting the first trocar under left hypochondrium. Operative duration was 63 minutes. She complained abdominal distension at postoperative day (POD) 1 and 2 but there was no abnormality in the fetus. She was discharged on POD 4. After that she gave birth to a healthy baby. LC in third trimester of pregnancy was safely performed with obstetrics back up.

**P072****Safe Laparoscopic Surgical Approach of Foreign Body Migration**

Alvarenga S Emanuela, MD, Autont Schlermine, MD, Derek McCranie, Alexander Ramirez, MD, FACS; Florida State University

Intrauterine device (IUD) migration out of the uterine cavity is a serious complication. Its incidence in the US has been reported to be about 0.001% annually. Previously published systematic review supports the use of laparoscopic surgery for elective removal of migrated IUCDs from the peritoneal cavity. We present the safety and efficacy of the Laparoscopic approach to this complication in the acute care setting. Depicted is an otherwise healthy 40 year old female with no previous surgical history who presented to the ED with worsening abdominal pain for one week with no associated symptoms. On physical exam, patient was non toxic. Abdomen was moderately distended with guarding and rebound tenderness to palpation, no rigid. Patient had been seen shortly prior to ED admission by her OB/GYN and recent work up with abdominal/pelvic x-ray and ultrasound has revealed a misplaced IUD in the transverse position (side ways). Pregnancy test was negative. Based on patient clinical presentation and recent radiologic findings, we decided to proceed with Diagnostic Laparoscopy. After systematic review of cavity, the foreign body was found to be incorporated within the greater omentum. We proceeded, laparoscopically with omentectomy+foreign body removal. There were no perioperative complications, patient was discharged on the following day.

The use of laparoscopy in elective IUD retrieval within in the abdominal cavity has been considered standard of care in surgical management to date. This poster demonstrates its use as an effective approach for safe removal of intra-abdominal foreign bodies also in the acute setting.



**P073****Symptomatic Inguinal and Umbilical Hernias in the Emergency Department: Opportunity Lost?**

**Andrew T Bates, MD, Jie Yang, PhD, Maria Altieri, Chencan Zhu, BS, Salvatore Docimo, Jr., DO, Konstantinos Spaniolas, MD, Aurora Pryor, MD; Stony Brook University Hospital**

**Introduction:** Patients with symptomatic inguinal and umbilical hernias often present to the emergency department (ED) when their symptoms change or increase, usually not requiring emergent surgery. However, little is known about how often these patients present prior to eventual repair and whether they undergo surgery at the initial presenting institution. The aim of this study was to assess the clinical flow of patients presenting in the ED for inguinal and umbilical hernia.

**Methods:** All patients presenting to EDs in New York State from 2005 to 2014 with symptomatic inguinal and umbilical hernias were identified using the New York State longitudinal hospital claims database (SPARCS). Patients were followed for records of hernia repair and subsequent inpatient and outpatient visits up to 2014.

**Results:** 42,950 patients presenting to the ED for symptomatic inguinal hernia were identified. 5.3% (2,297) of ED presentations resulted in inpatient admissions. 14,491 (33.7%) had repair later and their average time from ED presentation to inguinal hernia repair was 158 ( $\pm 351$ ) days. 90.1% of patients who did not have subsequent surgery had only one ED visit. Of those that underwent interval repair, 79.7% had only one ED visit prior to surgery. For those patients with only one ED visit before repair, 29.3% had repair at a different hospital, as opposed to 48.6% if multiple ED visits were made. 15,297 umbilical hernia patients presenting to the ED were identified. 7.2% (1,109) resulted in inpatient admission. 3,507 (22.9%) had interval repair, with the average time from ED presentation to umbilical hernia repair being 175 ( $\pm 369.82$ ) days. 92% of patients who did not record of later repair presented to the ED once. Of those patients who underwent repair, 78.5% did so after one ED visit. For those patients with only one ED visit before repair, 32.9% had repair at a different hospital, as opposed to 48.6% if multiple ED visits were made.

**Conclusion:** A majority of patients with symptomatic inguinal and umbilical hernias that present to the ED do so once with no subsequent follow-up or repair. For those patients that undergo interval repair, a significant portion will hope for surgery at other hospitals. A significant proportion of patients with acutely symptomatic inguinal/umbilical hernias who undergo interval repair after a previous ED visit, will opt for definitive surgery at another hospital facility. This represents a missed opportunity for continuity of care for providers and healthcare systems.

**P074****A Comparative Study Between Apache II Scoring and Mannheim Peritonitis Index to Assess Prognosis in Perforation Peritonitis**

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**Introduction:** Peritonitis is the inflammation of the serous membrane that lines the abdominal cavity and the organ contained therein and is one of the most common infections, and an important problem that a surgeon has to face. Reproducible scoring system that allows a surgeon to determine the severity of intra-abdominal infections are essential to prognosticate the patient. This study was done to compare APACHE II scoring and MPI score to assess prognosis in perforation peritonitis.

**Methods:** All patients admitted with hollow viscus perforation from 1st November 2015 till 31st March 2017 was included in the study. It was a cross sectional observational study. APACHE II and Mannheim Peritonitis Index (MPI) scoring systems were calculated in all the patients in order to assess their individual risk of morbidity and mortality. The outcome variables were studied postoperatively -

Post-operative wound infection, wound dehiscence, Anastomotic leak, Respiratory complications, Duration of Hospital stay, need of ventilator support and Mortality. The inferences were drawn with the use of appropriate tests of significance.

**Results:** The study comprised of 63 patients. Neither APACHE II nor MPI could predict postoperative wound infection. The mean APACHE II score of 63 subjects included in the study was  $11.2 \pm 8.1$  with range of 0 to 35 and the mean MPI score of 63 subjects included in the study was  $26.9 \pm 7.2$  with range of 6 to 39. APACHE II was able to predict post-operative respiratory complications, post-operative need for ventilatory support, hospital stay duration and Mortality while MPI was able to predict post-operative wound dehiscence, post-operative respiratory complications, post-operative need for ventilatory support and Mortality. Neither APACHE II nor MPI could predict postoperative anastomotic leak and postoperative wound infection.

**Conclusion:** Mannheim Peritonitis index is a useful and simple method to determine outcome in patients with peritonitis. MPI is comparable to APACHE II in assessing the prognosis in perforation peritonitis and can well be used in emergency setting in place of APACHE II scoring when time is a definite constraint.

**P075****MicroRNA-17 and the Prognosis of Human Carcinomas: A Systematic Review and Meta-analysis**

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**Background:** The recognition of biomarkers to predict the outcome of cancer is in need. MicroRNA-17 (miR-17) family has been thoroughly studied and reported to contribute to the progress of human carcinomas. miR-17 is one of the most important miR-17 family member, and has been reported as a tumor biomarker by various researches. However, the prognostic value of miR-17 in cancers remains unclear. Therefore, we put up with a systematic review and meta-analysis to summarize and analyze the relationship between the miR-17 status and clinical outcome in several kinds of human cancers.

**Methods:** Published articles associated with miR-17 and clinical outcome of cancers were screened by searching the online databases of PubMed, Web of Science, Embase, China Biomedical Literature Database (CBM), Chinese National Knowledge Infrastructure (CNKI), Technology of Chongqing (VIP) and Wan Fang databases. The patients' survival results were pooled, and pooled hazard ratio (HR) with 95% confidential intervals (95% CI) were calculated and used for measuring the strength of association between miR-17 and the prognosis of cancers, including hepatocellular carcinoma (HCC), lung cancer, osteosarcoma, glioma, T-cell lymphoblastic lymphoma and colon cancer (CC). Heterogeneity, publication bias and subgroup analysis were also conducted.

**Results:** The systematic review and meta-analysis is registered in PROSPERO (No. CRD42017065749). In all 12 articles, totally 1096 patients were included in this meta-analysis. The results indicated that the increased expression of miR-17 played an unfavorable role in overall survival (OS) in various human carcinomas with the HR of 1.342 (95% CI=1.238–1.456) concerning the publication bias. In subgroup analysis, HR of ethnicity (Caucasian HR=1.48 and Asian HR=1.40), disease (digestive system HR=1.36 and non-digestive system HR=1.54), detection method (qRT-PCR HR=1.40 and in situ hybridization, ISH HR=2.59) and detection sample (tissue HR=1.45 and serum HR=1.32), all  $p < 0.05$ . On the analysis of disease-free survival (DFS) and recurrence-free survival (RFS), the unfavorable prognosis role was also found with the increased expression of miR-17 (HR=1.40, 95% CI=1.23–1.60).

**Conclusions:** miR-17 might be a useful biomarker in predicting the clinical outcome of human cancers.

**Keywords:** microRNA-17, Cancer, Outcome, Prognosis, Meta-analysis.

**P076****Role of Mitochondrial Enzymes in Gastrointestinal System of Mitochondrial Myopathy Patients**

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**Introduction:** Mitochondria is a small energy producing structure of a cell. Mitochondrial myopathy (MM) is mixed disorder clinically, which can affect various systems besides skeletal muscle. MM starts with muscle weakness or exercise weakness. MM patients have decreased skeletal muscle mitochondrial function than the healthy person, because of weakened intrinsic mitochondrial function and decreased mitochondrial volume density. No one has studied the MM role in GERD and constipation so far. This study is aimed to see effects of MM on the gastrointestinal system specifically gastroesophageal reflux disease (GERD), gall bladder issues, and constipation.

**Methods:** Between May 2011 and June 2016, 101 MM diagnosed patients at Buffalo General Hospital were included in this retrospective study. We assessed their DeMeester score for GERD and Wexner's constipation questionnaire for constipation. DeMeester Score>14 and constipation score>15 were set points for GERD and constipation respectively. Data was analyzed by using SPSS version 24. Mitochondrial enzymes were assessed by using their muscle biopsy report.

**Results:** Out of 101 (85.1% female, 14.9% male) mitochondrial myopathy patients, 38.6% and 13.9% were suffering from GERD and constipation respectively. 35.1%, 43.4% and 95.9% patients had gall bladder issues, obstructive sleep apnea (OSA) and fatigue respectively. MM GERD patients (87.2% female, 12.8 male) had mean DeMeester score 22.56 (SD: 6.49) more than normal although 76.3% patients were on GERD medications and 29.2% patients had NADH cytochrome C reductase, cytochrome C oxidase and citrate synthase abnormal mitochondrial enzyme in MM associated GERD but 26.1% MM patients had abnormal cytochrome C oxidase enzyme only. MM along with constipation had mean wexner's constipation score 19.14 (SD: 2.568) more than the normal although 94.9% were taking enema, medications or digital assistance. 50% patients had cytochrome C oxidase and NADH cytochrome C reductase enzymes were abnormal in those patients. 29.4% MM associated gall bladder issues patients had cytochrome C oxidase abnormal. 63.6% MM associated GERD and constipation patients had gall bladder issues.

**Conclusion:** In this present study, we found that MM had effects on gastrointestinal system causing GERD, constipation and gall bladder issues. GERD, constipation and gall bladder problems are common in MM patients even patients are taking medications for GERD and constipation. Cytochrome C oxidase, citrate synthase and NADH cytochrome C reductase are the most commonly impaired mitochondrial enzyme in MM patients and MM associated GERD, constipation and gall bladder issues patients.

**P077****MicroRNA-124 Inhibition Upregulates Hippocampal Expression of Genes Central to Synaptic Plasticity, Glucocorticoid Signaling, and Neurogenesis in a Rat Model of Gulf War Illness**

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**Objectives:** Gulf War Illness (GWI) is a chronic, multisymptom illness marked by cognitive and mood dysfunction and disrupted neuroendocrine-immune homeostasis affecting 30% of GW veterans. After 25+ years, useful treatments are lacking and its cause is poorly understood, although exposures to pyridostigmine bromide and pesticides are consistently identified among the strongest risk factors. Previous work in our laboratory using an established rat model of GWI identified persistent elevation of microRNA-124 (miR-124) levels in the hippocampus whose gene targets are involved in cognition-associated pathways and neuroendocrine function, suggesting that miR-124 inhibition is a promising therapeutic approach to improve the complex symptoms exhibited by GWI. The purpose of this study was to identify broad effects of miR-124 inhibition in the brain by profiling the expression of genes known to play a critical role in synaptic plasticity, glucocorticoid signaling, and neurogenesis in GWI rats administered a miR-124 antisense oligonucleotide (miR-124 inhibitor).

**Methods and Procedures:** Nine months after completion of a 28-day exposure regimen involving GW-relevant chemicals and stress, rats underwent intracerebroventricular infusion of miR-124 inhibitor (n=9) or scrambled negative control oligonucleotide (n=8) and were implanted with 28-day osmotic pumps delivering 0.1 nmol/day. Intranasal delivery of oligonucleotides was performed on additional rats (n=4 per group; daily for 10 days) to determine whether miR-124 inhibition is achievable using a noninvasive procedure. Hippocampi were harvested and quantitative PCR arrays were used to profile the expression of focused panels of genes important for 1) synaptic alterations during learning and memory, 2) signaling initiated by the glucocorticoid receptor (known miR-124 target), and 3) neurogenesis. Hippocampi were also analyzed by quantitative PCR to examine expression levels of endogenous miR-124.

**Results:** Upregulation (>2.5 fold change, p<0.05) of 8 synaptic plasticity genes, 11 glucocorticoid signaling genes, and 4 neurogenesis genes was observed in the hippocampus of GWI rats infused with miR-124 inhibitor compared to scrambled control, consistent with a significant reduction (p<0.001) in miR-124 levels detected in rats receiving miR-124 inhibitor. Altered gene expression and a reduction in miR-124 levels were not observed in rats after intranasal delivery.

**Conclusion:** miR-124 antagonism in the hippocampus upregulates the expression of several downstream targets involved in synaptic plasticity, glucocorticoid signaling, and neurogenesis and is a promising therapeutic approach to improve cognition, emotion regulation, and neuroendocrine dysfunction in GWI. Further testing is being pursued to discover the optimal dose for intranasal administration to test viability of this option for ill GW veterans.

**P078**

### A Prospective Randomized Controlled Study Comparing Ultrasonic Dissector with Electrocautery for Axillary Dissection in Patients of Carcinoma Breast

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**Background:** The ultrasonic dissector, commonly known as the harmonic scalpel, has been in use for achieving haemostasis in surgery for almost 20 yrs. Its advantages in breast surgery, especially in the dissection of axilla, have been a matter of debate as previous studies have shown inconsistent results. This study compares the outcomes of the ultrasonic dissector in axillary dissection with that of the conventional electrocautery.

**Methods:** Patients who were undergoing MRM and BCS with axillary dissection from November 2014 till March 2016 were included in the study. Patients were randomized into two groups, group A undergoing axillary dissection with ultrasonic dissector and group B with electrocautery. The operative time, intra-op bleeding, post-op pain, post op drain volume, hospital stay and any other complications were noted in the two groups.

**Results:** The numbers of patients in both groups were 35 each. Group A had a significantly shorter operative time, both for axillary dissection (30.86 min vs. 40.63 min,  $p<0.001$ ) and the total duration (77.20 vs. 90.20 min,  $p=0.001$ ). The blood loss was significantly less in group A, as measured by the mop count. There was significant reduction in the total post-op drainage volume, which resulted in fewer days of drain in-situ and the total number days stayed in the hospital. There was no significant change in the post-op complications such as haematoma, seroma, flap necrosis, oedema, etc.

**Conclusion:** With the use of ultrasonic dissector, the operative time, blood loss and the axillary drainage was significantly reduced. The axillary drainage in turn, reduced the hospital stay. There was no significant difference in terms of complications like haematoma formation, seroma formation, skin flap necrosis or oedema.

**P079**

### Role of Intraoperative Cholangiography for Detecting Residual Stones After Biliary Pancreatitis: Still Useful? A Retrospective Study

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**Introduction:** Intraoperative cholangiography (IOC) may detect residual stones in the common bile duct (CBD) after acute biliary pancreatitis (ABP). The aim of the present study is to analyze the utility of IOC in detecting residual stones in patients undergoing cholecystectomy for ABP and if complications are related with this procedure.

**Case Description:** Demographic and clinical factors were assessed in patients with ABP who underwent IOC during laparoscopic cholecystectomy. Factors assessed included preoperative size of the CBD on ultrasonography, presence of stones in the gallbladder and the CBD, and IOC results. For the statistical analysis,  $\chi^2$  or Fisher's exact tests to compare proportions and the nonparametric Mann-Whitney U test for analysis of values with abnormal distribution were used. **Discussion:** The study included 579 patients. All preoperative laboratory indicators were elevated. The laboratory tests do not demonstrate any statistical significance between these two groups. The group of the patients without stones in the CBD diagnosed by IOC was also divided in patients with diameters <0.87mm and with diameters ≥0.87mm of the CBD. Also in these two groups, the statistical analysis of the laboratory tests does not demonstrate significant difference. All patients underwent IOC. IOC showed stones in 84/113 patients (74.3%). A comparison of patients with and without stones at IOC showed similar mean times from hospitalization to surgery (5.97days [range 2–12.7days] vs. 6.17days [range 2–23.7days]), from surgery until hospital discharge (2.07days [range 0–4.7days] vs. 2.27days [range 0–11.7days]), and overall length of stay (7.97days [range 3–19.7days] vs. 8.37days [range 3–23.7days]) ( $P>0.001$ ).

**Conclusion:** IOC is rarely useful to diagnose residual CBD stones, without increasing complications related to the procedure itself. It can be safely avoided if other preoperative imaging procedures for the bile ducts have ruled out biliary malformations.

**P080**

### Robotic-Assisted Completion Cholecystectomy: A Safe and Effective Minimally Invasive Approach to a Challenging Surgical Scenario

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**Background:** Housed in a high volume tertiary referral center, our division receives a large amount of transfers and referrals from outside institutions for patients who require completion cholecystectomies. In this study “completion cholecystectomy” refers to patients that meet one of three criteria: 1. previous subtotal cholecystectomy, 2. previously aborted cholecystectomy, or 3. previous cholecystectomy with incidental finding of cancer on pathology. Traditionally, exploration of a reoperative field in the right-upper quadrant mandates an open approach due to dense adhesions and inflammation. Over the past few years, we have found that robotic-assisted surgery has allowed us to perform these completion cholecystectomies in a minimally invasive fashion.

**Methods:** Case logs and operating room billing logs were reviewed from 2010 to 2017 to identify all robotic-assisted cholecystectomies performed at our institution. Review of all reports identified 30 completion cholecystectomies. All additional variables including demographics, operative variables, and postoperative outcomes were determined from manual chart review of all consultation notes, operative reports, anesthesia records, progress notes, discharge summaries, and postoperative office visits.

**Results:** Of the 30 identified robotic-assisted completion cholecystectomies, 16 patients had a previous subtotal cholecystectomy, 11 patients had an aborted cholecystectomy, and 3 patients had an incidental finding of T2 gallbladder carcinoma on pathology. Fifteen patients (50%) underwent preoperative ERCP either for choledocholithiasis or to determine biliary anatomy. Average time from original procedure was 44 months with 30.0% of previous procedures performed in an open approach. Average OR time was 142.1 minutes, average EBL was 102.1 cc, and average length of stay was 2.1 days. One patient (3.3%) was readmitted within 30 days for nausea that resolved with antiemetics. Three patients (10.0%) had minor postoperative complications (Clavien-Dindo grade 1 or 2) which resolved with pharmacologic therapy. No patients suffered a 90-day mortality. All cases were completed in a minimally invasive fashion without a conversion to an open procedure.

**Conclusions:** Although rare, completion cholecystectomies present a challenging surgical scenario. Although traditionally performed in an open approach, we have had success in recent years at our institution with a robotic-assisted approach to completion cholecystectomy. We feel that the robotic approach offers certain advantages in a hostile, reoperative field which allows us to perform these procedures in a minimally invasive fashion with no conversions to an open procedure to date. Previously limited to case reports, this report of 30 procedures represents the largest case series of robot-assisted completion cholecystectomies to our knowledge.

Average Age	52.5 years
Average ASA	2.6
Average BMI	32.9 kg/m <sup>2</sup>
Average Months from Previous Procedure	44.0
Female	18 (60.0%)
Caucasian	24 (80.0%)
Preoperative ERCP	15 (50.0%)
Previous Subtotal Cholecystectomy	16 (53.3%)
Previous Aborted Cholecystectomy	11 (36.7%)
Incidental Gallbladder Carcinoma on Pathology	3 (10%)

Table 1: Demographics and preoperative variables for 30 robotic-assisted completion cholecystectomies

**P081****Impact of Timing of Interval Cholecystectomy, Following Percutaneous Cholecystostomy Tube for Acute Cholecystitis, on Operative and Patient Outcomes**

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**Background:** Percutaneous cholecystostomy tube (PCT) has been used as a bridge treatment for grade II-III moderate to severe acute cholecystitis (AC) to “cool” the gallbladder down over several weeks and allow the inflammation to resolve prior to performing interval cholecystectomy (IC) and removal of the PCT, often laparoscopically. The aim of this study was to assess the impact of timing of IC after PCT on operative success and outcomes.

**Methods:** A retrospective review of electronic medical records of patients who were treated for AC with a PCT, and subsequently underwent IC at our institution between January 2005 to December 2016 was performed. The patients were divided into three groups ( $n=7$  each), based on the duration of the PCT prior to IC, and these groups were comparatively analyzed. A comparative sub-analysis of clinical outcomes between patients who underwent surgery within the first week vs. third week or later after PCT was also performed.

**Results:** A total of 21 patients met the study criteria. Each group had 7 patients. There were no statistically significant differences between the 3 groups in regards to age, gender, BMI, imaging findings, and indications for cholecystostomy tube placement. Overall, there was no statistically significant difference in outcomes between performing IC within the first 5 weeks, 5–8 weeks and >8 weeks after PCT placement. The length of stay, overall morbidity, Clavien-Dindo grade of complications and mortality were similar between the 3 time intervals. However, a sub-analysis showed that patients who underwent IC within the first week of PCT placement had statistically significant higher mortality rate ( $p=0.048$ ) compared to those who underwent IC>3 weeks of PCT placement. The two patients who died in our sample had IC within a week after PCT placement. Even though there was a statistically significantly higher morbidity rate in those who had IC>3 weeks after PCT, the Clavien-Dindo grade of these complications was lower than.

**Conclusion:** Delaying IC to >5 weeks after PCT placement for AC is not associated with any improvement in patient morbidity, length of stay or rate of conversion from laparoscopic to open cholecystectomy. Cholecystectomy within the first week of PCT placement is associated with higher mortality rate than after 3 weeks likely due to associated sepsis.

**P083****The Effect of Intraoperative Bile Spillage on Operative Decisions and Surgical Outcomes in Laparoscopic Cholecystectomy**

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**Introduction:** The effect of intraoperative bile spillage during laparoscopic cholecystectomy (LC) on operative time (OR time), length of stay (LOS), postoperative complication rates, and 30 day readmission rates was analyzed. Laparoscopic cholecystectomy is the gold standard operation for gallbladder disease in the United States. Number of studies have shown that same day discharge in elective laparoscopic cholecystectomy is feasible and safe. Bile spillage during this procedure can be a common occurrence in teaching institutions, however, data on the effects of operative outcomes is lacking.

**Methods:** This is a retrospective study analyzing all of the laparoscopic cholecystectomies performed at The Brooklyn Hospital Center (TBHC), both emergent and elective, from 2016 to 2017. Patient data was collected on demographics, comorbidities, bile spillage, operative findings, complications, LOS, and 30 day readmission rates. Statistical analysis was performed using IBM SPSS Statistics v. 19. Covaried analysis of variance (ANCOVA) was performed on continuous variables and significance levels were calculated. Pearson's Chi Square significance level was calculated for all binomial variables.

**Results:** Of the 281 patients who underwent LC during this time period, intraoperative bile spillage was encountered in 32 patients. Interestingly, bile spillage was significantly more likely to be seen in elective cases over acute cases (11.8% vs 10.8%,  $p<0.05$ ). There was a statistically significant increase in OR time in cases where intraoperative bile spillage was encountered vs. cases where no bile spillage was encountered (146 vs. 124 min,  $p=0.007$ ). There was a significant increase in rate of conversion to open procedure when bile spillage was encountered (3.1% vs. 0.4%,  $p<0.05$ ). Drain placement rates increased, not surprisingly, when bile spillage was encountered (34.4% vs. 5.6%,  $p<0.05$ ). There was no statistically significant difference in LOS between cases with bile spillage and cases without (2.47 days vs. 1.75 days). There was no significant increase in complication rate or 30 day readmission rates.

**Conclusions:** Intraoperative bile spillage significantly increases OR time, conversion to open procedure, and drain placement. However, there was no significant effect observed of intraoperative bile spillage on length of stay, complication, and 30 day readmission rates. Thus, intraoperative bile spillage appears to have little clinical significance on surgical outcomes. However it may have an impact on overall healthcare costs. Larger prospective studies evaluating the effect of intraoperative bile spillage on LOS, OR time, complication rates, and 30 day readmission rates are needed to analyze these effects further.

**P084****Vascular Surprises in Calot's Triangle During Laparoscopic Cholecystectomy**

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**Study Design:** Prospective and observational study.

**Place and Duration:** From January, 2012 to July 2017. Surgical Unit II, Holy Family Hospital, Rawalpindi.

**Patients and Methods:** Thousand patients with a diagnosis of cholelithiasis were included. Exclusion criteria are patient younger than 12 year and older than 80 year. Calot's triangle dissection was done meticulously. Cystic artery and hepatic artery anomalies and variations were observed and analyzed on SPSS 21.

**Results:** The age varies from 12 to 80 years. On the basis of distributional variation the cystic artery was single in 90% cases, branched in 7% cases and absent in 3% cases. On positional variations the cystic artery was superomedial to the cystic duct in 85% cases, anterior in 7% cases, and posterior in 3% cases and low lying in 5% of the cases. On the basis of length variation results showed that 800 (80%) cases had a normal cystic artery. A short cystic artery was found in 150 (15%) cases and a long cystic artery was present in 50 (5%) cases. Other arterial variations are of hepatic artery i.e Moynihan's Hump (3%) and and right hepatic artery present in calots triangle in 5%

**Conclusions:** For the safety of laparoscopic cholecystectomy one should be well aware of the anatomical variations of the cystic and hepatic artery.

**Keywords:** Cholelithiasis, Cholecystitis, Laparoscopic Cholecystectomy.

**P085****As Small as it Gets: Micro-invasive Laparoscopic Cholecystectomy Using Only two 5 mm Trocars and a Needle Grasper**

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**Background:** The majority of surgeons use four ports including for laparoscopic cholecystectomy (LC). Multiple efforts have been made to reduce number and size of ports. left upper quadrant (LUQ).

**Patients and Methods:** Of 114 LCs performed from 6/2014–4/2017, 109 (96%) were done using three instruments including 55 cases in which 2 trocars and the Teleflex needle grasper were used. In 26 cases only two 5 mm trocars were (left upper quadrant (LUQ) and umbilicus) with the minigrasper being placed between the two. The gallbladder (GB) serosa was incised on both sides and a window was created behind the GB midportion and widened towards fundus and infundibulum. Cystic artery (CA) and cystic duct (CD) were dissected out obtaining the critical view and after the last fundus adhesion was cut, CA and CD were secured with clips or endoloop.

**Results:** Median age of 19 women and 7 men was 42.4 (range 24.1–77.4) years. LC was done for acute cholecystitis ( $n=4$ ), chronic cholecystitis ( $n=8$ ), biliary dyskinesia ( $n=9$ ), choledocholithiasis ( $n=5$ ). Three patients had an ERCP with bile duct clearance prior to the LC. In one case a Keith needle was used to suspend the GB fundus for better exposure. Twelve patients had additional procedures together with their LC (wedge liver biopsy (4), lysis of adhesions (3), umbilical hernia repair (1), mesenteric/lymphnode biopsies (4)). Median OR time was 51 (range 34–129) minutes. The specimen was removed through the LUQ port site in 9 patients. There were no vascular or bile duct injuries in this series. 71% of cases were done as outpatient procedures, 25% of patients required 23 hours observation only three patients were hospitalized for medical reasons.

**Conclusion:** In selected cases with either small stones or biliary dyskinesia, LC with only two 5 mm ports and a needle grasper is possible. The Teleflex minigrasper can completely replace a port based grasper.

**P086****Surgical Outcomes Following Percutaneous Cholecystostomy Placement: A Retrospective Chart Review**

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**Introduction:** Laparoscopic cholecystectomy is a common procedure in the United States, and is safe even in patients with acute disease. However, some patients are still not candidates for urgent surgery; in these circumstances, percutaneous cholecystostomy may be used as a temporizing measure until patients can undergo definitive surgery. This study examined surgical outcomes in patients who underwent percutaneous cholecystostomy (PC) placement, versus all other patients and versus those who underwent early laparoscopic cholecystectomy (LC).

**Methods:** After IRB approval, 900 of approximately 3,000 cholecystectomies performed within one four-hospital system between 2009 and 2015 were randomly selected and retrospectively reviewed. Pre-, intra-, and postoperative data were collected, including all complications within 90 days. Early LC was defined as surgery within 7 days of admission for acute illness, per Gurusamy et al (2013). Following preliminary data analysis, multivariable logistic regression models were generated to identify whether PC was predictive of outcomes of interest.

**Results:** Of the patients reviewed, 35 (3.9%) had percutaneous cholecystostomy placement prior to cholecystectomy, all but one within our institution. The decision to pursue PC versus early LC was made clinically by the attending surgeon; PC was preferred in patients whose disease severity, or comorbidities including postsurgical anatomy, pregnancy, or medical disease, made them poor surgical candidates.

Outcome*	OR	95% CI	p-value
Duration of Surgery >2 hours	2.23	0.86–5.77	0.0995
Cholecystostomy Tube vs. None	0.74	0.23–2.34	0.6035
Critical View of Safety Stated			
Cholecystostomy Tube vs. None	1.71	0.65–4.49	0.2721
Fundus-first dissection			
Cholecystostomy Tube vs. None	14.70	3.21–67.32	0.0005
Conversion to Open			
Cholecystostomy Tube vs. None	10.41	2.47–43.87	0.0014
Surgical site infection			
Cholecystostomy Tube vs. None	0.64	0.04–10.83	0.7607
Wound dehiscence or hernia			
Cholecystostomy Tube vs. None	5.66	0.45–71.08	0.1794
Transfusion			
Cholecystostomy Tube vs. None	13.30	1.54–114.63	0.0185
Common bile duct injury			
Cholecystostomy Tube vs. None	1.20	0.27–5.29	0.8113
Other Complication			
Cholecystostomy Tube vs. None	3.39	1.11–10.32	0.0315
Any Complication			
Cholecystostomy Tube vs. None			

\*Controlling for age, sex, BMI, COPD, CAD, renal failure, preoperative creatinine, HTN, DM, EBL, previous abdominal surgery, previous ERCP, ASA class, and estimated blood loss. Statistically significant values are in bold.

Outcome*	OR	95% CI	p-value
Duration of Surgery >2 hours			
Cholecystostomy Tube vs. Early LC	1.36	0.47–3.91	0.5683
Critical View of Safety Stated			
Cholecystostomy Tube vs. Early LC	0.61	0.17–2.02	0.4465
Fundus-first dissection			
Cholecystostomy Tube vs. Early LC	1.45	0.49–4.27	0.4951
Conversion to Open			
Cholecystostomy Tube vs. Early LC	57.47	4.52–730.96	0.0018
Surgical site infection			
Cholecystostomy Tube vs. Early LC	4.41	0.81–23.88	0.0849
Wound dehiscence or hernia			
Cholecystostomy Tube vs. Early LC	-	-	-
Transfusion			
Cholecystostomy Tube vs. Early LC	1.30	0.17–10.07	0.8012
Common bile duct injury			
Cholecystostomy Tube vs. Early LC	1.43	0.20–10.31	0.7213
Other medical complication			
Cholecystostomy Tube vs. Early LC	0.30	0.03–3.39	0.3321
Any Complication			
Cholecystostomy Tube vs. Early LC	2.25	0.60–8.58	0.2340

\*Controlling for age, sex, BMI, COPD, CAD, renal failure, preoperative creatinine, HTN, DM, EBL, previous abdominal surgery, previous ERCP, ASA class, and estimated blood loss. Statistically significant values are in bold.

The average duration of PC was  $57.6 \pm 33.8$  days. There was one CBD injury in the PC cohort, and three cystic duct stump leaks and three CBD injuries in the non-PC group. There was no significant difference in operative duration, critical view of safety, or choice of fundus-first dissection due to inflammation between PC and non-PC patients. Patients who underwent PC were more likely to have a surgical site infection or bile duct injury; although there were no significant differences in rates of wound dehiscence or hernia, need for transfusion, or postoperative medical complications, the PC cohort was significantly more likely to have any complication when all complications were pooled. Compared to patients who underwent early LC for acute illness requiring hospitalization, the PC cohort remained significantly more likely to require conversion to an open procedure. However, there were no differences in postoperative complications.

**Conclusions:** Although percutaneous cholecystostomy may be an appropriate temporizing measure in patients who are poor surgical candidates, it appears that surgery may be more difficult, even after the gallbladder has “cooled off.” It is also important to counsel these patients about the potential for additional postsurgical complications.

**P087****Advantages and Limitations about Early Laparoscopic Cholecystectomy: Experience in a District Hospital**

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**Introduction:** The standard treatment for lithiasic acute cholecystitis remains the laparoscopic cholecystectomy despite the timing of surgery is still controversial. The aim of this prospective study is to evaluate the advantages and limitations of early laparoscopic cholecystectomy in a district hospital.

**Methods and Procedure:** All patients undergoing laparoscopic cholecystectomy at the Surgical Department of “Carlo Urbani” Hospital in Jesi (Italy) from May to September 2017 were consecutively enrolled. Clinical data such as gender, age, BMI, comorbidity, previous abdominal surgery, previous acute cholecystitis were collected. Subsequently, the patients were arranged in two groups according to the timing of intervention (early versus elective surgery). For each group, we compared data concerning surgery, such as operative time, intraoperative and postoperative complications, length of hospital stay and cost analysis.

**Results:** This study is a part of an ongoing research. So far, we collected 67 laparoscopic cholecystectomies. Ten (15%) of them were admitted with acute cholecystitis and were operated during the hospital stay (group A). Group B included patients scheduled for elective surgery (n=57; 85%). The two groups were comparable with respect to clinical data. Conversion to open approach was performed in 3 cases, all of them in group B. Mean surgical time was  $67.5 \pm 22.01$  minutes in group A and  $62.4 \pm 19.77$  minutes in group B ( $p=0.494$ ). No significant differences in intraoperative and postoperative complications rates were seen in the two groups, just a few in both of them. Mean overall length of hospitalization was  $6.4 \pm 3.89$  days in group A and  $2 \pm 1.63$  days in group B ( $p=0.001$ ), whereas the difference in length of postoperative hospitalization was not statistically significant. Due to the extended hospitalization for group A, the cost increase as compared to group B was statistically significant, too.

**Conclusions:** Early laparoscopy is comparable to delayed laparoscopy in terms of postoperative hospitalization and complications in the management of acute cholecystitis. A longer hospital stay among patients scheduled for immediate surgery may be associated with a more time-consuming diagnostic work-up before surgery. However, in future research we expect to enhance our cost analysis with more data regarding the costs incurred in the first hospitalization reserved to non-operative treatment of group B inpatients with acute cholecystitis.

**P088****Reduced Consciousness, Malignancy and Quick Sequential Organ Failure Assessment (qSOFA) Score Predict Mortality in Octogenarian Patients with Acute Cholangitis**

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**Introduction:** With improvements in healthcare access and technology, admissions of octogenarian population with acute cholangitis (AC) are increasing. Octogenarians are vulnerable to inferior outcomes. There is no study to evaluate factors predicting outcomes of AC in octogenarians. The aim of our study is identify factors predicting outcomes, and to evaluate the quick sequential organ failure assessment (qSOFA) score and Tokyo Guidelines 2013 (TG13) severity grading for octogenarian patients with AC.

**Methods:** A retrospective review of octogenarian patients admitted with AC from January 2010 to December 2016 was performed. Demographic profile, clinical presentation and discharge outcomes were studied. Systemic inflammatory response syndrome (SIRS), qSOFA and TG13 severity grading scores were calculated. Mortality is defined as death within 30 days of admission or in hospital mortality. Statistical analysis was performed using SPSS Version 21.

**Results:** There were a total of 1875 patients admitted for AC, of which 284 (15%) were octogenarians. Majority (n=167, 59%) were female, with a mean age of 83 (range 80–86) years. Majority were secondary to gallstones (n=197, 69%), and 53 (19%) were due to malignancies. 140 (49%) and 8 (3%) patients fulfilled SIRS and qSOFA criteria of severity respectively. 142 (50%) and 93 (33%) of patients had a TG13 severity grading of moderate and severe respectively. Nine (3%) patients required inotropic support in the emergency department (ED) and 48 (17%) patients were admitted to critical care unit (CCU). 166 (58%) patients underwent endoscopic retrograde cholangiopancreatography (ERCP) and 33 (12%) underwent percutaneous transhepatic biliary drainage (PTBD) for biliary decompression. 8 patients underwent index cholecystectomy. Length of stay was 11.5 (range 1–91) days and 30-day mortality of 11%.

Multivariate analysis performed showed that an abnormal Glasgow coma score ( $p=0.017$ ) and malignancy ( $p<0.001$ ) predicted 30-day mortality. The use of ED inotropic support predicted CCU admission ( $p=0.004$ ). A positive blood culture ( $p=0.005$ ), presence of malignancy ( $p<0.001$ ), use of ED inotropes ( $p=0.001$ ), and index cholecystectomy ( $p=0.008$ ) predicted a longer length of stay. qSOFA ( $p<0.001$ ) and TG13 severity grading ( $p=0.001$ ) were predictive of 30-day mortality. SIRS criteria did not predict 30-day mortality.

**Conclusion:** Reduced consciousness and malignancy predicted 30-day mortality in octogenarian patients with AC. qSOFA and TG13 severity grading system is superior to SIRS criteria in predicting mortality of octogenarians with AC.

**P089****Randomized Control Study of Needlescopic Grasper Assisted Single- Versus Three-Incision Laparoscopic Cholecystectomy**

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**Introduction:** Single incision laparoscopic cholecystectomy (SILC) has some technical problems. Our group has performed needlescopic grasper assisted SILC (nSILC) to overcome these problems. We evaluate the technical feasibility, safety and benefit of nSILC versus three-port laparoscopic Cholecystectomy (TPLC).

**Methods and Procedures:** This prospective randomized control study was conducted to compare the advantages if any between the nSILC and TPLC. One hundred and forty eight patient were randomized into two groups, with one group underwent nSILC (74 patients) and a control group underwent TPLC (74 patients). Basic information about the patient and diagnosis was collected. The surgical outcome that was composed with critical view of safety (CVS) time, major procedure time and total operation time, and the comparison of postoperative complication was made.

**Result:** nSILC group was consisted of 20 male (27.0%) and 54 female (73.0%), and TPLC group was consisted of 32 male (43.2%) and 42 female (56.8%) ( $p=0.038$ ). The average age of nSILC group was  $44.5 \pm 13.2$  years old, and TPLC group was  $52.5 \pm 15.2$  years old ( $p=0.003$ ). CVS time of TPLC group was shorter than SILC group (nSILC:  $14.4 \pm 8.9$  min, TPLC:  $10.0 \pm 7.1$  min,  $p=0.002$ ), major procedure time (skin incision to GB removal from liver bed) of TPLC group was shorter than nSILC group (SILC group:  $21.7 \pm 15.3$  min, TPLC:  $10.6 \pm 8.4$  min,  $p=0.002$ ). However, there was no significant difference in postoperative complication (nSILC: 3, TPLC: 6,  $p=0.634$ ).

**Conclusion:** Although CVS time, major procedure time, and operation time of SILC were longer than TPLC. Overall clinical results were similar. nSILC is feasible and safe surgical procedure in patient with benign gallbladder disease.

**P090****Outcomes of Percutaneous Cholecystostomy in Malignant Biliary Obstruction**

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**Introduction:** Management of malignant biliary obstruction not amenable to surgery is usually by means of ERCP or PTHC. However, on occasions, these routes are not accessible and the alternate decompressive technique of percutaneous cholecystostomy (PC) has to be adopted. The aim of this study was to evaluate the efficacy and outcomes of PC in a highly selected series at a tertiary referral center.

**Methods:** We retrospectively reviewed all patients that had undergone PC from 2000 to 2014. Data collected included baseline demographics, comorbidities, details of PC placement and management, etiology of MBO, and post-procedure outcomes. The Charlson comorbidity index (CCI) was calculated for all patients at the time of PC.

**Results:** Four hundred and eight patients underwent PC placement of which 28 patients including 18 (64%) males and 10 (36%) females, with malignant biliary obstruction. The mean age at the time of PC placement was  $63.5 \pm 11.7$  years of age, and the mean CCI was  $8.03 \pm 2.82$  for all patients. Of MBO in all 28 patients was due to pancreatic malignancies (n=14), cholangiocarcinoma (n=6), primary hepatic malignancies (n=3), secondary hepatic tumors (n=4), and ampullary carcinoma (n=1). PC tube complications were reported in 7 (25%) patients. Mean number of tube exchanges was  $3.4 \pm 2.65$ . Mean duration from PC tube placement to death was  $159 \pm 159.4$  days. 14 total deaths were recorded.

**Conclusion:** PC placement appears to be a viable option in MBO in elderly and frail patients. In this cohort, PC may be a potential definitive management to improve quality of life.

**P091****Association of Biliary Disease and Reflux**

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**Background:** There are very few studies assessing the relationship between gastroesophageal reflux and biliary disease. This is surprising as they share presenting symptoms as well as risk factors, particularly obesity. Our group previously produced a review of 36 patients in our practice who had undergone some type of reflux procedure. Conclusions showed that the prevalence of gallbladder disease in our severe reflux population is much higher compared to that found in the general population. Our goal of this study is to expand on that data to include a larger sample size to investigate the incidence of biliary disease in our reflux population and decide if this should influence our pre-operative algorithm for anti-reflux surgery patients.

**Methods:** We expanded on our previously performed retrospective review of patients that underwent laparoscopic fundoplication for reflux disease. We previously reviewed data from 2015 to 2017. We are now looking at data from 2012 to 2017. Our expected sample size will include approximately 150 patients, 75 of which have currently been reviewed. Our previous study included only 36. The surgery preformed was either a Toupet or Nissen fundoplication, and one underwent a Dor. Demographic data, imaging studies, and pathology results were reviewed.

**Results:** We looked at whether each patient who underwent antireflux surgery had a prior cholecystectomy either remotely or recently, underwent concomitant cholecystectomy, or had no biliary disease in their workup. The groups had similar age and were predominantly women.

**Conclusion:** We once again demonstrated that the prevalence of gallbladder disease in our severe reflux population is much higher than the general population. When approaching a patient with gastroesophageal reflux disease, attention should be paid to gallbladder symptomatology as well. We recommend that it may be beneficial to include gallbladder ultrasound in pre-operative workup for antireflux surgery so that concomitant cholecystectomy can be performed if indicated.

**P092****Is High Morbidity and Cost Associated with Tube Cholecystostomy Worth It? A Paradigm Shift**

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**Introduction:** Acute cholecystitis is a common surgical disease with roughly 500,000 cholecystectomies performed in the US annually. The current dogma revolves around the “72 hour rule” advocating early cholecystectomy if within the window, and if beyond 72 hours, conservative treatment and interval operation. In patients beyond the 72 hour window, as well as with multiple comorbidities, advanced age, and other complicating factors, cholecystostomy has become an acceptable treatment as a bridge to interval cholecystectomy. While this has become an appropriate treatment modality, it does not come without its own set of complications. We aim to evaluate the rate of complications in our institution.

**Methods:** This is a retrospective review of all patients at our institution who underwent cholecystostomy placement between 2013 and 2016. We evaluate the comorbidities, readmission rate, overall rate of complication associated with cholecystostomy tubes, and eventual definitive cholecystectomy.

**Results:** Our cohort includes 100 patients, 52% of whom were male, with a mean age of 71. We had an overall complication rate of 49.5%, including tube dislodgements, leaking tubes, and misplaced tubes. All cause readmission rate was 56% and only 32% of patients who had cholecystostomy drains underwent interval cholecystectomy.

**Conclusion:** There has been much interest in treatment of acute cholecystitis in patients with multiple comorbidities. In review of our data, a surprisingly large number of patients had mechanical complications involving the cholecystostomy drain. In an era focused on decreasing readmission rates and their associated costs, drains carry a high risk of malfunction which will in turn, lead to increases in these two metrics. While there is more work to be done in the evaluation of early cholecystectomy versus cholecystostomy in this subgroup of patients, we suspect that early cholecystectomy in the medically optimized patient will lead to reduced length of stay and hospital costs as well as increased patient satisfaction.

**P094****Does Selective Use of Hepatobiliary Scintigraphy (HIDA) Scan for Diagnosis of Acute Cholecystitis, Following Equivocal Non-diagnostic Gallbladder Ultrasonography, Affect Outcomes**

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**Introduction:** Acute cholecystitis (AC) is diagnosed by characteristic gallbladder ultrasonographic findings (high specificity, low sensitivity). Hepatobiliary scintigraphy (HIDA) may be needed to confirm AC (higher sensitivity and specificity). The aim of this study was to assess the impact of the current selective use of HIDA scan for sonographically equivocal cases of AC on outcomes.

**Methods:** A retrospective chart review of patients treated for AC at our institution (1/2015 to 12/2016) was performed. Patients were divided into 2 groups: the Ultrasound Only group (US-only) and the Ultrasound-HIDA group (US-HIDA). Timing of US and HIDA, and intervention for AC since presentation to emergency room (ER), and their impact on outcomes were analyzed. AC severity was graded per the TG3-Tokyo guidelines.

**Results:** A total of 110 patients were analyzed. The 2 groups were statistically similar with regards to age, body mass index, ASA class II, III and IV, extent of leukocytosis at presentation and liver functions test levels at presentation. In the US-only group, diagnostic ultrasound was obtained sooner, [median of 3 (interquartile range, IQR 1.3–8.7) hours] from presentation to the ER compared to the US-HIDA group, [10.9 (IQR 3.6–40.6) hours],  $p=0.007$ . HIDA was obtained after a median delay of 11.5 (IQR 3.7–25) hours from a non-diagnostic ultrasound. Majority of patients (87%) in the US-only group had mild (TG3 grade I) to moderate (TG3 grade II) AC, while 78% of the US-HIDA group had moderate (TG3 grade II) to severe (TG3 grade III) AC ( $p=0.003$ ). Despite this, more patients in the US-HIDA group (39%) had a “normal” non-diagnostic ultrasound compared to the US-only group (4.3%),  $p<0.001$ . Seven patients in the US-HIDA group had no intervention due to normal HIDA scan (2), AC misdiagnosis due to liver cirrhosis (1), and severe medical comorbidities (4). More patients (74%) in the US-only group underwent laparoscopic cholecystectomy, compared to 39% in the US-HIDA group ( $p=0.006$ ). Between the two groups, there was no significant differences in 90-day morbidity, mortality and reoperations. However, the length of stay was longer by a median of 3.5 days in the US-HIDA group ( $p=0.003$ ).

**Conclusion:** Patients with moderate to severe AC are more likely to need HIDA scan due to a “normal” non-diagnostic ultrasound, have a delay in diagnosis, not have intervention for AC due to severe medical comorbidities and have lower chance of laparoscopic cholecystectomy. The length of hospital stay is significantly longer for these patient by a median of 3.5 days.

**P095****Is Routine Histopathology Necessary for all Gallbladder Specimens?**

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**Introduction:** Benign gallbladder disease is commonly treated with Laparoscopic cholecystectomy (LC). Gallbladder cancer (GBC) is a rare malignancy characterized by high invasiveness and poor survival. In our institution, all gallbladder specimens are routinely sent to pathology, to rule out GBC. The purpose of our study was to assess the efficacy for routine histopathology of gallbladder specimens after cholecystectomy (CLY) for all gallbladder disease.

**Methods and Procedures:** After obtaining approval from our institutional review board, a retrospective review was conducted on all patients who underwent CLY from June of 2012 to May 2016 were included in the study. The data obtained include gender, age, American Society of Anesthesiologist score (ASA), body mass index (BMI), comorbidities, length of stay (LOS), radiological imaging and pathology results. Independent T and Chi-square tests were performed using IBM® SPSS® 24 software.

**Results:** There were 903 CLY performed at our institution, of which 842 (93%) were LC. Females composed of 675 (75%) patients and the median age was 48.7 (1%) gallbladder specimens were found to be cancerous. 896 (99%) gallbladder specimens were benign. Majority 533 (59%) were chronic cholecystitis, 238 (27%) were acute cholecystitis and 22 (2%) were gangrenous cholecystitis. 29 (3%) were found to be acalculus cholecystitis and 5 (1%) were cholelithiasis. 69 (7%) were found to be adenomyosis, and other.

**Conclusion:** In our institution, less than 1% (7) of all gallbladder specimens were found to be cancerous. It would decrease cost and work load if gallbladder specimens are selectively sent to pathology.

**P096****Identifying Factors Contributing to Morbidity in Recurrent Cholangitis**

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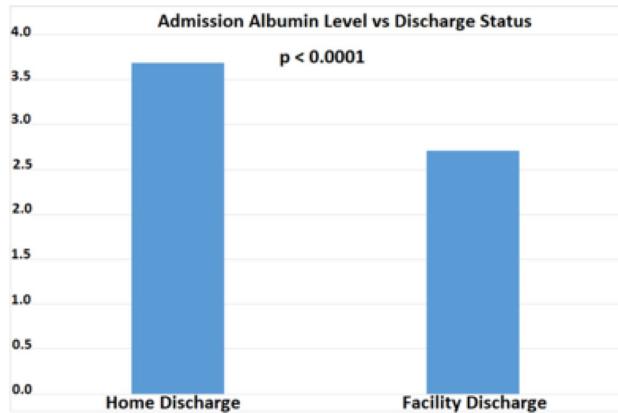
**Introduction:** Recurrent Cholangitis can be caused by parasitical, calculous or malignant disease. We sought to determine clinical factors associated with recurrent cholangitis in two Las Vegas community hospitals to aid providers in management of this disease.

**Methods and Procedures:** Retrospective, multi-center study. Over 4000 ERCPs were analyzed between 2010 and 2017. 24 patients were identified as having multiple (60) admissions for cholangitis per Tokyo criteria. Univariate and multivariate analysis was conducted.

**Results:** Patients with a significantly ( $p<0.0001$ ) higher albumin level on admission (3.7) were discharged home more often than patients discharged to a facility or hospice (2.7). On Multivariate analysis, non-home discharge was associated with lower albumin level at admission ( $p=0.0055$ ) and greater maximum temperature prior to decompression ( $p=0.0354$ ). Increased hospital stay was associated with lower albumin level at admission ( $p=0.0019$ ).

A majority (31/60) of recurrent episodes involved stent placement, exchange or removal. 14 patients (58%) had either biliary malignancy, gallbladder or both. Blood cultures were drawn in 52% of all episodes and positive in 45%, E coli being the most common pathogen isolated. All patients had low HDL levels (6–36, mean 22).

**Conclusions:** High fevers and poor nutritional status was associated with increased length of hospital stay and fewer home discharges. Tumors, gallbladders and malfunctioning stents contribute substantially to morbidity. Close follow up for indicated gallbladder removal, stent management and nutritional optimization is critical to reduce the burden of this disease.

**P097****Laparoscopic Versus Open Excision of Choledochal Cyst in Neonates; Surgical Methods and Outcomes**

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**Purpose:** Laparoscopic excision of choledochal cyst (LEC) can be performed preferably in pediatrics and adults. However, LEC is not performed well in neonates because the safety and feasibility of neonatal LEC remain unknown. The purpose of this study is to evaluate our surgical outcomes of LEC in neonates.

**Methods:** More than 350 pediatric patients with choledochal cyst underwent surgical treatment in Asan Medical Center, South Korea. This is a retrospective study of 35 neonates who underwent excision of choledochal cyst between November 2001 and May 2016. The 19 neonates underwent open excision of choledochal cyst (OEC) and 16 neonates underwent LEC. We compared the surgical method in neonate choledochal cyst between OEC and LEC. The perioperative and surgical outcomes that were reviewed included age, operative time, postoperative hospital stay, time to diet, and surgical complications. The patients were followed up for 42 months (range, 9–146 months).

**Results:** There was no difference in range of bile duct excision and manner of Roux-en-Y hepatojejunostomy between OEC and LEC groups. There was no intraoperative complication in both groups and no open conversion in the LEC group except one case which was ruptured choledochal cyst. The median age of OEC and LEC groups were 13 days (range, 2–30) and 12.5 days (range, 6–26) and median body weight at the time of operation were 3.50 kg (range, 2.64–4.22) and 3.32 kg (range, 2.73–4.22), respectively. The median operative time was 163 minutes (range, 126–336) in OEC and 237.5 minutes (range, 150–351) in LEC groups and there was no significant difference between OEC and LEC groups ( $P=0.116$ ). Intraoperative bleeding was minimal in both groups. The postoperative hospital-stay, time to start diet, and time to return to full feeding had no significant differences in both groups. After discharge, 5 of 19 (26%) OEC patients experienced readmission due to cholangitis and ileus, while there were none in the LEC group.

**Conclusions:** This study revealed that LEC had better prognosis compared to OEC. LEC provided an excellent cosmetic result. So we suggest LEC could be the treatment of choice for neonatal choledochal cyst. This is a small series, therefore future studies will have to include a larger number of patients and evaluate long-term follow-up.

**Keywords:** Choledochal cyst, Laparoscopy, Neonate.

**P098****Laparoscopic Narrow Band Imaging for Intraoperative Diagnosis of Tumor Invasiveness in Gallbladder Carcinoma: A Preliminary Study**

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**Introduction:** Determining tumor invasiveness before operation is one of the most important unsolved issues in the management of gallbladder cancer. We hypothesized that the assessment of irregular vessels on the gallbladder wall may be useful for detecting subserosal infiltration. We present an initial report on the clinical usefulness of laparoscopic narrow band imaging (NBI) for the intraoperative diagnosis of tumor invasiveness in gallbladder carcinoma.

**Methods:** Thirteen patients with gallbladder cancer were included in this study. Patients with tumors located in the liver bed and those with definitive invasion observed on computed tomography findings were excluded from this study. Gallbladders were observed using NBI and the microvasculature was evaluated. According to previous reports of endoscopic NBI, we defined four findings as positive: vessel dilatation, tortuosity, interruption, and heterogeneity. The NBI findings were compared with postoperative pathological findings. The study protocol was approved by the Institutional Review Board of the Oita University.

**Results:** The serosal surface of the tumor site and its microvasculature were successfully observed in all 13 patients. Laparoscopic NBI detected at least one abnormal finding in seven patients, and postoperative pathology showed subserosal infiltration accompanied by vessel invasion. On the contrary, six patients with no positive NBI findings showed mild or no subserosal infiltration and no vessel invasion.

**Conclusions:** Our study indicated that laparoscopic NBI may be useful for diagnosing subserosal infiltration accompanied by a vessel invasion.

**P099****Reduced-Port Laparoscopic Cholecystectomy for Young Surgeons**

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**Introduction:** Laparoscopic cholecystectomy (Lap-C) is the standard operation for the benign diseases. We have reported reduced port Lap-C (RPL-C) was safely and comparable method to SILS-C and conventional Lap-C (SAGES 2017). In this time, we examined the utility of RPL-C containing the post-operative adverse event.

**Procedures:** The adjustment is the benign illness including the cholezystolithiasis, and advanced obesity and the cases of the inflammation remaining have been excluded. The incision is put and cut open the abdomen to the umbilical region, and camera port was inserted. We used 5 mm flexible scope. 3 mm forceps for holding of the gallbladder bottom and left hand of operator were inserted directly with no port.

**Methods:** RPL-C has been introduced in this department since July, 2009. We performed 224 cases of Lap-C, containing SILS-C and American style conventional Lap-C, and we performed RPL-C has been performed already 156 cases. We compared the patient background and the operation factor between RPL-C, SILS-C, conventional Lap-C. Operators were young surgeons, they were not specialists of gastroenterological surgery or endoscopic surgery.

**Results:** The difference was not admitted in the age, gender, the physique, and the disease, and the difference was not admitted in hospital stay after the operation (RPL-C:SILS-C:conventional Lap-C=5.3±0.2 days:5.5±0.2 days:6.7±1.0 days) and the amount of blood loss (RPL-C:SILS-C:conventional Lap-C=4.7±0.9 ml:9.0±1.9 ml:9.6±4.2 ml) and operation time (RPL-C:SILS-C:conventional Lap-C=129±3 min:118±6 min:136±3 min). And surgical wound after RPL-C was cosmetically acceptable. Regarding as the post-operative adverse event, there were no patients of bile duct injury.

**Conclusion:** In the patients on reduced port Lap-C, there were no bile duct injuries of post-operative adverse event. Reduced port Lap-C is safely for young surgeons and comparable method.

**P100****Endoscopic Retrograde Cholangiopancreatogram (ERCP) Stent Occlusion After Sphincterotomy Due to Bleeding and Clot Formation**

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**Introduction:** Acute cholangitis is an ascending infection of the biliary tree secondary to obstruction and can be severe if proper intervention and treatment are not performed in a timely fashion. The most common management of cholangitis with ductal obstruction due to choledocholithiasis is intravenous hydration, empiric antibiotic therapy, endoscopic retrograde cholangiopancreatogram (ERCP) with sphincterotomy and stone extraction with or without stent placement, followed by a delayed laparoscopic cholecystectomy. We present the case of a patient with blood clot obstruction of a common bile duct (CBD) stent after ERCP with sphincterotomy and stone extraction.

**Case Presentation:** A 58 year old male presented to the emergency department with jaundice, right upper quadrant abdominal pain, truncal pruritis, nausea, vomiting, and fever. Biochemical analyses and liver profile demonstrated an elevated white blood cell count, hyperbilirubinemia, and elevated liver enzymes consistent with cholestasis. Biliary ultrasound demonstrated multiple gallstones and dilation of the CBD with a distal obstructing calculus. He proceeded to ERCP where biliary cannulation was achieved, sphincterotomy performed, and a large amount of sludge and pus was drained. An 8 mm stone was removed from the CBD by balloon sweep with completion cholangiogram demonstrating no filling defects. A stent was then placed in the CBD with adequate flow. Following the procedure, the patient continued to have increasing hyperbilirubinemia. A repeat ERCP revealed a large blood clot and continued bleeding at the previous sphincterotomy that resolved with epinephrine injection. The former stent was visualized in the proper position, removed with a snare, and found to be fully occluded with blood clots. After retrieval of additional clots, a new stent was placed with adequate return of bile. The patient recovered with resolution of his symptoms and hyperbilirubinemia with laparoscopic cholecystectomy.

**Discussion:** Cholangitis is characterized by Charcot's triad of right upper quadrant abdominal pain, fever, and jaundice due to an ascending bacterial infection of the biliary tree coinciding with obstruction of biliary flow most commonly from gallstones. Cholangiography via ERCP with associated sphincterotomy, stone extraction, and stenting is both diagnostic and therapeutic. While debated by endoscopists, stent placement has shown to reduce recurrent biliary complications, decrease length of hospital stay, and lessen morbidity. Although pancreatitis is the most common cause of hyperbilirubinemia post-ERCP, stent occlusion secondary to stones or blood clots should be considered to effectively treat patients. Proper hemostasis is important in any procedure and close patient follow-up should be performed to prevent further complications.

**P101****Choledochal Cyst Excision in Adults: Experience by Laparoscopic Approach**

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**Background:** Choledochal cyst (CC) is a rare disease, characterized by dilatations of the extra- or intrahepatic bile ducts. CCs occur most frequently in Asian and female populations. CC is associated with biliary lithiasis and considered at risk of malignant transformation. Todani's classification dividing CC into 5 types is the most useful in clinical practice. The current standard treatment is complete cyst excision with Roux-en-Y hepatojejunostomy and cholecystectomy for the extrahepatic disease (Todani type I and IV). In this report we present our experience using a total laparoscopic technique to treat adult patients with CC in 5-year period.

**Methods:** A retrospective review of the records of the patients above 15 years who underwent laparoscopic cyst excision and Roux-en-Y hepatojejunostomy in our hospital between January 2013 and May 2017 was carried out. The data included the clinical presentation, investigation, perioperative details and complication. The type of CC was classified according to Todani's classification.

**Results:** Seven cases of CC were reviewed, 6 females and 1 male with mean age 33 years (range 20–65 years). These included 5 cases of Todani type IB and 2 cases of type 4A. The predominant symptoms were chronic abdominal pain and jaundice. A case of both pancreatitis and cholangitis were also seen. Investigations included ultrasound with MRCP in 6 cases and ERCP in 1 case. The mean operative time was 4 hours and 20 minutes (3 hours 30 minutes to 5 hours range) with mean intraoperative blood loss 85 ml (range 20–200 ml). All the resected specimens showed chronic inflammation. Malignancy was not seen in any patients. The early postoperative complications included bile leakage with intra-abdominal collection in 2 patients, which were managed conservatively (evidenced by clinical status and imaging study), re-operation was not required. The median duration of hospital stay was 8 days (range 6–23 days). There was no perioperative mortality. All patients were followed up at 1, 6, and 12 months postoperatively, late complication were not detected during each visit.

**Conclusion:** In our opinion, laparoscopic cyst excision and hepatojejunostomy could offer more feasible and safe methods of treatment for CCs in adult patients with potentially less postoperative morbidity, a shortened length of stay and a lower blood loss when compared to the preferred open approach. However, we would need to study this on a larger sample of patients to report the efficacy and safety of laparoscopic approach.

**P102****The Application of Supine Position in ERCP: Is it as Safe and Effective as Prone Position?**

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**Objective:** To investigate if ERCP (endoscopic retrograde cholangiopancreatography) conducted with patient in supine position is as safe and effective as in traditional prone position.

**Methods:** 52 consecutive patients who were undergoing ERCP in our center were randomized to be operated in either prone or supine position. Demographic and clinical characteristics of the 52 study patients were recorded. Difficulty of cannulation of the ampulla of Vater was assessed with the Freeman Score. Total procedure time, intra-operative vital signs (Heart rate, oxygen desaturation and mean artery pressure), patient tolerance were also recorded and compared.

**Results:** There was no statistically difference for the Freeman score and procedure time between the two groups. Vital signs were compared in the two groups respectively on the basis of 4 steps during the procedure: enter of endoscope; cannulation; sphincterotomy and nasobiliary drainage, no significant difference were found between the two groups during each step, while heart rate and MAP during enter of endoscope in both supine ( $p=0.01$ ;  $p=0.001$ ) and prone group ( $p=0.027$ ;  $p=0.021$ ) increased significantly compared to base line level.

**Conclusion:** We believe that ERCP could be performed with the patient in the supine position since it is as safe and effective as that in prone position.

**P103****Endoscopic Trans-papillary Gallbladder Drainage (ETGBD) in Acute Cholecystitis: A Single Center Experience**

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**Background:** Surgery is the mainstay of treatment for cholecystitis, however, it may not be safe or feasible in some circumstances such as severe cholecystitis or cholecystitis in extremely high-risk patients. Gallbladder drainage may be an appropriate alternative or a bridging option prior to cholecystectomy. Endoscopic trans-papillary gallbladder drainage (ETGBD) has been proposed as a modality that is feasible and effective in cholecystitis.

**Objective:** The primary outcome of this study is to evaluate the effectiveness of ETGBD. The secondary outcome is to evaluate the safety, early experience outcomes, and complications of this procedure.

**Methods:** Retrospective medical records review between January 2014–December 2016 from a single tertiary referral hospital center, Rajavithi Hospital, Bangkok, Thailand. A total of 6 patients who was diagnosed with cholecystitis and underwent ETGBD. The procedure was performed at the endoscopic suite under light sedation via total intravenous anesthesia. The patient demographic data and procedures were collected. The technical success of ETGBD was defined as decompression of the gallbladder by successful cystic duct stent placement. The clinical success was defined as resolution of symptoms and/or improved laboratory data and ultra-sonographic findings.

**Results:** A total of 6 patients underwent ETGBD. Among these patients, 4 were high risk for surgery due to age or comorbidity, 1 had concomitant jaundice and 1 was failure of medical treatment.

Both technical and clinical success of ETGBD was achieved in 4 of 6 cases (67%).

The two patients that did not achieve technical success were due to failure to cannulate guidewire through cystic duct and the other had trans-cystic guidewire perforation that needed surgical intervention.

There were two intra-operative complications (33%). One was the patient who had trans-cystic guidewire perforation and another had anesthesia-related complication (hypotension requiring endotracheal intubation). There were no 30-day mortality.

**Conclusion:** Endoscopic trans-papillary gallbladder drainage is an alternative treatment modality for patients with cholecystitis who are at high-risk for surgery and/or those who are unsuitable for percutaneous gallbladder drainage. The technique is feasible, however, careful case selection and high endoscopic skill is needed.

**P104****Long-Term Outcomes After Subtotal Cholecystectomy: A Retrospective Case Series**

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**Introduction:** Subtotal cholecystectomy, where the infundibulum of the gallbladder is transected to avoid dissecting within a heavily inflamed triangle of Calot, has been suggested as a method to conduct laparoscopic cholecystectomy while avoiding common bile duct injury. However, some case reports have suggested the possibility of recurrent symptoms from the remnant gallbladder. This retrospective case series reports a minimum of two-year follow-up on patients who underwent subtotal cholecystectomy within one four-hospital system.

**Methods:** A retrospective chart review database containing 900 randomly selected cholecystectomies, all of which occurred between 2009 and 2015, was reviewed to identify all instances of subtotal cholecystectomy. Charts for these patients were reviewed through 09/2017, including any documentation from other providers, including primary care.

**Results:** Six patients who underwent subtotal cholecystectomy with a remnant of infundibulum left following surgery were identified. Surgical approach and the choice to perform subtotal cholecystectomy were dependent on the attending surgeon; all decisions were made intraoperatively. There was an average of 70 months of follow-up for these patients within our institution.

Patient	Month of surgery	Indication for subtotal cholecystectomy	Drain duration (days)	Follow-up through 2017
1	11/2010	Absent cystic duct; divided GB at level just above common bile duct and closed with suture. Strasberg class D bile duct injury occurred during surgery.	7	CBD injury managed with intraoperative T-tube placement; after T-tube removed, no further issues
2	08/2011	Severe inflammation; converted to open, unable to dissect last 5mm of infundibulum; GB transected and oversewn	3	No further issues
3	08/2012	Could not dissect medial wall of last 1cm of GB due to inflammation against bile duct; divided with blue load	19	No further issues
4	06/2010	Due to adhesions, GIA stapler used to divide GB at the neck	n/a	No further issues
5	09/2013	GB transected above large palpable stone in infundibulum; stone removed and remnant oversewn	8 and 9 (2 drains)	No further issues; lost to follow-up in 2015
6	11/2009	Unable to identify cystic artery or duct; infundibulum dissected, transected, and oversewn. Cystic duct occluded.	42	No further issues

**Discussion:** This case series adds six cases to the literature surrounding long-term outcomes in patients who underwent subtotal cholecystectomy. Although one patient was lost to follow-up, no patient had recurrent biliary colic or other complications arising from the remnant gallbladder. This may be encouraging to surgeons who feel that subtotal cholecystectomy with an infundibular remnant is the safest way to proceed with cholecystectomy in patients with severe inflammation.

**P105****Indocyanine Green Use in Laparoscopic Cholecystectomy: Potential Shift in Standard of Care?**

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**Objective:** This study aims to evaluate the utility and efficiency of ICG as an alternative to routine intraoperative cholangiogram in patients undergoing cholecystectomy.

**Introduction:** Common bile duct injury is an uncommon, but serious complication associated with laparoscopic cholecystectomy. Current guidelines state that when used routinely intraoperative cholangiogram (IOC) can decrease biliary injury, however it is not routinely used due to increased time of operation, and inaccessibility of equipment. Indocyanine Green (ICG) has been found to be effective for identification of biliary anatomy during cholecystectomy, however has not yet been widely adopted. We aim to assess if ICG is able to overcome the obstacles of IOC, while still effectively assessing biliary anatomy.

**Methods:** We performed a retrospective analysis of laparoscopic cholecystectomies performed in a single institution from January 2014 to September 2017. Elective and emergent cases were included. We stratified patients into ICG and non-ICG groups. Patients who had concomitant procedures performed were excluded. We analyzed patient demographic information, as well as BMI, ASA classification and comorbidities in both groups. Our primary outcome was operation time (skin to skin), and laparotomy conversion rate. Secondary outcomes were effectiveness of ICG in visualizing biliary anatomy, and cost.

**Results:** 145 patients were included in our study, 59 in the non-ICG arm and 86 in the ICG arm. Both groups were similar in background. There were no statistical differences in patient demographics, ASA classification, BMI, or comorbidities. There was no statistical difference in operation time (58.0 vs 54.5 minutes;  $p < 0.202$ ) or conversion rate (1.6 vs 0%;  $p < 0.226$ ). ICG was able to delineate biliary anatomy in 100% of the patients. The cost of a 25 mg/Vial kit of ICG is approximately \$70.

**Conclusion:** The use of ICG does not increase operating time during laparoscopic cholecystectomy. ICG is an inexpensive and effective tool used to delineate biliary anatomy without the inherent burden and limitations of IOC.

**P106****Outcomes of Laparoscopic-Assisted ERCP in Gastric Bypass Patients at a Community Hospital Center**

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**Introduction:** Obesity is a prevalent issue in today's society, which has increased the number of gastric weight loss surgeries. This presents an anatomical challenge to biliary disease requiring endoscopic retrograde cholangiopancreatography (ERCP). In gastric bypass patients, traditional ERCP via the mouth in these patients is technically more challenging, requiring a longer endoscope with a reported success rate of less than 70%. A solution is laparoscopic assisted ERCP (LA-ERCP) via gastrostomy. This minimally invasive technique has become increasingly more prevalent and safe. We present our experience with LA-ERCP at our teaching community hospital in a large cohort of patients.

**Methods and Procedures:** Retrospective chart review was performed on all patients with a history of prior laparoscopic gastric bypass surgery who underwent LA-ERCP from April 2008 to April 2016. The procedure was performed by two different general surgeons and one gastroenterologist. A pursestring suture and transfacial stay sutures were used to bring the gastric remnant to the abdominal wall. A gastrostomy was then created and accessed by the duodenoscope to perform the ERCP. Biliary sphincterotomy, papillary or biliary dilation, lithotripsy, stent placement, and/or stone removal were performed as indicated. We observed the incidence of postoperative outcomes, including acute pancreatitis, reoperation, post-procedure infection, pain control, hospital re-admission and bile leak.

**Results:** Thirty-two patients met inclusion criteria. Six patients were male and twenty-six were female, with mean ages of 59 (std dev 7) and 53 years (std dev 15), respectively. Indications for LA-ERCP included suspected choledocholithiasis (25/32), cholangitis with choledocholithiasis (2/32), acute pancreatitis (2/32), abdominal pain with abnormal LFT (1/32), cholangitis with cholelithiasis (1/32), and bile leak (1/32). LA-ERCP was successfully performed in all thirty-two patients. Biliary cannulation, sphincterotomy and stone extraction were performed on 31/32 patients, and one patient underwent sphincterotomy and stent placement for bile leak after recent laparoscopic cholecystectomy. One patient developed acute pancreatitis with elevated pancreatic enzymes which resolved after conservative treatment. One patient required a second LA-ERCP for stent replacement due to a persistent bile leak. The median length of stay was 2 days (range 1–10 days).

**Conclusions:** LA-ERCP is a safe and feasible alternative to open surgery, and can be safely implemented at community hospitals with adequately trained providers. Obesity is a growing burden on society, increasing the incidence of weight loss surgery. Our large study proves that in this minimally invasive era, LA-ERCP provides gastric bypass patients a safe alternative with less pain and increased satisfaction.

**P107****Recurrent Bile Duct Stones After Endoscopic Sphincterotomy in 2255 Patients**

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**Background:** Endoscopic sphincterotomy (ES) is an effective therapeutic procedure for common bile duct (CBD) stone clearance but it carries a substantial risk of recurrent stones at long-term outcome.

**Aim of the Study:** To evaluate the rate of CBD stones recurrence after primary complete endoscopic clearance, and to identify the risk factors of recurrence.

**Methods:** Between January 2002 and December 2016, 2255 patients with CBD stones who underwent successful ES and complete stone clearance were studied retrospectively. Recurrent CBD stone, was defined by the confirmation of the presence of CBD stone at least 6 months after previous complete CBD stone clearance by ES. The risk factors for recurrent CBD stones and mean time interval between initial ES and stone recurrence were analyzed.

**Results:** In Total, 2255 patients we included. The median follow up period was 89 (6–187) months. Recurrent CBD stones appeared in 159/2255 (7.05%) patients after a median time interval of 22 (6–216) months following ES. Stone recurrences were observed on multiple occasions in 20 patients (0.88%). On the univariate analysis, the significant risk factors related to recurrent CBD stone were male sex ( $P=0.001$ ), previous history of cholecystectomy ( $P=0.001$ ) multiple CBD stones ( $P=0.001$ ), large CBD stone ( $P=0.001$ ) the presence of periampullary diverticulum ( $P=0.001$ ) and stone crushing using mechanical lithotripsy ( $P=0.001$ )

**Conclusion:** Recurrence of CBD stones is an identified long-term risk after ES and stone clearance.

**P108****Two Port Laparoscopic Cholecystectomy in a Pregnant Woman**

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**Background:** Laparoscopic cholecystectomy during advanced pregnancy is challenging due to the limited intraabdominal space. Patients may be at increased risk for developing trocar site hernia.

**Case Report:** A 35 year old Hispanic female in her 22th week of pregnancy came to the ER with acute right upper quadrant pain. Due to lack of accessibility she had poor prenatal care. She had mildly elevated amylase but normal LFTs and ultrasound showed some gallbladder wall thickening suggestive for acute cholecystitis and no dilated biliary duct. Fetal ultrasound was normal. She was admitted to the hospital and started on antibiotics, obstetrics was consulted. Her amylase peaked at  $>600$  U/L but then normalized and indication for laparoscopic cholecystectomy was made. MRCP and ERCP were not performed as it was assumed that the patient had passed a stone. Five mm trocars were placed in the LUQ and the umbilicus and a Teleflex minigrasper between the tow. The uterus was found at the umbilical level. The GB was pulled out and the serosa was incised on both sides and a window was created behind the GB midportion and widened towards infundibulum and fundus. There was GB wall thickening and edema. The critical view was obtained and the cystic artery and duct were clipped and divided. The common bile duct appeared normal and no IOC was done. The specimen was retrieved through the LUQ port site using a 5 mm endobag after dilatation to 1.5 cm due to the presence of two large stones. The port site fascia was closed using a suture passer. The postoperative course was uneventful and both mother and baby were well at the two weeks follow up.

**Discussion:** In case of biliary pancreatitis during pregnancy, LC should be performed and if ultrasound shows a normal biliary system and amylase/lipase normalize, MRCP/ERCP and IOC may be avoidable to protect the baby. LC with two ports is feasible during pregnancy. Removal of the specimen through a lateral abdominal wall site may help prevent an umbilical port site hernia in this patient population.

**P109****Laparoscopic Cholecystectomy in Left-Sided Gallbladder**

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**Introduction:** Left-sided gallbladder (LSGB) is one of rare congenital anomalies in gallbladder and defined as a gallbladder located on left side of falciform ligament without situs inversus. Although there has been remarkable development on diagnostic imaging tools, almost left-sided gallbladder was found intraoperatively, not preoperatively.

**Methods:** Of 2,657 patients who underwent laparoscopic cholecystectomy (LC) for the treatment of gallbladder disease between August 2007 and December 2016, 7 patients (0.26%) were diagnosed as left-sided gallbladder. All LSGBs were found incidentally during LC and reviewed the preoperative computed tomography (CT) for finding evidence of LSGB and associated anomaly.

**Results:** All of 7 patients were men and mean age was 52.4 years (from 24 to 69). All patients had laparoscopic cholecystectomy for gallbladder disease (5 due to acute cholecystitis, 2 due to gallbladder polyp). In all cases, the gallbladder was located on the left side of falciform ligament. The operation was performed successfully with standard 4-trocar technique with confirming "critical view of safety (CVS)" as usual without 1 case. In 1 case which had an intraoperative complication and needed choledochojunostomy due to common bile duct injury, there was an associated anomaly called double common bile duct. Furthermore, in reviewing CT after operation, abnormal intrahepatic portal venous branching was found in all cases.

**Conclusion:** LSGB can be managed with laparoscopic cholecystectomy with CVS successfully. However, surgeons who found left-sided gallbladder have to make efforts to be aware of the possibility of associated anomalies.

**P110****Three Month Interval Laparoscopic Cholecystectomy Using Endoscopic Gallbladder Stenting for Severe Acute Cholecystitis**

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**Introduction:** The Tokyo guideline for acute cholecystitis (AC) recommends percutaneous transhepatic gallbladder drainage (PTGKD) followed by cholecystectomy for severe AC. But the optimal timing for the subsequent laparoscopic cholecystectomy remains unclear. And if PTGKD is performed, it appears to increase hospital stay and fee. So recently endoscopic gallbladder stenting (EGBS) after PTGKD has been performed in our institute, and interval laparoscopic cholecystectomy (ILC) performed more than three months from the onset of symptoms is recommended. The aim of this study is to investigate this procedure in our institution.

**Methods and Procedures:** From April 2016 and September 2017, three patients with severe AC underwent ILC using EGBS at our institution. The surgical outcomes were analyzed retrospectively.

**Results:** The patients consisted of two men and one woman with a mean age of 66 years (ranging from 63 to 69). Mean white blood cell count was  $11933/\text{m}^3$  (ranging from 10000 to 13100). Mean duration from onset of AC to PTGKD was 6 days (ranging from 3 to 10). Mean duration from onset to EGBS was 20 days (ranging from 10 to 20). Mean duration from onset to surgery was 117 days (ranging from 94 to 149). One case was removed EGBS tube preoperatively. The number of ports was three or four. The dome down technique after dissection of gallbladder neck was performed in two cases. Mean operating time was 248 minutes (ranging from 112 to 350), and mean blood loss was 20 ml (ranging from 0 to 50). There were no conversions to open surgery and no intraoperative complications without contamination of bile juice because of gallbladder injury. The drainage tube was inserted in two cases. Average length of postoperative hospital stay was 4.3 days (ranging from 4 to 5). There were no postoperative complications and no 30 day readmission.

**Conclusion:** ILC using EGBS at our institution is a safe and feasible procedure. So this procedure seems to be one option of the treatment for severe AC.

**P111****Splenic Abscess Arising After Routine Laparoscopic Cholecystectomy**

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**Introduction:** Splenic abscess is a rare, potentially lethal condition, with autopsy studies showing incidence rates between 0.14–0.7%. Mortality rates ranging from 47 to 100% making early diagnosis and prompt intervention vital. Several case reports have documented post surgical splenic abscess, most notably after laparoscopic sleeve gastrectomy. To the best of our knowledge, there has not been any reported cases of splenic abscess arising after laparoscopic cholecystectomy. It is important to remember this disease process for expeditious targeted treatment in future cases.

**Case Presentation:** A 69 year-old female with past medical history significant for cholelithiasis, hypertension, and hyperlipidemia presented to the emergency department (ED) with a chief complaint of abdominal pain for two days. Labs and imaging were obtained which confirmed the diagnosis of choledocholithiasis and pancreatitis. ERCP was performed which showed a 1.5 cm stone causing obstruction, with several other smaller filling defects. The stones were removed after sphincterotomy. Post procedurally, the patient underwent an uncomplicated laparoscopic cholecystectomy on Hospital Day (HD) #5.

Post operatively, the patient had persistent leukocytosis peaking at 16.8 thousand on postoperative day (POD) #6. A CT scan was performed which showed a rim-enhancing splenic collection measuring  $6.6 \times 2.2$  cm suggestive of an abscess.

Interventional radiology was consulted and aspirated 50 ml of purulent fluid. Cultures grew out Klebsiella pneumoniae and Enterobacter cloacae complex, and the patient was discharged home on Zosyn.

**Discussion:** Laparoscopic cholecystectomy has become the cornerstone in treatment of symptomatic biliary colic and acute cholecystitis. Of the many recognized complications of laparoscopic cholecystectomy, splenic abscess has not yet been reported in current literature.

The nonspecific signs and symptoms of splenic abscess make clinical diagnosis difficult. The classic triad of fever, palpable spleen and left upper quadrant pain are only seen in about two-thirds of patients. CT scan has been shown to be the most sensitive imaging modality for diagnosis of splenic abscess.

Current treatment options for splenic abscess are broken down into two subsets: percutaneous and surgical intervention. Percutaneous treatment includes image guided aspiration with or without placement of drainage catheter. Surgical intervention can be either laparoscopic or open and includes drainage of abscess with splenectomy or splenic conservation. The best treatment option remains unclear, and there is lacking prospective data demonstrating which modality is superior.

**P112****Loop Versus Suture Closure of the Gall Bladder Stump During Sub-total Cholecystectomy – A Retrospective Analysis**

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**Introduction:** Laparoscopic subtotal cholecystectomy is widely accepted as a safe alternative to the conventional laparoscopic cholecystectomy in case of acute cholecystitis with frozen calot's triangle. The remnant stump of the gallbladder may be either sutured or looped. However, there are limited studies comparing the outcomes of the two techniques. The present study is aimed at comparing loop and suture closure of the gall bladder stump.

**Methods:** A retrospective analysis of our prospectively maintained database revealed that between January 2013 and December 2016, 81 patients underwent laparoscopic subtotal cholecystectomy for acute cholecystitis, chronic cholecystitis or empyema gallbladder with frozen calot's triangle. The decision to use endoloop or sutures for stump closure was made intra-operatively after dividing the gallbladder through the infundibulum. A no.20 sized drain was kept in all the cases. The patients were discharged with drain in situ, and were reviewed on post-operative day 7 during which an ultrasound was done and drain removed if the progress was satisfactory. The intra-operative and post-operative data between the two groups were recorded and analyzed.

**Results:** Endoloop closure was performed in 45 patients and suture closure using 2.0 ethibond was done in 36 patients. Three patients from the sutured group had post operative bile leak among which one patient underwent endobiliary stenting. The other 2 were managed conservatively while the drain had to be retained for 2 weeks. Two patients in the endoloop group were detected to have retained stone in the remnant gallbladder cuff among which one had recurrent cholecystitis requiring laparoscopic completion cholecystectomy. None of the patients had bile duct injury or surgical site infection. Mean post operative stay was 2.5±1.2 days, did not significantly vary between the groups. Suturing needed more surgical expertise and had prolonged operative time than endoloop (68±22 min versus 84±18 min, p=0.04).

**Conclusion:** Suture or loop closure of the remnant gallbladder after subtotal cholecystectomy are equally effective. Suturing the stump may be associated with increased incidence of biliary leak while endoloop may have higher incidence of retained gallstones. The choice between the two may be made intra-operatively based on the surgeon's expertise and preference.

**P113****Current State of Complex Minimally Invasive Biliary Surgery**

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**Introduction:** Although minimally invasive surgery is a well-recognized part of modern surgery, the adoption of complex minimally invasive biliary procedures (MIBP) is unknown.

**Methods:** A comprehensive literature search of MIBP from 2011 to 2016 was performed by querying multiple electronic databases regardless of language of origin. All diagnoses and procedures relating primary to the biliary system were included. Laparoscopic cholecystectomy and related procedures were excluded from the search due to its universal application. Postoperative outcomes were assessed. Historical controls for open complex biliary procedures were used for comparison. P value<0.05 was defined as statistically significant.

**Results:** A total of 16 studies from 2011 to 2016 were included in this review; multiple other studies were excluded for lacking sufficient details. A total of 352 patients underwent complex MIBP. Three minimally invasive modalities were distinguished including laparoscopic assisted (n=12), laparoscopic (n=329), and robotic (n=11). Various surgical techniques were used including Roux-en-Y (REY) hepaticojejunostomy (n=132), hepaticojejunostomy (n=116), primary anastomosis+T-tube (n=94), choledochooduodenostomy (n=7), and REY cholangojejunostomy (n=3). Observed major morbidity (20% vs. 17%), biliary fistula (6% vs. 3%), anastomotic stricture (1.2% vs. 2%), reoperation rate (2% vs. 2%), and mortality (0.6% vs. <1%) after MIBP and open procedures respectively; no postoperative occurrence was statistically distinct. Mean operative times were found to be significantly longer in MIBP (385 minutes vs. 256 minutes), yet each study found operative times decreased in the MIBP with increased surgeon experience. Length of stay was significantly less in the MIBP compared to open procedures (5.8 days vs. 8 days).

**Conclusion:** Very few reports and a paucity of data exist documenting outcomes from complex MIBP. The limited data suggest that complex MIBP can be performed safely and effectively, yet universal adoption is not apparent based on the total number of patients in the literature. Further series are needed to more accurately compare outcomes.

**P114****How to Learn the Laparoscopic Cholecystectomy (LC)?: A Learning Curve of One Surgical Resident for Initial 151 Cases**

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**Introduction:** Laparoscopic cholecystectomy (LC) has been widely performed for the treatment of gallbladder disease. However, it has potential fatal complications like bile duct injury which are correlated with inexperience. Therefore, surgical training for safe and exact LC technique is important for surgical residents. The aim of this study is to investigate the personal learning curve of one resident and confirm the safety of LC performed by surgical residents.

**Methods:** We retrospectively reviewed 151 patients who underwent LC by one surgical resident at the Hanyang University Hospital. Three or four trocars were inserted and we established the "critical view of safety" in all patients. All procedures were supervised by an experienced HBP surgeon.

**Results:** Of total 428 LCs during the study, 151 cases were performed by one surgical resident. There were no statistical differences between two groups (group 1 – experienced surgeon, and group 2 – surgical resident) in open conversion rate (3.2% vs 0.7%, p=0.106) and postoperative complications (3.3% vs 6.6%, p=0.107). No major complications including bile duct injury were recorded in both groups. There was significant difference between two groups in operative time (51.52 vs 62.48, p<0.001).

**Conclusion:** LC performed by surgical residents is safe although they operated with longer operative time. However, inexperienced surgeons must always keep in mind confirmation of CVS and basic laparoscopic surgery technique during LC. These principles should be trained by attending staff for learning curve period.

**P115****Development of the Endoscopic Treatment for Bile Duct Injury – The Method of Direct Closure Using Bioabsorbable Polymer at the Part of Bile Duct Perforation-**

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**Background and Aim:** In recent years, due to the spread of laparoscopic cholecystectomy, bile duct injury as its complication has been reported at a certain frequency. Current surgical treatments include 1) suturing and closing the injured part laparoscopically during surgery, 2) transitioning to laparotomy and closing the suture, 3) inserting a tube such as T-tube under the laparotomy, 4) bile duct-intestinal anastomosis under the laparotomy, etc. are taken into consideration. Regardless of which treatment method, it is not a definite ideal treatment. We have developed a bioabsorbable material (caprolactone: lactic acid (50: 50) polymer reinforced with polyglycolic acid fiber and designed to be absorbed in about 8 weeks). At this conference, we would like to talk about the current state and problems of development of minimally invasive therapy for biliary damaged area using bioabsorbable materials we developed.

**Method:** In order to overcome the problem of the current bile duct injury cure method, we have been developed, a) a method of closing a perforation part endoscopically from the luminal side of a bile duct (a covered stent using a bioabsorbable material in the damaged part), b) Develop a method of closing the biliary duct injury under the laparoscope from the outside of the bile duct (adhering the bioabsorbable sheet to the bile duct perforation using a biocompatible adhesive).

**Results:** Experimental results of suturing the bioabsorbable material in the biliary duct in surgery of laparotomy were able to regenerate the bile duct without stenosis in the damaged area. However, various adhesives were tried to bond the sheet of this bioabsorbable material and the native bile duct under the endoscope, but at the moment, there is no glue that will allow the sheet to be adhered readily and reliably where there is moisture to a certain extent. A tool for delivering the sheet from the bile duct into the injured part is under development and good results are obtained at present.

**Conclusion:** It is possible to regenerate the bile duct without constriction using a bioabsorbable material. It is difficult to laparoscopically adhere to the injured part of the bile duct, but we hope that it will be possible in the near future to develop further adhesives.

**P116****A Comparative Study of Needlescopic Grasper Assisted Single Incision Versus Three-Port Versus Pure Single Incision Laparoscopic Cholecystectomy**

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**Introduction:** Single incision laparoscopic cholecystectomy (SILC) has emerged as a surgical option for disease of gallbladder, with the goal of reducing postoperative pain and cosmetic reason. However, pure SILC has some difficulties because of inherent limitations. The authors report on the surgical outcomes of SILC with needle grasper compared with pure SILC and conventional three port laparoscopic cholecystectomy.

**Methods and Procedures:** We analyzed the medical records of the patients who underwent laparoscopic cholecystectomy for benign disease of gallbladder in our hospital between January 2013 and January 2015. One hundred and three patients underwent laparoscopic cholecystectomy. Among them, 33 patients underwent pure SILC (pSILC), 35 patient underwent needle grasper SILC (nSILC), and 35 patients underwent three-port cholecystectomy (TPLC).

**Results:** All procedures were completed by laparoscopy, and the gallbladder was completely removed in three groups. There were statistical differences in the skin to skin operation time (pSILC:  $65.2 \pm 19.1$  min, nSILC:  $49.5 \pm 12.8$  min, and TPLC:  $43.4 \pm 14.7$ ,  $p < 0.001$ ), and major procedure time (pSILC:  $42.2 \pm 18.7$  min, nSILC:  $26.0 \pm 8.9$  min, and TPLC:  $30.3 \pm 16.2$ ,  $p < 0.001$ ). However, there were no significant differences in the visual analogue scale (pSILC:  $2.2 \pm 0.8$  min, nSILC:  $2.6 \pm 1.0$  min, and TPLC:  $2.6 \pm 0.9$ ,  $p = 0.161$ ), postoperative hospital stay (pSILC:  $2.6 \pm 1.6$  min, nSILC:  $2.3 \pm 1.0$  min, and TPLC:  $2.1 \pm 0.5$ ,  $p = 0.185$ ), and intraoperative blood loss (pSILC:  $32.7 \pm 13.8$  min, nSILC:  $31.9 \pm 21.0$  min, and TPLC:  $37.0 \pm 22.0$ ,  $p = 0.495$ ).

**Conclusions:** nSILC is feasible and safe surgical procedure in patients with benign gallbladder disease compared with TPLC, and it is effective approach to overcome the limitation of pSILC.

**P117****The Influence of Obesity During Single-Incision Laparoscopic Cholecystectomy**

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**Introduction:** Obesity has been influenced the outcomes of laparoscopic surgery. Here we investigate the influence of obesity during single-incision laparoscopic cholecystectomy (SILC).

**Patients and Methods:** We performed SILC in 298 patients, comprising 146 males and 152 females with a mean age of 55 years. Their diagnoses included 276 gallbladder stones, 15 polyps and 7 adenomyomatosis. Body mass index (BMI) were divided into 4 groups consisting of less than  $25 \text{ kg/m}^2$  (A),  $25\text{--}30 \text{ kg/m}^2$  (B),  $30\text{--}35 \text{ kg/m}^2$  (C) and more than  $35 \text{ kg/m}^2$  (D). We made a 2.5-cm longitudinal skin incision within the umbilicus. A wound retractor and a surgical glove were applied at that incision. We used the three 5-mm ports technique. After retracting the gallbladder upward, the cystic duct and artery were divided and identified using pre-bending forceps through the flexible port and laparoscopic coagulating shears (LCS). The cystic artery was dissected using the LCS and the cystic duct was also dissected after clipping. The gallbladder was freed from the liver bed using the LCS, and the specimen was retrieved from the umbilical wound.

**Results:** There were conversions to open laparotomy in 4 cases (1.3%) and requirement of additional ports in 23 (7.7%). The mean age (years), operation time (min), blood loss (ml) and postoperative hospital stay (days) in group A, B, C and D were 60.0, 55.5, 51.2 and 41.2 ( $p=0.05>$ ), 89.5, 101.7, 98.4 and 85.3 ( $p=0.206$ ), 19.7, 18.5, 15.6 and 3.4 ( $p=0.935$ ), and 3.5, 3.6, 3.2, and 3.0 ( $p=0.882$ ), respectively. There was a significant difference in age only. The complications were bile duct injury in one case (0.3%) and pneumothorax in two (0.6%).

**Conclusion:** Obesity had no influence of surgical outcomes for performing SILC.

**P118****Antegrade Method of Laparoscopic Cholecystectomy for Left-Sided Gallbladder**

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**Introduction:** The gallbladder (GB) placed in the left side (LS) of liver bed is a rare anatomy. This variation makes operator hard to perform cholecystectomy. Despite it is important to apprehend the detailed anatomy of bile duct and GB and understand how to approach LSGB in advance cholecystectomy, we usually encounter difficulties with this unusual situation just after beginning operation. We herein report surgical process of LSGB with video in this manuscript.

**Patients:** The patient was following up with gallstones about ten years and occasionally complained of the pain migrating from Left upper quadrant to epigastric area. LSGB was encountered after beginning laparoscope approach. Laparoscopic cholecystectomy was done antegrade method not to injure anomalous bile duct.

**Results:** To prevent the injury to anomalous bile duct, we began to carefully separate GB from its fundus first, prior to cystic duct ligation. Cholecystectomy was successfully done after complete detachment of GB from liver bed. Postoperative lab findings and patient's condition showed little possibility of injury on surgical site. Patient was discharged two days after surgery.

**Conclusion:** When surgeon encounter LSGB without diagnosis prior to operation, Antegrade dissection of GB enables surgeons to detect Calot's triangle easily and to complete operation safely. For unpredictable but possible anomalous GB, surgeon should always give a thought to suitably modified cholecystectomy.

**P119****Klatskin Tumor in the Light of ICD-O-3. A Population-Based Clinical Outcome Study Involving 1,144 Patients from the Surveillance Epidemiology and End Result (SEER) Database (2001–2012)**

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**Introduction:** Klatskin tumors (KT) occur at the confluence of right and left extrahepatic ducts and classified based on their anatomical and histological code in the International Classification of Diseases for Oncology (ICD-O). The second edition of ICD-O (ICD-O-2) allocated a distinctive histological code to KT, which was cross-referenced to the intrahepatic cholangiocarcinomas. This unclear coding may result in ambiguous reporting of the demographic and clinical features of KT. The current study aims to investigate the demographic, clinical and pathological factors impacting prognosis and survival of KT in the light of updated third edition of ICD-O (ICD-O-3).

**Methods:** Data on 1,144 KT patients from the Surveillance Epidemiology and End Result (SEER) database (2001–2012) was abstracted. KT patients were analyzed for age, gender, race, stage, treatment, and long-term survival. The data was analyzed using Chi-square tests, T-tests, univariate and multivariate analysis. Kaplan-Meier analysis was used to compare long-term survival between KT and sub-groups of all biliary cholangiocarcinomas (CC).

**Results:** Of all biliary CC, KT comprised of 9.35% with the mean age of diagnosis  $73 \pm 13$  years, was more common in males (54.8%) and Caucasians patients (69.5%). Histologically, moderately differentiated tumors were commonest (38.9%), followed by poorly differentiated (35.7%), well differentiated (23.3%) and undifferentiated tumors (2.2%),  $p \leq 0.001$ . Most tumors in KT group were 2–4 cm (41.5%), while fewer were >4 cm (29.7%), and <2 cm (28.8%),  $p \leq 0.001$ . ICD-O-3 defined most KT tumors in extrahepatic location (53.5%), while the remainder were in other biliary locations (46.5%),  $p \leq 0.001$ . Most KT patients received no treatment (73%), and those who were treated, the most frequent modality was radiation (52.7%), followed by surgery (28.1%), and both surgery and radiation (19.2%),  $p \leq 0.001$ . Mean survival time for KT patients treated with surgery was inferior to all CC of the biliary tree ( $1.72 \pm 2.61$  vs.  $1.87 \pm 2.18$  years),  $P = 0.047$ . Multivariate analysis identified regional metastasis (OR = 2.8, CI = 2.6–3.0), distant metastasis (OR = 2.1, CI = 1.9–2.4), lymph node positivity (OR = 1.6, CI = 1.4–1.8), Caucasian race (OR = 2.0, CI = 1.8–2.2), and male gender (OR = 1.2, CI = 1.1–1.3) to be independently associated with increased mortality for KT,  $p < 0.001$ .

**Conclusion:** ICD-O-3 has permitted greater understanding of Klatskin tumors. This is a rare and lethal biliary malignancy that presents most often in Caucasian males in their seventh decade of life with moderately differentiated histology. Surgical resection does not provide any survival advantage compared to similarly treated biliary CC. Also, the combination of surgery and radiation appeared to provide no added survival benefits compared to other treatment modalities for KT.

**P120****Laparoscopic Subtotal Cholecystectomy for Difficult Acute Calculous Cholecystitis**

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**Background:** When the critical view of safety can't be obtained during dissection of Calot's triangle in difficult gallbladder, conversion to open surgery is recommended to prevent bile duct injury. Several "damage control" techniques, such as cholecystostomy and subtotal cholecystectomy (SC), aim to decrease the conversion rate and risks of bile duct injury.

**Materials and Methods:** The medical records of all patients who had laparoscopic SC (LSC) for acute calculous cholecystitis (ACC) during the period from May 2009 to August 2016 at Tanta University Hospital, Egypt were retrospectively reviewed.

**Results:** During the study period, laparoscopic cholecystectomy (LC) was attempted in 68 difficult GBs out of 376 patients presenting with ACC. LSC was performed for 65 patients and cholecystostomy for the remaining 3 patients. LSC group included 50 females (77%) and 15 males (23%) with a mean age of  $42.35 \pm 12.4$  years. The mean duration of symptoms was  $27.5 \pm 13.3$  days before surgery. Six patients (9.2%) had pericholecystic abscesses and 4 (6.2%) had bile duct obstruction due to Mirizzi syndrome or choledocholithiasis (2 patients each). The cystic duct (CD) was dissected and controlled successfully in all patients and drains were used in 42 patients (64.6%). The mean operative blood loss was  $45.28 \pm 18.6$  CC and the mean operative time was  $96.3 \pm 24.19$  minutes. There were no conversions to open surgery, no operative complications or mortality. Three patients (4.6%) had superficial port site infection and 1 patient (1.5%) had post-ERCP bleeding that was controlled endoscopically. The mean postoperative hospital stay was  $28 \pm 17.8$  hours. No patients developed bile leak, intra-abdominal collections or jaundice and there was no postoperative mortality.

**Conclusion:** When surgery is indicated for difficult ACC, LSC with control of the CD, performed by experienced surgeons, is safe with excellent outcomes.

**P122****A Prospective Randomised Study of Intra-peritoneal Instillation of Ropivacaine Versus Bupivacaine in Reduction of Post-operative Pain After Laparoscopic Cholecystectomy**

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**Introduction:** The study was conducted to compare the efficacy of intraperitoneal instillation of Ropivacaine versus Bupivacaine for post operative pain relief after laparoscopic cholecystectomy and to compare the analgesic requirement and overall morbidity in patients with either of two interventions.

**Material and Method:** This prospective study was conducted in the Department of General Surgery, Govt. Medical College & Rajindra Hospital Patiala. 60 patients with symptomatic gall stones disease undergoing laparoscopic cholecystectomy were included with equal distribution either Group A (n=30 patients) received 0.5% of 30 ml (150 mg) of ropivacaine instillation at gall bladder bed ; Group B (n=30) received 20 ml of 0.5% bupivacaine hydrochloride at gall bladder bed and sub diaphragmatic space at the end of surgery. All cases were performed by experienced laparoscopic surgeons.

Intensity of pain was assessed on visual analogue scale (VAS) with evaluation at 6, 12, 24, 48 hr postoperative. Analgesis requirements was assessed in terms of requirement of number of Inj. Diclofenac Sodium (75 mg) I/m. Nausea and vomiting was assessed depending upon the episodes, number & need for anti emetic medication.

**Results and Conclusion:** Intensity of pain was assessed on visual analogue scale (VAS) with evaluation at 6, 12, 24, 48 hr postoperative. There was found significant difference among both the groups in terms of VAS score, abdominal pain, shoulder pain and analgesic requirement at 12 hours but no such significance was seen in 6, 24 and 48 hours.

To conclude intraperitoneal instillation of Ropivacaine or Bupivacaine reduced post operative pain significantly and amongst two groups. Bupivacaine was better at 12 hrs as shown by decreased VAS score, decreased shoulder tip pain, decreased analgesic requirement. Otherwise at 6, 24 and 48 hrs this difference was not significant among two groups.

**P121****Subtotal Cholecystectomy: Safe, Tolerated, but with Increased Need for Re-intervention**

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**Introduction:** Subtotal cholecystectomy (SC) is a standard operation utilized to prevent bile duct injury (BDI) when the Critical View of Safety cannot be safely achieved when encountering the difficult gallbladder. Although SC remains safe, the long-term implications, such as quality of life and need for further intervention, are less well known.

**Methods and Procedures:** All patients who underwent cholecystectomy at our institution since 2011 were identified in a retrospectively collected, IRB-approved database. Operative notes were carefully reviewed to identify all cases of SC, along with the appropriate subtype grouping (fenestrating or reconstituting). SC patients where matched to contemporary cases of total cholecystectomy (TC) based upon age, sex, and procedure method (open or laparoscopic). Patient charts were carefully reviewed for perioperative and long-term outcomes, including re-interventions and additional surgical procedures. The patients were subsequently contacted via telephone and asked to complete SF-36 and GIQOL surveys.

**Results:** Sixty-three cases (2.6%) of SC where identified out of 2418 cases (15 fenestrating, 48 reconstituting). Thirty (48%) cases were completed laparoscopically. Demographics of the two matched cohorts are presented in Table 1. Five SC patients required re-operative completion cholecystectomy for recurrent biliary disease. No TC patients required reoperation; however 2 major BDI occurred in this group (3%), versus no major BDI in the SC group. Quality of life surveys were completed in 21 (33%) SC and 23 (37%) TC patients. SF-36 and GIQOL scores are non-significant between groups with the exception of one sub-category "role limitations due to physical health," which was improved in the SC group.

Table 1. Patient demographic data

	Subtotal (N=63)	Total (N=63)	P-Value
Gender			
Male	34 (54%)	34 (54%)	1.000
Female	29 (46%)	29 (46%)	
Age (Mean $\pm$ SD)	62.6 $\pm$ 16.5	63.3 $\pm$ 18.4	0.840
BMI (Mean $\pm$ SD)	31.8 $\pm$ 8.09	30.9 $\pm$ 10.1	0.548
Length of Hospital Stay in Days (Mean $\pm$ SD)	5.1 $\pm$ 4.4	4.3 $\pm$ 3.6	0.249
Postoperative Diagnosis			
Biliary Colic	17 (27%)	24 (38%)	0.316
Acute Cholecystitis	34 (54%)	26 (41%)	
Cholelithiasis	12 (19%)	16 (25%)	
Major Bile Duct Injury	2 (3%)	0 (0%)	0.154
Time since Procedure in Months (Mean $\pm$ SD)	43.9 $\pm$ 25.9	55.4 $\pm$ 20.1	0.006
Re-Operative Biliary Operation	5 (7.9%)	0 (0%)	0.023
Time between Operations in Months (Mean $\pm$ SD)	17.0 $\pm$ 7.4		

**Conclusions:** In our series, long-term QOL scores do not differ between patients undergoing SC and TC. SC may be protective of major BDI; however it clearly comes with an increased risk for the need for re-operative procedures. SC should be considered in difficult operative scenarios, however, patients should be followed for recurrent biliary disease and need for re-operative management.

**P123****Factors Affecting Conversion of Laparoscopic Cholecystectomy to Open Surgery**

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**Background:** Laparoscopic cholecystectomy (LC) is the standard procedure for cholecystectomy. However, in some patients, LC cannot be successfully performed requiring conversion to open cholecystectomy (OC). This study was to analyze the factors affecting conversion of LC to OC.

**Method:** Retrospective medical records review between January 2008 to September 2016 from a single tertiary referral hospital, Rajavithi Hospital, Bangkok, Thailand. Patients who underwent elective LC and was converted to OC was analyzed. Exclusion criteria were cases that required emergency LC.

**Result:** A total number of 2,045 patients underwent elective LC during the 9 year review. Only 123 patients had conversion to OC (6.01%). The mean age was  $59 (\pm 13.6)$  years. Sixty-four patients were male (52%) and 59 patients were female (48%). Most patients had ASA score 2 (87%). The diagnosis of the patients for elective LC were symptomatic gall stone (51.2%), subsided cholecystitis (34.1%), choledocholithiasis post endoscopic removal (12.1%), and gall stone pancreatitis (2.43%). The most common factor influencing conversion is unclear anatomy in Calot's triangle (103 patients, 83.7%). The remaining factors were bleeding (6 patients, 4.87%), bile duct injury (6 patients, 4.87%), cholecystoduodenal fistula (3 patients, 2.43%), injury to other organ (3 patients, 2.43%), common bile duct exploration (1 patient, 0.81%), and other (1 patient, 0.81%).

**Conclusion:** The factors affecting conversion of LC to OC in elective setting were most commonly unclear anatomy of the Calot's triangle.

**P124****Surgeon Procedure Volume Strongly Associated with Adverse Events Post Laparoscopic Cholecystectomy**

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**Introduction:** Recent studies have reported mixed outcomes when comparing surgeon case volume and Laparoscopic Cholecystectomy (LC) outcomes. Formal minimally invasive surgical training (MIST) has been shown to be associated with shorter post-operative length of stay (LOS), but no difference in major adverse events such as bile leak, bile duct injury, intra-abdominal abscess formation, and death. We aim to determine 30-day rates of major adverse events after LC in a university hospital setting, to identify significant associated risk factors, and to determine if MIST or surgeon volume are associated with differences in LOS and major adverse events.

**Methods:** We conducted a single-center retrospective review of 2,764 cholecystectomies performed over a seven-year period (2009–2016). Characteristics and outcomes were compared using Chi squared or rank sum tests. Multivariable regression modeling was used to determine independent associations with the two main outcomes, major adverse events and LOS.

**Results:** We identified 2,764 adults who underwent LC during the study period, with a median age of 50, and 70% women. About 19% (n=531) of patients had a LOS>1 day and 4.3% (n=120) were re-admitted within the first 30 days after surgery for any reason. Within 30 days of LC, 2.2% (n=60) of patients suffered from one or more major adverse events. This includes 0.18% (n=5) of patients with bile duct injury, 1.3% (n=35) of patients with bile leak, 0.3% (n=7) of patients with intra-abdominal abscess, and 0.3% (n=9) of patients died for reasons related to their procedure or post-operative recovery. Table 1 shows the characteristics of the patients and procedures with a comparison of the patients with an adverse event versus those without one. In univariate analysis, high annual surgical volume (40+ cases/year) and procedure urgency were found to be significant predictors of adverse events and LOS, however, MIST was not. In multivariable analysis, controlling for significant univariate predictors, urgent or emergent cases were associated with a 3-fold increase in odds of an adverse event (OR=3.0 [CI 1.7, 5.1]) and high surgical volume with a significantly lower risk (OR=0.37 [CI 0.2, 0.8]. For the LOS outcome, procedure urgency (OR=45 [CI 33, 61]) and surgeon volume (OR=0.4 [CI 0.3, 0.6]) were also the strongest predictors.

**Conclusion:** Our adverse events rate from LC falls below the range of recently published data. After controlling for clinical covariates, procedure urgency and surgeon case volume were the strongest predictors of adverse events and LOS, whereas MIST was not.

**Table 1.** Characteristics of patients and procedures for patients undergoing cholecystectomy

Characteristic	Overall cohort N=2,764	No adverse event N=2,704	Any adverse event N=60	P value
<b>Patients</b>				
Age, median (range)	50 (18-95)	50 (18-95)	59 (18-88)	<b>0.009</b>
Senior citizen (age 65+), N, (%)	538 (19%)	513 (19%)	25 (42%)	<b>&lt;0.001</b>
Sex, female, N (%)	1,932 (70%)	1,896 (70%)	36 (60%)	0.09
White race, N (%)				
Body Mass Index *				
Underweight/normal	539 (20%)	535 (21%)	10 (17%)	
Overweight	859 (33%)	841 (32%)	19 (32%)	0.69
Obese	1,241 (47%)	1,213 (47%)	31 (52%)	
Diabetes, N, (%)	196 (7%)	186 (7%)	10 (17%)	<b>0.003</b>
<b>Procedures &amp; surgeons</b>				
Procedure urgency				
Elective	1,974 (71%)	1,949 (72%)	25 (42%)	
Urgent	207 (7%)	194 (7%)	13 (22%)	
Emergent	583 (21%)	561 (21%)	22 (37%)	<b>&lt;0.001</b>
MIST trained surgeon, N (%)	1,150 (42%)	1,130 (42%)	20 (33%)	0.19
Surgeon annual volume, N (%)				
Low volume surgeon (<20)	360 (13%)	345 (13%)	15 (25%)	
Medium volume surgeon (20-39)	672 (24%)	652 (24%)	20 (33%)	<b>0.001</b>
High volume surgeon (40+)	1,732 (63%)	1,707 (63%)	25 (42%)	
Length of stay				
Same day	2,233 (81%)	2,210 (82%)	23 (38%)	
1 day	169 (6%)	462 (17%)	25 (42%)	
2 or more days	362 (13%)	32 (1%)	12 (20%)	
Readmission	120 (4.3%)	92 (3%)	28 (47%)	<b>&lt;0.001</b>

\* values may not total to 100% due to missing values and rounding

**P125****Is it Feasible and Safe in Single Incision Laparoscopic Cholecystectomy in Resident Training Program?**

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**Introduction:** Single incision laparoscopic cholecystectomy (SILC) has some technical problems. Our group has performed needlescopic grasper assisted SILC (nSILC) to overcome these problems. nSILC are now taught to resident surgeon in training. We evaluate the safety and feasibility of this technique comparing with the three-port laparoscopic cholecystectomy (TPLC).

**Methods and Procedures:** We retrospectively reviewed the medical records of a single institution experiences in nSILC with resident training program. The surgical outcome of 79 patients who underwent cholecystectomy for gallbladder benign disease at our hospital between March 2013 and June 2016 was analyzed. A needlescopic grasper was used in nSILC, which was inserted through a direct puncture on right upper quadrant of abdomen. The scope and other instrument were inserted through umbilical port. All surgical procedure was performed by residents under the supervision of an experienced surgeon. Gallbladder stone, mild (grade I and II) acute cholecystitis, gallbladder polyp, gallbladder adenomyomatosis were included. Grade III severe cholecystitis (Tokyo Guideline) was excluded. 25 patients underwent SILC and 54 patients underwent TPLC. The data of these patients were collected and included clinical presentation, age, sex, BMI, stone type and umber, critical view of safety (CVS) time, main procedure time, skin to skin operation time, total operation time, hospital stay, intraoperative blood loss, and complications.

**Results:** All patients successfully underwent nSILC or TPLC without open conversion and post-operative complications. There were no statistical differences in sex, BMI, stone number, CVS time, main procedure time, skin to skin operation time, total operation time, hospital stay, and intraoperative blood loss (sex: p=0.468, BMI: p=0.491, stone number: p=0.305, CVS time: p=0.340, main procedure time: p=0.722, skin to skin operation time: p=0.892, total operation time: p=0.764, hospital stay: p=0.062, and intraoperative blood loss: p=0.574). However, age of nSILC was younger than that of TPLC (p=0.047).

**Conclusions:** In our study, there were no significant differences in surgical outcomes. However, nSILC group was younger than TPLC group, this result was thought that the number of performed cases were small. There was no case of intra-operative and post-operative complications. A single incision laparoscopic cholecystectomy performed by resident merits training under experienced supervisor surgeon. This training could improve the skill and help encourage the motivation of resident surgeon.

**P126****The Effect of Prior Ultrasound on Outcomes in Acute Versus Elective Laparoscopic Cholecystectomy**

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Patients who received ultrasound prior to admission for acute cholecystitis were compared with patients who presented electively for LC. Laparoscopic cholecystectomy (LC) is the gold standard operation for gallbladder disease. It is one of the most common operations performed on emergency services in the United States. Many patients receive diagnostic ultrasound imaging prior to presentation but are not operated on immediately.

**Methods:** This is a retrospective study analyzing all of the laparoscopic cholecystectomies performed at The Brooklyn Hospital Center (TBHC), both emergent and elective, from 2016 to 2017. Patient data was collected on demographics, comorbidities, operative findings, complications, length of stay (LOS), and 30 day readmission. Statistical analysis was performed using IBM SPSS Statistics v. 19. Covaried analysis of variance (ANCOVA) was performed on continuous variables and significance levels were calculated. Pearson's Chi Square significance level was calculated for all binomial variables.

**Results:** Of the 281 patients who underwent LC during this time period, 152 cases presented electively and 139 presented acutely. Of the patients who presented acutely, 20 had ultrasound prior to admission. There was no statistically significant difference between patients who presented acutely with a prior ultrasound and patients who presented electively for LC when comparing operative time (OR time), complication rates, LOS, and 30 day readmission rates. Acute cases (with NO prior ultrasound) were still associated with a statistically significantly increased length of stay (LOS) 3.5 days vs. 0.4 days for elective ( $p<0.05$ ) as well as a statistically significantly increased OR time 135 minutes vs. 119 for elective ( $p=0.002$ ). Complication rates and 30 day readmission rates did not differ significantly between acute and elective cases.

**Conclusions:** We found that receiving prior ultrasound in patients who presented acutely appears to have no statistically or clinically significant effect on OR time, complication rates, LOS, and 30 day readmission rates when compared to patients who presented for LC electively. However, there was a statistically and clinically significant increase in OR time and LOS in acute vs. elective cases in general. Thus, it is possible that having prior symptomatic disease, as indicated by prior ultrasound testing, appears to confer a protective advantage to this group. Larger prospective studies evaluating the effect of prior symptomatic disease on operative findings, complication rates, LOS and 30 day readmission rates when patients present acutely and undergo LC are needed to analyze these effects further.

**P127****Tobacco Use Does Not Contribute to Complications After Cholecystectomy: A Retrospective Chart Review**

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**Introduction:** Laparoscopic cholecystectomy is an extremely common procedure in the United States, with over 700,000 cases performed annually. Despite the procedure's overall safety, there has been some evidence that tobacco use is associated with increased risk of wound infection after LC. This retrospective chart review sought to examine whether tobacco use is associated with increased complications following laparoscopic cholecystectomy within a high-volume healthcare system.

**Methods:** After IRB approval, 900 of approximately 3,000 cholecystectomies performed within one four-hospital system between 2009 and 2015 were randomly selected, and patient charts were retrospectively reviewed. Pre-, intra-, and postoperative data were collected, including all complications within 90 days. Tobacco use cohorts were defined as follows: never, former (any historical tobacco use), and current (active tobacco use within 1 year of surgery) per the ACS NSQIP Surgical Risk guidelines. Following preliminary data analysis, multivariable logistic regression models were generated to identify whether tobacco use was predictive of outcomes of interest.

**Results:**

Table 2. Multivariable Logistic Regression for Outcomes by Tobacco Use

Outcome*	OR	95% CI	p-value
Acute Surgery			
Former vs. Never	1.01	0.67	1.53
Current vs. Never	2.02	1.13	3.61
Current vs. Former	1.99	1.05	3.77
Duration of Surgery 72+ minutes			
Former vs. Never	1.01	0.64	1.59
Current vs. Never	0.99	0.50	1.97
Current vs. Former	0.98	0.47	2.07
Convert to Open			
Former vs. Never	0.77	0.24	2.53
Current vs. Never	4.37	0.90	21.22
Current vs. Former	5.63	0.99	31.93
Surgical Site Infection			
Former vs. Never	1.06	0.34	3.30
Current vs. Never	2.01	0.52	7.84
Current vs. Former	1.89	0.42	8.56
Wound Dehiscence/Hernia			
Former vs. Never	3.46	0.53	22.58
Current vs. Never	4.09	0.25	66.58
Current vs. Former	1.18	0.09	15.99
Common Bile Duct Injury			
Former vs. Never	0.64	0.13	3.20
Current vs. Never	0.65	0.05	8.76
Current vs. Former	1.02	0.06	15.91
Other Medical Complication			
Former vs. Never	0.85	0.37	1.94
Current vs. Never	1.97	0.57	6.10
Current vs. Former	2.20	0.62	7.77
Any Complication			
Former vs. Never	0.94	0.46	1.92
Current vs. Never	1.83	0.70	4.98
Current vs. Former	1.93	0.66	5.68

\*Controlling for age, sex, BMI, cirrhosis, COPD, OSA, CAD, renal failure, preoperative creatinine, HTN, DM, and estimated blood loss. Values in bold are statistically significant.

Of the 900 cases analyzed, 535 patients (59.4%) were never smokers; 31.3% were former smokers, and 9.2% were current tobacco users or had quit less than 12 months prior to surgery. There were 17 surgical site infections, one wound dehiscence, one port site hernia, three common bile duct injuries, and 44 medical complications requiring prolonged hospitalization or readmission within 90 days.

Current tobacco users were significantly more likely to undergo urgent surgery (following emergency admission or direct admission to the hospital) than former or nonsmokers. However, there was no difference between cohorts for prolonged duration of surgery, conversion to an open procedure, surgical site infection, wound dehiscence or hernia, common bile duct injury, or other medical complication. There was no significant difference between cohorts when all postoperative complications were pooled.

**Conclusions:** There does not appear to be a significant difference in 90-day surgical outcomes or complications in active tobacco users vs. former or non-users. Although studies in other surgical settings have indicated a possible reduction in complications if patients abstained from smoking prior to surgery, this may not be beneficial in laparoscopic cholecystectomy. Moreover, as current tobacco use appears to be associated with higher rates of urgent surgery, these patients may not be able to stop smoking prior to an elective procedure. Prospective studies to further clarify whether there is any benefit towards tobacco cessation prior to LC may be valuable.

**P128****Patients Prioritize Safety First: Opinions of Transfer of Care for Unexpected Findings Versus Bile Duct Injury in Laparoscopic Cholecystectomy**

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**Introduction:** Surgeons often assume patients may be dissatisfied if their operation were stopped due to suspicious intraoperative findings or injury requiring transfer of care. Knowledge of patient centered opinions may help clarify how patients feel when these situations arise to support patient safety. We sought to assess patient opinions regarding transfer of care for unexpected intraoperative findings during laparoscopic cholecystectomy with and without bile duct injury, and whether these perceptions may differ.

**Methods and Procedures:** The investigators developed two clinical scenarios comparing transfer of care for unexpected intraoperative findings during elective laparoscopic cholecystectomy (without bile duct injury and with injury requiring open repair). A multi-institutional structured telephone interview process was conducted with patients ≥18 years of age who had an outpatient, uncomplicated laparoscopic cholecystectomy within the last year. The first scenario presented a case of suspicious findings prompting the surgeon to stop and transfer for specialized care; whereas, the second case was a bile duct injury requiring transfer of care. Textual and thematic analysis, as well as descriptive statistics, were used to analyze our interview results.

**Results:** Forty-five patients were contacted and completed the survey. Satisfaction with transfer of care for unexpected intraoperative findings without bile duct injury was 69% and over 95% of respondents were satisfied their surgeon stopped the procedure to initiate transfer due to safety concerns; 64% of patients would return to that surgeon for post operative care and 78% would see that surgeon for another operation in the future. In the scenario with bile duct injury requiring open repair, 86% were satisfied with their surgeon's decision to stop the operation, 91% of patients were satisfied with transfer of care, and 32% would see their first surgeon again in the future. Themes of prioritizing safety, providing explanations, appreciation for admission of error and setting aside ego were frequently cited in both scenarios.

**Conclusions:** Patients prioritize safety and are highly satisfied with halting a procedure to facilitate transfer of care for suspicious intraoperative findings during routine laparoscopic cholecystectomy. The majority would return to that surgeon for surgical care.

**P129****Progressively Increasing CA19-9 Sounded the Alarm of an Intrahepatic Cholangiocarcinoma**

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Potential good prognosis of preclinical cholangiocarcinoma underwent laparoscopic liver segmentectomy. A 76 years old male presented to gastroenterology department on January 4, 2016, with progressively increasing carbohydrate antigen 19-9 (Ca19-9) level.

Clinical manifestations only include a blood stool with less than 10 ml/d, with occasionally tenesmus. No special findings about physical examinations.

Past history includes middle segmentectomy of left lung in 1964, post-operation pathology implied tuberculosis. In 2013, he went through radical prostatectomy (Gleason 3+3, T2cN0Mo). In 2014, he was discovered to have elevated PSA level and went through 1-month radiotherapy. Now, he is on oral bicalutamide medication. In 2015, as he developed groin hernia, a tension-free hernioplasty was performed. He has hypertension, diabetes mellitus, and hemorrhoid as well. He also has 5-years history of hypertension, diabetes mellitus, and hemorrhoids.

Ca19-9 level was 237.9 (reference range: 0–34.0) on October 28, 2015. It rose to 310.5 on December 2, 2015. After admission, another test was done on January 4, 2016, and the figure rocketed to 338.3. Meanwhile, Ca242 were 118.9, >150, >150 respectively (0–20), cyfra 211 were 8.11, 9.22, 6.36 respectively (0–3.5). AFP and CEA were negative.

As for this patient, he is of high risk of hepatobiliary system diseases. Due to common bile duct calculi, ERCP was applied in 2010. He was affected by recurrent cystitis, and an open cystectomy surgery was performed in 2011, along with common bile duct incision, lithotomy under choledochoscope, and T tube drainage. Post-surgical pathology showed no evidence of tumor cells. His serum tests indicated that he was previously infected with hepatitis virus B.

After admission, a contrast enhanced computer tomography was performed and no malignancy was reported. PET/CT was suggested and a 3.6\*3.7\*2.7 cm high standard uptake value (SUVmax=6.0) lesion was indicated at the margin of left lobe of liver, where it can hardly distinguish the relationship between the lesion and lesser curvature of stomach.

After consultation by Department of Liver Surgery, laparoscopic left liver segmentectomy under general anesthesia was performed on January 19, 2016. The surgery lasted for 200 minutes, with less than 100 ml bleeding. The lesion was 3\*1.8\*2.5 cm, soft, parenchymal, partly enveloped, and its section is gray and poorly demarcated. Pathology reported it was poorly differentiated cholangiocarcinoma with necrosis, AFP (-), CAM5.2(+), CD34(vessel +), CEA(+), CK19(+), CK7(+), CK8(+), EGFR(+), Hepatocyte(-), Ki-67 (index 30%). Margin was negative.

Ca19-9 dropped to 107 7 days after the surgery.

**P130****Thoracoscopic Thymectomy - A Case Report**

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**Introduction:** Thymoma is one of the rare tumor entity benign or malignant arising from the epithelial cells of thymus gland, frequently associated with neuromuscular disorder Myasthenia Gravis. So, we are presenting this rare case of thymoma with myasthenia gravis in our institute.

**Methods:** We operated a single patient of thymoma in a case of myasthenia gravis by Video Assisted Thoracoscopic Approach.

**Results:** Operative time- 78 min, intraoperative blood loss –20 ml, post operative analgesia requirement in form of NSAIDS is for 2 days, no ventilatory support required post operatively. With follow up reduction in AchR Ab from 99 nmol/L to 15 nmol/L and reduction in symptoms in form of reduced ptosis.

**Conclusion:** Thoracoscopic thymectomy is feasible and safe in terms less operative time, less post operative pain and analgesia requirement and no post operative ventilatory support requirement.

**P131****Endoscopic Transmural Stents for Resolution of Duodenal Fistulas Following Necrotizing Pancreatitis**

**Carter C Lebares, MD, Stanley J Rogers, MD; UCSF**

**Background:** Duodenal fistulas are uncommon but morbid complications of acute necrotizing pancreatitis. If percutaneous drainage fails, surgical correction via roux-en-Y diversion or pancreaticoduodenectomy can be required. While self-expanding metal stents have been tried, complications like migration and perforation have limited such use. Endoscopic transmural stents have successfully treated fistulas of the stomach, particularly post-sleeve gastrectomy. Here we present a case of endoscopic transmural stents used to treat a non-resolving duodenal fistula following acute necrotizing pancreatitis.

**Methods:** Under general anesthesia, using a standard adult gastroscope, the fistula was identified in the second portion of the duodenum (Fig. 1). A flexible-tipped guide wire was used to identify the fistula tract and two 7 Fr 5 cm double pigtail biliary stents were deployed (Fig. 2) with positioning verified under fluoroscopy. Two weeks later these were removed and a single stent deployed into the visibly smaller tract (Fig. 3). Two weeks after that the single stent was removed and contrast medium was injected under fluoroscopic visualization, demonstrating resolution of the fistula (Fig. 4).

**Case:** This patient is a 72 year old woman with hypertension and congenital hearing loss who underwent a cholecystectomy for biliary colic and subsequent ERCP with sphincterotomy for retained stone. This was complicated by acute pancreatitis which progressed to severe necrotizing pancreatitis with infected retroperitoneal necrosis. Percutaneous drainage yielded initial improvement but a persistent moderate collection (300 cc per day) lead to the identification of a fistula in the second part of the duodenum. Repositioning and exchange of percutaneous drains over 8 weeks did not hasten resolution. Endoscopic transmural pigtail stents were tried after visualization of a large (8–10 mm diameter) fistula tract. Stents were utilized as described in Methods, with a total of three endoscopic interventions, at 2 week intervals, resulting in resolution of the fistula as evidenced by contrast injection into the duodenum under fluoroscopy and subsequent CT scan with oral contrast. The patient's symptoms resolved and she was tolerating a normal diet. She remained thus at 1 month follow-up.

**Conclusion:** This case demonstrates the benefit of endoscopic transmural stents for the resolution of duodenal fistulas, expanding the utility of this technique to address leaks and fistulas of the upper gastrointestinal tract. Further study is warranted to clarify the timing and adjuncts to optimize the use of this promising approach.



**P132****Totally Laparoscopic ALPPS Combined with the Microwave Ablation for a Patient with a Huge HCC**

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**Introduction:** Associating liver partition and portal vein ligation for staged hepatectomy (ALPPS) is a novel technique for resecting hepatic tumors that were previously considered unresectable due to the insufficient future liver remnant (FLR) which may result in postoperative liver failure (PLF). The procedure has been accepted and modified in many medical centers worldwide. But reports about the laparoscopic ALPPS were rare. This study aimed to report a totally ALPPS combined with microwave ablation for a patient with huge HCC and confirm the feasibility of laparoscopic ALPPS.

**Methods:** A 51-year-old man had complained of 1-year history of right upper abdominal pain, and the syndrome was worsened in recent month. Abdominal enhanced computed tomography (CT) imaging revealed a 15×11 cm solid mass in right lobe of liver with non-uniform and unclear boundary, the right posterior branch of the portal vein was invaded. In addition, a small lesion was simultaneously found in left lateral lobe of liver. The tumor was evaluated as unresectable due to the FLR was only 355 ml (25%). We decided to perform the laparoscopic ALPPS procedure. First stage including microwave ablation of the lesion in left lobe, cholecystectomy, ligation of the portal vein and transection of liver parenchyma. The second stage was done 11 days later and consisted of laparoscopic right hemihepatectomy.

**Results:** The two stages were underwent by laparoscopy successfully. The operation duration was 300 and 200 minutes, respectively. Estimated blood loss was 550 and 250 ml. The hospitalization time in intensive care unit was 1 and 3 days. There was no need for transfusion in both stages. The patient was discharged 22 days after the second stage and the total hospitalization time was 38 days. Recovery of the patient was uneventful in addition to the incision infection after the second stage which recovered with conservative management. The patient did not show any signs of liver failure. The CT scan before the second stage showed an enlargement of left lobe, the FLR was 533 ml (37.5%). There was no signs of residual liver disease in the CT scan 10 days after the operation. The patient showed no signs of recurrence or liver failure in the following up period of six months.

**Conclusion:** Totally laparoscopic ALPPS combined with microwave ablation is safe and feasible for the multiple HCC which was not resectable. The hypertrophy of remaining liver was fast and can achieve an adequate volume in a short time.

**P134****Pancreatojejun Derivation (Puestow) by Laparoscopy, About 2 Cases**

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**Introduction:** Chronic pancreatitis is a benign, irreversible inflammatory disorder characterized by the conversion of the pancreatic parenchyma into fibrous tissue. Initial management should be conservative, surgery is applied in case of failure of medical treatment. The development of minimally invasive techniques has made it possible to perform these highly technical procedures in a laparoscopic manner.

**Materials and Method:** We have the history of 2 patients with 19 and 42 years with chronic pancreatitis and pancreatic lithiasis of difficult handling but intractable pain to those who decided to surgical management. We performed the procedure under general anesthesia, epidural analgesia catheter was placed. Neumoperitoneum technique of cali, at 14 mmHg and approach using a 12 mm umbilical port, 2 working ports of 12 and a 1 of 5 mm port,. The pancreas was exposed by a section of the gastrocolic ligament with a 5 mm ultrasonic scalpel, with cephalic retraction of the stomach, opening of a smaller sac and approaching the transpavity of omentum. The ventral surface of the pancreas was exposed from the neck. An incision was made in a pancreas body with a monopolar hook. Primary pancreatic duct lumen was identified and the incision was extended longitudinally from the neck to the tail of the pancreas (8 cm). Roux's Y loop was prepared 50 cm from the Treitz ligament, with a jejunum section with a 60 mm stapler, Roux's loop was transmecoscopically retrocolic, closing the gap of the mesocolon with Monocryl. A 60-cm jejunum-jejunal anastomosis was performed with Endo-GIA stapler and closure of enterotomy with 2-0 polypropylene intracorporeal suture. Jejunal (Roux) isoperistaltic loop was placed longitudinally at the opening of the main pancreatic duct, and enterotomy was performed with monopolar in antimesenteric segment. The intracorporeal pancreatico and jejunum anastomosis was performed using a lower and an upper plane, with single points of total thickness with ethnobond 2-0. 1 closed drains were placed towards each anastomosis. this procedure was performed in the 2 patients reported.

**Results:**

Operative time 180–300 min

complications none

operative time 4–7 days

minimal bleeding

drains No1 retired in both cases at 7 days

1 year follow-up of patients improved pain\

**Conclusions:** Minimally invasive surgery is a fundamental tool for the approach and management of patients with biliopancreatic pathologies. the establishment of multidisciplinary groups, offer an excellent alteranativa in the integral management of the patients.

**P135**

**Hourglass Gallbladder Recognized During One-Step Laparoscopic Cholecystectomy and ERCP for Chronic Cholecystitis and Choledocholithiasis: A Case Report**

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Gallbladder anatomy is highly variable, and surgeons must be prepared to identify anomalies of form, number, and position. Variants include gallbladder agenesis, diverticulum, duplication, bilobed, multiseptate, Phrygian cap, ectopic, and hourglass gallbladder. The hourglass gallbladder has been described from the earliest days of cholecystectomy, as Morton described a congenital case in 1908, and Else thoroughly described the acquired and congenital strictures leading to the hourglass deformity in 1914. We describe a case of an hourglass gallbladder found during one-step endoscopic retrograde cholangiopancreatography (ERCP) and laparoscopic cholecystectomy.

This 71 year old male presented to an outside hospital with one day of nausea, and constant, severe, epigastric pain that radiated to his back. He endorsed a history of similar pain several times in the past. His abdomen was soft, non-tender, and without Murphy sign. Laboratory evaluation revealed total bilirubin 2.0 mg/dL, alkaline phosphatase 195 U/L, AST 835 U/L, ALT 800 U/L, and no leukocytosis. CT abdomen and pelvis revealed choledocholithiasis, distal choledocholithiasis, intra- and extra-hepatic ductal dilation, and a 3.8 centimeter left liver hemangioma. He was transferred for management of choledocholithiasis, and an abdominal ultrasound revealed choledocholithiasis, without gallbladder wall thickening or pericholecystic fluid, and a 7.7 millimeter common bile duct without choledocholithiasis. He was taken to the operating room for a one-step ERCP and laparoscopic cholecystectomy. Upon laparoscopy, dense adhesions to the gallbladder were found. After initially attempting to obtain the critical view of safety, we then embarked on the retrograde “top down” dissection. This isolated a spherical structure measuring 2.4 × 2.2 centimeters. Two very thin tubular structures were identified, clipped, and transected after we found they were too small to place a cholangiocatheter. The common bile duct appeared to be pulled anteriorly by surrounding inflammation, though this was later found to be the proximal segment of gallbladder. The intra-operative ERCP identified a remnant gallbladder with cholelithiasis and no extravasation of contrast. Given the unusual anatomy, we completed the operation, ordered a post-operative CT liver and MRCP, and consulted a hepatopancreaticobiliary surgeon. A small remnant gallbladder was identified on CT liver, though not on MRCP. Completion laparoscopic cholecystectomy with intraoperative cholangiogram and ultrasound was performed on hospital day 4.

This hourglass gallbladder variant likely occurred secondary to chronic fibrosis from cholecystitis, leading to a proximal and distal gallbladder lumen. In anatomic uncertainty, the “top down” dissection, intraoperative cholangiography, CT liver, and expert consultation are safe methods to avoid iatrogenic injury.

**P136**

**Laparoscopic Management of Bronchogenic Cyst of Stomach: A Case Report**

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**Introduction:** Bronchogenic Cysts are congenital cysts that arise as anomalous budding from the primitive tracheobronchial tree. Incidence of bronchogenic cyst in the wall of the stomach is extremely rare.

**Case Description:** A 23 year old male presented with epigastric pain for one month with no obstructive symptoms. On evaluation with CT, he was found to have a 5.3 × 3.1 cm cystic lesion arising from the posterior aspect of the body of the gastric fundus, partially compressing the stomach. He was provisionally diagnosed to have a stromal tumour of the body of stomach. Owing to persistent pain, the patient was planned for a diagnostic laparoscopy. With the patient in right lateral position, the surgery was then proceeded to Laparoscopic Partial Gastrectomy with excision of the gastric mass using endoscopic staplers. The postoperative course was uneventful. Histopathological Exam showed a serosal cyst with pseudostratified ciliated columnar epithelium with adjacent extensive xanthomatous changes. The final diagnosis was Gastric Bronchogenic Cyst. On follow-up at 4 weeks, patient was asymptomatic.

**Discussion:** Bronchogenic cysts of stomach are rare developmental malformations of the foregut. They are lined with cuboidal or pseudostratified ciliated epithelium and may or may not be surrounded by elastic fibres, smooth muscle and cartilage. Bronchogenic cysts are common in the hilar and middle mediastinal area, whereas extrathoracic and subdiaphragmatic bronchogenic cysts are rare. Of the 39 previously reported cases of gastric bronchogenic cysts, only 4 have been managed laparoscopically. On radiological imaging, they often appear uncharacteristic and are often diagnosed as GIST. Surgical resection is advised to treat symptoms and prevent malignant transformation.

**Conclusion:** Gastric bronchogenic cysts are a diagnostic challenge as they often mimic GIST. Symptomatic cases should be dealt with surgical resection.

**P137****Endoscopic Magnet Compression Anastomosis for Small Bowel Obstruction**

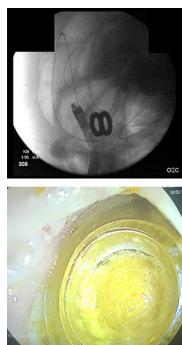
Carter Lebares, MD, Sandhya Kumar, MD, Matthew Lin, Nicholas Fidelman, MD, John Cello, MD, Michael Harrison, MD, Stanley Rogers, MD; University of California San Francisco

**Introduction:** Endoscopic entero-enteral bypass could change our approach to small bowel obstruction in patients with prohibitively high operative risk. Magnetic compression anastomoses have been well-vetted in animal studies, but remain infrequent in humans. Isolated cases of successful use in humans include treatment of biliary strictures and esophageal atresia. While endoscopic gastro-enteric magnetic anastomoses have been described, the associated multicenter cohort study was terminated due to serious adverse events. Since then, the technology has evolved and recently our own institution reported results of the first in-human trial of Magnetic Compression Anastomosis (Magnamosis), deployed through an open approach. Here we present the first case of endoscopic delivery of the Magnamosis device and the successful creation of an enterotomized anastomosis for chronic small bowel obstruction in a patient with prohibitively high operative risk.

**Methods:** The Magnamosis device has previously been approved by the Food and Drug Administration (FDA) for use in clinical trial. Our Institutional Review Board approved emergency compassionate endoscopic use of the device in this patient due to a non-resolving small bowel resection and prohibitively high operative risk.

**Case:** This is a 59 year old man with advanced liver disease, chronic obstructive pulmonary disease, and history of emergent right colectomy with end ileostomy for cecal perforation. He presented with multiple acute on chronic episodes of small bowel obstruction with a stable transition point in the distal ileum, radiographically estimated at 15 centimeters proximal to the ileostomy. Endoscopic evaluation through the ileostomy revealed a traversable obstruction with proximally dilated small bowel. The magnets were delivered via endoscopic snare under fluoroscopic guidance and positioned in adjacent loops of bowel on either side of the obstruction (Image 1). By 7 days post-procedure, healthy villi were visible through the central portion of the mated magnetic rings (Image 2). By 10 days the magnetic rings were mobile and the anastomosis was widely patent allowing easy passage of the gastroscope (Image 3), and the patient's symptoms were completely resolved. The rings passed through the ileostomy 11 days post-procedure. At 1 month follow up, the anastomosis was unchanged (Image 4).

**Conclusion:** This case demonstrates the benefit of an endoscopically created magnetic compression anastomosis in a patient with small bowel obstruction and high operative risk. Further studies are indicated to evaluate the use of this technique in similar patients or those with malignant obstructive.

**P138****Congenital Agenesis Presenting as a Small Contracted Gallbladder**

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Cholecystectomy is one of the commonest operations in general surgery [1]. Occasionally chronic cholecystitis can lead to a small contracted gallbladder. This diagnosis can be misleading as it may represent congenital agenesis of the gallbladder [2]. A 28-year-old female with a past history of pancreatitis presented with a three day history of right upper quadrant pain associated with nausea and vomiting. Upon exam she exhibited tenderness in the right upper quadrant. Her leukocyte count and liver function tests were within normal limits. Ultrasound revealed a poorly visualized, contracted gallbladder without stones and a dilated common bile duct (CBD). Cholescintigraphy revealed non visualization of the gallbladder after two hours, which was suggestive of acute cholecystitis. Decision was made to proceed with a laparoscopic cholecystectomy. The abdomen was entered by an open Hasson technique and standard trocar placement for a cholecystectomy was performed. On initial inspection, the gallbladder was not readily visible. A structure appearing to be the CBD was present and was mobilized circumferentially (Fig. 1). A 19 gauge butterfly cannula was utilized and multiple cholangiographic images were obtained (Fig. 2). No cystic duct or gallbladder was identified which was suggestive of congenital agenesis of the gallbladder. The patient did well postoperatively, and was discharged home on postoperative day two. The patient's symptoms resolved and she continues to be pain free one month postoperatively. Congenital agenesis of the gall bladder is a rare disorder. A high index of suspicion is required especially in the setting of a small contracted gall bladder. If preoperative imaging is inconclusive then diagnostic laparoscopy should be the next step. Cholangiogram should be performed routinely to confirm the diagnosis and to rule out an ectopic gall bladder. Conversion to open does not offer any distinct advantage, and laparotomy should be avoided if possible given its associated morbidity.

**P139****A Laparoscopic Aneurysm Ligation for Aneurysm of Left Inferior Phrenic Artery: A Case Report**

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There are many reports upper abdominal major arterial aneurysms. However, an aneurysm of left inferior phrenic artery had never been reported. A 48-year-old woman with liver cirrhosis associated with hepatitis B viral infection was referred to department of surgery for treatment of aneurysm of left inferior phrenic artery. She underwent trans-arterial chemoembolization (TACE) for treatment of hepatocellular carcinoma three times, previously. On 20 months after last TACE, 7 mm sized highly enhancing nodular lesion of gastric fundus was found on follow-up abdomen-pelvis computed tomography (A-P CT). One year later, the size of this lesion increased to 18 mm, and an aneurysm was diagnosed. She underwent angiography and attempted embolization with an aneurysm of the left inferior phrenic artery, but access failed. We performed a laparoscopic vessel ligation. She recovered with no complication and discharged on the 3th postoperative day.

**P140****Post CPR Liver Injury in a Pregnant Lady**

**Yousef Almuhanna, Vatsal Trivedi, Fady Balaa; University of Ottawa**

A 34 years old female, G7 and 10 weeks pregnant, was brought to the hospital by EMS, after being found on the floor in her toilette surrounded by vomitus and urine. Mother-in-law, who happens to be at the house that time, have heard severe retching followed by a loud bang sound. Firefighters have found no pulse and therefore started CPR. Return of spontaneous circulation was achieved, yet unfortunately, she had arrested again 5 minutes prior to arrival to ER. POCUS assessment showed large RVOT, and therefore tPA was started on the assumption of pulmonary embolism. Upon arrival of blood work, it was found that her hemoglobin had dropped from 110 to 54. FAST was repeated showing moderate to severe amount of free fluid in the Morrison's pouch and pelvis. She was then taken to the operating theatre, had undergone laparotomy showing liver segment II injury. Pringle's maneuver and aortic clamping did not control the bleed, therefore finger fracture and venous clips were used to temporary minimize the bleed, and head to interventional radiology suite. After multiple attempts to control the bleed, and the massive transfusion, she vital signs were not maintained, and had arrested afterwards.

**P141****Mesenteric Panniculitis: A Case Report**

**Sarrath Suttipong, MD, Chumpunut Chuthanan, MD, Chinnavat Sutthivana, MD, Petch Kasetswan, MD; Bhumibol Adulyadej Hospital, Bangkok, Thailand**

**Background:** Mesenteric panniculitis (MP) is a rare, benign and chronic fibrosing inflammatory disease that affects the adipose tissue of the mesentery of the small bowel and colon. The specific etiology is unknown and no clear information about the incidence. The diagnosis is suggested by CT and is usually confirmed by surgical biopsy. Treatment is based on some selected drugs. Surgical resection is sometimes attempted for definitive therapy, although the surgical approach is often limited. We reported a case of the MP diagnosed with CT and surgical biopsy by laparoscopic approach.

**Case Report:** 50-year-old woman with 5 months history of chronic abdominal pain, mainly localized in the sub-epigastrum, intermittent and mild. She had anorexia but no weight loss or change in bowel habits. No history of medical illness or surgery. The physical examination was unremarkable, except for palpation of ill-defined mass about 5 cm at mid-abdomen, firm, smooth surface with mild tenderness. The laboratory profile and tumor marker were normal. CT of the abdomen, which showed focal heterogeneous enhancement of the mesenteric fat with stranding ( $8.7 \times 4.8 \times 10$  cm) with multiple internal subcentimeter LNs in the supraumbilical area, which was probably inflammatory in origin and suggestive of MP. 18F-FDG PET/CT showed faint FDG uptake in multiple mesenteric LNs. The patient was subsequently underwent diagnostic laparoscopy with biopsy. Intra-operative finding showed a fat-like surface of yellowish mass at mesentery of jejunal segment, incisional biopsy was performed laparoscopically. The histology showed adipose tissue with areas of fat necrosis, fibrosis, foamy macrophages infiltration and predominant chronic inflammation, no evidence of malignancy. IHC studies (including CD68, S-100, CD3 and CD20) were performed and the result was compatible with reactive process. Treatment was started with 40 mg prednisone once daily and planned for follow-up with repeated CT scan.

**Discussion:** MP involves the small bowel mesentery in over 90% of cases. The diagnosis is made by 3 pathologic findings: fibrosis, chronic inflammation and fatty infiltration. The differential diagnosis is broad and has been associated with malignancies such as lymphoma, well-differentiated liposarcoma and melanoma. The imaging appearance varies depending on the predominant tissue component. A definitive diagnosis is biopsy but open biopsy is not always necessary. No data of laparoscopic biopsy, which has been reported previously. Treatment has been reserved for symptomatic cases with a variety of drugs. Our case was started on oral corticosteroid treatment and waited for responsive evaluation.

**P142****Internal Hernia Caused by a Free Intraperitoneal Staple After Laparoscopic Appendectomy**

**Lisa M Angotti, MD, MS, Christopher Decker, MD, Todd Beyer, MD; Albany Medical Center**

**Background:** Laparoscopic appendectomy is the gold standard for treatment of acute appendicitis. Stapled closure of the appendiceal stump is often performed and has been shown to have several advantages. Few prior cases have been reported demonstrating complications from free staples left within the abdominal cavity after the laparoscopic stapler has been fired.

**Case Report:** A previously healthy 29 year old female initially underwent laparoscopic appendectomy for acute uncomplicated appendicitis during which the appendix and mesoappendix were divided using laparoscopic gastrointestinal anastomosis (GIA) staplers. Her initial postoperative recovery was uncomplicated and she was discharged home the same day.

The patient returned to the emergency department on postoperative day 17 with one day of sharp mid-abdominal pain, obstipation, and emesis. Her abdomen was distended and mildly tender but not peritoneal. She was afebrile but was found to have a leukocytosis of 13.2. CT demonstrated twisted loops of dilated small bowel in the right lower quadrant with two transition points, suggestive of internal hernia with closed loop bowel obstruction.

Diagnostic laparoscopy was performed through the three prior appendectomy incisions. An adhesion was noted between the Veil of Treves and the mesentery of a more proximal loop of ileum caused by a solitary free closed staple, remote from the staple lines, resulting in an internal hernia containing several loops of ileum (Fig. 1). The hernia was reduced, and the small bowel was noted to have early ischemic discoloration. The adhesion was lysed by removing the staple from both structures to prevent recurrence. Through the remainder of the procedure, the compromised loops of bowel began to peristalsis and the color normalized. The procedure was concluded without resection. The patient recovered on a surgical floor and was discharged home on postoperative day one.

**Conclusion:** Gastrointestinal staplers are commonly used secondary to ease of use and low complication rate. It is not uncommon to leave free staples in the abdomen during laparoscopy as retrieval can often be more difficult and time consuming. Our case is only the second in the literature reporting an internal hernia with closed loop bowel obstruction as a complication of retained staple. Choosing the most appropriate size staple load, to reduce the number of extra staples after the fire, and removing as many free staples as possible can prevent potentially devastating complications.



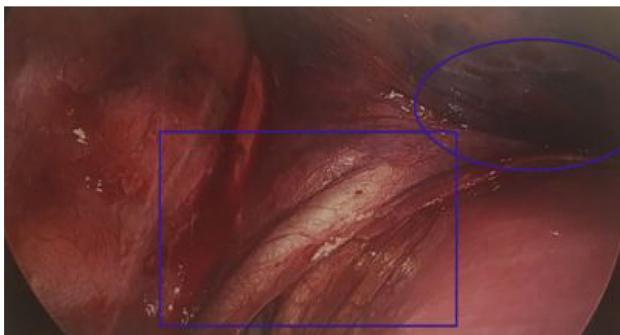
**Figure 1.** Internal hernia resulting from free intraperitoneal staple.

**P143**

**Video-Assisted Thoracoscopic Pulmonary Wedge Resection in a Patient with Hemoptysis and Intralobar Sequestration: A Case Report**

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**Case Report:** A 19-year-old male with history of Noonan's syndrome, bronchitis, and asthma presented with acute hemoptysis. While chest x-ray was unremarkable, a computed tomography angiogram of his chest was significant for intralobar pulmonary sequestration in the right lower lobe. The aberrant pulmonary artery originated from the abdominal aorta, immediately proximal to the celiac axis, and coursed through the hiatus in the retroperitoneum. Flexible, fiberoptic bronchoscopy revealed blood within the right lower lobe bronchus with no appreciable source. A right video-assisted thoracoscopic approach was taken for wedge resection of the sequestration. Two-port technique was utilized with the patient on single lung ventilation. The sequestration was easily identified; the anomalous pulmonary artery coursed directly to a large, focal area of hemorrhage noted within the lower lobe pulmonary parenchyma, as seen in Image [rectangle marking the aberrant artery and oval marking the sequestration]. Pathologically, the specimen was noted to be benign lung parenchyma with bronchiectasis and abundant, acute hemorrhage.



**Discussion:** Pulmonary sequestration (PS) is a rare, congenital bronchopulmonary foregut malformation. Literature describes the incidence of PS to be only 0.15–6.4% of all pulmonary malformations. As PS is most frequently diagnosed during childhood, the occurrence of diagnosis during adulthood is estimated to be less than 3 per 10,000 adults. Two types (intra- and extralobar) are described, with intralobar sequestration most common and contained within the normal visceral pleura. Both types have aberrant systemic arterial blood supply, most frequently from the thoracic aorta. Likewise, both types are nonfunctioning lung tissue, as there is no direct communication with the bronchopulmonary tree. The most common presentation is pneumonia, and often patients will have had recurrent symptoms before diagnosis. It is rare to present with hemoptysis, which is understood to be secondary to elevated capillary pressure within the sequestration and their communication through the pores of Kohn. While endovascular embolization of the aberrant pulmonary artery has been described as a safe alternative for surgical intervention, the subjects of these studies have primarily been children and long-term outcomes are unknown. The definitive treatment of PS continues to be surgical intervention. The surgeon should strive to leave as much normal lung parenchyma as possible. Video-assisted thoracoscopic resection is well tolerated by patients when compared to thoracotomy. However, it is vital for the surgeon to be aware of the potential risk of life-threatening hemorrhage secondary to the sequestration having systemic blood supply that must be controlled and ligated.

**P144**

**Resection of Giant Mesenteric and Ovarian Cysts by Hybrid Minimally Invasive Technique: A Case Report**

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**Case Report:** a 51 years-old female patient with history of an increased mass and weight loss of 7 kilograms in 15 months, associated with vomiting and nausea for eight months. Abdominal ultrasound showed an irregular cyst, without solid projections and without signs of flow in Doppler, measuring 20 × 11 × 20 cm. Investigation continued with CT scan that showed a large homogeneous cystic lesion with no septum in the abdominopelvic region, possibly mesenteric, measuring 20.5 × 10.5 × 24 cm. A laparoscopic approach for resection of the cyst was then performed. The surgery was performed with a patient in the dorsal decubitus, using three trocars: one in the umbilical region (11-mm) for the camera and where the pneumoperitoneum was created by the Hasson open technique under direct vision; and another two located in the epigastrum (5-mm) and in the right upper quadrant (3-mm). In addition to the mesenteric cyst, a simple cyst in the right ovary and a solid nodule with a lipomatous characteristic of approximately 3 cm in the abdominal cavity were visualized. Total resection of the mesenteric cyst with peripancreatic fibrous tissue was performed. The cyst was punctured and its contents fully aspirated. Resection of the right ovarian cyst was also performed. At the end of the procedure the mesenteric and ovarian cysts, the nodule, part of the omentum, and the peripancreatic tissue were removed through the 11-mm trocar at the umbilicus. Patient had no further complications, being discharged four days after the procedure. Histopathologic result showed a serous cyst in the right ovary, serous cyst in peripancreatic mesentery with chronic inflammatory process and signs of calcification; no signs of malignancy were observed in any specimen.

**Conclusion:** The Hybrid Laparoscopic technique was safe and effective for this procedure. The known advantages of the minimally invasive approach such as less trauma, greater dexterity, higher precision, lower postoperative pain, and shorter hospitalization time were confirmed.

**P145**

**Videolaparoscopic Treatment for Wilkie Syndrome Developed 10 Years After a Heller-Dor Procedure for Achalasia**

Felipe C Victer, MD, FACS, Pedro Henrique Salgado Rodrigues, MD, Andre M Silva, MD; Hospital Federal do Andaraí

Male 45 years old suffering from achalasia were submitted a heller dor procedure 10 years ago. Despite the fact of better life outcome, he begins to suffer difficulties to swallow in the last year. During investigation it was observed a upper gastro esophageal obstruction, due to a superior mesenteric artery syndrome. Tc scan was used to conclude the diagnosis. The patient were submitted to a duodenum-jejunum anastomosis with laparoscopic approach. After surgery he had relief of symptoms.

**P146****Case Report: Ulcerative Roux Limb Jejunitis After Gastric Bypass**

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**Introduction:** The differential diagnosis for abdominal pain after gastric bypass include dietary disorders, functional disorders, biliary disorders as well as pouch and remnant stomach disorders. With regards to small intestine disorders, the usual culprits are hernias, adhesions, stenosis, and intussusception. We describe a rare case of a patient with ulcerative roux limb jejunitis.

**Case Description:** A 48 year old female with asthma, diabetes mellitus, fibromyalgia, hypertension and roux-en-y gastric bypass in 2005 for weight loss presented to our hospital with one week history of abdominal pain, vomiting and poor oral intake. At that time, she reported one episode of dark colored stool with admission hemoglobin of 8.2 with known chronic iron deficient anemia. She endorsed recent heavy NSAID use to control her fibromyalgia discomfort. Patient was not on home proton pump inhibitors or H2 blockers after her gastric bypass. Inpatient upper endoscopy showed erosive pouchitis and moderately severe jejunitis thirty centimeters from the gastrojejunostomy anastomosis in the mid-jejunal roux limb. Biopsies taken at that time demonstrated acute ulceration of jejunum and patchy/non-specific gastritis. Patient was recommended to discontinue NSAID use and begin twice daily proton pump inhibitor treatment. Helicobacter pylori testing was negative during admission. Hemoglobin remained stable.

**Discussion:** Roux-en-y gastric bypass is associated with risk of several postoperative complications including malnutrition, GERD, internal hernia, anastomotic leak and marginal ulceration. There are several hypothesized causes of marginal ulceration post-RYGB including pouch size, orientation, staple line integrity, mucosal ischemia secondary to tension, NSAIDs, helicobacter pylori and smoking. Although several sources site jejunitis in post-RYGB patients, there are minimal reports of ulcerations thirty centimeters distal to the gastrojejunostomy anastomosis in the roux limb. Our patient's ulcer was attributed to her heavy NSAID use for fibromyalgia. Although not yet a standard of care, it is not an uncommon practice for patients to be placed on long-term acid-suppression therapy with proton-pump inhibitors to mitigate this risk. Our patient was not on long term PPI use at time of her jejunal limb ulcer diagnosis.

**Conclusion:** Marginal ulcers at the gastrojejunostomy anastomoses are well known post-operative complication of RYGB as well as asymptomatic jejunitis of the roux-limb. Patients with increased risk factors including heavy NSAID use and smoking are also at risk for jejunal ulceration up to 30 centimeters from the GJ anastomosis as demonstrated by our patient case. Long-term PPI suppression therapy for post-RYGB patients should be considered in those at high risk for ulcers.

**P147****Safe Laparoscopic Surgical Approach to GI Bleed in Jehovah's Witness Patient**

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We aimed to present the successful therapeutic approach utilizing laparoscopy for safely removing a Gastrointestinal Stromal Tumor. Depicted is a 66 year old Jehovah's witness female who presented to the emergency department for evaluation of bitemporal headache and dizziness and found with profound anemia with hemoglobin 5.4 and hematocrit 16.6 upon arrival to ED. The patient refused blood transfusion as her religious beliefs, Jehovah's Witness, preclude her from taking blood products. As part of her work up, endoscopy was performed and revealed a large, approximately 4 x 4 cm, prolapsed, ulcerated, nodular lesion with active bleeding in the cardia of the stomach. This was temporized but the friable tissue, with no single identifiable lesion for clip placement, left the patient at high risk for re-bleeding. She was taken to the operating room and Laparoscopic partial gastrectomy with intraoperative esophagogastroduodenoscopy were successfully performed, with minimal blood loss and no intraoperative complications. Patient was discharged on post op day 3.

**P148****Duodenal Stump Blowout After SADI-S Conversion to RYGB Managed with a Percutaneous Duodenostomy Tube. A Case Report and Review of the Literature**

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We present the case of a 46-year-old male with a history of morbid obesity with an initial BMI of 44.7, who underwent an elective laparoscopic single anastomosis duodenal-ileal bypass with sleeve gastrectomy (SADI-S). Postoperatively he developed an anastomotic leak at the duodeno-ileal anastomosis that would not resolve despite reoperation. He was then converted to a Roux-en-Y gastric bypass (RYGB). Postoperative imaging failed to reveal any signs of anastomotic leak and the patient was discharged tolerating an oral diet. He returned to the emergency department 11 days later with a 6 x 3 x 2 cm sub-hepatic collection arising from the duodenal stump from the surgical conversion. Interventional radiology percutaneously drained the collection and found a connection between the cavity and the duodenum. Using this connection, a percutaneous decompressive duodenostomy drain was successfully inserted into the duodenum using a guidewire through the abscess cavity along with an extra-enteric drain placed within this cavity. The collection was obliterated and the duodenal leak was controlled successfully with percutaneous drainage, bowel rest with parenteral nutrition and broad-spectrum intravenous (IV) antibiotics. The patient was reintroduced to a bariatric clear diet after a week of bowel rest and the abscess drain was then discontinued during the same hospital admission. The patient was discharged with the percutaneous duodenostomy tube which was removed in clinic 34 days later, after the patient tolerated capping trials and imaging failed to reveal any further collections, oral contrast extravasation or distal obstruction.

In this article we analyze notable imaging from the case and review current literature on the different management options for a duodenal stump blowout. We also discuss the basics of the SADI-S procedure and conversion of a SADI-S procedure to a RYGB.

**Keywords:** Anastomotic leak, Duodenal stump blowout, SADI-S, Duodenostomy tube.

**P149****Pancreatic Heterotopia Mimicking an Internal Hernia**

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Pancreatic heterotopia is often an incidental finding on autopsy, but in some cases can lead to abdominal pain, obstruction, or intussusception. We present a case of pancreatic heterotopia mimicking an internal hernia on radiologic imaging.

A 47 year old female with seven month history of chronic abdominal pain treated for low back pain and recurrent urinary tract infections. She was found to have a Computed Tomography (CT) scan concerning for internal hernia and labs consistent with acidosis. She was taken for a laparotomy and did not have an internal hernia, but an exophytic mass in the proximal jejunum. The mass was resected and a stapled side to side jejunolejunostomy was created. On pathologic review, the specimen was found to be pancreatic heterotopia. Her post operative course was complicated by an ileus, but was discharged post op day three. At her two week follow up she had minimal incisional pain and at one year follow-up she had resolution of her left upper quadrant abdominal pain. Prior to this report, pancreatic heterotopia has never been described as presenting on CT scan as an internal hernia. Although uncommon it should remain in the differential when evaluating a patient presenting with abdominal pain and radiologic evidence of obstruction or internal hernia.

**P150**

**A Refractory Abscess of the Adrenal Gland Associated with Suboptimal Indwelling Catheter Management in a Diabetic Patient**

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**Introduction:** Adrenal gland abscess is an extremely rare finding in adults. We present a case of a refractory adrenal abscess likely secondary to inadequate drainage of an adrenal cyst.

**Case:** The patient is a 53-year-old female with a history of poorly controlled type 2 diabetes and prior treatment of a non-functioning, benign cyst of the left adrenal gland. In Singapore in 2016, the patient underwent four separate episodes of percutaneous aspiration and drainage with an indwelling catheter. Shortly after immigrating to the U.S. in February 2017, she was admitted to our facility with flank pain and a non-healing draining sinus at the prior left flank drain site without significant systematic symptoms. CT images confirmed a  $4 \times 5 \times 7 \text{ cm}^3$  left suprarenal fluid collection with a calcified rim (Figs. 1–3). An ultrasound-guided percutaneous drainage obtained 40 mL of purulent fluid, and an indwelling drain catheter was placed. The drain fluid was cultured and found to be positive for Methicillin-sensitive staphylococcus aureus. The patient was treated with a course of antibiotics and discharged home. The patient demonstrated poor compliance with care of her drain catheter and the adrenal abscess persisted on follow-up CT imaging (sizing  $4.2 \times 4.4 \times 4.7 \text{ cm}^3$ ). Subsequently, the patient elected to undergo a laparoscopic left adrenalectomy with excision of associated adrenal abscess in April 2017 after establishing care with a primary care physician and optimizing her diabetic control. The procedure and postoperative course were uneventful and the patient recovered well. Pathology revealed benign inflammation of the left adrenal gland, with necrosis, calcification and fibrotic changes in the para-adrenal tissue.

**Discussion:** There are few instances of adrenal gland abscess reported in the literature. Our patient has a recent surgical history of multiple percutaneous aspiration and indwelling catheter drainages for a symptomatic benign adrenal cyst. Her uncontrolled diabetes and noncompliance with instructions for drain care likely contributed to her development of a refractory adrenal abscess. This case highlights the importance of prudent decision making with regards to electing to drain adrenal gland pathology, as well as vigilant management of indwelling catheters.

**P151**

**A case of Leiomyosarcoma of duodenum**

Lavith Kuttichi, Vishwanath Pai, Pari Muthukumar; Sri Ramachandra Medical College

**Introduction:** Leiomyosarcoma of the duodenum is a rare disease it can occur in both sexes with approximately the same frequency. Peak incidence is in the 40 to 49 year age. Leiomyosarcoma is relatively infrequent compared to adenocarcinoma of the duodenum. It may develop from all parts of the gastrointestinal tract. The duodenal localisation is rare.

**Case Report:** A 64 year old male presented with complaints of abdominal pain for one month in the epigastric region which increased after food intake. No obstructive symptoms. On palpation, palpable mass occupying epigastric and right hypochondrium. On evaluation with CECT abdomen shows growth in the second part of duodenum. Patient underwent pancreaticoduodenectomy. The postoperative course was uneventful. Histopathological examination revealed as leiomyosarcoma of second part of duodenum. On follow-up at 4 weeks, patient was asymptomatic.

**Conclusion:** Leiomyosarcoma of the duodenum is relatively infrequent compared to adenocarcinoma of the duodenum. They are usually large tumours that involve the full thickness of the bowel wall and present in small intestine and Colon. Present with intestinal bleeding, obstruction and weight loss. They are aggressive often Metastasis to peritoneum, liver, lungs and bone.

Clinical latency makes the diagnosis often at an advanced stage. The most effective surgical therapy has been radical local excision of the tumor. Extensive removal of regional lymphatics would not seem to be a fruitful pursuit, since nodal metastases are rare. Since the techniques of pancreatic and duodenal surgery have been refined, excisional therapy has been possible with a low mortality. Aggressive surgical therapy is indicated both for relief of symptoms and because of the definite chance for cure in some cases.

**P152**

**Left Adrenalectomy and Retroperitoneal Lymphadenectomy by Hybrid Minimally Invasive Technique: A Case Report**

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**Case Report:** A 26-year-old male patient who was diagnosed with high blood pressure at 18 years-old and presented tetraparesis and intense asthenia for six months. Blood tests showed hypokalemia, hypernatremia, and suppressed renin activity. Ultrasound of the urinary tract was normal. CT scan of the abdomen showed a hypodense nodule with regular margins, measuring  $1.4 \times 1.0 \text{ cm}$  with a density of 18 HU in the non-contrast phase and heterogeneous uptake after the injection of the contrast in the left adrenal gland. Thus, the diagnosis of hyperaldosteronism secondary to the left adrenal nodule was confirmed, and surgical resection was indicated. The procedure was performed with the patient in the right lateral decubitus. Two 3-mm and one 5-mm trocars were used on the left flank, as well as the 10-mm portal for the camera in the lower right quadrant under direct vision. The pneumoperitoneum was created by the Hasson open technique in the transumbilical incision. The procedure consisted of the dissection, isolation and electrocautery of the left renal capsule and the left adrenal region with ultrasonic device, as well as the periadrenal vessels, adjacent lymph nodes and periadrenal and adrenal fat tissue. The surgery was uneventful and the patient had no further complications, being discharged the next day. Histopathologic result showed a completely excised adrenocortical adenoma.

**Conclusions:** The hybrid minimally invasive approach proved to be safe and effective for this procedure, and the known advantages of minimally invasive surgery such as less trauma, better visualization, better dexterity, better aesthetics, and reduced hospital stay were observed.

**P153****An Unusual Presentation of Coccidioidomycosis with Peritoneal Involvement in an Immunocompetent Individual**

**Joseph D Krocke<sup>1</sup>, Benjamin Clapp, MD, FACS<sup>2</sup>:** <sup>1</sup>The Texas Tech Health Sciences Center Paul L Foster School of Medicine, <sup>2</sup>The Texas Tech Health Sciences Center Department of Surgery

**Background:** Coccidioidomycosis is a fungal infection endemic to the southwestern United States, Central America and South America. *Coccidioides* is ubiquitous in many of these endemic regions, with near 100% seroconversion in some communities. Two-thirds of these mycotic infections may be asymptomatic. The most common presentation of coccidioidomycosis consists of “flu-like” symptoms or pneumonia. Less than five percent of symptomatic cases progress to disseminated coccidioidomycosis which may involve any organ system. Very rarely infection may include the peritoneum. We report a case of coccidioidomycosis with peritoneal involvement in an immunocompetent individual.

**Case:** A 36-year-old male presented to the Emergency Department with progressive abdominal pain. He was seen and treated for pneumonia in the Emergency Department one week prior. The patient worked outdoors in Arizona and was otherwise healthy with a family history of malignancy and blood disorders. Fever, leukocytosis and ascites on computed tomography scan prompted a diagnostic laparoscopy which revealed peritoneal granulomas positive for *Coccidioides*. The patient was treated outpatient with Fluconazole.

**Discussion:** Since 1939 this is the 38th reported case of peritoneal coccidioidomycosis to our knowledge. The patient described in this case report was an otherwise healthy 36-year-old male; this is incongruent with many of the previously recorded cases which involved disseminated disease in immunocompromised patients. The patient's family history of malignancy and blood disorders suggests a potential underlying genetic predisposition that could account for this abdominal presentation. Possible mutations include genes coding for the interleukin-12  $\beta 1$  receptor and the signal transducer and activator of transcription 1 which have been implicated in increased coccidioidomycosis susceptibility. Peritoneal infection presents a unique challenge in diagnosis. In these cases coccidioidomycosis may not be suspected due to nonspecific symptoms and imaging, the infrequency of this extra-pulmonary manifestation and clinical characteristics that mimic the presentation of tuberculosis and malignancy. Abdominal infections have been misdiagnosed as appendicular abscesses, iliopsoas abscesses, adnexal abscesses and pancreatic masses. Consequently, the diagnosis of peritoneal coccidioidomycosis is often made after laparoscopic exploration of the abdomen and histopathology, as it was in this case report.

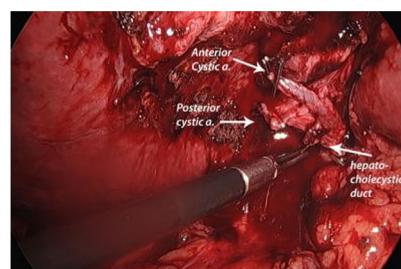
**Conclusions:** Coccidioidomycosis incidence is on the rise in endemic areas and it often falls on the surgeon to make the diagnosis in extra-pulmonary cases. The peritoneal subset of coccidioidomycosis should be considered in endemic areas when a young, otherwise healthy patient presents with abdominal pain. Failure to recognize the possibility of coccidioidomycosis may lead to unnecessary treatments and procedures.

**P154****Indocyanine Green Cholangiography to Detect Anomalous Biliary Anatomy**

**Steven D Schwartberg, MD, Gabrielle Yee, MS;** University at Buffalo Jacobs School of Medicine

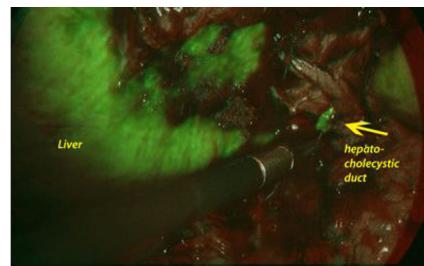
**Introduction:** Common bile duct injury is the most feared complication of cholecystectomy. Imaging with indocyanine green (ICG) is a safe and effective technique to detect biliary anatomy in open, laparoscopic and robotic surgery. Several studies report detecting aberrant biliary anatomy with the use of ICG in laparoscopic cholecystectomy with high success rates. By identifying the cystic duct-common hepatic duct confluence before dissecting Calot's triangle, ICG allows surgeons to perform “virtual” cholangiography at the start of procedures to identify either normal anatomy or possible anatomic variants. It is clear that ICG use is an effective tool to achieve the critical view of safety. However, no reports have suggested ICG cholangiography as the last operative step in cholecystectomy to identify hidden biliary anomalies and avoid postoperative bile leak complications.

**Case Report:** We report a novel use of ICG cholangiography in visualizing anomalous biliary anatomy prior to closing, thus avoiding potential bile duct leakage. In our case, ICG cholangiography was used to fluoresce the common hepatic duct, common bile duct and cystic duct.



**Figure 1.** Identification of the biliary anatomy during laparoscopic cholecystectomy, showing the operative view using a standard light.

The cystic duct was transected, and the gallbladder was removed using electrosurgery. At the completion of the gallbladder removal, the liver was elevated to inspect the clips on the cystic duct and artery. At this point, near infrared imaging was reinitiated, and a small 1 mm structure was noted to fluoresce next to the cystic artery. This structure was identified using white light and subsequently clipped.



**Figure 2.** Use of ICG-enhanced fluorescence upon completion of cholecystectomy demonstrated an aberrant hepatocholecystic duct.

**Discussion:** The use of ICG in this context after the completion of the cholecystectomy facilitated the identification of a small hepatocystic or aberrant duct, which would have likely leaked bile sometime in the postoperative period. Based on our experience, we recommend one additional routine near infrared viewing to identify small structures or potential leaks at the completion of cholecystectomy. Improved visualization of the extrahepatic biliary anatomy by ICG has the potential to translate into improved clinical outcomes. Limitations to ICG cholangiography include the inability to visualize deep ductal structures due to limited penetration of near infrared light and poor exposure of Calot's triangle with inexperienced laparoscopic surgeons. Future studies should aim to establish guidelines on optimal dosage and time frame for ICG administration and bile duct visualization.

**P155****Malignant Solitary Fibrous Tumor of the Stomach: Uncommon Differential Diagnosis for GIST Tumors**

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Solitary fibrous tumors (SFT) are uncommon fibroblastic mesenchymal neoplasms that display a wide range of histologic behaviors. These tumors, which are estimated to account for 2% of all soft tissue neoplasms, typically follow a benign clinical course. However, it is estimated that 10–30% of SFTs are malignant and demonstrate aggressive behavior with local recurrence and metastasis up to several years after surgical resection. We report a case of SFT arising from the stomach, which is an exceptionally rare finding and has been reported only six times in the literature. Additionally, this tumor was associated with dedifferentiation into undifferentiated pleomorphic sarcoma. To our knowledge, there are no documented cases of a malignant SFT arising from the stomach to demonstrate dedifferentiation into an undifferentiated pleomorphic sarcoma.

A 68-year-old male presented to the emergency department with vague complaints of right-sided flank pain. The patient had a history of nephrolithiasis and underwent a CT abdomen. This scan revealed a large heterogeneous mass in the left upper quadrant. The patient underwent endoscopic ultrasonography with fine needle aspiration of the mass, which stained strongly for CD34. Gastrointestinal stromal tumor (GIST) was the favored diagnosis as it is by far the most common mesenchymal neoplasm of the stomach, especially CD34 positive spindle cell neoplasm. Accordingly, the patient began treatment with imatinib; however, after four weeks of therapy, there was no significant radiologic regression. A second biopsy was performed and the specimen was sent for STAT6 immunohistochemistry, which revealed diffuse strong nuclear positivity. A diagnosis of solitary fibrous tumor was provided. Surgical resection of the tumor was performed, which measured 17 × 14 × 10.5 cm. The patient was to undergo surveillance imaging every 3 to 6 months post-operatively. Surveillance scan showed solitary metastatic disease in the left lateral segment of the liver. He underwent left lateral segmentectomy with an uneventful recovery. Our case was complicated by diagnostic dilemma with GIST, highlighting the challenges of diagnosing and characterizing SFTs. Dedifferentiation, or the abrupt transition from a classic SFT into a high-grade sarcoma, is a particularly concerning finding in our case, as it is associated with a worse prognosis than classic malignant SFT. The STAT6 marker by immunohistochemistry is very specific for SFT and may have aided in the diagnosis earlier. Therefore, it is imperative to keep solitary fibrous tumor, albeit exceedingly rare, in the differential diagnosis of mesenchymal neoplasms of the stomach.

**P156****Appendiceal Diverticulitis, an Uncommon but Relevant Pathology, Successfully Treated with Laparoscopic Appendectomy**

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Appendiceal diverticulitis is an uncommon pathology that can clinically mimic acute appendicitis. Some radiographic distinctions have been reported, but final pathologic examination of the surgical specimen is required to confirm the diagnosis. Symptoms are often more mild, which can lead to a delayed diagnosis, and increases the risk of severe complications such as perforation.

A 48 year old female presented with a three day history of right lower quadrant pain. She described the pain as constant and radiating to the left lower quadrant. Associated symptoms included nausea and vomiting, and decreased appetite; she denied fevers or diarrhea. The patient had no significant past medical history, and surgical history was significant for a total nephrectomy for living donor kidney transplant to her mother. On physical exam she was tender in the right lower quadrant with rebound and a positive Rosving's sign. All laboratory results were unremarkable, and she was hemodynamically stable. CT scan was performed and demonstrated a dilated fluid filled appendix with surrounding inflammatory change without abscess or free intra-peritoneal air. She was subsequently admitted to the hospital, made npo, started on IV antibiotics, and was taken to the operating room where she underwent an uncomplicated laparoscopic appendectomy. Post-operatively, her hospital course was unremarkable. Pathology revealed acute suppurative appendicitis secondary to an acutely inflamed appendiceal diverticula, consistent with a final diagnosis of acute appendiceal diverticulitis.

Appendiceal diverticulitis should be considered in patients presenting with acute right lower quadrant abdominal pain. Although some consider appendiceal diverticulitis a variant of acute appendicitis, it is important to distinguish between the two diagnoses. Appendiceal diverticulitis has a higher rate of complications, including perforation, and is associated with a higher risk of neoplasm, particularly mucinous adenomas and carcinoid tumors. Appendectomy should be performed in all cases in order to obtain appropriate pathological examination and rule out coexistent neoplasms. Laparoscopic appendectomy is a safe and appropriate approach to treatment of appendiceal diverticulitis.

**P157****Resection of Stromal Tumor by Minilaparoscopy Assisted by Upper GI Endoscopy: A Case Report**

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**Case Report:** A 62-year-old male patient, who had had melena for about a year. Upper GI endoscopy and biopsy showed a gastrointestinal stromal tumor (GIST) in the stomach. A video-laparoscopic partial gastrectomy was then proposed. The surgery was performed with the patient in the right lateral decubitus. Two 3-mm minilaparoscopic trocars, a 5-mm conventional trocar for an ultrasonic instrument and a 10-mm trocar in the umbilical region for the camera were used. Pneumoperitoneum was created using the Hasson open technique under direct vision. Trans-operative endoscopy was performed to identify the tumor easily. Initially, the ultrasonic device released the large omentum, and then, the tumor was resected in the body of the stomach. The gastric wall was manually sutured with a 2-0 Vicryl, and the tumor was removed in an endobag through the 10-mm incision in the umbilicus. The surgery was uneventful, with a total time of 72 minutes. The patient had no further complications, being discharged two days after the procedure with good clinical conditions. Histopathological result showed a free margins GIST.

**Conclusion:** The minimally invasive approach proved to be safe and effective for this procedure. The known advantages of video-surgery such as less trauma, better visualization, increased dexterity, better esthetics, and less postoperative recovery time were confirmed. The Upper GI endoscopy contributed to improve the safety and efficacy of the procedure, allowing a more precise resection of the GIST, as well as the intragastric review of the suture line at the end of the surgery.

**P158****Portal Vein Thrombosis After Elective Laparoscopic Right Hemicolectomy for Recurrent Diverticulitis**

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**Background:** Portal vein thrombosis (PVT) is a rare post-operative complication, which has been associated with a wide range of precipitating factors. Most commonly described associated conditions include: cirrhosis, bacteremia, myeloproliferative disorders and hypercoagulable states. PVT most frequently occurs as a complication after hepatobilary surgery, and although possible, very few cases have been documented occurring after laparoscopic surgery of the gastrointestinal tract. Herein, we describe a case of PVT in a patient who underwent elective laparoscopic right hemicolectomy and was treated successfully at our center.

**Case:** A 39 year-old female with past medical history of depression, migraines and endometriosis underwent an uncomplicated laparoscopic right hemicolectomy at our facility, for recurrent right-sided diverticulitis. She had suffered 4 previous episodes of diverticulitis and desired definitive surgical treatment. Her hospital course was uneventful and she was discharged to home on post-operative day 2. On post-operative day 9, she presented to the emergency department complaining of severe abdominal pain, back pain and nausea. Computed tomography of abdomen and pelvis revealed PVT. She was initiated on therapeutic anticoagulation with heparin. Hematology was consulted for hypercoagulable workup. Further investigation revealed that she had a family history of a brother who had had a lower extremity deep venous thrombosis, with negative hypercoagulable workup. She had also previously been taking leuprorelin and conjugated estrogen and medroxyprogesterone for her endometriosis. She was ultimately found to have a heterozygous prothrombin G20210A gene mutation. Her anticoagulation was bridged to Coumadin and she was discharged home. She has recovered as expected, without any further complications.

**Discussion:** Although more common in patients with cirrhosis after hepatobilary surgery, PVT is a rare complication that can occur after virtually all types laparoscopic surgeries, including elective right hemicolectomy. Patients may be completely asymptomatic, or present with a broad spectrum of symptoms including: severe abdominal pain, fever, diarrhea, or gastrointestinal bleeding. Physicians should be aware of this possible complication, since early diagnosis and treatment is imperative to prevent life-threatening complications, such as intestinal ischemia and perforation. A detailed medical and family history is imperative, and all patients with post-operative PVT should undergo complete hypercoagulability workup.

**P159****Upper GI Bleed in the Setting of Fundoplication: An Occult Presentation of Late Onset Gastric Ischemia**

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This is a case of a 37 year old male with a previous history of a redo-hiatal hernia 5 years prior who presented with two episodes of upper gastrointestinal bleeding with no identifiable source noted on both endoscopy and angiography. During his second admission, initial hemoglobin was 5.5 g/dL and endoscopy performed showed massive amount of blood in the stomach. Continuous oozing was seen originating in the fundus area but no clear source could be identified. Empiric epinephrine was injected to the area but failed to achieve hemostasis. Angiography was also negative. Repeat endoscopy performed showed no active bleeding, however, distention of the wrap into the gastric cavity was observed. The patient re-bled and was taken to the operating room emergently after failed attempt at endoscopic control. The patient underwent proximal gastrectomy after intra-operative gastrostomy and exploration was unable to identify a bleeding source. The patient was left with an open abdomen and in discontinuity while resuscitation was performed in the surgical intensive care unit. He subsequently underwent a Roux-en-Y reconstruction and gastrostomy tube placement via the distal gastric remnant. Upper gastrointestinal series performed demonstrated absence of leak, and the patient was started on a liquid diet supplemented with tube feeding. His recovery was uneventful and he was discharged home in stable condition.

Pathology revealed gastric ischemia at the base of the wrap making it impossible to visualize through endoscopy. On reviewing the literature, gastric ulcers and ischemia have been previously described. Incidence was up to 3% and their onset of presentation ranged from the early post-operative period up to 5 years. Most were located in the lesser curvature. The exact pathophysiology for its occurrence is not completely understood. Factors hypothesized include technical aspect of the fundoplication causing inappropriate tension, vessel disruption and ischemia, and injury to the vagus nerve affecting gastric emptying which was thought to increase gastrin secretion.

Treatment includes medical management with proton pump inhibitors; however, few cases describe antrectomy with inclusion of the bleeding ulcer. Our case presents failed medical and endoscopic management. We recommend take down of the fundoplication in hemodynamically stable patients to completely evaluate the gastric mucosa, identify, and address the source of bleeding. Otherwise emergent cases will require staged gastrectomy including the wrap followed by Roux-en-Y reconstruction.

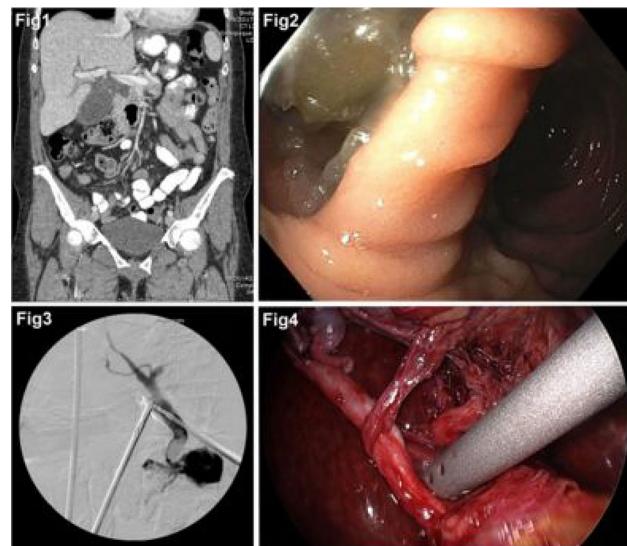
**P161****Acalculous Cholecystitis Associated with a Large Periampullary Duodenal Diverticulum: A Case Report**

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**Introduction:** Periampullary diverticulum (PAD) could compress common bile duct (CBD), and consequently cause obstructive jaundice and cholangitis as few publications have documented. Here we first report an acalculous cholecystitis associated with a PAD-related CBD obstruction.

**Case:** The patient was a 60-year-old female with a past surgical history of laparoscopic sleeve gastrectomy who presented at the emergency room with upper abdominal pain and vomiting for one day, associated with leukocytosis and left shift. Serum total bilirubin raised up to 6.1 mg/dL on hospital day (HD) 3. CT, ultrasound, and MRCP images confirmed a distended, wall-thickening gallbladder with pericholecystic fluid, and a significantly dilated CBD at 1.2 cm of diameter (Fig. 1), without cholelithiasis or choledocholithiasis. ERCP was unable to be completed due to the post-gastrectomy anatomy and the failure in cannulation into the ampulla which embedded in a large food-impacted PAD (Fig. 2). On HD5, the patient underwent a diagnostic laparoscopy and an intra-operative cholangiogram which confirmed a mildly inflamed edematous gallbladder, and a  $3.8 \times 3.8 \text{ cm}^2$  large PAD with a narrow neck that was distorting the distal CBD (Fig. 3). Since the patient's bilirubin level had been improving, we decided to only do a laparoscopic cholecystectomy. Intraoperatively an anatomic variation of the cystic artery encircling the cystic duct (Fig. 4) was also identified. Postoperatively the patient recovered well during the thereafter inpatient course and at the postoperative 3-week outpatient follow-up. The pathology of the excised gallbladder confirmed cholecystitis without cholelithiasis.

**Discussion:** Lemmel's syndrome is defined, in the absence of cholelithiasis or other detectable obstacle, by obstructive jaundice due to PAD. Since Lemmel described this duodenal-diverticulum-obstructive jaundice in 1934, there still have been very few cases reported or investigated. To date there is no report describing the association of acalculous cholecystitis with Lemmel's syndrome. This patient's mild acalculous cholecystitis probably attributed to the biliary obstruction and consequent gallbladder hydrops. Her symptoms could be from either acalculous cholecystitis or intermittently worsening biliary obstruction. In this case, the contribution of the anatomic variation of the cystic artery is unclear. In the future, if this patient's symptoms recur, the treatment plans for her will be sphincterotomy, removal of the impacted food in the PAD, or diverticulectomy.



**P162****Accidental Fish Bone Ingestion Masquerading as Acute Abdomen**

Anil Khetarpal; Khetarpal Hospital

**Aim:** To report a case of fish bone ingestion masquerading as acute abdomen.

**Case Report:** A 48 years old female patient presented with complaints of severe abdominal pain since 5 days. There was no history of associated nausea or vomiting, fever or altered in bowel habits. On examination patient had tenderness and guarding localized to the right iliac fossa. Blood investigations revealed raised inflammatory markers. Ultrasound whole abdomen and Contrast Enhanced Computed Tomography (CECT) were normal. Patient was managed conservatively but in view of persistence of symptoms a triple puncture diagnostic laparoscopy was performed on day 3 of admission. Omental inflammation with soapy appendix was found and appendicectomy was performed. On further assessment a foreign body was also found in the ileum which was removed and identified as a fish bone. Patient had a satisfactory post operative recovery and was discharged in stable condition.

**Discussion:** Acute abdomen due to fish bone ingestion is not a very common occurrence. Unfortunately the history is often non-specific and these people can be misdiagnosed with acute appendicitis & other pathologies. CT scans can be useful to aid diagnostics. It is however not fully sensitive in detecting complications arising from fishbone ingestion.

**Conclusion:** Any patient with acute abdomen, with non-specific history and normal imaging may still benefit from a diagnostic laparoscopy.

**P163****Nothing but NET: Neuroendocrine Tumor Masquerading as a Small Bowel Obstruction and Cecal Necrosis**

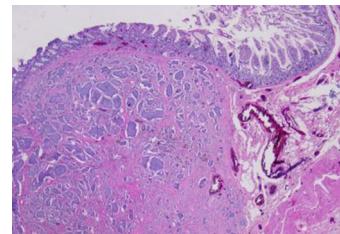
Yael Marks, MD, Denis Gratsianskiy, MD, Neal Mineyev, Jeffrey Aronoff, MD; Lenox Hill Hospital

**Introduction:** Here we report an isolated cecal necrosis likely secondary to mesenteric fibrosis from a small bowel neuroendocrine tumor.

**Case Presentation:** 69 yo M with BPH, COPD, and HTN who presented with a four day history of abdominal pain, vomiting, constipation and obstipation. He had never had any abdominal surgeries. CT demonstrated dilated loops of small bowel a transition point in the mid abdomen and sub-mucosal fat deposition in the distal small bowel and cecum and calcified right mesenteric lymph nodes. Creatinine was 1.8, WBC 17,000, and stable vital signs. During exploratory laparotomy a loop of ileum had wrapped itself around an infarcted wall of the cecum (non-circumferential). On closer inspection of the small bowel, a small nodule and tethering of the mesentery were noted 35 cm from the ileocecal valve. An ileocectomy was performed.



Pathology revealed transmural gangrenous necrosis of the cecum. A 1.7 cm well-differentiated neuroendocrine tumor was found in the resected ileum. Six of sixteen lymph nodes showed metastatic neuroendocrine tumor cells. Surgical margins were clear from malignant cells. The tumor was considered well-differentiated neuroendocrine carcinoma with a Ki-67 index of <3%. Biochemical testing were significant for a 5 HIAA level of 5.2, Chromogranin A of 125 and a Serotonin level of 340.



**Discussion:** This patient presented with a bowel obstruction, partial cecal necrosis and neuroendocrine carcinoma. Literature suggests that cecal necrosis in the majority of cases is caused by a vascular event, occlusive or non-occlusive. The patient had atherosclerosis and an underlying malignancy which can be associated with prothrombotic states and contributes to an overall risk of thrombosis.

The cecum can sustain ischemic ischemic injury in the presence of severe or prolonged hypotension. Most frequent causes being decompensated heart failure, hemorrhage, arrhythmia or severe dehydration, only 1 of which was present in this patient.

The midgut neuroendocrine tumor is generally located in the terminal ileum, as a fibrotic sub-mucosal tumor 1 cm or less. Mesenteric metastases are often larger than the primary tumor and associated with fibrosis which may entrap loops of the small intestine and cause bowel obstruction. This may eventually encase the mesenteric vessels with resulting venous stasis and ischemia in segments of the intestine as seen in this patient.

**Conclusion:** Cecal necrosis is a rare entity, but its incidence increases with age. Isolated cecal necrosis may manifest as a CT-negative appendicitis or a small bowel obstruction in the absence of past surgical history.

**P164****Inusual Cases of Small Bowel Herniation Through the Falciform and Triangular Ligament**Andres Falla, MD<sup>1</sup>, Santiago Navas, MD<sup>2</sup>, Gustavo Aguirre, MD<sup>1</sup>:<sup>1</sup>Hospital Militar Central, Bogota, <sup>2</sup>Fundacion Cardioinfantil Bucaramanga

**Introduction:** Internal hernias account for a small percentage of small bowel obstruction, and the condition involves herniation of a viscus through a normal or abnormal opening within the peritoneal cavity. Paroduodenal hernias account for more than 50% of the cases. Other less common causes include transmesenteric, transomental, foramen of Winslow and paracecal hernias. Only surgical findings can confirm the diagnosis and offer adequate treatment. Here we report two unusual cases of small bowel herniation through a defect in the Falciform ligament in an male and an woman 75 and 49 years old, and a case an male 65-years-old with herniation bowel brought triangular ligament without surgical history abdominal.

**Discussion:** The falciform ligament separates the left lateral and left medial segments along the umbilical fissure and anchors the liver to the anterior abdominal wall. The non-peritonealization of this ligament, which may be better understood as the failure of the two layers of peritoneum to fuse around the umbilical vein and to the abdominal wall leads to a defect between the round ligament and the anterior wall, configuring an abnormal opening through which any viscous could potentially herniate.

We present a very unusual cases of right upper abdominal pain due to the presence of an internal hernia through the falciform and triangular ligament in a patients without surgical history and otherwise healthy. Upon arrival, clinical findings did not suggest small bowel obstruction in the absence of nausea, vomiting or abdominal distension. Instead, biliary origin of symptoms was suspected. Ultrasonography only showed severely distended bowel loops and free liquid in right subphrenic space. It was abdominal CT scan findings and the persistence of symptoms what made us take the patients to the operating room.

Laparoscopic transection of the Falciform and triangular Ligament successfully released the entrapped loop with successful reperfusion by the end of the surgery. In the absence of any prothrombotic comorbidity, the patients were discharged asymptomatic without further anticoagulation.

To date only few similar cases have been reported, and most of them described in neonates and pediatric patients. To our knowledge, this cases reporteds in the elderly. In this patients laparoscopic approach was both diagnostic and therapeutic with the transection the ligament.

**P166****Perforated Peptic Ulcer and Cachexia Associated with Unsuspected Severe Hyperparathyroidism from an Occult Giant Parathyroid Adenoma**

Sarah Pearlstein, MD, Daniel Kuriloff, MD, FACS, ECNU, Rebecca Kowalski, MD, FACS; Northwell Health

**Introduction:** Giant parathyroid adenomas (>3.5 gm) are a rare cause of primary hyperparathyroidism (PHPT). Despite having elevated calcium and PTH levels, they usually present with asymptomatic disease, especially with the widespread use of biochemical assays in screening exams. Symptomatic hyperparathyroidism classically can present as fatigue, muscle weakness, memory loss/confusion, bone pain, abdominal pain, constipation, and nephrolithiasis. We present a case of abdominal pain and cachexia from a perforated peptic ulcer (PPU) as the first presenting sign of occult primary hyperparathyroidism from a giant parathyroid adenoma.

**Case Description:** A 59 year-old cachectic male presented with two days of worsening abdominal pain and nausea. The patient had no history of gastroesophageal reflux or peptic ulcer disease (PUD). On admission, serum calcium was elevated to 12.3 mg/dL (upper limit 10.5 mg/dL). CT scan of the abdomen/pelvis demonstrated duodenal wall thickening with perforation and pneumoperitoneum. There were no renal calcifications. He was taken to the OR for a laparoscopic Graham patch and abdominal washout. On POD1 (post-operative day 1), serum calcium remained elevated at 12.5 mg/dL. A PTH on POD2 was 1184 pg/mL (normal: up to 65 pg/mL) confirming primary hyperparathyroidism. He was treated with intravenous fluids and furosemide, but the serum calcium remained elevated. A SPECT/CT Sestamibi scan showed a giant left extrathyroidal mass with intense uptake, consistent with giant parathyroid adenoma. Ultrasound of the neck revealed a 5.4 × 2.7 × 2.8 cm mass. DEXA scan showed osteoporosis in the lumbar spine and left femoral neck. Serum gastrin level was normal 39 pg/mL (4–200 pg/mL). He underwent a parathyroideectomy. Calcium and PTH returned to normal by POD1 (9.8 mg/dL, 22.6 pg/dL). Pathology confirmed a giant parathyroid adenoma (3.6 × 3.0 × 1.2 cm and 12 gm).

**Discussion:** PPU is associated with a mortality of up to 30%, and morbidity of 50%. The etiology of PUD includes H pylori, NSAIDs and smoking. The association of PUD and hyperparathyroidism is well known, and studies have shown that improvement in peptic ulcer symptoms can occur after parathyroideectomy. It has been suggested that increased calcium levels due to hyperparathyroidism can lead to gastric acid hypersecretion and therefore PUD. Peptic ulcer perforation as the first manifestation of PHPT is rare and to our knowledge the first reported case caused by giant parathyroid adenoma.

**Conclusion:** In patients with a perforated peptic ulcer without obvious cause, we recommend obtaining a serum calcium level, and if elevated, a PTH to rule out hyperparathyroidism.

**P165****Management of Spontaneous Splenic Rupture**Roberto Javier Rueda Esteban<sup>1</sup>, Andres Mauricio Garcia Sierra<sup>2</sup>, Felipe Perdomo<sup>2</sup>; <sup>1</sup>Universidad de los Andes, <sup>2</sup>Fundacion Santa Fe

This is a patient's rare case of spontaneous splenic rupture associated to chronic myeloid leukemia as an uncommon complication. The case report and review of the relevant literature on symptomatology and clinical management is presented. Emphasis is made about the importance of including splenic rupture as differential diagnosis for acute abdominal pain, especially in a patient with neoplastic hematopathology, since early treatment increases patient survival and prognosis.

**P167****Gastric Conduit Bronchial Fistula 13 Years After Esophagectomy**

Daniel French, Ellsmere James, MD, MSc, Sunil Patel, MD, Drew Bethune; Dalhousie University

Esophagectomy is a complex operation associated with serious immediate complications and long term chronic complications. Gastric ulcers are a common chronic complication after esophagectomy with gastric conduit reconstruction. These are rarely complicated by significant bleeding or perforation. We report a case of delayed diagnosis of a fistula forming between a gastric conduit and right bronchial tree 13 years after esophagectomy. This was successfully treated using multiple therapeutic approaches including endoscopic localization and resection through a right thoracotomy. To the best of our knowledge, our patient is the only survivor from a chronic gastric conduit bronchial fistula.

A 53 year old male with type 1 diabetes mellitus, dyslipidemia, asthma and smoking history presented 15 years after an Ivory-Lewis esophagectomy for a gastrointestinal stromal tumor (GIST) with a chronic cough starting 13 years after his esophagectomy followed by multiple episodes of hemoptysis over the next 2 years. The patient was known to have ulcers in his gastric conduit with a massive bleed 1 year after his esophagectomy.

Repeat endoscopy revealed two large chronic ulcers that had increased in size based on comparison of pictures from endoscopies 3 to 6 years after his esophagectomy despite maximal medical management. The patient presented to numerous specialists at tertiary care centers in Canada and the United States. Ultimately, in a clinic the patient was observed to cough immediately after the ingestion of water, but not solids leading to a provisional diagnosis of a gastrobronchial fistula. A barium swallow failed to show a fistula (Fig. 1). However at endoscopy, instillation of saline directed at an ulcer immediately induced a cough, but this was not reproduced when the saline was directed away from the ulcer. The fistula was ultimately demonstrated by placing a wire through the ulcer and visualizing it bronchoscopically in the right superior segmental bronchus (Figs. 2–4). In an effort to pursue a minimally invasive approach two attempts were made to close the fistula with over-the- scope clips (OTSC). Unfortunately, the patient's symptoms persisted. A wire was placed through the fistula and delivered through the patient's mouth and endotracheal tube. A right thoracotomy allowed access to the conduit, which was opened and the fistula localized using the wire. The fistula was resected and the bronchus closed. At twelve month follow up the patient did not have a recurrent cough or hemoptysis while tolerating a full diet.

**P168****Snap, Crackle, Pop: A Case of Non Operative Pneumoperitoneum, Penumoretroperitoneum and Pneumomediastinum**

Christopher De Jesus, MD, Neal Mineyev, MD, Yael Marks, MD, Parswa Ansari, MD; Lenox Hill Hospital



The simultaneous finding of spontaneous pneumoperitoneum, pneumoretroperitoneum, pneumomediastinum and subcutaneous emphysema is an extremely rare presentation. We present a case of a patient in which the workup for abdominal pain resulted in a surprising but rather benign entity. There have been multiple reviews in the literature regarding workup for spontaneous pneumomediastinum, however, there are no recommendations regarding non-operative management for spontaneous and extensive pneumoretroperitoneum. It may seem quite difficult to not undertake aggressive diagnostic workup in a patient with the constellation of signs and symptoms as presented. We present the case in which laparoscopy or further surgical intervention was not pursued and clinical observation was adequate after ruling out obvious perforation with less invasive diagnostic studies. Knowledge about this clinical scenario would avoid unnecessary workup and most importantly, mobilization of operating rooms and invasive diagnostic procedures to find no signs of perforation.

**P169****Late Obliteration of Gastrojejunostomy with a Gastrogastrostic Fistula After Laparoscopic Roux-en Y Gastric Bypass**

Piotr Gorecki, MD, Victor Gazivoda, BS, Gabriel Rivera, MD, Mukul Arya, MD; New York Presbyterian Brooklyn Methodist Hospital

**Introduction:** Roux en-Y gastric bypass (RYGB) is one of the initial and most studied weight reduction procedures and remains the gold standard for comparison in bariatric surgery clinical outcomes. Although RYGB is an effective procedure for weight loss, it has been less popular over last several years because of increased morbidity compared to the more utilized vertical sleeve gastrectomy (VSG). Early complications of RYGB include bleeding, perforation, or leakage. Late complications include internal hernias, small bowel obstruction, anastomotic stenosis, marginal ulcers, and gastrogastrostic fistulas.

**Case Report:** A 50-year old female with a past medical history of morbid obesity, diabetes mellitus type 2, hypertension, GERD, peptic ulcer disease, cholelithiasis, liver dysfunction with ascites, asthma, and a past surgical history of RYGB (11 years ago) presented to our institution with acute on chronic abdominal pain associated with nausea, vomiting, dysphagia, inability to eat and maintain hydration, and an additional weight loss of about 100 lbs. over the last year. In addition, the patient was a chronic opioid and NSAID user, had an extensive smoking history, and had not followed with her surgeon for 11 years. At the time of presentation, the patient weighed 82 lbs (BMI: 13.2), had normal vital signs, and appeared cachectic. An upper gastrointestinal study followed by an upper endoscopic examination demonstrated complete obliteration of the gastrojejunostomy anastomosis and revealed a 2-cm long gastrogastrostic fistula originating from the distal end of the gastric pouch to the lesser curvature of the excluded stomach. After conservative measures were initiated to hydrate and metabolically stabilize the patient, the decision was made to proceed with diagnostic laparoscopy and surgical placement of a gastrostomy tube to the gastric remnant. The patient was discharged after tolerating a full liquid diet and gastrostomy tube feedings, for plan of future revision of gastrojejunostomy when optimal nutritional status is achieved.

**Conclusions:** Late complications of RYGB occur at a rate of 15–20%. Major risk factors for anastomotic complications include non-compliance, smoking, and opiate and NSAID abuse. Though abdominal pain, anastomotic stenosis, marginal ulcers, and fistulas are relatively common late complications of RYGB, complete obliteration of the gastrojejunostomy anastomosis has not been well described in the literature. This case demonstrates the importance of long term follow up post RYGB for early diagnosis of late complications and brings attention to this rare, but possible sequelae that can arise in patients after RYGB. Contrast radiograms and upper endoscopic photographs will be presented.

**P170****Laparoscopic Resection of a Hypoglycemia- Inducing Retroperitoneal Fibrosarcoma**

Hany G Fahmy, FRCS, FACS, Mohamed A Abdelwahab, Alaa Taha; Royal Commission Medical Center, Yanbu Industrial, K.S.A

**Introduction:** Retroperitoneal sarcoma represents approximately 12–15% of all sarcomas and less than 0.5% of all neoplasia. Radiotherapy and chemotherapy still do not represent valid therapeutic alternatives; therefore complete surgical resection is the only potential curative treatment modality for retroperitoneal sarcomas. The ability of complete resection of a retroperitoneal sarcoma with tumor grading remains the most important predictor of local recurrence and disease-specific survival. In a patient with a large fibrosarcoma and associated hypoglycemia, assays for insulin-like activity (ILA) were found to be high in the extract of tumor tissue, while insulin was not detected in significant concentration neither in the same extract nor in his serum. Laparoscopic surgery represents an alternative technique for radical resection of such tumors as a minimally invasive rather than traditional surgery. Only few cases were reported in the literature.

**Case Report:** We report a rare case of 53 years old Filipino gentleman presented to emergency department unconscious due to hypoglycemia. The patient was resuscitated, recovered and admitted for further investigations. Multiple Hypoglycemic attacks occurred during admission. Initial investigations were within average normal except for serum glucose value of 35 mg (2.0 mmol/L). His TSH, glucagon, and fasting cortisol levels were within the normal range, and his serum insulin and C-peptide levels were undetectable. We could detect hypokalemia (serum potassium, 2.3 mEq/L) in his serum. He tested negative for the anti-insulin antibodies. His abdominal ultrasound as well as his computed tomography scans showed the presence of a large retroperitoneal tumor (15 cm × 12 cm × 7 cm) with a heterogeneous contrast effect. A glucose supplement was required to maintain the plasma glucose level within normal limits during which complete resection of the tumor which was performed laparoscopically. The procedure was performed using three ports.

The sarcomatous mass was completely resected by the use of a harmonic scalpel with clipping of the main vascular blood supply. Patient passed through a smooth postoperative period with minimal wound pain and did not show any further hypoglycemic attacks. Pathological diagnosis of retroperitoneal solitary fibrosarcomatous tumor was confirmed.

**Conclusion:** Diagnosis of such hypoglycemia inducing Retroperitoneal Fibrosarcoma represents great challenge especially when patients presents only with hypoglycemia and no other abdominal symptoms, management using minimal invasive technique to resect and remove such tumors from the retroperitoneal region shows superiority in recovery and limitation of complications when done by experienced surgeons.

**P171****Remnant Stomach Perforation: A Unique Presentation of Obstructed Internal Hernia After Gastric Bypass**

Katherine H Yancey, MD<sup>1</sup>, Andrew M O'Neill, MD<sup>2</sup>: <sup>1</sup>Mission Health, <sup>2</sup>MAHEC

**Introduction:** Roux-en-Y gastric bypass (RYGB) is a frequently performed bariatric procedure, of which internal hernia (IH) is a known complication. We discuss a rare finding of occult gastric remnant perforation as a result of an obstructed IH in a post bypass patient.

**Methods:** We present a case report of a single bariatric surgeon's experience at a tertiary care hospital. Literature review of PUBMED confirms the unique presentation and operative findings in our patient, as few similar cases have been published. A 59-year-old male s/p RYGB 12 years ago presented to the ED with right upper quadrant pain, nausea, vomiting, and a leukocytosis of 24,100. BMI was 31.7; weight was 254 lbs. Workup included an abdominal ultrasound showing gallbladder distention without signs of cholecystitis. Liver function tests were normal. Further imaging included a CT scan, remarkable for a paraesophageal hernia (PEH) containing the gastric pouch, and an elevated left hemidiaphragm. The scan showed no evidence of IH or bowel obstruction. An upper GI series was additionally obtained, which was also negative for small bowel obstruction. Due to unclear etiology for this patient's symptoms or source of leukocytosis, diagnostic laparoscopy was planned.

**Results:** Intraoperative findings were significant for IH containing dilated small bowel with twisted and incarcerated omentum through the jejunojunostomy site, as well as a distended gallbladder without acute inflammation. IH was reduced and closed without bowel resection. Cholecystectomy was completed. Subsequent inspection of the diaphragmatic hiatus revealed uncomplicated herniation of the gastric pouch. In attempts to dissect the left diaphragmatic crus, a large pocket of purulent material was encountered below the left diaphragm in the region of the remnant stomach fundus. Methylene blue test and intraoperative endoscopy did not demonstrate any connection to gastric pouch. The purulence was attributed to an occult remnant stomach perforation related to distal obstructed IH. A drain was left in the abscess and the PEH was not surgically addressed. Patient was discharged on postoperative day 5. He has not suffered any further complications or recurrent complaints.

**Conclusion:** Gastric perforation following RYGB is an uncommon complication resulting from IH. This diagnosis was missed by preoperative imaging and was only found after thorough laparoscopic investigation. Surgeons should maintain a high clinical suspicion of IH in post RYGB patients with otherwise unexplained abdominal symptoms, fever, and leukocytosis, even in the absence of confirmatory diagnostic testing. Threshold for operative exploration in this clinical setting should remain low.

**P172****Adenocarcinoma in Gastric Remnant After Gastric Roux-en-Y Bypass Surgery for Morbid Obesity: A Case Report**

Alejandro Garza, MD, Robert Alleyn, MD, Jose Almeda, MD, Ricardo Martinez, MD; UTRGV

Obesity is an epidemic condition worldwide carrying significant morbidity and mortality. Surgical therapy is the only proven effective method to sustain weight loss. Among the different surgical procedures gastric bypass is the most effective. During this surgery, most of the stomach is excluded from the upper gastrointestinal tract which makes future evaluation of the same very challenging. This could potentially lead to delay in diagnosis of any pathology in the bypass stomach. Gastric Cancer is the 14th most common cause of cancer and cause of cancer death in the United States.

We present a case report of a patient who underwent a Roux-en-Y gastric bypass and went on to developed adenocarcinoma in the gastric remnant 28 year after her surgery. She underwent an exploratory laparotomy, extended antrectomy, subtotal gastrectomy including the gastro-colic ligament, and incidental appendectomy. Pathology showed grade 4 undifferentiated adenocarcinoma that penetrated the visceral peritoneum with clear margins. There was angiolymphatic invasion and perineural invasion along with metastatic carcinoma in 5 out of 6 lymph nodes. Patient received adjuvant chemotherapy. The patient continues to be in clinical and radiological remission 3 years after her diagnosis.

There are multiple risk factors for the development of gastric cancer in general. Infection of the gastric mucosa by Helicobacter pylori, which can cause inflammation and result in a pre-malignant lesion. It is one of the most clinically relevant factors because it can be treated before neoplastic changes occurs. Other risk factors include a family history, low fruit and vegetable consumption, obesity, smoking, and previous gastric surgeries.

Due to the surgical anatomic changes, inherent to the Roux N Y Gastric Bypass it is technically difficult to monitor and evaluate the remnant stomach with upper endoscopy which highlights the importance of pre-operative evaluation. There are different non-surgical methods to evaluate the remnant stomach besides any abdominal CT scan. These include radiographic techniques with percutaneous contrast injection, placement of a gastrostomy tube for later access, as well as retrograde endoscopy with a pediatric colonoscope or a double-balloon enteroscope.

According to the literature there are only 8 cases reported of malignancy arising in the remnant stomach after bypass surgery. Due to the low incidence, this case is reported to help physicians carry a high level of clinical suspicion in these patients.

**P173****Ruptured Hepatic Aneurysm as First Presenting Symptom of Polyarteritis Nodosa**

Shinban Liu, DO, Vadim Meytes, DO, Maria Roberto, DO; NYU Langone Hospital - Brooklyn

**Introduction:** Polyarteritis nodosa (PAN) is a systemic transmural inflammatory vasculitis that affects medium-sized arteries. Inflammation of the vessel wall and intimal proliferation creates luminal narrowing which can lead to stenosis and insufficiency. The same inflammatory process causes disruption of the elastic lamina leading to aneurysm formation and possible spontaneous rupture with life-threatening bleeding. Multifocal segments of stenosis and aneurysm formation are characteristically identified as a "rosary sign" or "beads on a string". Unlike other vasculitides, PAN does not involve small arteries or veins, and is not associated with anti-neutrophil cytoplasmic antibodies. We present the case of a 66 year old female with a significant intra-abdominal bleed that was explored and repaired primarily. She was subsequently found on angiogram and post-mortem pathology to have findings consistent with PAN.

**Case Presentation:** 66 year old female who presented to the emergency department with abdominal pain followed by hemorrhagic shock and found to have a ruptured left hepatic artery aneurysm during exploratory laparotomy. This aneurysm was suture ligated with a successful outcome. A mesenteric arteriogram was performed the following day and demonstrated lesions consistent with PAN including aneurysms of the left gastric branches, right and left hepatic arteries, and beaded appearance of the iliac artery. However, 2 days after hospital discharge she developed massive pulmonary embolism from which she did not recover. Postmortem examination confirmed rupture of the left hepatic artery aneurysm in addition to gross anatomical and histological findings consistent with PAN.

**Discussion:** Polyarteritis nodosa is a systemic inflammatory vasculitis that causes intimal proliferation and elastic lamina disruption. This multifocal disruption of the vessel results in aneurysm formation alternating with stenosis creating a characteristic "rosary sign" on imaging. Spontaneous rupture of these aneurysms is rare and almost always fatal due to life-threatening hemorrhage. With acutely ruptured aneurysms, prompt diagnosis, aggressive resuscitation, and hemostasis through transarterial embolization or surgery is paramount for patient survival. While acute rupture of an aneurysm as the result of PAN is exceedingly rare, it must be considered as a differential diagnosis in the setting of acute abdominal pain and hemodynamic instability. In a patient known to have a medical history of PAN and aneurysm formation, routine monitoring and disease progression should be followed.

**P175****Laparoscopic Repair of Paraduodenal Hernia Presenting as Small Bowel Obstruction**

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**Introduction:** 300,000 surgeries are done annually in the US for small bowel obstruction, which is most commonly caused by intraabdominal adhesions, malignancy, and hernias. 0.2 to 5.8% of small bowel obstructions are due to paraduodenal hernias. Paraduodenal hernias carry a 50% lifetime risk of incarceration with a mortality of 20 to 50%.

**Case Report:** The patient is a 78 year old male who presented with severe upper abdominal pain for one day. He was passing flatus and had had a bowel movement the previous day. On examination, the patient was tender over the upper abdomen. Computed tomography (CT) scan with IV contrast showed a mesenteric swirl sign. The decision was made to perform diagnostic laparoscopy with possible small bowel resection.

Intraoperatively, a mesenteric defect was noted posterior and to the right of the duodenum, through which bowel was herniating. The herniated bowel and its mesentery were edematous. The defect was sutured closed, taking seromuscular and mesenteric bites through the stomach, jejunum, and mesentery. The patient had an uneventful recovery postoperatively and was discharged on post-operative day 2. He returned on postoperative day 28 with perumbilical pain which resolved with conservative management. He was followed up 6 weeks postoperatively and was doing well.

**Discussion:** Paraduodenal hernias are the most common internal hernias. They are seen more often in males. They are caused by failure of the counterclockwise rotation of the prearterial segment of the embryonic midgut in weeks 2 to 12 of embryonic development. Paraduodenal hernias usually present with chronic intermittent abdominal pain, weight loss, nausea, and vomiting. They may present acutely with symptoms of bowel obstruction. Peritoneal signs are often not appreciated due to retroperitoneal position of the hernia. CT scan of the abdomen often shows clustering of bowel loops, which cannot be displaced on repositioning the patient. If imaging is equivocal, diagnostic laparoscopy may be undertaken.

Surgical correction consists of reducing the bowel, resecting nonviable segments, and either closing the defect or opening the sac laterally into the general peritoneal cavity. In summary, paraduodenal hernias are a rare cause of bowel obstruction and as such present a challenge in diagnosis and early intervention.

**References:** Laparoscopic Repair of a Right Paraduodenal Hernia (2009) James Bittner et al PMID PMC3015939  
Right Paraduodenal Hernia in an Adult Patient: Diagnostic Approach and Surgical Management (2011) Carlos M. Nuño-Guzmána José et al PMID PMC3180666

**P177****Laparoscopic Management of Colonic Lipoma Causing Sigmoid Intussusception**

Yvette Farran, MS, Jorge A Miranda, MS, Benjamin Clapp, MD, Elizabeth De la Rosa, MD; Texas Tech University Health Sciences Center

**Introduction:** Sigmoid colon intussusception is rarely encountered and given its vague symptomatology diagnosis and management can be difficult. The treatment of an intussusception in adults is different than in children. Lipomas as the causative etiology for intussusception are encountered up to 0.83% of the times and up to 70%- 90% of the patients require surgical resection for treatment.

**Methods:** This is a case report about a 62 year old male that presented with two weeks of worsening abdominal pain and distention. Physical exam was only pertinent for abdominal pain on light palpation, guarding and moderate distress. CT scan of abdomen and pelvis demonstrated a lipomatous mass causing complete obstruction of the sigmoid colon with intussusception. This was managed with laparoscopic sigmoidectomy. The patient had an uncomplicated post-operative period and was discharged on post-operative day 2. Pathology of the lipomatous mass confirmed a benign lipoma.

**Discussion:** Intussusception is rarely encountered in clinical practice in adults and constitutes 5% of all cases. Lipoma induced sigmoid intussusception with complete obstruction is rare. Symptoms can be non-specific as in this case. This case report highlights the importance of timely diagnosis and treatment of an intussusception in adult patients. CT scan is the gold standard for diagnosis and often shows a "target sign". Other imaging techniques like ultrasound have shown adequate results but remain less effective than CT scan. The treatment in adults is not a reduction by enema like in pediatrics but rather resection of the lead point. This can be appropriately done with a laparoscopic technique in most cases.

**Conclusion:** Colonic intussusception is rare. Surgery is the only treatment for an intussusception in adults since the lead point needs to be removed, and can be attempted safely with a laparoscopic approach.

**P176****Laparoscopic Resection of Giant Pseudo Diverticulum of Appendix: A Very Rare Disease**

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Diverticulosis of the appendix is a rare disease found in 0.004–2.1% of appendectomies, first described in 1893. The clinical presentation may be acute inflammatory with or without appendicitis or it may be an incidental finding in an uninflamed appendix. The congenital type is rare and it has all the bowel wall layers. It most frequently represents as pseudo diverticulum which lacks the muscularis layer. The pathogenesis of appendiceal diverticula is not completely elucidated. Its symptoms are similar to and often misdiagnosed for that early acute or chronic appendicitis. While appendectomy is curative for both entities, it is important to distinguish diverticulum of the appendix from appendicitis as it is four times more likely to perforate and may be a sign of an underlying neoplasm. We reported a very rare giant pseudo diverticulum of the appendix in a 69-year-old male presenting with chronic abdominal discomfort for months. Abdominal X-ray showed abnormal gaseous finding. Physical exam was significant for a soft rubbery mass in the perumbilical region. Blood work revealed slight elevation of C-reactive protein. Preoperative CT and MRI showed a 9-centimeter- large cavity composed of thin wall, located at the tip of the appendix with peri appendicular fat stranding. In the concern of pending obstructive symptom and chronic abdominal pain, we decided to perform the resection laparoscopic. The soft mass arose from the tip of the appendix. There were dense adhesions between the appendix, mesentery, and sigmoid colon. After adhesiolysis, laparoscopic appendectomy was performed with EndoGIA. The specimen was extracted through a small incision without spillage. Hospital course was uneventful and the patient was discharged on post-operative day 4. The pathological finding was consistent with a pseudo diverticulum of the appendix which lacked muscularis layer and the inner wall of the cavity was lined with a scattered cubital epithelial layer in the continuity with the appendiceal mucosal membrane. Here we report a successful laparoscopic resection of an extremely rare giant chronic pseudo diverticulum of the appendix.

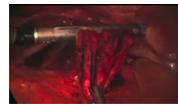
**P178****Case Presentation: Achalasia and Large Epiphrenic Esophageal Diverticulum**

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**Case Report:** 60 year-old female with no significant past medical history presents with a 10-year history of nocturnal cough that had worsened over the past 3 months and had associated regurgitation. She underwent esophagogastroduodenoscopy (EGD) that showed a tortuous esophagus and tight lower esophageal sphincter that required dilation. She received an upper gastrointestinal (UGI) contrast study that showed a dilated, tortuous esophagus with ‘bird’s beak’ tapering, consistent with achalasia, as well as a large epiphrenic diverticulum measuring 7×7 cm.



Esophageal manometry confirmed “pan-esophageal pressurization” consistent with Type II achalasia. Given her symptoms in the presence of these findings, she elected to proceed with surgery. She underwent laparoscopic, trans-hiatal epiphrenic diverticulectomy, Heller myotomy and Dorr fundoplication. Extensive dissection allowed for approximately 8 cm of retraction down from the chest and we were able to come across it with a single blue load of a 60 mm linear cutting stapler.



Post-operatively, she tolerated the procedure well with immediate improvement in her symptoms. Her UGI on post-operative day 1 showed no evidence of leak, she tolerated a soft diet and was discharged home.



She was seen at 2-week and 1-year follow-up appointments with complete resolution of symptoms.

**Discussion:** Epiphrenic diverticula in the presence of achalasia has an occurrence rate of 25%. Large diverticula (>5 cm), are even more rare with only a handful of case reports in the literature. Historically, thoracotomy or, more recently, thoracoscopic approaches are required for resection. However, thoracic approaches are associated with a 20% increase in morbidity, namely due to staple line leak and the resulting pulmonary complications. Only a single case report exists on our review of the literature that demonstrates successful trans-hiatal laparoscopic resection without post-operative complications of a diverticulum of this size. The shortest documented length of hospital stay post-operatively for similar cases is 4 days, while the average is 7–10 days or longer for those with complications. Our patient was able to go home on post-operative day 1 after a normal UGI and was tolerating a soft diet. Not only does this case show that a large epiphrenic diverticulum can be successfully resected via the trans-abdominal laparoscopic approach, this case makes the argument that patients undergoing any minimally-invasive epiphrenic diverticulectomy and myotomy, with or without fundoplication, may be successfully managed with early post-operative contrast studies and dietary advancement, thus decreasing their length of hospitalization and overall cost of treatment.

**P179****Laparoscopic Distal Gastrectomy with D2 Lymph Node Dissection for Gastric Cancer in a Patient with Situs Inversus Totalis**

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**Background:** Situs inversus totalis (SIT) is a rare congenital condition in which the abdominal and thoracic organs are located opposite to their normal positions. Few cases of laparoscopic surgery for gastric cancer with SIT have been reported. We report a case of laparoscopic distal gastrectomy with D2 lymph node dissection performed for gastric cancer in a patient with SIT.

**Case Description:** An 80-year-old woman was admitted to our hospital for treatment of gastric cancer that was diagnosed by esophagogastroduodenoscopy (EGD) at a local clinic after she experienced anemia and nausea. EGD identified an irregularly shaped gastric ulcer located at the anterior side of the lesser curvature of the antrum. A biopsy revealed a moderately differentiated adenocarcinoma. She was then diagnosed with SIT by chest radiography and abdominal computed tomography (CT). The abdominal CT showed that all organs were inversely positioned and that the wall of the antrum had thickened; it also showed the lymph nodes in the lesser curvature of the stomach, without distant metastasis or an abnormal course of vascularity. The patient was clinically diagnosed with T3N1M0 stage IIIA gastric cancer according to the Japanese Classification of Gastric Carcinoma. A laparoscopic distal gastrectomy with D2 lymph node dissection in accordance with the Japanese Gastric Cancer Treatment Guidelines as well as a Roux-en-Y anastomosis due to an esophageal hiatal hernia were performed. The surgery was safely and successfully performed, although it required more time than usual because the inverted anatomic structures were repeatedly examined during the surgery. The postoperative course was positive, and the patient was discharged on postoperative day 7 without any complications. The final stage of this case was pT1bN0M0 stage IA. Currently, the patient is doing well without recurrent gastric cancer.

**Conclusion:** Gastric cancer with SIT is an extremely rare occurrence. We experienced a case of laparoscopic distal gastrectomy with D2 lymph node dissection performed for gastric cancer in a patient with SIT. We simulated the operation for SIT by viewing left-right reversed ordinary surgical videos. The abdominal CT angiography with a three-dimensional reconstruction helped reveal any variation and confirmed the structures and locations of vessels before the surgery. The operation could safely be performed following the standardized surgical technique by reversing the surgeon standing position and trocar position.

**P180****Rhabdomyosarcoma of the Sternum in 2 Years Old Child Challenges in the Management**

Mohammad Al-Onazi, MD, MME, Mohammed Babiker, MD; Prince Sultan Military Medical City

Sternum or chest wall resection is performed for a variety of conditions such as primary and secondary tumors of the chest wall or the sternum.

Sternum reconstruction has been a complex problem in the past due to intraoperative technical difficulties, surgical complications, and respiratory failure caused by the chest wall instability and paradoxical respiratory movements. Advances in the fields of surgery and anesthesia result in more aggressive resections. Nowadays neither the size nor the position of the chest wall defect limits surgical management, because resection and reconstruction are performed in a single operation that provides immediate chest wall stability. Chest wall resection involves resection of the ribs, sternum, costal cartilages and the accompanying soft tissues and the reconstruction strategy depends on the site and extent of the resected chest wall defect.

Here I’ll present, the youngest ever case reported, 2 years old girl with rhabdomyosarcoma involving the sternum. I will present the management challenges and the reconstruction options.

**P181****A Clinicopathological Study of Neuroendocrine Tumours of the Gastrointestinal Tract – A Case Series**

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**Introduction:** Neuroendocrine malignancies constitute 0.5% of all cancers. The gastrointestinal tract is the commonest site, followed by the lung. The last decade has seen a steady increase in their incidence. This is a case series of twenty five such tumours and their clinicopathological characteristics.

**Materials and Methods:** Twenty five patients with neuroendocrine tumours of the gastrointestinal tract were studied with reference to their demographic and clinicopathological characteristics. Apart from routine pathological examination, these tumours were also checked for E Cadherin expression as an independent marker of aggressive disease.

**Results:** The age of our patients ranged from 18 to 67 years. We had 13 female and 12 male patients, contradicting a female preponderance in literature. The vast majority of the tumours we encountered were from the stomach and duodenum, with 5 and 12 patients, respectively. Two tumours were at the gastro-duodenal junction, two from the appendix, small intestine and pancreas, each, and one each from the rectum and gall bladder. This is in contrast to literature that shows that neuroendocrine tumours of the GIT most commonly arise from the appendix and small bowel, followed by the rectum, stomach and duodenum. Two of these tumours were functional. The diagnosis was confirmed by immunohistochemistry staining for Chromogranin A and Synaptophysin. Grading was done using WHO criteria that takes into account the mitotic count, Ki 67 Index and necrosis. 21 of our cases were Grade I. Further, Immunohistochemistry for E cadherin showed that absence of expression correlated with more aggressive clinical behavior. 18 out of twenty five patients were operable at presentation and standard resections depending on the organ of origin with adjuvant therapies were given as required. 5 could only be given palliative care. The 2 functional tumours were treated with radiolabelled somatostatin analogues following uptake studies.

**Conclusion:** As neuroendocrine tumours are relatively rare, information about them is not as abundant as with other malignancies. Absence of E Cadherin expression is associated with more aggressive disease. More studies are required that document the pathological characteristics and clinical behavior in order to offer well rounded treatment protocols that treat not only the primary, but also the generalized effects of the secretions produced by them. Targeted chemotherapy is gaining prominence, but more specific drugs directed at the plethora of receptors these tumours express, could potentially revolutionize treatment.

**P182****Double Gallbladder – A Rare Anomaly?**

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**Introduction:** When searching for “Double Gallbladder” in PubMed, 129 results are obtained, many dated within the last decade (1). Unfortunately there are no publications from Denmark. We would like to present first to our knowledge reported case of double gallbladder in Denmark. Double gallbladder is a rare anomaly with a prevalence of 1:3800 in autopsy studies, described first by Boyden in 1926 (2). There are several classifications of double gallbladder that are based on relation between gallbladder, cystic duct and common bile duct (2,3). Non-specific symptoms and inadequate imaging are possible causes of lack of awareness of the condition. Removal of all gallbladders, preferably laparoscopic with special attention to the biliary anatomy, is recommended (4).

**Method:** Case report with review of the literature.

A 55-year-old female patient of Polish origin was hospitalized due to upper right quadrant pain. On admission clinical manifestations and paraclinical abnormalities of pancreatitis were present. Ultrasound scanning of the abdomen showed bile stones, ultrasonic manifestations of acute cholecystitis and normal intra- and extrahepatic bile ducts. Because of elevated liver enzymes MRCP was performed and showed double gallbladder, double cystic duct and signs of pancreas anulare. Scheduled ERCP confirmed bile stones in CBD, double gallbladder with double cystic duct, H-type according to Harlaffits classification (3). Because of minor retroperitoneal perforation second ERCP was needed for removal of all stones. The patient was then scheduled to laparoscopic cholecystectomy with perioperative cholangiography.

**Conclusion:** Anatomical variations of the gallbladder such as double gallbladder are rare and often remain unnoticed. They are most often identified because of clinical manifestations symptoms, diverse imaging studies, during surgery or autopsy. As most of them are not expected, they can contribute to complications during surgery. Careful preoperative imaging is very important to prevent accidental bile duct injury. Looking at the number of case reports, double gallbladder seems to be slightly more common than expected. The interesting question is whether a gallbladder discovered during an unrelated radiological investigation in a patient that previously underwent a cholecystectomy can represent undetected case of double gallbladder. We would like to present a review of the literature as well as images from MRCP, ERCP and laparoscopy.

**P183****Repair of Perforated Gastric Ulcer with Falciform Pedicle Flap**

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**Introduction:** Several decades ago, surgical training was saturated with procedures to treat peptic ulcer disease. Since the introduction of histamine-2 blockers and proton pump inhibitors, these procedures have dwindled significantly. However, there are still instances where patients require surgical intervention for peptic ulcer disease. Perforation is one of the indications for surgery. The surgical options to treat a perforated peptic ulcer are numerous. One of the most common options is a Graham patch. We are presenting a case of a patient with a perforated ulcer that did not have available omentum for the repair.

**Methods and Procedures:** Recently, a 64-year-old female with a past history of an open total abdominal hysterectomy and bilateral salpingo-oophorectomy presented as an outpatient with chronic lower abdominal pain. She underwent a work-up and imaging that did not reveal any pathology. At diagnostic laparoscopy, she had diffuse lower abdominal adhesions, which were lysed. She was discharged on the same day, but presented to the Emergency Department two days later with severe abdominal pain and fevers. The work-up revealed tachycardia, diffuse abdominal tenderness with peritoneal signs, leukocytosis and a large amount of free air on imaging. She was emergently brought to the Operating Room for a diagnostic laparoscopy. During laparoscopic exploration, the lower abdominal cavity appeared normal for a recent lysis of adhesions. Attention was turned to the upper cavity to find the pathology. Bile-stained free fluid and peri-gastric exudates were identified, but no perforation was visualized. Intra-operative endoscopy revealed the site of perforation in the antrum on the lesser curvature. A biopsy was performed and the decision was made to perform a Graham patch. However, the omentum was already densely involved with the lower abdominal cavity from the enterolysis. Due to the close proximity of the falciform ligament, it was mobilized laparoscopically and the pedicle was used as a Graham patch. The patient recovered without any additional issues. The biopsy was reported as a chronic gastric ulcer.



**Conclusion:** Surgical history has given us many options to treat peptic ulcer disease that are not nearly as common as they were decades ago. Perforated ulcers can be managed laparoscopically and Graham patches are a common choice for repair. However, the lack of the omentum for a proper pedicle flap can pose a problem in some patients. We have shown in this patient that a falciform pedicle flap can be successfully used as a substitution.

**P184****Laparoscopic Management of Boerhaave's Syndrome After a Late Presentation: A Case Report and Literature Review**

**Tahir Yunus, Hager Aref, Obadah Alhallaq; IMC**

**Background:** Boerhaave's syndrome involves an abrupt elevation in the intraluminal pressure of the oesophagus, causing a transmural perforation. It is associated with high morbidity and mortality. Having a nonspecific presentation may contribute to a delay in diagnosis and results in poor outcomes. Treatment is challenging, yet early surgical intervention is the most important prognostic factor.

**Case Presentation:** We present a case of a thirty-two-year-old male with a long medical history of dysphagia due to benign oesophageal stricture. He presented with acute onset of epigastric pain after severe emesis. Based on Computed Tomography scan, he was diagnosed with Boerhaave's syndrome. Presenting with signs of shock, mandated immediate Surgical exploration. For which he was taken for Laparoscopic primary repair with uneventful postoperative recovery.



**Conclusion:** The Golden period of the first 24 hours of insult still applies for cases of oesophageal perforation. The rarity of these cases makes a comparison between the various treatment methods difficult. Our data support that the use of Laparoscopic operative intervention with primary repair as the mainstay of treatment for the management of oesophageal perforation.

**P185****Intermittent Intussusception and Microcytic Anemia Caused by a Submucosal Jejunal Lipoma: A Rare Case Report**

Lindsay Tse, DO, Elizabeth Verrico, DO, Maurizio Miglietta, DO; HUMC Palisades

Lipomas of the gastrointestinal tract are rare benign soft tissue tumors that are often discovered incidentally. These lesions are often asymptomatic, but have occasionally been reported to have clinical significance as will be described in this case report. A 40 year old male initially presented to his primary care physician's office with a three week history of vague intermittent abdominal pain. His pain was located in the mid epigastrum and was associated with mild nausea. Past medical history was significant for hyperlipidemia and a right- sided goiter, and he denied any previous surgeries. Outpatient work up revealed a microcytic anemia, intermittent melena and hemoccult positive stools. The patient was referred to hematology and gastroenterology. Endoscopies revealed gastritis, and small internal and external hemorrhoids. He underwent an outpatient CT scan which demonstrated a  $6.0 \times 2.3$  cm mass within the lumen of the jejunum causing long segment non-obstructing intussusception. Subsequently, the patient was referred to surgery and underwent a diagnostic laparoscopy. At the time of surgery, an approximately twelve centimeter segment of proximal jejunum was identified intussuscepting into a distal limb. This segment was attempted to be reduced laparoscopically, however there was significant mesentery within in the intussusceptum and the segment could not be safely reduced. Therefore, the section of bowel was delivered through a small periumbilical incision. The intussusceptum was then able to be manually reduced from the intussusception. At this point a large mass was palpated inside the lumen of the jejunum. A small bowel side to side, functional end to end resection and anastomosis was performed. The bowel was returned to the abdomen and the abdomen was re-insufflated. The remainder of the small bowel was run and no additional lesions were identified. Final pathology revealed a  $5.5 \times 3.6 \times 3.5$  cm submucosal partially obstructing lipoma with ulceration at the tip. The patient recovered uneventfully and was discharged home on the second post operative day. This case report describes a submucosal jejunal lipoma that was acting as a lead point for intermittent non-obstructing small bowel intussusception, while simultaneously causing a microcytic anemia due to ulceration at the tip of the lipoma. Laparoscopic assisted reduction and small bowel resection is a safe and effective treatment for gastrointestinal tract lipomas that are unable to be removed endoscopically.

**P186****Gastrocolocutaneous Fistula Following Percutaneous Endoscopic Gastrostomy Tube Placement: Case Report of Endoscopic Management**

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Percutaneous endoscopic gastrostomy (PEG) is an alternative to laparotomy for open gastrostomy tube placement to provide enteral nutrition for those who are unable to pass nutrition orally. Despite being less invasive, the procedure is not without its complications, one of which includes the formation of a gastrocolocutaneous fistula.

The case describes a 90 year old female who presented with a PEG placed 6 months prior with reports of leakage of tube feeds from the gastrostomy site. As there was concern for possible ileus or obstruction, an upper GI series was completed which seemed to indicate dislodgement of the g-tube. The g-tube was replaced and a follow-up gastrograffin study was repeated which now indicated that the g-tube was within the lumen of the colon. Soon thereafter fecal matter was noted to be draining around the g-tube site; however, patient was without clinical signs of peritonitis. The patient was managed non-surgically as she was a poor surgical candidate with multiple prohibitive co-morbidities. The g-tube was removed bedside by cutting it flush at the skin level with the anticipation that the remainder of the tube would be excreted with bowel movements. The decision was then made to attempt closure of the gastric fistula endoscopically which was accomplished with hemoclips. A follow up upper GI study 72 hours later showed no extravasation of contrast through the gastric fistula. The colocutaneous fistula had self-resolved over the next couple days as well.

Placement of the PEG tube through the transverse colon can present with varying ill effects including diarrhea, pneumoperitoneum, peritonitis, gram negative pulmonary infection or feculent vomiting with the formation of a gastrocutaneous fistula. Treatment historically for a gastrocolocutaneous fistula has been exploration and excision of the fistula tract with resection of the involved colonic segment. However, there currently is no gold standard for the management of, and really ranges from conservative management to surgical and is dependent on the presenting symptoms. If the PEG becomes dislodged with resultant spillage from the colon with resultant peritonitis, surgical exploration is needed with removal of the g-tube and repair of the stomach and colon. On the other hand, non-surgical management has been suggested in management of a well-established fistula. Fistula closure may be spontaneous; however, can be inhibited due to delayed gastric emptying or leakage of gastric secretions through the fistula. Endoscopic clipping of the fistula tract employing the hemoclips is a treatment option.

**P187****Median Arcuate Ligament Release for Celiac Compression Syndrome: Single Surgeon Experience**

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Median Arcuate Ligament Syndrome (MALS) is a rare etiology of abdominal pain caused by narrowing of the celiac artery at its origin by the median arcuate ligament with relative hypoperfusion downstream. Patients suffer from post-prandial abdominal pain, abdominal pain associated with exercise, nausea, and unintentional weight loss. Diagnosis is historically made by demonstrating elevated celiac artery velocities and respiratory variation on dynamic vascular studies. Standard of care for MALS patients is laparoscopic celiac artery dissection with release of the median arcuate ligament.

At our institution, we have encountered fourteen patients (eleven female, three male) diagnosed by elevated peak velocity in the celiac artery by duplex ultrasound in conjunction with CT angiogram, MR angiogram, Arteriogram, or multiple modalities. All but one patient had multiple diagnostic imaging modalities, with the most common being CT angiogram; eight patients had invasive imaging. The mean age at presentation was 58.7 years in men and 47.8 years in women. On average, male patients presented with a longer duration of symptoms, 17.7 years (range 3–30 years), as compared to women, 3.3 years (range 1–15 years). Symptoms were fairly consistent between genders and included nausea, emesis, abnormal bowel habits, early satiety, post-prandial pain, and weight loss. All male patients reported at least two symptoms, most commonly nausea and post-prandial pain. In female patients, 82% reported having three or more symptoms. Notably, post-prandial pain was universal among men and women, while weight loss was exclusive to female patients as reported by 73%. Pre-operative peak velocities were recorded in all but one patient, with mean values more elevated in female patients as opposed to male patients, 156 cm/s versus 345 cm/s. Post-operative duplexes were obtained in seven patients; pooled data show a mean change of negative 210 cm/s for an average of 112 cm/s after decompression. In all cases, the celiac artery trifurcation was visualized and noted to have a distinct change in artery caliber after division of the ligament.

In total, 79% of patients reported significant improvement with return to normal diet and healthy weight gain post-operatively. Of the three without complete resolution, two were diagnosed with motility disorders and one was lost to follow-up. Our experience demonstrates that laparoscopic release of the median arcuate ligament in patients with significant flow limitation of the celiac artery on dynamic and anatomic imaging can be a successful treatment option for patients with recalcitrant pain and gastrointestinal dysfunction with no alternative diagnosis.

**P188****Congenital Abdominal Adhesions in a Bariatric Patient**

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Adhesions are fibrotic bands that form between and among abdominal organs. The most common cause of abdominal adhesions is previous surgery in the area as well as radiation, infection and frequently occurring with unknown etiology. These bands occur among abdominal organs, commonly the small bowel, and can lead to obstruction or remain asymptomatic, akin to the patient discussed here.

Congenital abdominal adhesions are rare and have received little attention in research and field of study. The patient described in this case is a 25-year-old female with a past medical history of morbid obesity, BMI of 45, hypertension and no past abdominal surgical procedures. The patient presented in August 2017 for bariatric surgical consultation and was ultimately taken for an attempted laparoscopic sleeve gastrectomy.

Upon entering the abdomen, significant adhesions were encountered and an additional attending was called to assist in identifying the stomach. The splenic flexure was found to be plastered to the diaphragm and the descending and transverse colon were adhered to the anterior surface of the stomach. Additionally, small bowel adhesions encased the area between the right and left hepatic lobes as well as the caudate lobe. After extensive enterolysis, the pylorus remained the only identifiable portion of the stomach. The patient also demonstrated significant hepatomegaly and a wedge resection was performed. The amount of adhesion and matting of the small and large bowel obscured the view of the stomach and the procedure was deemed too dangerous and terminated. This case represents the uncommon scenario in which an abdomen with no prior surgical history presents with extensive, obscuring adhesions. One such recent study describes the influence of cytokines and proinflammatory states as contributors to obstruction and malrotation in children, but this patient demonstrated no significant history. Further investigation is needed to determine potential etiologies of symptomatic and non-symptomatic congenital adhesions among bariatric patients who fail conservative treatment. Today the patient is doing well and the surgical team will attempt to complete the procedure in the coming months.

**P189****Laparoscopic Splenectomy: An Interesting Case Report**

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**Introduction:** Splenules, or accessory spleens, are a rare disease entity. Most often, they are asymptomatic, and found incidentally during radiographic workup for an unrelated problem. Torsion can cause a splenule to not only become symptomatic, but also confound the results of usual diagnostic studies.

**Case Description:** A 61-year-old female patient with history of uncomplicated hypertension, hyperlipidemia, hysterectomy, cholecystectomy, spinal surgery, and partial left nephrectomy, presented to the hospital with a two-week history of intermittent left upper quadrant abdominal pain. She denied any similar episodes in the past, or any associated symptoms. Further investigation with a CT scan of the abdomen and pelvis showed an acute inflammatory process in the left upper quadrant in same location as some colonic diverticulosis, as well as a 4.5 cm soft tissue mass. This indeterminate soft tissue mass was described as having decreased attenuation compared with the spleen. Differential diagnosis for this mass included malignancy, an atypical splenule, or an infectious/inflammatory mass. An MRI was recommended for further evaluation, but did not reveal any additional significant findings. Nuclear medicine liver/spleen scintigraphy was performed, which showed no focal activity associated with the indeterminate left upper quadrant mass, therefore making it unlikely to reflect a splenule, and making malignancy the diagnosis of exclusion. Following a period of observation with analgesia, intravenous antibiotics, and bowel rest, her abdominal pain did not resolve, and the decision was made to proceed with operative exploration. Diagnostic laparoscopy revealed an approximately 5 cm spherical mass in the left upper quadrant located just below the inferior aspect of the spleen. The superior aspect of the mass gave rise to a vascular pedicle, which upon tracing, seemed to originate from the splenic hilum. This pedicle was easily ligated, and the mass removed. Pathology revealed an extensive infarcted hemorrhagic nodule with organizing thrombus and attached thrombosed artery, consistent with an infarcted splenule due to torsion along its own axis. The patient had an uncomplicated post-operative course.

**Discussion:** This case report demonstrates the unusual presentation and workup of a patient that was ultimately diagnosed with an infarcted splenule, despite imaging findings that did not correlate, and may even have confused her diagnosis. Scintigraphy, which is normally the gold standard for diagnosing and localizing accessory splenic tissue, was in this case unrevealing, due to inability of the tracer to traverse the torqued vascular pedicle. Operative exploration was both diagnostic and therapeutic.

**P190****Chikungunya Disease: Infection Associated with Atypical Presentation of Duodenal Perforation**

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**Abstract:** Introduction: To observe surgical emergency of Duodenal perforation with atypical presentation in already diagnosed cases of Chikungunya disease.

**Methodology:** This was an observational study that was conducted in the tertiary care setup of Jinnah Postgraduate Medical center. The study duration was from November, 2016 till August, 2017 and consecutive convenient sampling technique was employed. Patients diagnosed with Chikungunya presenting with symptoms of peritonitis were included in the study. Patient's demographics, physical findings, intraoperative findings and post-operative complications were recorded. The data was entered in SPSS version 18.

**Results:** Included in this study were thirty (30) patients with the mean age of  $45.37 \pm 9.25$  SD, being more common in males. Mean Duration of disease in days =  $14.38 \pm 4.168$  SD and Mean Duration of Peritonitis =  $1.683 \pm 0.77$  SD. With a history of Chikungunya virus of average 2 weeks, diagnosed with serum Chikungunya IgM antibodies. The unusual presentation of slit like perforation with a mean length of 1 cm was observed. All the cases were repaired with Graham's Omentopexy. Postoperatively the only complication noted was surgical site infection in 8 (eight) patients which was treated with antibiotics suggested by culture and sensitivity report and local wound care. One patient died due to sepsis at presentation.

**Conclusion:** Chikungunya virus was found circulating in rodents in Pakistan as early as 1983. Duodenal ulcer perforation which is a common surgical emergency in our part of the world usually presents with pinpoint perforation in ant wall of first part of duodenum unlike in already diagnosed cases of Chikungunya Disease where a slit like duodenal perforation is noted in the anterior wall of first part of duodenum. Literature and consensus relate this perforation with the excessive use of NSAIDs due to usual presentation of arthritis in Chikungunya disease but the unusual presentation is still to be answered.

**P191****Bouveret's Syndrome: Endoscopic and Surgical Management of a Rare Form of Gallstone Ileus**

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**Introduction:** Bouveret's Syndrome is a rare form of gallstone ileus in which an impaction of a gallstone in the duodenum results in a gastric outlet obstruction. Gallstone ileus accounts for approximately 2–3% of all cases of small bowel obstruction. The terminal ileum is the most common location for a calculus to cause obstruction followed by the proximal ileum, jejunum and duodenum/stomach respectively. Open and laparoscopic surgery has previously been the mainstay of treatment for Bouveret's Syndrome, however with the advent of new endoscopic techniques and instruments there has been increasing success in endoscopic management. This case report looks at a patient with a gastric outlet obstruction from a gallstone, and discusses the current literature regarding diagnosis and management.

**Case:** 69 year old male presented with several day history of epigastric abdominal pain and multiple episodes of nonbloody, nonbilious emesis. He had previously been diagnosed with cholelithiasis, however had refused surgery at that time. On admission the patient was found to have a leukocytosis of 13.5. An ultrasound was performed in which the images were limited due to pneumobilia. A subsequent CT scan revealed pneumobilia, and a large 2 cm gallstone impacted in the first portion of the duodenum causing a gastric outlet obstruction. The patient underwent failed endoscopic attempts at removal and ultimately required a laparotomy, enterotomy with stone extraction.

**Discussion:** Bouveret's syndrome is a rare variant of gallstone ileus. With newer endoscopic techniques and electrohydraulic lithotripsy, there has been increasing success with endoscopic retrieval of the impacted gallstones. There is some controversy in regards to the need for definitive operative management. Stone extraction without cholecystectomy and fistula repair, has been shown to have less postoperative complications as well as lower mortality rates compared to when a cholecystectomy and fistula repair has been performed.

**P192****Why Does Conversion From Laparoscopy to Open Surgery Occur?**

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**Introduction:** We studied the risk factors for laparoscopic (Lap) conversion across a group of subspecialist colorectal surgeons with expertise in minimally invasive techniques.

**Methods:** We reviewed our prospective database for Lap conversion cases among all consecutive abdominopelvic procedures performed from 7/1/2007 through 12/31/2016. First, we identified procedures that were converted from Lap to open. Next, we performed a case-controlled trial by matching Lap converted procedures to Lap completed procedures. Then we abstracted covariates such as reason for conversion, prior abdominal surgery, procedure type, patient diagnosis, BMI, incision time, use of a hand assist, and ASA score. Last we developed multivariate models to identify risk factors for Lap conversion to open surgery adjusting for all listed covariates.

**Results:** From a database of 12,454 procedures, we identified 100 Lap colorectal procedures converted to open surgery and matched them to 339 Lap completed procedures. In the entire dataset of abdominopelvic procedures, Lap techniques were attempted in  $49 \pm 1\%$ . Among surgeon's with more than 50 Lap cases, we found significant variability in Lap attempts (range of 16–65% of any one surgeon's cases) and substantial variability in surgeon specific conversion rates (range 1–8%; median of 7%). However, there was no correlation between surgeon Lap attempt rate and surgeon Lap conversion rate ( $p=0.4$ ). There was also no correlation between surgery start time and Lap conversion. The most common reasons for conversion were adhesions ( $n=47$ ) and difficult patient anatomy ( $n=35$ ). Proportionately more patients with a diagnosis of inflammatory bowel disease (6%) were converted to open as compared to the diagnoses of neoplasm (3%) or diverticulitis (4%) ( $p<0.05$ ). Furthermore, proportionately more lap abdominoperineal resections (12.5%) were converted to open as compared to ileocolic resections (5.5%) or left colectomy (2.8%) ( $p<0.05$ ). On multivariate analysis, both male sex and prior history of abdominopelvic surgery increased the risk of Lap conversion while the use of a hand assist technique attenuated conversion risk.

**Conclusions:** Our data reveal a low rate of Lap conversion to open surgery despite a high rate of Lap attempted colorectal surgery. Increased surgeon affinity for Lap attempted surgery did not influence Lap conversion rates but the surgical indication of inflammatory bowel disease and the procedure of abdominoperineal resection did elevate the risk of Lap conversion. On multivariate analysis, prior abdominal surgery was associated with increased risk of conversion and was the most common reason reported for conversion on the operative report.

**P193****Patient-Reported Outcomes Among Patients Undergoing Open and Laparoscopic Colorectal Surgery: A Pilot Study**

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Table. Adjusted mean changes in PROMIS scores associated with laparoscopic vs. open surgery			
PROMIS Domain	Coefficient	95% CI	p value
Depression	-2.14	(-10.79 - 6.49)	0.62
Interest in sex	1.82	(-12.77 - 16.41)	0.80
Pain interference	-0.78	(-9.14 - 7.57)	0.85
Ability to participate	2.78	(-6.83 - 12.38)	0.57

**Introduction:** The use of minimally-invasive techniques in colorectal surgery has gained popularity due to benefits in both short-term and long-term clinical outcomes. Patient-reported outcomes (PRO) are increasingly recognized as vital measures of clinical outcomes and performance. This study aims to compare physical, mental, and social PRO in patients undergoing open and laparoscopic colorectal surgery with the hypothesis that patients undergoing laparoscopic surgery will report higher PROs.

**Methods:** This pilot study utilized the National Institutes of Health Patient-Reported Outcomes Measure Information System (PROMIS) to collect responses from patients undergoing open and laparoscopic colorectal surgery at a single institution from July 2013 to April 2015. Domains included pain interference, ability to participate in social roles and activities, depression, and interest in sexual activity. Scores were collected at 1-month preoperative and postoperative appointments. Data was reviewed using a multivariable linear model controlling for patient and procedural characteristics to determine associations between mean change in PROMIS scores and laparoscopic surgery.

**Results:** Surveys were completed by 107 patients, with 57 (53.3%) undergoing laparoscopic surgery. Open surgery was more common in men [31 (62.0%) vs. 17 (29.8%); p=0.008]. Colon cancer was the most common diagnosis overall, but the rate of rectal cancer was higher in the open surgery group [18 (36.0%) vs. 9 (15.8%)], as were rates of neoadjuvant chemotherapy (p=0.02) and radiation (p=0.004). Preoperative (p=0.01) and postoperative (p<0.0001) stomas were less common in the laparoscopic group. There were no unadjusted differences in mean PROMIS score changes among patients undergoing open and laparoscopic surgery across included domains. Likewise, the multivariable analysis identified no association between the mean changes in PROMIS scores and laparoscopic surgery in any of the assessed domains (Table).

**Conclusions:** This pilot study demonstrated that PROMIS can be used to collect PROs in a busy colorectal surgery clinic. These data do not demonstrate a difference in PROs between laparoscopic and open colorectal surgery patients, but larger prospective studies are needed.

**P194****A Study of Neoadjuvant Modified FOLFOXIRI for Locally Advanced Low Rectal Cancer**

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Total mesorectal excision (TME) with neoadjuvant chemoradiotherapy (NACRT) is standard treatment for rectal cancer, which has resulted in a decrease in local recurrence. However, NACRT has shown no significant overall survival and some adverse effects mainly caused by radiation therapy. Recently, the usefulness of neoadjuvant chemotherapy (NAC) has been reported. We retrospectively assessed the efficacy and safety of the neoadjuvant mFOLFOXIRI compared with NACRT followed by laparoscopic surgery.

A total of 76 patients undergoing laparoscopic surgery for lower rectal cancer (clinical Stage: II or III) from July 2014 to February 2017 in our department were retrospectively evaluated. 40 patients underwent NAC, and 36 patients underwent NACRT. The following data were collected: pathological complete response (pCR), histological grade, down staging, radial margin (RM) and postoperative complications. Histological grade was defined as follows: tumor cell necrosis or degeneration is present in less than one third of the tumor area (Grade 1a), between one and two thirds (Grade 1b), more than two thirds but viable cells remain (Grade 2), and complete response (Grade 3). These two groups were demographically comparable. Down staging did not differ between the two groups. Histological grade (Grade 1b) and pCR were significantly higher in the NACRT than in the NAC group (p<0.05). RM had no significant difference in both groups, but tended to be able to secure negative RM in the NAC group (95% vs. 83.3%, p=0.06). There were no significant differences in complications (wound infection, pelvic abscess, ileus, urinary disturbance, urinary tract infection). However, NAC group reduced complications after stoma closure (0% vs. 17.4%; rectovaginal fistula:1, rectourethral fistula:2, ischemic enteritis:1, p<0.05). Compared to NACRT, NAC was inferior in local control, but it was able to secure negative RM, and reduced complications after stoma closure. Neoadjuvant mFOLFOXIRI for locally advanced low rectal cancer seems to be promising. Long-term outcome should be evaluated in the near future.

**P195****Single Incision vs Multi-port Laparoscopic Complete Mesocolic Excision (CME) Colectomy for Colon Cancer. A Systematic Review and Meta-analysis**

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**Aims:** Increasing evidence suggest that CME may improve overall and disease free survival in colon cancer. Our aims were to investigate the safety and efficacy of single incision laparoscopic CME colectomy (SILCC) compared to multiport CME laparoscopic colectomy (MPCLC) providing the first meta-analytical evidence.

**Methods:** PUBMED, Scopus and Cochrane library were searched. Studies comparing the SILCC to MPCLC in adults with colon adenocarcinoma were included. The studies were critically appraised using the Newcastle Ottawa Scale. Statistical heterogeneity was assessed with  $\chi^2$  and I<sup>2</sup>. The symmetry of funnel plots was examined for publication bias.

**Results:** One randomized and four case control trials were included (540 SILCC Vs 609 SL). No difference was found in anastomotic leakage [OR: 0.95 (0.37, 2.43); P=0.92], post-operative ileus [OR=0.86 (0.44, 1.69); P=0.66], surgical site infection [OR=0.70 (0.35, 1.43); P=0.33], number of retrieved lymph nodes [Weighted mean difference (WMD)=0.54 (-0.43, 1.50), P=0.28], length of hospital stay [WMD = -0.09 (-0.28, 0.11); p=0.38] and pulmonary complications [OR=2.05 (0.28, 15.20); P=0.48]. Operative time was significantly longer in the MPCLC [WMD = -6.79 (-11.84, -1.71); P=0.008] but with a high level of heterogeneity I<sup>2</sup>=63%.

**Conclusions:** The increased technical requirements of the SILCC don't seem to increase morbidity or mortality. The equal number of lymph nodes in the two groups suggest that the extent of the dissection in the single incision group was not compromised.

**P196****Does Obesity Class Impact Outcomes of Total Proctocolectomies with Ileal-Pouch Anal Anastomosis? An ACS-NSQIP Analysis**

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**Introduction:** Obesity has been associated with increased morbidity following total proctocolectomies with ileal-pouch anal anastomosis (TPC-IPAA). However, the incremental added risk of increasing obesity class is not known. The aim of this study was to evaluate the additional morbidity of increasing obesity class for TPC-IPAA.

**Methods:** After ethics board approval, the ACS-NSQIP database (2005–2015) was accessed to identify patients who underwent elective TPC-IPAA. Body mass index (BMI, kg/m<sup>2</sup>) was classified as normal (18.5–24.9), overweight (25.0–29.9), obesity class-I (30–34.9), obesity class-II (35–39.9) and obesity class-III ( $\geq 40$ ). Primary outcomes were overall surgical site infection (SSI) and organ-space infection (OSI). Secondary outcomes were 30-day major morbidity and length of hospital stay (LOS).

**Results:** Of 4581 patients who underwent TPC-IPAA, 57.4%, 17.6% and 9.8% were for ulcerative colitis, malignant colonic neoplasms and benign colonic neoplasms. Median (IQR) age was 44 (31.56) years and 56.3% were male. Half (51.21%) of patients underwent a laparoscopic TPC-IPAA. Rates of overall SSI, OSI and major morbidity were 15.5%, 8.5% and 27.3%. Median LOS was 7 (5,10) days. Over one-third of patients (38.5%) had a normal BMI, 4.1% were underweight, 32.9% were overweight, 16.0% were class-I obese, and 8.4% were class II/III obese. On multivariate regression analysis, higher obesity class was associated with significantly increased odds of SSI and OSI (Table 1). Similarly, increased risk of 30-day major morbidity and a one day increase in LOS were observed across all obesity categories.

**Conclusion:** Increasing obesity class was associated with a significant incremental risk of SSI and OSI following TPC-IPAA. Knowledge of this increased risk stratified by obesity class may help guide preoperative planning, especially pertaining to counseling patients for staged procedures to allow for appropriate preoperative weight loss prior to IPAA reconstruction.

Table 1-Multivariate Regression for SSI and OSI (\*Indicates statistical significance)

		SSI(OR 95%CI)	OSI(OR 95%CI)
BMI	Underweight	1.19(0.78-1.83)	1.49(0.91-2.47)
	Normal(Reference)		
	Overweight	1.21(0.99-1.48)	1.03(0.79-1.33)
	Obesity I	1.61(1.27-2.03)*	1.53(1.14-2.05)*
Diabetes	Obesity II/III	2.27(1.72-3.00)*	1.59(1.10-2.30)*
	0.79(0.57-1.08)	0.67(0.42-1.06)	
Smoking			
	1.05(0.83-1.34)	1.12(0.83-1.51)	
	Laparoscopy	0.71(0.60-0.83)*	0.94(0.76-1.16)
Operative time(min)			
	1.001(1.001-1.002)*	1.001(1.001-1.002)*	
	Immunosuppression	1.25(1.05-1.49)*	1.38(1.10-1.71)*
Wound classification	Clean-Contaminated(Reference)		
	Contaminated	1.24(0.99-1.56)*	1.34(1.00-1.79)*
	Dirty	2.13(1.35-3.37)*	2.56(1.51-4.34)*

**P197****Reduced Port Laparoscopic Lymph Node Dissection Around the Inferior Mesenteric Artery with Preservation of the Left Colic Artery for the Treatment of Sigmoid and Rectal Cancer**

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**Aim:** In curatively intended resection of sigmoid and rectal cancer, many surgeons prefer to perform ligation of the root of the inferior mesenteric artery (IMA), high tie, because of oncological reasons. However, ligation of the IMA has been known to decrease blood flow to the anastomosis. There are few reports of patients undergoing the reduced port laparoscopic approach (RPS) including single-incision laparoscopic approach (SILS) even among those undergoing laparoscopic lymph node dissection around the IMA with preservation of the left colic artery (LCA). Our objective was to evaluate the quality of this procedure regarding application of RPS for the treatment of sigmoid and rectal cancer.

**Methods:** The feasibility of this procedure was evaluated in 61 consecutive cases of RPS for sigmoid and rectal cancer. A Lap protector (LP) was inserted through a 2.5 cm transumbilical incision, and an EZ-access was mounted to LP and three 5-mm ports were placed. Almost all procedures were performed with standard laparoscopic instruments using a flexible scope (SILS). A 12 mm port was inserted in right lower quadrant mainly in rectal cancer surgery (SILS+1). Our method involves peeling off the vascular sheath from the IMA and dissection of the LN around the IMA together with the sheath.

**Results:** Lymph nodes around the IMA were dissected with preservation of the LCA in 26 cases (group A). The IMA was ligated at its root in 35 cases (high tie, group B). In group A, 11 patients were treated with SILS and 15 patients were treated with SILS+1. In group B, 15 patients were treated with SILS and 20 patients were treated with SILS+1. Median operative time was 187.7, and 154.8 min for group A, and B, respectively. The operative time was significantly longer in group A. Estimated blood loss was 13.7 and 13.0 g, and mean numbers of harvested LN were 21.7, and 23.8. None of the other operative results of groups A and B were different statistically. In this series, there was only one anastomotic leakage in group B.

**Conclusion:** Our method allows equivalent laparoscopic lymph node dissection to the high tie technique. The operative time tends to be longer, however this procedure has a possibility to reduce an anastomotic leakage.

**P198****Splenic Flexure Mobilization in Robotic Colorectal Surgery: How to Approach It?**

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**Introduction:** the routine mobilization of the left colonic flexure in colorectal surgery is still a matter of debate. We present our surgical approach with data. This technique may increases the surgical expertise/confidence when the surgical maneuver is necessary. Up to 40% of all splenectomies are for surgery-related injuries; 80% of those splenic injuries are treated by splenectomy. The iatrogenic splenic injury rate during colorectal surgery is 0.96%. Iatrogenic splenic injuries create: increased risk of mortality/morbidity, extended operative time/patient in-hospital stay and increased healthcare costs. Risk factors for iatrogenic splenic injury are: advanced age, adhesions, underlying pathology. Obesity is not a risk factor. It is debated if the left colonic flexure mobilization is a risk factor for splenic injury. The ligament over-traction is the most frequent damage mechanism. The most dangerous surgical maneuver is the spleno-colic ligament surgical dissection. Moreover, laparoscopy decreases by almost 3.5 times the splenic injury risk. Some surgeons are reluctant to routinely take down the splenic flexure.

**Materials and Procedures:** 129 robotic left colonic/rectal cases with routine splenic flexure mobilization technique have been performed: left colectomy (n=74), rectal surgery (n=45), transverse-colectomy (n=6) and pancolectomy (n=4). Conversion rate 1.6%, EBL<100 mL postop-leak (0.8%) and 0% iatrogenic splenic injuries.

**Results:** In our approach, there are 4 pathways that need to be mastered for the splenic flexure mobilization:a) medial to lateral dissection (underneath the inferior mesenteric vein); b) lateral to medial (from the lateral peritoneal reflection); c) access to the lesser sac with omental detachment from the transverse colon; d) access to the lesser sac rather than to the spleen. In our experience the routine mobilization of the splenic flexure may have some advantages: a) Better (without tension) distal anastomosis formation; b) Better perfusion of the proximal stump; c) Wider oncological dissection; d) No need of going back to the flexure when the proximal stump is too short; e) mastering a surgical maneuver useful in other procedures (e.g. distal pancreatectomy). The theoretical drawbacks of routine splenic flexure mobilization can be:a) longer operative time, which is on average increased by 35 minutes; b) Risk of splenic injuries, in our experience, no splenic injuries have been registered.

**Conclusions:** technical accuracy with cautious dissection/visualization can reduce iatrogenic splenic damages rate. Laparoscopy decreases splenic injury rate. Robotic surgery may have the potential to further reduce this complications. Our data suggest that the routine mobilization of the splenic flexure, has more advantages than drawbacks and it can reduce the iatrogenic splenic injury rate. More trials are needed in order confirm our findings.

**P199****Preliminary Experience of the Use of Robotic Stapler in Total Mesorectal Excision - Low Anterior Rectal Resection: Comparison with the Laparoscopic Device**

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**Introduction:** The robotic stapler with the EndoWrist™ technology (Intuitive Surgical, Inc.) includes a larger range of motion and articulation compared to the laparoscopic device, and may provide some benefits in difficult areas like the pelvis. To date, few studies have been published on the application of robotic endowristed stapling. We present our preliminary experience using the robotic stapler in low anterior rectal resection (LARR) with total mesorectal excision (TME) for rectal cancer.

**Methods and Procedures:** Between March 2016 and September 2017, 24 patients underwent elective robotic LARR with TME and primary colorectal anastomosis within the ERAS program. Patient demographic, intra-operative data and post-operative outcomes were compared between the EndoWrist™ 45 robotic stapler group (RS group) and the laparoscopic stapler group (LS group).

**Results:** The two groups were homogeneous in terms of demographic and clinical characteristics. Thirteen (10 males) and 11 patients (8 males) were included in RS and in LS group, respectively. Seven patients received preoperative chemoradiation in RS group, 8 in LS group. There was no difference in intra-operative blood loss and total operative time. The median number of stapler fires for patients in RS group and in LS group was 2 (range, 1–3) and 3 (range, 2–4), respectively. Loop-ilostomy was fashioned in 8 patients in RS group (61.5%) and 8 patients in LS group (72.7%). The 30 days mortality was nil. Two cases of anastomotic leaks have been detected in RS group (15.4%), 2 cases (18.2%), occurred in LS group, all treated conservatively. The mean length of postoperative stay was 6.5±5.7 days in RS group, 6.9±3.9 days in LS group.

**Conclusions:** In our preliminary experience the application of robotic stapler during LARR with TME has shown to be safe and feasible with acceptable morbidity. Even if our case series is pretty small, fewer stapler fires were required in the RSG compared to LSG. We believe that the robotic stapler might lead to a more precise firing during pelvic surgery; it can explain the trend toward a decreased number of fires, that has been well documented in literature to be related to a lower risk of anastomotic leak. Further high quality studies are required to confirm these findings.

**P200**

**Laparoscopic Ultralow Anterior Resection with Total Mesorectal Excision and Transanal Specimen Extraction for Rectal Cancer: A Consecutive Series of 51 Patients**

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**Background and Objectives:** The present study was aimed at investigating the safety and feasibility of laparoscopic ultra-low anterior resection (L-ULAR) with total mesorectal excision (TME) and transanal specimen extraction for rectal cancer located at lower one-third rectum, and specifically understanding the oncological outcome of the operation.

**Patients and Method:** A prospective designed database of a consecutive series of patients undergoing laparoscopic ultra-low anterior resection for rectal malignancy with various tumor-node-metastasis (TNM) classifications from 1991 to 2012 at the Texas Endosurgery Institute was analyzed. In this study ultra-low anterior resection is defined as low anterior resection for the malignant lesion at distal 1/3 of rectum.

**Results:** 51 ultralow anterior resections were completed laparoscopically with TME and transanal specimen extraction. The operating time for the surgery was  $169.7 \pm 31.1$  minutes, and estimated blood loss during the procedure was  $104.5 \pm 72.1$  ml. The length of the lesion from the anal verge measured with intraoperative colonoscopy ranged from 3.5 cm to 6.9 cm, and shortest distance of colorectal anastomosis from the anal verge is 1 cm. Since diverting ileostomy was routinely installed after L-ULAR, none was found to have anastomotic leakage, however 3 patients developed anal stenosis within 6-month follow-up. Therefore the overall rate of postoperative complication is 5.9%. Moreover 4 patients were reported to have local recurrence in 2-year follow-up with the rate of 7.8%.

**Conclusions:** L-ULAR is safe and effective procedure for the rectal cancer at distal 1/3 rectum with comparable local recurrence and postoperative complication rates, thereby suggesting L-ULAR can be considered as a procedure of choice for rectal cancer at very low location in the rectum.

**P202**

**Questionnaire to Survey Cosmetic Outcomes in Minimally Invasive Surgery for Colon Cancer**

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**Background:** There has been a steady increase in penetration of minimally invasive surgery for colon cancer including conventional multiport laparoscopic colectomy (MLC) and single-site laparoscopic colectomy (SLC). However, it is not clear how important the cosmetic outcome, one of the advantages of SLC, is to patients and whether SLC reflects social needs.

**Methods:** We used a web-based questionnaire to survey both non-medical persons and medical specialists for what factors were considered important on the assumption that respondents undergo surgery and that the MIP (most important person) for them undergoes. Five factors (curability, safety, pain, duration of hospital stay, and cosmetic outcomes) were compared. After randomly paired pre and postoperative photographs of the abdomen of the patients performed SLC and MLC were shown, perceptions of body image and cosmesis were assessed using a visual analogue scale.

**Results:** This study included a total of 1,352 respondents (990 non-medical and 362 medical). Curability was assigned as the most important factor, followed by safety. The scores for cosmetic outcomes were almost equal with those of the duration of hospital stay, which was associated with medical costs and pain. Participants who were female, younger, and in the non-medical group placed great importance on cosmetic outcomes. For all questions regarding body image and cosmesis, SLC had superior scores compared with MLC.

**Conclusions:** Understandably, curability and safety were scored as the most important factors in colon cancer surgery. Although, medical specialists should consider cosmetic outcomes as social needs, even in malignant cases.

**Keywords:** Colon cancer, Single-site laparoscopic colectomy, Cosmetic outcomes, Minimally invasive surgery.

**P201**

**Transanal Endoscopic Microsurgery (TEMs) for Mucosal Excisional Biopsy of Rectal Tumors of Uncertain Behavior – Case Report and Description of Technique**

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**Introduction:** Transanal local excision is an excellent treatment choice for benign rectal lesions. For rectal cancer, however, local full-thickness excisions are fraught with high local recurrence rates - even if limited to early and best selected lesions. This corroborated observation is likely caused by a combination of missed nodal disease and direct implantation of tumor cells into the mesorectum, which upstages even early T1 lesions to at least a T3 lesion. The treatment of choice for invasive adenocarcinoma consists of an oncological total mesorectal resection, possibly with other modalities. Rectal tumors of uncertain behavior can present a treatment dilemma between over-treatment vs under-treatment.

**Concept:** If the nature of a lesion is not certain or if contradictory results have been obtained, we propose a superficial local excision as a mucosal excisional biopsy to establish the diagnosis while avoiding interference with subsequent definitive treatment modalities by preserving the integrity of the external rectal wall and mesorectum. A benign final pathology concludes the treatment, whereas a detection of invasive cancer will be managed with a subsequent oncological resection.

**Methods:** This is a case report of a 70-year-old woman found to have a 4.4 cm villous lesion in the mid to distal rectum without proven or disproven invasive cancer. A TEMS-guided mucosal resection of the rectal mass at 3 cm above the anal verge was performed whereby the lesion was dissected off the underlying muscularis.

**Results:** With preoperative discrepant ERUS and MRI staging uT0-1 vs cT3 lesion, a technically successful mucosal resection of the large rectal mass was carried out. Pathology revealed a tubulovillous adenoma without high grade dysplasia or malignancy and a complete resection.

**Conclusion:** TEMS mucosal excisional biopsy of rectal tumors of uncertain behavior allows for a less invasive diagnostic approach that may (a) be definitive treatment if the lesion is proven benign, or (b) confirm the need for more aggressive treatment without having burned any treatment bridges or upstaged an early tumor by violating the mesorectal plane. An oncologic resection with appropriate (neo-)adjuvant chemotherapy can be carried out while preventing the potential for tumor seeding at initial operation.

**P203**

**The Use of a Novel Smart Phone Application and the Quality of Bowel Preparation for Colonoscopy, a Randomized Controlled Trial**

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**Background:** Adequate visualization of the entire lumen of the large bowel is essential in detecting pathology and establishing diagnoses during colonoscopies. Patients are provided dietary instructions and medications in order to achieve adequate bowel preparation. Given the extensive amount of preparation required, some patients may be unable to adhere to the prescribed routine, resulting in rescheduling or repeat procedures and misallocation of limited resources. A number of previous quality-improvement efforts have been implemented to ensure adequate preparation prior to colonoscopy.

**Objective:** The objective of this study was to develop and assess the feasibility of a novel smart phone application in the delivery of bowel preparation instructions.

**Methods:** A novel smart phone application was developed to deliver bowel preparation instructions to patients undergoing colonoscopy for the first time. Patients were included in the pilot phase of this project if they were undergoing a colonoscopy for the first time. We included patients who had access to a smart phone, had not previously had a bowel preparation for any reason. We excluded patients with a previous diagnosis of inflammatory bowel disease or colorectal cancer. Patient surveys were administered at the time of colonoscopy. Patients were questioned regarding the completeness of bowel preparation and adherence to bowel preparation instructions. Patient questionnaires were completed to ascertain the ease of use of the smart phone application and any concerns that arose. Quality of bowel preparation was assessed by the colonoscopist using the validated Ottawa bowel preparation score.

This is the pilot study results for the "COLOPREP" Trial (NCT03225560).

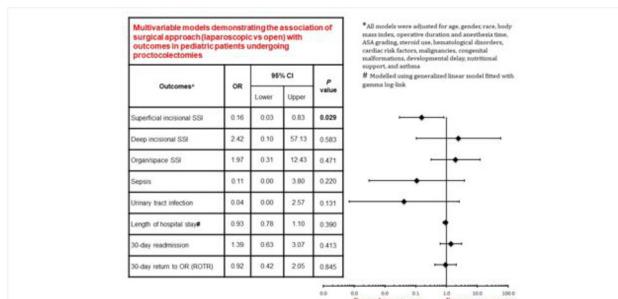
**Results:** A total of 20 patients were enrolled in the pilot phase of this study. Patient satisfaction, adherence to instructions and ease of use of the smart phone application were ascertained. Bowel preparation, as assessed by the colonoscopist, was reported.

**Conclusions:** This study assessed the feasibility of using a novel smart phone application for delivery of bowel preparation instruction. This pilot study is the initial phase of a randomized controlled trial to compare smart phone application vs. written instructions in the delivery of bowel preparation instructions.

**P204**

### The Equivalence of Short-Term Perioperative Outcomes Among Pediatric Patients Undergoing Laparoscopic and Open Ileal-Pouch Anastomosis

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**Introduction:** Limited literature exists evaluating the differences in efficacy between laparoscopic and open protocolectomy with ileal-pouch anal anastomosis (IPAA) among pediatric patients. We hypothesized that patients undergoing a laparoscopic IPAA would have superior short-term outcomes compared to an open IPAA due to the accepted benefits of minimally-invasive surgery (MIS).

**Methods:** Using the ACS-NSQIP pediatric PUF [2012–2015], we identified patients (<18 years) that underwent laparoscopic or open IPAA. The association of laparoscopic MIS (with respect to open surgery) with 30-day perioperative outcomes [superficial, deep and organ SSI, sepsis, UTI, length of hospital stay (LOS), readmission and Return-to-OR (RTOR)] was investigated using multivariable regression techniques.

**Results:** A total of 256 pediatric patients (median age: 13 years, 52% female, Caucasian 84%, ASA I/II 68%) underwent IPAA (laparoscopic: 62%; open: 38%), with no significant differences in demographic and clinical characteristics across the two groups. In terms of outcomes, patients undergoing laparoscopic IPAA had significantly fewer superficial SSIs (1.9% vs 8.2%; p=0.023) and a shorter median LOS (7 vs 8 days; p=0.008). All other outcomes were not significantly different [Table-1].

In multivariable models adjusted for confounders, patients undergoing laparoscopic IPAA had a lower likelihood of developing superficial SSI compared to open IPAA (OR: 0.16; 95%CI: 0.03–0.83; p=0.029). However, no significant differences were noted across the two approaches for sepsis, UTI, median LOS, 30-day readmission and RTOR rates in multivariable models (Figure-1). In a subset analysis, older age (OR: 1.18; 95% CI: 1.04–1.33; p=0.010) and increased operative duration (OR: 1.02; 95% CI: 1.01–1.04; p=0.041) were associated with an increased risk of 30-day readmission.

**Conclusions:** Most of the perceived benefits of a MIS on perioperative outcomes were not objectively validated. Laparoscopic IPAA in the pediatric population has similar short-term perioperative outcomes compared to patient undergoing open IPAA except for superficial SSI.

**P205**

### Management of Right-Sided Colonic Uncomplicated Diverticulitis: Conservative Treatment or Laparoscopic Diverticulectomy?

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**Purpose:** Right-sided diverticulitis is a rare clinical entity in Western countries but is more common in some Asian countries. At present, there are only guidelines for patients with acute left-sided diverticulitis. Controversies abound as regards the optimal treatment for those with acute right colonic diverticulitis, ranging from conservative therapy, diverticulectomy to right hemicolectomy. This study aims to establish guidelines for patients with right colon diverticulitis (RCD).

**Methods:** This prospective non-randomized controlled study ran from December 2009 to May 2014. Patients were enrolled if diagnosed with first attack of uncomplicated RCD by typically clinical symptoms and computerized tomography scan images or diagnosis during surgery. Included patients were divided into two treatment arms, conservative treatment or laparoscopic diverticulectomy, depending on their choice. The outcomes were treatment success, complications and recurrent diverticulitis during follow-up.

**Results:** 158 patients (male:female ratio: 2:1, median age 35.6 years) were included (81 conservative arm and 74 surgical arm). Median follow-up was 44 months. There were no statistically significant differences found in clinical features and laboratory findings between the two groups. No statistically significant difference was found regarding the overall success rates and the complication rates between the conservative and the surgical arms (success rates: 90.1% and 86.5% (p=0.48) and complication rates: 8.6% and 12.2% (p=0.472), respectively). However, surgical treatment was better than conservative treatment in preventing recurrent diverticulitis (recurrence rates: 0% and 5.4% (p=0.031), respectively).

**Conclusion:** Conservative management with bowel rest and antibiotics is a safe and effective treatment for right-sided colonic uncomplicated diverticulitis and may be considered as the initial option. On the other hand, laparoscopic diverticulectomy is also safe, effective and adequate. Surgery is advocated to decrease the recurrence rate.

**P206**

### Does Time to Closure of Loop Ileostomy Increase the Risk of Postoperative Ileus? A Large, Single-Institution Review

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**Introduction:** It has been hypothesized that the structural and functional changes that develop in the defunctioned segment of bowel may contribute to the development of postoperative ileus (POI) after loop ileostomy closure (LIC). As such, longer intersurgery interval between ileostomy creation and LIC may increase POI.

**Methods and Procedures:** After institutional review board approval, all patients who underwent LIC at a single institution between 2007–2017 were identified. The primary endpoint, primary POI, was defined as either a) being kept nil-per-os on or after postoperative day 3 for symptoms of nausea/vomiting, distension, and/or obstipation or b) having a nasogastric tube (NGT) inserted, without postoperative obstruction or sepsis. Secondary endpoints included length of hospital stay (LOS) and non-POI related morbidity. Patients who left the operating room with a NGT, had a planned laparotomy with a concomitant procedure at the time of LIC, had a total protocolectomy as their index operation, or had secondary POI, were excluded. Patients were then divided into two groups based on timing from the index operation to LIC (<6 months vs. > 6 months).

**Results:** Two hundred fifty-nine patients underwent LIC – 92 within 6 months of ileostomy creation, and 167 after 6 months. The median age was 65.2 (56.0–73.0) years and 58.7% were male. Patients with >6 months intersurgery interval were more likely to have a diagnosis of colorectal cancer (89.8% vs. 77.2%, p=0.010), to have had an open index colorectal resection (88.6% vs. 76.1%, p=0.040), and to have suffered an anastomotic leak after the index resection (15.0% vs. 4.3%, p=0.012). POI was observed in 18.9% of patients, while overall 30-day post-operative and non-POI related morbidity were 39.5% and 23.6%, respectively. POI was more frequently observed in patients with >6 months intersurgery interval (22.8% vs. 12.0%, p=0.046). Completion of adjuvant chemotherapy prior to LIC was the only other predictor of POI on univariate analysis (51.0% vs. 34.9%, p=0.049). In all patients, POI resulted in a greater median LOS (9 (8–16.5) vs. 5 (4–6) days, p<0.001) but was not associated with an increase in non-POI related morbidity (27.3% vs. 22.4%, p=0.55). On multivariable regression, intersurgery interval>6 months remained a significant predictor of POI (OR 2.57, 95% CI 1.21–5.91).

**Conclusions:** Intersurgery interval>6 months is an independent predictor of primary POI after LIC. Such patients may benefit from preoperative bowel stimulation; a novel intervention being evaluated to decrease POI after LIC.

**P207****Sacral Neuromodulation in the Treatment of Fecal Incontinence in a Pediatric Patient with Hirschsprung's Disease: A Case Report**

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**Objective:** Fecal incontinence can be a debilitating problem significantly diminishing productivity and quality of life. Sacral neuromodulation has emerged as a first line surgical option treatment in patients with fecal incontinence. Though its efficacy has been rigorously evaluated in adult populations there is scant data available for its use in the pediatric patients with fecal incontinence. This case study discusses the management of fecal incontinence in a pediatric patient with a history of Hirschsprung's disease utilizing sacral nerve stimulation.

**Methods:** Our patient is a 15-year-old female with a history of Hirschsprung's diagnosed in infancy and treated surgically with coloanal pull through at the age of 1 who presented with complaints of fecal incontinence. The patient was wearing pads daily, noting frequent uncontrolled bowel movements as well as having frequent missed days of school due to these symptoms. Despite maximal medical management and pelvic floor physical therapy the patient continued to have 3–10 episodes of fecal incontinence daily. A CT scan with rectal contrast was used to establish her post-operative anatomy. Anal manometry showed low rest/squeeze pressures, absent resting anal inhibitory reflex, and abnormal sensation. Furthermore, during balloon expulsion testing the patient failed to pass device. The patient was deemed a candidate for Stage 1 testing with sacral nerve neuromodulation. During follow-up, the patient was noted to have resolution of her episodes of fecal incontinence and the second stage was completed. The patient continues to note 100% continence and dramatic improvement in her quality of life.

**Conclusion:** In this patient with a history of severe fecal incontinence due to Hirschsprung's disease, sacral neuromodulation has had a significant impact on her quality of life. Post-operatively she continues to have marked improvement in her symptoms with 4–5 bowel movements a day with no recurrence of fecal incontinence. The use of sacral neuromodulation is a promising treatment for fecal incontinence in the pediatric population. Future research investigating the long-term efficacy of this treatment modality in the pediatric population is needed.

**P209****A Study of Small Bowel Obstruction After Laparoscopic Colectomy**

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**Background:** We adopt laparoscopic colectomy for all colorectal cancer since we have introduced in 1993. To assess the safety of laparoscopic colectomy, we retrospectively examined surgical cases of postoperative small bowel obstruction.

1861 colorectal cancer patients underwent laparoscopic colectomy between January 2000 and September 2016 in our department. Among them, cases where surgery was required for treatment of postoperative small bowel obstruction were examined in this study. Postoperative small bowel obstruction which developed during hospital stay was defined as early bowel obstruction, and that which developed after discharge was defined as late bowel obstruction.

Cases of bowel obstruction caused by colorectal cancer recurrence and progression were excluded. 9 surgical cases (0.48%) were considered to be early bowel obstruction and 15 (0.81%) were classified as late bowel obstruction. Left hemicolectomy (n=4, 3.03%) was a significantly more frequent procedure in early bowel obstruction, and abdominoperineal resection (n=5, 4.20%) was significantly more common in late bowel obstruction ( $p<0.05$ ). Both early and late bowel obstruction included adhesive small bowel obstruction (n=19), internal hernia (n=3), and strangulation obstruction (n=2). Internal hernia (n=3) and strangulation obstruction (n=2) occurred after left hemicolectomy and abdominoperineal resection, respectively. There is no apparent relationship between surgical procedures and adhesion regions (abdominal wall, intestinal tract, and pelvic cavity).

The incidence rate of postoperative small bowel obstruction remained low, and laparoscopic colectomy had been safely performed. However, countermeasures are needed because of the high frequency of both early and late bowel obstruction which occurred after left hemicolectomy and abdominoperineal resection, respectively.

**P210****Improved Utilization of Resources as an Improvement of Outcome: The Effect of Multidisciplinary Team for Rectal Cancer in a District Hospital**

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**Introduction:** Nowadays, treatment decisions about patients with rectal cancer are increasingly made within the context of a multi-disciplinary team (MDT) meeting. The outcomes of rectal cancer patients before and after the era of multi-disciplinary team was analyzed and compared in this paper. The purpose of the present study is to evaluate the value of discussing rectal cancer patients in a multi-disciplinary team.

**Methods and Procedures:** In our health institute, weekly MDT conferences were initiated in January 2015. Meetings were attended by surgeons, radiologists, radiation and medical oncologists and key nursing personnel. All rectal cancer patients diagnosed and treated in 2014–2015 in the General Surgery Division of the "Carlo Urbani" hospital in Jesi (AN, Italy) were included. Then, the data from rectal cancer patients in 2014 were evaluated, before the adoption of MDT and in year 2015, after the adoption of meetings. Datasets regarding demographics, tumor stage, treatment, and outcomes based on pathology after operation were obtained. During an MDT discussion patient history, clinical and psychological condition, co-morbidity, modes of work-up, clinical staging, and optimal treatment strategies were discussed. A database was created to include each patient's workup, treatments to date and recommendations by each specialty. "Demographic variables" consisted of age at diagnosis, sex, body mass index, comorbidities, American Society of Anesthesiologists physical status classification system, clinical stage and pathological stage. Other analyzed variables included baseline carcinoembryonic antigen (CEA), the type of imaging, use of neoadjuvant chemo-radiation, restaging following neoadjuvant therapy, distance from the anal verge, operation type and use of adjuvant chemo-radiation. "Outcome variables" consisted in a comparison for each group between clinical and pathological stage.

**Results:** Sixty-five patients were included in this study: thirty patients in 2014 (pre-MDT) and thirty-five patients in 2015. Demographic variables did not differ significantly between groups. Preoperative clinical stages with baseline preoperative CEA and postoperative pathological stage were analysed, too. Thanks to the MDT and the increased use of the neoadjuvant therapy, a statistically significant difference in reduction of the stage between the clinical and pathological stage in the patients of the MDT group was verified.

**Conclusions:** The vast majority of rectal MDT decisions were implemented and when decisions changed, it mostly related to patient factors that had not been taken into account prior to the adoption of multi-disciplinary team. Analysis of the implementation of team decisions is an informative process in order to monitor the quality of MDT decision-making.

**P211****Single-Incision Plus One Port Laparoscopic Lateral Lymph Node Dissection for Lower Rectal Cancer**

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**Purpose:** In Japan, lateral pelvic node dissection (LPND) is the standard treatment for locally advanced lower rectal cancer. There are few reports of patients undergoing single-incision plus one port laparoscopic (SILS+1) LPND even among those undergoing laparoscopic LPND. The aim of this study is to describe our initial experience and assess the feasibility and safety of SILS+1 LPND for patients with advanced lower rectal cancer.

**Methods:** A Lap protector (LP) was inserted through a 2.5 cm transumbilical incision, and an EZ-access was mounted to LP and three 5-mm ports were placed. A 12 mm port was inserted in right lower quadrant. A single institutional experience of SILS+1 LPLND for rectal cancer are presented. Inclusion criteria was Indications for LLD were lower rectal cancer with T3–4, or T1–2 rectal cancer with metastasis of lateral lymph node, as described by the Japanese Society for Cancer of the Colon and Rectum (JSCCR) guidelines for the treatment of colorectal cancer. Perioperative outcomes including operative time, operative blood loss, length of stay, postoperative complications, and histopathological data were collected prospectively.

**Results:** Between January 2014 and December 2016, 19 consecutive patients underwent SILS+1 LPND for rectal cancer. Median patient age was 67.5 years (range 43–86). Operative procedures included low anterior resections (n=10), Hartmann procedures (n=4) abdominoperineal resections (n=4), and intersphincteric resection (n=1). Bilateral lymph node dissection was performed in 16 patients. The median operative time was 429.0 (range 276–700) min, and the median blood loss was 125.8 mL (range 10–310). There were no cases of open surgery or laparoscopic conversion. The median duration of postoperative hospital stay was 14.5 days (range 8–33). No Clavien–Dindo classification Grade III–IV complications occurred, and there was no perioperative mortality. The median number of harvested lymph nodes was 28.4 (range 19–59). One patient (5.6%) developed local recurrence in this series during a median follow-up of 15 month.

**Conclusions:** SILS+1 LPND is a safe, feasible, and useful approach for patients with advanced lower rectal cancer. Further studies are needed prove the advantages of SILS+1 LPND or to evaluate long-term oncological outcomes.

**P212**

**The Assessment of a Flexible Self-expandable Metallic Stent for Malignant Colorectal Obstruction as ‘Bridge to Surgery’ in Our Institute**

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**Introduction:** Endoscopic stenting with a self-expandable metallic stent (SEMS) is widely accepted procedure for malignant colorectal obstruction. We assessed the safety and efficacy of insertion of a SEMS followed by elective surgery as ‘Bridge to Surgery (BTS)’ in our institute.

**Methods:** This study was a retrospective study in our institute. The data was collected from medical charts from January 2014 to June 2017.

**Results:** A total of 408 consecutive patients underwent radical surgery for colorectal malignancy during this period. In this series, 16 patients (3.9%) were diagnosed malignant colorectal obstruction and intended to a BTS. The stent was successfully placed in 13 patients and all the patients were planned to undergo radical surgery. The failed 3 patients underwent stoma creation (2 patients) and Hartmann’s procedure. The technical success rate was 81% and the clinical success rate was 100%. The median time from SEMS to surgery was 11 days (2–31 days). Open and laparoscopic surgery was performed in 4 and 8 patients, respectively, except for one patient refused radical surgery because of a great age. The tumor could be resected in 12 patients (BTS patients) with primary anastomosis. However, diverting stoma creation was needed in 3 patients and decompression rectal tube was placed in 1 patient. The entire patient laparoscopically was no conversion to open surgery. There was no anastomotic leakage in BTS patients. The median duration of postoperative hospital stay was 10 days (8–54 days). The overall postoperative complication was 23% (3/13) including 2 bowel obstruction and 1 anastomotic stricture. The median follow-up period was 580 days. During the follow-up period, 3 patients were relapsed peritoneal dissemination, ovarian metastasis, and liver and pulmonary metastases, respectively. Former 2 patients were diagnosed Stage Iva at the time of primary surgery. One patient died from sudden death.

**Conclusions:** Our data suggested that routine use of SEMS insertion was safe and effective procedure for malignant colorectal obstruction as a BTS. Moreover, laparoscopic procedure was useful procedure in BTS patient. The short- and long-term surgical outcomes were also acceptable.

**P214**

**Plasma Levels of Serpin E1, a Tumorigenic Protein, are Persistently Elevated During the First Month After Minimally Invasive Colorectal Cancer Resection Which May Support Residual Tumor Growth and Metastasis**

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**Introduction:** Serpin E1, also known as Plasminogen activator inhibitor-1 (PAI-1) is an inhibitor of urokinase type plasminogen activator (uPA) and tissue-type plasminogen activators (tPA). PAI-1 plays a role in the regulation of angiogenesis, wound healing, and tumor cell invasion; over expression has been noted in breast, esophageal, and colorectal cancer (CRC). PAI-1 is also a potent regulator of endothelial cell (EC) proliferation and migration in vitro and of angiogenesis and tumor growth in vivo. The plasminogen/plasmin system plays a key role in cancer progression by mediating extracellular matrix degradation and tumor cell migration. Surgery’s impact on plasma PAI-1 levels is unknown. This study’s purpose was to measure plasma PAI-1 levels before and during the first month after minimally invasive colorectal resection (MICR) for CRC.

**Method:** CRC patients who had MICR who were enrolled in an IRB approved data/plasma bank for whom adequate plasma samples were available were eligible. Clinical and pathologic data were reviewed. Only patients for whom preoperative (PreOp), postoperative day (POD) 1, POD 3 and at least 1 late postop plasma sample (POD 7–34) were available were studied. Late samples were bundled into 7 day time blocks and considered as single time points. Plasma was isolated and stored at -80°C. PAI-1 levels were determined in duplicate via ELISA and the results reported as mean  $\pm$  SD. The Wilcoxon paired t-test was used for analysis (significance, p<0.05).

**Results:** 91 MICR CRC patients (colon 73%; rectal 27%; 45 male/46 female, mean age 67.3  $\pm$  13.6 years) were studied. The mean incision length was 8.0  $\pm$  3.9 cm and mean length of stay was 6.8  $\pm$  4.3 days. The final cancer stage breakdown follows; I (n=30), II (n=30), III (n=36) and IV (n=4). % When compared to mean Preop levels (18.5  $\pm$  8.3 ng/ml), significantly elevated mean levels (ng/ml) were noted on POD 1 (32.2  $\pm$  22.4; n=91, p<0.001), POD 3 (22.9  $\pm$  13.1, n=86, p=0.003), POD7-13 (30.2  $\pm$  17.5, n=65, p<0.001), and POD14-20 (28.5  $\pm$  16.4, n=26, p=0.001), POD 21–27 (28.2  $\pm$  15.8, n=19, p<0.001) and There was no significant difference noted between the POD 27–34 and PreOp results.

**Conclusion:** Plasma PAI-1 levels are significantly elevated vs. Preop levels for 1 month after MICR for CRC. The early increase after MICR may be related to the acute inflammatory response via macrophage activation. The elevation noted during weeks 2–4, however, may be related to PAI-1 associated VEGF induced angiogenesis occurring in the healing wounds; these plasma changes may also promote angiogenesis in residual tumor deposits. Further studies are warranted.

**P213**

**Diverticular Disease: Is it Rare in Africans?**

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**Introduction:** Diverticular disease is uncommon among Africans with traditional high fibre diet. A westernization of diet, increasing aged population and access to colonoscopy in a metropolitan population is likely to affect the prevalence pattern. This study aims to study the prevalence of diverticular disease in a Nigerian metropolis of Sub-Saharan Africa.

**Patients and Method:** This is a cohort study of all consecutive patients presenting for colonoscopy to a referral ambulatory care endoscopy facility in Port Harcourt metropolis, Niger Delta region of Nigeria from March 2014–September 2017. The variables studied included: demographics; clinical and endoscopic findings; treatment. Statistical analysis was done using SPSS (Chicago IL, USA) version 20.

**Results:** A total of 213 colonoscopies were performed with 29 (13.6%) cases of diverticular disease. The age range of patients was from 27 to 80 years (mean 62.76  $\pm$  12.77 yrs). There were 22 males and 7 females; a male to female ratio of 3:1. Bleeding per rectum was the most common presentation. Seven (24.1%) and 6 (20.7%) cases showed evidence of inflammation and bleeding respectively; > 5 diverticula were seen per patient in 18 cases. The left colon was affected in 23 (79.3%), especially the sigmoid colon in 15 (51.7%) cases. Colectomy was performed for 3 patients.

**Conclusion:** Diverticular disease is not uncommon. A male and left-sided colon predominance is the trend.

**P215**

**Rate of Polyp Detection in Cecum/Ascending Colon, With and Without Retroflexion: A Retrospective Analysis**

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**Objectives:** Retroflexion in the rectum at the end of a colonoscopy is a requirement for a complete endoscopic evaluation. Retroflexion helps to visualize and detect polyps which would be missed otherwise. Currently new endoscopes are available which can do retroflexion in the caecum.

**Aim:** Our study aims to compare the rate of polyp detection rate in Cecum and Ascending colon with and without retroflexion in cecum.

**Methods:** This is a single center, single operator, retrospective study. A total of two hundred patients were involved. A single center IRB waiver was obtained. Patients were divided into two groups based on the presence/absence of retroflexion in caecum during their colonoscopy. The data was obtained from 2017 records.

Group A (n=100) had colonoscopy without retroflexion in caecum

Group B (n=100) had colonoscopy with retroflexion in caecum

Inclusion criteria: Patients undergoing screening colonoscopy between the age of 40 and 85.

**Results:** Group A: Total of 100 patients were screened. A total of 95 polyps were detected in group A. Number of cecal polyps were 4 (4.2% of total polyp count). Number of ascending colon polyp were 18 (19% of total polyp). On analyzing the pathology 60% of the cecal polyps were tubular adenoma, 20% hyperplastic polyps 20% and 20% lymphoid aggregate. Number of ascending colon polyps were 18, of which 72% were tubular adenoma, 22% tubular adenoma and 6% tubulovillous adenoma

Group B: Total of 100 patients were screened. A total of 80 polyps were detected. Number of cecal polyps detected were 5 (6.2% of total polyp count). Number of ascending of ascending colon polyps were 11 (13%). On analyzing pathology, 80% cecal polyps were tubular adenoma and 20% were sessile serrated. Out of the ascending colon polyps 27% were tubular adenoma, 27% sessile serrated, 27% tubulovillous and 18% hyperplastic polyp.

**Side Events:** Two mass lesions were noted in both group A and B. There was incomplete colonoscopy in group A and B.

**Conclusion:** This retrospective analysis reveals a small increase in polyp detection in the cecum with retroflexion, especially in detecting sessile polyps which have more malignant potential. However, a large multicenter analysis will be required to validate the above observation.

**P216****Minimally Invasive Rectopexy for Rectal Prolapse has Improved Postoperative Morbidity Compared to Traditional Open Repairs, an Analysis Using the ACS-NSQIP Database**

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**Background:** While uncommon, rectal prolapse is a disabling condition affecting older females. In a small subset of patients, concomitant organ prolapses with or without incarceration can lead to significant morbidity. As the field of laparoscopy has evolved, minimally invasive surgical options for rectal prolapse have led to improved quality and reduced morbidity for patients suffering this debilitating disease.

**Methods:** The 2012–2015 ACS-NSQIP databases was queried for patients undergoing a traditional or minimally invasive rectopexy based on CPT codes (45400,45402,45540,45541 and 45550). Emergent cases and patients with preoperative infections or inflammatory states were excluded. The primary outcome of interest was a 30-day postoperative composite morbidity score. Statistical analysis incorporated multivariate analysis and binomial logistic regression with  $p < 0.05$  holding significance.

**Results:** These inclusion and exclusion criteria identified 2393 patients undergoing traditional (1113) and minimally invasive (1280) rectopexy for prolapse between 2012 and 2015. Patients undergoing traditional rectopexy were older ( $p < 0.001$ ), had a higher body mass index ( $p = 0.018$ ), more comorbid conditions (diabetes, COPD, hypertension) and less functional independence ( $p = 0.026$ ). Patients undergoing a traditional rectopexy had a higher composite morbidity incidence of 13.2% vs. 8% for minimally invasive rectopexy ( $p < 0.001$ ). Specifically, minimally invasive rectopexy patients had a 2.63% reduction in wound complications ( $p = 0.002$ ) and a shorter hospital stay (3.3 days vs. 4.3 days,  $p < 0.001$ ) compared to a traditional rectopexy. Readmission rates were also 2.6% lower in the minimally invasive group ( $p = 0.015$ ). After controlling for the differences in the cohorts, a minimally invasive approach was a significant protective factor against the incidence of 30-day postoperative morbidity (OR 0.476,  $p < 0.001$ ).

**Conclusion:** A minimally invasive rectopexy has improved 30-day postoperative morbidity compared to a traditional rectopexy and should be strongly considered for the treatment of rectal prolapse.

**P218****Selective Colorectal Cancer Imaging by Use of Indocyanine Green Versus Next-Generation Cancer-Specific Targeting Agents**

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Current clinical advances in operative near-infrared visualisation of cells, tissues and structures are predicated on the use of commercial available near-infrared cameras to excite and visualise emission energy from non-selective, approved compounds (predominantly indocyanine green (ICG)). It is expected that new generation compounds wholly selective for specific cellular components are now needed for further advance and a variety of molecular targets have been proposed and are being developed primarily for oncological imaging purposes. Recent publications have however suggested ICG itself is retained within malignant tissue differently to its uptake and clearance from surrounding non-malignant tissue which is important for two reasons. Firstly, it exploits and makes visual the increased vascular permeability and disordered clearance associated with carcinogenesis which is a common endpoint of a variety of mediators including but not limited to VEGF. This raises the useful option of targeting downstream effects of cancer compounds on a metabolic basis as opposed to tagging individual cell or antigen components. This means that a single agent could be used to target a variety of cancers rather than needing a specific one for each specific sub-type as well as obviating the issue of cancer cells heterogeneity even in a single cancer deposit. Second, it is very likely that some or all of the “localisation” effect of proposed selective compounds may well be due to a similar phenomenon rather than cell-specific binding and may make distinction from other areas of similar metabolic behaviour (ie inflammatory regions) difficult. The crucial step-advance for such agent development so may well relate to timing of compound delivery and “visualisation window” at the region of interest rather than highly selective onco-cellular-targeting. To illustrate this in more detail, we have been examining the tissue-specific effects and actions of near-infrared excitation in patients ( $n=7$ ) with localised malignant colorectal primaries receiving an aliquot of ICG before such examination at the time of resection. ICG can be selectively apparent in the colorectal primary 15 minutes after its systemic administration likely due to altered vascular dynamics. Additional dose-related work has shown that early administration (40–180 minutes before examination) does not give useful information related to tumour fluorescence. Interestingly none of these patients had fluorescence seen within their regional lymphatics but none also had malignant lymph nodes associated with their large primaries on pathological examination.

**P217****Optimal Interval from Placement of a Self-expandable Metallic Stent to Surgery in Patients with Malignant Large Bowel Obstruction**

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**Objectives:** The short-term safety and efficacy of a self-expandable metallic stent (SEMS) placement followed by elective surgery, “bridge to surgery (BTS)”, for malignant large-bowel obstruction (MLBO) have been well described. The aim of this study was to investigate the risk factors for postoperative complications and optimal interval between SEMS placement and surgery in patients with MLBO.

**Methods:** Retrospective examination of patient records revealed that the BTS strategy was attempted in 49 patients with MLBO from January 2013 to March 2017 in our institution. Two of these patients were excluded because they had undergone emergency surgery for SEMS migration; thus, 47 patients with MLBO who had undergone SEMS placement followed by elective surgery were included. Of these patients, eight had developed postoperative complications (Clavien-Dindo grading  $\geq II$ ) (postoperative complication: POC group) whereas 39 patients had no such complications (No POC group).

**Results:** Univariate analyses showed that the factors of ASA score, number of lymph nodes resected, interval between SEMS and surgery, and preoperative albumin concentration were associated with postoperative complications. Multivariate analysis identified only the interval between SEMS and surgery as an independent risk factor. Furthermore, a cut-off value of 15 days for interval between SEMS and surgery was identified by ROC curve analysis.

**Conclusions:** An interval of  $\geq 15$  days from SEMS placement to surgery is an independent predictive factor for postoperative complications in patients undergoing elective surgery in a BTS setting. Thus, an interval of over 15 days is recommended for minimizing postoperative complications.

**P219**

**Pelvic Peritoneum Closure with Improved Techniques as a Standard Surgical Procedure in Laparoscopic Abdominoperineal Resection: A Retrospective Study of 82 Cases**

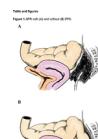
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**Introduction:** Pelvic peritoneum closure (PPC) is a standard operative procedure in conventional open abdominoperineal resection (APR) to prevent postoperative complications. However, this procedure is not usually performed in laparoscopic APR for its technique difficulty, which may lead to increased rates of complications (Fig. 1). Here, we compared the feasibility and peri-operative outcomes of the laparoscopic APR with and without pelvic peritoneum closure (PPC) for lower rectal cancer.

**Methods and Procedures:** From September 2015 to May 2017, clinical data of 82 patients with lower rectal cancer undergoing APR in our medical center were studied retrospectively. Among all these eligible patients, 38 of them were in the PPC group (received laparoscopic APR with PPC via barbed sutures and Hemo-lock clips, Fig. 2) and the other 44 cases were in the non-PPC group (received laparoscopic APR without PPC). Short-term outcomes were contrasted between these two groups.

**Results:** None of cases were converted to open surgery. There was no significant difference in PPC and non-PPC group for operation time ( $148.1 \pm 26.2$  min vs  $141.5 \pm 21.0$  min,  $P=0.213$ ), the operative time for pelvic peritoneum closure in PPC group was  $7.9 \pm 2.9$  min, and intra-operative blood loss ( $105.5 \pm 41.6$  ml vs  $112.9 \pm 46.2$  ml,  $P=0.471$ ) between these two groups. In terms of postoperative complications, incidence of perineal hernia, perineal wound infection and postoperative bowel obstruction were significantly reduced in PPC group compared with the non-PPC group (Table 1). Besides, no significant difference was found in terms of the number of lymph nodes harvested ( $14.4 \pm 2.4$  vs  $13.9 \pm 2.3$ ,  $P=0.272$ ), circumferential resection margin (CRM) positivity (2.6% vs 4.5%,  $P=0.645$ ) and the time of hospital stay ( $(15.4 \pm 3.0)$  d vs  $(16.2 \pm 4.1)$  d,  $P=0.333$ ).

**Conclusions:** PPC should be served as a standard procedure in laparoscopic APR for lower rectal cancer, which didn't significantly increase the length of surgery or intra-operative blood loss, and might result in a significantly reduced incidence of postoperative complications including perineal hernia, perineal wound infection and intestinal obstruction. This surgical procedure could be easily managed with barbed sutures and Hemo-lock clips by experienced hands.



**Table 1** Postoperative findings

	Perineal hernia [n (%)]	Perineal wound infection [n (%)]	Postoperative bowel obstruction [n (%)]
PPC group (n=38)	0	2 (5.3%)	1 (2.6%)
non-PPC group (n=44)	4 (9.1%)	9 (20.5%)	8 (18.1%)
P value	-	0.044	0.025

**P220**

**Effects of Obesity on Laparoscopic Colon Cancer Surgery Performed by Various Operative Methods**

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**Introduction:** There are reports of increased operative duration, blood loss and postoperative morbidity, caused by difficulties in obtaining good visualization and in controlling bleeding when laparoscopic resection is performed in obese patients with colon cancer.

**Purpose:** The aim of this study was to investigate the impact of obesity on perioperative outcomes after laparoscopic colorectal resection performed by various operative methods in our department.

**Patients and Methods:** We conducted a retrospective analysis of 435 patients with colorectal cancer who underwent laparoscopic surgery between January 2011 to December 2015. Right colectomy was performed in 84 patients, sigmoidectomy in 73 patients, and low anterior resection in 50 patients. The surgical outcomes were compared between non-obese (body mass index [BMI]<25 kg/m<sup>2</sup>) and obese (BMI ≥25 kg/m<sup>2</sup>) patients.

**Results:** Right colectomy cases: The amount of blood loss was significantly increased in the obese group compared with the non-obese group, but operation time did not differ significantly between the groups. There were no significant differences between the two groups in the rate of postoperative complications and duration of post-operative hospitalization. Sigmoidectomy cases: There were no significant differences between the two groups in operation time and amount of blood loss. Even though the preoperative ASA score and the rate of postoperative complications were higher in the obese group, the mean postoperative hospital stay did not differ significantly between the two groups. Low anterior resection cases: There were no significant differences between the obese group and the non-obese groups in operation time, amount of blood loss, rate of postoperative complications, and duration of post-operative hospitalization.

**Discussion:** Although there are some reports of increased operative times in obese patients, the operative procedure was not extended in any of the present study patients. The amount of blood loss was significantly increased in the obese group compared with the non-obese group when right colectomy was performed. Among the patients undergoing sigmoidectomy, the postoperative rate of complications was higher in the obese group; however, the preoperative ASA status was also higher in the obese group than non-obese group, indicating that factors other than obesity may be involved.

**Conclusion:** We concluded that laparoscopic colorectal resection appeared to be safe and feasible in both obese patients and non-obese patients. However, BMI may not accurately reflect the amount of visceral fat present.

**P221**

**Endoscopic Mucosal Resection for Early Colorectal Cancer Followed by Surgery or Surveillance**

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**Introduction:** The aim of this study was investigate the safety of Endoscopic mucosal resection (EMR) for early colorectal cancer comparing with outcomes of radical resection after EMR. EMR has been applied for early colorectal cancer with the strict indications. The radical resection after EMR is often required if the known risk factors including poor differentiation, lymphovascular invasion, resection margin involvement, and deep invasion depth.

**Methods:** Between June 2006 and June 2017, 8490 EMRs were performed for 5250 patients with colorectal polyps at Kyung Hee University Hospital at Gangdong. After the patients with benign polyps were excluded among them, medical records and pathologic reports were reviewed. Colonoscopic finding and pathologic variables were analyzed and compared.

**Results:** A total of 103 patients underwent EMR for early colorectal cancer. 40 patients had risk factors and were recommended for surgery after EMR, whereas 28 patients among them underwent surgery. 12 patients refused surgery due to old age, poor condition, and avoidance of stoma formation. In contrast, one patient without risk factors underwent surgery because he wanted. The gross types of polyp and tumor size were not different between the two groups. However, rectal polyps than colon polyps were found frequently in the observation group than in the surgery group (25.7% vs. 10.3%,  $P=0.047$ ). In addition, there were more favorable differentiation of the tumor and shallow depth of invasion in the observation group. In contrast, lymphovascular invasion and resection margin involvement were more found in the surgery group (34.5% vs. 1.4%,  $P<0.001$  and 20.7% vs. 4.1%,  $P<0.001$ , respectively). During 48.4 months of follow up period, no recurrence was noted in the both groups.

**Conclusion:** EMR for early colorectal cancer appeared to be safe and feasible. Pathologic reports as well as colonoscopic findings are important to decide performing surgery or observation. Even some patients with risk factors could benefit from EMR alone, but close surveillance is mandatory to confirm long-term oncologic results.

**P223****A Prospective Study Beyond the RCT Between Our Modified Ripstein Method and Modified Wells Method for Complete Rectal Prolapse**

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**Background:** For the complete rectal prolapse (basically longer than 3 cm), we thought sling rectopexy was most reasonable to hang up and fix the rectum, which drooped down and prolapsed due to the relaxation of supporting tissue. We considered Ripstein method had enough fixed power of rectum to sacrum. However, complications of rectal stenosis, constipation, mesh infection and mesh penetration were reported. Therefore, we modified Ripstein method to conquer such complications.

**Aim:** A prospective study beyond the randomized control trial (RCT) between our modified (m)-Ripstein method and m-Wells methods was performed to evaluate feasibility and efficacy of our m-Ripstein method.

**Materials and Methods:** From December 2007 to August 2017, 79 rectopexies for complete rectal prolapse were assigned to RCT. To prevent the complication of original Ripstein method, we devised to set the horizontal length of T style BARSTM mesh up to almost 1.2 fold of rectal circumference for loose fit, and prolong the vertical length of the mesh to almost 2 fold of the original for straight fit. Mesh was fixed to rectum with Endo Universal StaplerTM and to sacrum with AbsorbateckTM. When each 25 cases were registered to RCT, second recurrence of m-Wells method occurred. We stopped m-Wells method until the cause would be clear and continued m-Ripstein method to 51 cases. After the cause of recurrence by m-Wells method was revealed, it was resumed to 28 cases.

**Results:** Patient's characteristics (average value) in m-Ripstein 51 cases vs. m-Wells 28 cases were not significantly different; age 79.1 vs. 78.9-year-old, female 86.3 vs. 85.7%, BMI 21.7 vs. 21.1, length of prolapse 4.7 vs. 4.3 cm, comorbidities number per patient 4.4 vs. 4.8 and ASA-PS 2.6 vs. 2.6. In clinical outcomes (average value), operative time was 164 vs. 143 minutes ( $P=0.0318$ ) and the others; blood loss 33 vs. 11 grams, intraoperative accident 18 vs. 7%, postoperative complication 9.8 vs. 3.6%, mesh infection/morbidity 0 vs. 0%, meal start 1.9 vs. 1.9 POD, postoperative constipation 14 vs. 14%, postoperative fecal incontinence 7.8 vs. 0%, postoperative urinary incontinence 5.9 vs. 0%, postoperative stay 9.4 vs. 9.0 days, follow up interval 39 vs. 31 months and recurrence rate 0 vs. 7.1% were not significantly different.

**Conclusion:** Primary evaluation item of recurrence rate were not significantly different. Secondary evaluation items of postoperative constipation, fecal incontinence and urinary incontinence were not significantly different between two groups. Our m-Ripstein method was feasible and showed good outcome especially in recurrence.

**P224****Metastatic 253 Lymph Nodes were Associated with Metastatic 251 and 252 Lymph Nodes and the Numbers of Harvested 253 Lymph Nodes in Rectal Cancer**

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**Background:** Inferior mesenteric artery lymph nodes (253 lymph nodes) metastasis occurs in approximately 0.3 to 13.9% according to different T stage in rectal cancer, which is an important prognostic factor after curative resection for rectal cancer. The aim of this study was to evaluate the independent risk factors of 253 lymph nodes metastasis in rectal cancer.

**Methods:** A total of 200 patients who underwent curative resection of the rectal cancer between January 2014 and August 2017 were selected. The patients were classified into 2 groups: 253-positive group (n=18) and the 253-negative group (n=182). The status of 253 lymph nodes were analyzed using univariate and multivariate analysis.

**Results:** The rate of 253 lymph nodes metastasis in our study was 9%. Univariate analysis revealed that the risk factors of 253 lymph nodes metastasis were as follows: Mucinous adenocarcinoma and poorly differentiated ( $p=0.025$ ); depth of tumor invasion ( $p=0.013$ ); 251 lymph nodes positive ( $p<0.001$ ); 252 lymph nodes positive ( $p<0.001$ ); the number of 253 lymph nodes harvested ( $p=0.003$ ). After multivariate regression analysis, only 251 lymph nodes positive (OR, 7.627; 95%CI, 1.664–34.976;  $p=0.009$ ), 252 lymph nodes positive (OR, 5.273; 95%CI, 1.457–19.081;  $p=0.011$ ); the numbers of 253 lymph nodes harvested (OR, 1.255; 95%CI, 1.082–1.454;  $p=0.003$ ) were identified as independent risk factors of 253 lymph nodes metastasis in rectal cancer.

**Conclusions:** The status of 251 and 252 lymph nodes metastasis, and the numbers of 253 lymph nodes harvested were identified as independent risk factors of 253 lymph node metastasis in rectal cancer.

**P225****Surgical Procedure for Laparoscopic Transanal Total Mesorectal Excision and Bilateral Lateral Lymph Node Dissection of Lower Rectal Carcinoma**

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**Introduction:** The results of the Japan Clinical Oncology Group (JCOG) 0212 Study suggested that total mesorectal excision (TME) and lateral lymph node dissection (LLND) could become the standard treatment for lower rectal carcinoma. However, LLND must also be performed laparoscopically if surgery for lower rectal carcinoma is to be carried out as a completely laparoscopic procedure. Transanal TME (TaTME) is expected to provide better results than the conventional TME, both oncologically and in terms of pelvic function, and its use has recently been spreading in Japan. We started performing laparoscopic TaTME+LLND in our department in July 2016 and here report the short-term outcomes.

**Subjects and Methods:** We used laparoscopic TaTME+LLND to treat 5 men and 3 women with cT3 or deeper rectal carcinoma in whom the inferior margin of the tumor was on the anal side of the peritoneal reflection. This was a retrospective study of short-term postoperative outcomes.

**Surgical Procedure:** Laparoscopic surgery was started simultaneously by two teams, one working transabdominally and the other working transanally. The transabdominal team performed the standard proximal LLND and mobilization of the splenic flexure via five ports. They then dissected the bilateral lateral lymph nodes, mainly in the obturator (#283) and internal iliac (#263) groups. During this time, the transanal team performed laparoscopic TaTME. Finally, both dissection layers were connected and the cancer was excised.

**Results:** Six patients had clinical stage II and two had clinical stage III lower rectal carcinoma. All the patients underwent preoperative chemotherapy with S-1+L-OHP. Five underwent a sphincter-preserving surgery, and three underwent rectal amputation. The mean operating time was 335 minutes (range, 267–382 minutes), and the mean amount of hemorrhage was 136 g (20–440 g). The mean number of lymph nodes dissected was 24, and R0 resection was performed in all the cases. The mean length of hospital stay was 14 days, and a postoperative complication of Clavien-Dindo grade III or higher occurred in one patient (anastomotic failure).

**Conclusions:** Laparoscopic TaTME+LLND performed by two teams simultaneously is an extremely useful procedure that not only reduces operating time, but also is less invasive than laparoscopic surgery. It may also be effective for improving curative nature, nerve preservation, and anal function.

**P226****The Advantages of Endostapler in Securing the Base of Appendix in Laparoscopic Appendectomy**

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**Objective:** In laparoscopic appendectomy, the base of the appendix is usually secured by applying a roders knot. The aim of this study was to compare the advantages of using staplers and hem-o-locks for securing the base of the appendix.

**Method:** The study included 82 patients between age of 12 to 75 years with acute appendicitis randomly divided into two groups. In the first group, the base of the appendix was secured using roders knot. In the second group, mesoappendix was not dissected and was included in the endostapler jaws. The primary outcome was overall morbidity. Secondary outcomes were total duration of surgery, total length of stay and ease in difficult cases.



Type	Total cases	Conversion to Open	Stump blowout	Mean Operative time (minutes)	Total length of stay(days)	Need of Hemicolectomy / Secondary procedure
Roeders knot	42	0	0	30	1	2 (Quadricolectomy)
Endostapler	40	0	0	18	1	0

**Result:** No morbidity was recorded in any group. The time of the operative procedure was significantly longer in the cases with roders knot than in the Stapler group ( $P<0.0001$ ) as mesoappendix was not dissected in the later. 2 cases with unhealthy base were progressed to laparoscopic quadricolectomy. Apart from the ease of applying a stapler, cases of second group with gangrenous base were easily tackled using endostapler, avoiding the need of a hemicolectomy.

**Conclusion:** All forms of closure of the appendix base are acceptable, but endostapler technique apart from providing a secure base, reduces operative time and is an essential tool in cases of gangrenous base.

**P227****Factors Influencing the Quality of Lymph Node Dissection in Colorectal Cancer**

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**Introduction:** Accurate staging is essential to estimate the prognosis of patients with colorectal cancer (CRC) and lymph node evaluation is key to determine it. In non-metastatic CRC, the number of harvested lymph nodes is the strongest prognostic factor for outcome and survival. Additionally, it is thought that a higher lymph node yield may be representative of a higher quality of surgical care. Due to the importance of the association between lymph node evaluation and outcome in CRC, it is necessary to evaluate factors which may affect lymph node harvest.

**Methods and Procedures:** In order to determine the influence of different patient-related factors, of tumor characteristics and operative parameters impacting the quality of oncological lymph node dissection and harvesting intraoperatively, a prospective collection and retrospective analysis of all cases of colorectal cancer patients operated on in the Digestive Surgery Department at Barretos Cancer Hospital (IRCAD LATIN AMERICA, Sao Paulo, Brazil) was performed between July 2015 and February 2017.

**Results:** Over the abovementioned period, 640 radical surgeries for colorectal cancer were performed, 294 (46%) of which were performed in female patients and 346 (54%) in male patients. Lesions were located as follows: right colon (99 cases, 15.5%), transverse colon (19 cases, 3%), left colon (30 cases, 4.8%), sigmoid colon (163 cases, 25.6%) and rectum (325 cases, 51.1%). Seventy percent of patient cases were performed laparoscopically with a conversion rate of 3.6%. The mean number of resected nodes according to tumor location was the following: 19 for the right colon, 20 for the transverse colon, 24 for the left colon, 20 for the sigmoid colon and rectum. Preoperative radiotherapy ( $p<0.001$ ) has a negative impact on the number of dissected nodes. Other patient-related factors such as age, gender and BMI have no influence on this. There was no relationship between tumor-specific factors and the quality of node dissection. Finally, operative time ( $p=0.021$ ) is the only technique-specific factor affecting the radicality of surgical resection in patients with colorectal cancer, probably as a reflection of more surgically complex cases.

**Conclusion:** Preoperative radiotherapy and operative time are factors which are often interrelated, have a significant impact on the number of harvested nodes. The relationship of these findings with the outcome and survival of CRC patients is yet to be determined.

**P228****Outcome of Laparoscopic Reversal of Hartmann's Procedure**

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**Introduction:** Hartmann's procedure is commonly done in treating complicated diverticulitis, neglected rectal trauma with sepsis and sometimes malignancy. The traditional techniques to restore the intestinal continuity after Hartmann's procedure were for many years the standard of care in these operations, but in fact they carry many morbidity and even mortality and failure. Laparoscopic techniques is not only carry the advantage of minimal invasive surgery, but also of better visualization and magnification, the aim is evaluating the outcome of using the laparoscope in reversal of Hartmann's procedure as regard feasibility and safety.

**Patients and Method:** Forty patients were subjected to laparoscopic reversal of Hartmann's procedure in Tanta University Hospital, their ages ranged between 25 to 70 years, the time elapsed after the original operation ranged from 6 months to 5 years, excluding advanced malignancy. Conversion occurred in 6 cases due to extensive adhesions and bleeding.

**Results:** No mortality, or major morbidity in our study and only single leak treated by covering ileostomy. Conclusion: Laparoscopic Hartmann's procedure is feasible, promising technique with minimal morbidity.

**P229****Laparoscope in the Colorectal Emergent Surgery-Analysis of Consecutive 57 Patients Single Center Experience**

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**Background:** Minimal invasive surgery has been well established in the elective colorectal surgery and it has been proven better clinical outcome compared with open surgery. In the emergent setting, laparoscope is used mostly in the colectomy, appendectomy but laparoscopic emergent colorectal surgery is limited for its complexity and difficulty. The aim of this study was to evaluate the feasibility of laparoscopic emergent colorectal surgery.

**Methods:** This study is prospective collected, observational single center study of patients undergoing laparoscopic emergent colorectal surgery from 2011 to 2016. The patient demographics, surgery indication and detail, complication, clinical outcome and hospital stay were collected and analyzed.

**Results:** There are total 130 emergent colorectal operations and 57 patients were managed with minimal invasive method. Among these laparoscopic emergent surgery, there are 33 male patients and 24 female patients. Mean age of the patients was 63.8 years (Range 31–89 years). The main indication for operation: perforation 49.1% (28/57), leakage after elective colorectal surgery 42.1% (24/57), obstruction 3.5% (2/57), ischemia colitis 3.5% (2/57), bleeding 1.8% (1/57). There are 19 cases in ASA 2, 32 cases in ASA 3, 6 cases in ASA 4. The qSOFA score for sepsis: 23 cases was 0, 28 cases was 1, 5 cases was 2, 1 case was 3.

There are 27 cases undergoing laparoscopic lavage with diverting stomy, 15 cases were Hartmann procedure, 5 cases were anterior resection, 4 cases were right hemicolectomy, 3 cases were perforation repair, 3 cases were redo anastomosis. There are 6 cases conversion to open method including 3 cases were due to bowel adhesion, 2 cases were due to bowel distension, 1 case was due to severe shock status. Mean operative time is 180.3 minutes.

The overall mortality rate was 5.2% and major complication rate (Clavien-Dindo grade above 2) was 24.5%. Re-operation rate was 15.7%. The mean hospital stay was 17.1 days.

**Conclusions:** This study presents evidence of an initially clinical outcome in emergent laparoscopic colorectal surgery. In the absence of large case series, the benefits of a laparoscopic approach should befall to at least a minority of these patients.

**P230****In Vivo Real-Time Assessment of Anastomotic Blood Supply of Colorectal Surgery Using Confocal Laser Endomicroscopy in an Anastomotic Model**

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**Introduction:** Anastomotic leakage (AL) is one of the serious postoperative complications in the colorectal surgery. One of the significant factors leading to leakage is the poor bowel perfusion. Confocal laser endomicroscopy (CLE) can provide real-time observation of the cell structure and tissue morphology. In our study, we aim to assess the situation of anastomotic perfusion using CLE.

**Method:** The experimental rabbits were separated into two groups: group A (good anastomotic perfusion, n=6), group B (poor anastomotic perfusion, n=6). The partial colectomy and anastomosis was performed for group A and B. Then detection for anastomotic perfusion using CLE was carried out after the surgery. During the continuous scanning, we counted the number of blood cells that cross over the certain point of anastomotic stoma in the same period.

**Results:** Assistant with fluorescein sodium, the blood vessels are highlighted. We can see significant difference of imaging effect between group A and group B. The average number of blood cells are 34.7/min of group A and 6.0/min of group B ( $p<0.001$ ), which has significant difference.

**Conclusion:** CLE can allow real-time observation of the blood flow of anastomotic stoma *in vivo*. Therefore, it is feasible to assess the anastomotic perfusion using CLE in colorectal surgery.



**P231****Intra-operative Colonoscopy During Colorectal Surgery Does Not Increase Postoperative Complications: An Assessment from the ACS-NSQIP Procedure-Targeted Cohort**

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Outcomes	Colonoscopy (+) (N=651)	Colonoscopy (-) (N=4928)	P value
Operative time, minutes	239 +/- 111	219 +/- 101	<0.001
Superficial SSI	25 (3.8)	205 (4.2)	0.83
Organ space SSI	29 (4.4)	216 (4.3)	0.91
Pneumonia	6 (0.9)	63 (1.3)	0.57
Urinary tract infection	17 (2.6)	123 (2.5)	0.79
Pulmonary embolism	2 (0.3)	24 (0.5)	0.19
Unplanned intubation	6 (0.9)	59 (1.2)	0.59
Bleeding requiring transfusion	41 (6.3)	343 (6.9)	0.56
Ventilator dependency	7 (1.0)	44 (0.9)	0.65
Sepsis	17 (2.6)	117 (2.4)	0.69
Progressive renal failure	4 (0.6)	29 (0.6)	0.79
Acute renal failure	4 (0.6)	22 (0.5)	0.53
Ileus	65 (10.0)	547 (11.1)	0.42
Anastomotic leak	30 (4.6)	196 (3.9)	0.45
Length of hospital stay <sup>a</sup> , days	5.4 +/- 4.8	5.9 +/- 5.4	0.005

**Background:** Intraoperative colonoscopy (IOC) is an adjunct in colorectal surgery (CRS) especially in patients with malignancies in order to detect location of the primary or synchronous lesions as well as assessing anastomotic integrity. However, effects of intraoperative colonoscopy on short term outcomes during CRS is a concern. This study aims to evaluate safety and feasibility and post-operative outcomes of intraoperative colonoscopy in left-sided colectomy patients for colorectal cancer patients by using the nationwide database.

**Patients and Methods:** Patients undergoing elective left-sided colectomy with low pelvic anastomosis without any proximal diversion for colorectal cancer were reviewed from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) procedure-targeted database (2013–2015) according to their primary procedure Current Procedural Terminology (CPT) code. Subsequently, patients who underwent intraoperative colonoscopy were identified from concurrent CPT codes and divided into two groups based on the simultaneous intraoperative colonoscopy. Demographics, comorbidities, 30-day postoperative complications were evaluated and compared between the groups. Multivariate logistic regression was conducted adjusting for significant factors between the groups.

**Results:** A total of 5579 patients were identified and IOC was performed for 651 (11.7%) patients. The groups were comparable in terms of demographics, characteristics and operative factors except for surgical approach (laparoscopic surgery: 85.8% vs 75.2%, p<0.001), mechanical bowel preparation (71.7% vs 75.8%, p=0.03), oral antibiotic use with bowel preparation (32.8% vs. 39.5%, p=0.002) and preoperative chemotherapy within 90 days (15.6% vs. 18.9%, p=0.04). Comparison of individual postoperative complications and length of stay were summarized in the table. After multivariate risk-adjustment, the results did not change and groups remain comparable. **Conclusion:** Use of intraoperative colonoscopy does not adversely affect short term outcomes after colorectal resections. Surgeons should utilize intraoperative colonoscopy liberally for left sided colorectal resections.

**Table:** Comparison of postoperative outcomes between patients who had colonoscopy or not.

**P233****Laparoscopic Ileostomy via Reduced Port Surgery for the Patients with Advanced Colorectal Cancer Before Chemotherapy**

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**Objective:** Laparoscopic ileostomy commonly performed for the patients with colorectal obstruction due to cancer, peritonitis with perforation of colon or the other reason. Reduced port surgery is a novel technique that may be performed when considering minimally invasive surgery and desiring a cosmetic benefit. The aim of this study was to evaluate safety and feasibility of reduced port laparoscopic ileostomy for the patients with advanced colorectal cancer before chemotherapy.

**Methods:** Between July 2012 and August 2017, 39 patients who underwent reduced port laparoscopic ileostomy were included (15 male and 14 female, age: 66 years old). The outcomes were evaluated in terms of operation time, intraoperative blood loss and perioperative complications.

**Surgical Procedures:** The patients were placed in the supine position and the operator stood left side. An access device with the wound-protector (EZ access, HAKKO, Nagano, Japan) was inserted on the future ileostomy site in the right lower abdomen, inserting two of 5-mm trocars, maintaining pneumoperitoneum at 10 mmHg with carbon dioxide. A 5-mm trocar was inserted in the left lower abdomen. A 5-mm flexible laparoscope was inserted from access device port. After exploring abdominal cavity, ileum end was identified. Then the marking using dye was put on the ileum of 25 cm proximal from the ileum end. The ileum marked by dye was grasped, and extracted through the access device. Then a Brooke ileostomy was created.

**Results:** Reduced port laparoscopic ileostomy was performed for 39 patients with colorectal obstruction due to cancer before chemotherapy. The mean operative time was 107 minutes, the mean blood loss was 5.0 ml. Three patient received one additional port. There were no intraoperative complications. Five patients (12.8%) experienced postoperative complications (two of deep surgical site infection, one of pneumonia, one of outlet obstruction and one of renal dysfunction). There were no other intraoperative or postoperative complications.

**Conclusion:** Reduced port laparoscopic ileostomy is a safe and feasible procedure for the patients with advanced colorectal cancer before chemotherapy.

**P234****Impact of Past History of Abdominal Operation in Laparoscopic Colorectal Surgery**

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**Background/Aim:** Laparoscopic colorectal surgery has been widely spread even if patients have past history of abdominal operation. However, widespread adhesion caused by past abdominal operation may result in increase of postoperative complications. We evaluated the impact of past abdominal operation in laparoscopic colorectal resection (LCR).

**Methods:** We performed elective LCR on 354 patients for primary colorectal cancers between June 2008 and June 2015. Seventy-two patients were excluded in this study following reasons: 44 patients underwent multiple organ resection, and colorectal cancer was diagnosed with Stage IV in 28 patients. Accordingly, 282 patients were eligible for comparative analysis, with 70 in group PO (post operation) and 212 in group C (control). In group PO, past operative procedures were as follows: appendectomy (57%), digestive tract (7%), hepato-biliary-pancreatic (7%), gynecologic (17%), urologic surgery (10%), and others (2%).

**Results:** There were no significant differences between two groups in ASA (grade≤2: 81 vs. 88%, p=0.14), BMI (23.4 vs. 23.1 kg/m<sup>2</sup>, p=0.53), tumor location (right colon/left colon/rectum 47/19/34 vs. 33/30/37%, p=0.48), or Stage (≤1: 40 vs. 36%, p=0.53) except for age (Group PO vs. C: 70.4 vs. 66.7 y.o., p<0.01) and the ratio of male patients (49 vs. 67%, p<0.01). Peri- and post-operative factors were almost equivalent between two groups including operative procedure (right side colon/left colon/rectal resection 47/14/39 vs. 35/22/43%, p=0.15), the number of dissected lymph nodes (16.6 vs. 16.6, p=0.99), surgical time (173.9 vs. 183.7 min, p=0.18), estimated blood loss (32.4 vs. 26.6 gram, p=0.67), conversion to open surgery (1.4 vs. 1.9%, p=0.80), re-operation (4.3 vs. 1.4%, p=0.15), length of postoperative stay (14.6 vs. 13.0 days, p=0.41), and re-admission (2.9 vs. 1.4%, p=0.60). However, the incidence of postoperative complications (Clavien-Dindo classification grade≥2) was significantly higher in group PO than in group C (24 vs. 11%, p<0.01), especially in surgical-site infections (9 vs. 3%, p=0.07). To evaluate the risk factors of postoperative complications, logistic regression analysis was performed. Univariate analysis showed four variables associated with the risk of postoperative complications: male (p=0.03), past operative history of digestive organs including appendectomy, digestive tract, and hepato-biliary-pancreatic surgery (p<0.001), conversion to open surgery (p=0.09), and estimated blood loss (p=0.03). Multivariate analysis showed that only past operative history of digestive organs was an independent factor associated with postoperative complications.

**Conclusions:** The incidence rate of postoperative complications in LCR was high in patients who had past history of abdominal operation, especially in digestive organs.

**P235**

### Laparoscopic Transanal Abdominal Transanal Resection with Descending Coloanal Anastomosis (TATA) for Rectal Cancer. Our Own Experience

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**Introduction:** The treatment of rectal cancer requires highly skilled practice by the entire multidisciplinary team. Important aims of treatment are: to reduce the risk of residual disease in the pelvis, with lower morbidity and to preserve good sphincter function. The TATA procedure is Transanal Transabdominal radical proctosigmoidectomy with coloanal anastomosis. This technique was first developed in 1984 by Dr. Gerald Marks to avoid a permanent colostomy for low-lying rectal cancer. This study reports the long-term results of TATA procedure for low rectal cancer.

**Methods and Procedures:** A prospective study was on 38 patients with low rectal cancer between April 2007 and July 2017 in a tertiary referral university-affiliated center specializing in laparoscopic surgery. All resections were carried out by a team of dedicated colorectal surgery and standard protocol was used for all pre-and-post-operative care. All the patients underwent total mesorectal excision.

**Results:** 38 consecutive patients (19 male, 19 female, mean age 57) underwent TATA procedure, 30 of them (78.9%) after neoadjuvant radiochemotherapy. The mean operation time was 201 min (range 90–360) and the mean estimated blood loss was 73 ml (range 10–500). The overall incidence of morbidity was 15.8% (6/38) and the mean hospital stay was 4.4 days. The mean follow-up period was 36.8 (range, 1–123) months with a recurrence rate of 7.9% (3/38), overall estimated 5-year survival 78.2% and the disease-free survival rate 89.5%.

**Conclusion:** Laparoscopic total mesorectal excision with TATA procedure is safe with excellent local recurrence and disease-free survival rate.

**P237**

### Study on the Suitable Height of Staple of Laparoscopic Surgery Use Liner Stapler for Better Double Stapling Technique for Left-Sided Colorectal Cancer

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**Background:** The double stapling technique (DST) has widely spread colorectal anastomosis especially for anastomosis after low anterior resection. As for the colorectal cancer treatment, Heald reported total mesorectal excision (TME) in 1982, and has been accepted as the standard technique for rectal resection due to the decreased local recurrence rate and improved functional results. With advent of DST, there is a background that it has become possible to preserve anus, even in the case with the lesion at lower rectum. Laparoscopic surgery for colon cancer was introduced in the 1990s, and has had promising results including long-term outcomes. According to the spread of laparoscopic surgery, laparoscopic surgery had been applied to the rectal resection, with technical difficulty. One of the reasons for the difficulty is that the high rate of anastomotic leakage, a critical adverse effect of low anterior resection (LAR). Thus, risk factors for anastomotic leakage were widely discussed, including technical factors such as pre-compression and number or firing. The decisive difference in conventional LAR and laparoscopic LAR in DST, is the stapler used for transection of the rectum. The laparoscopic staplers which are currently available are thought to be not ideal, and there is little evidence of specific specifications of stapler for laparoscopic surgery.

**Materials and Methods:** All method described in this study was approved by the institutional ethical review committee. We reviewed the colon and rectal wall thickness according to histological examination using H&E staining of distal margin of resected specimen of the patients who underwent surgery for left-sided colorectal cancer from April, 2016 to March 2017 (n=77). For clinical experience, we performed 23 laparoscopic surgeries for left-sided colorectal cancer using laparoscopic surgery use high-height staple stapler (Powered Echelon Flex GST® 60 mm loaded with black cartridge, closed staple height 2.3 mm), followed by DST using circular stapler.

**Results:** Average entire wall and muscularis thickness of resected specimen were 2.93 mm (95% confidence interval (CI), 2.57–2.93), and 1.56 mm (95% CI, 1.36–1.78). Since two intestinal walls overlap during rectal transection, we chose the high-height staple stapler in clinical cases. No remarkable adverse event using high-height stapled stapler, including misfiring, bleeding from stump, and anastomotic leakage in clinical cases.

**Summary:** Although, among the techniques that are currently available, transection of rectal stump by laparoscopic surgery was feasible, rectal closure with laparoscopic stapler with high-height staple seemed to be a potentially useful option for laparoscopic LAR.

**P236**

### Transanal Total Mesorectal Excision – Two Years experience

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**Introduction:** More than 10 years ago, laparoscopic technique was considered to be a fully accepted surgical method for treatment of rectal cancer. The following years are a further search for a new surgical method that reduces invasiveness and improves treatment outcomes. It seems that such a method is transanal total mesorectal excision.

The aim of this study was to evaluate the new method of rectal cancer surgery (TaTME) after 2 years of its use.

**Methods:** Radicity of treatment (R0 resection, local recurrence), outcome of surgical treatment and quality of life of patients after surgery were evaluated.

**Results:** In the period from 10.03.2015. - 30.06.2017. 33 patients (19 men, 14 women) were operated in the Clinic. In 29 cases the indication for surgery was lower and middle rectal cancer and in 4 cases high grade dysplasia. All patients underwent laparoscopic rectal proctectomy with transanal access (TaTME). In all cases, complete oncological radicalization (resection R0) was obtained. The average operation time was 156 minutes. We had used two teams approach (Cecil approach) with 2 laparoscopic sets – abdominal and perineal starting at the same time. In the postoperative course, 6 patients had signs of anastomosis leak (3 of them required reoperation).

The follow-up period is 1–29 months. None of the patients had any recurrence of cancer.

**Conclusions:**

1. Transanal TME for rectal cancer surgery is an alternative method to conventional laparoscopic surgery.
2. In a large proportion of patients with lower and middle tumors, the rectum can avoid abdomino-perineal resection with permanent colostomy.
3. Because of the small group of patients and short observation period, the method requires further investigation

**P238**

### Robotic Subtotal Colectomy for Severe Acute Ulcerative Colitis is as Safe as Laparoscopic Approach

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**Introduction:** Laparoscopic subtotal colectomy (LSTC) was initially controversial in patients with severe acute Ulcerative Colitis (UC) given patients' severity of illness, toxicity, and technical factors such as colonic dilatation. Since then, it has been shown to be feasible and safe in experienced hands. The development and adoption of the Intuitive da Vinci® Xi Robot has allowed ease of use for multiquadrant surgery with minimal docking time. Our goal is to compare the intraoperative and postoperative outcomes of our early experience with Robotic Subtotal Colectomy (RSTC) vs. LSTC.

**Methods:** We queried our prospectively maintained database of patients who underwent RSTC from 2015 to 2017. We identified patients who underwent RSTC for severe acute UC and compared them to a matched cohort of patients who underwent LSTC for the same diagnosis. Statistical significance was set at 0.05. The Intuitive da Vinci Xi was used for all Robotic approaches. Port placement and specimen extraction (via the ileostomy site) were uniform within both groups.

**Results:** We identified 6 patients who underwent RSTC (4 females, median age: 41.5 years) and 13 patients who underwent LSTC (6 females, median age: 29 years). They were well matched for gender and demographic variables. The RSTC group had more patients with significant comorbidities (5/6=83%) than the LSTC group (3/13=23%) ( $p=0.01$ ). There were no differences in operative time (mean RSTC 314.0 vs. LSTC 294 minutes,  $p=0.5$ ) or estimated blood loss (RSTC 79 ml vs. LSTC 75 ml,  $p=0.9$ ). Mean length of stay was shorter (1.2 days) for RSTC (3.4 vs. 4.6 days,  $p=0.2$ ) and return of bowel function was earlier (0.7 days) in the RSTC group (1.3 vs. 2 days,  $p=0.1$ ), however, these were not statistically different. There were no intraoperative complications in either group. Postoperative major complication rates were similar (RSTC, 1/6=16% vs. 3/13=23% for LSTC;  $p=0.9$ ). Readmission rate was less for the RSTC group (16%) than LSTC group (38.4%) ( $p=0.3$ ). No patient required reoperation in the RSTC group (0%) vs. 2 patients (15.3%) in the LSTC ( $p=0.2$ ).

**Conclusions:** RSTC for severe acute UC is at least as safe as the laparoscopic approach. Although the robotic cohort had more comorbidities, major postoperative complications, readmissions, and reoperation rates were less when compared to LSTC. RSTC was also associated with an earlier return of bowel function and shorter length of stay. A prospective study with larger numbers is needed to see if the superiority of robotic versus laparoscopic approaches is reproducible.

**P239**

### Carcinoma Colon; Risk Factors for Conversion from Laparoscopic to Open, An Experience from a Tertiary Care Hospital

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**Introduction:** We conducted this study to identify the risk factors responsible for conversion from laparoscopic (L) to open (O) in Asian population.

**Methods and Procedures:** Retrospective analysis of the medical record files of all the patients who presented to our hospital with the diagnosis of carcinoma colon who underwent laparoscopic resection from Jan 2006 to Dec 2015. Demographics, operative findings and histopathological reports were all recorded on a pre-formed data sheet. Risk factors responsible for conversion were identified and compared. All the analysis was performed on SPSS 21.

**Results:** In total 244 patients were operated in these 10 years period, in which 127 were operated laparoscopically. There were 19 conversions from laparoscopic to open constituting 15% of total laparoscopic surgeries. Increase BMI (24.7 for Lap Vs 29.3 for Open), male sex and large tumor size (6 cm for Lap Vs 7 cm for Open) are significant risk factors that contributed to laparoscopic conversion rates, similarly locally advanced disease (T4) was also a factor responsible for conversion (14.8% in lap and 31.6% in open group). Age, comorbidities and CEA levels were not significant risk factors. Intra-operatively there was not much difference in two procedures in terms of blood loss (mean 500 mLs for Lap Vs 100 mLs for Open), duration of surgery (mean 227 minutes for Lap Vs 235 minutes for Open) which were statistically not significant. Proximal, distal and mesenteric resection margins were comparable. Median number of lymph nodes retrieved was more in open group (average 22 for open Vs 16.5 for lap).

**Conclusion:** Advance stage, large size of tumor, male sex and obesity were the risk factors associated with conversion from laparoscopic to open surgery. Late presentation to a physician might be one of the reasons for this high conversion rate.

**P240**

### Robotic-Assisted Right Colectomy Decreases Conversion in Minimally Invasive Right Colectomy in Right Colon Cancer

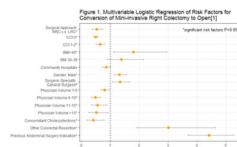
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**Objectives:** To evaluate the rate, risk factors and impacts of conversion to open right colectomy (ORC) for both traditional laparoscopic (LRC) and robotic-assisted right colectomy (RRC) performed for right colon cancer patients.

**Methods:** Patients >18 with right colon cancer undergoing elective right colectomy as the primary procedure during 2013–2015 Q3 were identified from Premier Perspective Database® using ICD-9-CM diagnosis and procedures codes. Three level analyses were conducted: (1) Unadjusted and Propensity-Score Matching (PSM) adjusted conversion rates were compared between LRC and RRC groups; (2) A multivariate logistics regression was used to quantify the effect of surgical modality on conversion adjusting for patient, surgeon, and hospital level risk factors of conversion to open; and (3) Impacts of conversion were assessed through comparing the 30-day perioperative outcomes and cost between the converted and non-converted groups.

**Results:** There were 10,622 eligible patients during January 2013–September 2015. Among them, 6,024 patients underwent LRC and 662 patients underwent RRC. Both unadjusted and PSM adjusted results suggest RRC had a significantly lower conversion rate than LRC (Unadjusted: 6.8% vs. 12.3% P≤0.0001; adjusted: 6.7% vs. 11.2%, P=0.01). The multivariate logistic regression quantified that RRC was associated with a 47% decreased odds of conversion to ORC compared with LRC (adjusted odds ratio [OR] 0.53, 95% confidence interval [CI] 0.38–0.72). Other significant preventive factors of conversion included lower patient Charlson comorbidity index/CCI, high volume surgeon, colorectal specialized surgeon, and simpler concomitant procedure such as cholecystectomy. Significant risk factors of conversion included BMI>40, male gender, other concomitant colorectal resection, and previous abdominal surgery. Comparing converted to non-converted patients, conversion was found to be associated with significantly higher perioperative complication (including surgical site infection), postoperative blood transfusion, 30-day complication related readmission, longer operative time and higher perioperative 30-day cost (All P values<0.01).

**Conclusion:** Conversion to open surgery for right colon cancer patients is associated with higher perioperative complication, longer LOS, operation-room time and higher cost. Robotic assistance, high volume surgeon and surgeon with colorectal specialty are associated with decreased odds of conversion.



[1] Other factors included in the multivariate regression: Age category (18–34, 35–44, 45–64, 65+), race, presence of benign polyps, presence of diverticulitis/diverticulosis, smoker, concomitant hernia procedures, payor, provider bed size, provider region, year

**P241**

### Laparoscopic Surgery for Colorectal Cancer Patients with a Poor Performance Status

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**Introduction:** As the proportion of elderly people increases, the number of patients with a poor performance status (PS) because of previous illnesses is likely to continue to increase. The aim of this study is to compare short-term and long-term outcomes of laparoscopic surgery (LS) to open surgery (OS) for those patients with colorectal cancer.

**Materials and Methods:** In this study, patients with ECOG performance status of 3 or greater were defined as poor PS patients. This was a retrospective study of poor PS patients with colorectal cancer who underwent either laparoscopic or open surgery from January 2006 to September 2017 in our hospital. Data on baseline characteristics, intraoperative findings, short-term outcomes, and long-term outcomes were analyzed statistically.

**Results:** During the study period, 16 and 23 consecutive poor PS patients underwent open and laparoscopic surgery for colorectal cancer, respectively. In LS group, 19 procedures (82.7%) were technically successful without the need for conversion to open surgery. There were no significant differences between two groups with regard of the baseline characteristics. LS group was associated with less cumulative blood loss (185 vs. 20 mL; p<0.001), and intraoperative blood transfusion (44.0 vs. 8.7%; p=0.018). Although there were no differences in 30-day mortality and morbidity, the rate of major complications (Clavien-Dindo grade≥III) was significantly lower in LS group (31.2 vs. 4.3%; p=0.033). There were no differences in long-term outcomes between two groups.

**Conclusion:** Laparoscopic surgery was beneficial approach for poor performance status patients with colorectal cancer.

**P242**

### Comparison Between Conventional Colectomy & Complete Mesocolic Excision For Colon Cancer – A Systematic Review and Pooled Analysis

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**Introduction:** Complete mesocolic excision (CME) has been advocated based on oncologic superiority, but is not commonly performed in North America. Furthermore, many data are limited to case series with few comparative studies. Therefore the objective was to systematically review studies comparing the short- and long-term outcomes between CME and non-CME colectomy for colon cancer.

**Methods:** A systematic review was performed according to PRISMA guidelines of MEDLINE, EMBASE, HealthStar, Web of Science, and Cochrane Library. Studies were only included if they compared conventional resection (non-CME) to CME for colon cancer. Quality was assessed using the Methodological Index for Non-Randomized Studies (MINORS). The main outcome measures were short-term morbidity and oncologic outcomes. Study eligibility, data extraction and quality assessment was performed by two independent reviewers, and disagreements resolved by consensus. Weighted pooled means and proportions with 95%CI were calculated using a random-effects model when appropriate.

**Results:** Out of 825 citations, 23 studies underwent full-text review and 14 met the inclusion criteria, of which 10 were unique series. Mean MINORS score was 13.6 (range 11–16). The mean sample size in the CME group was 1075 (range 45–3756) and 785 (range 40–3425) in the non-CME group. In the 10 unique studies, 4 included only right-sided resection, and 44.2% (95% CI 35.8–52.6) of the remaining 6 were right-sided colectomies. Of the 5 studies that reported surgical approach, 52.2% (95% CI 31.0–73.3) of CME were performed laparoscopically. There were 4 papers reporting plane of dissection, with CME plane achieved in 87.4% (79.7–95.2). Mean OR time in CME group was 167 minutes (range 163–171) and in non-CME group 138 minutes (range 135–142). Perioperative morbidity was reported in 6 studies, with pooled overall complications of 22.5% (95% CI 18.4–26.6) for CME and 19.6 (95% CI 13.6–25.5) for non-CME resections. Anastomotic leak occurred in 6.0% (95% CI 2.2–9.7) of CME versus 6.0% (95% CI 4.1–7.9) in non-CME colectomies. CME surgery consistently resulted in more lymph nodes retrieved, longer distance to high tie, and specimen length. There were 7 studies that compared 3- or 5-year overall or disease-free survival, or local recurrence. Only 2 studies reported statistically significant higher disease-free or overall survival in favour of CME. Local recurrence was lower after CME in 1 of 4 reported studies.

**Conclusions:** The quality of the current evidence is limited and does not consistently support the superiority of CME. More rigorous data are needed before CME can be recommended as the standard of care for colon cancer resections.

**P243****Laparoscopic Re Intervention for the Treatment of Fecal Peritonitis Without Stoma**

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**Introduction:** To assess the feasibility of a single-stage colorectal laparoscopic re intervention without ostomy. Colonic Laparoscopic interventions on patients that previously underwent a minimally invasive procedure, constitutes the current boundary in the management of the acute colorectal pathology. That includes, patients with fecal peritonitis due to diverting procedures already treated surgically. The outcome of our patients could significantly improve if the surgical procedure is performed in one time, with no stoma.

**Method and Procedures:** From September 1995 to June 2016, one hundred thirty-two patients underwent colorectal laparoscopic surgery. Five of these patients developed complications: three perforations due to colonoscopy and two due to dehiscence of the anastomosis. These five patients underwent a second laparoscopic procedure that included resection and anastomosis. No stoma required.

**Results:** All five patients underwent a second laparoscopic procedure due to an anastomosis leak. No stoma was required. The procedure consisted on resection of the previous anastomosis, re-anastomosis, abdominal lavage, aspiration and drains placement. All of them supported with parenteral nutrition. There were no surgical complications. Only one patient developed pneumonic symptoms that were solved.

**Conclusion:** The reported results, regarding no conversion rate, nor mortality, on our series of patients, suggest that single stage laparoscopic re intervention is feasible, despite fecal peritonitis.

**P245****The Role of Intraoperative Colonoscopy After Colorectal Anastomosis**

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**Introduction:** Anastomotic complication after stapled anastomosis in colorectal cancer surgery is a considerable problem. There are various types of anastomotic complication and they have different severity. This study was aimed to evaluate the impact of intraoperative colonoscopy on detection of anastomotic complication, and its effectiveness in treatment of anastomotic complications after anterior resection (AR) and low anterior resection (LAR) for colorectal cancer intraoperatively.

**Methods:** From Dec. 2016 to Jul. 2017, a total of 72 patients who underwent anastomosis between sigmoid colon and rectum after colorectal resection were reviewed retrospectively. Intraoperative colonoscopy was performed routinely since December 2016 in our hospital after anterior resection and low anterior resection. To identify effectiveness of intraoperative colonoscopy, we compared postoperative complications with non-intraoperative colonoscopy group during previous 11 months. Intraoperative colonoscopy was performed after anastomosis to visualize the anastomosis line and to perform an air leakage test. If anastomotic defect and moderate bleeding were found in intraoperative colonoscopy, it was managed by means of reinforcement suture or transanal suture repair. We used Logistic regression to analyze anastomotic complication between two groups with or without intraoperative colonoscopy.

**Results:** Of the 72 patients who were performed intraoperative colonoscopy after AR (n=50) and LAR (n=22), abnormal findings including bleeding and air leak were found in 14 patients (19.4%). Among those, 9 cases were observed without any procedure, additional procedures were performed in 5 patients (6.9%), transanal suture (3). Lembert suture (2)). Postoperative complication was developed in 12 patients; 6 patients had anastomosis bleeding (8.3%), 2 patients had ileus (2.8%), 1 patient had pneumonia (1.4%), 3 patients had minor complication (4.2%, acute urinary retention, chylous drainage, laparoscopic port site bleeding). Among 6 patients who had anastomosis bleeding, 4 patients were treated by endoscopic clipping, 2 patients were cured by conservative treatment. There was no postoperative anastomotic leakage. The cases of AR and LAR were 62 and 48 in non-intraoperative colonoscopy group, there was no significant difference between two group ( $P=0.07$ ). The proportion of laparoscopic surgery was 86.4% and 92.2% on intraoperative colonoscopy and non-intraoperative colonoscopy group, respectively, there was significant difference statistically ( $P=0.02$ ). However, there was no significant difference in anastomotic complication rate between two groups. ( $RR=0.27$ , 95% CI, 0.34–2.585).

**Conclusions:** Although there was no significant difference in postoperative anastomotic complication rate between two groups, intraoperative colonoscopy may be valuable method for decreasing postoperative complication by visualizing anastomosis line and performing additional procedure.

**P244****Complete Mesocolic Excision for Transverse Colon in Our Hospital**

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**Introduction:** Total mesorectal excision is known to be a gold standard surgical procedure for the rectal cancer. Subsequently complete mesocolic excision (CME) is recognized as an essential surgical procedure for the colon cancer. The transverse colon is relatively minor location for colon cancer. Variety of vessels and mobilization of splenic flexure and dissection close to pancreas make operations for the transverse colon cancer complicated. Laparoscopic transverse mesocolic excision in our hospital is presented.

**Method:** laparoscopic surgery is conducted with five trocars under the lithotomy position. Inferior mesenteric vein is cut after dissection of the descending colon with medial approach. The lower edge of pancreas is exposed near the inferior mesenteric vein and is dissected along toward the tail of pancreas. The splenic flexure is mobilized with lateral approach and the dissection between transverse mesocolon and the lower edge of pancreas is continued in the direction to the pancreas head. Coming to the exposure of superior mesenteric artery and vein, the origin of middle colic artery and vein are cut. The transverse mesocolon is separated from the pancreas head and the duodenum with preserving the gastrocolic trunk of Henle and the right gastropiploic vein. The hepatic flexure is mobilized and CME for the transverse colon is finished. This method, the 'tail to head of pancreas' approach, we called, was performed from September 2015. This method is well performed with one series of surgical view, and seems to be a simple procedure as CME with central vascular ligation for the transverse colonic cancer. There were no intraoperative complications, and one postoperative pancreatitis with grade 2 of Clavien-Dindo classification of surgical complications.

**Conclusion:** Our method, the 'tail to head of pancreas' approach, with transverse mesocolic excision is simple, safe and feasible.

**P246****Investigation of Lymph Node Metastasis of Laparoscopic Splenic Flexure Colon Cancer Resection**

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**Introduction:** The splenic flexure colon cancer is relatively small number, the anatomical characteristics and the dominant artery are complicated. It is essential to accurately identify the lymph node dissection range. The distribution of lymph node metastasis was assessed from laparoscopic splenic flexure colon cancer resection at our hospital.

**Materials:** Harvested lymph nodes by laparoscopic splenic flexure colon cancer resection in which both the middle colonic artery (MCA) and left colic artery (LCA) were dissected, were examined in this study.

**Results:** There were 52 (29 males and 23 females) splenic flexure colon cancer resection from January 2012 to August 2017. The patients number of depth of invasion was; T1: 10, T2: 6, T3: 25, T4a: 10, T4b: 1, and those of pathological stage was; I: 14, IIa: 14, IIb: 2, IIc: 1, IIIa: 4, IIIb: 10, IIIc: 2, IV: 6. The lymph node metastasis was positive in 22/52 patients (42.3%), grades were; N1a: 10, N1b: 8, N2a: 3, N2b: 1. There were 14 patients of transverse colon cancer and 8 patients of descending colon cancer. The dominant vessels of transverse colon cancer were MCA: 8 patients, LCA: 3 patients, and accessory middle colon artery (acce.MCA): 3 patients. Despite transverse colon cancer, lymph node metastasis of the LCA region was observed in 4/14 patients (28.6%). The dominant vessels of descending colon cancer were LCA: 7 patients, acce.MCA: 1 patient. Despite descending colon cancer, lymph node metastasis of the MCA region was observed in 2/8 patients (25%).

**Conclusion:** It was suggested that lymph node dissection of both middle and left colic regions is necessary for splenic flexure colon cancer, because lymph node metastasis was recognized in both region.

**P247**

### The Effectiveness of Single-Incision Laparoscopic Right Hemicolectomy with Intracorporeal Resection for Colon Cancer: Propensity Score Matching Analysis

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**Aims:** Laparoscopic right hemicolectomy became the standard of care for treating cecum, ascending and proximal transverse colon cancer in many centers. Most centers use laparoscopic colectomy with extracorporeal resection and anastomosis (LC). Single-incision laparoscopic colectomy with intracorporeal resection and extracorporeal (SC) remains controversial. The aim of the present study is to compare these two techniques using propensity score matching analysis.

**Methods:** We analysed the data of 111 patients who underwent laparoscopic right hemicolectomy with LC or SC between December 2015 and December 2016. The propensity score was calculated from age, gender, body mass index, the American Society of Anesthesiologists score, previous abdominal surgery and D3 Lymphnode dissection. Short-term outcomes were recorded. Postoperative pain was evaluated using a visual analogue scale (VAS) and postoperative analgesic use as outcome measure.

**Results:** The length of skin incision in the SC group was significantly shorter than in the LC group: median (range) 3 (3.5–6) cm versus 4 (3–6) cm ( $P=0.007$ ). The VAS score on day 1 and day 2 after surgery was significantly less in the SC group than in the LC group: median (range) 30 (10–50) versus 50 (20–69) on day 1 ( $P=0.037$ ) and median (range) 10 (0–50) versus 30 (0–70) on day 2 ( $P=0.029$ ). Significantly fewer the number of requiring analgesia in the SC group on day 1 and day 2 after surgery: median (range) 1 (0–3) times versus 2 (0–4) times on day 1 ( $P=0.024$ ) and 1 (0–2) times versus 1 (0–4) times on day 2 ( $P=0.035$ ). There were no significant differences in operative time, intraoperative blood loss, the number of lymph nodes removed and postoperative courses between the groups.

**Conclusions:** SC for right colon cancer is safe and technically feasible. SC reduces the length of skin incision and postoperative pain compared with conventional LC.

**P248**

### Comparative Study of Clinical Efficacy Between Cephalo-Medial-to-Lateral Approach and Medial-to-Lateral Approach in Laparoscopic Total Mesorectal Excision in Rectal Cancer Surgery: Midterm Results

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The Clinical data of 137 patients with rectal carcinoma who underwent laparoscopic radical resection in three Surgery Centers between May 2016 and September 2017 were randomized and analyzed prospectively, to investigate the operative technique, postoperative recovery, feasibility and safety of the Cephalo-Medial-to-Lateral approach in Laparoscopic Total Mesorectal Excision of Rectal Cancer.

Patients were divided into the following groups: Cephalo-Medial-to-Lateral approach group (CML group, n=63) and Medial-to-Lateral approach group (ML group, n=74). In the CML group (40 males, 23 females), the average age was  $61.68 \pm 10.38$  (range 36–90 years); In the ML group (44 males, 30 females), the average age was  $62.05 \pm 11.96$  (range 38–86 years). There was no conversion to open, intraoperative complications or operation related death. In the CML group, the mean operative time was  $103.11 \pm 22.40$  min, and the mean blood loss was  $97.89 \pm 53.35$  ml. The mean hospitalization days was  $9.48 \pm 5.04$  days. In the ML group, the mean operative time was  $101.37 \pm 20.27$  min ( $P=0.634$ ), and the mean blood loss was  $94.18 \pm 93.32$  ml ( $P=0.780$ ). The mean hospitalization days was  $10.08 \pm 6.92$  days ( $P=0.605$ ). In the CML group, there were 2 cases with postoperative anastomotic leakage, while there were 8 cases in the ML group.

The mean number of dissected lymph nodes was  $15.61 \pm 5.08$  in CML group. The mean number of harvested LN.253 was  $1.75 \pm 1.03$ , and the number of cases with metastatic LN.253 was 4 (7.14%) in CML group. The mean number of dissected lymph nodes was  $15.71 \pm 4.89$  in ML group ( $P=0.081$ ). The mean number of harvested LN.253 was  $15.71 \pm 4.89$  ( $P=0.904$ ), and the number of cases with metastatic LN.253 was 4 (12.90%) in ML group.

All the cases were followed up for 0.5–15 months. During the follow-up period, there were 3 cases of recurrence in CML group and 2 cases in ML group; there were no cases of tumor-related death in both two groups. The midterm results concluded that the effect of Cephalo-Medial-to-Lateral approach in laparoscopic total mesorectal excision of rectal cancer was similar to the traditional Medial-to-Lateral approach. We look forward to the final result to thoroughly evaluate the oncological effect of this technique.

**P249**

### Short-Term and Long-Term Outcome Following Laparoscopic Versus Open Surgery for Pathologic T4 Colorectal Cancer: A 10-Years Experience in a Singe Centre

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**Introduction:** Laparoscopic technique has been widely used in the treatment of colorectal cancer, while playing its minimally invasive advantages, but also achieved a good effect of radical oncology. However, T4 colorectal cancer is not recommended laparoscopic surgery.

**Methods:** Retrospectively collected pT4 colorectal cancer data from 2006 to 2015 in Guangdong General Hospital, all cases were undergoing radical surgery.

**Results:** A total of 211 cases were enrolled in the pT4 group, including 101 cases of laparoscopic group, 110 cases of open group, conversion rate was 12.9%. There was no difference in baseline data (age, sex, BMI, ASA, etc.) ( $P<0.05$ ). There was a significant difference between the two groups ( $p<0.05$ ) in blood loss, postoperative complications and postoperative recovery index. In the pathologic T4a/b, combined-organ resection, postoperative recurrence, the laparotomy group had more cases, and there was a statistically significant difference between the two groups ( $p<0.05$ ). The 3-and 5-year overall survival rates were 74.9% and 60.5% for the LAP group and 62.4% and 46.5% for the OPEN group ( $p=0.060$ ). Meanwhile, the 3-and 5-years disease- ( $P=0.053$ ), IIIC stage, lymph node status, CA19-9 and adjuvant chemotherapy were independent prognostic factors affecting overall survival. The age, pT4a/b, IIIC stage, CA19-9 and adjuvant chemotherapy were independent influencing factors of disease-free survival.

**Conclusions:** Laparoscopic surgery for pT4 colorectal cancer surgery, it is not only in the play of its minimally invasive but also obtained with the similar long-term effect. But we need more multicenter, prospective, and large sample clinical studies to validate our findings.

**P250**

### Efficacy of Fat Dissolution Fluid Containing Collagenase and Lipase for Lymph Node Retrieval After Laparoscopic Lymph Node Dissection for Colorectal Cancer

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**Introduction:** Lymph node (LN) retrieval after surgery is important. In the present study we evaluated the efficacy of the fat dissolution technique using fluid containing collagenase and lipase to avoid staging migration after laparoscopic colorectal surgery.

**Methods:** Seventeen patients who underwent laparoscopic LN dissection for colorectal cancer were evaluated. First, unfix LN within the resected mesentery were explored by visual inspection and palpation immediately after the operation by the surgeon, which is the most common practice in Japan. Subsequently, the fat dissolution technique was used on remnant fat tissue, and the LNs were evaluated again. The primary endpoint was whether the second assessment increased the number of LNs evaluated.

**Results:** The median number of LNs identified at the first and second assessments was 14 and 6, respectively, resulting in a significant increase in the total number of LNs evaluated (14 vs. 21,  $P<0.01$ , paired t-test). One positive node was identified among all the additional LNs identified (1.0%; 1/96). Although staging was not altered in any patient, the second assessment resulted in an increase in the originally insufficient number of LNs evaluated (<12 for Stage II) in three patients, whose treatment may be altered. Tumor cells detected after the fat dissolution technique were stained with carcinoembryonic antigen and cytokeratin-20.

**Conclusion:** Using the fat dissolution liquid on remnant fat tissue of the mesentery of the colon and rectum enabled identification of additional LNs. This method should be considered when the number of LNs identified is not sufficient after conventional LN retrieval, and may avoid stage migration.

**P251****Laparoscopic Lateral Lymphadenectomy for Selective Primary Rectal Cancer Patients**

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**Background:** Recently lateral lymph node (LN) metastasis of rectal cancer is also recognized in Western countries. Currently our indication of lateral lymphadenectomy (LLA) is existing suspicious positive lateral lymph node metastasis by MRI or CT scan. Purpose of this study is to assess short and long term outcome of laparoscopic LLA for rectal cancer.

**Method:** Curative laparoscopic resection was performed for 354 lower rectal cancer since April 2007 to April 2016, and 36 patients (10.2%, 5 bilateral and 31 unilateral) underwent laparoscopic LLA starting from 2009. LLA was performed mainly for internal iliac part and obturator fossa part with autonomic nerve preservation if possible. Short and long term results were assessed.

**Results:** Mean age was 62.8 years old, and 29 males and 7 females were included. Procedures were; low anterior resection: 17, intersphincteric resection: 14, and abdominoperineal resection: 5. LLA was performed in 6 patients in early phase (2007–2011, 6.6%), and in 30 patients in late phase (2012–2016, 11.4%). Preoperative chemoradiation (CRT) was performed for 7 pts (19.4%). Pathological stage was; I: 2 (post-CRT), II: 10, III: 24. Lateral LN metastasis positive rates were 44.4% (16/36). Number of positive lateral LN was; one: 14 pts, two bilateral: 1pt, and three unilateral: 1pt. Mean operative time was 357 minutes (230–611) and mean blood loss was 72 g (0–575). Median postoperative hospital stay was 10 days (6–43). Postoperative complications were; ileus 8.3% (3/36), anastomotic leak 6.5% (2/31), one conservative, one surgical drainage, wound infection 0%, and mortality 0%, respectively. Urinary dysfunction using self-catheterization was observed 2 pts (5.6%) and they were unnecessary one month later. Five year overall survival was 90.0%. Three year and 5 year relapse free survivals was 80.8%, 51.3% in lateral LN positive and 76.8% and 69.1% in lateral LN negative, respectively. Local recurrence was observed 18.8% (3/16) in lateral LN positive and 20.0% (4/20) in lateral LN negative. Distant metastasis without local recurrence was observed 31.3% (5/16) in lateral LN positive and 10.0% (2/20) in lateral LN negative.

**Conclusion:** Laparoscopic lateral lymphadenectomy for selective primary rectal cancer patients was effective for local and distant metastasis control.

**P252****Evaluation of Pathological Resection Margin After Laparoscopic Intersphincteric Resection for Low Rectal Cancer**

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**Aim:** The aim of this study is to evaluate the pathological resection margin after laparoscopic intersphincteric resection for low rectal cancer.

**Method:** From 2010 to 2014, there were eight laparoscopic intersphincteric resection cases for low rectal cancer. We evaluated the clinicopathological findings and the positivity of pathological resection margin.

**Results:** The median distance from the anal verge to the tumor was 40 mm (range, 10–45), and the median diameter of the tumor was 27 mm (range, 15–60). There was no case with neoadjuvant therapy. The estimated tumor depth were cT1 in 5 cases (62.5%) and cT2 in 3 cases (37.5%), and the actual tumor depth were pTis in 3 cases (37.5%) and pT1 in 2 cases (25.0%) and pT2 in 3 cases (37.5%). The median distal resection margin was 10 mm (range, 5–25). Pathological resection margin, such as the proximal, distal and circumferential margin was negative in all cases (100%). There was no mortality, but morbidity occurred in two cases (one case of anastomotic leakage and one case of small bowel obstruction). No recurrence nor distant metastasis was observed in the follow up period.

**Conclusion:** There was no positive resection margin case in the series. Our patient selection, indication and the technique were considered to be precise and appropriate.

**P253****Correction of Colovesical and Colovaginal Fistulas by Minimally Invasive Surgery, Our First 28 Cases**

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**Introduction:** The fistulas of the intestine to the vagina or the bladder include a highly morbid entity, with several functional limitation and loss of the quality of life, its diagnosis is complex and more than its treatment, which include a wide range of possibilities that go from the simple derivative colostomy in search of the spontaneous closure of the fistula, under the complete correction of the pathology with resections, anastomosis and mini-vasive reconstructions.

Give to know our experience in the minimally invasive treatment of whole vaginal and whole vesical fistules by laparoscopic via, for the last 3 years.

**Material and Methods:** Description of cases operated in this period 2014–2017

**Results:** A total of 28 patients were operated in this period, 26 women and 2 men, all those by laparoscopic via, with intestinal resection, in 26 thick intestine cases, in one small intestine and in another case with the commitment of the two, everyone restriction and intestinal anastomosis and in no matter were colostomy, primary closures of the fistula in 7 patients were required, conversion to open surgery in a case and there was no recurrence, 2 patients had prolonged hospitalization for localized infections, a requirement reintervention for revision. A patient suffered a umbilical eventration for the extraction site, which was corrected one year after laparoscopy.

**Conclusion:** Minimally invasive surgery in patients with this type of pathology becomes an excellent strategy for the integral management of these patients. Group work guarantees good results.

**P254****Fallibility of Preoperative Localisation (Including Ink Tattoo) Ahead of Laparoscopic Resection of Colon Tumors**

**Robbie Sparks, Dr. Ronan Cahill; Mater Misericordiae University Hospital**

**Background:** Precise preoperative localisation of colonic cancer is a prerequisite for correct oncological resection. Effective endoscopic lesion tattoo is vital for small, radiologically unsee tumors planned for laparoscopic resection but its practice may be imperfect.

**Methods:** Retrospective review of consecutive patients with preoperative endoscopic lesion tattoo who underwent laparoscopic colonic resection identified from our prospectively-maintained cancer database with supplementary clinical chart and radiological, histological, endoscopic and theatre database/logbook interrogation.

**Results:** 169 patients (95 males, mean age 68 years, median BMI 27.8 kg/m<sup>2</sup>, 77 left sided lesions, 36 screen detected, 21 benign polyps, 23% conversion rate). In 104 operations (60%) tattoo visibility was documented with tattoo absence noted in 9 (8.5%) although tattoo was identifiable in the pathological specimen in four. In those with "missing tattoos", six of the lesions were radiologically occult and in three the tumor was found in a different colonic segment then had been judged at colonoscopy. Four patients had on-table colonoscopy and five were converted to laparotomy (55% conversion rate, p<0.005). Mean postoperative length of stay was 15.5 (range 4–38) days. One patient's segmental resection contained only benign pathology requiring a second operation to remove the cancer. On univariate analysis, time between endoscopy and surgery (but not patient age, gender, BMI, endoscopist or surgeon seniority, tumor size or location) was significantly associated with absence of tattoo intraoperatively (p=0.006).

**Conclusion:** Recording related to tattoo is variable but definite lack of gross tattoo visualisation significantly impacts the procedure. The mechanism of tattoo absence is multifactorial needing careful consideration but solvable.

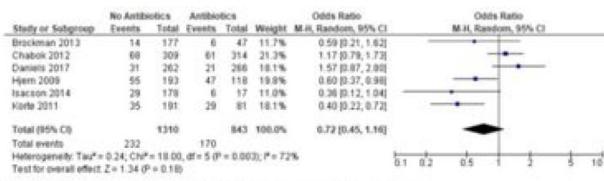
**P255****The Role of Antibiotics in Acute Uncomplicated Diverticulitis: A Systematic Review and Meta-analysis**

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**Introduction:** The aim of the present study was to perform a systematic review of the literature to determine the role of antibiotics in the management of acute uncomplicated diverticulitis (AUD). Diverticular disease is the most common disease of the large bowel and poses a significant burden on healthcare resources. In the United States alone, the cost of diverticular disease has been estimated to be over \$3 billion making it the fifth most important gastrointestinal disease economically. The use of antibiotics in the management of AUD, however, is primarily based on expert opinion as current high-quality evidence is lacking. Recent studies have not only questioned the optimal type and duration of antibiotic regimens, but whether antibiotics provide any benefit in the treatment of AUD.

**Methods and Procedures:** A comprehensive literature search for both published and unpublished studies of “diverticulitis AND antibiotics” from 1946 to June 2017 was performed using Medline, EMBASE, Scopus, the Cochrane Library, and Web of Science databases. Included studies were assessed for methodological quality and bias. Abstracts and titles were screened for inclusion by two independent reviewers as per PRISMA guidelines. Outcomes assessed in the meta-analysis included treatment failure, recurrence, abscess, perforation, bleeding, stenosis, hospital length of stay, need for elective surgery or emergent surgery and overall morbidity using the Revman 5.3 software.

**Results:** Eight studies with 2469 patients were included for review. Overall complication rates (Fig. 1) were not statistically significant between groups (OR 0.72; CI 0.45 to 1.16; P=0.18), but antibiotic use was associated with a longer length of stay in hospital (MD -1.13; CI -1.77 to -0.48; P=0.0006). Subgroup analysis revealed no difference in readmission rates (OR 0.77; CI 0.55 to 1.09; P=0.14), treatment failure rates (OR 0.43; CI 0.15 to 1.27; P=0.13), progression to complicated diverticulitis, or increased need for elective (OR 0.66; CI 0.24 to 1.79; P=0.80) or emergent surgery (OR 0.69; CI 0.24 to 1.79; P=0.80) between study groups.



**Figure 1:** Major complications for antibiotic vs no antibiotic groups

**Conclusions:** Antibiotic use in patients with acute uncomplicated diverticulitis is not associated with a reduction in major complications, readmissions, treatment failure, progression to complicated diverticulitis, or need for elective and emergent surgery. However, it increases the length of hospital stay. Given the risk of selection bias in included studies, further randomized trials are needed to clarify the need for antibiotics in uncomplicated diverticulitis.

**P256****Laparoscopic Para-Aortic Lymph Node Resection for Colorectal Cancer**

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**Aims:** Isolated para-aortic lymph node (PALN) metastasis is a relatively rare type of metastasis in colorectal cancer. PALN metastases are frequently associated with other distant metastases, and their surgical management remains controversial. This study aimed to investigate the technical feasibility and oncological outcomes of laparoscopic PALN resection in patients with colorectal cancer.

**Methods:** This retrospective study was performed between July 2011 and December 2016 and included 7 patients who underwent laparoscopic PALN resection for colorectal cancer. Indications of laparoscopic PALN resection were as follows: (1) no other synchronous distant metastases except PALN; and (2) PALN metastasis located below the renal vein and without invading a major vessel. Five ports were placed, and if necessary, an additional port was inserted near the median line to avoid the operator's instruments contacting the abdominal aorta.

**Results:** The median age was 67 years (range, 57–74 years), and 4 patients were men. The primary tumor was rectal cancer in 4 patients and colon cancer in 3. Six patients were clinically diagnosed with synchronous PALN metastasis, and 1 patient had metachronous PALN metastasis. Four patients received neoadjuvant chemotherapy before PALN resection. The median operating time was 423 min (range, 183–770 min), and the blood loss was 23 mL (range, 5–210 mL). There was no conversion to an open procedure. Postoperative complications occurred in 3 patients. However, the patients were conservatively treated. The median postoperative hospital stay duration was 16 days.

**Conclusion:** The results of our retrospective study suggest that laparoscopic PALN resection in patients with colorectal cancer may be a feasible approach for selected patients.

**P258****Laparoscopic Sigmoidectomy with Transanal Extraction**

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**Aim:** We want to highlight the feasibility of a sigmoidectomy using total laparoscopic with a transanal extraction of the specimen.

**Methods:** it is a 34-year-old female patient, obese ( $BMI=34 \text{ kg/m}^2$ ) to the antecedents of laparoscopic cholecystectomy and chronic constipation. she was treated three months ago for a sigmoidal diverticulitis complicated with a pelvic abscess. the evolution has been favorable under antibiotic therapy and percutaneous drainage of the abscess. The Colonoscopy showed a multiple diverticula located between 20 and 25 cm from the anal verge. prophylactic sigmoidectomy was performed laparoscopically using 3 trocars (10 mm supra umbilical, 12 mm FID and 5 mm right flank). The specimen was extracted transanally, thus avoiding a pubic incision. The steps of the intervention were: 1- mobilisation of left colon 2- closing of distal left colon stump 3- rectal stump lavage 4- opening on the rectum 5-transanal introduction of the anvil 6-specimen transanal extraction 7- closing og rectal stump 8-colonic positioning of the anvil 9- colorctal anastomosis.

**Results:** the intervention was 150 minutes. no perioperative incidents. the liquid regime was authorized on the night of the intervention. the operating procedures were favorable with an exit to J2 post operative. the anaphath examination of the surgical specimen confirmed the presence of sigmoidal diverticula.

**Conclusion:** laparoscopic sigmoidectomy with transanal extraction of the specimen for benign disease is a seductive technique with satisfactory results. it avoids a pubic incision with its parietal and aesthetic complications.

**P259****SIK1 Expression is Down-regulated in Colorectal Cancer and Implies Poor Clinical Outcome**

**Chengzhi Huang;** Guangdong General Hospital (Guangdong Academy of Medical Science)

**Background:** Colorectal cancer (CRC) is one of the most common malignant diseases over the world. Of the causes of the death of CRC, metastasis to liver or lung are the major factors. However, there is still lack of precise tumor biomarker that precisely predict the clinical outcome of CRC. The salt-inducible kinase 1 (SIK1) encodes a serine kinase of AMP-activated protein kinase (AMPK) family, which may play critical roles in tumorigenesis and tumor progression. This study aimed the study the expression and clinical significance of SIK1 and CRC patients.

**Methods:** The expression of SIK1 protein was measured by western-blot and analysis of immunohistochemistry. SIK1 mRNA expression in cancerous tissue was measured by RT-PCR.

**Results:** The expression level of SIK1 was correlated with the following factors: tumor invasion (T stages), lymph node metastasis, clinical stages (TNM) and tumor location. The down-regulated SIK1 implies poor clinical outcome measured by Kaplan-Meier analysis ( $P$ -value <0.05), and may act as an independent risk factor of CRC patients.

**Conclusions:** The protein SIK1 is down-regulated in CRC cancer tissues, and may implies poor clinical outcome.

**Keywords:** SIK1, Colorectal cancer, Prognosis, Tumor biomarker.

**P260****A Novel Technique Using Fluorescence to Identify Lymphatic Patterns in Colon Cancer**

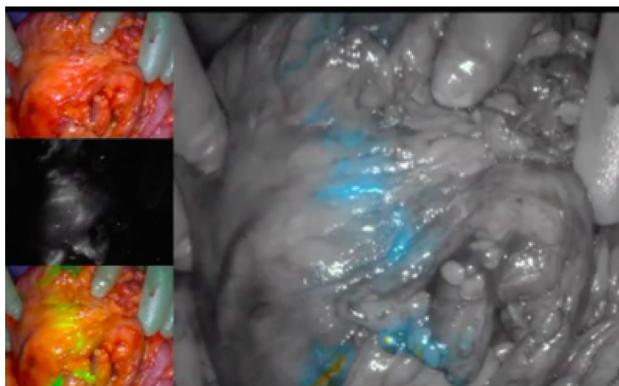
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**Background:** Surgical specimens for resected colon cancer vary in quality and there remains no universally accepted technique to guide resection margins. A minimum of 12 lymph nodes provides some quality assurance, however this remains a crude marker of optimal oncological surgery. A tool to precisely identify lymphatic drainage within the mesentery could improve the oncologic quality of resection and better guide adjuvant treatment through more optimal mesenteric lymphadenectomy. While fluorescence imaging (FI) has been described to identify nodal disease in several other cancers, feasibility and best practices have not been established in colon cancer. We describe a novel technique of FI using Indocyanine Green (ICG) to identify lymphatic spread and potentially guide optimal mesenteric lymphadenectomy in colon cancer.

**Methods:** Three consecutive patients with colon cancer undergoing a laparoscopic resection had peritumoral subserosal injection of ICG for FI after extracorporealization of the mobilized specimen. Three concentrations of ICG were injected –5 mg/10 mL, 5 mg/5 mL, and 5 mg/3 mL. A total of 4 mL was given for each patient. Using a modified laparoscopic camera, the ICG was excited by light in the near-infrared (NIR) spectrum, for real-time visualization of the lymphatic drainage. The main outcome measure was identification of lymphatic drainage.

**Results:** Three patients with right-sided primary colon cancer were evaluated. All three patients had successful identification of the lymphatic drainage pattern along the mesentery. The most successful protocol was 1 mL (concentration 5 mg/10 mL) subserosal injection at 4 points within close proximity (1 cm) of the tumor with a 23-gauge needle, then waiting 5 minutes for complete mapping. No intraoperative or injection-related adverse effects occurred with 30-day follow-up. The median lymph node yield was 31. All specimens had tumor-free margins.

**Conclusion:** From this small series, fluorescence imaging with ICG is a potentially safe and feasible technique for identifying mesocolic lymphatic drainage patterns. This proof of concept and protocol will lead to future studies to examine the utility of fluorescence imaging to guide more precise surgery in colon cancer.

**P261****Indocyanine Green (ICG)-Enhanced Fluorescence and Perianastomotic Tissue Perfusion During Robotic and Laparoscopic Colorectal Surgery. Review of the Literature and University of Illinois at Chicago (UIC) Data**

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**Introduction:** anastomotic leakage in colon/rectal surgery is a dangerous event with an occurrence rate ranging from 1 to 30%. The associated mortality rate is between 6–22%. The white-light intraoperative subjective surgical assessment (the most frequently used approach) underestimates the actual anastomotic leakage rate. Intraoperative tissue perfusion assessment by Indocyanine green (ICG)-enhanced fluorescence has been reported in multiple clinical scenarios in laparoscopic/robotic surgery, as well as for bowel perfusion assessment. This technology can detect microvascular impairment, potentially preventing anastomotic leakage. We reviewed the literature and present our data to evaluate the feasibility and usefulness of ICG-enhanced fluorescence in the intraoperative assessment of vascular peri-anastomotic tissue perfusion in colorectal surgery.

**Methods and Procedures:** A PubMed literature narrative review has been performed. Moreover, out of a total of 164 robotic colorectal cases, we retrospectively analyzed 28 ICG-enhanced fluorescence robotic colorectal resections (15 left colectomies-8 rectal resections-3 right-l transverse-1 pancolectomy).

**Results:** After ICG-technology use, the biggest ( $n>100$ ) case-series showed a rate of 3.7–19% of cases in which they changed the level of resection based on ICG. ICG technology may variably reduce the anastomotic leak rate from 4 to 12%. However, the threshold values to define the actual sub-optimal perfusion are still under investigation. In our experience, out of 28 ICG cases performed; the conversion, intraoperative complication, dye allergic reaction and mortality rates were all 0%. Post-op surgical complications: 1 case of leak (3.6%) and 1 SBO for incarcerated hernia (3.6%). In 2 cases, with normal white-light assessment, the level of the anastomosis was changed after ICG showed ischemic tissues. Despite the application of ICG, 1 anastomotic leak has been registered.

**Conclusions:** ICG-enhanced fluorescence may intraoperatively change the white-light assessed resection/anastomotic level, potentially decreasing the anastomotic leakage rate. Our data shows that this technology is safe, feasible and may prevent anastomotic leakage. However, the decision making is still too subjective and not data driven. At this stage ICG, beside being a promising technique, doesn't have high level of evidence (most of the reports are retrospective). Some randomized prospective trials with an adequate statistical power are needed. A precise injection dose and timing standardization is required. The main challenge is to develop a method to objectively obtain a real-time intensity assessment. This may provide objective metric thresholds for an intraoperative evidence/data-based surgical decision making.

**P262****Does Bariatric Surgery Decrease the Risk of Colorectal Cancer Diagnosis Post-operatively?**

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**Introduction:** According to the World Health Organization, colorectal cancer is the 3rd most commonly diagnosed cancer in the world. One of the main risk factors for the development of colorectal cancer is obesity. Obesity is seen to increase the risk of colorectal cancer by 9% in women per 5 kg/m<sup>2</sup> and 24% in men per 5 kg/m<sup>2</sup>. Bariatric surgery is one of the treatments that is considered to achieve and sustain a significant amount of intentional weight loss in patients. Considering that fact that bariatric surgery decreases obesity, this intentional weight loss would seem to provide a favorable outcome in terms of diagnosis and prognosis of colorectal cancer.

**Methods:** A systematic review of the literature was conducted via PubMed to identify relevant studies from January 2008 through May 2017. The main outcome for this study is to assess whether patients who underwent bariatric surgery (restrictive and malabsorptive procedures) had an increased or decreased risk of colorectal cancer. All studies included in this meta-analysis are retrospective cohort studies. Results were expressed as standard difference in means with standard error. Statistical analysis was done using fixed-effects meta-analysis to compare the mean value of the two groups between bariatric surgery and non-surgery in patients with colorectal cancer. (Comprehensive Meta-Analysis Version 3.3.070 software; Biostat Inc., Englewood, NJ).

**Results:** Four out of 86 studies were quantitatively assessed and included for meta-analysis. Among the four studies, 22,857 underwent bariatric surgery and 78,536 did not undergo bariatric surgery. There is a significant decrease ( $0.139 \pm 0.057$ ;  $p=0.016$ ) in the risk in patients developing colorectal cancer in patients who underwent bariatric surgery compared to those who didn't get surgery.

**Conclusion:** Bariatric surgery patients appear to have a decreased risk of colorectal cancer compared to patients who did not have bariatric surgery.

**P264****Disturbance of Sexual Function After an Operation for Rectal Cancer and a Fundamental Study of the Relationship Between Autonomic Nerves and Arteries in the Pelvis**

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**Background:** Disturbance of sexual function after an operation for rectal cancer has often occurred. The relationship between autonomic nerves and arteries in pelvis was examined.

**Methods:** Clinical studies of 15 male patients with resected rectal cancer were performed using Snap Gauge method, Penile-Brachial Index and evoked Bulbo-Cavernous Reflex. In 30 canine experiments, pelvic splanchnic nerve (PSN) electric stimulation, arterial flow measurement, corpus cavernosum pressure measurement and muscle strip study using drugs were evaluated.

**Results:** In clinical studies of 15 male patients, transection of the hypogastric nerve (HGN) and the sympathetic trunk did not affect the erectile function in the postoperative course. In animal experiments transection of these nerves did not affect the increase in inner pressure of the penis cavernosum. In postoperative cases in which only one side of the lower grade branches of the PSN (S4) were preserved, the erectile function was preserved. In animal experiments in which the PSN of one side was disturbed, the IPA flow of the same side decreased, while the flow of the other side increased. We have evaluated the role of adrenergic components in the PSN on the erectile function in the dog. The effect of norepinephrine hydrochloride on canine vascular smooth muscle was examined in vitro. Vascular smooth muscle strips from the IPA relaxed longitudinally. Electrical stimulation of the PSN increased blood flow in the IPA and also elevated the cavernous pressure. These increases were blocked in part by phentolamine, but not by propranolol or atropine. The effects of cholinergic and adrenergic agonists and antagonists on mechanical responses were also examined in muscle strips obtained from various arteries in the intra-pelvic region including the IPA. Norepinephrine induced contraction in the iliac artery and relaxation in the IPA, and both the contraction and relaxation responses were blocked by phentolamine but not by propranolol. These findings suggest that in the dog,  $\alpha$ -adrenergic components projected through the PSN may contribute to penile erection.

**Conclusion:** Blood flow in the IPA was controlled significantly by the same side PSN, but compensatory by the other side PSN. It is also conceivable that the erectile function through the PSN is controlled by the sympathetic nerve, not by the parasympathetic nerve. In postoperative cases in which only one side of the lower grade branches of the PSN (S4) were preserved, the erectile function was preserved.

**P263****Initial Experience of Endoscopic Mucosal Resection for Rectal Carcinoid Tumors**

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**Introduction:** The incidence of rectal carcinoid tumors is increasing due to the widespread use of screening colonoscopy. Endoscopic mucosal resection (EMR) is a useful method for small rectal carcinoid tumors ( $\leq 10$  mm) because of its simplicity, quick procedure and low complication rates. We aimed to describe our experience and evaluate the outcomes of EMR for rectal carcinoid tumors.

**Methods and Procedures:** The patients enrolled in this study were 13 patients with small rectal carcinoid tumors who underwent EMR using a submucosal injection technique of epinephrine-saline mixture between August 2010 and October 2016. All medical records, including characteristics of the patients and tumors, complications, were retrospectively reviewed.

**Results:** The patients were 6 men and 7 women, with a mean age of 40.8 years (range, 21–72 years). En block resection was performed by EMR in all cases. The endoscopic mean size of tumors was 6.46 mm (range, 5–10 mm). The pathologically measured mean size of the resected specimens was 5.92 mm (range, 4–10 mm). The mean size of resected carcinoid tumors was 4.33 mm (range, 1.8–7 mm). The tumor shape was submucosal tumor in 10 and polyp in 3. Histological examination revealed that 5 cases had resection margin positive of tumor and 1 case had undetermined resection margin of tumor. Of the 6 patients, 4 patients underwent endoscopic treatment and 2 patients underwent transanal excision. No residual tumor was found in additionally removed tissue. There were 2 cases with EMR-related complications: 1 early postprocedural bleeding and 1 postpolypectomy syndrome. There was no significant bleeding requiring blood transfusion or perforations.

**Conclusion:** Endoscopic mucosal resection is considered to be a relatively safe and useful method for treatment of small rectal carcinoids in selected patients.

**P265****Total Laparoscopic Approach for Rectal Cancer Resection -A Single Center Experience**

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**Introduction:** The role of minimal invasive surgery is well established. As regards rectal cancers particularly low lying rectal cancer studies are still going on for safety, feasibility and duplicability. A large prospective single institutional study aims to assess the effectiveness of our technique of Laparoscopic resection of rectal cancer in terms of oncological safety, complications and long term prognosis.

**Method:** Between July 2006 to June 2016, 582 patients underwent laparoscopic LAR for rectal adenocarcinoma at our Minimal Invasive Oncology Centre. Routine preoperative work up was done. Patients were evaluated for complications and were graded and managed as per Clavien-Dindo classification. Survival probability analysis rate using Kaplan Meier method.

**Results:** Total number of Patient included in the study was 582 (375 men and 207 women) average age of 65 years. Tumour located in upper, middle and lower rectum were 132, 258 and 192 patients respectively. A total of 33 patients received chemoradiation preoperatively and 450 patients received chemotherapy/Radiation and chemoradiation postoperatively. Laparoscopic TME was done in 381 patients. 6 out of 381 patients underwent low anterior resection with hand sewn coloanal anastomosis (CAA).

Average operating time was 124 minutes with an average of 70 ml blood loss and an average of 5 days as hospital stay. Average number of Lymph nodes removed were 25.4

The overall complication rate was 20.8% i.e. 121 out of 582 patients had complications graded under Clavien-Dindo classification. No conversion to conventional surgery was required. The most common postoperative complication was the anastomotic leak. (Grade II, IIIB and IV acc. to Clavien- Dindo classification) we had 71 leaks (13.4%). After a mean follow up of 46 months (1–128 months), tumor recurrence occurred in 39 patients of 582. Overall recurrence rate was 6.7%. Overall Cancer related survival rate was 99.3%, 96.7%, and 90.7%, 90.7% and 87.7% at 1st, and 2nd, 3rd, 4th and 5th year respectively. Five year survival rate was 100% for stage I, 94.4% for stage II, 66.6% for stage III, and 44.6% for stage IV.

**Conclusion:** Laparoscopic TME technique is feasible and safe. With development of improved technique, devices and expertise, laparoscopic resection for rectal cancer should be a standard method. Our results clearly demonstrate that laparoscopic rectal resection is not associated with higher morbidity or mortality. Furthermore oncological and surgical principles were respected and long term outcomes compared to the previous literature and open surgery were comparable.

Single largest Series of Laparoscopic management of Rectal cancer from India.

**P266****Neoadjuvant Therapy for Rectal Cancer: Is Surgery the Best Consecutive Option for Everybody?**

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**Introduction:** Currently, neoadjuvant chemo-radiotherapy (nCRT) followed by low anterior resection or abdominoperineal resection are the standard treatments for locally advanced rectal cancer. nCRT can improve resectability, achieve better sphincter preservation and reduce local recurrence. Although total mesorectal excision is the standard treatment for advanced rectal cancer, recent trends in minimally invasive treatments led to an increase in local excision or “watch and wait” in patients with an excellent response to nCRT. The purpose of this study, part of an ongoing research, is critically evaluating the feasibility of “non-operative treatment” for rectal cancer in a district hospital.

**Methods and Procedures:** A total of 29 patients with rectal cancer, who where treated with nCRT from January to August 2017 at “Carlo Urbani” district Hospital in Jesi (Italy), were retrospectively reviewed. All patients had histologically-confirmed primary adenocarcinoma of the rectum located within 12 cm from the anal verge. The involved patients completed nCRT and had no recurrence disease, distant metastasis, synchronous malignancies. They were classified according to the Mandard’s Tumor Regression Grade (TRG) into two clusters: group A (TRG 1–3) and B (TRG 4–5). **Results:** The average age of people is 67.2 and 17 were male. Five patients underwent abdominoperineal resection and 76% fell within group A. Six patients had lymph nodes involved. Four patients suffered relevant complications, such as wound complication, anastomotic leak, operative reintervention and death. Univariate analysis showed that the main predictors of tumor regression were the absence of lymph-nodes involvement from initial imaging ( $p<0.05$ ), normal initial carcinoembryonic antigen level ( $p<0.05$ ) and tumor downstaging in imaging ( $p<0.05$ ). In addition, most relevant complications occurred to elderly patients although they observed a good clinical response. Besides, 13% of patients were found to be complete pathologic responders upon examination of the surgical specimen.

**Conclusions:** The oncologic feasibility of non-operative management for the patients with complete clinical response after nCRT has been growing, but some studies have suggested lack of oncologic safety in these patients. The patients with a complete clinical response expect good survival, but they may still harbor residual disease. No consensus on “watch and wait” policy in the field of rectal cancer was obtained, yet. Our data did not entirely support this policy although it might be the best strategy, based on the predictors of tumor regression, to avoid the complications associated with surgery in elderly patients with significant medical comorbidities and fear of a permanent stoma.

**P267****Laparoscopic Total Abdominal Colectomy for Emergent Ulcerative Colitis Reduces Postoperative Morbidity, an Analysis Using the ACS-NSQIP Targeted Colectomy Database**

**Matthew Skancke, Dr. Khashayar Vaziri, Dr. Richard Amdur, Bindu Umaphati, Dr. Vincent Obias; George Washington University**

**Background:** The adoption of the laparoscopic approach to complex abdominal surgery has grown, and minimally invasive treatment for ulcerative colitis (UC) has gained popularity. We evaluated the outcomes of emergent laparoscopic and open total abdominal colectomy (TAC) of UC.

**Methods:** The 2012–2015 ACS-NSQIP and targeted colectomy databases were queried for patients undergoing TAC emergently for UC. Patients admitted to the hospital for more than 20 days prior to surgery and those in septic shock were excluded. Statistical analysis incorporated t-test and binomial logistic regression with  $p<0.05$  holding significance. The primary outcome of interest was morbidity and mortality within 30 days following surgery.

**Results:** This search identified 209 patients undergoing open (163) and laparoscopic (47) TAC emergently for UC. Patients undergoing open TAC were older ( $p=0.003$ ), had more comorbidities and were more inflammatory (SIRS or Sepsis 63% vs. 36%,  $p=0.001$ ). Laparoscopic operative times were also longer than laparotomy (219 vs. 152 min,  $p<0.001$ ) and had a 13% conversion rate. Within the 30 days postoperative period, patients who underwent laparotomy had a higher morbidity (69% vs. 42%,  $p=0.001$ ), higher mortality (13% vs. 2%,  $p=0.034$ ) and a longer postoperative length of stay (14.5 days vs. 10.4 days,  $p=0.037$ ) compared to laparoscopic total abdominal colectomy. After controlling for the differences in cohorts, regression analysis indicated that a laparoscopic approach had a protective effect on postoperative morbidity (OR 0.439, CI 0.206 to 0.933,  $p=0.032$ ) but no significant effect on mortality ( $p=0.296$ ).

**Conclusion:** Emergent laparoscopic TAC for UC reduces composite morbidity without effecting mortality when compared to open TAC. Laparoscopic TAC should be considered for emergent UC patients who are not in septic shock.

**P268****Minimally Invasive Versus Open Low Anterior Resection for Rectal Cancer: Results from the Single Medical Center**

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**Objective:** To examine survival of patients who underwent minimally invasive low anterior resection (LAR) versus open LAR for rectal cancer in single medical center in Taiwan.

**Background:** The utilization of minimally invasive surgery (including of laparoscopic and robotic LAR) for rectal cancer has steadily increased. Short-term outcomes between these techniques and open surgery have shown equivalent results. However, long-term survival outcomes between these groups are unknown.

**Methods:** We retrospectively enrolled 613 patients who suffered from the rectal cancer and underwent LAR in China Medical University Hospital from January 2012 from December 2016. Patients were classified as laparoscopic, robotic, and open groups. The clinicopathological and surgical data of these patients were collected and retrospectively analyzed.

**Results:** Among 613 patients with rectal cancer, 93.8% minimally invasive LAR (MI-LAR) and 6.2% underwent open LAR (O-LAR) and. Among 613 patients, 95% of the patients underwent sphincter-preserving operation. Overall, 5-year overall survival rate was 80.6% and 5-year disease-free survival rate was 75.3%. Local recurrence occurred in 4.23% of the patients and distant metastases occurred in 23.9% of the patients. MI-LAR was associated with shorter length of stay, shorter days of urinary catheterization, less circumferential resection margin, less 30-day mortality, but equivalent distal resection margin. In a subgroup analysis of laparoscopic LAR (L-LAR) versus robotic LAR (R-LAR), there were no differences in lymph node harvest, distal and circumferential margin positivity, length of stay. The 3-year and 5-year overall survival for MI-LAR were 86.6% and 80.5%. The 3-year and 5-year overall survival for O-LAR were 81.1%. The 3-year and 5-year disease-free survival for MI-LAR were 79.6% and 75.6%. The 3-year and 5-year disease-free survival for O-LAR were 69.3%.

**Conclusions:** In our retrospective study, minimally invasive LAR for rectal cancer has better short-term and long-term outcome than open LAR. Our findings support the ongoing adoption of minimally invasive techniques for rectal cancer.

**P269****Short-Term Clinical and Oncological Outcomes After Transumbilical Single Incision Laparoscopic Total Mesorectal Excision for Rectal Cancer: A Retrospective Analysis from One Center**

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**Introduction:** Conventional 5 incision laparoscopic surgery procedure for rectal cancer is widely accepted as a successful alternative to laparotomy now, bestowing specific advantages without causing detriment to oncological outcome. Evolving from this, single-incision laparoscopic surgery (SILS) has been successfully utilized for the removal of colonic tumors, but the literature lacks sufficient data analyzing the suitability of SILS for rectal cancer especially for total resection mesorectal excision (TME), particularly on oncological outcome. We report the short-term clinical and oncological outcomes from a large cases retrospective analysis of observational study of SILS for TME procedure of rectal cancer.

**Methods:** 95 rectal cancer patients who underwent transumbilical single incision laparoscopic TME surgery were recruited in the current study. Short-term perioperative clinical parameters and oncological outcomes were observed and all patients were followed up after surgery. Then summarize the preliminary application results.

**Results:** 87 operations were accomplished successfully with single incision laparoscopy, 7 patients were converted to multiport approach, and 1 was converted to laparotomy, no diverting ileostomy was performed. The average operative time was  $(128.5 \pm 43.6)$  min, with an average blood loss of  $(75.5 \pm 121.7)$  ml, the median postoperative hospital stay was  $(10.3 \pm 2.1)$  days. All patients received a R0 resection and the surgical margin were conformed negative in all 87 cases, the median number of harvested lymph node is  $(18.4 \pm 8.9)$ , the specimens met the requirement of TME. There were 3 postoperative complications, no operation-related mortality or postoperative anastomotic leakage was observed. No patient appeared recurrent in a median follow up of 14 months.

**Conclusions:** Total mesorectal excision surgery for rectal cancer can be safely performed using transumbilical single incision laparoscopic technique, with acceptable short-term clinical and oncological outcome.

**P270****Inflammatory Response to Acute Treatment of Colonic Obstruction due to Colorectal Malignancy, Comparing Colonic Stenting and Surgery**

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**Background:** Any surgical trauma induces an inflammatory response, which is considered as a negative factor in the general immune response, specially in malignant disease. The C-Reactive Protein (CRP) is an acute phase protein often used as a marker of surgical trauma. Stent treatment has been used as a treatment option for colonic obstruction in palliative cases for many years, and also as a bridge to surgery in selected cases. In a pilot study we compared the inflammatory response after acute stent treatment or surgery for malignant colonic obstruction.

**Method:** We compared two consecutive series of treatment of acute malignant colonic obstruction, stent treatment or emergency surgery during 2011–2012. All patients were admitted with acute colonic obstruction due to colorectal cancer. Choice of treatment was based on attending senior colorectal surgeons' preference, patient comorbidities and disseminated disease was considered. Patient age, CRP, time to first defecation and length of stay was recorded.

**Results:** A total of 31 patients were identified in a retrospective analysis. 15 patients had acute stent treatment and 16 had acute surgical treatment for colonic obstruction, all due to colorectal cancer. Median age was 77 y (30–95) with no difference between the groups. There was no difference in metastatic disease between the groups. Median time until first defecation after treatment was significantly shorter for the stented patients (39 h (4–73)) compared with those operated (96 h (24–168)) ( $p<0.001$ ). Median hospital stay was also shorter in the stent group, 6 days (2–32), versus 11 days (7–30) in the surgical group ( $p=0.016$ ). CRP did not differ between the groups before treatment. Both treatments resulted in increased CRP levels at postoperative days 1 and 2, but the CRP levels were significantly higher in the surgical group than in the stent group at both time points (POD 1  $p=0.017$ , POD 2  $p<0.001$ )

**Conclusion:** Acute stent treatment in colonic malignant obstruction seems to induce a less pronounced inflammatory response compared with surgery, as shown by a significantly reduced increase in postoperative CRP resulting in shorter time to first defecation and a shorter hospital stay.

**P273****Meckel's Diverticulum: Analysis of 27 Cases in an Adult Population**

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**Introduction:** Meckel's diverticulum is the most common congenital abnormality in newborns, present in about 2–4% of them. Diagnostic of Meckel's diverticulum requires a high index of suspicion, and even with the use of modern imaging technologies, they are often diagnosed intraoperatively. What to do when an asymptomatic diverticulum is found incidentally during surgery for other causes is a matter of discussion.

**Objective:** The aim of this article is to report 27 symptomatic and asymptomatic incidentally found cases seen in a fourth-level hospital in Colombia.

**Materials and Methods:** The reports of the histopathologic examinations carried out in the hospital in the last 12 years were reviewed searching for those containing Meckel's diverticulum in their diagnosis. Patients were divided in asymptomatic and symptomatic groups. The asymptomatic group was defined as patients who were operated for a different indication and a Meckel's diverticulum was found incidentally. Morbidity was divided in early and late complications after the initial surgery.

**Results:** From January 2004 to June 2017, a total of 42 pathology reports included the diagnosis Meckel's diverticulum. A total of 27 adult patients were retrieved. All of those patients with Meckel's diverticulum a total of 22 patients were symptomatic, being SBO the most common complication and required the surgical removal incidentally.

**Conclusion:** The correct approach of the patients with diverticular pathology allows the early identification and the appropriate management of the surgical complications that can be presented.

**P272****Short-Term Outcome of Transanal Total Mesorectal Excision for Rectal Cancer: Experience of CMUH**

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**Purpose:** Because conventional laparoscopic rectal surgery is difficult due to narrow pelvis, then the new surgical method, Transanal Total Mesorectal Excision (TaTME) has been developed for middle or low rectal cancer. This study to evaluate the safety and short-term outcome of TaTME for rectal cancer.

**Materials and Methods:** We enrolled 37 patients with rectal cancer diagnosed in China Medical University Hospital from January 2016 to August 2017. All the patients received TaTME for rectal cancer. The clinicopathological and surgical data of these patients were prospectively collected and analyzed.

**Results:** Of 37 patients, 70.3% were men. The mean age of all patients was 64.3 years-old. 46% of rectal tumor were located at middle rectum and 51% were located at low rectum. 67.6% of patients received neoadjuvant chemoradiation. Median operative time was 335 min. Median distal margin was 1.9 cm. Positive circumferential margin rate was 2.6%. Three patients underwent intraoperative complication, urethra injury, vaginal perforation, and left internal iliac artery injury. Median harvested lymph nodes were 14.1. The anastomotic leakage rate was 18.9%. Median hospital stay was 7.1 days. Median days of urinary catheterization was 2.3 days. There were 18.9% of patients who needed urinary re-catheterization. Three patients discharged with Foley catheter.

**Conclusion:** Although conventional laparoscopic rectal surgery is difficult, transanal total mesorectal excision for middle and low rectal cancer is the alternative method and it is feasible and safe. It can provide good short-term clinical and oncological outcomes.

**P274****Neuroendocrine Tumor Arising from a Tailgut Cyst: A Rare Presacral Mass**

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Presacral masses are a rare entity, with an incidence of 0.014% and can be classified in several categories, including inflammatory, neurogenic, congenital, osseous and miscellaneous. In this case, a neuroendocrine tumor was identified with concern for iliac chain lymphatic and gluteal metastasis. The patient underwent abdominoperineal resection, excision of presacral mass, lymph node biopsy and omental flap. Final pathology returned as a grade II neuroendocrine tumor arising from a tailgut cyst.

A 29 year old female with a ten year history of recurrent perianal, ischiorectal and deep postanal abscesses presents with a presacral mass biopsy proven well-differentiated neuroendocrine tumor. Octreotide scan demonstrated avidity for presacral mass as well as left intergluteal lymph node and two internal iliac lymph nodes. Chromogranin A, neuron-specific enolase and serotonin markers were all negative. The patient was taken to the operating room and underwent abdominoperineal resection, resection of presacral mass and internal iliac nodes with an omental flap.

Neuroendocrine tumors arising from tailgut cysts of the presacral space are rare in nature. In a retrospective study from Great Britain, four of thirty one tailgut cysts had malignant transformation, so it is generally recommended to resect the cysts. In this case, the patient's tumor was a moderately differentiated, Grade II with extensive lymphovascular and perineural invasion. There are no prospective studies showing neoadjuvant therapies in neuroendocrine tumors of the presacral space. According NCCN guidelines, patient is currently asymptomatic with low tumor burden. Recommended treatment at this time is observation with surveillance tumor markers every 3–12 months or octreotide.

**P275****LCA-Preserving Technique Reduces the Anastomotic Leakage Rate in Laparoscopic Mid/Low Rectal Cancer Surgery: Midterm Results from a Single-Center Randomized Controlled Trial**

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Anastomotic leakage has been commonly regarded as one of the toughing postoperative complications in laparoscopic mid/low rectal cancer surgery, attenuating the short-term clinical benefits. The left colic artery (LCA) has been routinely central-ligated in dissection process to guarantee the oncological effects, which may potentially attribute to the postoperative ischemia-induced anastomotic leakage in the patients with left-colic vessel variation, e.g. bypass or absent of Riolan arch. However, no specific study focuses on the surgical benefits of LCA preservation compares to conventional ones. Herein, we conduct a single center randomized controlled trial, demonstrating that LCA-preserving technique shows significant reduction rate of postoperative leakage as well as overall complications comparing to the traditional central-ligation group. No difference in survival rate and recurrence in short term is found between the two groups. The LCA-preserving strategy is proven to be repeatedly safe and feasible, potentially reduce the risk of anastomotic leakage with comparable short-term outcomes. Further investigation is required for both the oncological safety and long-term prognosis for this innovative technique.

**P276****Laparoscopic Surgery for the Very Elderly Patients with Colorectal Cancer**

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**Objective:** An increasing number of laparoscopic surgery are being performed on more elderly patients. The aim of this study was to evaluate the outcomes of laparoscopic resection for colorectal cancer in the very elderly patients.

**Methods:** A retrospective analysis of 28 consecutive patients aged  $\geq$  85 years who underwent curative laparoscopic resection for colorectal cancer between January 2009 and February 2017 was collected. Short-term and oncological outcomes were investigated.

**Results:** The analyzed group included 15 males and 13 females with a mean age of 86.5 (range, 85–94) years. The majority had right-sided tumors and multiple comorbidities [18 (64.3%) and 17 (60.7%), respectively]. Twenty-two patients (78.6%) were diagnosed as over stage II cancers, but 7 patients (25.0%) underwent D3 lymphadenectomy. The mean number of harvested lymph nodes was 15 (range, 1–41). Nine patients (32.1%) developed postoperative complications with delirium (21.4%) as the most frequently observed complaint. Adjuvant chemotherapy was applied for only one patients (3.6%). With a median follow-up time of 17.8 months, the recurrences occurred in 5 patients (17.9%), and 3 of them chose best supportive care.

**Conclusions:** Laparoscopic colorectal resection with modified lymphadenectomy for the very elderly patients is feasible. However, more active adjuvant therapy might improve prognosis.

**P278****Corrosive Proctocolitis: A Case Report**

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Unintentional administration of corrosive enema have occurred after accidental contamination of endoscopes in most patients. But accidental administration of corrosive agents for bowel cleansing can occur. The agents implicated for chemical colitis is 15% Hydrochloric acid and 2% Ethoxylated alcohol. We present a case of corrosive proctocolitis, present with abdominal pain and bloody diarrhea. Endoscopy revealed edema, erythema and friability of colonic mucosa. An experience of successful non-operative treatments had been demonstrated.

**P280****Real-Time 3D Optical Diagnosis of Colorectal Cancer Using Three-photon Imaging**

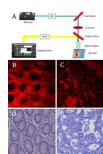
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**Background:** Three-photon imaging (TPI), which was based on the field of nonlinear optics and femtosecond lasers, has been proved to be able to provide the 3-dimensional (3D) morphological feature of living tissues without the administration of exogenous contrast agents. The purpose of this study is to investigate whether TPI could make a real-time histological 3D diagnosis for colorectal cancer compared with the gold standard hematoxylin-eosin (H-E).

**Methods:** This study was conducted between January 2017 and August 2017. A total of 30 patients diagnosed as colon or rectum carcinoma by preoperative colonoscopy were included. All patients received radical surgery. The fresh, unfixed and unstained full-thickness cancerous and the corresponding normal specimens in the same patient, were immediately prepared to receive TPI after surgery. For 3D visualization, the z-stacks were reconstructed. All tissue went through routine histological procedures. TPI images were compared with H-E by the same attending pathologist.

**Results:** The schematic diagram of TPI is shown in Fig. 1A. Peak TPI signal intensity excited at 1300 nm was detected in living tissues. The field of view (FOV) was  $500 \times 500 \mu\text{m}$  and the imaging deep was  $200 \mu\text{m}$  in each specimen. In normal specimens, glands lined regularly and characterized as a typical foveolar, which was comparable to H-E images (Fig. 1B and 1D). In cancerous specimens, irregular tissue architecture and shape were identified by TPI, which was also validated by corresponding H-E images (Fig. 1C and 1E). TPI images can be acquired with a view of 3D visualization. Based on rates of correlation with pathological diagnosis, the accuracy, sensitivity, specificity, positive predictive value, negative predictive value were 95%, 90%, 100%, 100%, 90.9%, respectively.

**Conclusions:** It is feasible to use TPI to make a real-time 3D optical diagnosis for colorectal cancer. With the miniaturization and integration of colonoscopy, TPI has the potential to make a real-time histological 3D diagnosis for colorectal cancer in the future, especially in low rectal cancer.

**P281****Alvimopan Use in Colorectal Resection Patients**

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**Introduction:** Alvimopan (Alvim) is a peripherally acting  $\mu$ -opioid receptor antagonist used to accelerate gastrointestinal functional recovery postoperatively (postop) after bowel resection. The purpose of this retrospective study was to compare the time to first flatus and bowel movement (BM) as well as length of stay (LOS) following elective minimally invasive colorectal resection (CRR) in a group of patients (pts) who received alvimopan perioperatively (periop) vs a group that did not get this agent.

**Methods:** A data review from 2000 to 2015 from 2 IRB approved databases was carried out. Operative, hospital and office charts were reviewed. Routine use of Alvim for elective CRR cases was started in 2013. Besides GI data, preoperative comorbidities and 30 day postop complication rates were assessed. The results with periop Alvim were compared to a no-Alvim group. The Students T and Chi-Square tests were used.

**Results:** A total of 902 pts underwent elective CRR. Alvim was administered periop to 262 pts (29%). The breakdown of indications between groups were similar. Alvim pts were younger (60.4 vs. 63.8 years old,  $p=0.002$ ) and, as regards comorbidities, less likely to have heart disease (CAD 4.1% vs 13.9%, other heart disease 13.2% vs 19.5%) but were otherwise similar. The rate of laparoscopic-assisted (Alvim, 80.9%; No Alvim, 68%) and hand assisted or hybrid operations (Alvim, 19.1%; No Alvim, 32%) were similar. Alvim pts had significantly earlier return of flatus (2.4 vs 2.9 days) and first BM (2.6 vs 3.5,  $p<0.001$  for both) than the No Alvim group. There was also a trend toward a shorter LOS (6.1 vs 6.7 days,  $p=0.05$ ) for the Alvim group. Overall complication rates were similar, however. Alvim pts had lower rates of post-operative ileus (5.3% vs 14.1%,  $p<0.0002$ ), sSSI's (5.8 vs 10%,  $p=0.04$ ), and blood transfusion (7.1 vs 13.0%,  $p=0.01$ ) than the No Alvim group.

**Conclusion:** The two groups compared were largely similar (most co-morbidities, indications, CRR type) with the differences in age and cardiac issues noted. The impact of the higher rates of sSSI's, blood transfusion, and MI in the no Alvim group on GI function is unclear. Pts who received Alvim periop had an accelerated return of bowel function, decreased postoperative ileus and shorter length of stay. These results suggest that Alvim is effective in reducing the postoperative ileus but further study is warranted.

**P282****Laparoscopic Total Proctocolectomy, Results of Different Strategy for FAP and IBD**

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**Background:** Laparoscopic total proctocolectomy (TPC) is selected for minimally invasive surgical treatment of familial adenomatous polyposis (FAP) and ulcerative colitis (UC). Our policy of TPC is no diverting ileostomy for FAP and creating ileostomy for IBD because most of the patients received steroid therapy.

**Objective:** We examined the outcome of laparoscopic TPC according to disease of FAP and IBD (UC and Crohn's disease).

**Methods:** Twenty-three consecutive patients who underwent laparoscopic TPC between April 2007 and March 2017 were examined. The patients were divided into FAP group and IBD group.

**Results:** Seven patients of FAP and 16 patients of IBD (UC 15, Crohn's disease 1) underwent laparoscopic TPC or total colectomy. Among them, 12 patients (FAP 3, IBD 9) were cancer-associated cases. The procedures of the FAP group was TPC with IACA in 6 patients and HALS total colectomy with IRA in 1 patient. The procedures of IBD group were TPC with IACA in 11 patients, TPC with IAA in 2 patients, total colectomy with IRA in 3 patients, of which 5 HALS cases. The mean operative time and blood loss were 318 minutes, 32.0 g in the FAP group and 382 minutes, 86.8 g in the IBD group, respectively. Diverting ileostomy was constructed in 11 patients of only UC group. Early complications of FAP group were observed in 3 cases (postoperative ileus 2, anastomotic leak with conservative treatment 1), and those of IBD were observed in 8 cases (ileus 4, anastomotic leak with conservative treatment 1, abdominal abscess 1, wound infection 1). The median postoperative hospital stay was 12 days in the FAP group and 14 days in the IBD group. Complications requiring reoperation were 2 cases (FAP 1: intestinal obstruction, IBD 1: inflammation of stoma-closure site). No cancer recurrence and mortality were observed. One case of FAP underwent additional transanal mucosal resection due to new lesion of adenoma.

**Conclusions:** Laparoscopic total proctocolectomy for FAP and IBD was performed safely, especially less complications occurred in FAP patients without diverting ileostomy. In addition, follow-up of remaining mucosa is important in IACA and IRA patients.

**P283****Video Endoscopic Treatment of Complex Anal Fistula-Results of Series of 210 Cases**

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Treatment of complex anal fistula has always been a nightmare for surgeons by conventional means. Even the lowest and simple looking fistula at times comes out to be a complex one with high incidence of recurrence above 20%.

Most of the availability diagnostic including MRI is not conclusive and many a times the surgeon remains in a state of confusion as to what is going to come at the operation table.

The conventional treatment modalities also usually leave the patient wounded needing almost 6 to 12 weeks to heal with a risk of sphincter damage and a high risk of recurrence.

We would be presenting the technical details and results of our series of 210 cases of complex anal fistula treated by Video assisted endoscopic therapy.

**P286****The Role of Laparoscopic Primary Tumor Removal for Patients with Stage IV Colorectal Cancer**

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**Introduction:** The role of primary tumor removal in patients with stage IV colorectal cancer (CRC) is still controversial. We assessed the impact of primary tumor removal for patients with stage IV CRC, and evaluated the role of laparoscopic surgery for patients with stage IV CRC.

**Materials and Methods:** One hundred eighty-four patients (male: 105, female: 79, median age: 66 (26–91)) with stage IV CRC who had surgical treatments in Tohoku University Hospital from 2000 to 2017 were retrospectively analyzed. Survival analysis was conducted using Kaplan-Meier methods. The relationship between primary tumor removal and overall survival (OS) was evaluated by Cox-proportional hazards regression models with age, sex, CEA, primary tumor location, metastatic sites and number, metastasectomy, and receipt of systemic chemotherapy.

**Results:** Primary tumor was surgically removed in 147 (80%) patients (group A), however, palliative procedures, such as colostomy or bypass, were carried out in 37 (20%) patients (group B). Three and five-years survival rate were 49% and 25% for group A, 7% and 0% for group B, respectively ( $p<0.0001$ ). Cox-proportional hazards regression models indicated that female (HR: 0.60, 95%CI: 0.41–0.89,  $p=0.0096$ ), primary tumor removal (HR: 0.32, 95%CI: 0.20–0.52,  $p<0.0001$ ), and metastasectomy (HR: 0.26, 95%CI: 0.11–0.53,  $p<0.0001$ ) were associated with improved survival with the patients with Stage IV CRC. In group A, primary tumor of 109 patients (74%) were removed with open-laparotomy (OPEN), on the other hand, that of 38 patients (26%) were laparoscopically removed (LAP). LAP group showed statistically shorter hospital-length of stay after surgery (11 vs 19 days,  $p<0.0001$ ), and less blood-loss (38 vs 309 ml,  $p<0.0001$ ). There was no difference in operative time between the two groups (LAP vs OPEN, 224 vs 214 ml,  $p=0.7535$ ). Furthermore, LAP was associated with a longer survival compared to OPEN group; three and five-years survival rate: 62% and 40% vs 44% and 22%, respectively ( $p=0.0345$ ).

**Conclusion:** Primary tumor removal may improve the outcome of patient with stage IV CRC. Less invasive laparoscopic approach may be beneficial for the patients with stage IV disease who need further immediate treatments for distant metastases.

**P285****Usefulness of Indocyanine Green (ICG) Fluorescence System and Thermography for Evaluating Bloodflow of Intestine in Laparoscopic Anterior Resection**

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**Background:** One of the important causes for anastomotic leakage (AL) in anterior resection is an insufficient blood flow of the stump. The HEMS (Hyper eye medical system) and SPIES (laparoscopic ICG system) can detect the blood flow of fresh organ intraoperatively by injection of indocyanine green (ICG). And thermography also can evaluate the bloodflow less invasively. The aim of this study is to evaluate the usefulness of ICG system and thermography in laparoscopic anterior resection.

**Patients and Methods:** This study retrospectively included 86 patients who underwent laparoscopic anterior resection for colon cancer with double stapling anastomosis procedure. Blood flow evaluation of oral stumps was performed with measurement of fluorescence time (FT) using HEMS and SPIES. And bloodflow was also evaluated by thermography.

**Result:** Evaluation by ICG system: In all cases, the AL rate was 8.1% (7/86 cases). Over 60 FT cases, the AL rate was 60%, higher than that of under 60 s cases and these patients need additional management, covering stoma or additional resection. And in border cases, FT 50 ~ 60 sec, AL rate is 10.0%, higher than under 50 s cases. In these borderline cases, if covering stoma was performed in patients with more than three well known risk factors, the AL rate reduced to 2.6% and false positive was 6.9%. And under 50 s cases, they need no additional management.

Evaluation by thermography: In residual intestine, the temperature was significantly higher than resected intestine (31.5 vs 29.0?,  $p<0.01$ ). And the temperature in FT under 50 s cases was significantly higher than over FT over 50 s cases (26.3 vs 30.8?). The temperature and FT was tended to be oppositely correlated ( $R^2=0.36$ ).

**Conclusion:** Both ICG system and thermography may be useful to avoid anastomotic leakage.

**P287****5-Year Pathologic Complete Response Outcomes in Rectal Cancer Patients Undergoing Neoadjuvant Chemoradiation Therapy: A Community-Based Hospital Study**

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**Introduction:** Some patients who undergo neoadjuvant chemoradiation therapy (CRT) for rectal cancer achieve a pathologic complete response (pCR) in which no tumor cells are discovered during pathologic analysis of the resection specimen. Achievement of pCR is correlated to improved prognoses relative to non-pCR counterparts. Such correlations are not well established in the context of a community-based hospital. The study sought to examine response rates, recurrences, and survivals in locally advanced rectal cancer patients and compare patient outcomes to those achieved at major academic institutions.

**Methods and Procedures:** A single-center retrospective chart review was performed at a local, community-based hospital. Study population consisted of 118 patients with locally advanced rectal cancer treated with neoadjuvant CRT followed by surgical resection. Patients with a history of metastasis, Inflammatory Bowel Disease (IBD), hereditary cancer syndromes, concurrent or prior malignancy, and emergent surgery were excluded.

**Results:** 24 patients (20.3%) achieved pCR in the test population. Across both groups, mean age ( $p=.352$ ), gender ( $p=.254$ ), and ethnicity ( $p=.529$ ) were found to be comparable. Mean interval between CRT and OR ( $p=.116$ ), pre-op stage ( $p=.736$ ), number of nodes ( $p=.208$ ), radiation dose ( $p=.094$ ), tumor location ( $p=.753$ ), and days of follow-up ( $p=.497$ ) presented statistically insignificant differences between groups. At 5 years, 26 non-pCR patients (27.7%) had a recurrence with zero recurrences in the pCR group. 5-year mortality presented 25 non-pCR patients (26.6%) compared to 1 pCR patient (4.17%).

**Conclusion:** A multidisciplinary approach to rectal cancer consisting of standardized preoperative treatment and surgical resection can achieve patient outcomes and survival similar to those of larger academic institutions, even in the context of a community-based hospital.

**P288****Transanal Total Mesorectal Excision Within the Holy Plane for Rectal Cancer**

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**Objective:** The aim of this study was to assess safety and feasibility of total mesorectum excision (TME) within the holy plane based on embryology for rectal cancer.

**Methods:** Prospectively collected data of 36 consecutive patients with rectal cancer who underwent TaTME from November 2014 to August 2017 were enrolled. Surgical outcomes including TME completeness, operative time for TME completion, blood loss, complications, pathological findings and length of hospital stay were assessed.

**Surgical Procedure:** After performing rectal lavage, self-retaining anal retractor was set, and anal dilators were used for an atraumatic introduction of the transanal access devise (GelPOINT path). Three of 10-mm trocars and one of 15-mm trocar were inserted through the GelPOINT path in a quadrant shape. Then the GelPOINT path was introduced through the anal to rectum. After rectosigmoid colon was temporarily clamped using an atraumatic endo bulldog clip, pneumoperitoneum was maintained at 15 mmHg with carbon dioxide via an Air Seal platform. A purse-string suture using a 0 polypropylene with 26-mm rounded needle was performed clock-wise to tightly occlude the rectum with a 3 cm margin distal to the tumor. After irrigation with saline and marking dissection line with tattooing the rectal mucosa distal to the mucosal folds, a mucosal transection of rectum was initiated. Then a full-thickness rectal transection was performed circumferentially. After dissection of rectococcygeal muscle at 6 o'clock and rectourethral muscle in the anterior wall, circumferential sharp dissection within the holy plane was performed. Dissection proceeded between the endopelvic fascia and the prehypogastric nerve fascia in the posterior plane, between the Denonvilliers's fascia and the anterior mesorectum in the anterior plane, and between pelvic nerve and the mesorectum with recognition of the neurovascular bundle in the lateral plane. Then the dissection connected to the abdominal plane via laparoscopic team with working together until TME completed.

**Results:** TME completion performed in 34 (94.4%) patients. Thirty five (97.2%) patients had negative of circumferential resection margin. Mean of TME completion time and blood loss were 146 min and 72 g, respectively. One (2.8%) patient had an intraoperative complication and 7 (19.4%) patients had postoperative complications. No other complications occurred. The length of hospital stay was 12 days.

**Conclusions:** TaTME within the holy plane on based on embryology is a safe and feasible procedure for rectal cancer.

**P289****Colorectal Cancer and Acromegaly: A Case Report and Review of the Current Guidelines**

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**Abstract:** Acromegaly is a debilitating condition marked by excessive production of growth hormone. This leads to disfigurement, cardiopulmonary complications, and increased risk for cancer. With up to a two-fold increased risk of developing colon cancer and worse prognosis for diagnosed patients, earlier and more frequent screening has been recommended. We present a case of a 54-year-old Hispanic male with acromegaly who presented to our hospital with hematochezia and weight loss. A near-obstructing rectal adenocarcinoma with metastasis to the liver was discovered. After completing neoadjuvant chemoradiotherapy, he underwent laparoscopic low-anterior colon resection and simultaneous open hepatic resection. In this case report, we review the literature and current guidelines in screening this high-risk group of patients.

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**P290****A New Strategy of Lymph Node Dissection in Complete Mesocolic Excision (CME) for Laparoscopic Right Hemicolectomy: Feasibility and Outcome**

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**Introduction:** In this study, we discovered that in CME for laparoscopic right hemicolectomy starting at the ileocolic vessel and proceeds along the superior mesenteric artery (SMA) achieved a better oncologic outcome compared with the conventional ones proceeding along the superior mesenteric vein (SMV).

**Methods and Procedures:** 46 patients admitted to a Shanghai minimally invasive surgical center were included from September 2015 to January 2017 and were randomly divided into two groups: study group ( $n = 26$ ) and conventional group ( $n = 20$ ). Operation time, blood loss during surgery, liquid intake time, postoperative hospital stay, postoperative complications within 30 days after surgery, Specimen length, and number of lymph nodes harvested as well as the positive lymph node rate were observed and studied.

**Results:** There was no statistical difference between the two groups with the exception of number of lymph node dissected and the positive lymph node rate for stage III colon cancer. The study group had more lymph node retrieved and also a higher positive rate compared with the conventional group. The mean number of lymph node retrieved of study group was  $21.8 \pm 2.47$ , while the conventional group was  $19.9 \pm 2.24$  ( $P < 0.05$ ). And the positive lymph node rate for study group was 41.6%, the conventional group was 34.4%.

**Conclusion:** When performing the laparoscopic right hemicolectomy, dissecting the lymph node along with the left side of SMA could be achievable and there were no differences of surgical outcomes compared with the conventional ways, while there was a higher number of lymph nodes dissected and positive rate probably leading to a better oncologic outcome.

**P291****A Study on Rectum Cancer Surgery Using Needlescopic instruments**

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**Aims:** We describe laparoscopic surgery for rectal cancer using needlescopic instruments performed at our department.

**Methods:** From 2012 to 2016, 19 cases of rectal cancer underwent surgery using needlescopic instruments: 3 cases at rectosigmoid colon, 5 at upper rectum, and 11 at lower rectum. An umbilical camera port (12-mm) and two needlescopic instruments (EndoReliefTM) were directly punctured into the assistant surgical site. We started with 5 port sites. In low rectum cancer cases, we kept the good pelvic visualization by lifting the peritoneum of the bladder onto the ventral side using the Lone Star Retractor StaySTM.

**Results:** The median age was 70 years (56–91 years), with 9 males and 10 females, and body mass index was  $21.1 \text{ kg/m}^2$  (16–25  $\text{kg/m}^2$ ). Anterior resection was performed in 2 cases, low anterior resection in 7 cases, intersphincteric resection in 4 cases, abdominoperineal resection in 4 cases, Hartmann's procedure in 2 cases, and lateral lymph node dissection in 1 case. In addition, one case of T4b (bladder) was converted from laparoscopic to open surgery. However, there were no cases in which needlescopic instruments were replaced with conventional forceps. Moreover, intraoperative complications related to the forceps were not observed.

**Conclusions:** In rectum cancer surgery, needlescopic instruments leave a small postoperative wound; healing is rapid and the cosmetic result is excellent. Surgical safety is comparable to that using conventional forceps. There is no problem with the rigidity of needlescopic instruments. However, where the shaft is curved, operative control requires attention to mobility and directionality. In low rectum surgery, use of needlescopic instruments is limited due to the curvature of the shaft during the dissection of the anterior rectum wall, but it is possible to maintain a good field of view by using auxiliary equipment. Therefore, more cases could be considered for surgeries using needlescopic instruments with the help of auxiliary equipment.

**P292****Retrospective Review of Immunofluorescence Imaging for Colorectal Anastomoses**

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**Introduction:** Anastomotic leaks are devastating complications of colorectal operations that lead to significant morbidity and potential mortality. Inadequate tissue perfusion is considered a key contributor to anastomotic failure following colorectal operations. Currently, clinical judgment is the most commonly used method for evaluating adequate blood supply to an anastomosis. More recently intraoperative laser angiography using indocyanine green (ICG) has been utilized to assess tissue viability, particularly in reconstructive plastic surgery. This technology provides a real-time evaluation of tissue perfusion and is a helpful tool for intra-operative decisions, particularly in deciding to revise an intended colorectal anastomosis. Our study aimed to determine if there is a statistical significance in colorectal anastomotic leak or abscess rate using ICG compared to common clinical practice.

**Methods & Procedures:** 126 patients undergoing left-sided colorectal operations, between March 2012 and February 2015, were retrospectively reviewed. 55 patients' colorectal anastomoses were evaluated using ICG angiography (ICGA) to qualitatively assess tissue perfusion (ICG group). Peri-operative and post-operative outcomes, including anastomotic leak and abscess rates, were compared to 65 patients who had colorectal operations without ICGa (control group). The primary outcomes of intra-abdominal leak rate and intra-abdominal abscess rate were compared using exact Chi-square tests. The secondary outcomes of 30-days OR return, mortality, and readmission rate were compared using Chi-square tests. All statistical analyses were performed using SAS software.

**Results:** Two leading indications for surgery included malignancy ( $n = 57$ ) and diverticulitis ( $n = 48$ ). The majority of patients either had a low anterior resection ( $n = 75$ ) or sigmoidectomy ( $n = 42$ ). All operations were primarily minimally invasive. No statistically significant difference was seen between the two groups in regards to patient demographics, rate of proximal diversion ( $p = 0.112$ ), and splenic flexure mobilization ( $p = 0.200$ ). Patients in the ICGa group were more likely to have high IMA ligation than in the control group (70.9% vs. 24.4%,  $p$ -value <0.001). Of the ICGa group, 16 of the 55 patients underwent additional colonic resection while 39 of the 55 did not undergo additional colonic resection. There was no statistically significant difference in primary or secondary outcomes between the two groups.

**Conclusion:** ICG angiography has become a helpful adjunct in determining adequate perfusion to an intended colorectal anastomosis. This data is unable to support any difference in patient outcome utilizing this technology over surgeons' visual and clinical assessment. Our results may contribute to larger studies to determine if there is a true difference in anastomotic leak or abscess rate using this technology.

**P293****Completely Medial Access by Page-Turning Approach for Laparoscopic Right Hemi-Colectomy: 6-Year-Experience in Single Center**

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**Objective:** To investigate the feasibility and surgical strategy of complete mesocolic excision (CME) with completely medial access by "page-turning" approach (CMAPA) for the laparoscopic right hemicolectomy.

**Methods and Procedures:** The CMAPA is a modified medial approach of CME, which focus on the exploration of surgical plane instead of the recognition of vessels.

**Surgical Procedures:** (1) Start point: the anatomy projection of ileocolic vessel; (2) Expose the whole trunk of SMV to the level of inferior edge of pancreas before ligating any branches, for the purpose of high tie and verifying their location; (3) Enter the intermesenteric space (IMS) and right retrocolic space (RRCS) with cranial and right extension through transverse retrocolic space (TRCS); (4) Complete mobilize the mesocolon and remove the tumor en-bloc. See Figure 1?2.

**Results:**

Clinical outcome:

From September 2011 to March 2017, there were 72 patients underwent CMAPA in Shanghai Ruijin Hospital. The average operation time was  $135.9 \pm 28.3$  minutes, average blood loss was  $63.2 \pm 32.2$  ml, number of lymph node was  $20.6 \pm 7.7$ , average specimen length was  $23.9 \pm 4.7$  cm, flatus time was  $2.5 \pm 0.8$  days, fluid intake time was  $3.2 \pm 0.8$  days and average hospital stay was  $8.9 \pm 4.7$  days. The overall complications rate was 6.94% (5/72). Compared to traditional medial approach of CME performed in our center, the blood loss, operation time and hospital stay were significantly reduced by performing CMAPA for laparoscopic right hemicolectomy.

**Conclusion:** The advantage of the CMAPA

- (1) To avoid the laparoscopic "leverage effect" and "tunnel effect".
- (2) To make the branches of superior mesenteric vessels more easily recognized.
- (3) To offer surgeons an alternative route entering the TRCS, IMS and RRCS.
- (4) To avoid repetitive flipping of the colon complying with the "no touch" principle, and to lower the requirements of assistants.

**Figure 1:** Anatomy and surgical planes concerning CMAPA.

**Figure 2:** The surgical procedures of CMAPA. A: Start point; B: Dissection of the surgical trunk; C: Exploring the TRCS and RRCS; D: Dissection of lymph nodes and vessels.

**P294****Usefulness of "One-Stop Shop" Simulation for Liver Surgery Using EOB-MRI**

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**Aim:** We have reported a possibility of "One-stop shop" simulation for liver surgery by MRI using gadolinium-ethoxybenzyl-diethylenetriamine pentaacetic acid (EOB-MRI) (Emerging technology, SAGES 2017), which is characterized by (1) one-time examination, (2) no-radiation exposure, (3) demonstration of liver vasculatures including biliary tract, (4) diagnosis of tumors, (5) volumetry and (6) estimation of liver functional reserve in each segment. The aim of this study is to investigate usefulness of "One-stop shop" simulation for liver surgery using EOB-MRI.

**Methods:** Accuracy of liver vasculatures: 3D-reconstruction of dynamic EOB-MRI imaging was done by SYNAPSE VINCENT software (FUJIFILM Medical Co., Ltd, Japan), using a manual tracing method. Visualization of hepatic vessels in EOB-MRI was compared with that in dynamic CT in 10 patients.

**Assessment of liver functional reserve:** The standardized signal intensity (SI) of each segment was calculated by SI of each segment divided by SI of the right erector spine muscle. The standardized total liver functional volume (TLFV) was calculated by  $\sum [k=1 \text{ to } 8] (\text{standardized SI of segment } k) \times \text{volume of segment } (k)$  divided by body surface area. The following formula of resection limit was established using 28 normal liver cases (70% of the liver is resectable) and 5 unresectable cirrhotic patients such as recipients of liver transplantation (0% of the liver is resectable). The estimated resection limit (%) =  $70\% \times (\text{the standardized TLFV of the patient} - 962)/1,076$ . This formula was validated using other 30 patients who underwent hepatectomy.

**Results:** Accuracy of liver vasculatures: The liver simulation by EOB-MRI succeeded in demonstrating hepatic vasculatures including biliary tract, diagnosis of hepatic tumors, and volumetry without any radiation exposure. Regarding the vessel anatomy at hilar area, biliary tract was more clearly visualized in EOB-MRI. Regarding the hepatic artery, right and left hepatic arteries were well visualized in all cases, however, small-sized middle hepatic artery was visualized in only one out of 10 patients.

**Assessment of liver functional reserve:** As a result of validation of the 30 patients, one patient having resection volume with over the resection limit died of liver failure, however, the other 29 cases within their resection limits did not suffer from liver failure.

**Conclusion:** "One-stop shop" liver surgery simulation could contribute to safety of liver surgery such as laparoscopic hepatectomy, because of no radiation exposure, accurate assessment of anatomical variations especially biliary tract, and helping decision making of resection volume.

**P295****Ten Years of Live Broadcast Laparoendoscopic Surgeries for Students Exploring Health Careers**

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**Background:** A national shortage of nearly 400,000 MDs and RNs is projected by 2025. To help meet this need, in 2010 the American Hospital Association recommended not only improving workflow and staff retention, but attracting a new generation of healthcare workers. With this impetus, our group developed a multidisciplinary program to broadcast live operations to high school students starting in 2008. We are currently in our 10th year of the curriculum.

**Methods:** An educational grant from Highmark BlueShield supported technical upgrades to allow streaming of live procedures to a remote studio audience at a prominent center for science and the arts, as well as for independent research evaluation through follow-up questionnaires. We selected commonly-performed and generally uncomplicated elective procedures, starting with laparoscopic gastric bypass in Year 1; expanding to include robotic and laparoscopic hysterectomy in Year 2; sleeve gastrectomy in Year 3; robotic nephrectomy in Year 4; cholecystectomy in Year 5; and then adding endoscopic therapeutic interventions. Students received pre-visit teaching modules including images showing key steps of the procedure to be viewed. The in-studio program was hosted by an education specialist from the science center and a surgical resident from our institution, with laparoscopic instruments available for manipulation by participants. Participants then viewed a video highlighting the roles of all healthcare providers involved in the specialty to be featured, including nurses, physicians, dietitians, psychologists, technologists, etc. Live questions and answers were then encouraged between students and surgeons during the surgery broadcast. The program also expanded from high schools to vocational-technical colleges and nursing schools.

**Results:** During the 2008–2009 academic year there were 6 sessions presented to 11 schools, with 421 student participants. By the 2016–2017 year this increased to 19 sessions presented to 55 schools, with 1721 participants. In sum, throughout the first 9 years of the program, there were 395 schools attending, with a total of 11,351 participants. Of polled high school participants, 63% of responders acknowledged considering a career in healthcare after this experience.

**Conclusion:** Over 10 years, our program has grown steadily in popularity such that schools from several counties attend and regularly return, and we have been asked to expand the program to create a surgical summer camp for students interested in science and technology. Live broadcast surgery in an elective, minimally invasive format provides unique visibility and access to surgical procedures for student audiences and promotes future interest in healthcare careers.

**P296****Improving Trainees' Self-assessment Through Gaze Guidance**

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**Introduction:** Effective learning to become competent in surgery depends on a trainee's ability to accurately recognize their strengths and weaknesses. However, a surgical trainee's self-assessment is poorly correlated with expert assessment. This study aimed to improve self-assessment by the visual gaze guidance provided through telestration during laparoscopic training. We hypothesized that visual conveyance of where to look or perform actions on the laparoscopic video enhances the trainees' awareness of the gaps in their skills and knowledge.

**Methods and Procedures:** A lab-developed telestration system that enables the trainer to point or draw a free hand sketch over a laparoscopic video was used in the study (Fig. 1). Seven surgical trainees (1 surgical fellow, 1 research fellow, 2 PYG-2 and 3 PYG-1) participated in a counterbalanced, within subjects controlled experiment, comparing standard guidance with telestration-supplemented guidance. The trainees performed four laparoscopic cholecystectomy tasks – mobilizing cystic duct and artery, clipping the duct, clipping the artery, and cutting the duct and artery, on a laparoscopic simulation. Performance assessment, adapted from the global rating scale (GRS) instrument, was completed by the trainers and trainees at the end of each task. The mean self-assessment scores were compared with the trainers' scores by the linear mixed model, where the trainees' performance indicated by the trainers' scores was control. The assessment alignment was evaluated by Spearman's Rho.

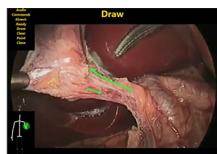


Figure 1. User interface of the telestration system.

**Results:** The trainers' scores were significantly lower than the self-assessment scores in the standard guidance, while the scores of the trainers and trainees were much more similar (Fig. 2).

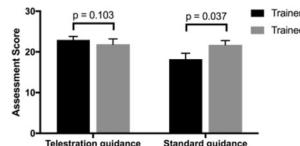


Figure 2. Mean assessment scores.

The correlation between the trainers' and trainees' assessment in telestration guidance was high ( $r=0.852$ ,  $p<0.001$ ), compared to the standard guidance ( $r=0.569$ ,  $p=0.03$ ). The correlation comparison for each GRS criterion shows a significant increase ( $p=0.005$ ) in the assessment alignment for depth perception in telestration guidance ( $r=0.90$ ,  $p<0.001$ ), compared to the standard guidance ( $r=0.30$ ,  $p=0.31$ ) (Fig. 3).

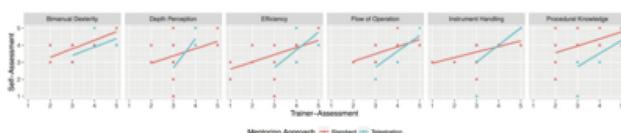


Figure 3. Scatter plots for the performance assessment between trainers and trainees.

**Conclusions:** The visual gaze guidance improved the alignment of assessment between the trainer and trainees, especially for the assessment alignment in depth perception. For visual gaze guidance to become an integrated part of the training, further work needs to be conducted to understand how gaze guidance change the nature of the training process.

**P297****Applying to Surgical Residency: What Makes the Best Candidates?**

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**Objective:** While quotas for Canadian surgical residency programs are at their lowest point in ten years, the number of Canadian graduating medical students is at an apogee. This year, only 288 spots in surgical residency programs were available for 2893 students applying to CARMs. Undergraduate medical students individually collect anecdotal information regarding what influences admission to their surgical subspecialties of interest, as scarce literature covers the topic. We thus surveyed surgeons and residents to analyze the relative importance of modifiable factors and innate attributes in the selection of new surgical residents.

**Methods:** An electronic survey was sent to all surgeons and surgical residents affiliated with the University of Montreal. Participants were asked to specify their surgical subspecialty, their status, their level of experience and whether they were an active member of a residency selection committee. The subjective importance of predefined application elements and candidate qualities was assessed using 5-point Likert-type items.

**Results:** Of the 510 surgeons and 207 residents to whom the survey was sent, 136 (26.9%) and 91 (44.0%) completed the survey. Evaluations of elective rotations and evaluations of core rotations were considered very important by 79.7% and 62.9% of responders respectively. Regarding letters of recommendation, the content was rated very important (58.8%) more often than the notoriety of the author (25.6%). Networking with key surgeons was considered the least important element to prioritize with 23% of negative assessments. With regards to the fundamental qualities of surgical candidates, the extremes were "clinical judgement" with 90.1% and "innate technical ability" with 26.4% of responders rating them very important. No significant differences in responses were observed between staffs and residents, between members and non-members of selection committees, between different levels of surgical experience and between surgical subspecialties.

**Conclusion:** Clinical judgement and performance in core and elective rotations along with strong personalized letters of recommendation should be prioritized by medical students aiming for a surgical career.

**P298****Simple and Economical Endoscopic Surgery Training Device Made of Frozen Fruit and Agar**

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**Background and Objective:** Many types of training devices had been proposed since the early days of endoscopic surgery. However, they are too expensive for daily training of novices. We developed a simple and economical training device made of frozen fruit and agar.

**Material and Methods:** To make this device, 6 g of agar powder was added to 300 mL of boiling water and boiled for 2 min. The solution was then poured into a stainless steel tray containing frozen blueberries and lychees and refrigerated for 2 h. Basic maneuvers required during endoscopic dissection and resection of a tumor with laparoscopic forceps and electrosurgical devices were then performed using this agar model in a conventional laparoscopic training box.

**Results:** Using this model, endoscopic dissection and enucleation of a tumor with an electrosurgical device could be practiced repeatedly with minimal expense and preparation. The time required for production of this model was less than 15 min and the cost of one training session was approximately US\$1.50.

**Conclusion:** We have developed a simple and economical training model for endoscopic surgery made of frozen fruit and agar that can be used repeatedly for training in dissection and resection of tumors using electrosurgical devices. This device can be used for basic training in a variety of surgical procedures.

**P299**

**Usefulness of Mirror-Reversed Images of Laparoscopic Surgery of Patients with Normal Anatomy for Preoperative Surgical Simulation for a Laparoscopic Treatment of Early Gastric Cancer in a Patient with Situs Inversus Totalis**

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**Background:** Situs inversus totalis (SIT) is a rare congenital anomaly and a challenging condition for laparoscopic surgeries because standardized strategy to overcome such anatomical difficulties. Mirror-reversed video images of laparoscopic surgeries for patients with normal anatomy could help to develop surgical strategies for patients with SIT. We had a chance to evaluate this idea with a treatment of a patient of early gastric cancer, and describe the surgical results of the case.

**Patient and Methods:** Seventy-two-year-old women with a history of SIT was referred to our department for the treatment of early gastric cancer, and laparoscopic distal gastrectomy with D1+ lymphadenectomy was scheduled. A video record of the same surgery for a patient with similar physical attribute performed before then was retrieved, and was edited with a computer into full length, totally mirror-reversed images of the surgery. Designated operator and assistant simulated the operation using the video several times before surgery.

**Results:** Laparoscopic distal gastrectomy was performed with D1+ lymphadenectomy while the operator was on the left side of the patient and the assistant on the other side, being opposite positions as usual. Laparoscopic B-1 reconstruction was followed using “Delta anastomosis” technique reported by Kanaya et al. Total laparoscopic procedures were completed with the operation time of 250 minutes and the blood loss below measurable limits. No appreciable complications were observed after surgery and the patient was discharged on postoperative day 12. No recurrence of the disease was detected until 5 years after surgery.

**Conclusion:** Although further validation is unlikely because of a rare incidence of this anatomy, the same technique would be recommended for one of the preoperative preparations for similar cases.

**P300**

**Surgical Simulation Curriculum Gives Residents Confidence and Transferable Skills to the OR. - The Results of Surgical Simulation Perception Survey -**

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**Background:** Surgical simulation is thought to provide a basis for improvement of resident surgical skill training, in the safety of a simulation setting. It is unclear whether surgical skills learned in a simulation curriculum actually contribute to the improvement of surgical skills when transferred to the OR.

**Methods:** A ten question online survey was sent to attending surgeons and residents. The questionnaire focused on 5 domains: confidence, independence, transferable skills, improvement of skills/knowledge and time spent on the simulation curriculum. Evaluation data was collected and anonymously analyzed.

**Results:** A total of 41 (22 residents and 19 attending surgeons) responded. Results showed that residents spent significantly more time in the simulation lab than attending surgeons during their residency ( $p < 0.0001$ ). Residents felt more strongly than attending surgeons that confidence in the OR improved because of simulation (86% vs. 53%,  $p = 0.0367$ ). Residents also thought that skills learned in simulation are more transferable to the OR compared to opinions of attending surgeons (95.5% vs. 68.4%,  $P = 0.0364$ ). There were no differences in opinion between attending surgeons and residents in believing the time spent on the simulation curriculum is appropriate (78.0%), that simulation is useful for improving surgical skills (95.1%), and that simulation is helpful for building surgical knowledge (80.5%).

**Conclusion:** A surgical simulation curriculum improves surgical residents' confidence. Skills that residents learn in the simulation curriculum are more transferable to the OR than attending surgeons may have previously believed.

**P301**

**Playing to Your Skills: A Randomized Controlled Trial Evaluating a Dedicated Video-Game for Minimally Invasive Surgery**

Cuan M Harrington, Vishwa Chaitanya, Patrick Dicker, Oscar Traynor, Dara Kavanagh; Royal College of Surgeons in Ireland

**Background:** Video-gaming demands elements of visual attention, hand-eye coordination and depth perception which may be contiguous with laparoscopic skill development. General video gaming has demonstrated altered cortical-plasticity and improved baseline/acquisition of minimally invasive skills. The present study aimed to evaluate for skill acquisition associated with a commercially-available dedicated laparoscopic video-game (Underground) and its unique (laparoscopic-like) controller for the Nintendo® Wii U™ console.

**Methods and Procedures:** This single blinded randomized controlled study was conducted with twenty laparoscopically naïve student volunteers of limited (<3 hours/week) videogaming backgrounds. Baseline laparoscopic skills were assessed using four basic tasks on the Virtual Reality (VR) simulator (LAP Mentor™, 3D systems, Colorado, USA). Participants were randomized to two groups: Group A were requested to complete five hours of video-gaming (Underground) per week and Group B were to avoid gaming beyond their normal frequency. After four weeks participants were reassessed using the same VR tasks. Changes in simulator performances were assessed for each group and for intragroup variances using mixed model regression.

**Results:** Significant inter and intragroup performances were present for the video-gaming and control group across the four basic tasks. The video-gaming group demonstrated significant improvements in thirty-one of the metrics examined including dominant ( $p \leq 0.004$ ) and non-dominant ( $p < 0.050$ ) instrument movements, pathlengths ( $p \leq 0.040$ ), time taken ( $p \leq 0.021$ ) and end score ( $p \leq 0.046$ , [task-dependent]). The control group demonstrated improvements in fourteen of these measures. The video-gaming group demonstrated significant ( $p < 0.05$ ) improvements compared to the control in five metrics. Despite encouraged game-play and the console in participants' domiciles, voluntary engagement was lower than directed due to factors including: game enjoyment (33.3%), lack of available time (22.2%) and entertainment distractions (11.1%).

**Conclusion:** Our work revealed significant value in training using a dedicated laparoscopic videogame for acquisition of virtual laparoscopic skills. This novel serious-game may provide foundations for future surgical developments on games consoles in the home environment.

**P302**

**Innate Predictors of Acquisition and Retention of Fundamentals of Laparoscopic Surgery (FLS) Task Performance**

Cuan M Harrington, Patrick Dicker, Oscar Traynor, Dara Kavanagh; Royal College of Surgeons in Ireland

**Background:** Minimally invasive surgery poses a unique learning curve due to the requirement for non-intuitive psychomotor skills. Programmes such as the Fundamentals of Laparoscopic Surgery (FLS) provide mandatory training and certification for many residents. However, predictors of FLS performance and retention remain to be described. This single-centre observational study aimed to assess for factors predicting the acquisition and retention of FLS performance amongst a surgically naïve cohort.

**Methods:** Laparoscopically naïve individuals were recruited consecutively from preclinical years of a medical university. Participants completed five visuospatial and psychomotor tests followed by a questionnaire surveying demographics, extracurricular experiences and personality traits. Individuals completed a baseline assessment of the five FLS tasks evaluated by FLS standards. Subsequently, participants attended a 270-minute training-course over week one and two on inanimate box trainers. A post-training assessment was performed in week three to evaluate skill acquisition. Participants were withdrawn from laparoscopic exposure and retested at four one-month intervals to assess skill retention.

**Results:** Forty-nine eligible participants were enrolled with 35 (71.4%) and 32 (65.3%) completing the acquisition and retention phases respectively. Mean age of participants was 19.3 ( $\pm 1.2$ ) years with 68.6% female predominance. Participants demonstrated significant improvements in all five tasks during the acquisition ( $r = -0.26$  to  $-0.62$  [ $p < 0.05$ ]) and retention ( $r = -0.38$  to  $-0.61$  [ $p < 0.01$ ]) periods. Significant predictors of skill acquisition involved the aptitudes: card rotations for intracorporeal knot ( $p = 0.027$ ) and combined tasks ( $p = 0.024$ ) and cube comparisons for extracorporeal knot ( $p = 0.040$ ). During the skill retention phase: Card rotations significantly predicted higher skill retention across all five tasks ( $p < 0.05$ ). Cube comparisons for Tasks 1–2, 4–5 ( $p < 0.05$ ), PicSOR for peg-transfer ( $p = 0.017$ ) and grooved pegboard for peg-transfer ( $p = 0.023$ ) and ligating-loop ( $p = 0.038$ ) tasks. Those of sporting, musical instrument, video-gaming background or of higher competitive personalities demonstrated no benefit in skill acquisition.

**Conclusions:** The visuospatial aptitudes of card rotations and cube comparisons predicted significant FLS performance for skill acquisition and retention. Extracurricular experiences and competitive personality demonstrated no consistent benefits. The application of similar aptitudes within selection criteria to surgical residency should be further considered.

**P303**

**Virtual Electrosurgery Skills Trainer (VEST™) Bipolar Energy Module May be Used with FUSE Curriculum to Improve Safety in Using Bipolar Devices**

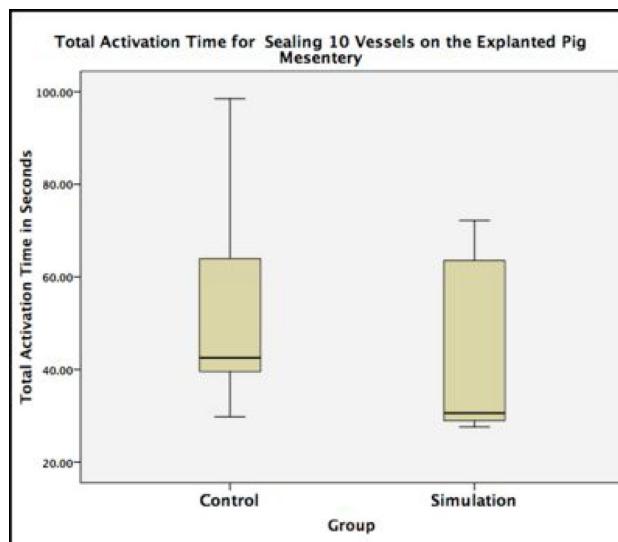
Ganesh Sankaranarayanan, PhD<sup>1</sup>, Carlos Lopez, PhD<sup>2</sup>, Nicholas Milet<sup>2</sup>, Rehma Shabbir, MBBS<sup>1</sup>, Coleman Odlozil<sup>1</sup>, Darius Sherman<sup>1</sup>, Jaisa Olasky, MD<sup>3</sup>, Katerina Wells, MD<sup>1</sup>, Sanket Chauhan, MD<sup>1</sup>, James Fleshman, MD<sup>1</sup>, Suvarnu De, ScD<sup>2</sup>, Daniel B Jones, MD<sup>4</sup>; <sup>1</sup>Baylor University Medical Center at Dallas, <sup>2</sup>Rensselaer Polytechnic Institute, <sup>3</sup>Mt Auburn Hospital, <sup>4</sup>Beth Israel Deaconess Medical Center

**Introduction:** Bipolar energy can cause thermal injury to adjacent organs when used improperly. SAGES FUSE curriculum provides didactic knowledge on principles and best practices for safety, but there is no hands-on component to practice these skills. The objective of this study is to compare the effectiveness of the VEST™ Bipolar training module in addition to the FUSE Curriculum.

**Methods and Procedures:** The study was a mixed design with two groups, control and simulation. After a pre-test that assessed their baseline knowledge, the subjects were randomized to two groups. Both groups were given a 10 min presentation, reading materials from the FUSE manual and an online didactic module on bipolar energy. The simulation group also practiced on the simulator for one session that consisted of five trials on the effect of activation time on thermal damage and the importance of providing a margin of safety by sealing short gastric vessels. After one week the performance of both groups was assessed using a post-questionnaire. One week after the post-test both groups performed sealing of 10 vessels on an explanted porcine mesentery with vessels perfused. Their performance was videotaped and their activation times were recorded. A total safety score was calculated by assessing the proximity of the location of activation to the intestine by two independent raters. Wilcoxon - Signed Rank and Mann-Whitney U tests were used to assess difference within and between groups.

**Results:** A total of 16 residents (8 in each group) participated in this IRB approved study. Median test scores for both groups increased (Simulation, p=0.041 and Control, p=0.027). No difference was found between the two groups in their pre-test ( $p=1.0$ ) and post-test ( $p=0.955$ ) scores indicating learning. The median total activation time for control group was higher (42.55 s) compared to simulation (30.6 s) but was not statistically significant ( $p=0.336$ ). There was a moderate agreement between two raters for margin of safety ( $\kappa=0.58$ ,  $p<0.001$ ). Total safety scores showed no difference between the two groups ( $p=0.573$ ).

**Conclusions:** Subjects with simulation training had lower activation time compared to control. Training for margin of safety requires more simulation refinement. Small sample size and variations in the explanted models contributed to variability in data but even with small sample size, simulation training along with the FUSE curriculum trended towards being more beneficial than the FUSE curriculum alone.

**P304**

**The International Laparoscopic Advancement Program: Evaluating the Surgical Education Environment in Mexico**

Lauren M Baumann, MHS, MD<sup>1</sup>, Rodrigo Prieto, MD<sup>2</sup>, Eduardo Moreno-Paquentin, MD<sup>3</sup>, Raymond R Price<sup>4</sup>, Jeffrey Hazey, MD<sup>5</sup>, Katherine A Barsness, MD<sup>1</sup>; <sup>1</sup>Ann & Robert H. Lurie Children's Hospital, <sup>2</sup>University of Guadalajara, <sup>3</sup>Centro Médico ABC, <sup>4</sup>University of Utah, <sup>5</sup>Ohio State University Medical Center

**Introduction:** The International Laparoscopic Advancement Program (iLAP) is a collaborative initiative between the SAGES Global Affairs Committee and the Asociación Mexicana de Cirugía General, that aims to build educational infrastructure and standardize training and education in laparoscopy throughout Mexico. iLAP participants engage in didactic and hands-on modules in educational theory, laparoscopic techniques, and simulation based education (SBE), and then develop and implement a 1-day SBE course for local trainees. The purposes of this study were to understand the existing educational environment at a single institution in Mexico and measure the changes in perceptions, attitudes, and engagement in surgical education after an intensive training course.

**Methods and Procedures:** All 13 faculty and 13 of 25 general surgery resident participants completed a survey that contained 7 items designed to assess the existing educational environment at a large, public hospital in Mexico. Using a 5-point Likert scale, residents self-rated the quality of faculty feedback and the learning environment within their institution (1=strongly disagree, 3=neutral, 5=strongly agree). Faculty rated their perceptions of the same educational themes. Upon completion of a faculty-led simulation course, residents rated the educational environment during the course. Faculty provided additional qualitative feedback. Descriptive analyses were performed. IRB-exemption was obtained through Lurie Children's Hospital.

**Results:** Discordance existed in perceptions of the existing educational environment. The greatest disparity between resident and faculty perceptions included "faculty provide sufficient feedback in the operating room" (31% vs. 100%), "faculty promote an active learning environment" (38% vs. 85%), and "residents may ask questions without fear of negative evaluation" (46% vs. 100%). Faculty and residents agreed with "residents are sometimes afraid to speak up in the operating room for fear of retaliation" (46% each). Post-course evaluations (n=19) revealed universal improvement in all educational themes during the simulation course. Qualitative feedback revealed most faculty plan to incorporate open communication and safe learning into their practice. Residents were equally positive, with 100% optimistic that they will see changes within the educational environment.

**Conclusions:** Significant discordance exists in resident and faculty perceptions of the educational environment at a large teaching hospital in Guadalajara, Mexico. After participation in the iLAP course, residents noted demonstrable change in the faculty approach to education and feedback, and both faculty and residents expressed optimism for increased engagement in education. The immediate successes of the iLAP initiative should be followed over time, as the ultimate measure of success is sustainability and scalability throughout Mexico.

**Table 1.** Percent agreement with descriptions of the existing educational environment by faculty and residents pre-course, and residents post-course.

Question	Baseline Faculty	Baseline Resident	Post-course Resident
Residents have sufficient instruction from faculty in the operating room or simulation lab.	100%	31%	100%
Faculty feedback helps residents improve performance in the operating room.	100%	77%	100%
The faculty and staff at my institution are interested in resident education.	92%	69%	100%
Residents feel that asking questions may negatively affect a faculty or staff member's evaluation of their performance.	100%	46%	100%
The faculty or staff at my institution sometimes talk down to or belittle other residents or medical trainees.	54%	77%	95%
The faculty and staff at my institution create an environment that encourages active learning for residents.	85%	38%	**
Residents are sometimes afraid to speak up in the operating room for fear of retaliation.	46%	46%	**

\*\*Not assessed during course

**P305****Development and Preliminary Validation of a Novel Formative Assessment Tool for Laparoscopic Anterior Resection**

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**Background:** Laparoscopic anterior resection is technically challenging and the learning curve is long. Well-designed formative assessments can provide trainees effective and constructive feedback, an important element in efficient learning. Previously reported assessments for laparoscopic colorectal procedures were developed for summative assessment. We aimed to develop a formative assessment tool to evaluate competence and provide trainees with effective feedback in laparoscopic anterior resection.

**Methods:** The assessment tool was developed by an expert panel from McGill University affiliated hospitals. The procedure was deconstructed into a series of sequential steps including general domains, surgical principles, injury prevention and technical skills specific to laparoscopic anterior resection. The tool contains 12 discrete items with global rating scales for each step of the operation; each domain was scored using a 5-point Likert scale, with anchors for scores of 1, 3 and 5. Each operation was assessed through direct observation in the operating-room by the attending, a trained observer, and trainees themselves.

Intraclass correlation coefficients (ICCs) were calculated to estimate interrater reliability for (1) attending surgeon and trained observer, (2) attending surgeon and self-assessment, and (3) trained observer and self-assessment. Internal consistency was measured using Cronbach's alpha. Comparison between training levels was done using Mann-Whitney U-test. The Global Operative Assessment of Laparoscopic Skills (GOALS) was also used to assess trainees' general laparoscopic skills. Spearman's correlation was used to determine association between GOALS and this procedure-specific tool. Overall usefulness of this tool was evaluated using a 10 cm Visual Analog Scale.

**Results:** In this pilot study, fourteen operations, performed by 5 experienced surgeons and 5 trainees were assessed. The ICC between (1) attending surgeon and observer was 0.77 (95% CI 0.26 to 0.93) (2) observer and self-assessment was 0.74 (95% CI 0.30 to 0.92), and (3) attending surgeon and self-assessment was 0.43 (95% CI -0.11 to 0.79).

The internal consistency of the items was excellent (Cronbach's  $\alpha=0.93$ ). There was a significant difference in median total score between experienced surgeons and trainees ( $87.2 \pm 9.4$  vs.  $68.8 \pm 9.3$ ;  $p=0.016$ ). There was strong correlation ( $r=0.884$ ) between GOALS and this procedure-specific score. Overall usefulness of this assessment tool was rated as  $7.4 \pm 1.7$ . All assessments were completed in about 5 minutes.

**Conclusions:** We present a new procedure-specific formative assessment tool for laparoscopic anterior resection and provide preliminary evidence of its reliability and validity. This formative assessment tool could be used for constructive feedback and tracking performance in competency-based surgical training.

**P306****A Cognitive Task Analysis Approach Toward the Design of a Virtual Reality Simulator for Endoscopic Submucosal Dissection**

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**Introduction:** One of the key challenges to the proliferation of endoscopic submucosal dissection (ESD) in the West has been a lack of training platforms. Therefore, the Virtual Endoluminal Surgery Simulator (VESS) is being developed as a training tool for ESD. The aim of our study is to inform the design of VESS using Cognitive Task Analysis (CTA), which is a human factors engineering framework to describe practitioners' mental models and cognitive processes and incorporate insights into the simulator's design.

**Methods and Procedures:** CTA-based interview questions were developed to probe the cognitive challenges and strategies employed at each stage of the ESD procedure. Six ESD practitioners were interviewed for varying lengths of time. Two of these interviews were conducted simultaneously during an observation of a training workshop where the CTA participants were instructors (total observation time was five hours, and interview time was  $\sim 60$  minutes). Another interview was conducted during observation of ESD procedures (total observation time was 22 hours, and interview time was  $\sim 110$  minutes). Participants had varying levels of experience in ESD, with 4 of them being 'super-experts' (exclusively ESD exponents), 1 an 'expert' and 1 a fellow. A CTA of the data is currently being conducted to systematically inform design of functionalities in the simulator.

**Results:** Analysis of our data highlights a few prominent themes at each stage of ESD: goals, challenges (e.g., avoiding perforation of muscularis); points of decision-making (e.g., partial or full incision for boundary demarcation); skills involved (e.g., dissection); and ambiguity (e.g., unclear lesion boundaries). Participants also described risks associated with each stage of ESD and strategies to prevent or overcome the same.

**Conclusions:** Qualitative data for a CTA were collected through observations and interviews of ESD practitioners. Preliminary analysis has indicated prominent themes to consider in the design of the training simulator. The next step in the study is to conduct a full-scale CTA of ESD based on the current data. The ultimate benefit of the CTA would be to incorporate the results into informing the design of VESS in a way that is compatible with the mental models of ESD trainees, thus enhancing the fidelity and effectiveness of the simulator.

**P307****Learning Curves to Measure Proficiency in Colonoscopy Training Amongst Surgery Trainees: A Novel Competency-Based Approach**

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**Background:** Colonoscopy is an important diagnostic and therapeutic procedure in the management of colonic disease; achieving competence during residency is an integral part of performing high-quality colonoscopy in-practice, regardless of specialty. There is debate and controversy however, regarding what, if any, number of procedures achieves said proficiency. Furthermore, there is significant heterogeneity in the current guidelines and studies published to-date on the definition of competence in colonoscopy.

**Objective:** To determine individualized learning curves as an alternative to 'number of procedures' for assessing colonoscopy competence.

**Methods and Procedures:** This is a multi-institutional prospective cohort study involving eleven surgical trainees (novice endoscopists). The main outcome, colonoscopy competence, was assessed by determining the independent colonoscopy completion rate (ICCR), the number of procedures required to reach 90% independent colonoscopy completion and polyp detection rate. Individual and overall ICCR were calculated using moving average analysis.

**Results:** Eleven second-year general surgery residents performed a mean [SD] 229 [91] colonoscopies. The individual and average learning curves follow a logarithmic pattern. By moving average analysis, the residents reached an ICCR of 90% at 338 procedures. The mean ICCR was 65.9%, 84.2% and 87.1% after 100, 200 and 300 procedures, respectively. The polyp detection rate was 19.94 [4.76] %. The mean [SD] percentage of colonoscopies with polyps removed by the resident was 25.66 [0.0962] %. Four of eleven (36%) residents reached a 90% ICCR before 200 procedures, while 5/11 (45%) reached this rate overall.

**Limitations:** Only assessed surgical trainees, lacks comparison with gastroenterology fellows.

**Conclusions:** While a benchmark for a minimum number of procedures may be necessary to allow supervisors to adequately assess performance, it is difficult to determine what number is optimal. There appears to be significant heterogeneity in both overall number of colonoscopies completed by each resident, as well as the mean ICCR and the number of procedures required to reach the current benchmark for competency. The use of learning curves allows real-time tracking of progress and training tailored to the individual, as we move forward in the era of competency-based medical education.

**P308**

### **Creation of an Operative Robotic Index to Evaluate Novice Robotic Surgeons Using a Combination of Objective Measurements and CUSUM Analyses**

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**Background:** With the growing popularity of robotic-assisted surgery, new methods for evaluation of technical skill are necessary to determine when a surgeon is qualified to perform an operation independently. Current evaluation methods are limited to 5 point Likert scales which require a degree of subjective scoring. Surgeons in training need an objective method of evaluation to view progress and target areas for improvement. One method of objectively evaluating surgical performance is a cumulative sum control chart (CUSUM). By plotting consecutive operative outcomes on a CUSUM chart, surgeons can view their learning curve for a given task. Another method of objective evaluation is the dV Logger®, or “Black Box,” which records objective measurements directly from the da Vinci® system.

**Methods:** We followed two HPB fellows during dry lab simulation of 40 robotic-assisted hepatojejunostomy reconstructions using biotissues to model a portion of a Whipple procedure. We simultaneously recorded objective measurements of dexterity from the da Vinci® system and performed CUSUM analyses for each procedural step. We modeled each variable using machine learning (a self-correcting and autoregressive modeling tool) to reflect the fellows' learning curves for each task. Statistically significant objective variables were then combined into a single formula to create an Operative Robotic Index (ORI).

**Results:** Variables that significantly improved over the course of the simulation included completion time ( $p=0.017$ ), economy of motion in arm 1 ( $p=0.001$ ), number of times head was removed from the console ( $p=0.001$ ), total time left master manipulator was active ( $p=0.005$ ), total time right master manipulator was active ( $p<0.001$ ), and total time that any arm was active ( $p<0.001$ ). The inflection points of our CUSUM charts and plots of objective variables both showed improvement in technical performance beginning between trials 14 and 16 [Fig. 1 and Fig. 2]. The Operative Robotic Index showed a strong fit to our observed data and improved with additional trials ( $R^2=0.796$ ). [Figure 3].

**Conclusions:** In this study we identified objective variables recorded by the da Vinci® system which correlated with the technical dexterity of fellows during a robotics dry lab. We broke a complex procedure down in stepwise fashion with CUSUM analyses to determine targets for improvement. Using variables which correlated with the improved performance of the fellows, we effectively modeled the learning curve with the creation of an Operative Robotics Index (ORI). This study successfully models the learning curve of novice robotic surgeons using a novel combination of objective measures.

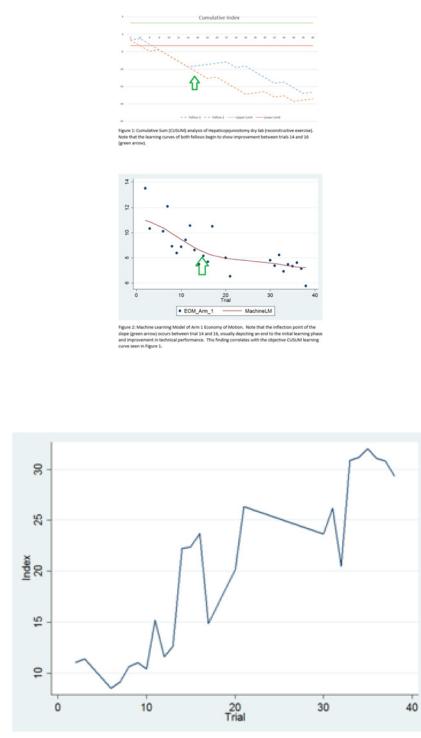


Figure 3: The combined Operative Robotic Index (ORI) of fellows showed significant improvement over the course of 40 Hepatojejunostomy reconstructive exercises

**P309**

### **Current Status of Robotic Surgery Training Within General Surgery Residency**

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**Introduction:** Robotic surgery is a specialized skill which requires time and resources to master. In a general surgery residency program that seeks to train competent surgeons in both open, laparoscopic and endoscopic techniques it is difficult to see where adding robotic training will be of benefit and at what cost this will be to the remaining surgical skills. We therefore sought to ascertain robotic surgery's current role in the training of new general surgeons by soliciting the opinions of current general surgery program directors on the role of robotic surgery at their respective institutions.

**Methods:** An IRB approved survey was created and sent to General Surgery program directors across the country to assess how robotic surgery training is being integrated into current surgical training. The survey was sent via email to publicly available email addresses from the ACGME website of program directors. It was voluntary in nature and consisted of questions regarding current status of robotic training in Residency as well as future goals.

**Results:** Overall response from our PD survey were at 12% of the 266 surgical programs with addresses available via ACGME, though responses continue to be submitted at the time of this abstract. Approximately 48% of all respondents are from independent, university based programs. 85% felt that robotics was an emerging skillset important for residents to master versus 15% feeling that it was more appropriate for fellowship. All respondents noted that robotic surgeons were present at their institution, 90% within the core faculty, and 50% indicated that they were actively recruiting robotically trained surgeons. Additionally, 95% of programs indicated that residents were exposed to robotic surgery, 81% of these on core general surgery rotations. 62% of respondents indicated that they had a formal robotic training curriculum with 81% of programs taking measures to integrate robotics into the future curriculum though 71% lacked specific milestones for such training. Finally, opinion was evenly divided among respondents as to whether one could sign off on residents to perform robotic assisted cases upon completion of PGY5 year with 45% agreeing with that statement and the remainder indicating some additional training would be necessary.

**Conclusions:** Our study highlights the emerging field of robotic assisted MIS surgery and its increasing role in residency training. It is evident from the data, that robotic surgery is a growing part of residency experience. Importantly, however, milestones were significantly lacking for determining resident progress in robotic training.

**P310**

### **Resident Acute Care Service Allows More Autonomy for Laparoscopic Procedures**

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**Purpose:** Developing autonomy has been a challenge in surgical training especially with laparoscopic procedures. With the implementation of a new resident acute care surgery service managed by our senior residents with attending supervision, we sought understand if autonomy for laparoscopic procedures had improved and if our residents ranked their confidence and autonomy equivalent to open procedures.

**Methods:** All general surgery residents over a one-year period completed self evaluations on individual operative case performance. For each procedure, an attending evaluation of the resident's performance was also submitted. We compared evaluations for laparoscopic abdominal procedures to open abdominal procedures and further analyzed those evaluations specific to the resident acute care surgery service as compared to attending services.

**Results:** A total of 1775 resident evaluations were collected for abdominal cases. Of these, 1072 cases were laparoscopic cases and 703 were performed open. On average both residents and attendings ranked resident's performance on laparoscopic procedures significantly higher than open procedures in all categories: knowledge of procedure, intraoperative communication and overall grade. Additionally, Zwisch scale of autonomy was significantly higher for laparoscopy compared to open by both attendings and residents (2.70 vs 2.35 and 2.52 vs 2.19 respectively,  $p<0.001$ ). When we compared evaluations for laparoscopic cases done under the resident acute care service compared to attending services, residents' ranking of Zwisch scale of autonomy was significantly higher on the resident acute service (3.27 vs 2.36,  $p<0.001$ ) and similarly attendings' ranking of Zwisch scale of autonomy was also higher on the resident service (3.20 vs 2.54,  $p<0.001$ ).

**Conclusions:** The highest ratings of autonomy were given to laparoscopic procedures on the resident acute care surgery service when both compared to procedures performed on attending services and when compared to open procedures. We conclude that the structure of a resident acute care surgery service highly increases the autonomy and confidence of chief residents with laparoscopy prior to graduation.

**P311****Suture Training Simulation Prior to Medicine Elective in Medical Students: A Randomized Controlled Trial**

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**Introduction:** In Chile, medical students have the opportunity to undertake a month-long Medicine Elective (ME) in a community hospital, primary care center or emergency department within the country at the end of their first clinical year. Due to the lack of opportunities to practice suturing in the first years, students usually do not have an optimal performance in this type of medical procedure during the ME. Simulation training programs in suturing improve technical skills, self-confidence and patient safety in the medical internship. The objective of this study is to evaluate the impact of implementing a simulated suture training program earlier in the medical curriculum, before the ME.

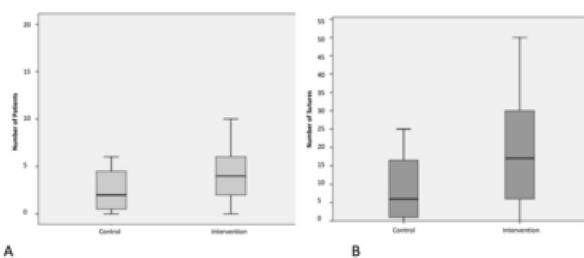
**Methods:** We conducted a prospective, randomized controlled trial with 50 medical students at the end of their first clinical year. They were randomized into two equal groups. The intervention group received an intensive suture training program consisting in one theory class, four practical sessions and effective feedback from an expert surgeon. The control group did not receive training, remaining with the classic opportunistic learning approach during the ME. After the ME, all students undertook an electronic survey. Statistical analysis was performed on the answers of both groups. Per protocol analysis was applied.

**Results:** There were no statistical differences between groups in terms of age and sex. Four students did not complete the training program. One student in the control group did not reply to the survey. Higher self-confidence with regards to suturing was reported in the intervention group in comparison with the control group [10/21 (48%) vs 4/29 (14%), p<0.001]. Also, a greater student desire to carry out suture-related procedures was reported in the intervention group than the control group [16/21 (76%) vs 11/29 (38%), p<0.001]. In addition, a lower rate of overseeing physician intervention was reported in the intervention group [3/21 (14%) vs 14/29 (48%), p<0.001] (Table 1). A greater number of patients requiring sutures were treated by the intervention group than the control group, with a median of 4 patients (3–7) against 2 (1–4). The intervention group performed a higher number of sutures with a median of 17 (6–31) vs 7 (2–16), with a statistically significant difference (p<0.05) in both cases (Fig. 1).

**Conclusion:** A simulated suture training program prior to the ME generates a positive impact on medical students by improving self-confidence and desire to attend patients that require sutures. This leads to a higher rate of both exposure to suture techniques and suture execution.

LIKERT ITEM	CONTROL GROUP (n=28)			INTERVENTION GROUP (n=21)			P* (p-value)
	Frequently or Very Frequently	Do not know	Rarely or Very Rarely	Frequently or Very Frequently	Do not know	Rarely or Very Rarely	
SELF-CONFIDENCE	4*	9	15	10*	7	4	<0,001
DESIRE TO CARRY OUT SUTURE-RELATED PROCEDURES	11	8	9	16*	2	3	<0,001
OVERSEEING PHYSICIAN INTERVENTION	14	7	7	3*	1	17	<0,001

**Table 1.** Summary of the Likert-type survey answers applied to participants after ME. (\*) Significant statistical differences between "Frequently or Very Frequently" Likert-level of the Intervention Group compared to Control Group.



**Figure 1.** (A) Median and CI 95% of Number of patients required sutures treated by Control and Intervention Group. (B) Median and CI 95% of Number of sutures performed by Control and Intervention Group.

**P312****Development and Validity Evidence for a New Comprehensive Intra-operative Assessment Tool: A Pilot Study**

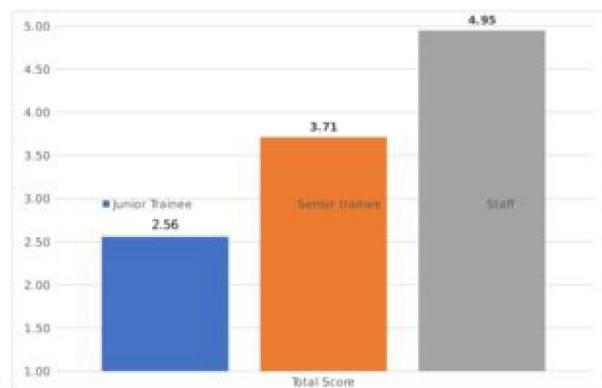
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**Introduction:** Measuring performance in the operating room (OR) is challenging. Performance is a multifaceted construct a complex interaction of many behaviors and actions that reflect an individual's knowledge and skill. No assessment tool to date provides an expertise-based, comprehensive evaluation of the various aptitudes necessary to excel in the OR, especially with respect to advanced cognitive skills. Using qualitative methodologies, we previously defined behavioral themes that guide surgeons' behaviors, decisions, and actions, within a universal framework of 5 domains that reflect intra-operative performance. The purpose of this pilot study was to use this framework to derive a comprehensive assessment tool and to obtain evidence for its validity as a measure of intra-operative performance.

**Methods:** An assessment tool was developed by a panel of 9 surgeons and 5 surgical trainees based on the five-domain model of intra-operative performance: 1) Psychomotor skills; 2) Declarative knowledge; 3) Interpersonal skills (two items); 4) Personal resourcefulness, and 5) Advanced cognitive skills (ten items). All items were rated on an ordinal scale of 1 (inadequate) to 5 (expert) and equally weighted. Surgical residents and surgeons from a single academic center were evaluated on their performance during standard general surgery operations, for example, Open inguinal hernia repair and Laparoscopic cholecystectomy. For residents, there were 2 evaluators - the attending surgeon and an observing surgeon. Attending surgeons evaluated their own performances and were also assessed by 2 observing surgeons. Internal consistency, inter-rater reliability, and correlation of total scores with training level (junior residents, senior residents, staff surgeons) were calculated. Likert scale questionnaires were administered to evaluate the tool's usability, feasibility, and educational value.

**Results:** Fifteen subjects (5 junior residents, 5 senior residents, 5 surgeons) participated. The total score on the assessment demonstrated significant differences between training levels (Figure). Inter-rater reliability was high (interclass correlation coefficient=0.87), as were internal consistency between each domain score (Cronbach's alpha=0.95), internal consistency amongst items in the Advanced cognitive skill domain (Cronbach's alpha=0.99), and internal consistency amongst items in the Interpersonal skills domain (Cronbach's alpha=0.99). All assessments required less than five minutes to complete. Overall, evaluators agreed that the assessment tool was easy to use, was comprehensive, and should be used routinely throughout training to track performance and provide formative feedback.

**Conclusion:** In this pilot study, we developed a comprehensive assessment tool for intra-operative performance and provide preliminary validity evidence for the score.



**Figure 2.** Mean Global evaluation score for each group by Evaluator 1. Scores of junior residents, senior residents and surgeons were compared using Analysis of Variance. Error bars represent 95% confidence intervals.

**P313****3-Year General Surgery Residency Program; Outcomes on Abdominal Procedures and the Impact of Using a Simulated Laparoscopic Training Program**

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**Introduction:** The aim of a General Surgery Residency (GSR) is to train an autonomous and competent specialist, nevertheless the duration of these programs varies in different countries. The shorter-lasting GSR must optimize residents' exposure to surgical time. Simulated training is a tool which could help to optimize surgical training during the GSR. The aim of this article is to describe the outcomes of a 3-year GSR program and to analyze the effect of introducing a validated laparoscopic surgery training program (LSTP) in the number and type of abdominal surgical procedures performed by residents.

**Methods:** A non-concurrent cohort study was designed. We included graduated surgeons (GS) between the years 2012–2015 (four generations). Data was obtained from institutional records and from prospective residents' records during their GSR. Only surgical interventions of the abdomen as a primary surgeon were described and analyzed. The control group (NLSTP) were GS from 2012, not trained with LSTP. Surgical procedures per program year (PGY), surgical technique, priority of the intervention and hospital-site were described. We calculate the annual range of procedures and residents per staff to analyze the institutional changes effects on resident's surgical exposition in the follow-up period. Statistical analysis was performed with ANOVA test for related samples, X2 or Student's T test according to the nature of data.

**Results:** Interventions of 28 GS were analyzed (NLSTP: 5 GS and LSTP: 23 GS). The average of procedures and residents per staff for the entire follow-up period were 166 and 0.98 respectively. There were no statistically significant differences when comparing the annual average of procedures and residents per staff. Residents performed a mean of 372 abdominal procedures, with a higher mean number of medium to complex procedures in the LSTP group (Table 1). Residents trained with LSTP performed a higher number of all and laparoscopic abdominal procedures [384 vs 319 ( $p=0.04$ ) and [183 vs 148 ( $p=0.05$ )] respectively (Fig. 1).

**Conclusion:** General surgeons graduated from a 3-year residency program performed diverse abdominal procedures through each PGY. Introduction of a laparoscopic simulated training program appears to increase the number of all and laparoscopic abdominal procedures.

Variable	Total	NLSTP n=5	LSTP n=23	p
Mean number of all abdominal procedures by resident <sup>a</sup>	372 (260–474)	319 (260–381)	384 (272–474)	0.04
Intermediate - complex abdominal procedures <sup>b</sup>	45 (21–55)	30 (21–43)	48 (30–55)	0.02
Surgery technique <sup>c</sup>				
Laparoscopic	5528 (53%)	742 (46.5%)	4786 (54.2%)	< 0.01
Open	4887 (47%)	852 (53.5%)	4035 (45.8%)	
Open abdominal procedures <sup>c</sup>	201 (114–290)	171 (133–218)	207 (114–290)	NS
Laparoscopic abdominal procedures <sup>c</sup>	176 (118–240)	148 (118–176)	183 (129–240)	< 0.01
Setting of procedure <sup>c</sup>				
Elective	4253 (40.8%)	654 (41%)	3599 (40.8%)	NS
Emergency	6162 (59.2%)	940 (59%)	5222 (59.2%)	
Hospital's complexity level <sup>c</sup>				
Tertiary	7324 (70.3%)	1140 (71.5%)	6184 (70.1%)	NS
Community hospitals	3091 (29.7%)	454 (28.5%)	2637 (29.9%)	

Table 1 Characteristics of abdominal interventions

<sup>a</sup>Average / range  
<sup>b</sup>Number/percentage

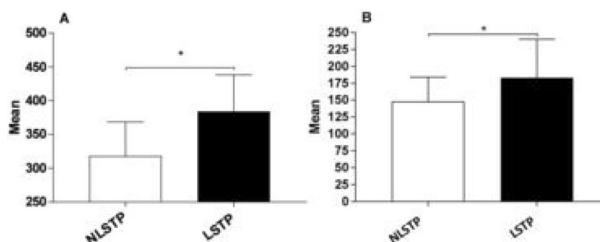


Figure 1. (A) Mean and standard deviation of all abdominal procedures and (B) Mean and standard deviation of laparoscopic procedures (\*). Statistically significant difference ( $p < 0.05$ ).

**P314****Validation of Simulator for Assessment of Developed Suturing Skills 2nd Report**

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**Introduction:** The purpose of this study was to evaluate the validity of our developed system for assessing suturing skills in laparoscopic surgery (Fig. 1). We have updated numbers of participants and a comparison method compared with the last year report.

**Methods and Procedures:** Fig. 1 shows our developed computerized system for objective assessment of suturing skills by using a laparoscopic intestinal suturing model, E-Lap. The system includes a new artificial intestinal model that mimics living tissue and pressure-measuring and image-processing devices. Each examinee performs a specific skill using the artificial model, which is linked to a Suture Simulator Instruction/Evaluation Unit. The model uses internal air pressure measurements and image processing to evaluate suturing skills. Five criteria, scored on a five-grade scale, were used to evaluate participants' skills (Fig. 2). The volume of air pressure leak was determined by the volume of air inside the sutured artificial intestine. For example, for the criterion "air pressure leakage", the approximate midpoint of the acceptable range was Grade 3. Values lower than the minimum acceptable value received lower grades and those above the midpoint of the acceptable range higher grades.

We enrolled 277 surgeons who participated a simulator competition event at the 29th annual meeting of the Japan Society for Endoscopic Surgery (JSES 2016). Participants were divided into groups: Qualified surgeon (QS; n=58) and Non-Qualified surgeon (NQS; n=219) groups. The Endoscopic Surgical Skill Qualification (ESSQ) System was developed in 2004 by JSES. All participants performed the skill assessment suturing task using the E-Lap and resultant scores were compared between the two groups.

**Results:** The scores of QS and NQS for air pressure leak were  $2.09 \pm 1.30$  and  $1.68 \pm 1.18$ , respectively; for full-thickness sutures  $4.46 \pm 0.73$  and  $4.10 \pm 1.08$ , respectively; for suture tension  $3.25 \pm 1.24$  and  $3.27 \pm 1.12$ , respectively; for area of wound opening  $4.07 \pm 1.05$  and  $3.24 \pm 1.07$ , respectively; and for performance time  $3.98 \pm 0.97$  and  $3.24 \pm 1.07$ , respectively. Significant differences ( $p < 0.01$ ) between QS and NQS were observed for air pressure leak, full-thickness sutures and performance time.

**Conclusions:** This system could distinguish between the two groups (skillful and not skillful surgeons) from the viewpoint of the suturing surgical skill clearly and would be therefore a useful tool for training and assessment of laparoscopic surgeons.

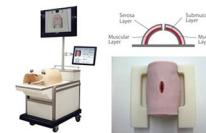


Fig. 1



Fig. 2

**P315****Maintaining Confidence: A 6-Month Follow Up of the Sages Flexible Endoscopy Course**

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**Introduction:** The SAGES flexible endoscopy course for minimally-invasive surgery (MIS) fellows has been shown to improve confidence and skills in performing GI endoscopy. This study evaluated the long-term retention of these confidence levels and investigated how fellows have changed practices within their fellowships as a result of the course.

**Methods:** Participating MIS fellows completed surveys six months after the course. Respondents rated their confidence to independently perform sixteen endoscopic procedures (1=not at all; 5=very). While the pre- and post-course surveys identified anticipated endoscopy uses and barriers to use, the 6-month follow-up survey evaluated actual usage and barriers to use in each fellow's practice. Respondents also noted participation in additional skills courses and status of Fundamentals of Endoscopic Surgery (FES) certification. Comparison of responses from the immediate post-course survey to the 6-month follow-up survey were examined. McNemar and paired t-tests were used for analyses.

**Results:** Twenty-three of 57 (40%) course participants returned the 6-month survey. 26% had passed the FES skills examination and 17% had attended another flexible endoscopy course. No major barriers to endoscopy use were identified. In fact, fellows reported less competition with GI providers as a barrier to practice compared to their original post-course expectations (50% versus 86%; p<0.01). In addition, confidence was maintained in performing the majority of the 16 endoscopic procedures, although fellows reported significant decreases in confidence in independently performing snare polypectomy (~26%; p<0.05), control of variceal bleeding (~39%; p<0.05), colonic stenting (~48%; p<0.01), BARRX (~40%; p<0.05), and TIF (~31%; p<0.05). Fewer fellows used the GI suite to manage surgical problems than was anticipated post course (26% versus 74%; p<0.01). Fellows without FES certification reported loss in confidence to independently perform BARRX (~54%; p<0.05) and colonic stenting (~63%; p<0.01), and also a 58% decrease in the use of GI suites to manage surgical problems (p<0.05). Fellows who passed FES noted no significant loss of independence, changes in use, or barriers to use. 18% of fellows made additional partnerships with industry after the course. 41% stated flexible endoscopy has influenced their post-fellowship job choice. 100% would recommend the course to other fellows.

**Conclusions:** The SAGES flexible endoscopy course for MIS fellows results in long-term practice changes with participating fellows maintaining confidence to perform the majority of taught endoscopic procedures six months later, and over 40% reporting that flexible endoscopy influenced their career choice. Additionally, fellows experienced no major barriers to implementing endoscopy into practice.

**P316****The Role of Mentorship Programs in Laparoscopic Training During Surgical Residency**

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**Introduction:** Residency programs have undergone a tectonic shift over the past 3 decades to incorporate minimal access approaches as a part of routine training. The influx of new techniques, skill & technologies within the operating room has brought its own set of challenges.

During their training, residents assist & operate with multiple consultants in varying specialties. The lack of a continuous, consistent oversight to evaluate the development of an individual's skills was noted.

**Materials and Methods:** At our center, we formulated a laparoscopic mentorship program where a senior consultant was paired with a particular trainee resident for a period of 6 weeks. 12 consultants & 12 residents were a part of the study. The OR schedules were rearranged to accommodate these pairs. An evaluation of the residents' views was performed prior to the study and once at its completion, using a simple questionnaire with each parameter scored between 1 & 10.

**Results and Discussion:** Continuous, consistent evaluation by a consultant over an extended period of time allowed them to assess their assigned resident's laparoscopic skill set. All pairs observed an increased frequency of errors being noticed & improved upon. The consultants stressed upon shedding undesirable operative habits.

	Pre-study	Post-study
Confidence	7.1	8.2
Surgical exposure	7	8.8
Satisfaction with training	6.9	8.1

Table 1: Residents' self-assessment scores prior to & after study

There was a significant improvement in residents' scores at the end of the short study.

**Conclusion:** We found that the short-term mentorship program was easy to incorporate within our OR schedule and was well received by the participants. Continuous short rotations under senior consultants appear to allow residents to not only fully observe and imbibe correct operative techniques, but also helps shed unfavorable habits. We are currently amid the second cycle of our study & looking forward to the results at the end of this academic year.

**P317****Analysis of Laparoscopic Skills of General Surgery Residents in a Simulation Lab Over 7 Years**

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**Introduction:** Simulation is an integral part of surgical residency education and becoming certified in Fundamentals of Laparoscopic Surgery (FLS) is a requirement for general surgery residents to graduate. Here we examine general surgery residents' performance on the five tasks tested for FLS certification in order to determine which tasks should be focused on inside and outside the simulation lab.

**Methods and Procedures:** From October 2009 through October 2016, 139 general surgery residents were evaluated during a minimally invasive rotation using the FLS Laparoscopic Trainer Box. Proficiency was analyzed in the following five areas: Peg Transfer, Precision Cutting, Ligating Loop, Suture with an Extracorporeal Knot, and Suture with an Intracorporeal Knot. Residents were proctored by a MIS attending physician.

**Results:** In the Peg Transfer Task, 100% of residents were able to complete the task. The average time of completion was 102 s (range 41 s–261 s). 4 residents performed an error (2.9%). In the Precision Cutting Task, 93% of residents were able to complete the task. The average time to complete the task was 162 s (range 80 s–290 s). 28 residents performed an error (20.1%). In the Ligating Loop Task, 92% of residents were able to complete the task. The average time to complete the task was 97 s (range 43 s–253 s). 21 residents performed an error (15.1%). In the Extracorporeal Knot Task, 92% of residents were able to complete the task. The average time to complete the task was 214 s (range 100–405 s). 44 residents performed an error (31.7%). In the Intracorporeal Knot Task, 89% of residents were able to complete the task. The average time to complete the task was 248 s (range 72–565 s). 10 residents performed an error (7.2%).

**Conclusions:** Residents had the highest completion rate and least amount of errors performed in the Peg Transfer Task. The Extracorporeal & Intracorporeal Knot Tasks were the most frequently failed exercises with the highest percentage of errors seen in Extracorporeal Knot Task. Accuracy and immediate improvement in time scores can be seen with teaching and attending direction on needle handling and suturing techniques. Therefore, residents should focus on Extracorporeal and Intracorporeal Knot Tasks while in the simulation lab.

**P318****The Development of a Virtual Simulator for Colorectal Endoscopic Submucosal Dissection (ESD)**

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**Introduction:** Colorectal cancer is one of the most common cancers in the United States. Endoscopic Submucosal Dissection (ESD) is an emerging minimally invasive technique that allows complete en-bloc resection and a much lower recurrence rate at long-term follow-ups. However, performing colorectal ESD is technically demanding since the colorectal wall is thin and constantly moving, and potentially higher rates of complications (e.g., bleeding and perforations). Hence, an adequate training for colorectal ESD is needed to acquire basic proficiency with minimum complications.

**Objectives:** A virtual reality (VR)-based simulator with visual and haptic feedback for training in colorectal ESD will be developed, which aim to allow trainees to attain competence in a controlled environment with no risk to patients. In this work, a newly developed application of the virtual simulator that promotes the endoscopists to perform and assess technical skills in ESD is developed. Training tasks are built based on physics-based computational models of human anatomy with tumors.

**Methods:** The main modules of the VR-based simulator for colorectal ESD involve: (1) rendering; (2) haptic interface; (3) physics-based simulation; and (4) performance recording and assessment metrics. The rendering engine allows surgical tasks to be performed in the three-dimensional virtual environment. Haptic feedback mechanisms allow users to physically feel the interaction forces. Physics-based simulation technologies are employed to enable the complicated simulation for performing virtual surgical tool-tissue interactions. The simulator can also collect learners' performance data to offer feedback based on the built-in metrics.

**Results:** Four training tasks involving marking, injection solution, circumferential cutting, and submucosal dissection are designed to practice skills with different surgical tools. The marking task aims to identify the lesion. The injection solution task minimizes the risk of bleeding and perforation to protect the muscularis. In the circumferential cutting task, the objective is initial incision of the lesion with the surgical tools. The objective of the dissection task is to remove the tumor from the connective tissue of the submucosa under the lesion.

**Conclusions:** The VR-based simulator enables realistic ESD tasks to provide a possibility for developing, validating and objectively evaluating the performance metrics in colorectal ESD training, and offers an opportunity to rise up the learning curve before application to patients.

**P319**

### The Influence of Social Media in Surgical Education: How Surgeons Exchange Experience and Knowledge in These Platforms. Preliminary Results

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**Background:** Engagement with social media is increasing within medical professionals. There are many different platforms, such as Facebook, Instagram, WhatsApp, Twitter, Telegram, and so on. The aim of this study is to evaluate how surgeons who use these platforms interact and how social media can contribute for surgical education.

**Methods:** A google survey was posted on different groups of facebook. These restricted groups are formed only by general surgeons, general surgery residents, and medical students: IHC (international Hernia Collaboration), RSC (Robotic Surgery Collaboration), and Mini Friends. They were asked the following questions: How often do you look for surgical education on social media?; Do you publish in surgical groups on social media difficult cases that you need other opinions of how to manage the case?; Do you comment on other surgeons cases who ask for help on difficult cases? Would you consider changing your practice (your surgical technique) based on other surgeon experience published on social media?; Have you already changed your practice based on other surgeon experience published on social media? Do you think it is OK to publish cases on restricted surgical groups on social media? Do you think it is important this connection with surgeons around the globe through social media to discuss patient management? In How many groups do you participate?

**Results:** The survey was answered by 309 participants. 65% (201) look for surgical education everyday. 59.5% publish in social media their difficult cases to discuss with other surgeons. 78.6% comment on other surgeons cases who ask for help. 85.4% would consider changing their practice based on other surgeons tips or tricks published on social media. 62.5% have already changed their practice based in experiences published in social media. 278 (90%) participants see no problem in publishing cases in restricted groups. 56.6% participate in more than three groups.

**Conclusions:** Social media is a new and important tool for surgical education. More and more surgeons are joining restricted groups to discuss surgical techniques, manuscripts, etc in a daily basis. This is a preliminary result of the branch with surgeons who participate in those groups. Another population of surgeons that are not in these groups are going to be studied and a full statistical analysis will be performed.

**P320**

### Measuring Transfer of Skill from the Virtual Transluminal Endoscopic Surgery Trainer (VTEST) to EASIE-R Model

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**Background:** The Virtual Transluminal Endoscopic Surgery Trainer (VTEST) simulator is a virtual reality system that was designed to train the hybrid-NOTES technique. Transfer of skill acquired while training on the VTEST was measured in a near-real cholecystectomy procedure staged in the EASIE-R model.

**Methods:** Sixteen medical students were divided randomly and evenly into 2 groups: Control, Training. All subjects performed the cholecystectomy procedure on the VTEST simulator to establish a baseline (pre-test). The training group received 15 training sessions, over a period of 3 consecutive weeks, consisting of 5 trials per session or as many trials as can be accomplished in one hour, whichever was achieved first. At the end of the training period, all subjects performed one trial on the VTEST simulator (post-test), and again 2 to 3 weeks later (retention test). Two months after that, subjects performed the hybrid-NOTES cholecystectomy procedure on an EASIE-R model. Performance with the EASIE-R simulator was video-recorded, and three tasks within the cholecystectomy procedure were isolated for evaluation: clipping, cutting, and dissecting the gallbladder. Objective performance measures, such as time and error, were extracted from the videos by two independent reviewers, while subjective performance was scored by four expert surgeons who were blinded to the training conditions. Expert reviewers used a modified version of the Operative Performance Rating System by the American Board of Surgery and the Objective Structured Assessment of Technical Skills (OSATS) tool.

**Results:** There was no difference in task completion time between the control and training groups, ( $t(10)=1.045$ ,  $p=.161$ ) in the cutting and clipping tasks. However, there was a significant difference in the number of errors, ( $t(10)=1.847$ ,  $p=.047$ ). There was no difference in subjective performance between the training groups for the clipping and cutting tasks. In the gallbladder dissection task, however, there was a statistical significance in "instrument handling" based on one of the surgeons' ratings ( $t(14)=1.919$ ,  $p=.03$ ), and a statistical significance in "time and motion" based on another surgeon's rating ( $t(14)=2.118$ ,  $p=.03$ ).

**Conclusions:** Results indicate that 3 weeks of training on the VTEST simulator did not allow the subjects to transfer their learned skills equally to the near-real environment, even though they retained the skills when tested for retention. This new insight suggests that modification of the training method for different types of surgical skills may be warranted to optimize their transfer to the real environment.

**P321**

### Examining the Effect of Operative Volume: Does Non-bariatric Surgical Volume Affect Outcomes After Bariatric Surgery?

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**Introduction:** Higher operative volumes are associated with improved patient outcomes in bariatric surgery. As studies have shown that experience and learned skills in surrogate surgical operations may be transferrable to a specific index operation, the question remains as to whether this also applies to bariatric surgery. The goal of the study is to investigate whether bariatric surgeons who perform high volumes of non-bariatric surgery show an improvement in their patient outcomes after bariatric surgery.

**Methods and Procedures:** This was a retrospective population-based review of all patients aged >18 years receiving a bariatric procedure in Ontario from 2008 to 2015, using Canadian Institute of Health Information databases. Individual surgeon outcome data of 29 bariatric surgeons was collected for analysis and grouped for bariatric and non-bariatric surgeries. The main outcome of interest for this study was all-cause morbidity after bariatric surgery during the index admission. All-cause morbidity included any documented complication which extended length of stay by 24 hours or required reoperation. Bariatric cases included Roux-en-Y gastric bypass, sleeve gastrectomy, and biliopancreatic diversion with duodenal switch. Non-bariatric cases included all general surgery cases except for hernia repairs, both open and laparoscopic (cholecystectomy, colectomy, appendectomy, etc.). Univariate analysis was performed with Chi-squared test. Multivariate analysis with adjustment using a random effects model for surgeon and hospital-level correlation was performed, with multilevel logistic regression performed using Markov Chain modelling for the final model.

**Results:** For bariatric surgeons in Ontario, the average number of bariatric and non-bariatric operations per year was 78 (88% RYGB) and 72 respectively. A significantly higher proportion of complications after bariatric surgery was seen in older patients, those with hypertension, severe diabetes, and coronary artery disease. A reduction in complications was seen when bariatric surgeons exceeded 50 bariatric cases (OR 0.66, CI 0.50–0.86,  $p=0.002$ ). As for performance of non-bariatric surgery, higher volume was not shown to significantly affect complication rates after bariatric surgery, even when exceeding 100 cases (OR 0.95, CI 0.71–1.25,  $p=0.66$ ).

**Conclusions:** This study provides evidence to suggest that for bariatric surgeons, experience and skills acquired in performing non-bariatric surgery may not translate to improved outcomes in bariatric surgery. As seen in this study, improvement in bariatric surgical outcomes is likely more dependent on experience specifically performing bariatric procedures. As there may be no benefit acquired from performing surrogate procedures, this may have implications in the design of subspecialty training programs and for accreditation purposes.

**P322**

### Smartphones as Telementoring Tools for Training in the Fundamentals of Laparoscopic Surgery (FLS) Skills

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**Introduction:** The Fundamentals of Laparoscopic Surgery (FLS) skills curriculum is an established simulation program with proven clinical value. Time constraint is one of the barriers for individualized training of surgical residents on FLS skills by faculty in busy clinical environments. The purpose of this study was to develop and implement a self-directed, proficiency-based technical skills training model with the use of cellphone cameras as a telementoring tool.

**Methods and Procedures:** This curriculum was developed by the Arizona Center for Endoscopic Surgery (ACES) in collaboration with the Arizona Simulation Training & Education Center (ASTEC). A universally adjustable cellphone holder was used where smartphones could be placed inside the FLS box in order to capture the task from a similar angle as the onboard camera. Residents were able to use their own smartphones to record their performance on each of the five FLS tasks in high definition (HD) quality. After each practicing session, they would upload their videos to a designated folder on a password-protected computer in the simulation lab. This folder was linked to a cloud-based storage system that FLS instructor had exclusive access. The faculty was able to review each video in the next 24 hours and provide immediate feedback to the residents via email, over the phone or in-person. The video library of performance also allowed the instructor to track the progress of the residents and whether they reached proficiency level in all five tasks to take the FLS examination. This program was offered to all surgical trainees.



**Results:** Utilization of simulation lab to practice FLS tasks increased significantly across all postgraduate years after implementation of this model. Six residents took the FLS examination. The passing rate of the residents remained the same (100% before and after) but their scores in FLS manual skills improved significantly compared to the group prior to implementation. The residents evaluated this change positively and reported that the use of videos and immediate feedback by faculty was a valuable intervention in their learning experience.

**Conclusions:** The smartphone cameras are readily available and can be used for telementoring. Incorporation of telementoring in standard proficiency based FLS training can promote self-directed learning and improve the access to experts for immediate feedback as a crucial element of effective training in acquisition of laparoscopic skills.

**P323****A Pilot Study of Laparoscopic Performance on a DIY Low Cost Laparoscopic Trainer**

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**Introduction:** Traditional laparoscopic box trainers are important in laparoscopic training; however, they are expensive and not easily portable. Low cost trainers can be developed from common household materials, and we constructed the Twelve Pack Box Trainer using an empty box of soda and either a Samsung Galaxy S6 or an iPhone 6 as both the camera and screen. Previous studies evaluating low cost trainers have not compared resident performance to standard trainers. This study tested resident performance of the FLS peg transfer task on the Twelve-Pack Box (TPB) trainer vs. the standard FLS box.

**Methods:** Ten residents were asked to perform the Peg Transfer task twice consecutively on both the standard FLS trainer and the TPB Trainer for a total of 4 repetitions. Half used FLS box first while the other used the TPB trainer first before crossing over the other trainer. Each repetition was timed with a stopwatch. Afterwards, residents were asked to complete an online survey about the two trainers. Using a Likert Scale, residents rated their comfort performing the Peg Transfer, the screen resolution, size, and overall opinion of the Twelve-Pack Box Trainer.

**Results:** Ten residents (PGY1: 6, PGY2: 1, PGY3: 3) participated; three were FLS certified. Median peg transfer time on the FLS trainer (63.5 s, IQR: 57.5–72.5) was significantly lower than on the TPB trainer (114.5 s, IQR: 95.5–155) ( $p<0.001$ ). There was no significant difference in total errors between the two trainers ( $p=0.3$ ). FLS certified residents were significantly faster than non-FLS certified residents on both trainers ( $p<0.01$ ). All residents felt the task was more difficult on the TPB trainer with 30% stating the TPB trainer was less comfortable to use, and 60% stating the screen was too small. Most residents felt the TPB trainer adequately portrays the 3D space in 2D well (70%) and mimics the fulcrum effect of laparoscopy (90%). Half of the residents responded that they would use the TPB trainer at home.

**Conclusion:** The TPB Trainer, while cost efficient and effective in simulating effects of laparoscopy, was more difficult for residents to use than the standard FLS trainer, likely due to the small size of the smartphone screen. With only half of residents willing to use it as a take home simulator, other low-cost options should be explored to improve access to simulation outside the hospital for residents.

**P324****Usefulness of the Rubric Evaluation as the Qualitative Evaluation of the Laparoscopic Training**

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**Background:** It is important that making individual procedures a language, and an objective qualitative evaluation for the laparoscopic training. Recently, task training and the sham operation using the virtual simulator are carried out for medical students as the basic laparoscopic maneuver training, but there are few reports of objective qualitative evaluation for the training. In this study, we investigated Rubric evaluation as the qualitative evaluation for laparoscopic training.

**Materials and Methods:** One hundred and six students in 5th grade of Tokushima Univ. were participated. Basic laparoscopic task training (gummy band ligation, beads transfer, delivery of beads, gauze excision) with training box and sham laparoscopic cholecystectomy with virtual simulator were performed. Task execution time and Rubric evaluation which includes the evaluation standard that became a language for each maneuver were performed before and after basic task training and sham operation. The group who are bad at laparoscopic maneuver was decided by time exceeded in tasks more than two from before practice. Relationship between the group who are bad at laparoscopic maneuver and the group which self-evaluation was higher in a Rubric evaluation was investigated.

**Results:** In basic task training, average task execution time in all students was shortened after practice compared with before practice, but investigated individual, 6 students exceeded in more than two tasks. Rubric evaluation in basic task training showed no difference between self-evaluation and evaluation by tutor before and after practice. In sham laparoscopic cholecystectomy, all students and tutor showed high score by Rubric evaluation after practice compared with before practice. Some students showed higher score than tutor, especially in part of extension of operation field by elevation of the Gall bladder, exposure of triangle of Calot, and exposure of cystic duct. Students who showed high score by self-evaluation in many maneuver of sham laparoscopic cholecystectomy also exceeded in more than two basic tasks.

**Conclusions:** As rubric evaluation showed the point of the maneuver is made a language definitely, it was useful for an objective qualitative evaluation for laparoscopic training.

**P325****Pre-operative Patient Education: A Comparison of In-Person and Online Educational Sessions in Bariatric Surgery**

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**Introduction:** Bariatric surgery candidates have the opportunity to research bariatric surgeons and hospitals prior to scheduling their elective surgery. Pre-operative information sessions are important tools for bariatric surgeons to provide patient education while increasing their patient population. Online education is becoming increasingly popular, but its utility over in-person education is uncertain. Our objective was to compare patients attending the two most commonly used educational formats: online (webinars) and in-person (seminars) and determine which were more likely to undergo bariatric surgery.

**Methods:** We conducted a retrospective cohort study of 2,700 patients who attended pre-operative information sessions from January 2014 to December 2016 by reviewing data maintained by the Obesity, Prevention, Policy and Management (OPPM) Database from our institution. The patients were divided into two groups: those who attended an in-person session (n=785) and those who attended an online session (n=1,915). The proportion of patients who went on to have bariatric surgery was compared between the two groups. To categorize the study sample, patient demographics, surgeon providing the information session, and procedure performed were compared between groups. Multivariate logistic regression model was applied to compare the effectiveness of in-person session and online session.

**Results:** Of 2,700 patients analyzed, 71% attended online information sessions (77% female, mean age 42). The remaining 29% attended in-person information sessions (73% female, mean age 46). Analysis found that 21.1% of patients who attended online information sessions went on to have a bariatric surgical procedure, while 32.6% of patients who attended in-person sessions went on to have a bariatric surgical procedure. After controlling for differences in age and gender, results of multivariate logistic regression analysis indicate that patients who attended in-person sessions were 71% more likely to have a bariatric surgical procedure than patients who attended an online session (adjusted OR 1.71; 95% CI: 1.40–2.10;  $P<0.001$ ).

**Conclusion:** Internet-based training is rapidly becoming a commonly used tool for pre-operative education in bariatric surgery and many other fields. Multiple studies have demonstrated that internet-based training may be as effective as other forms of education. While online education may be convenient, our results suggest that in-person training should not be abandoned as an educational platform.

**P326****How Many Throws Does it Take to Tie a Secure Knot?**

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**Introduction:** Knot security is the ability of knots to resist slippage as force is applied, and the optimal number of throws to ensure a secure knot improves efficiency and outcome. The literature on the accepted number of throws per type of suture material has been largely anecdotal, often referring to 3 throws for silk, 4 for polyglactin 910 (Vicryl), five for polydioxanone (PDS), and six for polypropylene (Prolene). We report a pilot knot-tying study of four suture types to determine optimal numbers of throws.

**Materials and Methods:** Four senior general surgery residents (PGY-5 and above) and four attending surgeons participated. Participants viewed a standardized instructional video and a one-handed knot-tying tutorial. They were instructed to tie one-handed knots, beginning each knot with two throws in the same direction, and square the third and subsequent throws in the opposite direction. Each surgeon tied 64 knots, using different types of 2-0 suture material: silk, polyglactin, polydioxanone, and polypropylene. Suture types were evaluated using 3, 4, 5, or 6 throws. The participants were randomized to both suture type and order of throw numbers. The knots were then tested on the F.A.S.T knot tester (Sawbones, Vashon Island, WA) for slippage (insecure knot) or breakage (secure knot). Generalized estimating equation (GEE) analysis was used to determine optimal throw number.

**Results:** 512 knots were individually tested on the knot tester for slippage and recorded as % slipped (see table). The percentage of slipped knots varied by participant and ranged from 5 to 67%. Generalized estimating equation analysis suggested that the only significant variable when determining knot security was number of throws ( $p=0.02$ ), not suture type or participant training level. The optimal number of throws for 2-0 silk, polydioxanone, and polypropylene was five, whereas six throws was optimal for polyglactin.

**Conclusion:** Knot security is dependent on the number of throws placed, and these optimal numbers were higher in our study than the commonly accepted number of throws.

Percentage of Knot Slippage		
Type	Throws	% Slipped
Silk	3	59
	4	38
	5	22
	6	25
Vicryl	3	81
	4	63
	5	41
	6	38
PDS	3	53
	4	34
	5	22
	6	31
Prolene	3	47
	4	38
	5	9
	6	19

**P327****Evaluation of Take-Home Laparoscopic Simulation Programmes in the UK and Implications for Global Delivery**

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**Introduction:** Laparoscopic skills can be learned using portable simulators and these skills are transferrable to the operating room. Several training regions within the UK have therefore developed and delivered home-based laparoscopic training programmes for junior surgical trainees. Although performance improved in some, overall engagement has been poor. Similar results have been observed in North America. The aim of our study was to uncover the reasons for poor engagement with home-based simulation with a view to developing a future, more successful, programme.

**Methods:** This was a qualitative study utilising focus groups. Interviews were undertaken with key stakeholders involved in various laparoscopic home-based simulation programmes through the UK. Training equipment comprised the eoSim portable simulator paired with online training tasks. The tasks were similar to those used in the Fundamentals of Laparoscopic surgery programme (FLS). Basic metric feedback was provided (eg time to complete task). A total of 45 individuals were interviewed, including surgical trainees, consultant trainers, training directors and programme faculty. This generated approximately 7 hours of data which was coded using nVIVO software. A basic thematic analysis was performed.

**Results:** Trainees cited multiple competing professional commitments as a barrier to engaging with home-based simulation. They tended to focus on scoring 'points' which contributed toward career progression rather than tasks which were interesting, or associated with personal development. This approach is perpetuated by the surgical training system, which rewards trainees with points for publications and exams, but not for operative skill. This leads to conflict between trainers and trainees, the former expecting trainees to instead focus upon developing their technical abilities. Trainees were unsatisfied with metric feedback and wanted individual feedback from consultant trainers (attending equivalent). Trainees generally perceived consultants as lacking interest toward the programmes and training in general. However, some consultants were in fact unaware of the programmes being delivered and others felt lacking in confidence to deliver necessary training to trainees.

**Conclusions:** Our findings are widely generalizable and have implications for any institution delivering a similar programme. As a means of improving engagement, the inception of scheduled simulation study days, providing trainees with the opportunity for personalised feedback from consultants, has been suggested. Equipping trainers with the necessary competencies to deliver training can be achieved by ensuring attendance at the necessary professional development courses. Tackling the 'box ticking' culture is more challenging and may involve a move toward restructuring the current surgical training scheme.

**P328****Call for Action: Validation and Impact of an Active Shooter Simulation Training Curriculum for Healthcare Personnel**

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**Introduction:** To provide evidence for the face and content validity of a hybrid active-shooter team training simulation and the impact of a hybrid curricular model on learner’s engagement and performance. The following study was conducted because hospitals are increasingly threatened by active-shooter incidents, and no active and noticeable training is currently available to train hospital staff members.

**Methods:** Thirty-five volunteers (medical students, residents and other allied health providers) from the University of Minnesota affiliated medical centers were randomly selected and divided into control and experimental groups. The control group (N=14) was given a traditional lecture-style presentation. The experimental group (N=21) participated in the hybrid curriculum which included augmented reality, kinesthetic simulation, and debriefing components. Following both curriculum styles, NASA Task Load Index (TLX) surveys were completed by each group member. A final active shooter simulation experience was presented and evaluated by active-shooter trained raters using a checklist of critical actions from the Department of Defense. A post-simulation NASA TLX survey and Post-test were provided. To assess face and content validation of a hybrid team-training simulation exercise to prepare healthcare personnel in the event of a hospital-related active-shooter crisis, a 5-point Likert-scale survey determined the realism, utility, and applicability of this type of training while engagement and performance during the simulation were measured using a NASA-TLX survey and contrasted with the rater’s evaluation.

**Results:** Pre-simulation NASA TLX indexes were higher for the experimental ( $54.87 \pm 3.393$ ;  $p=0.0029$ ) vs. control groups ( $38.29 \pm 3.765$ ). Post-simulation NASA TLX indexes remained stable ( $0.1108 \pm 3.271$ ;  $p=0.0079$ ) vs. decreased in the control group ( $-15.17 \pm 4.104$ ). Experimental group was more engaged ( $93.75 \pm 6.250\%$ ;  $p=0.001$ ), had faster decision-making ( $4.750 \pm 0.2500$ ;  $p=0.001$ ), and higher survivability ( $4.500 \pm 0.2887$ ;  $p=0.002$ ) vs. the control group ( $37.50 \pm 7.217\%$  ( $2.750 \pm 0.2500$ ) ( $3.000 \pm 0.0$ )).

**Conclusion:** Our study provided evidence to support the face and content validation of an active-shooter simulation team training curriculum as a useful adjunct to health care institutional safety planning. We demonstrated that this type of training requires an optimal level of cognitive activation to increase learner’s engagement and performance. We concluded that the hybrid design of our curriculum was successful in delivering these optimal levels of cognitive stimuli by producing engaging team training simulation experience capable of motivating our learners to acquire the tactical skills and life-preserving behaviors consistent with better survival opportunities during a hospital related active-shooter crisis.

**P329****The International Laparoscopic Advancement Program: Enhancing Surgical Education in Mexico**

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**Introduction:** SAGES Global Affairs Committee, in partnership with the Asociación Mexicana de Cirugía General, launched the International Laparoscopic Advancement Program (iLAP), that seeks to standardize laparoscopy training and education across Mexico. iLAP participants engage in didactic and hands-on modules in educational theory, laparoscopic techniques, and simulation based education (SBE), and then develop and implement a 1-day surgical simulation course for trainees. The purposes of this study were to characterize existing minimally invasive surgical (MIS) experience, evaluate baseline educational knowledge and skills, and determine implementation success after an intensive education course.

**Methods and Procedures:** All 13 faculty and 13 of 25 resident participants completed a pre-course survey. Participants self-reported baseline MIS experience and comfort levels with MIS skills and procedures using a 3-point Likert scale (1=not comfortable, 2=somewhat comfortable, 3=very comfortable), and noted previous surgical education experience. Following the course, faculty self-rated their comfort level with educational techniques and institutional support for MIS, and provided qualitative course feedback. Resident participants self-rated their comfort level with MIS skills following the faculty-lead simulation course. Descriptive analyses were performed. IRB-exemption was obtained through Lurie Children’s Hospital.

**Results:** Faculty performed a range of MIS procedures, 100% of participants had experience with cholecystectomy compared to 54% with colectomy and 23% ventral hernia repair. Resident MIS exposure was notably lower. Most faculty self-reported being “somewhat” or “very comfortable” with MIS skills (range 66–100%). resident comfort level with MIS skills was lower (Table 1). Most common faculty-cited reasons for not performing MIS were lack of comfort with MIS skills (44%) and lack of institutional support for MIS (28%). There was limited baseline experience with educational methods, including no experience with skills assessments and curriculum development. On post-course evaluation, 100% of faculty participants self-reported as comfortable performing objective skills assessments and implementing a surgical education curriculum. Additionally, after participation in the faculty-implemented SBE course, residents self-reported improvement in all MIS skills.

**Conclusions:** While the majority of surgeons at a large, Mexican teaching hospital are performing laparoscopic surgery, the institutional support for MIS is often lacking, and formalized MIS training is in early development. The iLAP initiative seeks to drive adoption and sustainability of safe laparoscopic techniques and increase educational awareness and effectiveness. After instituting a short, intensive surgical education course, participants self-reported improvement in educational and MIS skills. However, long-term adoption of these educational strategies for sustainable improvements in MIS remains to be assessed.

Table 1. Proportion of residents who self-reported being “somewhat” or “very comfortable” with various MIS skills before or at the start of the iLAP course			
	Before	After	Post
Selection of the appropriate indications	93%	100%	84%
Explaining anaesthesia complications	54%	79%	
Ability to detect CO <sub>2</sub> 铭ed	46%	95%	
Patent selection for troponomy	85%	90%	
Knowledge of the risks and benefits	82%	95%	
Selection of the appropriate energy	69%	95%	
Knowledge of hemostasis	82%	95%	

**P330****Design of the Electrosurgery Skill Trainer (VEST) Direct and Capacitive Coupling Effects Module**

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**Introduction:** The Virtual Electrosurgical Skill Trainer (VEST) provides surgeons and trainees with a hands-on approach to learning the best practices in electrosurgery. It is comprised of five modules covering tissue effects, stray currents, bipolar tools, monopolar tools and OR fire safety. The module in this study teaches the origins of stray currents and shows the learner how they can cause damage to non-target tissues via direct and capacitive coupling. The aim of this study was to assess learning using the VEST system.

**Methods:** The IRB approved study followed a single group pretest-posttest design and was conducted at the SAGES 2017 Learning Center. Thirty-eight subjects participated and out of these, 42% were attending surgeons while the rest were medical students, residents and fellows. 37% of subjects had prior FUSE exposure, while the remaining had none. Subjects were asked to complete a five-question multiple choice questionnaire before and after using the simulator. It assessed their knowledge in topics such as direct coupling, capacitive coupling and insulation failure. Participants then used the simulator to complete three tasks. First, the subject used direct coupling to seal a vessel and observed the desired effects and potential pitfalls. In the second task the subject was immersed inside the peritoneal cavity and was directed to use the active electrode to observe how the activation of energy can cause capacitive coupling. In the third task the subject practiced evaluating the insulation of electrosurgical tools for defects. Wilcoxon’s Signed Rank test was used to differentiate between pre- and post-test scores, and the Mann-Whitney U test was used to differentiate between the groups of subjects as a function of FUSE experience.

**Results:** The median score on the pre-simulator assessment was 60% and the post-simulator median score was 80% ( $p=0.035$ ). There was no statistically significant difference in pre-assessment scores between attending surgeons and the others ( $p=0.148$ ). Subjects with prior FUSE exposure scored significantly higher on the pre-module assessment compared to those that had no prior FUSE exposure (80% vs 40%,  $p=0.024$ ). In the post-assessment their median scores were 80% and 60%, respectively ( $p=0.019$ ).

**Conclusions:** The VEST simulator module successfully increased the overall participants’ knowledge of coupling in electrosurgery regardless of level of surgical experience. Participants with prior exposure to the FUSE curriculum had increased knowledge on this topic at baseline as compared to participants without any FUSE exposure.

**P331****Assessment of Non-technical Skills in Acute Care Team Simulation Training**

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**Introduction:** The objective of this study was to assess the reliability of a modified NOTECHS rating scale for the evaluation of medical students' non-technical (NT) skills. The importance of physician NT skills for the safe care of patients is receiving increasing attention in the literature. Tools to assess NT skills such as NOTECHS that addresses communication, situation awareness, cooperation, leadership, and decision-making have been shown to be valid and reliable. Despite its importance, the assessment of NT skills of medical students, our future physicians, has received little attention.

**Methods and Procedures:** Twenty-seven medical students participated in 1 of 6 acute care simulated scenarios, each approximately 10 minutes long. Video recordings of student performance were reviewed and assessed using a modified NOTECHS rating tool adapted for these scenarios with input from a team of clinicians, nurses, and human factors specialists. The rating scale ranged from 0 to 6, 0 representing very problematic behavior (e.g., not vocalizing concerns or decision process) and 6 representing model behavior (e.g., identifies future problems and remains calm to unexpected events). Two reviewers rated all videos independently on the 5 NOTECHS domains and specific subscales. Student scores in each NT skill domain and interrater reliability were assessed.

**Results:** A summary of the scores of each NOTECHS domain is shown in Table 1. The highest overall average score of a participant was 4.9 while the lowest was 1.5. The intra-class correlation (ICC; two-way random model) was 0.66, and the Cronbach's coefficient was >0.62. The lowest ICC agreement was in the situation awareness domain (0.59) while the highest agreement was in leadership (0.73).

**Table 1. Summary of NOTECHS scores from two annotators.**

NOTECHS Domain	Average Score (mean±SD)	Min Score	Max Score
Communication	3.8±0.4	1.5	5.4
Situation awareness	3.4±0.3	1.5	4.5
Cooperation	3.9±0.4	1.7	5.2
Leadership	3.7±0.6	1.0	5.0
Decision-making	3.7±0.3	1.7	4.9

**Conclusion:** Medical student NT skills during acute care simulated scenarios vary significantly using a modified NOTECHS assessment. This newly developed tool provides a framework for educators to evaluate medical students' NT skills during simulation training. It further identified domains where students scored lower, such as situation awareness, and could be targeted for education. The moderate ICC, between the 0.5–0.75 range, shows that further refinement of the tool is needed to reliably assess the constructs. Future steps to obtain validity evidence include additional raters and applying the tool in non-simulated settings.

**P332****Perception of the Use of Technology in Medicine and Robotic Surgery Among Undergraduates and Medical Students: Preliminary Results from a Survey**

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**Introduction:** A general misconception of the real concept of robotic surgery seems to be revealed in our clinical practice. Despite its introduction almost years ago, robotic surgery is still related to many myths and beliefs. Before designing a trial to see if these false awareness could impact on outcome, we measured this misconception by a survey. Moreover we tested if medical school is able today to give to the future doctors a necessary knowledge about robotic surgery. With the same survey we explore the feelings about the introduction of the Artificial Intelligence in medicine and the perception of the consequences of a larger use of technology in medicine.

**Methods and Procedures:** a multiple choice survey was designed and anonymously administered via the platform SurveyMonkey (<http://www.surveymonkey.com>). A total of 55 questions were selected from the research team and included in the survey. The questionnaire was divided in three parts: the first was to get information on participants' population; the second asked specific questions about robotic surgery; the third focused on technology use in medical education.

**Results:** we received and analyzed 81 questionnaires, 70 of which totally filled. Many undergraduates consider robotic surgery as "experimental", will prefer open surgery on themselves and see a risk for robotic surgery in damaging the patient-surgeon relationship. This situation is better for medical students, but still a great difference were encountered. 25% of UG consider robotic surgery as "experimental" vs only 2.7% of MS (Q22). Most thought robotic surgery had been used for only 10 years or less (Q23). 12.12% of UG and 32.43% of MS gave the right answer ( $p=0.03$ ). Almost 66% of UG see robotic surgery as a risk in damaging the patient-surgeon relationship. This is not seen among MS (Q29) ( $p=.007$ ). 40% of UG are fearful of robots used to operate them. This fear is significantly reduced among medical students ( $p=.05$ ). UG were less familiar with the indications and uses for robotics. MS gave a correct response more frequently (Q31, 15.15% vs 37.84%,  $p=0.04$ ).

**Conclusions:** our results indicates that nowadays, the robotic surgery is related a lot of misperceptions and a generally low level of information. This general picture is partially mitigated during the medical school, but the level of knowledge is still low. A big effort seems mandatory to clarify every technical aspect and an ethic debate about robotics, technology and AI as part of medical curriculum is advisable.

**P333****Pre-simulation Cognitive Boost: Increasing Engagement and Performance of Team Training Simulations**

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**Background:** Learning theory states that a certain level of physiological stress or cognitive activation is required to achieve optimal task engagement and performance by the learners. Our study will seek to determine if a hybrid team training curriculum inclusive of a task-oriented interactive virtual environment could help achieve the optimal level of cognitive activation required to result in a higher task engagement and performance.

**Methods:** A total of thirty-five medical professionals from the University of Minnesota participated in several team training simulations. Participants were randomly selected to an experimental and control groups. The experimental group ( $N=21$ ) was exposed to a hybrid team training module, consisting of a task-oriented augmented reality phase followed by a second and third phase consisting of a kinesthetic simulation scenario and debriefing, respectively. The augmented reality phase presented the trainees to an interactive 360-degree image of the same clinical room where the simulation would take place allowing for "Situated-Learning" to take place. During the learning phase, trainees were encouraged to interact and communicate with each other while completing the tasks allowing for "Social-Learning" to effect. The control group ( $N=14$ ), educational component consisted of a traditional audiovisual lecture-style introductory presentation, a simulation, and debriefing. After completing their respective educational components, each group completed a NASA Task Load Index survey to assess the cognitive load experience of the individual educational models. Subjects were then exposed to a final simulation (test simulation) similar in content and structure to the initial simulation. This was followed by a second NASA TLX survey. Raters evaluated both group level of engagement and performance using a validated checklist of critical actions.

**Results:** The experimental groups showed higher weighted overall NASA cognitive load index scores than the control group ( $p=0.002$ ) prior to the test simulation. The weighted NASA score remained elevated in the experimental participant groups following the test simulation, whereas in the control group the post-simulation NASA assessment revealed a decrease in cognitive load ( $p=0.0079$ ). Expert raters using a validated checklist determined that  $93.75 \pm 6.25\%$  of the experimental (hybrid curriculum) group and  $37.50 \pm 7.21\%$  of the control group appeared to be more engaged and performed better during the simulation.

**Conclusions:** Pre-simulation task-oriented augmented reality learning environments designed to incorporate situated, and social learning virtual experiences can provide the optimal level of cognitive boost that can result in a higher participant engagement and performance during team training simulation scenarios.

**P334****A Video-Based Assessment Tool to Measure Intra-operative Laparoscopic Suturing Using a Modified Script Concordance Methodology**

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**Introduction:** Laparoscopic suturing (LS) is a challenging and its complexity and nuances, including the component of intraoperative decision making, are not modeled or measured in current simulation and assessment platforms. The script concordance test (SCT) is used to assess clinical reasoning, but has never been applied to assessment of the cognitive aspects of operative skills. The purpose of this study is to provide evidence for validity of this novel SCT-based online assessment for LS skills.

**Methods:** We previously designed a video-based online SCT for laparoscopic suturing using a cognitive task analysis and expert panelists. The CTA yielded 4 LS domains: needle handling (NH), tissue handling (TH), knot tying techniques (KT) and operative ergonomics (OE). The test was then administered online using a survey platform with embedded videos of Nissen Fundoplications and Paraesophageal hernia repairs. Five-point scales with anchoring descriptors from –2 to +2 were used. Scoring was based on a modified SCT methodology. Experts were defined as surgeons and fellows with LS experience of >25 cases annually. Their SCT scores were compared to inexperienced surgeons (surgeons, fellows and residents with less than 25 LS cases annually). Validity was assessed by comparing scores of experienced and inexperienced surgeons. Cronbach's alpha was used to assess the internal consistency of the test.

**Results:** The survey started off with 47 questions in each of the following domains: 13 NH, 4 TH, 20 KT and 10 OE. Thirty-seven surgeons (18 experts and 19 inexperienced surgeons) from academic and community practices across North America participated. Questions that demonstrated a large discrepancy among experts and panelists with a weighted score difference more than 40 were discarded ( $n=20$ ). One question was discarded because it received a 100% score from all participants. This yielded twenty-six remaining questions in the following domains: 8 NH, 2 TH, 11 KT and 5 OE. The test reliability level (Cronbach a) was 0.80. The mean score was  $72 \pm 9\%$  and  $63 \pm 15\%$  ( $p=0.02$ ) for experts and inexperienced surgeons, respectively. The mean time to complete the test was 21 minutes.

**Conclusion:** This study provides validity evidence for a novel intra-operative LS assessment. The variability of responses between experts and panelists suggests that SCT may capture the clinical differences/surgeon preferences in performing LS intra-operatively. Integrating the SCT-based educational tool into a training curriculum may better prepare trainees for performing LS in the OR. It may also have a role to play in the assessment of decision-making skills for LS.

**P335****Academic League of Videolaparoscopy: A New Strategy to Awaken the Interest of Medical Students in Minimally Invasive Surgery**

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**Introduction:** Despite the huge importance of laparoscopy, medical students have a brief contact with this surgical specialty during medical school in Brazil. Usually, they get in touch with this specialty during the surgery clerkship in the last years of medical school. Therefore, few students perform clinical research or develop interest for this area during graduation.

**Objective:** to awaken the interest in laparoscopy of medical students early in medical school, improving the development of clinical research projects, and to prepare new generations of minimally invasive surgeons.

**Discussion:** The Academic league of videolaparoscopy was created in 2010 under the guidance of Dr. Gustavo Carvalho from the University of Pernambuco, Brazil. An Academic league is a group of medical students who are guided by a tutor to develop three areas: research, teaching, and clinical practice. Every year new students join the league after being selected with a multiple question test and an analysis of the curriculum vitae. The students are stimulated to participate in laparoscopic procedures as observers, learning about the techniques and instruments. Moreover, there are minimally invasive surgery lectures and courses during the year. General surgery residents can also be part of the program as tutors. They are encouraged to present lectures, and to assist with research projects. 50 medical students participated of this program in 7 years. 50% pursued a surgical specialty after graduation. 30% did minimally invasive surgery as a fellowship.

**Conclusions:** the students who participate in several activities provided by the league have an increased interest in pursuing the path to become a laparoscopic surgeon.

**P336****Redefining Successful Surgical Training in the Age of Social Media**

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**Background:** Surgical education is an active and adaptive process of developing knowledge, technical and non-technical skills. The rise of social media has created a paradigm shift in surgical education, with online learning platforms offering exposure to real-time content, expert instruction, and global collaboration. While these disruptive technologies evolve, their influence on surgical education has not been investigated. Our goal was to evaluate the growth and impact of an online surgical education model- the Advances in Surgery (AIS) channel. Our hypothesis was that utilization and engagement with the platform continues to grow, providing novel methods of measuring successful education.

**Methods:** Assessment of the platform's membership demographic, user activity, and engagement was performed from inception in 2013 to Quarter 2 2017. The AIS channel uniquely provides free, high quality, innovative content from elite surgeons in scheduled and continuously available formats across colorectal, bariatric and endocrine surgery service lines. Users login to access content, with demographics, time spent, and content accessed recorded as measures of active account utilization and engagement. The main outcome measures were overall membership trends, utilization patterns by region, content type, and surgical specialty for the platform.

**Results:** Users were predominately male (81.2%), surgeons (92.9%), and ranged in age from 47 to 56 years (24.6%). The main surgical subspecialty represented was colorectal (52.6%). Active account usage/weekly recurrence was 60.1% (10% industry benchmark), with users engaged for a mean 32 minutes/session (excluding live events). Since inception, steady exponential growth was seen across several dimensions. Registered users and unique IP addresses increased from over 3,000 and 190,128 in 2013 to over 43,000 and 2.1 million in 2017, respectively. The number of countries represented increased to reach 183 across 6 continents. At present, over 76 live surgeries and 16 live congresses have been broadcast from 26 countries, with over 2,000 surgical videos available on demand to facilitate surgical education. The greatest engagement is seen with live surgical broadcasts.

**Conclusion:** Our analysis demonstrated proof of concept for a unique, online surgical education model to provide effective surgical education. Success was validated through the increase in overall users, sustained active account usage, and global penetration. User preferences for live surgical broadcasts were seen. Knowing the utilization and preference patterns, the platform can continue to evolve and enhance the learners' experience. With this growth and penetrance, there is the potential to globally improve patient outcomes and the quality of care provided.

**P337****Preoperative Skill Evaluation in Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair with 3D-Printed TAPP Simulator**

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**Background:** A realistic simulator for transabdominal preperitoneal (TAPP) inguinal hernia repair would enhance the surgeons' training experience before they enter the operating theater. The purpose of this study was to evaluate the efficacy of 3D-printed TAPP simulator in evaluating preoperative skill before entering operative theater.

**Methods:** 15 surgeons in our institution were enrolled in this study. They performed simulation TAPP and the performance score was measured using TAPP check list. The TAPP simulator allows for the performance of all procedures required in TAPP. The correlation between post - graduate years (PGYs), age, experienced a number of laparoscopic surgery (more than 100, less than 100), experienced number of TAPP and the performance score was evaluated.

**Results:** Strong correlation between experienced member of TAPP inguinal hernia repair and the performance score was evaluated in this study ( $r=0.705$ ). However, the correlation between PGY, age and score was weak ( $r=0.419, r=0.366$ ).

**Conclusions:** Preoperative evaluation using TAPP simulator and TAPP check list support the distinction between novices and experts. Both education systems are a valuable and affordable tool for evaluation and training of TAPP inguinal hernia repair.

**P338****A Delphi Study to Identify Key Skills that Reflect Laparoscopic Suturing Expertise: Preliminary Results**

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**Introduction:** As the field of laparoscopic surgery grows, the need for standard measures of complex laparoscopic surgical skills is apparent. Fundamentals of Laparoscopic Skills (FLS) testing is required to complete general surgery residency, but there is no standard metric to convey expertise in advanced laparoscopic procedures. In an effort to develop a standardized assessment of laparoscopic suturing expertise, a group of experts was surveyed using Delphi methodology to reach consensus on observed laparoscopic suturing skills reflective of performing at an expert level.

**Methods:** Expert laparoscopic surgeons participated in serial surveys via REDCap (Research Electronic Data Capture). Experts included surgeons who perform >25/year laparoscopic procedures that involve intra-corporeal suturing, obtained from the authors' personal and professional networks. Using a 5 point Likert scale, participants were asked to agree/disagree if 30 different observed laparoscopic suturing skills indicate performing at an expert level. These skills were chosen from prior assessment instruments in the literature and the authors' previously published work. Tasks were considered to meet criteria for consensus and eliminated from the next round of the survey after reaching 80% consensus as "strongly agree." Results of the previous round of surveys were shared with participants at the start of the next round. The predefined endpoint for the Delphi was set as maximum of 4 rounds, reaching 80% consensus on each skill, or if >50% of initial respondents fail to return for subsequent surveys.

**Results:** After the first round of the Delphi survey, 17 respondents met inclusion criteria. Preliminary data demonstrated 4 skills that reached consensus (>80% of respondents chose "strongly agree"): forearm suturing, avoiding tissue trauma, having a technically acceptable final product (ie. tight closure), and tying a secure knot at the end of suturing. 4 items did not approach consensus (<80% of respondents chose "strongly agree" or "agree"): alternating hands for each throw while tying, never missing a target when grabbing needle/suture, alternating direction of throws when tying, and backhand suturing. Data from all four rounds of surveys as well as the final draft of the assessment instrument will be available at time of presentation.

**Conclusion:** Preliminary data of this Delphi study allowed us to reach consensus amongst a group of expert laparoscopic surgeons on the characteristics of expert laparoscopic suturing, which will allow creation of a comprehensive assessment tool for this domain. Validation of such a tool will help advance the surgical field towards true competency-based credentialing and promotion.

**P339****Evaluation of Usefulness of the SAGES Safe Cholecystectomy Program in the Eye of the European Surgeon**

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**Background:** Common bile duct injury (CBDI) is one of the most severe complications of this surgery and it is estimated to occur in 0.3–1.5% of the cases. To minimize the occurrence of CBDI, the Society of American Gastrointestinal and Endoscopic Surgeons established a Safe Cholecystectomy Program, containing of Critical View Of Safety as well as 6 simple rules for surgeons to follow during laparoscopic cholecystectomy.

**Aim:** The study was designed to assess the knowledge of SCP among European surgeons (specialists and residents). Additionally, surgeons' opinion on usefulness of each of the rules of SCP was gathered. The data were analyzed in terms of differences between residents and specialists. This is to set ground for and an educational program and increase the safety of elective laparoscopic cholecystectomy by minimizing the occurrence of CBDI.

**Methods:** The data on the knowledge of SCP and opinion on usefulness of its rules were gathered in form of an anonymous questionnaire distributed among participants of several surgical conferences in Poland. The questionnaire then asked about the surgeon's experience in terms of cholecystectomies performed and the number of complications in form of CBDI. It then listed the SCP Rules and asked the surgeon about their opinion on usefulness of each of the rules on a 10-point scale. Gathered data were subject to statistical analysis and a comparison between specialists and residents was performed. The study has been registered in the ClinicalTrials.gov-NCT03155321.

**Results:** 184 completed questionnaires were gathered. 114 (61.96%) specialists (72.8% male, mean age 50 y) and 70 (38.04%) residents (56% male, mean age 34 y) completed the questionnaire. Mean work experience was 22 years among specialists and 4.5 years among residents. A relatively high percentage of specialists have experienced CBDI in their practice (46% vs. 17% of residents, p=0.014). At the same time, significantly more specialists are accustomed with the SAGES SCP than residents (49.3% vs. 21.7%, p=0.021), although these numbers are still low. Significant differences in the mean usefulness score between residents and specialists were observed in regard to two rules: rule 2 was found more useful by residents (mean score 7.07 vs. 6.01, p=0.008), whereas rule 3 was found more useful by specialists (mean 8.74 vs. 8.36, p=0.009).

**Conclusions:** The awareness of the SAGES Safe Cholecystectomy Program in Poland is still low and needs to be promoted. Both surgical residents and specialists consider the rules of SCP to be useful during surgery, although there are slight differences in the usefulness scores between the groups. An educational program to promote and further implement the SCP should be established.

**P340****Increased Withdrawal Time Immediately Following Colonoscopy Skills Improvement (CSI) Training**

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The Canadian Association of Gastroenterology (CAG) has implemented the Colonoscopy Skills Improvement (CSI) program across Canada with the goal of improving colonoscopy quality. The program's efficacy has not yet been formally assessed.

This retrospective cohort study was performed on nineteen endoscopists practicing in a tertiary referral center who have undergone CSI training since October 2014. Fifty consecutive procedures immediately prior to, immediately after, and eight months after CSI training were included for each endoscopist. Data were extracted from the electronic medical record (EMR) and entered into SPSS version 20.0 for analysis. Student's T-test was used to compare groups for continuous data; Chi-squared tests were used for categorical data. A p-value of less than 0.05 was considered significant.

Data for 2250 procedures have been analyzed. Patient groups immediately pre, post and eight months after CSI training were comparable in terms of: mean age (60.1 yrs v. 60.4 yrs v. 60.1 yrs), sex (43.1% male v. 49.2% male v. 45.5% male), indication, and completion rate (94.0% v. 94.3% v. 94.4%). There was a statistically significant increase in withdrawal time (12.4 min v. 13.2 min, p=0.043) immediately after CSI training. This was not maintained in the eight month follow up period (12.4 min v. 12.3 min, p=0.940).

Participation in the CSI program is associated with increased withdrawal time immediately following training. However, this increase was not sustained at the eight-month follow up.

**P341****National Training initiative for Transanal Total Mesorectal Excision (TaTME) in the UK**

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**Introduction:** Transanal total mesorectal excision (TaTME) has attracted substantial interest amongst colorectal surgeons throughout the world. Technical challenges of the technique however have been acknowledged by early adopters and this may underpin the early reports of visceral injuries which occurred during the perineal phase. Evidence from previous surgical training programs suggest that a structured proctorship programme can shorten the learning curve, operative time and most importantly reduce major complications. The aim of this study was to report on the first national pilot training initiative which was developed in the UK to ensure safe introduction of this technique.

**Methods:** A pilot training programme for the UK has been established in partnership with the healthcare industry, and supported by the Association of Coloproctology of Great Britain and Ireland. The programme consists of three phases: (i) Development of a consensus process on the optimum training curriculum of TATME from all relevant stakeholders, including experts, early adopters, and potential learners, to guide the training of this technique (ii) Piloting of this training curriculum and (iii) Assessment and quality assurance mechanisms to monitor training and measure outcomes.

**Results:** A cohesive multi-modal training curriculum has been developed providing clear guidance on case selection, supporting multi-disciplinary and multimodal training including online modules, dry-lab, purse-string simulators, cadaveric training and formal clinical proctoring programme. The UK pilot programme opened for applications in May 2017 and, after a rigorous selection process, the initiative was launched in September 2017 with 10 trainees mentoring 10 consultant colorectal surgeons from five centres. The selection of learners was based on suitable case volume and prior experience in laparoscopic rectal surgery. Objective assessment tools were applied to an unedited video of a laparoscopic rectal surgery case for each applicant. For the selected centres, access to the iApp TaTME app was provided to access educational content including operative video footage, prior to attending a bespoke cadaveric workshop. Each learner will then benefit from a structured, centrally organised and funded proctorship programme at their own institutions. A global assessment score form has been specifically designed to monitor training and a formal accreditation process will be used to sign off each learner using competency assessment tool. Data on the cadaveric workshop and initial outcomes of the clinical mentorship will be presented at the conference.

**Conclusion:** A competency-based pilot training programme for transanal total mesorectal excision has been launched in the UK to support safe introduction of this technique.

**P342****Validation of a Virtual FLS Intracorporeal Suturing Simulator**

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**Introduction:** Intracorporeal suturing is one of the most important and difficult procedures in laparoscopic surgery. Practicing on a FLS trainer box is effective but requires large amount of consumables and is scored subjectively. The purpose of this study is to evaluate the face validity of the intracorporeal suturing task on a Virtual Fundamentals of Laparoscopic Surgery Simulator (Virtual FLS).

**Methods and Procedures:** After a video demonstration and a practice period, twenty-three medical students and residents completed an evaluation of the simulator. The participants were asked to perform the standard intracorporeal suturing task on each of the Virtual FLS and the traditional FLS box trainer. The presentation order of the devices was balanced. The performance scores on each device were calculated based on time (seconds), deviations to the black dots (mm), and incision gap (mm). The participants were then asked to finish a 13-question questionnaire regarding the face validity of the simulator. Participants answered questions with ratings from 1 (not realistic/useful) to 5 (very realistic/useful). A Wilcoxon signed ranks test was performed to identify differences in performance on the Virtual FLS compared to the traditional FLS box trainer.

**Results:** Responses to 10 of the 13 questions (76.9%) averaged above a 3.0 out of 5. Those that rated the highest were the degree of realism of the target objects in the Virtual FLS compared to the FLS (3.87) and the usefulness of the Virtual FLS simulation in learning hand-eye coordination skills compared to the FLS (3.83). Those rated lowest were the quality of the force feedback in the Virtual FLS compared to the FLS (2.91) and the degree of realism of the instrument handling in the Virtual FLS compared to that in actual laparoscopic surgery (2.92). Average intracorporeal suturing completion time on the Virtual FLS was 441 (standard deviation=167) seconds compared to 434 (164) seconds on the box trainer (p=0.903). There was also no significant difference for the incision gap (p=0.098). Deviation in needle insertion from the black dot was smaller for the box trainer than the virtual simulator (2.16 vs. 7.02, p<0.001).

**Conclusions:** Overall, participants showed comparable performance on the Virtual FLS and traditional box trainer. Differences in needle insertion deviation may result from limited depth perception in the virtual environment. The Virtual FLS system showed face validity and has the potential to support training on suturing skills.

**P343****The First Report of Development and Use of a Non-biomaterial Training Model for Thoracoscopic Esophagectomy**

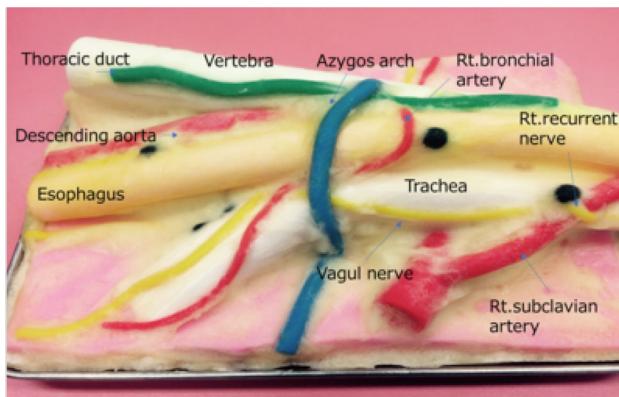
Chiaki Sato, PhD, Ken Koseki, MD, Yu Onodera, Hirotaka Ishida, Shota Maruyama, Hiroshi Okamoto, Takahiro Heishi, Tadashi Sakurai, Yusuke Taniyama, Takeshi Naito, Takashi Kamei, Prof, Michiaki Unno; Tohoku University Graduate School of Medicine, Department of Surgery

**Introduction:** Surgeons have increasingly adopted thoracoscopic esophagectomy as an alternative to open esophagectomy. However, training opportunities for these techniques remain limited. Presently, most training methods for thoracoscopic esophagectomy use live porcines; this presents several problems including cost, long preparation times, and ethical issues. These problems further prevent frequent training. Currently, no alternative models for thoracoscopic esophagectomy training. We report, for the first time, the development and use of a non-biomaterial training model for thoracoscopic esophagectomy.

**Methods:** We collaborated with Sunarrow Co., Ltd. (Tokyo, Japan) to develop the training model. We created organ models for esophagus, trachea, bronchus, aorta, vagus nerve, recurrent nerve, bronchial artery, lymph node, vertebrae, azygos vein, and thoracic duct, and filled the models with a polyvinyl alcohol hydrogel. The gaps between organs were filled with a filler material mimicking connective tissue. We chose a synthetic resin that closely mimics the characteristics (rigidity or elasticity) of each organ. After each organ was fixed, the model was covered with a filler to create a pleural membrane to allow training in peeling operations. In addition, because a patient plate was attached to the rear of the training model, excision with an energy device was possible and more closely simulated surgical conditions.

**Results:** Using the training model resulted in a highly satisfactory level of experience in three trainees. The trainees were able to learn anatomical positions and sequence of surgical procedures, including endoscope handling. The training model was sufficiently tough to withstand handling by untrained personnel.

**Conclusions:** The non-biomaterial training model developed in this study provides effective education and satisfactory training experiences in thoracoscopic esophagectomy.

**P344****iView Expert. Adapting a Method from Space and Aviation Training, to Explicate and Transfer Medical Expertise in Complex Tasks**

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**Introduction:** As doctors become expert in a complex procedure, they develop automatic nuances of performance that are difficult to explain to a peer or a trainee (so called ‘unconscious competence’). Traditional methods which aim to allow sharing of expertise have limitations: concurrent reporting alters the flow of the task at hand while retrospective reporting is subject to bias and often incomplete. iView Expert is a technique validated in the aerospace domain which externalises an expert’s cognitive processes, without disrupting the task at hand.

The aim of this project is to assess the feasibility of adapting the technique to medical training.

**Methods:** This was an observational case study in which an expert endoscopist wore a head mounted camera to capture a complex procedure (colonoscopy). Captured video was reviewed during a facilitated debrief which externalised the expert’s cognitive processes. The debrief was recorded and formed an audio commentary. The video and accompanying audio commentary formed a learning package which was watched by a specialty trainee.

The technique differs from standard procedural videos in that it provides a more detailed insight into cognitive processes of the expert. This is achieved through the debrief, which encourages reflection upon kinesthetic (head movement) as well as auditory and visual cues, resulting in a higher level of experiential immersion.

Questionnaires examined acceptability and educational value of the technique using Likert scales and free text answers. Quantitative data were presented using basic descriptions in terms of agreement with statements. Qualitative data from free text responses were coded in order to identify key themes.

**Results:** The expert agreed that wearing the camera was acceptable and did not interfere with the procedure, nor usual decision making processes.

Qualitative analysis revealed the debrief process to be associated with a high level of experiential immersion: “as if they were there”.

Both the expert and the trainee strongly agreed that the process was educationally valuable and that they learned something new.

Qualitative analysis demonstrated that the technique revealed useful and unique nuances of the procedure.

**Conclusion:** The intervention could represent a powerful adjunct to existing training methods, especially amongst more experienced practitioners. We are currently undertaking a larger study involving a greater range of procedures with more learners.

**P345****“Is Hands-on Endoscopic Lab Training Beneficial to Surgical Residents? Residents Prospective of Surgical Endoscopy”**

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**Introduction:** Endoscopy is an important skill for general surgeons to possess. However, there is lack of training within surgery residency programs. We implemented a one-day endoscopic surgery course with the aim of improving the confidence of surgical residents in performing endoscopic procedures. We also aimed to examine the effect of the exposure to this course on self-reported confidence in performing endoscopic procedures.

**Methods and Procedures:** The Fundamental of Endoscopic Surgery Course at Texas Tech University Health Science Center is a one-day course consisting of both didactic training and lab training. The didactic part of the course is taught by attending physicians and focuses on the basics of endoscopy, management of upper and lower gastrointestinal (GI) bleed, and techniques to perform a variety of GI endoscopic procedures on swine esophagus and stomach explant. The lab portion of the course allows residents to perform different endoscopic surgical procedures with the attending physicians providing guidance. Residents from PGY-1 to PGY-5 participated in the course. A 14-item questionnaire that measured the self-reported confidence in performing several endoscopic procedures on a 1–5 Likert scale was administered before and after the course.

**Results:** Twenty-two participants successfully completed the training and the questionnaires. A significant improvement was observed in the overall confidence in performing a variety of endoscopic procedures ( $1.231 \pm 0.384$ ,  $p < 0.001$ ). The improvements remained significant even after controlling for the years of postgraduate surgical training ( $P < 0.001$ ).

**Conclusion:** The one-day Fundamental of Endoscopic Surgery Course enabled residents to be more confident with endoscopic procedures. Overall, the residents felt that the course was helpful and would like to attend more than one session per year. This course should be held, at least, annually to allow the general surgery residents to become even more confident with this important skill. By being more confident in their surgical endoscopy skills, they will ultimately be able to provide better care for patients.

**P346****Does Hands-on Laparoscopic Swine Model Course Improve Surgery Resident's Skills and Confidence?**

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**Introduction:** A course evaluation study on the effectiveness of improving laparoscopic skills of surgical residents using swine models was evaluated through a self-report questionnaire administered before and after course completion. The purpose of the training is to provide surgical residents opportunities to practice and advance their laparoscopic proficiencies.

**Methods and Procedures:** Participating residents in all post-graduate year levels (PGY1 through PGY5, n=17) were provided anesthetized pigs with which to perform a variety of simple to complex laparoscopic cases. Prior to training, residents were given a questionnaire composed of eleven questions requiring the subjects to rate their confidence in performing various laparoscopic procedures on a 1–5 Likert scale. After completion of the course, an identical questionnaire was distributed with two additional questions relating to the overall impact of the course.

All statistical analyses were conducted using R statistical software (version 3.1.2). Missing individual responses were imputed using the mice package (version 2.30) in R. A composite score was derived for each subject by averaging and comparing the responses to the eleven questions at both time points (pre-training and post-training) with and without control of an individual's post-graduate year (PGY) via a paired t-test and a simple linear regression model.

**Results:** Responses to the questionnaire had a reasonable internal consistency in each of the pre-training and post-training administrations (Cronbach's  $\alpha=0.0934$  and 0.912, respectively). Exposure to the training program significantly improved confidence in performance, as evidenced by a significant increase in the composite score ( $\Delta=0.565$ , 95%CI=0.281, 0.850,  $p<0.001$ ). This improvement remained significant, even after controlling for PGY ( $p=0.0175$ ). PGY was not significantly associated with change of the composite score ( $P=0.434$ ). On average, the participants rated the lab to be very helpful ( $4.294\pm0.686$  on a 5-point Likert scale) and indicated preference to attend the lab 4 times a year ( $4.000\pm1.173$ ).

**Conclusion:** Overall, one-day hands-on training using swine models improved resident's skills, confidence, and understanding of laparoscopic surgery. The information acquired through the questionnaire emphasized the importance of providing a laparoscopic training course as a standard requirement at all medical institutions. Allowing opportunities for surgical residents to practice their laparoscopic skillset will not only help in their individual academic advancements, it will allow them to provide optimum care for their patients.

**P347****Smartphone Application Guides Laparoscopic Training Through Simulation and Reduces the Need of Feedback from Expert Tutors**

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**Background:** Learning laparoscopy is difficult and many educational tools including simulation training are required. Feedback plays a crucial role for motor skill training but require expert tutors and its time consuming.

E-learning increases knowledge acquisition through a more interacting multimedia experience and reduces de costs of learning. In the last decade multiple applications (apps) have been developed for mobile medical training.

A new iOS app was developed using specially designed educational videos that explain the main technical aspects in advanced laparoscopy through simulation training. The aim of this study is to present the first results of its incorporation in a surgical simulation lab as a complement of effective feedback.

**Methods:** Twenty-five consecutive residents were trained in our simulation lab through a 15 session validated training program for the acquisition of advanced laparoscopic skills needed for the performance of a laparoscopic hand-sewn jejunostomy. Every session had written instructions and a basic tutorial video.

The app consist two main sections, the first one explains the essential techniques needed for intracorporeal suturing and the second is a complete walkthrough of the validated training program. The trainees were divided in two groups, the first was trained without using the app (NAPP) and the second group was trained using the app (YAPP). Both groups of trainees could ask for feedback anytime they needed. Trainees were assessed before and after the training program using validated rating scales and the number of necessary tutor-feedback sessions were registered.

Finally the YAPP group answered a survey about the strengths and weaknesses of the app for learning advanced laparoscopic skills.

**Results:** Twenty-five residents completed the training program; 15 YAPP and 10 NAPP. Both groups finalized their training with no statistical significant differences in their scores ( $p=0.32$ ). The number of tutor-feedback needed to complete the training in the YAPP vs NAPP was of [4 (3–6) vs 13 (10–14) ( $p<0.001$ )] respectively.

In the questionnaire all participants considered that the app was effective for learning advanced laparoscopy. Over 4000 downloads have been registered since the app was published in the Apple App Store in 2013.

**Conclusion:** We present a novel smartphone app that guides laparoscopic training using simulation-based educational videos with very good results. The use of app guided learning reduces de need of expert tutor feedback reducing the costs of simulated training.

**P348****Single Incision Laparoscopic Appendectomy is Feasible Training Method for Surgical Resident Learning Single Incision Laparoscopic Surgery**

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**Purpose:** Laparoscopic appendectomy (LA) has been widely performed for acute appendicitis. In addition, minimally invasive surgery such as LA is common surgical technique to the surgical residents. However, single incision laparoscopic surgery (SILS) is a challenge to inexperienced surgical residents. We described our initial experience in teaching SILS procedure for appendectomy in our medical center.

**Methods:** Twenty nine cases of single incision laparoscopic appendectomy (SILA) were performed by single surgical resident and 110 cases of LA were performed by 4 surgical residents and 5 board-certified surgeons. A study was reviewed retrospectively.

**Results:** The mean operative time in SILA and MLA groups was  $44.5\pm14$  min (range 25–85 min) and  $74.8\pm26$  min (range 20–125 min) respectively, significantly shorter in the SILA groups ( $p<0.05$ ). The postoperative hospital stay in the SILA and the MLA groups was  $3.3\pm1.6$  day (range 2–6 day) and  $4.0\pm2.9$  day (range 22–12 day) respectively ( $p<0.05$ ). In SILA group, wound infection developed in 3 cases. In Multi-port laparoscopic appendectomy (MLA) group, bladder injury during operation and postoperative ileus developed.

**Conclusion:** SILA is a feasible method of training process in laparoscopic surgery for the surgical resident starting to learn SILS.

**P350****Select General Surgery Residents can be Trained to Perform Both Diagnostic and Therapeutic ERCP During Their Residency**

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**Introduction:** Training select general surgery residents in diagnostic and therapeutic endoscopic retrograde cholangiopancreatography (ERCP) has been successfully implemented, as confirmed by the three practicing surgical endoscopists that have graduated from our institution. We present the follow-up results from the presentation of Poster 141 at the SAGES 2013 Scientific Session, which asked the question: “can surgery residents be trained to perform diagnostic and therapeutic ERCP during their training?”

**Methods and Procedures:** First described by general surgeons (McCune et al. in 1968), ERCP is routinely performed by gastroenterologists. A general surgeon introduced ERCP to our institution in 1985, and began training select general surgery residents in this skill in 2010. SAGES 2013 Poster 141 and 2015 Poster 162 describe our graduated supervised training program from the junior to chief (or fellowship) years. Three residents have completed this program, and two senior residents are currently enrolled. The graduates and residents were contacted in person, via telephone, and via electronic mail to discuss the utilization of ERCP in their practice.

**Results:** Three general surgery residents who completed this training program are board certified in general surgery, and completed additional fellowship training and certification [(1) Surgical Critical Care/Acute Care Surgery; (2) Surgical Oncology/Hepatopancreaticobiliary Surgery; (3) Advanced Gastrointestinal Minimally Invasive Surgery/Bariatric Surgery/Flexible Endoscopy]. Each received credentials to perform diagnostic and therapeutic ERCP from their respective hospitals in Nevada, Minnesota, and Idaho. One continues to teach ERCP to general surgery residents, and another taught the skill to fellows in an advanced endoscopy fellowship. All three continue to use ERCP in their practice (2 to 5 times per month), as they each specialized in a field that utilizes ERCP routinely. Choledocholithiasis is the most frequent indication, though ERCP is also performed for iatrogenic biliary duct leaks, traumatic biliary or pancreatic duct leaks, chronic pancreatitis, and malignancy.

**Conclusions:** Training in esophagogastroduodenoscopy and colonoscopy is required for general surgery residents, but the addition of ERCP to select residents' training enables them to completely manage their patients' surgical disease. The training of select general surgery residents in this skill has been successful, evidenced by the continued use of ERCP in the practices of three residents who completed this training program at our institution. The decision to train residents in this skill should be left to individual program directors and department chairs. We recommend that residents selected for this additional training should plan to practice in specialties where ERCP can be implemented.

**P351****Effect of Enhanced Recovery After Surgery Pathways Including Transversus Abdominus Plane Block on Hospital Length of Stay and Narcotic Use in Patients Undergoing Complex Ventral Hernia Repairs**

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**Objectives:** Enhanced Recovery After Surgery (ERAS) pathways have been shown to expedite discharges and lower the rate of non-surgical complications in certain surgical populations. We implemented an ERAS pathway including a transversus abdominus plane (TAP) block for patients undergoing complex ventral hernia repairs to determine if streamlining patient care would result in shorter length of stays and less narcotic requirements compared to patients in the pre-ERAS period.

**Methods and Procedures:** An ERAS pathway was implemented for patients undergoing complex ventral hernia repairs (trasversus abdominus release, posterior rectus sheath release, and endoscopic component separation) beginning in July 2016. Prior to the procedure, patients received a TAP block using a combination of Exparel and bupivacaine. Post-operatively patients were given standardized orders including a multi-faceted pain regimen composed of mainly non-narcotic analgesics. Early ambulation and rapid diet advancement were also emphasized. Hospital length of stay (LOS), hours requiring patient-controlled analgesia (PCA), and morphine equivalents used per day of hospital stay were compared for patients in the post-ERAS time period and patients undergoing similar procedures in the year preceding ERAS implementation.

**Results:** A total of 57 patients were analyzed for this study, 37 of which underwent repair after ERAS implementation. Compared to the pre-ERAS population, post-ERAS patients were similar in terms of age (mean age 61.1 for post-ERAS vs. 60.1 for pre-ERAS), gender makeup (81% vs. 80% female), and BMI (32.1 vs. 32.6 all p values >0.05). Length of stay was significantly shorter in post-ERAS patients (Table 1). Hours requiring PCA and morphine equivalents given per day were also significantly reduced in post-ERAS patients.

**Conclusion:** Implementation of an ERAS pathway with the inclusion of a TAP block decreased hospital stay and narcotic use for patients undergoing complex hernia repair.

**Table 1. Outcomes for Patients Undergoing Complex Ventral Hernia Repair Pre-and Post-ERAS Implementation**

	Pre-ERAS	Post-ERAS	P value
Mean Length of Stay (days)	5.8	2.7	<0.01
Mean Time Requiring PCA (hours)	102.3	5.5	<0.01
Mean Morphine Equivalents Used/Day in Hospital	19.4	9.3	<0.01

**P352****Outpatient Anti-reflux Surgery: Re-evaluating the Need for Inpatient Admission Following Laparoscopic Nissen Fundoplication**

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**Introduction:** Laparoscopic Nissen fundoplication procedures are a safe and effective option for definitive anti-reflux treatment in select patients; however, patient selection criteria for same day discharge remain unclear. A retrospective study was undertaken to evaluate Nissen fundoplication procedures performed on an ambulatory surgical care basis to investigate patient-specific factors contributing to success or failure of outpatient treatment.

**Methods:** Data was obtained via a retrospective chart review to assess patient characteristics on all patients who underwent laparoscopic Nissen fundoplication by a single surgeon between October 2016 and July 2017. Studied parameters were compared between same day discharge (SDD) and post-operative admission (POA) patients, and included length of stay, complication rate, readmission rate, operative time, age, sex, ASA score, and BMI.

**Results:** Forty-nine patients were evaluated with subsequent exclusion of three patients from this study for additional alternative intraoperative interventions. Of the forty-six patients included in the study, thirty-two (69.6%) made up the SDD group while fourteen (30.4%) were in the POA group. The mean age of the study participants was 56.4 years, (SDD 50.9±14.3 yrs vs. POA 67.9±10.4 yrs, p-value<0.05). Sixteen males (34.8%) and 30 females (65.2%) were included, and no post-operative mortalities occurred throughout the study duration. Average ASA score was similar between groups, with an average score of 2.4±0.5 (POA) compared to 2.2±0.5 (SDD) (p=0.131). Operative duration averaged 105.8±26.6 min in the POA group compared to 78.9±25.7 min in the SDD group (p value<0.05). Mean BMI among SDD patients was 29.5±5.2 compared to 30.6±7.0 among POA patients (p value: 0.546). Within the SDD group, one patient (3.1%) was readmitted on postoperative day three for nausea and vomiting. This study reports a success rate of 67.4% for same day discharge, with an overall average length of stay of 7.2 hours. Of the fourteen patients admitted after surgery, 50% were admitted secondary to insurance reimbursement provisions.

**Conclusion:** Same-day discharge after Nissen fundoplication and hiatal hernia repair is feasible for select patients. One major challenge for same day discharge is the current insurance provisions required for hospital reimbursement. Within the parameters of this study, BMI and ASA score did not differ between discharged and admitted patients, while older age and increased procedure duration were associated with need for admission.

**P353****Feasibility of Enhanced Recovery Program in Emergency Minimal Access Surgery**

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**Introduction:** Minimal access surgery is an imperative element of Enhanced recovery program and has significantly improved the outcomes. Enhanced recovery program (ERP) synonym “fast track” surgery “was first conceived by Dr Henrich Kelhet. Largely described for colorectal surgery and reported to be feasible and useful for maintaining physiological function and smooth the progress of recovery. Most of the patients who present for surgical emergency are not adequately prepared and many are not in normal physiological state. The feasibility of Enhanced recovery programs protocol in such emergency minimal access surgery remains indistinct. This study was designed to validate an Enhanced recovery program in patients who undergo emergency minimal access surgery.

**Methods and Procedures:** The subjects were patients who underwent emergency minimal access surgery between June 2016 and March 2017 at the Victoria hospital, Bangalore. They received perioperative care according to an Enhanced recovery program. All data were collected and analysed. The end point was the length of hospital stay, pain and postoperative complications.

**Results:** A total of 135 patients were studied. According to the Clavien-Dindo classification, the incidence of ≥grade 2 postoperative complications was 10.8% and that of ≥grade 3 complications was 3.9%. Nearly all patients did not require delay of meal step-up (95.1%). Only 6 patients (3.0%) underwent reoperation. The median postoperative hospital stay was 5 days. Only 4 patients (2.0%) required readmission. There was no mortality.

**Conclusions:** Our results suggest that our Enhanced recovery program is feasible in patients who undergo emergency minimal access surgery.

**Keywords:** Enhanced recovery program, Emergency minimal access surgery, Feasibility, Post-operative complications, Perioperative care.

**P355****Surgeon-Administered TAP Blocks Within a Narcotic Sparing Pain Management Pathway in Patients Undergoing Abdominal Surgery in a Rural Hospital**

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**Introduction:** Data suggests value in using TAP (transversus abdominis plane) neural blockade in abdominal surgical procedures. We deploy TAP blockade using liposomal bupivacaine via ultrasound (US) as part of a narcotic sparing pain management pathway for patients undergoing abdominal surgery in our rural community setting. Our goal was to evaluate adequacy of post-operative discomfort and the success in avoiding narcotic usage.

**Methods and Procedures:** Records of patients undergoing abdominal surgical procedures performed by one surgeon over an 18 month period were reviewed under IRB approval. Patients taking narcotics prior to the procedure (except for discomfort due to the condition being surgically treated) were excluded from analysis, as were those admitted to the hospital for postoperative treatment. US guided lateral TAP blocks were performed by the surgeon using 266 mg of liposomal bupivacaine and 50 mg of bupivacaine in the OR prior to the incision. Unilateral block was performed for unilateral procedures (e.g. inguinal hernia) and bilateral for laparoscopic or midline procedures. Incisional sites were treated with a field block of 50 mg of bupivacaine. Prescriptions for medications included 1,000 mg of acetaminophen QID and 220 mg of naproxen sodium TID for 7 days. A prescription for tramadol (50 or 100 mg PRN up to 4 times daily; 40 tablets with no refill) was given. Patients were seen in followup two weeks postoperatively.

**Results:** A total of 47 patients met criteria including 28 males and 19 females (mean age: 46, range: 21–80). Mean BMI was 30.5 (range: 19.0–50.5) and ASA classification was: 1=21%, 2=69%, and 3=10%. Procedures included both laparoscopic (15 cholecystectomies, 7 appendectomies, and 8 ventral, 5 umbilical, and 2 inguinal hernia repairs with mesh) and open (9 inguinal hernia repairs with mesh and 1 mesenteric mass biopsy) procedures. There was one 30 day complication (port site hematoma treated non-operatively). One patient required narcotics on POD #3 (oxycodone was given); no other patients called with pain complaints. All patients reported adequate pain control during scheduled postoperative clinic visit.

**Conclusion:** Incorporating a surgeon performed US guided TAP block with an oral narcotic sparing protocol resulted in minimal need for oral narcotic prescriptions in patients undergoing abdominal surgery in a rural community hospital. Analysis of the cost, time away from work, and patient satisfaction with TAP blocks within this pathway will be under further review.

**P354****Early Postoperative Diet After Bariatric Surgery: Impact on Length of Stay and 30-Day Readmission**

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**Introduction:** Pathways for enhanced recovery after surgery (ERAS) have been shown to improve length of stay and postoperative complication rates across various surgical fields, however there is a relative lack of evidence-based studies in bariatric surgery. The objective of the current study was to determine if starting a bariatric full liquid diet on postoperative day (POD) zero was associated with shorter length of stay (LOS) for patients who underwent laparoscopic sleeve gastrectomy (LSG) or Roux-en-y gastric bypass (RYGB).

**Methods:** Retrospective review of a prospectively collected dataset was conducted at a single institution before and after implementation of a new diet protocol for LSG and RYGB. Postoperative diet orders were changed from full liquid diet on POD 1 to POD 0. Length of stay and 30-day readmissions were reviewed from June 2016 to August 2017. Independent samples t-tests were used to compare continuous variables and chi-squared tests for categorical variables before and after diet change was implemented. Patients were excluded if they were undergoing revision surgery, were discharged directly from PACU, or had significant intraoperative complications or required reoperation within the same admission.

**Results:** A total of 86 patients were eligible for inclusion; 54.7% of cases occurred prior to ERAS diet implementation. The mean age was 44.2 (SD=15.4) and mean preoperative BMI was 47.5 (SD =8.0). The majority of patients were female (74.4%) and underwent LSG (67.4%). The mean LOS for the entire sample was 38.5 hours (SD=18.0). This was significantly shorter for LSG vs. RYGB (36.3 vs. 39.5 hours; p=0.024). LOS across both procedures was shorter after ERAS diet protocol was implemented (39.0 vs. 35.3 hours; p=0.48). This difference was significant for LSG (39.0 vs. 31.3 hours, p=0.008) but not for RYGB patients (39.2 vs. 39.7 hours, p=0.93). There were a total of 4 readmissions within 30 days of surgery with no difference pre- and post-ERAS diet implementation (p=0.402).

**Conclusions:** Early postoperative feeding the same day of bariatric surgery is associated with significantly shorter LOS for patients who undergo LSG but not RYGB, with no difference in 30-day readmissions. Future prospective studies are needed to support these findings and evaluate the impact of early feeding in combination with other components of ERAS pathways on bariatric surgical outcomes.

**P356****Laparoscopic Heller Myotomy and Dor Fundoplication: A Same Day Surgery with a Trained Team and an Enhanced Recovery Protocol**

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**Introduction:** The reported length of stay after Heller myotomy is 1–4 days. The aim was to report the results of Heller myotomy and Dor fundoplication in a single esophageal center and the feasibility of the procedure as same day surgery (SDS).

**Methods:** Patients who underwent laparoscopic Heller myotomy and Dor fundoplication from 11/20/2009 to 08/17/2017, were included. The procedures were planned as SDS after 04/2015. All were performed by the same anesthesia and surgical team. The 4 steps used to facilitate SDS included 1: Prior to surgery-clear liquid diet for 24 hours, 2: In preoperative holding -antiemetics: dermal patch and IV, 3: In the operating room - intubation in semi upright position, analgesics IV at the time of incision and at the time of extubation, antiemetic and removal of Foley catheter prior to extubation. None had nasogastric tube. 4: In the recovery room - check dressings, start clear liquid diet, verify ability to void, review discharge instructions, including full liquid diet for 2 weeks and lifting restrictions. Patients were seen in the clinic 5–9 days after surgery and were followed by the operating surgeon, using a questionnaire by telephone. Values are median (IQR).

**Results:** There were 67 patients. Completion Heller (n=7), epiphrenic diverticulum (n=3) were excluded, 57 patients were included. 32M (56%/25F (44%), age 48 (35–59). The first 45 were inpatient with LOS of 1 day, the last 12 were planned as SDS. One patient who vomited at the time of intubation was discharged on POD#2 (added to the inpatient list); 11/12 (92%) were SDS. There was no difference between, age, ASA, BMI, duration of symptoms, radiographic staging, number of balloon/Botox injections between 2 groups. The duration of operation was 131 min (113–158), inpatient: 139.5 (114–163) vs. SDS: 123 (107–139), p<0.01. There was no transfusion, conversion, leak or readmission. Questionnaire was obtained in 45/57 (79%) at 32 months (12–61), inpatient 36/46 (78%), at (25.6–67) vs SDS: 9/11 (82%) at 8 (4–12). All were satisfied with the operation, 39/45 (87%) were free of preoperative symptoms, 44/45 (98%) could eat as desired, weight-gain: 10 (0–15) lbs, use of PPI: 3/45 (7%). There was no difference between 2 groups.

**Conclusions:** Heller myotomy can be planned as same day surgery and successfully performed in majority of patients. The requirements include an experienced surgical team, and a recovery protocol focused on prevention of nausea and adequate pain control in the perioperative period. Clear instructions to the team and patients are essential.

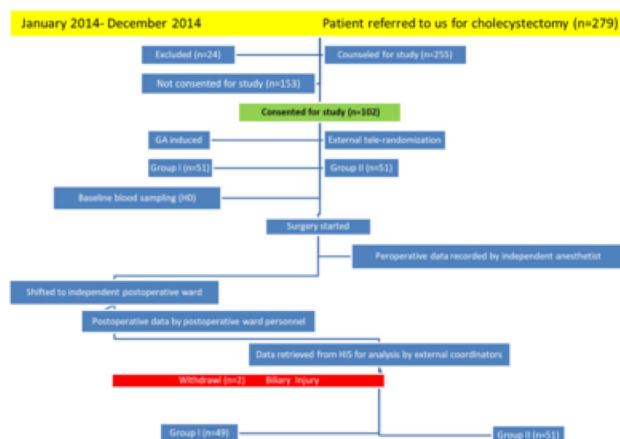
**P357**

**Patient Specific Factors of Sterile Inflammation Markers of Convalescence Following Laparoscopic Surgery-Results of a Triple Blind Randomized Control Study**

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**Introduction:** Enhanced recovery after surgery (ERAS) in post-operative convalescence (POC) following minimally invasive surgery (MIS) is determined by sterile inflammation which is mediated by an interplay between pro/anti-inflammatory and immunosuppressive cytokine cascades (PAIKn). The PAIKn & POC vary, even in similar surgeries. Damage associated molecular patterns (DAMPs) trigger PAIKn, driven dominantly by interleukin-6 (IL6). Heat shock protein (HSP), the thermal equivalent of DAMP, has distinct IL6- PAIKn footprint. We studied the patient-specific markers for subjective POC & PAIKn association, in ERAS compatible clinical-pathway for index MIS i.e. cholecystectomy.

**Methods and Procedures:** (RCT-Clinical trials registry, India. REF/2014/06/007153). Randomization to energy use or non-use was done for HSP being the dominant/potential confounder. Patient demographics perioperative data, PAIKn markers & hepatopancreatic data [juxta-operative (H0), at 4-hours (H4) & at 24-hours (H24)], were prospectively collated.

**Results:**

Patient/Operative Variant n=100; Mean (range)			
Age- years	44.18(18-76)		
Gender	M = 29, F = 71		
Kuppuswamy Socio-Economic Class	Upper = 20, Upper-middle = 32, Lower-middle = 36, Upper-lower = 11, Lower = 1		
BMI(kg/m2)	22.9 (16.45-32.04)		
Acute/Chronic	Acute=11, Chronic=89		
Comorbidities	DM=14, HTN=11, Others=17		
Substance abuse	Alcohol=24, Smokers=14		
ASA Grade	I=65, II=34, III=1, IV=0, V=0		
GB perforation	Occurred in 26 patients		
Operative time(min.)	31.8(12-98)		
Discharge fitness(hrs)	5.9(3-28)		
Return to normal act	4.95(2-36)days		
PAIKn markers & Liver-Pancreas biochemistry [Mean (range)]			
	H0	H 4	H24
IL-6	6.808 (0.22-135.8)	24.9549 (2-485.48)	28.0373 (1.39-442)
HS-CRP	0.8985 (0.02-21.37)	1.30885 (0.02-21.77)	3.6922 (0.05-24.8)
TNF $\alpha$	9.4306 (0.02-38.6)	12.8645 (0.02-39.1)	14.3929 (0.71-61.9)
SGOT	29.03(7-200)	48.86(17-428)	39.08(18-116)
SGPT	33.39(7-184)	42.9(11-198)	40.17(14-154)
ALP	82.2454(14-314)	78.2(26-249)	76.71(21-241)
GGT	28.1922(4-289)	28.59(5-245)	27.39(7-185)
Amylase	64.4692(18-496)	57.35(15-291)	61.32(14-240)
Lipase	34.28(9-79)	30.46(9-66)	33.69(8-69)

Data (following standard scales/metrics) for Patient-Reported-Outcomes e.g. pain, nausea-vomiting, & fatigue will be analyzed with the above data and the analysis with conclusions will be presented & discussed.

**P358**

**Post-operative Analgesia in Colorectal Surgery**

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**Introduction:** The aim of this project is to assess the quality of post-operative pain relief in colorectal surgery and identify patients in whom pain management has not been effective, in order to improve the quality of post-operative care.

Effective management of post-operative pain has long been recognised as important in improving the post-operative experience, reducing complications and promoting early discharge from hospital.

**Standards:** all patients should be pain free at rest, 100% of elective patients should be told about what analgesia they will have post-operatively, 100% of patients should be satisfied with their pain management and 100% of patients should feel staff did everything they could to control their pain. **Methods and Procedures:** Questionnaires were given to 20 patients on the day prior to discharge. 13 questions about pre-operative and post-operative pain experience were asked. Data regarding post-operative analgesia were collected from medication charts and medical notes. Data were collected over a period of two months (August/September 2017).

Range of procedures: 4 elective laparoscopic abdomino-peritoneal excision-of-rectum with IGAP flaps, 1 elective laparoscopic right hemicolectomy, 7 laparotomy+bowel resection/stoma formation (5 elective, 2 emergency), 1 elective repair of parastomal hernia, 5 appendicectomy (2 laparoscopic elective, 2 laparoscopic emergency, 1 laparotomy emergency) and 2 elective reversal of ileoscopy.

Pain scores (1–10): Immediately post-operative pain, day 1 post-operative pain, post-operative pain after day 1 and pain on moving/coughing/straining.

**Results:** Mean immediate post-operative pain score was 4.0 (10% of patients with score 8+), mean day 1 post-operative pain score was 4.8, mean post-operative pain score after day 1 was 4.25, mean pain score on moving was 6.2 (30% of patients with score 8+), mean pain score on coughing/straining was 6.8 (30% of patients with score 8+).

90% of patients were satisfied with their post-operative pain management and felt that the staff had done everything they could to manage their pain.

25% of patients were not aware of their post-operative analgesia regimen and 50% did not know how regularly they could request analgesia.

**Conclusions:** Effective management of post-operative pain is a key part of post-operative care and an important component of enhanced recovery programmes.

Patient satisfaction with pain management has been found to correlate with received pre-operative information.

Increasing ward nurses' and acute pain teams' knowledge is important in improving patients' pain experiences.

Interestingly, those patients who had a background of long-term opioid requirements reported that they were satisfied with their pain management.

**P359**

**Pilot Study of a Novel, Surgically-Administered Quadratus Lumborum Block**

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**Introduction:** Quadratus lumborum (QL) blocks are effective for pain control after abdominal surgery, modifying somatic and visceral pain. Published descriptions are for anesthesiologist administration pre- or post-operatively. We present a pilot series of patients undergoing a novel intraoperative ultrasound-guided QL block by the surgeon.

**Methods and Procedures:** A patient undergoing a standard ultrasound guided QL3 block by an anesthesiologist established the baseline anticipated response, and procedure time. The procedure, performed under sedation preoperatively, required over 60 minutes. For this study, patients undergoing laparoscopic colorectal surgery were administered a lateral QL block (modified QL 1) under ultrasound guidance by the operating surgeon. 40 ml of a mixture (10 ml injectable liposomal bupivacaine suspension, 15 ml 0.25% bupivacaine hydrochloride and 15 ml normal saline) was injected bilaterally, after induction, skin preparation, draping, and prior to the operation. Post-operative narcotic use and pain VAS scores were documented.

**Results:** Six patients were administered a bi-lateral QL block intraoperatively. Procedures were: 3 laparoscopic sigmoid colectomies, one end ileostomy reversal, laparoscopic completion proctectomy with ileal pouch anal anastomosis, and a laparoscopic descending colectomy. Of the narcotic naïve patients, mean pain VAS on post op days 0, 1 and 2 were 4.5, 3.2 and 2.3 respectively within a multimodal pain management/enhanced recovery program, where standing orders prompting narcotic administration by nursing staff is pain VAS 5. All were discharged on POD 2 or 3 without narcotic prescriptions. Two of the 6 patients were chronic narcotic users, and they were discharged on their baseline narcotics, i.e. without additional narcotics. All intraoperative blocks were performed in less than 20 minutes.

**Conclusion:** A novel, surgeon-administered lateral QL block under ultrasound guidance, is feasible and provides post-operative pain control. Patients are discharged home on no/baseless narcotics. A randomized controlled trial is being constructed based on these striking findings.

**Keywords:** LC-laparoscopic cholecystectomy, GA-general anaesthesia, SA-spinal anaesthesia.

**P360****To Evaluate Efficacy and Safety of Laparoscopic Cholecystectomy Under Spinal Anaesthesia**

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**Introduction:** Cholecystectomy have shown some advantages when done under spinal anaesthesia (SA) and associated with less intra operative and post -operative morbidity and mortality. Laparoscopic cholecystectomy (LC) under regional anaesthesia alone included patients with coexisting pulmonary disease, who are deemed high risk for GA. The aim of the present study is to assess the efficacy and safety of laparoscopic cholecystectomy under SA.

**Materials:** This prospective, interventional study was conducted on 60 patients with chronic calculous cholecystitis attending General surgery out- patient department of our institution.

**Results:** In our study, intraoperative complications recorded were hypotension, bradycardia, intra op shoulder tip pain, bleeding from the liver bed, bile spillage, post-op pain and vomiting. 10% patients had intraoperative pain, 5% had shoulder tip pain, 3.3% had bradycardia, 3.3% had hypotension, 1.7% had bile spillage and 1.7% had bleeding.

**Conclusion:** Laparoscopic cholecystectomy under spinal anaesthesia should be promoted more even in developing countries but we need to establish well evaluated safety guidelines that could be followed faithfully for minimizing the risk of complication.

**P362****Battle of the Super Obese Sexes: Female Versus Male Variation in Pre-operative Clinical Characteristics Among 1,673 Surgical Patients Undergoing Bilio-Pancreatic Bypass/Duodenal Switch (BPD/DS)**

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**Introduction:** The objective of this study was to identify variation in weight and demographics in the distribution of pre-operative clinical characteristics between super obese females compared with males who were about to undergo BPD/DS surgery. As the American obesity epidemic increases, morbidly obese patients have become integral to every surgical practice; they are no longer limited to bariatric surgeons. Every clinical insight helps the surgeon to optimize outcomes when operating on and managing these medically fragile individuals. In this context, however, clinically and statistically significant differences in demographics, body mass, and in the distribution of weight-related medical problems between super-obese women and men are unknown.

**Methods:** Pre-operative data from 1,673 Surgical Review Corporation BOLD database patients who were planning to undergo BPD/DS were analyzed retrospectively in two groups: Female (n=1217) and Male (n=456). Statistical analyses: ANOVA compared age, weight, and Body Mass Index (BMI) and Chi-squared assessed dichotomous variable distribution.

**Results:** Pre-operative female/male weight ( $138 \pm 27$ ,  $174 \pm 34$  kg), BMI ( $51 \pm 9$ ,  $53 \pm 10$ ) and age ( $45 \pm 11$ ,  $46 \pm 11$ ) varied by sex ( $p < 0.05$ , as did Medicaid/Medicare/Private/Self-Pay insurance status (female % 9.7/9.6/7/7/4.1 and male % 5.4/11.5/81/2.5.  $p < 0.05$ ). Female abdominal panniculus, asthma, cholelithiasis, GERD, stress urinary incontinence, depression, fibromyalgia ( $p < 0.01$ ) and mental health diagnosis ( $p < 0.05$ ) (8 comorbidities) were higher than those characteristics among men. Male alcohol use, congestive heart failure, hypertension, ischemic heart disease, dyslipidemia, obstructive sleep apnea, diabetes, gout ( $p < 0.01$ ), liver disease and unemployment ( $p < 0.05$ ) (10 comorbidities) were higher than female. Race, abdominal hernia, angina, back pain, DVT/PE, impaired functional status, lower extremity edema, musculoskeletal pain, obesity hypoventilation syndrome, peripheral vascular disease, pseudotumor cerebri, psychomotor impairment, pulmonary hypertension, and substance/tobacco abuse did not vary by sex.

**Conclusions:** Among super-obese patients who were pre-operative for BPD/DS, demographics and clinical characteristics varied significantly by sex. Females suffered from higher rates of asthma, abdominal skin inflammation, hepatobiliary illnesses, and psychological issues including depression and fibromyalgia. Males were older, heavier, more often unemployed, drank more alcohol, suffered increased cardiac dysfunction, liver disease, obstructive sleep apnea, diabetes and other endocrine/metabolic co-morbidities. The advanced clinical knowledge reported here may help to optimize pre-operative comorbidities prior to surgical intervention in the effort to decrease perioperative morbidity and mortality in super-obese surgical patients.

**P361****Tranversus Abdominis Plane Block with Liposomal Bupivacaine in Patients Undergoing Laparoscopic Sleeve Gastrectomy Decreases Post-operative Opiate Use**

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**Background:** The “Opioid Crisis” has taken over headlines with increasing public attention brought to the drastically increasing rates of addiction to prescription narcotics. In 2015, the American Society of Addiction Medicine reported 2 million Americans with an addiction to prescription pain relievers and a four-fold increase in overdose related deaths. In a medical setting, increased opiate use is associated with increased rates of delirium, ileus, urinary retention, and respiratory depression. These risks are increased in the obese/bariatric population. Transversus abdominis plane (TAP) block is a safe and effective approach to achieve optimum pain control. It reduces the use of opiates in patients undergoing major abdominal surgery. However, there is currently no data in the literature examining its use in the bariatric population. Our study examines the use of liposomal bupivacaine for TAP block in patients undergoing laparoscopic sleeve gastrectomy (LSG).

**Methods:** Sixteen patients undergoing LSG with TAP block were compared with historical cohort of sixteen patients undergoing LSG without TAP block (standard group). The primary outcome measured was post-operative in-hospital opiate use (morphine equivalents). Statistical analysis was performed using Student's t test for continuous variables and Fisher's exact test for categorical variables.

**Results:** Both groups were well matched in regards to BMI, age, and ASA class. There was a significant decrease in the post-operative use of opiates with the use of the TAP block (11.4 mg in the TAP block group vs. 43 mg in the standard group;  $p = 0.00002$ ). There was no difference in the mean length of stay between the two groups. There was an increase in the mean operative time with use of the TAP block (76 minutes in the TAP block group vs. 58 minutes in the standard group;  $p < 0.05$ )

Value	TAP Block	Standard Care	p-value
Opiate Use (mg, SD)	11.43 (8.4)	43.03 (17.8)	0.00002
Length of Stay (days, SD)	1.625 (0.62)	1.18 (0.54)	0.54
Operative Time (minutes, SD)	75.56 (21.14)	57.62 (16.5)	0.01

**Conclusions:** The use liposomal bupivacaine for TAP block provides substantial analgesia, allowing for significant reduction in post-operative opiate use in our bariatric patients. This can be an important adjunct in pain control for the bariatric population and aid in post-operative complication risk reduction.

**P363****The Impact of Transversus Abdominis Plane Block on Patients in an Enhanced Recovery Bariatric Surgery Pathway**

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**Introduction:** A transversus abdominis plane (TAP) block is an ultrasound-guided injection of local anesthetic in the plane between the internal oblique and transversus abdominis muscles to interrupt innervation to the abdominal skin, muscles, and parietal peritoneum. Currently there are incongruent findings on the benefit of this regional anesthetic to surgical patients, particularly the obese population. We hypothesized the addition of a TAP block in an enhanced recovery pathway (ERAS) for bariatric patients would decrease opioid use and shorten hospital length of stay.

**Methods:** A retrospective review of all patients who underwent bariatric surgery at a single institution from January to December 2016 was performed. Patients were identified as: no TAP block (No TAP), TAP blocks that were performed after induction either pre-surgery (Pre-TAP) or post-surgery (Post-TAP). The primary outcome was time to first opioid (min) and total morphine (mg) equivalents in PACU. The secondary outcome was hospital length of stay (LOS) and 30-day readmission. Patients were compared on pre-operative and intraoperative factors by univariate analysis using Wilcoxon rank sum, Chi-square, and Fisher's exact tests where appropriate.

**Results:** A total of 129 bariatric procedures were performed of which 105 underwent a TAP block, with 81 Pre-TAP block patients and 23 Post-TAP block patients. In PACU, average morphine (mg) equivalent was calculated as No TAP of  $10.4 \pm 8.1$ , Pre-TAP of  $7.4 \pm 7.3$ , Post-TAP of  $7.7 \pm 8.2$  mg ( $p = 0.33$ ). There was no significant difference in time (min) to first opioid in PACU (No TAP  $29.1 \pm 20.9$ , Pre-TAP  $26.8 \pm 21.8$ , Post-TAP  $26.1 \pm 18.4$ ). Length of stay (days) was not significantly different between No TAP, Pre-TAP and Post-TAP block patients ( $3.0 \pm 2.2$  vs.  $2.6 \pm 5.4$  vs.  $3.2 \pm 5.9$ ). Finally, there was also no difference in 30-day readmission between No-TAP, Pre-TAP and Post-TAP patients (5.9% vs. 4.9% vs. 0%).

**Conclusion:** The addition of a TAP block to our ERAS pathway for bariatric patients failed to reduce use of opioids or decrease hospital length of stay and 30 day readmission. The failure to show any significant differences may be attributed to our small study population. However, in the TAP block group opioid use was lower by 3 mg and with nearly half the number of readmissions. The potential for a positive impact with minimal risk of a TAP block is an important reason to continue to prospectively study the impact of TAP blocks on bariatric surgery patients.

**P364****Move for Your Bowels: Perioperative Activity Impacts the Duration of Postoperative Ileus**

**Heather Carmichael, MD, Douglas Overbey, MD, Edward Jones, MD, Teresa Jones, MD, Carlton Barnett, John Moore, MD, Thomas Robinson, MD; University of Colorado, Denver Veteran Affairs Medical Center**

**Objective:** Prolonged postoperative ileus increases hospital length of stay and therefore impacts healthcare costs. Although many surgeons recommend ambulation in the postoperative period to hasten return of bowel function, little evidence exists to support this practice. Our hypothesis is that early ambulation does reduce the time to return of bowel function after intestinal surgery.

**Methods:** A subset of 16 patients undergoing intestinal surgery from an ongoing, prospective trial evaluating perioperative physical activity was analyzed. Preoperatively, patients wore an activity tracker for a minimum of three days to establish a baseline activity level, measured by daily steps. Postoperatively, steps were recorded for 30 days. Patients were included in this study if they underwent an operation on the small bowel, colon, or rectum. Resolution of postoperative ileus was defined as the postoperative day when patients were noted to meet all of the following criteria on review of nursing documentation: passing flatus, stooling or having ostomy output, and tolerating a regular diet without intravenous fluids. "Early" postoperative activity was defined as the average number of daily steps during the first two postoperative days.

**Results:** Included patients had a median age of 63 years (range 49–80). Surgical procedures included laparoscopic or open partial colectomy, ileostomy reversal, low abdominal resection, and abdominoperitoneal resection. Patients averaged 5483 steps (range 1349–9698) at preoperative baseline and 1015 steps (range 27–3090) in the first two postoperative days. The median number of postoperative days until resolution of ileus was 4 (range 2–6).

Resolution of ileus after surgery was significantly correlated with both preoperative and postoperative steps on multiple linear regression. An increase of 1000 steps daily preoperatively was associated with a 0.44 day decrease in duration of ileus ( $p<0.001$ ); similarly an increase of 1000 steps daily in the early postoperative period was associated with a decrease of 0.76 days ( $p<0.001$ ). This multivariate regression produced an  $R^2$  value of 0.80 as compared to values of 0.55 and 0.39 on univariate regression of preoperative and postoperative steps, respectively.

**Conclusions:** Both preoperative and postoperative activity, as measured by daily steps, correlated with earlier resolution of ileus in patients undergoing intestinal surgery. The effect of early postoperative steps remained significant even when controlling for preoperative activity in a multivariate analysis. These findings support the common practice of encouraging early ambulation after surgery to hasten discharge.

**P365****Laparoscopic Assisted Nerve Block in Treatment of Inguinodynia**

**Trenton Kinnear, MD, Lauren Grimsley, MD, Brandie Forman, Nikita Shokur, Vince Vetrano, Bruce Ramshaw, MD; UT Medical Center Knoxville**

**Background:** Traditional methods of clinical research may not be adequate to improve the value of care for patients with complex medical problems such as chronic pain after inguinal hernia repair. This problem is very complex with many potential factors contributing to the development of this complication.

**Methods:** We have implemented a clinical quality improvement (CQI) effort in an attempt to better measure and improve outcomes for patients suffering with chronic groin pain (inguinodynia) after inguinal hernia repair. Between April 2011–January 2017, 104 patients underwent 105 operations in an attempt to relieve pain. Patients who had prior laparoscopic inguinal hernia repair had their procedure completed either laparoscopically with mesh removal and neurolysis or a combination of a laparoscopic and open procedure (mesh removal, neurectomy and primary reconstruction of the groin) in an attempt to relieve pain. Some patients received an intraoperative block laparoscopically while another group of patients received an intraoperative block via an open procedure. This evaluation of outcomes was intended to investigate whether there are differences in outcomes depending on whether the patient received a laparoscopic or an open nerve block.

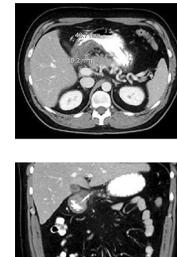
**Results:** Fifty-nine patients received an intraoperative block for inguinodynia. Of those fifty-nine patients, twenty-three patients had intraoperative blocks laparoscopically and thirty-six patients had an open intraoperative nerve block. Of those twenty-three laparoscopic patients, 43% (10 of 23) had no pain immediately after surgery while 41% (15 of 36) of the open patients had no pain after surgery. The average OR time for the open procedure was 124 minutes while the laparoscopic procedure was 120 minutes averaged. The average post anesthesia care unit time for the open group of patients was 68 minutes while the laparoscopic group of patients had an average time of 51 minutes in the PACU. For the laparoscopic group of patients, 91% (21 of 23) patients were discharged the same day as their procedure. For the open group of patients, 72% (26 of 36) patients were discharged the same day as their procedure.

**Discussion:** These results suggest the patients who received an intraoperative block laparoscopically were more likely to be able to spend less time in the post anesthesia care unit and be discharged home the same day. Based on these results, additional process improvement ideas will be implemented in an attempt to improve outcomes.

**P366****Transgastric Endoscopic Drainage of a Peripancreatic Abscess from a BBQ Brush Bristle Gastric Perforation**

**Riley D Stewart, MD, MSc, FRCSC, James Ellsmere, MD, MSc, FRCSC; Dalhousie University Division of General Surgery**

**Introduction:** Oropharyngeal and Gastrointestinal (GI) perforations from BBQ brush bristles are being reported in the literature with increasing frequency. Media attention to this problem has increased awareness by the public. Most commonly, BBQ bristles lodged in the GI tract can be removed endoscopically or pass without complication. Rarely, surgical intervention is required for removal of the bristle or drainage of an associated abscess. We report a case of gastric perforation by a BBQ bristle leading to a pancreatic abscess.



**Case Report:** A 41-year-old male presented to a regional center with epigastric pain and malaise. His medical history included: hypertension, dyslipidemia, GERD, and smoking. His surgical history included: a tonsillectomy, excision of bronchial cleft cyst, and an umbilical hernia repair. On presentation, his laboratory investigations were unremarkable aside from an elevated white blood cell count. Investigations including an abdominal X-rays and an abdominal ultrasound were unremarkable. He was initially treated with a proton pump inhibitor for presumed peptic ulcer disease. He returned to the local emergency room, no better than before. A CT scan was arranged which demonstrated a foreign body at the pylorus consistent with a BBQ bristle and a peripancreatic fluid collection (Figs. 1 & 2). A gastroscopy failed to identify the bristle. He was admitted, placed on IV antibiotics and referred to our center. Despite several days of antibiotics prior to arrival, the collection size on repeat CT scan had increased and the patient had ongoing pain. We repeated the endoscopy with a side viewing endoscope. The perforation was identified posteriorly at the pylorus. The bristle had migrated into the peripancreatic space. The perforation was cannulated with a Jaglome. Fluoroscopy was used to confirm the position of a wire in the fluid collection (Figs. 3 & 4). Pus was drained from the collection into the stomach by placement of a 5 French pigtail catheter (Fig. 5).



The patient was discharged pain free the following day. The patient was asymptomatic at 6 weeks' follow-up. A repeat CT scan showed resolution of the abscess and safe migration of the bristle and stent out of the GI tract (Fig. 6).



**Conclusion:** To our knowledge, this is the first reported transgastric endoscopic drainage of a peripancreatic abscess caused by a BBQ bristle gastric perforation. This case is a demonstration of the ever-expanding role of therapeutic endoscopy in a surgical practice.

**P367****Endoscopic Retroflexed Balloon Dilation of the GE Junction**

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**Introduction:** Endoscopic balloon dilation of the gastroesophageal junction (GEJ) is generally limited to 20 mm in diameter. In many stenotic or spastic disorders of the GEJ 20 mm is just not big enough. Larger balloon sizes are available (30 and 40 mm), although these are deployed under fluoroscopy without endoscopy. Thus, these larger dilations are often not feasible at the time of the diagnostic endoscopy because different facilities and/or equipment are needed. Also, fluoroscopic 30 mm balloon dilations are associated with a 5 percent perforation rate. To address these shortcomings we present an experience with a retroflexed “against the scope” balloon dilation of the GEJ. In detail, the GEJ is visualized while retroflexed and a balloon is then placed through the scope. The GEJ is cannulated next to the scope and deployed. Please see the attached image for example.



**Methods and Procedures:** A retrospective chart review was performed for a single surgeon during the past five years. We identified those who had retrograde dilations and evaluated the indications, repeat dilations, complications and symptomatic response.

**Results:** A total of 24 retrograde dilations were performed on 15 patients with GEJ related dysphagia. The average age was 54.2 years. 17 of 24 dilations were with a 20 mm balloon while other dilations used as small as a 14 mm balloon. 19 dilations were performed for persistent dysphagia after cardiomyotomy between 57 and 5971 days after surgery. Other indications for dilation were dysphagia after fundoplication (3/24), dysphagia after paraesophageal hernia repair (1/24) and achalasia during pregnancy (1/24). 5 patients required a total of 9 repeat retrograde dilations at an average time of 488 days after previous dilation. There were 2 instances reported where the dilation did not improve symptoms. There was mucosal breakdown noted in 7 instances although there were no perforations. Bleeding was noted in 5 instances although this was always minimal and self-resolving.

**Conclusions:** Retrograde endoscopic dilation is safe and effective in this small series. The 20 mm balloon against a 10 mm scope gives a 30 mm diameter, but a different shape and a decreased total circumference. There is a possible added safety advantage given that the balloon is inflated under visualization. It can be inflated in steps or stopped if it appears too aggressive. In addition these larger dilations were provided at the time of the initial diagnostic EGD without extra equipment. More studies are needed to compare retrograde endoscopic dilation to other methods of management of GEJ stenosis.

**P370****Feasibility of Laparoscopic Surgery Using a Flexible Endoscopic Surgery System: Preliminary Results from Animal Experiments**

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**Introduction:** Robot-assisted surgery allows surgeons to perform many types of complex laparoscopic surgical procedures. More and more patients are treated with this sophisticated system. However, all the instruments used in the currently available surgical robot system is rigid. Therefore, there exists a limitation in the extent of reach to the deeper surgical fields. In order to overcome this difficulty, we are developing a novel flexible endoscopic surgery system (FESS) which has flexible single port platform of 3 cm in diameter, independently controlled endoscope and instruments, open architecture that is compatible with existing flexible devices and a magnified 3D HD camera that has sensors of both RGB and infrared. Furthermore, the system is smaller and would be more cost-effective than existing robotic surgical system. A preliminary experiment was performed in surgical procedures using porcine model to evaluate effectiveness and feasibility of FESS.

**Methods and Procedures:** Experimental protocols were approved by the Animal Research Committees of our institution. We used a female swine of 25 kg. An assistant force lifted up the fundus of gallbladder to create good visualization of surgical field. The cystic duct was ligated by laparoscopic clip device from assistant port. Blunt dissection was performed by pushing the forceps and sharp dissection by monopolar electrocoagulation.

**Results:** The FESS accomplished the dissection of the gallbladder from the liver bed successfully. Two 5 mm forceps had enough grasping and dissecting force and dexterity. The gallbladder was removed from single port site easily.

**Conclusions:** This experiment showed that it is feasible to intuitively operate single-site cholecystectomy with FESS. In order to realize a pure FESS procedure, an additional novel device to create good visualization of the surgical field is necessary for the FESS platform. A prototype has already been developed for evaluation in securing the surgical field. The optimal working range, or “sweet spot” of FESS is not relatively large. In addressing this issue, the feature of easy setup is being improved to enable more efficient positioning and shifting of the sweet spot for the surgical field. This mechanism could enhance the expansion of procedures suitable for FESS. The target procedures of FESS are those specifically suitable for single port surgery, such as transanal surgeries and transcervical mediastinoscopic surgeries. Intraluminal procedures and natural orifice transluminal surgery (NOTES), which are not considered suitable for rigid surgical robot, are also good applications of FESS.

**P371****Regression of Anal and Scrotal Squamous Cell Carcinoma (HPV Related) with Imiquimod**

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Index patient is a 48 year old HIV positive homosexual man with anal-scrotal condylomas (AIN) initially presented in 2012, then treated with radiation in 2014 for recurrence. Recurred in 2016 with changes severe enough to "...consider diagnosis of invasive squamous cell carcinoma...". Patient elected trial of Imiquimod 5% cream three times per week to defer recommendation of abdomino-perineal resection. Imiquimod has no antiviral effect but stimulates interferon and cytokines to suppress HPV subtypes 6 and 11, among other immune effects. No data exists as to systemic effects of Imiquimod. After three months of therapy, lesions had largely regressed with only one specimen showing "...concern for squamous cell carcinoma in situ...". Patient has elected to continue treatment pending further biopsy. This report is typical of a number of other reports of small numbers of cases of neoplasia regression with Imiquimod 5% cream to include Melanoma-in-situ, Basal cell cancer of skin and other cutaneous malignancies as well as VIN. A second female patient, 38 years old, HIV+ with HPV lesions (AIN3) including urethral lesions, is being treated with vulvar application of Imiquimod to determine if urethral lesions will regress. There is no FDA-approved indication for mucosal application of Imiquimod. Biopsies are pending at completion of six month trial of Imiquimod.

**P372****Increasing Flexible Endoscopy Case Volume During Surgical Fellowships: A Fellowship Council Case Log Evaluation**

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**Introduction:** Training in flexible endoscopy remains a critical skill for surgeons, as therapeutic endoscopy procedures continue to evolve and to supplant standard surgical operations. The role of endoscopy across surgical subspecialties is shifting, as endoluminal procedures (like per-oral endoscopic myotomy and endoluminal bariatric interventions) have become commonplace. While surgical residency minimum case volumes are mandated, little is known about the volume of endoscopic procedures surgical fellows participate in. We aimed to characterize the volume of flexible endoscopy cases logged by surgical subspecialty fellows as a measure of endoscopic platform use by surgeons.

**Methods:** Operative case logs for fellows enrolled in post-graduate training programs participating in The Fellowship Council were de-identified (no patient or program specific information) and provided for analysis. The case log is an online, mandatory, self-reported collection of all surgeries, procedures and endoscopies performed during fellowship year. All cases listed within the category of "GI Endoscopy" in which the fellow designated their role as "Primary" surgeon for the procedure were further sorted based on subcategory and linked to the year of fellowship graduation. Rigid endoscopy, trans-anal endoscopic procedures, and those in which the fellows roll was "First Assistant" were excluded.

**Results:** From 2007 to 2017, a total of 152,102 unique flexible endoscopic procedures were documented by 1,603 individual fellows. Fellowship program classifications included colorectal, minimally invasive, bariatric, hepatobiliary, flexible endoscopy and thoracic surgery. For fellows graduating in 2008, a total of 10,071 flexible endoscopic procedures were recorded among 123 fellows (average 82 procedures per fellow, range 1–633). This included a total of 6,018 diagnostic upper endoscopy, 432 therapeutic colonoscopies, with 577 endoscopic retrograde cholangiopancreatography (ERCP) procedures. Due to case log documentation limits, no percutaneous endoscopic gastrostomy (PEG) or enteral stenting procedures were able to be uniquely recorded. By the graduating class of 2017, flexible endoscopy procedure volume had increased to 16,462 procedures completed by 166 fellows (average 99 procedures per fellow, range 1–1012). This included a total of 12,616 diagnostic upper endoscopy, 808 therapeutic colonoscopies, 471 ERCP, 276 PEG and 205 enteral stenting procedures.

**Conclusion:** Flexible endoscopy procedure volumes appear to be increasing among Fellowship Council matched subspecialty trainees. Further evaluation and analysis of this robust data set and direct comparative analysis of procedural types is warranted to better establish emerging trends.

**P373****Duodenal Stenting is Clinically Effective for the Management of Fistulous Output After Complex Pancreaticoduodenal Trauma: A Matched Case-Control Study**

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**Introduction:** Complex pancreatic and duodenal injuries due to trauma continue to present a formidable challenge to the trauma surgeon with a described mortality of 5–30% and morbidity of 22–27%. Duodenal fistula formation subsequent to failure of attempted primary repair is associated with significant morbidity and mortality. We present the first reported series of four patients with complex trauma-related duodenal injuries who had failure of primary repair which were managed with duodenal stenting. We compared outcomes to a matched case control cohort of patients with trauma related duodenal injuries. The aim of this study is to document our experience with enteral stents in patients with complex duodenopancreatic traumatic injuries.

**Methods:** A retrospective review at a Level I trauma center identified 4 patients who underwent endoscopically placed indwelling covered metal stents after failure of primary duodenal repair in the form of high output duodenal fistulas. A matched case control cohort was identified including 6 patients with duodenal fistulas who were not treated with stents. Drainage volumes were collected and classified according to source and phase of intervention (i.e. admission to fistula diagnosis, to stent insertion, after removal, and until discharge).

**Results:** There was a decrease in the mean combined drain output of 497 ml/day ( $p=0.16$ ) after stent placement. When comparing the sum of all output sources, there was a statistically significant difference across phases ( $p=0.03$ ) and "After Removal" was significantly less when compared to the reference phase ( $p=0.05$ ). There was also a change in the directionality of the slope for the sum of all drain outputs with an increase of 13 ml/day<sup>2</sup> prior to stent placement compared to a decrease of 13 ml/day<sup>2</sup> ( $p=0.26$ ) after stent placement. The stenting group demonstrated a decrease in mean drain output (1063 ml/day vs 1446 ml/day,  $p=0.24$ ) and increase in distal gastrointestinal output (700 ml/day vs 223 ml/day,  $p=0.16$ ). One patient in the stent group required later operative repair. All other patients in the stenting and control group had resolution of their fistulas over time. There were 2 late mortalities in the control group.

**Conclusion:** The stent treated patients demonstrated diversion of approximately 500 ml/day of enteral contents distally. While all patients eventually healed their fistulas, the stent treated patients demonstrated an accelerated abatement of drain outputs when compared to the control cohort, but did not reach statistical significance. Indwelling enteral-coated stents appear to be an effective rescue method for an otherwise inaccessible duodenal fistula after failure of primary repair.

	Patient 1	Patient 2	Patient 3	Patient 4
ISS (Injury severity score)	24	25	25	25
Stent	Boston Scientific Wallflex Esophageal 23mm x 105mm	Boston Scientific 125mm x 23mm partially covered stent	25mm Esophageal Stent	Ultraflex Esophageal stent 23mm x 120mm
Date of placement from initial surgery	POD 37	POD 49	POD 41	POD 51
Date of removal	POD 112	POD 79	POD 63	POD 86
Confirmation of placement	UGI	UGI	UGI	UGI
Overall Outcomes	Survived, discharged to rehab	Survived, discharged to rehab	Survived, discharged to rehab	Survived, discharged to rehab

Phase	Mean per Day	p-value	Change per Day	p-value	Change per Day	p-value for Difference
Admit-Fistula	2228	0.60	15	0.77	-	-
Fistula-Insertion	2445	Ref.	8	0.90	13	
Insertion-Removal	2780	0.30	13	0.97	-13	0.26
After Removal	1720	0.05	-14	0.57		

	Mean per day			Change per day		
	Case	Control	p-value	Case	Control	p-value
Wound Vac	590	477	0.55	-3.6	-8.2	0.37
Drains	1063	1446	0.24	-10.1	-3.9	0.46
Distal	700	223	0.16	-0.4	-1.2	0.93
Sum	2278	2283	0.99	-14.1	-14.5	0.97

**P374****Esophageal Salvage Using Stents After Failure of Primary Surgical Repair of Penetrating Trauma**

Kevin L Chow, MD, Hassan Mashbari, MD, Mohannad Hemdi, MD, Eduardo Smith-Singares, MD; University of Illinois at Chicago

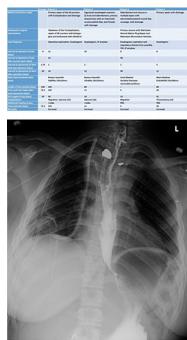
**Introduction:** Esophageal trauma represents an uncommon but potentially catastrophic injury with a reported overall mortality of up to 20%. The management of iatrogenic and spontaneous perforations have been previously described with well-established guidelines which have been mirrored in the trauma setting. Esophageal leaks are the most feared complication after primary surgical management and present a challenge to salvage. There has been increasing reports in the literature supporting the use of removable covered metal stents to treat esophageal perforations and leaks in the non-trauma setting. We present the first reported case series of four patients presenting with external penetrating trauma induced esophageal injuries, complicated by failure of initial primary surgical repair and leak development, successfully managed with the use of esophageal stents.

**Materials and Methods:** A retrospective review was performed at a Level I trauma center identifying four patients who underwent endoscopically placed removable covered metal stents, either by a surgical endoscopist or an interventional gastroenterologist, after failure of primary surgical repair of esophageal traumatic injuries. Demographic information, hospital stay, additional interventions, complications, imaging studies, ISS scores, and outcomes were collected.

**Results:** Our cohort consisted of 4 patients with penetrating injuries to the chest and neck with esophageal injuries (3 thoracic and 1 cervical esophageal injuries) managed with esophageal stenting after leaks were diagnosed following primary surgical repair. Their initial esophageal injuries included grades 1, 3 and 5. Leaks were diagnosed on average post-operative day 9. Two patients underwent an additional attempted surgical repair and subsequent leak development. Esophageal stents were placed under endoscopic and fluoroscopic guidance within 3 days of leak diagnosis. There was resolution of their esophageal fistulas with all patients resuming oral intake (averaging 72 days after stent placement). Three patients (75%) required further endoscopic interventions to adjust the stent due to migration or for dilations due to strictures. Mortality was 0%, all patients survived to be discharged from the hospital with average ICU length of stay of 30 days.

**Conclusion:** The use of esophageal stenting has progressed over the last few years, with successful management of both post-operative upper gastrointestinal leaks as well as benign, spontaneous, or iatrogenic esophageal perforations. While the mainstay of external penetrating traumatic esophageal injuries remains surgical exploration, debridement, and repair with peritoneal drainage; our case series illustrates that the use of esophageal stents is an attractive adjunct that can be effective in the management of post-operative leaks in the trauma patient.

	Patient 1	Patient 2	Patient 3	Patient 4
Sex	Male	Female	Male	Male
Age	46	16	21	32
Location of penetrating trauma	GSW Epigastrium	GSW Left Chest	GSW Neck	GSW Right Chest
Site of Esophageal Injury	Thoraco-abdominal	Thoracic	Cervical	Thoracic
Associated Injuries	Injury to supraceliac aorta, Grade 4 liver injury	Left lung contusion, fracture of clavicle and T3 vertebral body	Tracheal injury, C7 vertebral body fracture	Right lung hematoma, BLUL lobectomy and mediastinal exploration, coded, cerebral edema requiring craniectomy
Esophagus Injury Scale	III	V	III	I
Esophagus AIS	4	5	4	3
ISS	32	27	50	14
Initial ED Vital Signs				
HR	82	92	112	77
BP	150/110	108/54	135/70	135/41
GCS	13	15	7T	5T

**P375****Results of the Ovesco-Over-Overstitch Technique for Managing Bariatric Surgical Complications**

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**Introduction:** Endoscopic management of bariatric surgical complications is commonplace, including the management of leaks and fistulae. Large or complex full-thickness gastrointestinal (GI) tract defects often require multisession or multimodal therapy for closure. The challenges of this environment limit the utility of any single method for endoscopic closure. This abstract reports the results of bariatric surgical complications managed utilizing a novel technique combining endoscopic suturing and clipping.

**Methods:** A multicenter retrospective study of patients with full thickness GI tract defects following bariatric surgery. The study sites were two tertiary care academic medical centers. Patients were identified who underwent placement of an Ovesco clip (Tubingen, Germany) on top of a GI tract defect closure using the Overstitch device (Apollo Endosurgery, Austin). This Ovesco-Over-Overstitch (OOO) method was utilized in combination with standard endoscopic adjunct maneuvers such as mucosal ablation. Procedures were performed by two experienced surgeon-endoscopists.

**Results:** Ten patients were identified (8 female, mean age of 52 years, mean body mass index of 41 kg/m<sup>2</sup>); 8 symptomatic gastro-gastric fistula (mean fistula size of 1.6 cm) following gastric bypass, 1 sleeve gastrectomy leak, 1 gastro-plural fistula. Eight patients underwent OOO in a single session (mean procedure time 99 min). There were two recoverable operative complications (1 suture pull-through, 1 device entanglement) but no post-procedure morbidity. During follow-up (mean 333 days), there were 8 failed closures (80%), with a mean time to failure of 217 days. Four failures were ultimately managed surgically, 3 endoscopically, and 1 remained asymptomatic (excluded from consideration for reintervention).

**Discussion:** The OOO method led to an overall success rate of 40% for defect closure, with primary efficacy of 20% and an additional 20% rate of salvage with endoscopic therapy. Sixty percent of patients in this series therefore avoided a complex surgical revision. Downsizing a large defect via Overstitch and further securing the closure using an Ovesco clip is a viable technique for managing large full-thickness GI tract defects otherwise not be amenable to endoscopic closure.

**P376****Simultaneous Endoscopic Gastrostomy Closure and PEG Replacement After Early Accidental Removal**

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**Introduction:** Since 1980, the preferred method of enteral access has been the percutaneous endoscopic gastrostomy tube (PEG). Accidental removal is a common complication associated with excessive cost and possible significant morbidity.

Removal prior to 14 days is considered "early removal." Early removal has more significant risk associated with it, and can necessitate emergent operation to prevent peritonitis and sepsis. Some patients, who do not exhibit signs of peritonitis, may be simply observed. For these patients, PEG replacement would typically be delayed 5–10 days to ensure closure. This delay results in prolonged NPO status and worsened nutritional status. Presented below is a case of early accidental removal followed by endoscopic clip closure, and immediate PEG replacement.

**Case Report:** A 43-year-old male presented after a large left middle cerebral artery infarct. A PEG placement was completed without complication. Eleven hours after the procedure the patient had pulled the PEG tube out of the abdominal wall. At this time the patient appeared to have no abdominal pain and no signs of peritonitis. Twelve hours following the accidental removal of his PEG tube, the patient was taken back to the endoscopy suite, and an EGD was performed. The previous PEG site was identified and appeared closed and ulcerated. The mucosal defect was closed with two endoscopic metallic clips. A PEG tube was then placed at an adjacent site.

The following day, the patient was restarted on trickle feeds and advanced to regular tube feeding over a period of 24 hours. Since that time, his PEG has been functioning well.

**Discussion:** We propose that in the case of early accidental PEG removal, the patient should be examined first for evidence of peritonitis. If initial physical exam and radiographic investigation do not reveal peritonitis or significant pneumoperitoneum, the patient should undergo urgent repeat endoscopy. At this time, the gastrotomy can be closed endoscopically via metallic clips and PEG can be replaced immediately. Tube feeds can be initiated after a 12–24 hour period of dependent drainage with serial abdominal exams.

**P377**

### **Long Term Follow Up of Patients Undergoing Endoscopic Intervention for Abdominal Pain with Minimal Biliary Ductal Dilatation and Without Stone Disease or Malignancy**

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**Background:** Biliary colic after cholecystectomy in patients with minimal biliary ductal dilation and no evidence of biliary stones or malignancy represents a difficult clinical situation. While endoscopic methods can be used for symptom relief, their safety and efficacy have not been clearly demonstrated in this patient population. This study aimed to assess efficacy of endoscopic management in patients with abdominal pain in the presence of minimal biliary ductal dilation and no evidence of stone disease or malignancy.

**Methods:** A single institution database was queried for patients undergoing endoscopic retrograde cholangiopancreatography (ERCP) for abdominal pain between 1996 and 2016 with a common bile duct diameter of  $\leq 12$  mm. All patients had undergone prior cholecystectomy, were free of stone disease or malignancy, and did not have evidence of biliary ductal dilation. Gender, age, body mass index (BMI), serologic tests, and common bile duct (CBD) and pancreatic duct (PD) diameter were recorded. The number, type, and interval between endoscopic interventions were also evaluated along with the development of complications following endoscopic intervention. Duration of follow-up was noted along with the presence of abdominal pain at last follow-up.

**Results:** 35 patients underwent a collective total of 99 ERCPs. The majority (30 (86%)) were female and the median age was 57 (range 27–84). Median BMI was 26.3 (range 18.1–39.3). Serological tests upon initial evaluation demonstrated at most a mild transaminitis or amylasemias among patients in this cohort (Table 1). Median CBD diameter was 10 mm (range 4–12 mm), and median PD diameter was 2.8 mm (range 1.1–5.7 mm). 31 patients (89%) underwent sphincterotomy, 28 (80%) underwent stent placement, and 5 (14%) underwent balloon dilatation. 29 patients (83%) underwent a subsequent ERCP, and median number of ERCPs performed was 2 (range 1–10). Three of 35 patients (9%) developed post-ERCP pancreatitis at some point during their treatment. Among patients undergoing multiple ERCPs, median time between ERCP 1 and 2 was 77 days (range 12–4897 days), and median time between ERCP 2 and 3 was 98 days (range 45–1683 days). At last follow-up since initial ERCP (median 16 months, range 2.4–184 months), 23 (66%) patients were free from abdominal pain.

**Conclusion:** For patients with abdominal pain in the setting of minimal CBD dilation and no evidence of stone disease or malignancy, ERCP can safely and effectively be used to manage symptoms. While patients may require multiple interventions, they can derive long-term relief.

**P379**

### **Hybrid Endoluminal Stapled Pyloroplasty: An Alternative Treatment Option for Gastric Outlet Obstruction Syndrome**

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**Introduction:** Gastroparesis is a rapidly increasing problem with sometimes devastating patient consequences. Surgical treatments, particularly laparoscopic pyloroplasty, have recently gained popularity but require general anesthesia, advanced skills and create risk of leaks. Peroral Pyloromyotomy (POP) is a less invasive alternative but is technically demanding and not widely available. We propose an hybrid laparo-endoscopic collaborative approach using a novel gastric access device to allow a endoluminal stapled pyloroplasty as an alternative treatment option for functional gastric outlet obstruction.

**Methods and Procedures:** Under general anesthesia six female pigs (mean weight 33 kg) had endoscopic placement of 2 or 3 5 mm intragastric ports (TAGGS, Kansas, USA) using a technique similar to percutaneous endoscopic gastrostomy. A 5 mm laparoscope was used for visualization. EndoFLIP (Crospon, Inc., Galway, Ireland) was used to measure cross sectional area (CSA) and compliance of the pylorus before intervention, immediately after and at 1 week survival. Pyloroplasty was performed using a 5 mm articulating laparoscopic stapler (Dextera MicroCutter). After removing the TAGGS ports, the gastrotomies were closed by either endoscopic clip, endoscopic suture or suture under laparoscopic vision. The animals were survived for 1 week. After 6–8 days, a second laparo-endoscopic procedure was performed to verify healing of the pyloroplasty as well as intraluminal dimensions. At the end of the protocol, animals were euthanized.

**Results:** Six endoluminal linear stapled pyloroplasty were performed. The mean operative time was 112 min. In all cases, this technique was effective in achieving optimal pyloric dilatation. Median pyloric diameter (D) and median cross-sectional area (CSA) pre-pyloroplasty were 8 mm (4.9–11.6 mm) and 58.6 mm<sup>2</sup> (19–107 mm<sup>2</sup>). After the procedure, these values were increased to 13.41 mm (9.8–17.6 mm) and 147.7 mm<sup>2</sup> (76–244 mm<sup>2</sup>) respectively ( $p=0.0152$ ). No intraoperative events were observed, except one case that presented bleeding in the stapling line that merited transfixing suture with laparoscopic instruments. Postoperatively, all animals did well, with an adequate oral intake and without relevant complications. At follow-up endoscopy, all incisions were healed and the pylorus widely patent. There were no significant changes in the EndoFLIP values [D: 13.2 mm (10.6–16.1 mm), CSA: 141.3 mm<sup>2</sup> (88–204 mm<sup>2</sup>).  $p=0.9372$ ]. At explant, one animal had periampullary inflammation with a serous collection however testing showed no perforation.

**Conclusion:** Hybrid endoluminal stapled pyloroplasty appears a safe and effective treatment for gastroparesis and may be easier to learn and perform than alternatives such as POP and laparoscopic pyloroplasty.

**P378**

### **POEM Procedure: Presence of Anatomical Landmarks**

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**Introduction:** Since its inception in 2008, POEM has become a viable procedure for the treatment of achalasia and esophageal dysmotility disorders. However many institutions are in the beginning stages of implementing the procedure into their programs. In view of training, we report the successful ability to dissect and identify common landmarks during a POEM procedure performed by trainees under supervision in a high volume POEM center.

**Methods:** 23 posterior POEM procedures performed by trainees with experienced proctor guidance during the period between February to July 2017 were evaluated for the frequency of identifying the 2 perforating vessels, the presence of sling fibers, and position on the lesser curvature of stomach evaluated by double scoping method during the creation of the tunnel and myotomy for procedure.

**Results:** All 23 POEM procedures were successfully completed by trainees (GI and surgery fellows). The average length of procedure was 79 minutes. Indication for procedure included 13 patients with Type 1 achalasia (56%), 9 with Type 2 achalasia (40%) and 1 DES (4%). Average length of myotomy for all procedures was 10.4 cm. During these procedures 1 or 2 perforator vessels were identified in 11 (48%) of patients, sling muscle was identified in 10 patients (43%) of patients. Myotomy extended to anterior lesser curvature of stomach on double scope exam in 100% of patients. No patient had a serious complication requiring intervention.

**Conclusion:** Trainees performing a posterior POEM procedure were able to correctly dissect and identify the sling muscle and/or perforating vessels in approximately 48% and 40% respectively of procedures. However the myotomy position was correctly placed in all procedures. This indicates that while ideally the sling fibers and perforating vessels should be identified, a correctly positioned myotomy can still be successfully performed by trainees without identification of these landmarks.

**P380**

### **Internet Connection for Tele-endoscopy – Own Experience**

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The quality of endoscopic examination depends on the quality of endoscopic equipment, experience of the endoscopist and preparation of the patient. Contemporarily electronic endoscopes make feasible to transfer image directly to external device which is subsequently linked to computer network and can be transferred further. Dynamic image viewed in real time is more accurately interpreted by a physician than a static one. The possibility of simultaneous voice contact makes teleconsultation sterling.

The aim of this study was to present our own experience regarding endoscopic teleconsultations. **Materials and Methods:** Analysis enrolled examinations performed in endoscopic centers located in Lesser Poland district and in Denmark. Consultations took place in real time, consulting physicians had more than 10 years of experience in endoscopic procedures and over 10000 colonoscopies and therapeutic procedures performed. There were 84 teleconsultations via standard internet connection 10 MB/s. Endoscopic Centers were equipped with Olympus 180 and 190 series linked to video card.

Each card had its own IP address, and the image was accessible through Internet login from anywhere. Consulting physicians used computers connected to Internet for tracing the image synchronously and giving advice.

**Results:** Teleconsultations were undertaken in 0.67% of all endoscopic procedures. Teleconsultations concerned difficulties in endoscopic image interpretation in 17 cases and decisions regarding further treatment in 67 cases. The consulting physician solved all problems concerning proper endoscopic image interpretation. In 57 cases the elective procedure was rejected. The elective treatment was continued in remaining cases. 3 patients had a complication of polypectomy that was endoscopically treated.

**Conclusions:** The opinion of independent consulting physician in difficult clinical cases regarding endoscopic procedures helps to understand the endoscopic image in real time and implicates a decrease in complications after endoscopic procedures.

**P381****Transrectal Stent Placement for the Debridement of a Presacral Phlegmon**

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**Introduction:** A presacral phlegmon is a contained collection of infected fluid and inflammation within the bony pelvis, posterior to the rectum and anterior to the sacrum, that usually arises as a complication of surgery, malignancy, inflammatory bowel disease, ischemic colitis or perforated viscous. Symptoms include low-back pain, pelvic pain and fevers. Antibiotics and supportive therapy are the mainstay of treatment. However, if abscess develops, drainage is required usually by trans-gluteal percutaneous and/or surgical methods, both of which are associated with significant morbidity and mortality. Endoscopic ultrasound (EUS)-guided drainage of perirectal and presacral abscesses is a well described minimally-invasive approach that permits clear definition of anatomy, real-time access to the abscess and creation of an internalized fistula through placement of one or more transluminal stents. However, to date there is no published report describing endoscopic treatment of the more complicated, clinically challenging presacral phlegmon. Here we present a case of a symptomatic presacral phlegmon recalcitrant to medical management that was successfully treated with an endoscopically placed retrievable, transmural, lumen-apposing metal stent.

**Case Report:** This is a case-report of a 21-year-old, post-partum female who presented with fevers and recurrent lower back pain radiating to her rectum and vagina. Her spontaneous vaginal delivery was notable for a second-degree laceration that was primarily repaired at the time of delivery 3 months prior to presentation. Her past medical history was otherwise unremarkable. Radiographic imaging revealed several perirectal and presacral abscesses that were considered too small for percutaneous drainage. IV antibiotics were started and the largest abscess was targeted for EUS-guided aspiration. Unfortunately, her pain became constant and progressed in severity. A follow-up MRI a week later revealed a 7-cm presacral phlegmon.

**Results:** Colonoscopy revealed a luminal bulge in the rectum but was otherwise normal. To permit drainage and multiple sessions of endoscopic necrosectomy, a 15 mm lumen-apposing metal stent (LAMS) was placed transrectally under EUS-guidance into the presacral phlegmon. Endoscopic debridement with forceps and copious irrigation was performed. Over the following 2 weeks the patient reported purulent rectal drainage and resolution of her fevers and pain. Repeat endoscopy revealed a normal rectum and no sign of the stent. A follow up MRI showed a 3-cm area of heterogenous tissue in the presacral area.

**Conclusions:** Although not previously described for management of a presacral phlegmon, LAMS appears to be a safe and effective, minimally-invasive treatment option.

**P382****Hybrid Transgastric Approach for the Treatment of Pathologies of the Gastroesophageal Junction**

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**Introduction:** Flexible endoscopy has evolved to include multiple endoluminal procedures such as anti-reflux procedures, pyloromyotomy, and mucosal and submucosal tumor resections. However, these remain technically demanding procedures as they are hindered by the state of flexible technology which has difficult imaging, limited energy devices, no staplers, and cumbersome suturing abilities. An alternative approach is transgastric laparoscopy, which for almost 2 decades has been shown to be a good procedure for pancreatic pseudocyst drainage and full-thickness and mucosal resection of various lesions. We propose to expand the indications of transgastric laparoscopy by using novel endoscopically placed transgastric laparoscopy ports (TAGGS, Kansa, USA) to replicate endoscopic procedures such as endoluminal antireflux surgery.

**Methods and Procedures:** Under general anesthesia 5 female pigs (mean weight 27.6 kg) had endoscopic placement of 3 5 mm-intragastric ports (TAGGS, Kansas, USA) using a technique similar to percutaneous endoscopic gastrostomy. A 5 mm laparoscope was used for visualization. EndoFLIP, (Crospon, Inc., Galway, Ireland) was used to measure cross sectional area (CSA) and compliance of the gastroesophageal junction (GEJ) before and after intervention. Laparoendoscopic-assisted suture plication of the GEJ was performed using 3-0 sutures (Polysorb®). Once the TAGGS ports were removed, the gastrotomies were closed by using endoscopic clip. At the end of the protocol, animals were euthanized.

**Results:** Five laparoendoscopic-assisted sewing plication were performed. The mean operative time was 65.6 min (Endoscopic Evaluation: 3.2 min, TAGSS Insertion: 11 min, EndoFLIP Evaluation+GEJ Plication: 43.25 min, Gastric Wall Closure: 15 min). In all cases, this technique was effective in achieving adequate GEJ plication. Median GEJ diameter (D) and median cross-sectional area (CSA) pre-plication were 11.42 mm (8.6–13.6 mm) and 104.8 mm<sup>2</sup> (58–146 mm<sup>2</sup>). After the procedure, these values were decreased to 6.14 mm (5.7–6.6 mm) and 29.8 mm<sup>2</sup> (25–34 mm<sup>2</sup>) respectively ( $p=0.0079$ ). Median distensibility (d) and median compliance (C) pre-plication were 7.87 mm<sup>2</sup>/mmHg (2.4–22.69 mm<sup>2</sup>/mmHg) and 190.56 mm<sup>3</sup>/mmHg (70.9–502.8 mm<sup>3</sup>/mmHg). After the procedure, these values were decreased to 1.5 mm<sup>2</sup>/mmHg (0.7–2.2 mm<sup>2</sup>/mmHg) and 52.17 mm<sup>3</sup>/mmHg (21.9–98.7 mm<sup>3</sup>/mmHg) respectively ( $p=0.0317$ ). No intraoperative events were observed.

**Conclusion:** A hybrid laparoendoscopic approach is a feasible alternative for performing intra-gastric procedures with the assistance of conventional laparoscopic instruments; especially in cases where the location of the intervention limits the access of standard endoscopy or where endoscopic technology is inadequate. Further evaluation is planned in survival models and clinical trials.

**P383****Dissection-Enabled SCaffold Assisted Resection – DeSCAR – A Novel Technique for Resection of Residual or Non-lifting Gastrointestinal Neoplasia of the Colon**

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**Introduction:** Due to previous manipulation or submucosal invasion, colonic lesions referred for endoscopic mucosal resection (EMR) frequently have flat areas of visible tissue that cannot be snared. Current methods for treating residual tissue may lead to incomplete eradication or not allow complete tissue sampling for histologic evaluation. Our aim is to describe Dissection-enabled SCaffold Assisted Resection (DeSCAR): A new technique combining circumferential ESD with EMR for removal of superficial non-lifting or residual “islands” with suspected submucosal involvement/fibrosis.

**Methods:** From 2015 to 2017, lesions referred for EMR were retrospectively reviewed. Cases were identified where lifting and/or snaring of the lesion was incomplete and the DeSCAR technique was undertaken. Cases were reviewed for location, prior manipulation, rates of successful hybrid resection and adverse events.

**Results:** 29 lesions underwent DeSCAR due to non-lifting or residual “islands” of tissue. Patients were 52% M, 48% F, and average age 66 (SD  $\pm$  9.9 yrs). Lesions were located in the cecum (n=10), right colon (n=12), left colon (n=4) and rectum (n=3). Average size was 31 mm (SD  $\pm$  20.6 mm). Previous manipulation occurred in 28/29 cases (83% biopsy, 34% resection attempt, 52% tattoo). The technical success rate for resection of non-lifting lesions was 100%. There was one delayed bleeding episode but no other adverse events. Approximately 22% of patients have been followed up endoscopically to date with no evidence of residual adenoma.

**Conclusions:** DeSCAR is a feasible and safe alternative to argon plasma coagulation and avulsion for the endoscopic management of non-lifting or residual colonic lesions, providing en-bloc resection of tissue for histologic review. Further studies are needed to demonstrate long-term eradication and for comparison with other methods.

**P384****Endoscopic Luminal Stents for Treatment of Complications Following Bariatric Surgery**

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**Introduction:** Endoscopic stents have been used to treat bariatric surgery complications; however, data is lacking in the indications and efficacy.

**Methods:** A single institutional retrospective observational trial spanning 10 years of all bariatric surgery complications managed with endoscopic stents.

**Results:** 15 patients underwent 21 fully covered stent placement procedures. Indications for stent placement were leak in 8 patients (1 sleeve; 7 bypass) and stricture in 7 patients (4 bypass, 3 sleeve). Five patients had stent migration. Three required surgical removal, one patient endoscopic repositioning and one passed the stent per rectum. All eight patients with enteric leak successfully underwent stent placement in conjunction with diagnostic laparoscopy and drainage. All but one of these patients developed an enteric leak perioperative to index procedure. The average duration of stent treatment in these patients was 21 days (14–47 days). Of the 7 patients treated for a stricture, 3 patients (2 sleeve, 1 bypass) failed treatment and required subsequent definitive operative revision. Average length of time of stent treatment in these patients was 3 days (range, 1–14 days) and five had severe intolerance.

**Conclusions:** Endoscopic stent placement of leak may require multiple procedures and carries the risk of migration; however, this therapy seems to be an effective treatment. Failure rates are higher with strictures and are not as tolerated by patients.

**P386****Transluminal Endoscopic Drain Repositioning for Postoperative Gastrointestinal Leaks: A Case Series**

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**Introduction:** Leak is an uncommon but serious complication of gastrointestinal surgery. When identified post-operatively, percutaneous drains are used to manage abscesses and prevent further peritoneal contamination. If drain position is suboptimal, however, the consequences of persistent leak may necessitate a formal surgical intervention in a hostile abdomen. In select situations, we have utilized natural orifice transluminal endoscopic surgery (NOTES) methods to enter the abdominal cavity and place/reposition drains under direct endoscopic visualization a part of our comprehensive endoscopic management algorithm for leaks.

**Methods and Procedures:** A prospectively collected database was queried for patients who had undergone transluminal endoscopic drain repositioning (TEDR) as part of multimodal endolumenal therapy for leak (including interventions like defect closure, enteral feeding access, or endoluminal stent placement). Inadequate drainage was identified pre-procedurally by undrained fluid collections in conjunction with clinical signs of sepsis. Transluminal access was obtained via the leak site and carbon dioxide insufflation was used in all cases. The peritoneal cavity was surveilled and cleared of gross debris by irrigation and suction. Intraabdominal drains were located endoscopically and fluoroscopically, grasped with an endoscopic snare or grasper and repositioned adjacent to the leak site to ensure better drainage.

**Results:** Four patients (3 female), average age 50 (range 52–60), average body mass index 34 (range 29–39) were managed with TEDR as a component of endoscopic treatment of full-thickness gastrointestinal leak. Two patients developed leak following revisional bariatric surgery. One patient had an acutely dislodged gastrostomy tube with intraperitoneal leak after multiple laparotomies recently closed with a granulating vicryl mesh. One patient developed a leak at an esophagojejunostomy following total gastrectomy. Three patients had adequate drainage after the initial TEDR, while one patient required TEDR on two occasions. All patients had improved drainage demonstrated by resolution of clinical signs of sepsis and resolution of fluid collections. Drains were removed as clinically indicated.

**Conclusion:** Intraabdominal drains are an essential element in the management of full-thickness gastrointestinal leaks, but are not always able to be adequately positioned percutaneously. Transluminal endoscopic drain repositioning via a gastrointestinal defect is a viable option to avoid surgical intervention in an otherwise hostile field and is a novel practical NOTES application.

**P385****Wide-Angle Colonoscopy for Colorectal Cancer Prevention: Randomised Controlled Trial**

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**Background:** Colonoscopy is the most commonly performed endoscopic examination worldwide and is considered the gold standard for colorectal cancer screening. The quality of examination and endoscopic treatment is affected by a number of factors that are verified by recognized parameters such as cecal intubation rate and time (CIR, CIT), withdrawal time, adenoma detection rate (ADR) and polyp detection rate (PDR). Advanced endoscopic imaging improves accurate recognition of the nature and variety of pathologic lesions, while the endoscope tips, third eye retroscopy and wide-angle endoscopy allow detection of lesions located on the proximal side of the intestinal folds.

The aim of the study was to assess the suitability of wide-angle colonoscopy for the detection of colorectal lesions and to analyze the functionality of a special endoscope series regarding CIR, CIT and withdrawal time.

**Material and Methods:** The study enrolled 421 patients aged 18–80 years who were eligible for coloscopic examination performed for different indications. Patients with prior abdominal surgery, colorectal resections or inflammatory bowel disease were excluded from the study. Patients were randomized to either standard frontal view (SFV) (Olympus Evis Exera III 190) or the novel wide-angle FUSE colonoscopy (FUSE colonoscope CDVL slim c38). The study was approved by the local bioethics committee and was registered on ClinicalTrial.gov (NCT02929381).

**Results:** There were 214 patients examined with SFV and 207 with FUSE. The mean age of patients was 64.1 years ( $SD \pm 10.23$ ). Both groups were comparable in gender, age and BMI. The median cecal intubation time was 234 s with SFV vs. 311 with FUSE ( $p < 0.001$ ). There were no statistical differences in CIR and withdrawal time. FUSE had a higher incidence of diverticula detection rate (DDR) in the proximal part of the intestine ( $p < 0.05$ ). PDR with SFV was 34.8% and 40.1% with FUSE ( $p < 0.001$ ), however, ADR and advanced ADR (aADR) in both groups were similar (26.4% vs 27.1% and 14.2% vs. 13.9%).

**Conclusions:** Colonoscopy with FUSE endoscopes lasts longer and allows for the detection of more polyps and diverticula without affecting ADR and aADR. Our study did not reveal the superiority of wide-angle colonoscopy in prevention of colorectal cancer.

**P387****Is Epiphrenic Diverticulectomy Necessary at Time of Heller Myotomy?**

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**Background:** Epiphrenic diverticula (ED) arise from increased intraluminal pressures, often secondary to achalasia or another underlying esophageal motility disorder which causes “pulsion” physiology. ED are traditionally thought to contribute to patients’ symptoms of regurgitation and dysphagia, and are frequently resected at time of Heller myotomy and fundoplication done for treatment of the primary motility disorder. ED excision carries significant risks (staple line leak, pulmonary complications, mortality), and little is known regarding patients with ED and esophageal motility disorder who undergo surgical myotomy without ED resection. The goal of this study was to compare outcomes of patients with ED and esophageal motility disorder who did and did not undergo diverticulectomy at time of myotomy and fundoplication.

**Methods:** Retrospective analysis of prospectively collected database from 2004 to 2017 was performed. Patients with diagnosis of ED undergoing surgical treatment of symptomatic esophageal motility disorder were included. All patients underwent laparoscopic Heller myotomy with Toupet fundoplication by a single surgeon at a tertiary referral hospital. Patients were stratified according to whether ED was excised or not excised at time of primary surgery. Patient-reported symptoms were obtained from pre/post-operative clinic evaluations and mailed surveys during the follow-up period. Independent samples t-test and Fisher’s exact test were used to compare continuous and categorical variables respectively.

**Results:** ED was identified in 15 patients prior to surgery. Primary diagnoses included achalasia ( $n = 11$ ), nutcracker esophagus ( $n=3$ ), and diffuse esophageal spasm ( $n=1$ ). ED was excised in five patients (33.3%) and not excised in ten patients (66.6%), with no significant difference in frequency of preoperative dysphagia (80% vs. 90%,  $p=1.00$ ) or regurgitation (40% vs. 60%,  $p=0.61$ ) between groups respectively. Reasons for non-resection included ED was too proximal ( $n=7$ ), patient/surgeon preference ( $n=2$ ), and small ED size ( $n=1$ ). The resection group did not experience any leaks and there were no mortalities in either cohort during the follow-up period. At mean clinic follow-up of 198 days, there was no difference in frequency of residual dysphagia in patients who did or did not undergo ED resection (20% vs. 20%,  $p=1.00$ ) and neither cohort reported residual regurgitation symptoms.

**Conclusions:** This study suggests that leaving ED in place during surgical treatment of an esophageal motility disorder may achieve similar rates of postoperative symptom control. While ED excision in this study did not cause significant excess morbidity, ED resection introduces risk of leak and requires more extensive surgery that may not provide significant benefit to patients.

**P388****Delayed Gastric Emptying in Median Arcuate Ligament Syndrome**

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**Introduction:** Median Arcuate Ligament Syndrome (MALS) has been described in the literature as presenting with a constellation of symptoms including nausea, vomiting, weight loss, and post-prandial epigastric pain. While many of these symptoms are consistent with foregut pathology, a cohort of patients with MALS presenting with delayed gastric emptying has not been described in the literature. In this study we report on the possible association of MALS with delayed gastric emptying.

**Methods:** Cases of MALS release were collected between 2013 and 2017. Eight patients were identified who presented with MALS and underwent subsequent MALS release. All 8 patients underwent laparoscopic or robotic surgery. Patients were compiled into a retrospective database and their demographic, symptomatic, imaging, and outcomes data were analyzed.

**Results:** The mean age of the population was 46.5 (16–71). The mean BMI was 25.8 (13.4–43.8). Patients were followed for an average of 12.4 (1–45) months. Seven (88%) patients had preoperative symptoms: 7 (88%) post-prandial pain, 5 (63%) abdominal pain, 4 (50%) sitophobia, 1 (13%) bloating, 1 (13%) nausea. Six patients (75%) presented with weight loss with a mean weight loss of 11.95 kg (6.8–20). All 8 patients underwent either CT or MR angiography demonstrating celiac trunk stenosis, with a mean stenosis of 75.8% (50–99). Three (37.5%) patients showed anatomic abnormalities of the mesenteric vasculature. Six (75%) patients underwent preoperative dynamic duplex ultrasound demonstrating a mean celiac trunk systolic velocity of 243.8 (152–318) cm/s and a mean diastolic velocity of 72.6 (36–96) cm/s. Three (37.5%) of the 8 patients received gastric emptying studies, with all 3 patients showing delayed gastric emptying. Two (25%) of the 8 patients underwent upper gastrointestinal studies and both were found to have delayed gastric emptying. Following MALS release 3 (37.5%) patients experienced 100% resolution of symptoms, 1 (12.5%) experienced 75% resolution, and 3 (37.5%) did not have any resolution of symptoms. Of these patients whose symptoms were refractory to MALS release, 2 (25%) had a history of foregut surgery prior to MALS release.

**Conclusion:** We report for the first time, to our knowledge, a possible association between MALS and delayed gastric emptying. In our study sample, after patients underwent surgery for MALS, most had resolution of their symptoms, including those patients with delayed gastric emptying. Consideration should be given to work up patients for MALS when they present with delayed gastric emptying and typical symptoms associated with MALS. Our study is limited by the small sample size.

**P389****Patient Centered Outcomes After Laparoscopic Fundoplication: Which Factors Impact Satisfaction Two Years After Surgery?**

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**Background:** Laparoscopic fundoplication (LF) is often performed to treat paraesophageal hernia and/or GERD. Care is taken to select the right patients for the operation. Some patients may not improve, and others experience dysphagia or bloating after surgery. Factors associated with patient satisfaction after fundoplication would be helpful during the patient selection process.

**Methods:** A retrospective review of a prospectively collected database was performed. Queried patients underwent LF from 2009 to 2015. Non-elective operations and fundoplications after Heller myotomy were excluded. Of this cohort, patients were included only if they responded to a two-year postoperative quality of life survey. Surveys were distributed preoperatively, at three weeks, at one year, and at two years. The surveys include the Reflux Severity Index, GERD-HRQL, and Dysphagia Score. The GERD-HRQL asks about patient satisfaction with their current state (1 = dissatisfied, 2 = somewhat satisfied, 3 = very satisfied). The cohort was divided according to their answer to this question at two years. Demographics and preoperative factors were compared between the groups with Kruskal-Wallis and Fisher's Exact tests. Univariable and multivariable ordinal logistic regression was performed to identify preoperative symptoms associated with satisfaction at two years. Scores on the surveys over time were also analyzed.

**Results:** A total of 94 patients were included in the analysis (dissatisfied = 26, somewhat satisfied = 17, very satisfied = 51). The only significant demographic or preoperative difference was a high number of paraesophageal hernias in the 'very satisfied' cohort ( $p = 0.017$ ). On univariable regression, younger age and paraesophageal hernia predicted satisfaction. Several variables negatively predicted satisfaction with an OR <1. Multivariable regression, controlled for age and hernia type, identified throat clearing, post-nasal drip, and globus sensation as preoperative symptoms less likely to result in patient satisfaction ( $p = 0.001$ , 0.001, and 0.02, respectively). Subgroup analysis of patients with paraesophageal hernias revealed that patients with bloating preoperatively are less likely to be satisfied at two years. Survey scores over time showed all groups improving over three weeks, but while satisfied patients continued to improve, dissatisfied patients symptomatically worsened over time.

**Conclusion:** This study confirms previous reports stating atypical symptoms of GERD are less likely to improve after LF. It also shows individuals with paraesophageal hernia tend to do quite well, unless they report bloating preoperatively. Patient-centered analysis such as this can be useful when discussing postoperative expectations with patients, and may reveal opportunities to individualize operative approach.

**P390****Sutured Repair Versus Biologic Mesh Reinforcement for Hiatal Closure in Laparoscopic Hiatal Hernia Repairs**

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**Objective:** The study was performed to assess whether sutured crural closure or mesh reinforcement for hiatal closure yields better results with regards to symptom resolution and recurrence post-operatively.

**Material and Methods:** A prospective randomized controlled trial was carried out at Grant Medical College and Sir J.J. Group of Hospitals, Mumbai, India. Patients were randomized to receive either sutured repair or mesh reinforcement of hiatal closure. Outcomes of interest were symptom resolution, quality of life scores and recurrence in the post-operative period.

**Results:** 160 patients were recruited for the trial (80-sutured repair, 80-mesh reinforcement). The two groups were comparable in terms of demographic profiles, symptom severity and findings at esophagogastroscopy and manometry in the pre-operative period as well as size of the hiatal defect measured intra-operatively. Post-operatively the mesh repair group had significantly better symptom resolution in terms of early satiety, chest pain and regurgitation ( $p < 0.05$ ) while with respect to heartburn, dysphagia and post-prandial pain there was no significant difference between the improvements demonstrated. Improvement in Quality of life scores after either procedure was not significantly different. Recurrence was higher in the suture repair group (8 vs 0,  $p < 0.001$ ). Recurrence lead to poorer symptom severity scores as well as quality of life scores and one patient underwent re-operation.

The change in the symptom severity score from baseline after the procedure at 6 months in the subgroup population.

Symptom	Laparoscopic repair	mesh >5cm	Primary cruroplasty	sutured >5cm
	2-5cm	>5cm	2-5cm	>5cm
Heartburn	7.9±0.9	8.1±0.9	7.1±1.2	7.4±1.3
Regurgitation	7.9±1.1	8.2±1.1	7.4±1.1	7.3±1.2
Dysphagia	8±1.3	7.9±1.2	7.1±0.6	6.8±0.8
Chest Pain	8.5±1.1	8.3±0.8	7.5±0.9	7.3±0.8
Early Satiety	8.6±1.3	8.3±1.1	7.6±0.8	7.4±0.9
Postprandial Pain	8.1±1.2	7.8±1.1	7.3±0.8	7.0±0.9

**Conclusion:** Mesh reinforcement results in a reduced rate of recurrence and offers excellent symptom control in the short-term without a rise in complications when compared to sutured repair for the closure of hiatal defects in laparoscopic hiatal hernia repairs.

**P391****Laparoscopic Resections for Gastric and Duodenal Gists: Experience on 72 Patients. Technical Aspects of Different Types of Resections**

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**Background:** Gastrointestinal stromal tumor (GIST) is the neoplasm with malignant potential, which have determined active surgical tactics requiring complete resection for cure.

**Objective:** To develop and demonstrate different surgical techniques for laparoscopic resection of gastric and duodenal GIST's in different clinical cases depending on the size and location of tumors.

**Material and Methods:** In a period from 2005 to 2016, 72 patients underwent laparoscopic resection (67 – gastric resection, 5 – duodenal resection), using different techniques. All patients were investigated with upper GI endoscopy, EUS and abdominal contrast-CT, which allows us to get the complete evaluation of tumor, including size, location, type of growth and the GI layer. Based on the findings the decision on the type of resection was made.

The majority of resections were wedge or partial resections, performed using endoscopic staplers or using ultrasound scissors followed by double-suturing of gastro/duodenotomy.

In the cases of tumor location on the posterior gastric wall we mobilized the greater curvature to get a direct approach to the tumor with extraluminal growth. In the cases with intraluminal growth we used transgastric approach with small 1.5 cm incision on the anterior gastric wall for endoscopic stapler.

Technically the most complex procedures were in the cases of tumor location close to anatomically narrow places and muscle sphincters (gastroesophageal junction, pylorus, duodenal bulb, duodenal flexure), with high risk of stenosis and dysfunction of anatomical sphincters. In such cases we used «lifting-technique» in which we dissect serous and muscle layers circumferentially around the tumor making partial enucleation of lesion followed by total resection preserving almost all normal tissue with minimal suturing and deformity at the site of surgery.

**Results:** Median operation time was 150 min. Recovery was uneventful and median post-op hospital stay was 5 + 2.4 (2–8) days. The pathology showed R0 resection in all cases. The mean follow-up period was 42 months (range 3–74 months) with no local or distant recurrence or stenosis at the site of surgery.

**Conclusion:** Laparoscopic resections for GIST's should be considered the treatment of choice for the patients with local disease, choosing the type of resection the most appropriate for individual patient.

**P392****Minimally Invasive Reconstruction After Resection of Neoplasms of the Foregut: Outcomes of the National Cancer Institute of Peru**

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**Introduction:** Surgical resection remains the mainstay treatment for neoplasms of the hypopharynx, esophagus and esophago-gastric junction, although there are many options for reconstruction, in the last decades minimally-invasive surgery (MIS) has gained acceptance. The aim of this study is to present our clinical outcomes in different neoplasms of the foregut and the changes observed in the last 12 years with MIS.

**Methods and Procedures:** A retrospective study of the patients who had MIS reconstruction with the remnant stomach was performed. Clinical (age, sex, year of surgery, open or MIS, type of reconstruction, type of anastomosis, operative time), pathologic (primary neoplasm, histologic type) and postoperative course data (days of hospitalization, complications according to Dindo-Clavien Classification, anastomotic leak, mortality) were considered for analysis.

**Results:** Between February 2006 and April 2017 a total of 84 patients had esophagectomy, of them 42 were male and 42 female (1:1), mean age was 60.13 years ( $SD \pm 11.9$ ), 59 patients (72%) had MIS. The type of reconstruction was predominantly with a “pull-up” technique (n = 43, 51.2%) followed by the Kirschner-Akiyama procedure (n = 25, 29.8%), stapled gastroplasty was performed in 12 patients. All the anastomoses were performed at the level of the neck and only one of the patients had a stapled anastomosis, mean operative time was 374 min ( $SD \pm 92$  min) including resection of the specimen. Primary neoplasms were predominantly hypopharynx (n = 34, 40.5%), distal esophagus (n = 21, 25%), cervical esophagus (n = 12, 14.3%) and thoracic esophagus (n = 11, 13.1%). Histologic types were mainly squamous cell carcinoma (n = 63, 77.4%) and adenocarcinoma (n = 12, 14.3%). Mean of hospitalization days was 14.76 ( $SD \pm 9.374$ ). No complications were observed in 38 patients and major complications (Dindo-Clavien ≥IIb) were found in 18 patients. Anastomotic leak was present in 6 patients (7.1%) and perioperative mortality (30 days) was 2.4%. Progressive shift to laparoscopic surgery was evidenced through the years (2006–2009: 35.29%, 2010–2013: 70.27% and 2014–2017: 96.43%; p = 0.000) and reduction in major complications (p = 0.021) was observed. Anastomotic leaks (p = 0.545) and perioperative mortality (p = 0.373) did not show significant differences in the present study.

**Conclusions:** Results in our center show that major complications decrease with time after application of minimally-invasive surgery and no differences in anastomotic leaks and mortality were seen. Current data has lead us to abandon open total esophagectomy as a first-choice procedure.

**P393****Recurrent Laringeal Nerve Injury After Minimally Invasive Three Fields Esophagectomy: From Dysphagia to Pulmonary Complications. A Diagnosis Challenge**

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**Introduction:** Minimal Invasive three-fields esophagectomy for minimal invasion is the surgical standard for oncological procedures and benign diseases. Cervical dissection has a risk of 2 to 59% in some series, of, lesion or paralysis of the RNL, but the standard in McKeon approach is 14%. A high level of suspicion is needed because this type of lesion has an impact on postoperative evolution and the hospital stay.

**Main:** To describe three cases of RNL post esophagectomy paralysis in three planes by least invasion.

**Methods:** In a period of 3 years, January 2015 to June 2017, 10 esophagectomies for benign disease were performed. Three patients (2 males, 1 female) with diagnosis of terminal achalasia and 1 stenosis secondary to caustic ingestion consulted at the minimal invasion service Fundacion Valle del Lili. They were scheduled for minimal invasive three fields esophagectomy, one patient without complications and early discharge (5 postoperative day) but occasional dysphagia, the other two required early reintubation after de surgery with ARDS, 1 patient required tracheostomy, the second patient could be extubated after 2 days but with occasional dysphagia. All three had mild hoarseness after surgery. The patient who required tracheostomy was decannulated at 20 days without complication.

**Results:** The three patients underwent endoscopy without complication in the cervical anastomosis stenosis or disorder in the emptying of the gastric tube, swallowing study without alteration and laryngoscopy with paralysis of the left vocal cord. These patients went to speech therapy with total paralysis recovery at 6 months corroborated with laryngoscopy, without dysphagia or hoarseness.

**Conclusion:** RNL innervates the larynx and upper esophageal sphincter, therefore lesion or paresis causes symptoms such as hoarseness, dysphagia, difficulty swallowing, aspiration, difficulty in coughing, pneumonia and ARDS. Injury has a predecessor factor in pulmonary complications and prolongation of the hospital stay. 14% of these patients may require some surgical procedure to restore the function of RNL. Noninvasive monitoring of the laryngeal nerve decreases the risk of injury.

**P394****Laparoscopic Nissen Against Anterior Partial Fundoplication for Treatment of Gastroesophageal Reflux Disease - A Prospective Randomized Trial for Chinese Patients**

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**Background:** This is a prospective randomized trial comparing laparoscopic Nissen against anterior partial fundoplication for treatment of GERD in Chinese.

**Method:** Patients with typical symptoms and either erosive esophagitis or excessive acid exposure were recruited. Patients were randomized to laparoscopic Nissen fundoplication (LNF) or anterior fundoplication (LAF) after repair of crural defect. The demographics, perioperative and clinical outcomes were compared.

**Results:** From 2007 to 2016, 71 Chinese patients received either LNF (n = 36) or LAF (n = 35). There was no difference in preoperative DeMeester score (LNF 20.9 vs LAF 22.0; p = 0.842), as well as postoperative complication and hospital stay (LNF 2 (1-6) vs LAF 2 (1-12); p = 0.526). There was significantly higher postoperative dysphagia for LNF group (41.7% vs 20%; p = 0.048), while there was no difference in GERD recurrence (11.1% vs 17.1%; p = 0.733).

**Conclusion:** In Chinese with severe GERD, laparoscopic anterior fundoplication achieved similar effect compared to Nissen. Anterior fundoplication is associated with lower rate of dysphagia (NCT00480285).

Parameters	LNF (36)	LAF (35)	p value <sup>a</sup>
Age (yrs)	52 (28-70)	52 (21-65)	0.549
Gender (Male)(%)	22 (61.1)	25 (71.4)	0.358
Duration of GERD (months)	60 (12-120)	48 (10-180)	0.912
No of comorbidities	1 (0-4)	1 (0-5)	0.242
Preop DeMeester score	20.9 +/- 21.6	22.0 +/- 22.2	0.842
Operative time (mins)	100 (45-225)	105 (40-165)	0.787
Fundoplication time (mins)	30 (12-100)	42.5 (15-90)	0.001
Hospital stay (days)	4 (2-8)	4 (2-8)	0.747
Postop complication (%)	2 (5.6)	3 (8.6)	0.674
30 Days mortality	0	0	-
Days to resume diet	2 (1-4)	2 (1-5)	0.992
Overall postop dysphagia (%)	15 (41.7)	7 (20)	0.048
Reoperation (%)	2 (5.6)	1 (2.9)	1.0
Endoscopic dilatation (%)	5 (13.9)	1 (2.9)	0.199
Recurrence of GERD (%)	4 (11.1)	6 (17.1)	0.733
Postop DeMeester score at 12 months	0.3 (0-59.5)	0.3 (0-45.9)	0.326

**P395****Factors that Predict Same-Day Discharge Following Laparoscopic Antireflux Surgery**

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**Objective:** This study aimed to identify factors predictive of successful day-case laparoscopic antireflux surgery (LARS) and to develop a model which would allow clinicians to preoperatively predict which patients could safely undergo LARS as an outpatient.

**Methods:** Retrospective chart review of adult patients who underwent elective LARS at UVMCC from 2005 to 2014 was conducted. Patients were divided into those requiring at least one night inpatient stay (inpatient group) and patients discharged on the day of surgery (day-case group). Univariate analysis was performed to identify factors associated with overnight stay. Reverse stepwise multivariable logistical regression was performed on pre-operative variables. A model was derived to predict day-case surgery vs. overnight stay. The model was evaluated using the receiver operating curve (ROC).

**Results:** 387 patients were included in the analysis. Mean length of stay (LOS) was 0.47 nights ± 0.87. 249 patients (64%) were discharged on the day of surgery and 138 (36%) required inpatient stay [116 (84%) LOS = 1 day, 22 (16%) LOS ≥ 2 days]. 69% of patients were female. The average age (years) and pre-operative BMI of patients undergoing LARS were 48.2 and 31.4, respectively. On univariate analysis, the variables associated with overnight stay were increasing age, female gender, functional limitation (ASA class III or IV), Medicare insurance type, later procedure start time, increasing procedure duration, and the completion of additional procedures at the time of LARS. A logistical model using only preoperative variables was created using female gender, Medicare insurance, and procedure start time. This model was evaluated using the ROC which demonstrated that with a threshold of 0.17, the model has a sensitivity of predicting overnight stay after LARS of 94.5%, and a negative predictive value (NPV) of 81.6%. The 30 day readmission rate was not significant between the inpatient group (5.1%) and the day-case group (4.0%) [p = 0.627].

**Conclusion:** Overnight stay after LARS is associated with increasing age, female gender, functional limitation (ASA class III or IV), Medicare insurance type, later procedure start time, additional procedures, and longer procedure duration. Variables available at the time of the pre-operative evaluation including female gender, Medicare insurance type, and procedure start time can be used to predict patients with a higher risk of overnight admission. These parameters may help guide appropriate use of hospital resources for LARS.

**P397****1 cm or 2 cm: Which One is the Best Cut-Off for the Small Gastric GIST?**

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**Introduction:** The primary small gGIST should be treated as benign tumor without high-risk EUS features. But the size of the small GIST of the community continues to be controversial, 1 cm or 2 cm, is not yet a consensus on the formation of the problem.

**Methods:** Retrospective collecte clinical pathology data and prognosis information from 1998. 01-2015. 12 in four medical centers of southern China. Tumor size was divided into <1 cm and 1-2 cm two groups.

**Results:** 4 medical centers in 18 years were treated 276 cases of primary small gGIST. The median follow-up time was 38 months (3–156 months). 2 cases of recurrence, 2 cases of death. The overall 5-year survival rate was 98.7%. The tumor size is 0.2–2.0 cm. The median size is 1.0 cm. Using the Pearson line correlation analysis, there was a positive correlation between the mitotic count and the tumor size as continuity variable ( $r = 0.164$ ,  $p = 0.006$ ). The whole group was divided into two groups: <1 cm gGIST (Micro group) and 1–2 cm gGIST (Small group). There were 137 cases of Micro group and 139 cases of Small group. There was no significant difference between the two groups in age, sex, diagnosis, tumor location, adjuvant therapy, relapse, surgical procedure, resection, complication, positive margin, immunohistochemical expression ( $P > 0.05$ ). In mitotic count, Micro group: ≤ 5/50 HPF 134 cases, > 5/50 HPF ≤ 10/50 HPF 0 cases, > 10/50 HPF 3 cases, meanwhile Small group: ≤ 5/50 HPF 125 cases, > 5/50 HPF ≤ 10/50 HPF 7 cases, > 10/50 HPF 7 cases, there was a statistically significant difference between this two groups ( $p = 0.002$ ). Small group had more intermediate/high risk cases, so there was also a statistically significant difference between the two groups ( $p = 0.002$ ). Using the receiver operating characteristic curve (AUC = 0.707,  $P = 0.004$ ) and the Gordon index, we found that 1.15 cm was the best cutoff to separate low-risk cases and intermediate/high risk cases (sensitivity = 0.824, 1-specificity = 0.429).

**Conclusions:** Primary small gGIST has a good prognosis. For <1 cm gGIST (Micro group), it can be regarded as benign, just need the EUS follow-up. For 1–2 cm gGIST (Small group), the proportion of intermediate/high-risk cases is high, we think it needs to be treated with caution, resect it if necessary. 1.15 cm may be the new cut-off threshold to separate the small gGIST and large gGIST, but it still needs more cases to verify.

**P398****Case Report: Multiple Esophageal Diverticula Associated with Achalasia**

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**Introduction:** Achalasia is well defined disorder of increased lower esophageal sphincter tone (1). Epiphrenic esophageal diverticulum are a rare disorder believed to result from increased intra-esophageal pressure often in conjunction with motility disorder causing functional outflow obstruction. They are a pulsion-type pseudo-diverticulum with mucosal bulging most frequently from the right posterior esophageal wall (2). We present a very rare case of achalasia associated with multiple esophageal diverticula successfully treated with laparoscopic Heller myotomy with Dor fundoplication.

**Case Presentation:** A 75 year old woman presented with 4 years of dysphagia, chest discomfort, regurgitation, and weight loss. Esophagoscopy showed a patulous esophagus with multiple esophageal diverticula (Figure 1). Barium esophogram demonstrated 5 esophageal diverticula in the distal esophagus and delayed clearance of esophageal contrast (Figure 2). High resolution manometry revealed a hypertensive mean LES, an aperistaltic body on 10 of 10 wet swallows, and panesophageal pressurization in 7 of 10 wet swallows – consistent with Type II Achalasia by Chicago classification (1).

We performed a laparoscopic Heller Myotomy with Dor fundoplication. The myotomy was extended 6 cm above the gasstroesophageal junction and 3 cm onto the gastric cardia. An anterior diaphragmatic defect with a moderate type I hiatal hernia was repaired with two sutures, ensuring to not impinge the esophagus (Figure 3).

At 10 weeks post operatively the patient reports excellent results. Her dysphagia and chest discomfort have entirely resolved. Her Eckhardt score improved from seven preoperatively to one post operatively.

**Discussion:** Type II Achalasia is successfully treated in the majority of cases with laparoscopic Heller myotomy and partial fundoplication (3). However, esophageal diverticula typically require both myotomy as well as diverticulectomy for successful treatment (4). There is little experience with the surgical management of multiple esophageal diverticula. We propose a two stage surgical approach for these patients. We reason that the risk of esophageal leak or stenosis in the case of multiple esophageal diverticulectomies out weighs the proposed benefit. Indeed epidemiologic studies indicate that the majority of esophageal diverticula are asymptomatic (4). In the event the patient remains symptomatic after myotomy a second stage operation with diverticulectomies would be possible. This single experience suggests that diverticulectomy may not be necessary in the case of multiple diverticula associated with Achalasia. Instead, treatment may be directed at relieving the functional obstruction responsible for the symptoms by performing laparoscopic Heller Myotomy with Dor fundoplication.

**P399****Laparoscopic Transhiatal Resection of Siewert Type II Cancer**

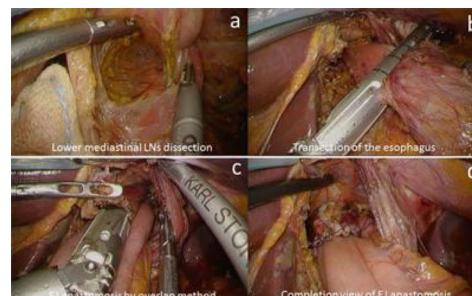
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**Objective:** The optimal surgical approach for Siewert type II cancer is still controversial due to the anatomical complexity of the region. Potential advantages of laparoscopic transhiatal approach have not been fully investigated.

**Methods and Procedures:** We retrospectively analyzed 55 consecutive patients with Siewert type II cancer who underwent laparoscopic transhiatal resection. Indication of surgery is patients with Siewert type II cancer with less than 3 cm esophageal invasion. Regarding the extent of resection, basically proximal gastrectomy with the lower esophageal resection was selected, aiming at preservation of gastric reservoir function. In terms of reconstruction after proximal gastrectomy, double-tract method was performed. Intraoperative peroral endoscopy was routinely employed for determination of the appropriate resection level of the stomach. Esophagojejunostomy was employed by overlap method using a 45 mm linear stapler. In order to obtain a wider operative field in the lower mediastinum, the diaphragmatic crus was dissected to widen the esophageal hiatus.

**Results:** In 55 patients (38 males and 17 females), median operation time was 282 minutes, and estimated blood loss was 18 g. The rate of surgical morbidity was 18%, and that of anastomotic leakage was 4%. There was no mortality. The mean length of proximal margin was 10 mm, and no positive margin was recorded. The 3- and 5-year overall survival rate was 96.1% and 75%, respectively.

**Conclusions:** Laparoscopic transhiatal resection for Siewert type II cancer is technically challenging, but appears feasible and safe when performed by an experienced surgical team. A large-scale prospective study is necessary for final conclusion.

**P400****Use of Fully Bioresorbable Poly-4-hydroxybutyrate Mesh for Reinforcement of Crural Closure During Para-Esophageal Hernia Repair**

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**Introduction:** Mesh use for reinforcement of primary crural closure is controversial. Synthetic mesh use poses a risk of erosion but there is no evidence that non-synthetic mesh is useful to minimize the risk of hernia recurrence. We evaluated a fully bioresorbable mesh made from poly-4-hydroxybutyrate (P4HB) for crural reinforcement after para-esophageal hernia (PEH) repair. The aim of this study was to evaluate the safety and efficacy of P4HB mesh at the hiatus in patients undergoing PEH repair.

**Methods and Procedures:** This was a review of prospectively collected data on 50 consecutive patients that had repair of a PEH with reinforcement of the crural closure with P4HB mesh. To be considered a PEH at least 50% of the stomach was herniated into the chest. A Collis gastroplasty or crural relaxing incision was added for short esophagus or crural tension when necessary. Routine follow-up consisted of Esophagogastroduodenoscopy (EGD) at 3 months for patients that had a Collis gastroplasty and a barium upper GI study (UGI), high resolution manometry (HRM) and pH test in all patients at 12 months. A hernia of any size identified during objective follow-up testing was considered a recurrence.

**Results:** There were 50 patients (34 females and 16 males) with a mean age of 65 years (98–30), and mean BMI of 30.24 (41.5–17.7). The median ASA was 2, mean operative time was 150 minutes, mean estimated blood loss was 103 ml and mean length of stay was 2.8 days. The majority of repairs were primary (88%) Two procedures (4%) were converted to open. A fundoplication was added to PEH repair in 49 patients (98%) while 1 patient underwent a partial gastrectomy. Collis gastroplasty was performed in 18 patients (36%) and a right relaxing incision in 2 patients (4%). The median follow-up was 8.5 months and 12 patients had their PEH repair at least 1 year ago. Objective testing at 3 months with EGD or UGI in 17 patients and at 1 year with UGI in 3 patients has shown only 1 recurrent hernia. There were no mesh-related complications or erosions.

**Conclusions:** PEH repair with bioresorbable P4HB mesh crural reinforcement and appropriate tension-reducing techniques when indicated is associated with a low early hernia recurrence rate and no mesh-related complications. Further studies with this mesh are indicated to confirm long-term efficacy.

**P401****Subjective and Objective Evaluation of Hiatal Closure Tension During Para-Esophageal Hernia Repair**

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**Introduction:** Tension is the enemy of hernia repair and a leading factor in hernia recurrence. At the hiatus, crural closure is an essential component of paraesophageal hernia (PEH) repair. Often the hiatus is very enlarged, and tension on the crural closure may be associated with the known high recurrence rate after PEH repair. The aims of this study were to 1) objectively quantify crural closure tension and to 2) determine the accuracy of the surgeon's perception of tension during PEH repair.

**Methods and Procedures:** Patients undergoing laparoscopic PEH repair from June–September 2017 had the tension necessary to approximate the crura measured using a commercially available tensiometer (MS-10 Force Gauge, Mark-10 Corporation, Copiague, NY, USA) and MesurGauge software (MESUR™gauge 15-1004, Mark-10 Corporation, Copiague, NY, USA) together with a Ti-Knot device (LSI Solutions, Victor, NY, USA). The measurements were digitally recorded in real time. Tension was measured at the time of Ti-Knot firing, indicated by a sharp drop of tension back to zero on the tension graph. Surgeons were asked to rate their perception of the closure tension as mild, moderate, or high for each stitch. Sutures were grouped according to location into posterior, middle, and anterior thirds of the hiatus. One-way ANOVA test was used for statistical analysis. Tension measurements are in lbf.

**Results:** Twenty-three patients had sixty-seven sutures placed at the hiatus. The overall median tension was 2.73 lbf. There was a steady increase in mean tension as the suture location progressed from posterior to anterior in the hiatus (posterior: 2.45 ± 1.22; middle: 3.36 ± 1.36; and anterior: 3.49 ± 1.69; p = 0.043). Surgeons rated the tension necessary to approximate the crura as mild in 41, moderate in 22 and high in 4 sutures. Overall, there was a significant difference in mean measured tension between the three subjective suture ratings by the surgeons. However, there was substantial variability and overlap amongst the surgeon's ratings (Figure).

**Conclusion:** The tension necessary to approximate the crura during PEH repair can be objectively measured and as expected increases progressively with anterior movement up the hiatus. While there was some correlation between a surgeon's subjective assessment of the tension necessary to bring the crura together and actual measured tension, there was wide variability and imprecision from one stitch to another. Objective tension measurement may provide a more reliable assessment of when excessive force is being used to re-approximate the crura and potentially improve PEH recurrence rates.

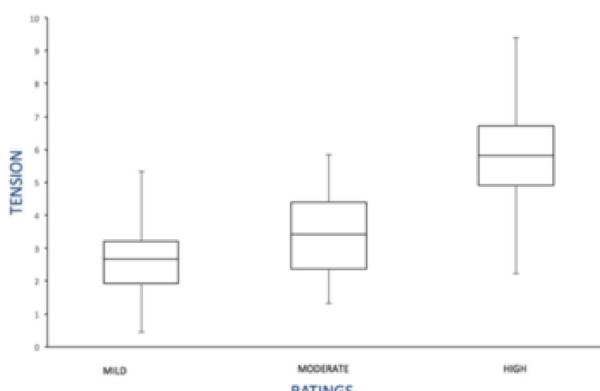


Figure: Surgeons' perception (RATINGS) of hiatal closure tension (TENSION).

**P402****Laparoscopic Repair of Recurrent Paraesophageal Hernia is Safe and Effective**

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**Introduction:** Paraesophageal hernias are increasing in prevalence, and unfortunately carry a high recurrence rate. Consequently, reoperation is expected to increase in frequency. Published data on the outcomes of recurrent paraesophageal hernia (RPEH) repair is very limited.

**Methods:** All RPEH repairs performed by the foregut surgical service at our institution from 2012 to 2015 were reviewed. Patients were included if their index operation was a true PEHR (initial type I hiatal hernia repairs were excluded, as well as multiply recurrent hernias). Demographics, medical and surgical history, and operative notes from the index surgery were reviewed. Details from standardized pre-operative symptom assessment, objective testing and operative details for the revisional surgery were collected. Patients were routinely offered 12 month post-operative upper gastrointestinal contrast evaluation. Postoperative outcomes included a standardized symptom assessment and results of objective testing at any time after surgery.

**Results:** Twenty six patients were identified who underwent repair of RPEH. Demographic, operative and perioperative data was available for all patients (Table 1). Twenty four patients underwent follow-up symptom evaluation (two were lost to follow-up after the initial hospitalization). Sixteen patients underwent follow-up objective testing by radiographic evaluation with contrast, endoscopy or both. These subgroups were used to calculate symptomatic and objective outcomes (Table 1).

**Conclusion:** Reoperative laparoscopic surgery for recurrent paraesophageal hernias is technically challenging as evidenced by long operative times. Despite this, perioperative outcomes at a high volume center are good, with low morbidity and no mortality. Importantly, symptomatic outcomes for this difficult problem are excellent.

Table 1. Clinical Details of Re-operative Paraesophageal Hernia Repair		
Demographics and Risk Factors	Operative Details	Outcomes
Age	Median Age: 49.2	Median Length of Hospital Stay (days): 2
Female	7/26 (27)	90 day Mortality: 0
Mean BMI	30.0	Periop Read: 0
Obesity (BMI > 30)	4/7 (57)	Periop Comp: 0
Diabetes	4/24 (17)	Periop Infection (CD grade 3-4): 1/24 (4)
COPD	3/24 (12)	Periop Infection (CD grade 1-2): 15/24 (62)
Smoking Hx	4/24 (17)	Periop DVT: 0
Alcohol Use	7/24 (29)	Periop VT: 3/24 (12)
Stained Use	7/24 (29)	Periop PE: 0
Other comorbidities	23/24 (96)	Periop Deaths: 3/24 (12)
CAD	7/24 (29)	Median Follow-up (years): 6.0 (range: 0.0-10.0)
Histol. Stitches	2	Reoperation: 6/24 (25)
Mesh Placement	76/92 (82)	Resolution of Primary Symptoms: 60/92 (65)
Adj Procedure	80/92 (87)	Reoperation: 30/92 (32)
Time to Recurrence (mo)	42.5	Resolution of Primary Symptoms: 60/92 (65)
Calls	3/92 (3)	Adj Procedure: 30/92 (32)
Op Time (min)	295.8	Radiographic/Endoscopic Recurrence Rate: 31/92 (34)
Adj Op Time (min)	395.8	Endoscopic Recurrence Rate: 32/92 (35)
Postop Comp	1	Adj Postop Comp: 1/92 (1)
Anesthesia	1	Complications within 3 yr: 34/92 (37)
Vagotomy	1	Adj Complications within 3 yr: 34/92 (37)

**P403****Interaction of the Lower Esophageal Sphincter and the Diaphragmatic Hiatus in Gastroesophageal Reflux Disease**

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**Introduction:** Hypotension of the lower esophageal sphincter (hLES) and the presence of hiatal hernia (HH) have both been associated with gastroesophageal reflux disease (GERD). The exact likelihood with which a hLES or a hiatal hernia predict GERD continues to be defined. We hypothesize a synergistic interaction in those with hLES and HH in predicting GERD as defined by a positive pH study.

**Methods and Procedures:** Between 2012 and 2013, 148 consecutive patients presenting to a surgical practice with symptoms most concerning for GERD, without prior antireflux surgery were evaluated by high resolution manometry (HRM), esophagogastroduodenoscopy (EGD), videoesophagogastricography (VEG) and an ambulatory pH study. hLES was defined as residual LES pressure of <15 mmHg, HH was defined as having been noted and measured by the radiologist, these were further categorized into any HH, 1–3 cm, >3–5 cm or >5 cm. Hill grades III and IV were used to define laxity of the LES as measured on insufflated endoscopy. A positive diagnosis of GERD is defined as a daily or composite DeMeester score of >14.72 on 24 or 48-hour ambulatory pH study. Data were analyzed using SPSS (SPSS Inc.) to calculate test characteristics including Fisher exact test and likelihood ratio.

**Results:** Prevalence of a +pH study was 61% (90/148) patients in this study. hLES alone did not significantly predict a +pH test (63% prevalence in those with a hLES vs. 52% in those with normal LES). (p = 0.47). Patients with any HH had a 73% probability of GERD, with a likelihood ratio (LR) of 1.68 [95% CI: 1.13–2.17], p = 0.001. A hLES with any hiatal hernia carried a 75% probability of a +pH test with a 1.94 [1.28–2.93], p = 0.001. This relationship was strongest with a hLES and HH of 1–3 cm in size, LR 1.99 [1.21–3.29], p < 0.01. Hill grade III/IV valve was only significantly associated with a +pH test (81%) when combined with a hLES and a HH of 1–3 cm, LR 2.18 [1.04–4.54], p = 0.02.

**Conclusion:** Hypotension of the LES alone did not predict GERD in this population while the presence of any HH did. The association between HH and GERD is strongest when hLES is present. Therefore, GERD is a disease caused by both a hypotensive LES and compromised integrity of the diaphragmatic hiatus. This conclusion has important implications in the surgical approaches to GERD.

**P404****Healthcare Utilization and Costs Associated with Antireflux Surgery**

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**Background:** While clinical outcomes have been reported for antireflux surgery, there is limited data on postoperative outpatient encounters and their associated costs. The aim of this study is to evaluate the utilization of healthcare and its associated costs during the 90-day postoperative period following antireflux surgery.

**Methods:** We analyzed data from the Truven Health MarketScan® Research Databases. Patients ≥16 years with an ICD-9 procedure code or CPT code for antireflux surgery and a primary diagnosis of GERD during 2012–2014 were selected. Only patients with continuous enrollment six months prior to the date of surgery and 90-days after surgery were analyzed. Patients with a diagnosis of esophageal cancer or achalasia during the six-month period prior to antireflux surgery, a length of stay > 30 days following index procedure, a capitated plan, or patients who underwent emergency surgery were excluded. Outpatient endoscopy was defined using ICD-9 and CPT codes, and related readmission was defined by clinical classification software.

**Results:** 40,853 patients were included with a mean age 49 years. 76% were female. Mean length of stay was 1.41 days and 93% of patients underwent a laparoscopic approach. The majority of patients (96%) did not require a related readmission. 4.2% of patients were readmitted one or more times, and 1.1% of patients required a surgical intervention. 14% of patients presented to the emergency department at least once within 90 days of surgery. 1.5% of patients underwent an outpatient upper endoscopy. The mean cost of the index surgical admission was \$24,034.15. Patients requiring one or more related readmissions accrued additional costs of \$29,512.97. Emergency department utilization added an additional \$926.53 per patient.

**Conclusion:** The majority of patients undergoing antireflux surgery do not require 90-day post discharge related readmission or endoscopy. However, patients who are readmitted accrue costs that, on average, double the overall cost of care compared to the initial hospitalization. Use of the emergency department was common but contributed much less to the overall cost for these patients. Future examinations into formulating interventions to prevent readmissions after anti-reflux surgery may help to reduce healthcare utilization in this patient population.

Outpatient endoscopy (N,%)		
0	40219	98.46
1	582	1.42
≥2	48	0.12
Endoscopy cost (\$,mean,SD)		
N=630		
	3436.91	7323.39
Related readmissions (N,%)		
0	39144	95.82
1	1463	3.58
≥2	2.46	0.60
Readmission cost (\$,mean,SD)		
N=1709		
	29512.97	57031.2
ER visits (N,%)		
0	35051	85.97
1	4086	10.02
≥2	1634	4.01
ER visit cost (\$,mean,SD)		
N=5720		
	926.53	2578.49

**P405****Investigating Rates of Reoperation or Postsurgical Gastroparesis Following Fundoplication or Paraesophageal Hernia Repair in New York State**

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**Introduction:** The development of postsurgical gastroparesis following Nissen fundoplication is poorly understood. In this study, we analyze the development of gastroparesis requiring intervention and other subsequent procedures following fundoplication and paraesophageal hernia (PEH) repair procedures in the state of New York.

**Methods:** Using a comprehensive state-wide administrative database (SPARCS), we examined all in-patient and outpatient records for adult patients who underwent fundoplication or PEH repair as a primary procedure for the treatment of GERD between the years of 2005–2010. Patients with an initial gastroparesis diagnosis were excluded from the analysis. Through the use of a unique identifier, each patient was followed until 2015 for the subsequent diagnosis of gastroparesis or reoperation. Surgical procedures for the treatment of gastroparesis included pyloroplasty, pyloromyotomy, or gastroenterostomy procedures. Multivariable logistic regression models were used to identify independent predictors for having subsequent reoperation.

**Results:** A total of 6,438 patients were analyzed. This included 3,961 fundoplication patients (61.52%) and 2,477 (38.48%) with PEH repair. In the fundoplication group, 388 (9.80%) patients had a follow-up diagnosis of gastroparesis as secondary procedure. 211 (8.52%) of the patients who underwent a primary PEH repair procedure had a follow-up procedure or gastroparesis diagnosis (Table 1). Mean time to follow-up procedure or diagnosis was 2.81 years for the fundoplication group and 2.16 years for the PEH repair group. The majority of the follow-up procedures in the fundoplication group were revisional procedures (fundoplication or PEH repair) (n = 254, 6.41%), while 134 (3.38%) patients were newly diagnosed with gastroparesis and/or underwent a secondary procedure for its treatment. In the PEH repair group, 116 (4.68%) patients underwent subsequent PEH repair or fundoplication, while 95 (3.84%) were diagnosed or surgically treated for gastroparesis. In the fundoplication group, risk factors for having a follow-up procedure to treat gastroparesis included being female (OR = 1.423, 95% CI = 1.02–1.99), history of COPD (OR = 1.412, 95% CI = 1.01–1.97), and history of diabetes (OR = 1.857, 95% CI = 1.18–2.93). For the PEH repair group, risk factors for a follow-up procedure to treat gastroparesis included history of hypothyroidism (OR = 1.707, 95% CI = 1.09–2.67).

**Conclusion:** Fundoplication and PEH repair procedures have a relatively low post-operative incidence of gastroparesis following initial procedure for treatment of GERD. Secondary fundoplication or PEH repair was more commonly performed compared to any of the surgical procedures for gastroparesis for both procedures. Further analysis of association with subsequent procedures is needed.

**Table 1. Number of patients with follow-up procedures/diagnoses by initial surgery types**

Initial Surgery type	Any follow-up procedure/ diagnosis	Any follow-up fundoplication/ PEH repair	Any follow-up diagnosis or treatment for gastroparesis
Fundo (N=3961)	388 (9.80%)	254 (6.41%)	134 (3.38%)
PEH repair (N=2477)	211 (8.52%)	116 (4.68%)	95 (3.84%)

**P406****Surgical Indication Using Reflux Test and Results of Laparoscopic Nissen Fundoplication for GERD Patients**

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**Introduction:** The indication of laparoscopic anti-reflux surgery for GERD patients is difficult to be judged fairly. We have established “Reflux Test” as the tool for the decision in the surgical indication for GERD patients.

**Surgical Indication:** Reflux Test: At the standing position a patient swallows 300 ml barium solution. After total solution goes into stomach, a patient lies down at the flat position.

Then a patient changes the position to left lateral decubitus position, flat position, right lateral decubitus position and flat position again every 10 seconds in the order.

During this procedure, gastro-esophageal reflux was evaluated and assigned to severe, moderate and slight category. If the reflux was observed slightly up to cervical esophagus, the case was assigned to moderate category. If the reflux was observed intensely up to cervical esophagus, the position was returned to head high position for the safety and the case was assigned to severe category. The anti-reflux surgery was considered in the moderate and severe categories.

**Results:** We have performed laparoscopic Nissen procedure in 87 cases. The mean operation time was 115 min. The outcome was assessed by Reflux Test performed on 4–5 postoperative day, and the results showed the reflux was disappeared in every cases.

Median follow-up period of this study was 38 months (7–95 months). In 13 cases (14.9%) PPI was restarted before 6 months after the anti-reflux surgery. In 25 cases (28.7%) PPI was restarted after the anti-reflux surgery during the whole follow-up period of this study.

The BMI of the patients had no relationship to the needed restart of PPI.

To evaluate the degree of esophagitis objectively before and after the anti-reflux surgery we designed “the esophagitis score”. In this scoring method, a number from 0–5 was assigned according to the degree of esophagitis along with the LA classification. The results of the study have shown that the reflux esophagitis was improved obviously after the anti-reflux surgery even in the PPI restarted group ( $p<0.001$ ).

**Discussion:** The number of GERD patients who needed anti-reflux surgery seems to be so high. To extract the patients who needed it remarkably is important. The anti-reflux surgery is most effective for the patients who really have the obvious reflux. Reflux Test is feasible because of its convenience and visual effects for the patients. The results of the laparoscopic Nissen fundoplication were good and satisfied by the patients mostly.

**P407****Giant Paraesophageal Hernia Repair Without Antireflux Procedure as Management of GERD**

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**Introduction:** Fundoplication at the time of giant paraesophageal hernia repair is controversial. The proposed advantages are better reflux control and lower recurrence. Disadvantages include fundoplication specific complications, might be unnecessary and may not decrease recurrence. We retrospectively reviewed giant paraesophageal hernia repairs (PEH) with two point gastropexy in the fundus and body, and no antireflux procedure. Data collected is postoperative GERD symptoms, postoperative Proton Pump inhibitors (PPIs) therapy and recurrence.

**Methods:** A retrospective review of patients who underwent repair of giant PEH from 2012 to December of 2016. Giant was defined as a hernia with 50% or more of the stomach above the diaphragm. Follow up consisted of upper GI (UGI) study one year postoperatively and reflux symptom questionnaire. Patients were followed every 4 months in the surgery clinic and a PPI wean was initiated at the second post-operative visit. The primary outcome we evaluated was discontinuation of PPIs. In addition, we utilized a standardized reflux scale and recurrence rates collected. Chi-Squared was used for statistical analysis.

**Results:** 69 patients underwent giant PEH repair as described, 13 (18.8%) were previously repaired. Average age was 68 years, and 54 of the patients were female. 58 patients (84%) reported preoperative PPI usage and 86% (59) of patients reported preoperative GERD symptoms. Seven patients were lost to follow up before the third postoperative visit. 42 (61%) patients received a one year UGI follow up and average follow up is 344 days post-operatively. The recurrence rate was 15.9% (11 patients), 3 (4.3%) required repeat repair.

25 of 58 patients were off PPI therapy postoperatively (chi 20.16, p<0.001). 33 patients continued single dosage PPI postoperatively. 20 patients reported full symptom relief on single dosage PPI. Total of 44 of 61 patients reported improvement in symptoms postoperatively regardless of PPI use (Chi 33.13, p<0.001). 9 of 59 patients had continued to report some GERD symptoms despite PPI therapy. No patients reported worsening GERD symptoms. The most common postoperative complaint was dysphagia, occurring in 17 (24%) patients.

**Conclusion:** Antireflux procedure in the setting of giant PEH repair proved extraneous in most these patients (44 of 69). Its possible that 9 of 69 would benefit from a fundoplication because of GERD despite medication after operation. The conundrum is beneficiaries cannot be identified preoperatively and exposing all giant PEH patients to the risk of dysphagia (11% to 15%), gas bloat (40%) and fundoplication failure (30%) seems unwarranted.

**P408****Paraesophageal Hernia Repair in the Morbidly Obese Patient: Is a Combined Roux-en-Y Gastric Bypass and Paraesophageal Hernia Repair Ideal?**

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**Introduction:** We hypothesize that laparoscopic paraesophageal hernia repair with concurrent roux-en-y gastric bypass (RYGB/PEH) can be performed with no increase in morbidity and fewer recurrences than laparoscopic paraesophageal hernia repair (LPEHR) in patients with morbid obesity.

**Methods:** All patients referred for paraesophageal hernia with a BMI (Body Mass Index) > 35 from 01/2008 to 06/2017 were included. Patients with type I hiatal hernia or previous foregut surgery were excluded. Primary outcome measure was recurrence. Secondary outcome measures were perioperative outcomes. Data were analyzed using unpaired t-test and Fisher's Exact test.

**Results:** A total of 64 patients underwent laparoscopic paraesophageal hernia repair (LPEHR) or laparoscopic roux-en-y gastric bypass combined with paraesophageal hernia repair (RYGB/PEH). Patients who underwent RYGB/PEH were younger with a higher BMI. There was no significant difference in perioperative morbidity, mortality, or recurrence.

**Conclusions:** Combined RYGB/PEH can be performed safely with no increase in perioperative morbidity or mortality with equivalent recurrence rates. This may be ideal given the metabolic benefit of RYGB.

Table 1. Demographics and outcomes			
	RYGB/PEH(n=15)	LPEHR(n=49)	
Age	54.5	65.6	p<0.001
Female	14 (93.3%)	39 (79.5%)	p=0.434
Pre-op BMI	43.1	38.4	p=0.001
Diabetes	4 (26.7%)	9 (18.3%)	p=0.483
Hypertension	10 (66.7%)	36 (73.4%)	p=0.744
Dyslipidemia	7 (46.7%)	25 (51%)	p=1.000
Pre-op High dose PPI	8 (53.3%)	36 (73.4%)	p=0.203
Surgery Duration (Minutes)	213.6	182.7	p=0.086
EBL (mL)	19.2	26.5	p=0.622
% Intrathoracic Stomach	87.5	81	p=0.610
Mean Weight Gain	4 (26.7%)	45 (91.8%)	p<0.001
Length of stay(days)	2.27	3.1	p=0.001
Complications	4 (26.7%)	45 (91.8%)	p<0.001
90-day Mortality	0	1 (2%)	p=1.000
Recurrence	2 (13.3%)	13 (26.5%)	p=0.488
Follow up (months)	29.3	36.2	p=0.402
Post-op high dose PPI	6 (40%)	10 (20%)	p=0.173
%EBWL	57.3%	15.2%	p<0.001

**P409****Sleeve Gastrectomy with Simultaneous Pyloroplasty Significantly Improves Gastric Emptying in Patients with Medically Refractory Gastroparesis**Ryan Fairley, DO<sup>1</sup>, Danial Cottam, MD<sup>2</sup>, Helmuth T Billy,MD<sup>3</sup>, <sup>1</sup>Community Memorial Hospitalof San Buenaventura, <sup>2</sup>Bariatric Medicine Institute, Salt Lake City Utah, <sup>3</sup>Ventura Advanced Surgical Associates, Ventura, California

**Background:** Gastroparesis is a chronic disorder that significantly impairs the quality of life in affected patients. Surgical options for patients that have failed medical management include placement of a gastric tube, insertion of a gastric stimulator, pyloroplasty and subtotal gastrectomy. Enhanced gastric emptying has been shown to occur following sleeve gastrectomy in morbidly obese individuals. In this study, we combined laparoscopic sleeve gastrectomy with pyloroplasty for treatment of patients presenting with endstage gastroparesis.

**Methods:** A retrospective review of adult patients presenting with end stage gastroparesis recalcitrant to further medical therapy. Three patients who underwent laparoscopic sleeve gastrectomy with pyloroplasty were reviewed. Data collected from electronic medical records included patient demographics, gastric emptying studies, hospital records, and clinic visits. We reviewed postsurgical outcomes of disease severity and compared it to preoperative symptoms, gastric emptying and emergency department visits.

**Results:** Three patients diagnosed with severe, end stage, idiopathic or diabetic gastroparesis underwent sleeve gastrectomy with pyloroplasty. All had severely abnormal gastric emptying studies showing a half-life of greater than 1000 minutes. Chronic, recurrent access of the ED was apparent in all patients. Pre-operatively patient #1 had 24 ED visits with 21 admissions to evaluate abdominal pain, nausea, and vomiting, patient #2 had 14 ED visits with 10 admissions for abdominal pain, nausea, and vomiting, patient #3 had 11 ED visits with 2 admissions for abdominal pain and vomiting. Post-operative gastric emptying studies improved in all patients. Two patients had normal gastric emptying times. One patient had improvement in gastric emptying with a 90% reduction from the preoperative value. Postoperative visits to the emergency room for vomiting decreased in all patients. Patient #1 had 12 ED visits with 11 admissions (7 for nausea and vomiting and 4 for diabetic ketoacidosis). Patient #2 had 1 ED visit for vomiting that did not require an admission. Patient #3 had 16 ED visits with 4 admissions (1 for abdominal pain, 1 for nausea and vomiting, 1 for benzodiazepine overdose and 1 for pneumonia). Following sleeve gastrectomy and pyloroplasty all patients were discharged on a regular diet and were off of TPN and tube feedings.

**Conclusions:** Medically refractory gastroparesis is a significant clinical challenge. Sleeve gastrectomy with pyloroplasty may be a simpler and more reliable therapy vs other surgical treatments. Pyloroplasty and sleeve gastrectomy may improve quality of life for patients with severe medically refractory gastroparesis. Emergency department visits were decreased postoperatively.

**P410****The Effect of Robotic Hiatal Hernia Repair with Concomitant Esophagopexy in Patients with Gastroesophageal Reflux Disease**Allison C Estep, MD<sup>1</sup>, Christopher J You, MD<sup>2</sup>; <sup>1</sup>MedStar Union Memorial Hospital, <sup>2</sup>MedStar Franklin Square Medical Center

**Background:** Gastroesophageal reflux disease (GERD) is a highly prevalent disorder with a multitude of treatment options ranging from lifestyle modifications and medical management to surgical options. Despite the numerous treatments available, there is still debate over which approach is most appropriate and effective for patients. This study aims to examine the effect of robotic hiatal hernia repair (RHHR) with the novel addition of esophagopexy in patients with GERD.

**Methods:** A single institution, single surgeon, prospectively maintained database was used to identify patients who underwent RHHR with a partial fundoplication and concomitant esophagopexy for GERD from November 2015 to July 2017. Patient characteristics, operative details and postoperative outcomes were analyzed. Primary endpoint was resolution of subjective GERD symptoms and discontinuation of proton pump inhibitor (PPI). Recurrence of hiatal hernia was a secondary endpoint.

**Results:** Eleven patients were identified meeting the inclusion criteria (RHHR + esophagopexy) with a mean follow-up of 9.5 weeks ± 19.4 weeks. In regards to the RHHR, 91% underwent a partial fundoplication and the additional 9% underwent a re-do wrap. This patient cohort was 81.8% female with a mean age of 61.5 ± 11.9 years. Preoperative esophagogastroduodenoscopy (EGD) was performed in 100% of patients with the study showing a hiatal hernia in 91.0%, gastritis in 45.4% and esophagitis in 63.6% of patients. Manometry was performed in 54.5% of the patients showing 50% of these patients with esophageal dysmotility. Esophagrams and pH studies were performed preoperatively in 36.4% and 45.5% of patients respectively. Preoperatively, 100% of patients had a documented diagnosis of GERD and were taking a PPI and/or H2 blocker. After RHHR with esophagopexy, 81.8% of patients had resolution of their GERD symptoms while 18.2% (n = 2) remained symptomatic. However, one of two patients reported a subjective decrease in symptom severity following the procedure. Despite resolution of symptoms, 81.1% remained on PPIs. Another 9% switched to H2 blockers and one patient discontinued all antisecretory therapy. None of the patients experienced recurrence of their hiatal hernia.

**Conclusion:** Based on our data, RHHR with esophagopexy results in resolution GERD symptoms in over 80% of symptomatic patient. In patients with hiatal hernias and GERD, RHHR with esophagopexy does lead to resolution of symptoms, however, the majority of patients remained on PPIs. Long-term follow up is needed to investigate whether these patients are able to discontinue PPIs and remain symptom free.

**P411****Laparoscopic D2 Gastrectomy for Gastric Cancer – A Single Institution Experience**

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**Background:** D2 gastrectomy for gastric carcinoma is a well-established procedure in patients undergoing surgery for gastric cancer and is the standard of care in our institution. Reduced pain, early ambulation, and better cosmetics are some of the benefits of minimally invasive surgery for early gastric cancer. We aimed to describe our experience in laparoscopic D2 gastrectomies undertaken by a single surgeon in our institution.

**Methods:** This is a single-center retrospective review of prospectively collected D2 gastrectomies performed by a single surgeon. Between November 2011 and February 2017, 45 laparoscopic subtotal/total gastrectomies were performed at Sheba Medical Center, a tertiary center for foregut cancer. Clinicopathological characteristics of the patients, surgical performance, postoperative outcomes and pathological data were collected.

**Results:** Forty-five patients underwent laparoscopic gastrectomy. Of these, 38 had subtotal gastrectomy and 7 had total gastrectomy. The median age in our series 65 (43–89). Most of the patients in our series had early gastric cancer (T1-2) (80%). The mean average of dissected lymph nodes was  $25 \pm 13$ . The mean operative time was  $249 \pm 48$ . The postoperative complications, classified using the Clavien-Dindo classification. Severe complications (> CD IIIa) rate was 11%.

**Conclusions:** Laparoscopic D2 gastrectomy for invasive gastric cancer is safe and feasible when carried out in high-volume centers by an experienced surgeon as part of a multidisciplinary team with careful case selection and appropriate high-quality postoperative support.

**P413****Esophago-Gastrostomy Reconstruction After Laparoscopic Proximal Gastrectomy with Special Attention to Postoperative Motor Function**

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**Introduction:** Recently, the frequency of early gastric cancer in the upper third of the stomach has especially increased. We report here our recent laparoscopic procedure of esophagogastrostomy after limited proximal gastrectomy (LPG) for the treatment of upper third early gastric cancer.

**Methods and Procedures:** Key points of our procedure are as follows; 1) Preservation of hepatic and pyloric branches of vagal nerve, 2) Preservation of intra-abdominal esophagus as much as possible, 3) End-to-side esophago-gastrostomy on the anterior wall, 2 cm from the lesser curvature and 3 cm from the top of the remnant stomach, using he circular stapler, 4) Seromuscular anchoring suture between the intra-abdominal stomach and the top of the remnant stomach, 5) Anchoring of the remnant stomach to the right crus of diaphragm. We evaluated postoperative clinical results of the patients after LPG.

**Results:** Our procedure technique preserved peristalsis of the entire length of the esophagus and lower third of the stomach, and allowed the greater curvature near the top of the stomach to function as a new fundus. Lumen of the lower esophagus was closed under normal condition and relaxed after swallowing. There was neither anastomotic leakage nor abdominal abscess. There was little reflux esophagitis on endoscopic examination. Postoperative change of hemoglobin levels and body weights were significantly less in the proximal gastrectomy group than in the total gastrectomy group.

**Conclusions:** Our procedure is a simple and easy technique, and may be a better choice for early gastric cancer in the upper-third stomach than laparoscopic proximal gastrectomy.

**P412****Minimally Invasive Management of Diaphragmatic Hernias After Esophagectomy: A Case Report**

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**Introduction:** Esophagectomy is a common treatment for both benign and malignant pathologies of the foregut. Hiatal paraconduit hernias are rare complications following esophagectomy. In this study, we review our experience with these rare diaphragmatic hernias.

**Methods:** A retrospective analysis of all patients presenting with hiatal hernia after esophageal resection at the University of Oklahoma Health Science Center between 2014 and 2017 was performed. Data was abstracted from the medical record for evaluation and included demographics, symptoms, repair techniques and outcomes. No patients were excluded.

**Results:** A total of ten patients were identified to have paraconduit hernias. During this time interval, there were a total of 130 esophageal resections performed. All patients had esophagectomy for malignant disease. Seven of the 10 patients have undergone surgery. Two patients are asymptomatic and are being followed at their request, and one patient is pending elective correction. Of the seven patients who underwent surgery, the median age was 58, with 5 males and two females. Six of the seven patients underwent minimally invasive Ivor Lewis esophagectomy and one had an open McKeown procedure. The median time from esophagectomy to hernia repair was 12 months, with range from 1 month to 120 months. The most common presenting complaint was abdominal pain and nausea. One patient was noted to have a paraconduit hernia on postoperative day 5 and taken to surgery for repair during the hospitalization. There was one death in a patient who presented with necrosis of the small bowel. The remaining 6 patients all had laparoscopic approach. One patient required a hand port to reduce incarcerated colon and one patient was noted to have a cecal perforation during port closure requiring repair. All patients had herniated colon, with small intestine or pancreas herniation noted in three. Repair was performed by reducing the viscera, a left phrenic relaxing incision, closure of the hiatus around the conduit and then closure of the diaphragmatic defect with mesh. At median follow up of 6 months, there are no recurrences.

**Conclusion:** Hiatal paraconduit hernias are becoming a frequent finding among survivors of esophageal cancer surgery. Our study demonstrates that there is a propensity for patients who undergo minimally invasive esophagectomy to develop these hernias. The vast majority of patients can undergo laparoscopic repair. Our recommendation is to perform a diaphragmatic relaxing incision and liberal use of mesh. Early results appear to be favorable regarding recurrence.

**P414****Surgical Outcomes of Circular-Stapled and Linear-Stapled Esophagojejunostomy in Gastric Cancer: A Propensity-Matched Analysis**

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**Aim:** There have been several reports illustrating the safety and efficacy of various surgical techniques in performing laparoscopic esophagojejunostomy (EJ). This study aims to compare two established methods of EJ anastomosis – circular stapling with purse-string suture ("Lap-Jack") and linear stapling technique – in laparoscopic total gastrectomy.

**Methods:** 314 patients diagnosed with gastric cancer underwent intracorporeal EJ anastomosis in laparoscopic total gastrectomy from January, 2013 to October, 2016. 254 cases used the circular stapler with purse-string "lap-jack" method, and 60 patients used the linear stapling method for EJ anastomosis. 59 were matched using propensity scores, and retrospective data for patient characteristics, surgical outcome, and post-operative complications was reviewed.

**Results:** The two groups showed no significant difference in age, BMI, or other clinicopathological characteristics, and there was no conversion to an open procedure. After propensity score matching analysis, the linear group had significantly shorter operating time ( $252.6 \pm 72.3$  vs  $200.1 \pm 61.7$ ,  $p \leq 0.001$ ) and more sufficient proximal margin ( $3.9 \pm 3.5$  vs  $4.9 \pm 3.0$ ,  $p = 0.022$ ). No significant difference was found in estimated blood loss, retrieved lymph node, hospital stay, and time for first flatus. There was no postoperative mortality.

Early postoperative complication of the circular and linear group occurred in 11 (18.6%) and 16 (27.1%,  $p = 0.381$ ) patients respectively. EJ leakage occurred in 2 (3.4%) cases from each groups, with 1 (50%) case from both group needing radiologic or surgical intervention. No other significant difference in early complication was found.

Late complication was observed in 7 (3.3%) cases (circular = 4 linear = 3,  $p = 1.000$ ) with 1 EJ anastomosis stricture in the linear group, but there was no statistical significance.

**Conclusion:** Both circular stapling and linear stapling techniques are feasible and safe in performing intracorporeal EJ anastomosis during laparoscopic total gastrectomy. Linear-stapling technique had more sufficient proximal margin and shorter operating time. There was no significant difference in anastomosis related complication between the two groups.

**P415****Short- and Long-Term Outcomes of Laparoscopic Gastrectomy for Advanced Gastric Cancer**

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**Background:** Although the current standard treatment for advanced gastric cancer (AGC) is open gastrectomy, laparoscopic gastrectomy (LG) is increasingly performed, especially in the East. However, it is a technically demanding procedure, and the feasibility remains unclear. The aim of the present study was to clarify the feasibility of LG for AGC.

**Patients and Methods:** The present study included 266 patients who underwent LG for AGC between 2010 and 2017. The indication of LG has gradually expanded in our institute, and is currently any stage gastric cancer except for gastric cancer obviously invading adjacent organs or gastric stump carcinoma. We retrospectively reviewed short- and long-term surgical outcomes of the patients.

**Results:** Male/female ratio was 2:1, and median age (range) was 68 (23–90) years. Distal gastrectomy was most frequently performed (62 %), followed by total gastrectomy (33%). Median operation time and intraoperative blood loss was 251 (156–529) minutes and 15 (0–505) g, respectively. Clavien-Dindo grade III or more complication rate was 8.6%. With a median follow-up period of 18 months, the 3-year recurrence free survival rates of pStage II and III patients were 98% and 91%, respectively.

**Conclusion:** The outcomes of LG for AGC are satisfactory, provided that an experienced team performs the surgery.

**P417****Outcomes After Robotic Versus Laparoscopic Roux-en-Y Gastric Bypass: A Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program National Database Analysis**

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**Objective:** Robotic assistance for bariatric surgery represents a novel application of a rapidly emerging technology. Its safety and efficacy remains primarily characterized by smaller, single-institution studies. In this investigation, the influence of robotic assistance on short-term perioperative outcomes is contrasted with the more established primary multi-port laparoscopic approach for patients undergoing Roux-en-Y gastric bypass (RYGB), using data from a national bariatric database.

**Methods:** A retrospective analysis of 2,976 robotic-assist and 38,716 laparoscopic RYGB patients from the 2015 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program national database were reviewed for differences in patient characteristics and short-term outcomes. On bivariate analysis, variables associated with primary outcomes of 30-day reoperation, readmission and reintervention were imputed into multivariate analyses to determine independent significance.

**Results:** Robotic-assist bypass patients were older ( $P<.001$ ), had a higher prevalence of comorbidities and had concomitant operations more frequently performed during surgery ( $P<.001$ ). On bivariate analysis, robotic-assist patients had a higher rate of readmission than laparoscopic patients (7.5% vs. 6.4%;  $P=.03$ ), but no differences in 30-day reoperation (2.7% vs. 2.5%;  $P=.63$ ), reintervention (3.3 vs. 2.7,  $P=.08$ ), or mortality (0.13% vs. 0.18%;  $P=.82$ ) were observed. Multivariate analysis failed to demonstrate differences between robotic-assist and laparoscopic patients in any of the primary endpoints ( $P>.05$ ).

**Conclusion:** Robotic-assistance does not confer an increased rate of morbidity and mortality after RYGB, and represents a feasible surgical modality for the surgeon willing to adopt the technology and accept its limitations.

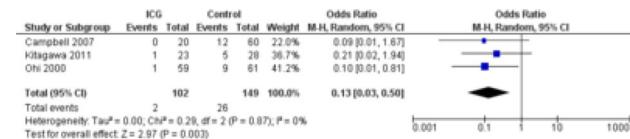
**P416****A Systematic Review and Meta-analysis on the Use of Indocyanine Green for the Prevention of Anatomic Leaks Following Esophagectomy**

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**Introduction:** The present study aims to evaluate the predictive value of indocyanine green (ICG) for the detection and prevention of anastomotic leak following esophagectomy. Anastomotic leak is a highly morbid and potentially fatal complication of esophagectomy. Ensuring adequate perfusion of the gastric conduit can minimize the risk of postoperative leak. Intraoperative evaluation with fluorescence angiography using ICG offers a dynamic assessment of gastric conduit perfusion, and can guide anastomotic site selection.

**Methods:** A search of electronic databases MEDLINE, EMBASE, SCOPUS, Web of Science and the Cochrane Library using the search terms “indocyanine/fluorescence” AND esophagectomy was completed to include all English articles published between 1946 and August 2017. Articles were selected by two independent reviewers based on the following major inclusion criteria: (1) Esophagectomy with gastric conduit reconstruction; (2) use of fluorescence angiography with indocyanine green to assess perfusion; (3) age  $\geq 18$  years; (4) sufficient outcome data for the calculation of leak rates and (5) sample size  $\geq 5$ . The quality of included studies was assessed using the Quality Assessment of Diagnostic Accuracy Studies-2.

**Results:** Our literature search yielded 146 potential studies, of which 14 studies were included for meta-analysis after screening and exclusions. There were eleven prospective and three retrospective studies. The pooled anastomotic leak rate when ICG was used was found to be 10%. Pooled sensitivity and specificity for leak detection were 0.83 (0.70–0.93) and 0.60 (0.55–0.66), respectively. When studies involving intraoperative modifications were removed, pooled sensitivity and specificity were only marginally changed to 0.75 (0.51–0.91) and 0.67 (0.55–0.77), respectively. The diagnostic odds ratio was found to be 5.68 (2.29–14.10) across all studies and 5.06 (0.93–27.55) when intraoperative interventions were excluded. Only three trials included a control group, giving a sample size of 251. In studies with a comparator group, ICG was associated with an 87% reduction in the risk of anastomotic leak [OR: 0.13 (0.03–0.50)].



**Conclusions:** In non-randomized trials, the use of ICG as an intraoperative tool for visualizing vascular perfusion and conduit site selection, is promising. However, poor data quality and heterogeneity in reported variables limits cross-study comparisons and generalizability of findings. Randomized, multi-center trials are needed to account for independent risk factors for leak rates and to better elucidate the impact of ICG in predicting and preventing anastomotic leaks.

**P418****Thoracoscopic Truncal Vagotomy Versus Surgical Revision of the Gastrojejunostomy for Recalcitrant Marginal Ulcers**

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**Introduction:** Marginal ulcer is a common complication following Roux-en-Y gastric bypass with incidence rates between 4 and 16%. Most marginal ulcers resolve with medical management and lifestyle changes, but in the rare case of a non-healing marginal ulcer there are few treatment options. Revision of the gastrojejunostomy (GJ) anastomosis carries significant morbidity and mortality with complication rates ranging from 10 to 50%. Thoracoscopic truncal vagotomy (TTV) may be a safer alternative with decreased operative times. The purpose of this study is to evaluate the safety and effectiveness of TTV in comparison to GJ revision for treatment of recalcitrant marginal ulcers.

**Methods and Procedures:** A retrospective chart review of patients who required surgical intervention for non-healing marginal ulcers was performed from 1st September 2012 to 1st September 2017. All underwent medical therapy along with lifestyle changes prior to intervention and had pre-operative EGD that demonstrated a recalcitrant marginal ulcer. Revision of the GJ anastomosis or TTV was performed. Data collected included operative time, ulcer recurrence, morbidity rate, and mortality rate. Statistical analysis was performed using T-test and Fischer's Exact Test.

**Results:** A total of fifteen patients were identified who underwent either GJ revision ( $n=8$ ) or TTV ( $n=7$ ). There were no 30-day mortalities in either group. Mean operative time was significantly lower in the TTV group in comparison to GJ revision ( $95.7 \pm 16$  vs.  $197.8 \pm 89$  minutes respectively,  $p=0.0141$ ). Recurrence of the ulcer was not significant between groups and occurred following 2 GJ revisions and 1 TTV. Overall complication rate was not significantly different with 88% in the GJ revision group and 57% in the TTV group. Complications included anastomotic leak (1 GJ), anastomotic stricture (2 GJ), aspiration (1 TTV), dysphagia (1 GJ and 3 TTV), and dumping syndrome (2 GJ).

**Conclusions:** Our results demonstrate that thoracoscopic vagotomy may be a better alternative with decreased operative times and similar effectiveness. However, further prospective observational studies with a larger patient population would be beneficial to evaluate complication rates and ulcer recurrence rates between groups.

**P419****Tubulovillous Adenoma of the Pylorus: Minimally Invasive Resection of a Rare Tumor**

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We present a case of a 59-year-old female with a history of thyroid cancer who initially presented to an outside hospital complaining of reflux, abdominal pain, early satiety, and 35-pound unintentional weight loss. Endoscopy demonstrated a 2 cm pre-pyloric mass; with initial biopsies of the mass demonstrating only gastric mucosa. Endoscopic ultrasound and FNA of the lesion also failed to elucidate its pathology. Due to the pyloric location of the mass and inability to rule out invasive malignancy, we recommended a robotic-assisted transgastric submucosal resection with possible distal gastrectomy. Intraoperatively we found a 270-degree circumferential pre-pyloric exophytic sessile tumor. Frozen sections suggested a benign papillary tumor therefore we proceeded with submucosal resection. The resulting mucosal defect and gastrotomy were closed primarily with absorbable suture. Final pathology showed the tumor to be a tubulovillous adenoma with high grade dysplasia arising against a background of intestinal metaplasia. The resection margins were negative for dysplasia. The postoperative course was complicated by a minor leak which did not require operative intervention and subsequent gastric outlet narrowing which required endoscopic dilation and feeding tube placement. However, the patient has recovered well and has advanced to diet as tolerated. Gastric adenoma has a prevalence of 0.5–3.75% in the western hemisphere. The risk of carcinomatous transformation in gastric adenomas is related to size, degree of dysplasia, and villosity. Gastric adenomas are considered precancerous lesions. Pre-operative pathologic diagnosis of dysplasia is often elusive as biopsies will often miss or under-grade the lesion. Guidelines advocate for complete resection with either endoscopic submucosal dissection or surgical resection depending on surgeon preference and local expertise. Endoscopic resection has been shown to be safe and efficacious in the removal of adenomas with good long-term outcomes. In this case the pathology of the lesion was unclear after multiple unsuccessful biopsies and required a surgical diagnosis to rule out invasive malignancy. Management of gastric adenomas, while rare, may require a multidisciplinary approach between surgical endoscopy, minimally invasive surgery, and surgical oncology to achieve local control in an oncologically sound manner. We show that transgastric submucosal resection can be achieved in a minimally invasive fashion using robotic assistance.

**P420****Concept of Para-hiatal Hernia and Its Management**

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**Objective:** Parahiatal Hernia is a rare type of diaphragmatic hernia with incidence of 0.2–0.35%. Para-hiatal hernias arises lateral to the left crural musculature adjacent to but separate from the oesophageal diaphragmatic hiatus. In view of its rare occurrence and little clinical suspicion, it is almost never diagnosed clinically. The current case report is intended to depict the clinical profile of an intraoperatively diagnosed para-hiatal hernia and feasibility of laparoscopic repair of para-hiatal hernias.

**Method:** Laparoscopic fundoplication is frequently performed at Grant Medical College and Sir J. J. Group of Hospitals, India. During one such case intraoperatively Para-hiatal hernia was diagnosed.



**Discussion:** Primary or true parahiatal hernias occur as a result of a congenital weakness and secondary defects follow hiatal surgery. The primary treatment of para-hiatal hernia is mesh-plasty. This is coupled with fundoplication in cases of large hernia and those symptomatic for gastroesophageal reflux disease. Laparoscopic repair of these uncommon hernias is safe, effective and provides all of the benefits of minimally invasive surgery.

**Conclusion:** Due to its rare occurrence, knowledge about this condition among laparoscopic surgeons is important to avoid diagnostic dilemma. Knowledge about its management aids intraoperatively to avoid performing incomplete procedure.

**P421****Comparison of the Estimated Lymph Node Metastasis Risk and the Predicted Surgical Risk in Patients with Early Gastric Cancer After Non-curative Endoscopic Submucosal Dissection**

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**Introduction:** Extended indications of endoscopic resection for early gastric cancer (EGC) have been widely accepted. According to current Japanese guidelines, additional gastrectomy with lymph node dissection (LND) is recommended for patients proven to have potential risks of lymph node metastasis (LNM) on histopathological findings. On the other hand, the frequency of LNM in these patients is extremely low. The aim of this study was to elucidate the accurate risk of LNM based on the number of risk factors (RF) for possible LNM, and to compare the stratified risk of LNM with predicted risk from additional radical resection.

**Methods and Procedures:** We enrolled 589 EGC patients who did not meet absolute or extended indications of endoscopic resection, and investigated the risk stratification of LNM according to the total number of LNM RFs described below; (1) SM2, (2) lymphatic vessels invasion, (3) Undifferentiated adenocarcinoma and >20 mm in diameter, and (4) >30 mm in diameter and ulcer formation. We compared the stratification risk to the surgical risk that was calculated based on the Japanese National Clinical Database (NCD) risk calculator in 52 patients with additional gastrectomy after ESD.

**Results:** The total number of LNM RFs and frequency of LNM were significantly correlated (0/1RF: 0.85%, 2RFs: 10.88%, 3RFs: 31.40%, 4RFs: 53.57%; p<0.05, Fischer exact test). The estimated frequency of LNM was found to be lower than the predicted value of in-hospital mortality rate based on NCD in 24.3% of 0/1RF-patients who underwent additional gastrectomy with LND after ESD.

**Conclusions:** The present study suggested that some patients must be over-indicated for additional gastrectomy with LND, and no additional surgical treatment or less invasive surgery, such as local LND (Sentinel node navigation surgery or lymphatic basin resection), might be indicated for some patients with low number (0/1 RF) of LNM risk factors after ESD.

**P422****Surgical Treatment Outcomes of Laparoscopic Proximal Gastrectomy for Early Gastric Cancer**

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**Aims:** Laparoscopic proximal gastrectomy has been applied for early gastric cancer in upper third. We previously reported outcomes of laparoscopic total gastrectomy in managing this condition. In this study, we applied this modified technique for upper third early gastric cancer with double tract reconstruction. It is expected that our technique could be useful for treating these cases.

**Methods:** From April of 2004 to June of 2017, 69 consecutive patients with upper third early gastric cancer were assigned to undergo surgical treatment with proximal gastrectomy at our hospital. We had 195 cases of total gastrectomy for upper third early gastric cancer in the same study period.

**Results:** Clinical records of 809 cases of upper third early gastric cancer (From April of 2004 to June of 2017) were analyzed retrospectively in background factors, operative time and length of hospital stay. Of them, 28 cases were treated by laparoscopic proximal gastrectomy and 41 cases were treated by open surgery (male 17, female 11, average age of m 64.2, f 68.1, range 37–82 in laparoscopic cases, m 29, f 12, m 63.7, f 76.1, 33–88 in open cases). We had 54 laparoscopic total gastrectomy and 141 open surgery (m 35, f 19, m 68.2, f 71.0, 48–83 in laparoscopic cases, m 94, f 47, m 70.5, f 72.9 in open cases). The average operative time in the laparoscopic proximal gastrectomy group was 326 min (221–682), as was 245 (90–355) in the laparoscopic surgery group, with 344 (292–522) in the open total gastrectomy and 221 (143–350) in the open surgery. The median hospital stay in the laparoscopic proximal gastrectomy group was 22.7 (13–72) days, as was 25.2 (15–44) in the open proximal group and 34.7 (16–127) in the laparoscopic total group and 29.0 (13–45) in the open total group. Postoperative body weight loss was –4.0 kg in the laparoscopic proximal gastrectomy group and was –4.0 kg in the open group as was –3.9 in the open total group and –5.9 in the open total group.

**Conclusions:** We conclude that laparoscopic proximal gastrectomy for upper third early gastric cancer could be useful for reducing invasiveness while keeping a postoperative body weight loss as same as in open surgery with an attractive advantage in managing this condition.

**P423****Ten Cases of Laparoscopic Total Gastrectomy for Remnant Gastric Cancer**

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**Background:** Laparoscopic total gastrectomy for remnant gastric cancer is much more difficult than common Laparoscopic total gastrectomy due to severe adhesions to adjacent organs, displacement of anatomical structure.

**Purpose:** The aim was to analyze 10 cases of Laparoscopic total gastrectomy for remnant gastric cancer at the Department of Surgery of Juntendo University Urayasu Hospital between November 1999 and April 2017.

**Method:** We analyzed outcome and feasibility of Laparoscopic total gastrectomy surgery for remnant gastric cancer. And we compared with laparoscopic total remnant gastrectomy (10 cases) versus Laparoscopic total gastrectomy (101 cases) in our hospital.

**Results:** In the previous laparoscopic surgeries. We performed laparoscopic distal gastrectomy in 5 cases, laparoscopic proximal gastrectomy in 2 cases, and open distal gastrectomy in 3 cases. All cases were performed laparoscopic total gastrectomy with R-Y reconstruction. 1 case of them had been converted to open surgery due to severe adhesions.

The mean operative time was 271 min and the mean blood loss was 189 ml. There were no intraoperative complications, and there were 2 postoperative complications as a pancreatic fistula and a bowel obstruction. However, there were no intra-operative complications more than Grade 3 according to the Clavien-Dindo classification. The mean postoperative hospital stay was 22.4 days. All cases were without recurrence.

Thus, there were no significant differences in operative time, bleeding volumes, intra and post-operative complications and hospital stay compared with Laparoscopic total gastrectomy.

**Conclusions:** Laparoscopic total remnant gastrectomy can be performed with similar short-term outcomes to Laparoscopic total gastrectomy, and may be feasible and safe procedure, and can become an option of therapeutic strategy.

**P425****Gastroparesis Following Laparoscopic Paraesophageal Hernia Repair**

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**Introduction:** Little discussion of gastroparesis (GP) following laparoscopic paraesophageal hernia repair (LPHR) has been reported in the literature. We wished to examine the incidence in our institution, and identify potential risk factors for development of gastroparesis following LPHR.

**Methods and Procedures:** A single institution retrospective chart review was preformed using CPT codes corresponding to paraesophageal hernia repair and fundoplication to identify patients undergoing laparoscopic paraesophageal hernia repair over a five year period (1/1/2012–12/31/2016) by three surgeons. Emergency procedures and reoperations were excluded. In total, 93 patients undergoing non-emergent first time LPHRs were identified. Size of the hiatal defect was identified when able, via either measurement between the diaphragmatic crura on CT or by medical record documentation. Data obtained included sex, age, hernia type, mesh usage, and existence of specific comorbidities associated with gastroparesis. Presence of gastroparesis was identified either by documentation of diagnosis via clinical judgment, or by results of gastric emptying nuclear medicine studies, with timing being no longer than 6 months from date of surgery. Independent Students t-test and Fisher exact test were used to determine statistical differences between the groups.

**Results:** 93 patients undergoing non-emergent first time LPHRs were identified. Of these, we were able to obtain the size of the hiatal defect in 72 patients. 10 patients overall were diagnosed with gastroparesis, with an overall incidence of 11.0%. When comparing all patients who developed gastroparesis to those who did not, only females comprised the group which did develop gastroparesis (0 males/10 females with GP, 28 males/55 females without GP, p=0.029).

Age was also found to be greater in the group which developed gastroparesis. For patients in which the size of the hernia defect was identified, the average age was 9 years older in the group diagnosed with gastroparesis ( $67.0 \pm 9.34$  with GP,  $58.0 \pm 13.4$  without GP, p=0.028). When including all patients for comparison, this difference approached statistical significance ( $67.0 \pm 9.34$  with GP,  $59.4 \pm 13.8$  without GP, p=0.02).

No differences were found between the two groups in respect to size of hiatal defect, presence of mesh, smoking status, presence of diabetes mellitus, or chronic narcotic usage.

**Conclusion:** Our findings indicate that older age and female sex are risk factors for development of gastroparesis following LPHR. Our study is limited by small sample size, as well as lack of uniformity in measurement of the hiatal defect.

**P424****An Institutional Analysis of Hiatal Hernia Recurrence Rates and Contributing Factors**

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Laparoscopic fundoplication (LF) is the treatment of choice for symptomatic hiatal hernia (HH). Mesh-reinforced curaplasty has considerably decreased recurrence rates for both large and small hernias, and newer synthetic absorbable meshes seem decrease rates even further. In this study, hiatal hernia repairs in an institutional database were analyzed for factors contributing to recurrence.

A retrospective review of a prospectively collected database was performed. Queried patients underwent LF from 2009 to 2016. Emergent operations, funduplications after Heller myotomy, and individuals without HH were excluded. Demographics, intraoperative, and postoperative variables were compared between the groups with Student's t-test, Mann-Whitney U test, or Fisher's Exact test. The cohort was also divided by groups according to mesh type (including no mesh). Comparisons were made among the groups using Chi-squared analysis.

A total of 249 patients were included in the analysis (no recurrence=216, recurrence=33). Demographic analysis revealed BMI to be significantly different (29.77 vs 27.79, respectively, p=0.04). Intraoperatively, the recurrence group had higher EBL (39.35 ml vs 83 ml, p=0.004) and intraoperative complication rate (0.93% vs 12.12%, p=0.003). Postoperatively, recurrence was associated with increased length of stay (52.35 h vs 107.31 h, p=0.03), increased time to activities of daily living (6.2 vs 9.1, p=0.03), ED visit within 30 days (8.8% vs 27.27%, p=0.005), and readmission within 30 days (5.09% vs 21.21%, p=0.004). Analyzing the cohort by mesh type, 94 patients received synthetic absorbable, 60 received biologic, and 94 received curaplasty without mesh. Recurrence rates for the respective groups were 8.51%, 16.67%, and 10.10%, although these differences were not significant (p=0.22). Time to recurrence was significantly different, respectively 0.81, 2.55, and 1.22 years (p=0.016).

Although this study was not powered to show lower recurrence rates with synthetic absorbable as compared to biologic, the 8.51% recurrence rate is consistent with other series utilizing this mesh. It is interesting to note the difference in time to recurrence. These results suggest that while synthetic absorbable mesh may result in lower recurrence rates, recurrence seems to occur earlier. The results also suggest that deconditioning (lower BMI), and difficult cases and/or recovery may predispose to recurrence. These findings can help inform LF mesh selection and predict which patients are at higher risk of recurrence.

**P426****Our Simplified Practical Procedure in Laparoscopic Nissen Fundoplication for Gerd Patients**

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**Introduction:** Laparoscopic techniques in anti-reflux surgery for GERD patients are still considered complicated by many surgeons. We have established a simplified practical procedure with less bleeding and less operative time.

**Surgical Procedure:****Setting**

Our 5-trocar setting with patients in the reverse Trendelenburg's position is as follows: 12 mm trocar just below the navel (A), 5 mm trocar at the upper right abdomen for pulling up lateral segment of the liver, 5 mm trocar at the upper right abdomen, 12 mm trocar at the upper left abdomen (B), 5 mm trocar at the middle left abdomen (C).

**Step 1**

Under laparoscopic view, left part of the lesser omentum was cut with preserving the hepatic branch of vagus nerve. The right crus of the diaphragma has been dissected free from the soft tissue around the stomach and abdominal esophagus. In this step the fascia of the right crus should be preserved and the soft tissue should not be damaged to avoid bleeding. After cutting the peritoneum just inside the right crus, the soft tissue was dissected bluntly to left side. Then the inside margin of the left crus of the diaphragma was recognized from the right side. In this part of the procedure, laparoscope uses trocar (A), the assistant uses trocar (B) to pull the stomach to left lower side and the operator's right hand uses trocar (C).

**Step 2**

The branches of left gastroepiploic vessels and the short gastric vessels were divided with ultrasonic coagulation and dissection device. The left crus of the diaphragma was exposed and the window at the posterior side of the abdominal esophagus was widely opened. In this part of the procedure, laparoscope uses trocar (A) at the beginning of dividing left gastroepiploic vessels, trocar (B) when dividing short gastric vessels.

**Step 3**

The right and left crus are sutured with interrupted stitches to reduce the hiatus. From the right side, the fundus of the stomach is grasped through the widely opened window behind the abdominal esophagus. Then the fundus of the stomach is pulled to obtain a 360 degree "stomach-wrap" around the abdominal esophagus (fundoplication). Using 2–0 non-absorbable braided suture, stitches are placed between both gastric flaps.

**Results:** We have performed this procedure in 87 cases. The mean operation time was 115 min. A favorable outcome was assessed by radiograms performed on 4–5 postoperative day. The patients are mostly satisfied with the postoperative results.

**P427****Internal Hernia After Gastrectomy for Gastric Cancer, a Single Center Experience**

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**Purpose:** Laparoscopic gastrectomy has been widely adopted as the treatment of choice by many countries and institutions. Internal hernia is a well-known complication after Rouxen-Y gastric bypass in the field of bariatric surgery. However, there were only a few reports of internal hernia after gastrectomy in gastric cancer patients. The purpose of this study was to analyze the incidence and clinical features of internal hernia after gastric cancer surgery in a high-volume center.

**Method:** 2,931 gastric cancer patients who underwent curative gastrectomy at Seoul National University Bundang Hospital between January 2013 and December 2016 were retrospectively reviewed in this study. Internal hernia was classified into two types, Mesenteric hernia and Petersen's hernia.

**Result:** 2201 patients who underwent distal gastrectomy (DG) with reconstruction by Billroth II, Rouxen-Y gastrojejunostomy and uncut Rouxen-Y gastrojejunostomy, total gastrectomy (TG) with Esophagojejunostomy, and proximal gastrectomy with double tract reconstruction (PG DTR) with esophagojejunostomy and gastrojejunostomy had potential space for internal hernia. Among these patients, 31 (1.4%) were determined as internal hernia by Computed Tomography and 29 patients (1.3%) underwent surgical treatment of internal herniation. Two patients were conservatively managed. All patients suffered from abdominal pain and 13/31(42%) patients showed nausea and vomiting. The median interval between the initial gastrectomy and surgery for internal hernia was 450 days. Mesenteric hernia was observed in 18 cases and Petersen's hernia in 12 cases. Since we started closing the mesenteric and Petersen's defects from May of 2015, there were only 5 cases (16%) observed afterwards but there were 24 cases (84%) before closure of the defects.

**Conclusion:** Internal hernia after gastrectomy is likely underreported. Although we analyzed 31 patients with internal hernia, there might be more patients with mild symptoms who were managed conservatively by their own. A high degree of suspicion for internal hernia should be maintained in patients presenting symptoms like nausea, vomiting and abdominal pain after gastrectomy with potential space for internal hernia. With our experience, closure of the mesenteric and Petersen's defect is helpful in reducing internal hernia. However, due to low incidence, a multi-center retrospective study is necessary.

**P428****Preoperative Anemia Predicts Worse Outcomes in Patients Undergoing Hiatal Hernia Repair**

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**Introduction:** The increased incidence of anemia in patients with a hiatal hernia (HH) has been clearly demonstrated, as has resolution of anemia after HH repair in these patients. Despite this, the implications of preoperative anemia on postoperative outcomes have not been well described. In this study, we aimed to identify the incidence of preoperative anemia in patients undergoing HH repair at our institution and sought to determine whether preoperative anemia had an impact on postoperative outcomes.

**Methods and Procedures:** Using our IRB-approved institutional HH database, we retrospectively identified patients undergoing HH repair between January 2011 and April 2017 at our institution. We identified all patients with anemia, defined as serum hemoglobin levels less than 13 mg/dL in men and 12 mg/dL in women, measured within two weeks prior to surgery, and compared this cohort to those that had normal hemoglobin values preoperatively. Specific perioperative outcomes analyzed included: estimated blood loss (EBL), operative time, need for blood transfusion, failure to extubate postoperatively, intensive care unit (ICU) admission, postoperative complications, length of stay (LOS), and 30-day readmission.

**Results:** We identified 266 patients undergoing HH repair, of which 233 had preoperative bloodwork available for review. The average age was 64 years and the majority of patients were female (79%, n=208). Most were treated electively (75%, n=196) and with a minimally invasive approach (97%, n=253). 70 patients (26.6%) had preoperative anemia. Compared to patients without anemia, patients with anemia had increased rates of failed extubation post-operatively (7.1% vs. 1.5%, p=0.033), increased ICU admissions (12.9% vs. 5.1%, p=0.034), increased need for perioperative blood transfusions (11.4% vs 0%, p=0.0003), and increased rates of postoperative complications (41.4% vs. 18.1%, p<0.0001). Although mean LOS (4.3 days vs. 3.2 days, p 0.077), mean operating time (262 mins vs. 252 mins, p=0.10), and EBL (52 ml vs 38 ml, p=0.38) were greater in the anemic group, they did not reach statistical significance, and there was no significant difference in 30-day readmission rate (8.6% vs 8.8%, p=0.95).

**Conclusions:** Anemia diagnosed on preoperative bloodwork appears to be associated with increased failure to extubate postoperatively, need for ICU admissions, need for perioperative blood transfusion, and increased overall complication rate after HH repair. However, we found no significant difference in LOS or 30-day readmissions between anemic and non-anemic patients. Since the majority of patients in this analysis underwent elective repairs, these results would support the preoperative treatment of anemia in patients undergoing HH repair.

**P429****Laparoscopic Repair of Perforated Peptic Ulcer with Barbed Knotless Suture: A Novel Approach**

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**Background:** In the past decade, the benefits of laparoscopic repair of perforated peptic ulcers (PPU) have been clearly established. The main drawbacks to laparoscopic repair are prolonged operative time and technical difficulty. Strategies to address these obstacles are needed.

**Methods:** Laparoscopic repair with modified Graham patch technique was carried out with barbed knotless suture (V-LocTM suture, Medtronic, Minneapolis, MN) on five patients who presented with PPU at a single institution. An evaluation of operative technique, post-operative management and complications was performed.

**Results:** Laparoscopic repair was successfully performed with the barbed knotless suture in all patients, with no patients requiring conversion to an open procedure. Mean operative time of all patients was 85.8 min. Mean time to initiation of feeding was 3 days and median length of hospital stay was 6 days. There were no post-operative repair leaks, reoperations, wound complications, or perioperative deaths.

**Conclusion:** Laparoscopic repair of PPU can be safely and efficiently performed utilizing a barbed knotless suture. Our data suggests that this technical modification can decrease procedural difficulty and operative time, which are the main challenges with laparoscopic repair.

**P430****Who Would Have Thought It: A 50-Dollar PTFE Felt Mesh is a Safe and Effective Method for Reinforcing Laparoscopic Hiatal Hernia Repairs**

**Samuel Cottam, Daniel Cottam, MD, Austin Cottam, Hinali Zaveri, MD, Amit Surve, MD; Bariatric Medicine Institute of Utah**

**Introduction:** Hiatal hernia repairs with mesh currently happens in approximately 30% of all hiatal hernia repairs. There is currently no consensus as to what type of mesh to use in these cases. Mesh choices are important as these range from <\$50 dollars to thousands of dollars to repair hiatal hernia. Our practice has been using a 50-dollar PTFE felt mesh since 2012. This paper was designed to assess this low cost mesh's safety and efficacy profile.

**Methods:** We retrospectively analyzed 155 patients who had a Hiatal Hernia repair in a private practice setting between July 2012 and July 2017. Patients Demographic data was analyzed and their complications were collected and analyzed. Patient complications were measured at 1, 6, 12, 24, 36, and 48 months.

**Results:** There were no mesh related complications in our study group. There were eight recurring Hiatal Hernias. Three patients did not want a reoperation as their symptoms were controlled with proton pump inhibitors. Five patients had reoperations where the hiatal hernia repair was repeated.

**Conclusion:** Inexpensive PTFE felt mesh is not prone to erosions. Additionally, it is an effective method to treat Hiatal Hernias.

**P431****Utilization of Surgical Treatment for Esophageal Adenocarcinoma Is Strongly Influenced by Age**

**Francisco Schlottmann, Paula Strassle, Marco G. Patti; University of North Carolina**

**Introduction:** Although esophagectomy remains the cornerstone for the treatment of esophageal adenocarcinoma, the recommendation of surgical resection is often conditioned by patient's age. We aimed to assess the trends in utilization of surgical treatment for esophageal adenocarcinoma in the US stratified by age groups.

**Methods and Procedures:** A retrospective, population-based analysis was performed using the National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) Program registry for the period 2004–2014. Adult patients ( $\geq 18$  years old) diagnosed with esophageal adenocarcinoma were eligible for inclusion. The yearly incidence of esophagectomy, stratified by age group (categorized as 18–49 years old, 50–70 years old, and >70 years old), was calculated using Poisson regression. Weighted log-binomial regression was used to compare the proportion of patients undergoing esophagectomy, within each age group. Inverse-probability of treatment weights were used to account for potential confounding by year of diagnosis, patient demographics, tumor grade, derived American Joint Committee on Cancer (AJCC) 6th edition TNM value, radiation, and chemotherapy.

**Results:** A total of 21,301 patients were included: 1,560 (7.3%) between 18 and 49 years old, 11,384 (53.4%) between 50 and 70 years old, and 8,357 (39.2%) older than 70 years old. During the study period, the rate of esophagectomy decreased from 34.1% to 28.2% ( $p=0.40$ ) in patients between 18 and 49 years old, from 38.6% to 33.3% ( $p=0.06$ ) in patients between 50 and 70 years old, and from 21.4% to 16.9% ( $p=0.04$ ) in patients older than 70 years old. After accounting for patient and cancer characteristics, patients older than 70 years old were 50% less likely to undergo esophagectomy compared to both patients 18–49 years old (RR 0.51, 95% CI 0.45, 0.57,  $p<0.0001$ ) and patients 50–70 years old (RR 0.53, 95% CI 0.50, 0.56,  $p<0.0001$ ). No significant difference in esophagectomy utilization was seen between 50–70 year old and 18–49 year olds (RR 0.95, 95% CI 0.86, 1.05,  $p=0.34$ ).

**Conclusion:** Surgical resection is scarcely used in patients older than 70 years old in the US, and they are significantly less likely to have surgery compared to their younger counterparts. Further investigation of surgical outcomes in elderly patients is warranted to determine if surgical treatment is underutilized in a large proportion of esophageal adenocarcinoma patients.

**P433****Mesenterization and Intra-operative Neural Monitoring to Reduce the Recurrent Laryngeal Nerve Paralysis After Thoracoscopic Esophagectomy in Prone Position**

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**Introduction:** As the thoracic esophageal carcinoma has a high metastatic rate of upper mediastinal lymph nodes, especially along the recurrent laryngeal nerve (RLN), it is crucial to perform complete lymph node dissection along the RLN without complications. Although Intraoperative neural monitoring (IONM) during thyroid and parathyroid surgery has gained widespread acceptance as the useful tool of visual nerve identification, the utilization of IONM during esophageal surgery has not become common. Here, we describe our procedures focusing on a lymphadenectomy along the RLN utilizing the IONM.

**Methods and Procedures:** We first dissect ventral and dorsal side of the esophagus preserving the membranous structure (Meso-esophagus), which contains tracheoesophageal artery, RLN and lymph nodes. We next identify the location of the RLN which runs in the Meso-esophagus using IONM before visual contact. After that, we perform lymphadenectomy around the RLN preserving the nerve. This technique was evaluated in 30 consecutive cases (neural monitoring group; Nm) of esophagectomy in prone positioning, and compared with our historical 56 cases (conventional method group; Cm).

**Results:** In all 30 cases of Nm group, we could obtain the location information of the left RLN before the nerve comes in sight. Sensitivity and specificity of the IONM to detect the RLN paralysis was 92% and 80% each. The operation time of thoracic part was significantly longer in Nm group compared to Cm group (279 min vs. 254 min each,  $p=0.003$ ). The number of resected lymph nodes were similar in each groups (Nm:  $3.3\pm2.6$  vs. Cm:  $2.9\pm2.6$ ,  $p=0.15$ ). Grade 1 and more RLN paralysis according to the Clavien-Dindo classification were seen in 5 cases (16.7%) after surgical operation in Nm group, which was lower than that in the Cm group (18/56, 32.1%,  $p=0.12$ ). Grade 2 and more RLN paralysis were also lower in Nm group than Cm group although not statistically significant (1/30, 3.3% vs. 6/56, 10.7%,  $p=0.20$ ). As a result, median postoperative hospital stay was significantly shorter in Nm group than Cm group (22 days vs. 39 days each,  $p=0.0003$ ).

**Conclusions:** Meso-esophagus oriented lymph nodes resection using IONM has substantial advantages to perform accurate and safe lymphadenectomy around the left RLN during prone esophagectomy. It could decrease the RLN paralysis and postoperative hospital stay after esophagectomy.

**P432****Long Term Efficacy of Laparoscopic Nissen Versus Toupet Fundoplication for the Management of Types III and IV Hiatal Hernias**

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**Introduction:** Laparoscopic hiatal hernia repair via partial (Toupet) or complete (Nissen) fundoplication remain the most commonly performed procedures for management of large hiatal hernia. Few studies have compared the procedures' long-term effectiveness with none looking beyond 5 years. This study sought to characterize the efficacy of laparoscopic Toupet versus Nissen fundoplication for types III and IV hiatal hernia using a telephone survey.

**Methods and Procedures:** With IRB approval, a review of all laparoscopic hiatal hernia repairs with mesh reinforcement performed over seven years at a single center by one surgeon was conducted. Patient demographics and perioperative characteristics were recorded. Hiatal hernia was classified per published SAGES guidelines as type III or IV using operative reports and preoperative imaging. Patients with type I or II or recurrent hiatal hernia and patients receiving concomitant procedures were excluded. The GERD-Health Related Quality of Life Survey was administered by telephone no earlier than 18 months postoperatively. Patients responded to items concerning symptom severity using a 5-point scale (0=no symptoms to 5=symptoms are incapacitating to do daily activities). Symptoms surveyed included heartburn (6 items), difficulty swallowing (1 item) and regurgitation (6 items) and reported degree of satisfaction with present condition.

**Results:** A total of 473 patients underwent laparoscopic fundoplication with 179 having type III or IV hiatal hernia that met inclusion criteria; 62 patients underwent Toupet and 117 underwent Nissen fundoplication. Average patient age was 64 years and 63% of patients were female. Cohorts were similar in demographics, comorbidities, and intraoperative factors except an increased number of patients that smoked in the Toupet cohort. Survey was completed by 77 patients (43%); 50 having had Nissen and 27 Toupet. Reasons for survey nonparticipation included inability to contact (90) or declined participation (12). Median time of survey completion after surgery was 54 months in the Nissen cohort and 25 months for the Toupet patients. Median survey responses across all items for both groups was 0 (no symptoms) with no variation between groups. Of patients that had Nissen, 26% reported current PPI use vs. 31% of Toupet patients ( $p=0.486$ ). Patient-reported satisfaction with current condition was similar between groups (67% Toupet, 72% Nissen,  $p=0.351$ ).

**Conclusions:** Surveyed symptoms did not vary between patients receiving laparoscopic Nissen vs. Toupet fundoplication, which may indicate that patients with large type III and IV hiatal hernia undergoing either procedure have similar long term postoperative symptom control.

**P434****Reducing the Incidence of Symptomatic Recurrent Hiatal Hernia: Initial Report of a Novel Technique**

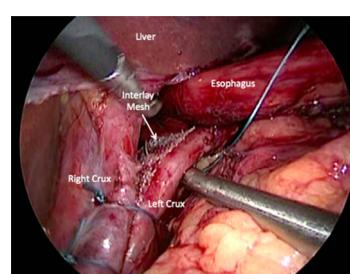
**Pei-Wen Lim, MD, Stephanie Bond, MS, Nicole Cherng, MD, John J Kelly, MD; University of Massachusetts Medical School**

**Background:** Laparoscopic hiatal hernia repair, particularly large type 1 and type 3 hernias, is associated with high recurrence rates. Various use of overlay mesh reinforcement have been described in an attempt to improve outcomes. Unfortunately, overlay use of biologic mesh continues to result in high recurrence rates, and more effective repairs employing permanent mesh raise serious erosion concerns and are therefore rarely used. We theorize that employing an interlay technique with permanent mesh (positioned between both crura) will help enhance crural closure and improve rates of hiatal hernia recurrences with minimal risk of erosion.

**Methods:** We reviewed all patients who underwent a laparoscopic hiatal hernia repair from April 2015 to August 2017 by a single surgeon from a prospectively maintained database at a tertiary care referral center ( $n=72$ ). Patients who underwent surgery for achalasia with concurrent hiatal repair were excluded. During this time frame, a new interlay technique of polypropylene mesh was employed upon suture closure of the crura. Outcomes of repair were retrospectively reviewed. Recurrence of hernia was identified by positive work up of patient's symptoms (new onset dysphagia, GERD, pain).

**Results:** A total of 72 consecutive laparoscopic hiatal hernia repair were reported in a period of 28 months. Interlay polypropylene mesh was utilized in all repairs. Patients were majority females (74.0%), had a median age of 61 and had a mean BMI of 31.3. Eleven (15.0%) patients were redo repairs. Majority of patients received a Nissen fundoplication ( $n=54$ , 75.0%) followed by a toupet fundoplication ( $n=14$ , 19.4%). Median length of stay after surgery was 1 day. Median follow up was 43 days (range: 11–659 days). There were zero reported recurrences.

**Conclusion:** Laparoscopic hiatal hernia repair with interlay polypropylene mesh appears in the short term to be a safe and durable technique to reduce the incidence of hiatal hernia recurrences. Further studies are needed to assess more long term outcomes of this novel technique.



**P435****Comparison of Symptomatic Outcomes Between Patients Undergoing Primary and Reoperative Fundoplication**Zia Kanani<sup>1</sup>, Melissa Helm<sup>1</sup>, Max Schumm<sup>2</sup>, Jon C Gould, MD<sup>1</sup>:<sup>1</sup>Medical College of Wisconsin, <sup>2</sup>UCLA

**Introduction:** Laparoscopic fundoplication remains the current gold standard surgical intervention for medically refractory gastroesophageal reflux disease. Studies suggest that on average 5–10% of patients undergo reoperative surgery due to recurrent, persistent, or new symptoms. The primary objective of this study was to characterize the long-term symptomatic outcomes of primary and reoperative fundoplications in a clinical series of patients who have undergone one or more fundoplications.

**Methods:** Patients who underwent laparoscopic primary or reoperative fundoplication between 2011 and 2017 by a single surgeon were retrospectively identified using a prospectively maintained database. Patients undergoing take-down of a failed fundoplication and conversion to Roux-en Y gastric bypass (for morbid obesity, severe gastroparesis, or 3 or more prior failed attempts) were excluded from the current analysis. All procedures were performed laparoscopically. Patients were asked to complete the validated GERD-Health Related Quality of Life (GERD-HRQL) survey prior to surgery and postoperatively at standard intervals to assess long-term symptomatic outcomes and quality of life. GERD-HRQL composite scores range from 0 (highest disease-related quality of life) to 50 (lowest disease-related quality of life, most severe symptoms).

**Results:** In total, there were 136 (62.4%) primary and 82 (37.6%) reoperative fundoplications that met inclusion criteria. Of the reoperative patients in this series, 67 (81.7%) were undergoing their first reoperative fundoplication and 15 (18.3%) their second reoperative fundoplication. Most primary patients underwent a Nissen (61.0%) while most reoperative patients underwent a Toupet fundoplication (59.8%). Primary fundoplication patients were significantly more likely to be on GERD medications prior to surgery than reoperative patients (92.6% vs. 75.6%;  $p<0.01$ ). There were no conversions to laparotomy and no mortalities. Prior to surgery, GERD-HRQL scores were similar for primary and reoperative patients ( $27.2 \pm 11.4$  vs.  $23.5 \pm 12.9$ ;  $p=0.10$ ). At two years follow-up, primary fundoplication patients had a significantly better GERD-related quality of life compared to reoperative patients (primary  $8.70 \pm 7.77$  vs. reoperative  $14.33 \pm 13.54$ ;  $p=0.02$ ). Prior to surgery, 83.1% of primary patients reported dissatisfaction with their present condition and 87.0% of reoperative patients were dissatisfied. At two years, 12/42 (28.6%) reoperative patients and 7/46 (15.2%) primary patients reported dissatisfaction with their condition ( $p=0.13$ ).

Table 1. Univariate Analyses of Patient Characteristics and Perioperative Information (* $p<0.05$ )			
	Primary Fundoplication n = 136	Reoperative Fundoplication n = 82	p-value
Age (years)	53 (44–63)	56 (45–63)	0.12
Sex-Female	88 (64.7%)	57 (69.5%)	0.47
Body Mass Index (kg/m <sup>2</sup> )	27.2 ± 11.4	23.5 ± 12.9	0.10
GERD-HRQL Composite Score	27.2 ± 11.4	23.5 ± 12.9	<0.01*
Intraop Complications	0 (0%)	1 (1.2%)	0.20
30-Day Postop Complications ≥ 3	3 (2.2%)	1 (1.2%)	0.60
Chronic GERD Medications			
Pre-op EGD Findings			
Hital Hernia	107 (78.7%)	35 (42.7%)	
Slipper Fundoplication			
Both		19 (23.2%)	<0.01*
Esophagus			
Barrett's Esophagus	50 (36.8%)	16 (19.5%)	0.01*
Normal Esophagus	26 (19.1%)	15 (18.1%)	0.88
Length of Hospital Stay (days)	1.73 ± 1.22	2.82 ± 1.57	<0.01*
Operative Time (minutes)	130 ± 65.3	197.9 ± 87.4	<0.01*
Postoperative Gastric Dilatation	11 (8.1%)	7 (8.5%)	0.97
Type of Fundoplication			
Nissen	81 (60.0%)	31 (38.2%)	<0.01*
Toupet	53 (39.0%)	49 (59.8%)	

**Conclusions:** Patients who need to undergo reoperative fundoplication have more severe GERD-related symptoms at 2 years post-op compared to patients undergoing primary fundoplication. However, good outcomes and morbidity rates of laparoscopic reoperation that approximate that of a primary fundoplication are possible in the hands of an experienced surgeon.

**P436****Adenocarcinoma of Duodenum: Surgical or Endoscopic Treatment?**

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**Introduction:** It is well known that the adenocarcinoma of the duodenum (ADC) is a quite rare lesion infact represents 40% of cancer of the small bowel and 30% of these are localized in the peri-ampullary area: 7% affect the sub-papillary tract and only 3% the supra-papillary segment of the duodenum. The ADC may arise from duodenal polyps (familial polyposis, or gardner's syndrome or be associated with coeliac disease).

Until now the treatment was the pancreateoduodenectomy (for anatomo-surgical reasons and for the possibility of regional lymphomere resection).

Infact in my series of 476 of such procedures, 102 were performed for duodenal cancer.

In this last 4 years 18 patients with ADC of supra-papillary segment of the duodenum underwent endoscopic sub-mucosal dissection (ESD).

The purpose of this study were to check the feasibility of the ESD in treating such cases.

In our experience this kind of endoscopic operation was feasible with high complication rate; perforation in 3 cases (0.54%); and bleeding occurred in 1 case (0.18%). All the complications were successfully treated endoscopically and the long-term outcomes was favorable.

Considering the high rate of complications, the difficult and long procedure, the compliance of patients (C02), the general anesthesia, a very skilled endoscopist is needed.

**Conclusions:** The ESD represent a new endoscopic approach established in clinical practice: end is performed following the intraluminal path (3rd space) which, unlike the others, remain virtual and has to be created by dissecting and expanding the tissues layer between the mucosa and the muscularis propria allowing the endoscope to gain access, the benefit of esd for treating the ADC of the supra-papillary segment of the duodenum, according to our experience, must be validate in the future; a pre-operative PET-TAC scan examination must be performed in order to demonstrate the lesion of the duodenum and if there is any lymphatic involvement and no infiltration of the head of the pancreas.

**P437****A Single Institution Experience of Laparoscopic Gastrectomy in Advanced Gastric Cancer: Analysis of Postoperative Morbidities and Long-Term Oncologic Outcomes**

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**Purpose:** This study summarizes the single institution experience of laparoscopic gastrectomy in advanced gastric cancer and evaluates the postoperative morbidities and long-term oncologic outcomes.

**Methods:** A total of 1,597 laparoscopic gastrectomy for advanced gastric cancer were performed at Seoul National University Bundang Hospital between May 2003 and May 2017. The characteristics of patients, surgical techniques, postoperative morbidities, and long-term oncologic outcomes were retrospectively reviewed using electronic medical records.

**Results:** 109 patients required conversion to open surgery. The reasons of conversion to open surgery were advanced stage (n=59), intraoperative bleeding (n=19), adhesion due to previous abdominal operation (n=10), small abdominal cavity (n=4), associated disease (n=4), and intraoperative pleural injury (n=2). The mean hospital stay was 7.0 days for distal gastrectomy, 9.6 days for total gastrectomy, 8.3 days for proximal gastrectomy, and 6.5 days for pylorus preserving gastrectomy. The mean number of collected lymph nodes was 58.7 for distal gastrectomy, 70.1 for total gastrectomy, 43.0 for proximal gastrectomy, and 46.5 for pylorus preserving gastrectomy. The rates of postoperative complications of grade II or more were 9.4 %. There was one case of postoperative mortality due to delayed bleeding after discharge. Old age was the only independent predictor of surgical morbidities. The 5-year overall survival rates were 90.8% in stage IB, 89.7% in stage IIA, 83.1% in stage IIB, 81.1% in stage IIIA, 67.1% in stage IIIB, 57.9% in stage IIIC, and 35.8% in stage IV. The 3-year disease free survival rates were 97.2% in stage IB, 94.1% in stage IIA, 87.2% in stage IIB, 77.5% in stage IIIA, 74.6% in stage IIIB, and 47.8% in stage IIIC. Histologic type, vascular invasion, tumor size, and TNM stage were factors associated with disease free survival rates in the multivariate analysis.

**Conclusion:** Laparoscopic gastrectomy was safe and technically feasible for the treatment of advanced gastric cancer, with acceptable rate of morbidity and mortality.

**P438****Comparison of Open and Laparoscopic Subtotal Gastrectomy with Lymph Node Dissection D2 for Distal Gastric Cancer**

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**Background:** Gastric cancer is common disease in Vietnam. Laparoscopic gastrectomy is widely used to treat early gastric cancer. But for advanced stage, there are many controversies due to no evidence and no long-term results. The aim of this study is to validate the efficacy and safety of laparoscopic subtotal gastrectomy for gastric cancer compared with open gastrectomy.

**Method:** This study was designed as a prospective, non-randomized clinical trial with a total of 622 patients affected gastric adenocarcinoma between July 2008 and June 2017, at University Medical Center, Hochiminh city, Vietnam. Of these, 310 (49.8%) patients were underwent open subtotal gastrectomy (OG), while 312 (50.2%) patients were to the laparoscopic subtotal gastrectomy (LG) group. Demographics, ASA status, pTNM stage, histologic type of the tumor, number of resected lymph nodes, operative time, intraoperative blood loss, postoperative complications, and 5-year overall survival rates were studied to assess outcome differences between the groups.

**Results:** In all patients, the procedures were completed with D2 resection. Laparoscopic subtotal gastrectomy was associated with significantly less blood loss ( $40 \pm 15$  ml in LG vs.  $84 \pm 26$  ml in OG,  $p=0.035$ ) and post-operative hospital stay ( $7.2 \pm 1.1$  days in LG vs.  $8.4 \pm 1.5$  days in OG,  $p=0.042$ ), but with similar operating time compared with the open gastrectomy ( $176 \pm 24$  min in LG vs.  $182 \pm 19$  min in OG,  $p=0.12$ ). No significant difference in the number of lymph nodes dissected was observed between these two groups ( $32.4 \pm 15.3$  in LG vs.  $30.3 \pm 13.4$  in OG,  $p=0.085$ ). All resected margin was negative in the 2 groups. The morbidity and mortality rates of the LG group were comparable to those of the OG group (11.6% vs. 13.5%,  $P=0.065$ , and 0.2% vs. 0.2%,  $P=0.084$ ). Five-year overall survival rates were 65.4% and 63.8% in the LG and OG groups, respectively ( $P=0.09$ ).

**Conclusions:** Laparoscopic subtotal gastrectomy for gastric adenocarcinoma is comparable to the open approach with regard to oncologic principles of resection, with equivalent margin status and adequate lymph node retrieval, demonstrating technically feasibility and equivalent 5-years survival. Additional benefits of decreased blood loss and length of hospital stay make this a preferable approach for selected patients.

**P439****Laparoscopic Transhiatal Approach for Treatment of Esophagogastric Junction Cancer**

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**Purpose:** Laparoscopic transhiatal approach (LA) for esophagogastric junction cancer has advantage in point of providing better view comparing with open approach (OA). In the present study, we focus on the surgical outcomes comparing LA with OA.

**Methods:** A total of 108 patients with Esophagogastric junction cancer who underwent gastrectomy with curative intent at Seoul National University Bundang Hospital between 2003 and 2017 were analyzed. Surgical outcomes were reviewed using electronic medical records.

**Results:** Thirty-seven patients underwent LA, and 71 underwent OA. Compared with OA, LA was associated with significantly less postoperative hospitalization duration (10.1 vs. 14.9 days,  $p=0.019$ ) and extended operation time (251.5 vs. 213.8 min,  $p=0.032$ ). There was no significant difference between LA and OA in intraoperative blood loss (150 vs. 170 ml,  $p=0.631$ ), proximal resection margin (0.8 vs. 0.9 cm,  $p=0.555$ ), or rate of surgical morbidity ( $\geq$ grade 2) for complications (8.1 vs 23.9%,  $p=0.080$ ). There were 2 cases of anastomotic leakage in OA group and no anastomotic leakage in LA group. There was no difference between groups in total number of harvested lymph nodes (58.5 vs. 57.7,  $p=0.889$ ). The 5-year overall survival rate and 3-year disease free survival rate were 81.8% and 79.7% for LA, and 50.7% and 56.1% for OA ( $p=0.024$  &  $0.046$ ). In multivariate analysis, TNM stage was the only independent factor associate with survival.

**Conclusion:** LA for esophagogastric junction cancer appears feasible and safe in short-term or long-term oncologic outcomes.

**P440****Laparoscopic Management of Intrathoracic Stomach with Acute Gastric Volvulus in High-Risk Patient**

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**Background:** Intrathoracic gastric volvulus is a life-threatening condition of paraesophageal hernia. The therapeutic is a challenge because in acute volvulus it may lead to gastric strangulation and necrosis. Most patients are elderly and with a significant associated medical illness which has higher morbidity and mortality of major surgery. We present a laparoscopic surgery is safe in paraesophageal hernia with acute intrathoracic gastric volvulus in a high-risk patient.

**Case Presentation:** An 80-year-old woman with underlying of diabetes mellitus and hypertension was transferred from an outlying hospital with anemia, dysphagia, urinary tract infection and aspiration pneumonia. She had severe recurrent emesis after admission. CT scan of the chest and abdomen revealed a large esophageal hiatal hernia, and most of the stomach was in the inferior mediastinum with organoaxial gastric volvulus. Endoscopy revealed flat pigmented spot gastric ulcer which compatible with Cameron lesion and twisting of gastric folds without evidence of ischemia. The endoscopic reduction was unsuccessful. A laparoscopic surgery was performed and the herniated stomach was successfully reduced. The hernial sac was excised. The crura were approximated and reinforced with composite mesh. Nissen fundoplication was performed along with gastropexy of the greater curve of the stomach to the abdominal wall. There was no peri-operative complication. She tolerated enteral diet on a postoperative day 3. She had an uneventful recovery and discharged in 2 weeks after treatment of her associated medical illnesses. She had no relapse of previous symptoms at her six-month follow-up assessment.



**Discussion:** Endoscopic reduction of acute gastric volvulus may be the first option in a patient with severe comorbidities. However, if there is evidence of ischemia or failure of endoscopic reduction, surgical treatment should be considered. Laparoscopic reduction and gastropexy may be a less-invasive and viable alternative to the more aggressive surgical procedure but definitive surgery with repair hiatal hernia can be done in a selected patient.

**Conclusion:** Minimally invasive treatments of acute gastric volvulus with paraesophageal hernia, either endoscopic or laparoscopic offer the option for reducing morbidity and mortality in elderly with significant comorbidities. The definitive laparoscopic surgery can be accomplished successfully and safely when it is performed with meticulous attention to the surgical technique and perioperative care.

**P441**
**Evaluation of an Enhanced Recovery After Surgery (ERAS) Program on Post-operative Length of Stay Following Laparoscopic Sleeve Gastrectomy**

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**Introduction:** The objective of this study was to evaluate the impact of an Enhanced Recovery After Surgery (ERAS) program on post-operative length of stay following laparoscopic sleeve gastrectomy. ERAS programs have been demonstrated to improve outcomes and decrease length of stay in multiple surgical disciplines however relatively little has been published regarding the impact of ERAS programs in bariatric surgery.

**Methods:** An ERAS program for all patients undergoing bariatric surgery was implemented in February 2017 at a single institution. We retrospectively reviewed all patients undergoing laparoscopic sleeve gastrectomy between February 2017 and August 2017. As a pre-ERAS historical control, we also reviewed all patients undergoing laparoscopic sleeve gastrectomy between January 2016 and December 2016. Baseline patient characteristics, additional concomitant operative procedures as well as 30-day readmission and complication rates were reviewed. Logistic regression analysis was used in univariate and multivariate models to identify factors that predicted early post-operative discharge. Data analysis was completed using Stata 12 SE software (StataCorp LP; College Station, TX).

**Results:** Eighty-five patients underwent laparoscopic sleeve gastrectomy after implementation of the ERAS program while 169 patients were included in the pre-ERAS control group. There were no statistically significant differences in the baseline characteristics between the two groups and there were no differences in the rate of concomitant procedures performed. There was a statistically significant decrease in post-operative length of stay following implementation of the ERAS program from 2.23 (95% CI 2.1, 2.37) days in the pre-ERAS group to 1.84 (95% CI 1.68, 1.99) days in the post-ERAS group ( $p=0.004$ ). There was also a significant increase in patients discharged home on the first post-operative day from 15.4% to 31.8% ( $p=0.002$ ) after beginning the ERAS program. In multivariate logistic regression, the only variable significantly associated with discharge on the first post-operative day was inclusion in the ERAS program (OR 2.57, 95% CI 1.36, 4.84). There were no significant differences in the rates of complications between the pre- and post-ERAS groups. Additionally, there were no complications noted for patients discharged on the first post-operative day and only 1 patient required readmission.

**Conclusion:** This study demonstrates that ERAS programs can significantly reduce length of stay following laparoscopic sleeve gastrectomy without an increase in post-operative complications or readmissions.

Baseline patient characteristics of patients undergoing laparoscopic sleeve gastrectomy			
	Pre-ERAS (n = 169)	Post-ERAS (n = 85)	p-value
Mean age in years	44.5	44.1	0.34
Mean pre-operative BMI in kg/m <sup>2</sup>	47.2	45.9	0.156
Female sex	146 (86.4%)	70 (82.4%)	0.395
Diabetes	50 (29.6%)	23 (27.1%)	0.675
Hypertension	93 (55.0%)	46 (54.1%)	0.89
Hyperlipidemia	45 (26.6%)	24 (28.7%)	0.786
Obstructive sleep apnea	51 (30.2%)	18 (21.2%)	0.128

Post-operative complications within 30 days following laparoscopic sleeve gastrectomy			
	Pre-ERAS (n = 169)	Post-ERAS (n = 85)	p-value
Readmission	14	8	0.763
Surgical site infection	1	0	0.48
Pneumonia	0	0	1
DVT/PE	1	0	0.48
Urinary tract infection	4	1	0.527
Acute kidney injury	6	5	0.389
Bleeding requiring transfusion	5	2	0.792
Reoperation	1	0	0.48

**P442**
**Type II Paraesophageal Hernia: Do They Even Exist or Are They Actually Parahiatal Hernias?**

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**Background:** Type II paraesophageal hernias (PEH) are defined as hernias in which the gastroesophageal junction remains within the abdomen while a portion of fundus herniates into the mediastinum through an attenuated phrenoesophageal membrane. This variety of hernia is described as comprising 8–20% of all PEHs in large published series. However, while Type II hernias are occasionally suspected on pre-operative diagnostic testing, in our experience this is rarely confirmed on intra-operative findings. This led to our question: do Type II PEHs even exist?

**Methods:** We reviewed all PEH repairs performed at the University of Washington Medical Center from 1994 to 2017, excluding Type I and re-operative cases. In addition, we searched for confirmatory evidence of Type II hernias via YouTube and WebSurg websites. Lastly, abstracts from the SAGES annual meetings from 2005 to 2017 were screened for reports of type II PEH.

**Results:** We performed 571 PEH repairs: 2 Type II, 524 Type III and 45 Type IV. However, the 2 Type II's had findings to suggest they may have originally been a parahiatal hernia. Four patients were initially thought to have a Type II hernia pre-operatively, but in fact had a parahiatal hernia (a hernia of fundus or body of the stomach through a separate defect in the diaphragm rather than through the hiatus). A YouTube search yielded 68 search results; of these none represented a true Type II, with 1 video demonstrating a parahiatal hernia. A similar search of WebSurg website revealed one case of a true Type II hernia, though it too may have evolved from a parahiatal. No video or case presentations of a Type II hernia were identified within SAGES annual meeting abstracts.

**Conclusions:** Type II PEH are much less common than reported, and probably less common than the rare parahiatal hernia. Parahiatal hernias may be frequently misidentified as a Type II PEH based on pre-operative imaging, and may have begun as parahiatal hernias that evolved into a single hiatal defect.

**P443**
**Laparoscopic Redo Surgery for Recurrent GERD and/or Hiatal Hernia After Surgery**

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It has been reported that Laparoscopic redo surgery is effective for recurrent GERD and/or hiatal hernia after surgery. However, there has been very few reports from Japan. We report an initial experience of laparoscopic surgery for Japanese patients with recurrent GERD and/or hiatal hernia. Among 177 patients who had undergone laparoscopic fundoplication in our hospital from 1997 to 2016, 15 patients with recurrent GERD/hiatal hernia underwent redo surgery. Preoperative work-up included upper GI series, endoscopy, CT, 24 h pH-impedance and manometry. The patients consisted of 8 women and 7 men with a mean age of 65.8 years. The interval from the initial surgery was 26.7 months (4 days–60 months). The types of initial fundoplication were Nissen: 10, Toupet: 4, Anterior: 1. The types of recurrence were sliding hernia: 11 and paraesophageal hernia: 4. One patient with recurrent sliding hernia had poor gastric motility. Laparoscopic redo surgery was performed on 14 patients. Redo surgery included crural repair with mesh reinforcement: 3, refundoplication: 10 (Nissen–Nissen: 3, Nissen–Toupet: 5, Toupet–Toupet: 1, Toupet–lateral: 1) and reduction of the incarcerated paraesophageal hernia: 1. Additional procedure included mesh reinforcement: 4 and pyloroplasty: 1. Open partial gastrectomy was performed for one patient with incarcerated and strangulated hernia. Operation time was 226 min. 3 patients was converted to open surgery. Oral intake was started on the 1st POD and postoperative stay was 6.5 days. Two patients recurred after redo surgery, one of whom underwent re-redo surgery. During the surgery, IVC was injured but rescued by open surgery. Eleven patients had good outcome and 4 patients required PPI after redo surgery. Our morphological fundoplication score significantly improved after redo surgery. Symptom score and acid exposure time were also significantly improved after redo surgery. Laparoscopic redo surgery for recurrent GERD and/or hiatal hernia after surgery is safe and effective, although attention should be paid during surgery to avoid injury of the adjacent organs.

**P444****Presence of Cameron Ulcers Is Associated with Increased Length of Stay and ICU Admission in Patients Undergoing Hiatal Hernia Repair**

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**Introduction:** Cameron ulcers (CU) are linear erosions or ulcerations in the gastric mucosa at the level of the diaphragmatic hiatus in patients with a hiatal hernia (HH) and are frequently associated with anemia. Perioperative outcomes of patients with CU undergoing HH repair are not well described. We sought to identify the incidence of CU in patients undergoing HH repair at our institution and determine whether the presence of CU impacted postoperative outcomes.

**Methods and Procedures:** Using our IRB-approved institutional HH database, we retrospectively identified patients undergoing repair between January 2011 and April 2017. We identified all patients with CU found on preoperative esophagogastroduodenoscopy (EGD). We compared patients with and without CU to determine if they differed in terms of preoperative anemia (defined as hemoglobin levels less than 13 mg/dL in men and 12 mg/dL in women). Lastly, we compared outcomes between the CU group and the non-CU group, focusing on need for perioperative blood transfusion, failure to extubate postoperatively, intensive care unit (ICU) admission, postoperative complications, length of stay (LOS), and 30-day readmission.

**Results:** We identified 266 patients undergoing HH repair, of which 230 (86%) had documented preoperative EGDs. The average age was 63 years and the majority of patients (78%, n=180) were female. Most underwent elective repair (n=219, 95%) and 96% (n=222) underwent minimally invasive repair. The incidence of CU was 30% (n=69). Patients with CU had significantly greater incidence of preoperative anemia compared to those without (38% vs. 21%, p=0.009). There was no significant difference between groups in rate of perioperative blood transfusion (2.9% vs 1.2%, p=0.38), failure to extubate postoperatively (5.8% vs. 1.2%, p=0.068), postoperative complications (29% vs. 19.9%, p=0.13), and 30-day readmissions (10.1% vs 6.8%, p=0.425). However, the presence of CU was associated with a significant increase in median postoperative LOS (3 days vs. 2 days, p=0.05) and ICU admission (11.6% vs. 3.7%, p=0.03).

**Conclusions:** The presence of CU on preoperative EGD is associated with increased rate of preoperative anemia, increased LOS, and increased ICU admission after HH repair. Although the cause of anemia in patients with HH is commonly attributed to CU, only 38% of CU patients were anemic, indicating that differences in outcomes may not only be attributed to a higher incidence of anemia in CU patients. The implications of CU in patients undergoing HH repair need to be further elucidated.

**P445****Laparoscopic Heller Myotomy as Treatment for Achalasia**

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**Objective:** Aim of this stud was to review our experience with laparoscopic Heller Dor Myotomy. Dysphagia constitutes the main symptom. Diagnosis is performed by means of esophageal manometry.

**Materials and Method:** Over a period of 15 years, 180 patients were treated with Heller myotomy plus Dor fundoplication laparoscopically. All patients had lost weight, and there was a prevalence of females with an average age of 46. Twenty five patients had Chagas disease. They were all assessed with serial X-rays, endoscopy, esophageal manometry, and their symptoms were assessed with a 0–4 score, 4 being the most severe.

**Results:** There was no conversion or mortality. In 3 patients the mucosa was perforated during myotomy. The mucosa was sutured without altering the result of the treatment. Average hospital stay was 36 hours. One patient had to be reoperated because of esophageal perforation with peritonitis. Sixty patients were followed up with manometric control and pH-probe testing, and only 10% of those had pathologic reflux.

**Conclusions:** Laparoscopic treatment of achalasia is possible and reproducible, while reducing the morbility of laparotomy with relieve of patients symptoms.

**P446****Laparoscopic Hiatal Hernia Repair with Anterior or Lateral Fundoplication**

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**Background:** Tailored fundoplication according to the esophageal motility is not indicated in recent guideline during laparoscopic hiatal hernia repair, however, dysphagia after surgery is still a crucial matter which might cause aspiration pneumonia especially in elderly patients. We have introduced laparoscopic hiatal hernia repair with anterior or lateral fundoplication for elderly patients with hiatal hernia to minimize dysphagia and evaluated the outcome.

**Surgical Technique:** After the crus was approximated posteriorly±anteriorly, anterior 90–180 degree fundoplication or lateral fundoplication was performed according to the age and the symptom of the patient. Onlay mesh was used only for patients with vulnerable hiatus.

**Patients and Methods:** From May 1997 to August 2017, a total of 182 patients with GERD and/or hiatal hernia underwent laparoscopic repair in our hospitals. Preoperative work up included esophagogram, endoscopy, CT, 24 h pH and impedance and manometry (selected patients). Nissen or Toupet was indicated for patients aged <75 and/or with severe to moderate reflux symptom. Anterior fundoplication was indicated for patients aged 70–85 years with mild reflux and/or dysphagia. Lateral fundoplication was indicated for patients aged over 80 with dysphagia and/or had a history of aspiration pneumonia. Symptom score and clinical outcome were evaluated.

**Results:** The type of fundoplication was as follows: Nissen: 70, Toupet: 69, Anterior: 28, lateral: 15. Operation time was 141±44.3 min and hospital stay was 9.1 days. There was no mortality. Conversion to open surgery was required on one patient. Symptom scores of heart burn, dysphagia and regurgitation were significantly improved both after anterior and lateral fundoplication. LES pressure (from 1.0 to 14.8 mmHg, p=0.0032), LES length (from 1.1 to 2.9, p=0.0021) and DeMeester score (from 27.2 to 2.4, p=0.0018) were significantly increased or improved after anterior fundoplication. In 88 patients with paraesophageal hernia, dysphagia (2/40 vs 6/48, p=0.283), esophagitis (4/48 vs 2/40, p=0.448), hernia recurrence (5/48 vs 4/40, p=1.00) and reoperation (6/40, vs 1/40, p=0.121) after anterior or lateral fundoplication were comparable to those after Nissen or Toupet fundoplication. There was no pneumonia after surgery. Anterior fundoplication showed excellent antireflux effect in 24 h pH and impedance monitoring although the number of patients was small.

**Conclusion:** Laparoscopic hiatal hernia repair with anterior or lateral fundoplication has feasible outcome and can be a option of fundoplication for elderly patients with dysphagia.

**P447****Exploring Pyloric Dynamics in Stenting - Using a Distensibility Technique**

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**Introduction:** Stent treatment in the gastrointestinal tract is emerging as a standard therapy for overcoming strictures and sealing perforations. We have started to treat patients with perforated duodenal ulcers using a partially covered stent and external drainage achieving good clinical results. Stent migration is a serious complication that may require surgery. Pyloric physiology during stent-treatment has not been studied and mechanisms for migration are unknown. The aims of this study were to investigate the pyloric response to distention mimicking stent-treatment, using the EndoFLIP, investigating changes in motility patterns due to distention at baseline, after a pro-kinetic drug and after food ingestion.

**Methods:** A non-survival study in five pigs was carried out, followed by a pilot study in one human volunteer. A gastroscopy was performed in anaesthetized pigs and the EndoFLIP was placed through the scope straddling the pylorus. Baseline distensibility readings were performed at stepwise balloon distention to 20 ml, 30 ml, 40 ml and 50 ml, measuring pyloric cross sectional area and pyloric pressure. Measurements were repeated after administration of a pro-kinetic drug (Neostigmin) and after instillation of a liquid meal. In the human study readings were performed in conscious sedation baseline and after stimulation with metoclopramide.

**Results:** During baseline readings the pylorus was shown to open more with increasing distention, together with higher amplitude motility waves. Reaching maximum distention-volume (50 ml), pyloric pressure increased significantly (p=0.016) and motility waves disappeared. After pro-kinetic stimulation pyloric pressure decreased and motility waves increased in frequency and amplitude at 20, 30 and 40 ml distentions. After food stimulation pyloric pressure stayed low and motility waves showed increase in amplitude at distentions of 20, 30 and 40 ml. During both tests the pylorus showed higher pressure and lack of motility waves at maximum probe distention of 50 ml. Similar results were found in the human study.

**Conclusions:** The pylorus seems to act as a sphincter at low distention but when further dilated starts acting as a peristaltic pump. When fully distended, pyloric motility waves almost disappeared and the pressure remained high, leaving the pylorus open and inactive.

Stent placement in the pylorus results in pyloric distention, possibly changing motility. This study indicates that a duodenal stent placed over the pylorus should have a high radial force in the pyloric part in order to dilate the pylorus and diminish the contraction waves, this might reduce stent migration.

**P448****Early Experience of Solo Single-Incision Distal Gastrectomy: A Review of Consecutive 100 Cases**

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**Introduction:** Cutting-edge technology in the field of minimal invasive surgery allows the application of single-incision laparoscopic surgery on gastric cancer. However, single-incision distal gastrectomy (SIDG) is still technically difficult due to limited range of motion and unstable field of view—even in the hands of an experienced scopist. Solo surgery using a passive scope holder may be the key in allowing SIDG to be safer and efficient. We report our initial experience of 100 consecutive cases of solo SIDG.

**Methods:** Prospectively collected database of 100 patients clinically diagnosed as early gastric cancer who underwent solo SIDG from October 2013 until July 2016 were analyzed. All the operations were held by a single surgeon and a scrub nurse. A passive laparoscopic scope holder was controlled by the surgeon to fix the field of view.

**Results:** The mean operation time (SD) was 122.8 ( $\pm 34.9$ ) min, and the average estimated blood loss was  $30.5 \pm 57.0$  mL. Average body mass index was  $23.4 \pm 2.9$  kg/m $^2$ . The median hospital stay (range) was 5 (4–14) days, and the mean number of retrieved lymph nodes was  $56.0 \pm 22.8$ . There was no conversion to multiport or open surgery. Early postoperative complication occurred on 7% with three delayed gastric emptying, two postoperative pneumonia, one pancreatitis, and one wound complication.

**Conclusion:** Solo SIDG using a passive scope holder allows SIDG to become more feasible by providing a stable field of view.

**P450****The Impact of Vagal Nerve Integrity Testing in the Surgical Management of Patients with Postsurgical Gastroparesis**

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**Background:** Thoracic and gastric operations can cause vagal nerve injury, either accidentally or intended. The most common procedure, which can lead to such an injury, includes fundoplication, lung or heart transplantation and esophageal or gastric surgery. Patients may present with minimal symptoms or some degree of gastroparesis. Gastric paroxysms of include nausea, vomiting, early satiation, bloating and abdominal pain. If these symptoms occur and persist, the clinician should have a high suspicion of a possible vagal injury. Investigative studies include endoscopy, esophageal motility, contrast imaging and often nuclear medicine gastric emptying studies (GES). However, GES in the post-surgical patient have limited sensitivity and specificity. If a vagal nerve injury is encountered, subsequent secondary operations must be planned accordingly.

**Methods:** From January 2014 to August 2017, patients who had a previous surgical history of a foregut operation, with the potential risk of a vagal nerve injury, had vagal nerve integrity (VNI) test results reviewed. VNI test was measured indirectly by the response of plasma pancreatic polypeptide to sham feeding. The data collected and analyzed included age, gender, previous surgical procedures, clinical presentation, results of VNI testing and the secondary procedure planned or performed. VNI testing was compared to other testing modalities to determine if outcomes would have changed.

**Results:** Eight patients (5 females) were included. The age ranged from 37 to 73 years. Two patients had prior lung transplantation and six patients had prior hiatal hernia repair with fundoplication. Seven patients presented with reflux and delayed gastric emptying symptoms. One lung transplantation patient had no symptoms but his lung biopsy pathology showed chronic micro-aspiration with rejection. The VNI testing results were compatible with vagal nerve injury in 6 patients. According to these abnormal results, the plans for Nissen fundoplication in 2 patients were modified by an additional pyloroplasty and the plans for redo-Nissen fundoplication in 4 patients were changed to redo-Nissen fundoplication plus pyloroplasty in 1 patient and partial gastrectomy with Roux-en-Y reconstruction in 3 patients. The operative plans in 2 patients with a normal VNI test were not altered. All patients that had secondary surgery had improvement in symptoms and/or improvement in objective tests (no signs of rejection).

**Conclusion:** The addition of VNI testing in patients with previous potential risks of vagal nerve injury may help the surgeon select the appropriate secondary procedure.

**P449****Peri-operative Outcomes After Elective and Emergent Repair of Giant Para-esophageal Hernia in the Modern Era - Should Early Laparoscopic Repair Be Offered More Liberally?**

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**Introduction:** Historically, surgery was offered to all patients with giant paraesophageal hernia to avoid the risks of gastric volvulus and incarceration. A paradigm shift occurred 15 years ago when decision-model analysis showed watchful waiting to be superior to elective laparoscopic repair (LPEHR) for elderly and minimally symptomatic patients due to high rates of morbidity and mortality with elective surgery. Recent reports suggest modern era outcomes have improved, such that elective repair may now be favorable for more patients. Furthermore, the morbidity of emergency surgery may still be significant.

The objectives of this study were to compare modern-era surgical outcomes after elective and emergency repair of giant paraesophageal hernias at a high volume tertiary care center.

**Methods:** A retrospective review was conducted of all Type II–IV paraesophageal hernia repairs performed between Jan 1, 2012 and Sept 15, 2017. Type I hiatal hernias (HH), HHs after esophagectomy, and cases with planned simultaneous procedures other than cholecystectomy were excluded from the final analysis. Comparisons between groups were made using t-test for continuous variables and chi squared test for categorical variables. Multiple logistic regression was used to identify independent risk factors for morbidity.

**Results:** A total of 309 cases were reviewed of which 194 met inclusion criteria (17 emergency, 177 elective). Eight had Type II PEH, 141 had Type III, and 45 had Type IV. Emergency patients were older [78 (SD12.8) vs 70 (SD10.6) years; p=0.003], more comorbid (ASA $\geq 3$ : 94% vs 33%, p<0.0001), and more likely to undergo gastrostomy tube insertion (23.5% vs 0%, p=0.003). Mean length of stay was shorter in the elective group: 2 (SD2.8) vs. 11 (SD17.7) days, p<0.0001, and emergency patients were less likely to return directly to their original residence at discharge (70.6% vs 99.4%, p<0.0001). There were significantly more major complications (Clavien-Dindo score  $\geq 3$ ) in the emergency group (29.4% vs 5.6%, p=0.006). Type of PEH, conversion to open, operative time, blood loss, splenectomy, gastric perforation, 30-day ER visits, readmission and re-operation rates were similar between groups. There were no peri-operative deaths in either group. In the elective group, age was not an independent risk factor for complications (OR 1.05, 95% CI 0.98–1.12).

**Conclusions:** The incidence of major complications and mortality in this series were much lower than those previously reported for elective LPEHR, while morbidity after emergency repair remains high. The paradigm of watchful waiting for elderly and/or minimally symptomatic patients with giant PEH should be revisited.

**P451****Take It or Leave It: Myotomy First Approach to Epiphrenic Diverticula**

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**Background:** Epiphrenic diverticula are a challenging surgical problem. Resection of these diverticula carries a reported leak rate from 5 to 24% (Brandeis et al. 2017). Post operative esophageal leak is a morbid, high risk complication. Some small reviews have published promising results with myotomy alone, however this approach has been limited to small or un-resectable diverticula (Allax et al. 2015). We present a single-center experience with a "Myotomy first" approach for all patients, regardless of diverticular size. The hypothesis is that cardiomyotomy alone will provide satisfactory symptom abatement in some patients. And MIS Cardiomyotomy causes minimal scarring, so a staged MIS diverticulectomy is feasible at a later date if diverticular retention/stasis continues. In order to discuss this treatment algorithm we present our experience with cardiomyotomy alone for patients with epiphrenic diverticula.

**Methods:** The electronic medical record was queried for patients with esophageal diverticula who were managed with cardiomyotomy and Dor fundoplication alone. Pre and post-operative reflux/dysphagia questionnaires were gathered; imaging studies, operative data, complications and follow up were reviewed.

**Results:** From March of 2016 until the present, 7 patients with esophageal diverticula were treated using the "myotomy first" approach. Intraoperative Esophagoscopy was done to internally visualize the elimination of the inciting spastic esophageal muscle. Preoperatively, all patients complained of regurgitation, followed by Dysphagia in 6 (85%) and Weight loss 3 (42%). Postoperatively, dysphagia and weight loss resolved in all subjects. Regurgitation symptoms resolved in 6 (85%) patients. The average size of the diverticula was  $22.7 \text{ cm}^2$ , the range was  $2\text{--}62 \text{ cm}^2$ . Post operative esophagram's showed persistent diverticulum, however most had decreased in size. There were no perioperative complications, average length of stay was 2.1 days and there were no ICU admissions or returns to the OR. The average length of follow up for these patients was 116 days where all patients reported being satisfied with their results and none of them have yet desired to pursue diverticulectomy.

**Discussion:** A "Myotomy first" approach resulted in excellent short term symptomatic control. None of the 7 have retained or re-experienced symptoms of diverticular retention worthy of surgical intervention. In the age of laparoscopic surgery, an esophageal epiphrenic diverticulectomy should be staged. This step wise approach seeks to assure surgical necessity for a morbid endeavor.



**P452****The ‘Cocoon’ Effect of an Omental Wrap in Maturing Gastro-Oesophageal Anastomosis: Comparative Case-Series Lap-Assisted vs Open Oesophagectomy for Oesophageal Cancers**

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**Background:** The two-stage oesophagectomy (Ivor-Lewis procedure) remains the mainstay of curative surgery for oesophageal cancers in the UK. Gastro-oesophageal anastomotic leak is a potentially devastating complication of this procedure affecting perioperative morbidity and mortality. Although the leak rates have improved over the years, it still remains widely variable. Intraoperative reinforcement of gastro-oesophageal anastomosis with an ‘omentum wrap’ has been proposed as a measure to reduce anastomotic leak rates. There is some data to suggest that this additional technique reduces anastomotic leak. We reviewed our single institution data to assess if the omental wrap indeed had a ‘cocoon’ effect in maturing the anastomosis and reducing leak rates.

**Methods:** Data for all cancer oesophagectomies (ILOG) performed in our institute since April 2013–17 was retrospectively analysed from a prospectively maintained database. The patients were categorised into two groups. Group A: those who underwent conventional open ILOG and Group B: those who had a laparoscopically assisted (abdominal phase) ILOG with an omental wrap reinforcement of the anastomosis during the thoracic phase.

The primary outcome was the anastomotic leak rates. Secondary outcomes included perioperative complications, 30-day mortality, post-op recovery and length of hospital stay.

**Results:** Both Group A (n=113) and Group B (n=52) were identical with regards to age at surgery (median 65 vs 68, p=0.080); Sex (% male 85 vs 77, p=0.208); history of smoking (p=0.521), and preoperative co-morbidities, fitness state (p>0.05). The BMI (median 27.9 vs 24.9, p=0.004) and ASA physical status Grade-3 (46.6% vs 28.8%, p=0.035) for Group A was significantly higher than Group B.

The anastomotic leak rate was significantly higher in Group A in comparison to Group B in which no patient developed anastomotic leak (17/113 vs 0/52, p=0.003). Similarly chest infections were also higher (47.8% vs 28.8%, p=0.027). Other morbidity such as reoperation, chyle leak, pulmonary embolism and 30-day mortality rate were similar in both groups. The median (IQR) length of stay was significantly higher for Group A 11 (9–19) vs Group B 9 (9–14) days p=0.038.

**Conclusions:** Our results have demonstrated significant improvement in the anastomotic leak rates, chest infections and hence faster post-op recovery for patients, with the addition of an omental wrap to reinforce the anastomosis. Shorter hospital stay in turn has cost-benefit implications to health care providers. A formal RCT to prove or disprove potential benefits of the wrap technique may be worth pursuing to inform current surgical practice.

**P453****Impact of the First Assistant in Laparoscopic Distal Gastrectomy**

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**Background:** In laparoscopic surgery, both surgical technique and adequate support and traction by an assistant are highly important. This study assessed the impact of the first assistant on short-term outcomes of laparoscopic distal gastrectomy (LDG) and laparoscope-assisted distal gastrectomy (LADG).

**Methods:** Patients who underwent LDG or LADG for gastric cancer at our hospital, between November 2013 and August 2017, were included. LDG and LADG cases of Billroth I reconstruction, performed by a single surgeon accredited in endoscopic procedures, were analyzed. The cases were categorized into the following 4 groups according to the first assistant's postgraduate years (PGY) of experience: group A, 3–5 years; group B, 6–10 years; group C, 11–15 years; and group D, >10 years. Short-term outcomes were compared between the groups.

**Results:** We examined 48 cases. Operative time was significantly longer in group A than in group B (P=0.029). No significant differences in operative time were found between groups B, C, and D. The cases were recategorized into 2 groups as follows: group A, the young assistant group (group Y, n=8), and groups B, C, and D, the senior assistant group (group S, n=40). Significant differences in operative time and method of anastomosis (circular stapler or delta anastomosis) were observed between the 2 groups (P=0.0054 and P=0.0028, respectively), but no significant differences in complication rates were found (P=1.0000). The unadjusted analysis revealed that the group, method of anastomosis, and body mass index (BMI) were significant factors associated with longer operative time. Multivariate linear regression analysis with stepwise model selection using Akaike's information criterion (AIC) revealed that BMI and group were significant factors associated with longer operative time (P=0.0075 and P=0.0024, respectively). Multivariate analysis using these 2 variables and the method of anastomosis confirmed the significance of BMI and group for longer operative time, but no significance was found in the method of anastomosis (P=0.0088, P=0.021, and P=0.51, respectively).

**Conclusions:** Our study showed that operative time tended to be longer when the first assistant had experience of less than 6 PGY, but the morbidity did not increase. As with the operator, the first assistant needs adequate training to ensure a smooth operation.

**P454****Using Magnetic Sphincter Augmentation for Treatment of Extra-esophageal Symptoms**

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**Background:** Gastric contents can reach beyond the esophagus into the larynx and pharynx causing an increasingly prevalent disease called laryngopharyngeal reflux (LPR). Magnetic sphincter augmentation (MSA) has been used as an alternative treatment for GERD with good success, but there is no data to support its use in LPR.

**Methods:** Forty-five patients with MSA implants for symptomatic relief with both GERD and LPR symptoms were examined. All patients experienced at least one typical GERD symptom as well as at least one extra-esophageal symptom. This was assessed using the GERD-HRQL which is 15 questions graded 1–5 on each question, and Reflux Symptom Index (RSI) which is 9 questions graded 1–5 on each question. Patients filled out questionnaires preoperatively, one month post-operatively (early follow up), and at 6 months to 1 year postoperatively (late follow up). The responses on the GERD-HRQL were clustered into questions inquiring about heartburn (6), dysphagia (2), and regurgitation (6).

**Results:** Of 45 patients, there were 39 available for preoperative scoring with a GERD-HRQL mean of 3 for heartburn, 2.6 for regurgitation, and total score of 39.3 At early follow up for 33 patients, 0.3 for heartburn, 1.3 for dysphagia, 0.3 for regurgitation, and total GERD-HRQL score of 6.3. At late follow up for 19 patients, 0.3 for heartburn, 1.1 for dysphagia, 0.2 for regurgitation, and total GERD-HRQL score of 5.2. The RSI questions were separated to evaluate each individual symptom. This showed an obvious downturn of all typical, as well as LPR symptoms, pre and postoperatively. The total RSI score for 41 patients was 22.5, at early follow up 7.6 in 26 patients, and late follow up of 8.8 in 20 patients. Subset analysis of hoarseness and cough were done for the questions on the RSI corresponding to each symptom. Preoperative mean scores of 21 patients reporting hoarseness was 3.5, and in late follow up was 0.9. Preoperative mean scores in 19 patients that reporting chronic cough was 3.1, and in late follow up was 1.0. Further subset analysis showed almost complete resolution of symptoms in patients following MSA implantation for a chief complaint of hoarseness and chronic cough.

**Conclusion:** Although MSA has historically been used to treat GERD, it appears to be an effective treatment for control of LPR symptoms.

**P455****Lower Thoracic Esophagectomy, Lymphadenectomy of Lower Mediastinum and Anastomosis in VATS-E for Esophago-Gastric Junction Cancer**

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**Introduction:** The number of esophago-gastric junction (EGJ) cancer case is increasing in Japan year by year. The aim of this study is to clarify the safe and adequate VATS-E procedure for lymph nodes (LN) dissection and anastomosis for EGJ cancer.

**Background:** The 14% of lower mediastinal LN metastasis or recurrence was found in totally 29 consecutive patients with EGJ cancer from 1999 to 2005 in our Hospital. Widespread LN metastasis from squamous cell carcinoma (SCC) was found in neck, mediastinum and abdomen, and abdomen from Adenocarcinoma (ADC). Frequent LN metastasis from Adenocarcinoma (ADC) was found in abdomen.

**Methods:** For Siewert type I, EGJ cancer, we performed the same VATS-E operation for the esophageal cancer.

**Patients:** For Siewert type II, EGJ cancer right thoraco-laparo consecutive incision and trans-thoracic esophagectomy was performed from 2007 to 2012 (n=3). For minimally invasive surgery, VATS-E and laparoscopic or open proximal gastrectomy for EGJ cancer are performed from 2014 (n=11). Three ports are used at the 7th, 9th and 5th intercostal space (ICS) for VATS-E and lower thoracic esophagectomy and lower mediastinal LN dissection were performed with pneumothorax by maintaining CO<sub>2</sub> insufflation. Esophago-gastric anastomosis are created by functional end to end anastomosis or orvil system in the chest.

**Results:**

- There are no complication except for a case with minor anastomotic leakage in VATS-E.
- Wide operative field is available in the chest for lymph-node dissection of lower mediastinum and anastomosis for EGJ cancer in VATS-E.

**Conclusion:** VATS-E allows us to perform the feasible and safe reconstruction as well as mediastinal LN dissection.

**P456****Laparoscopic Hiatal Hernia Repair; Making the Complex Routine Over 250 Cases**

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**Introduction:** Laparoscopic techniques have made hiatal hernia repair a more popular procedure. Like all surgical fields there is a push towards standardization of the post operative course while maintaining safe practices. Other surgical fields have streamlined recovery processes in an effort to standardize care and minimize costs. Laparoscopic hiatal hernia repair is a complex procedure, but with experience and a team approach, this operation can become a streamline process.

**Methods:** A retrospective review was done for over 250 laparoscopic hiatal hernia repairs at a single institution. Aspects of post operative care such hospital floor, nursing ratio utilized, pain medication, diet advancement, use of foley catheters and length of hospital stay were tracked. Statistical analysis was done to compare utilization of resources as years went on along with complications and readmissions.

**Results:** A total of 258 hiatal hernias were performed between 2011 and 2017. Improvements were noted in nearly every field over time, including faster foley removal, decreased length of hospital stay, decreased use of patient controlled analgesics (PCAs) and faster advancement of diet. Furthermore these patients are now treated on a surgical floor rather than the intensive care unit or step down with a higher nurse to patient ratio, decreasing hospital cost. There were no changes in complications, reoperations or readmissions over the course of the study.

**Conclusions:** Cost, length of stay and so called “advanced recovery pathways” are all the rage in the surgical literature. Anytime a procedure and its post operative course can become less of a “major undertaking” and more routine, the more streamline it becomes. This comes from making a standard protocol that descales treatment based on what is actually needed. Nearly every aspect of post operative care was simplified; length of stay and cost to the hospital was decreased while no additional complications or readmissions were accrued. The foundation of a formalized advanced recovery pathway will be implemented from these factors which were studied.

**P457****Linx Device After Laparoscopic Sleeve Gastrectomy: A Cautionary Tale**

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**Background:** The obesity epidemic continues to worsen. Bariatric surgery remains the most effective way to achieve weight loss and resolution of comorbidities. Laparoscopic sleeve gastrectomy has become the most common bariatric operation due to excellent efficacy and low morbidity and mortality. The most common complication of sleeve gastrectomy is gastroesophageal reflux disease (GERD), which can adversely impact the quality of life and lead to additional esophageal complications. Recently, esophageal magnetic sphincter augmentation (LINX®) has become an acceptable alternative to fundoplication for certain patients with GERD. The use of LINX® in patients who previously underwent laparoscopic sleeve gastrectomy was described in a case series in 2015. The known complications of these devices include dysphagia, need for endoscopic dilation, and device erosion. The complication profile of LINX® in the setting of sleeve gastrectomy has not been reported heretofore.

**Methods:** We present a case of a patient with prior sleeve gastrectomy who received a LINX® device one year after her bariatric operation due to severe GERD refractory to medical management. Initial evaluation demonstrated a hypotensive lower esophageal sphincter and hiatal hernia, but no evidence of stricture or twisting. Soon after LINX® implantation, the patient developed progressive dysphagia and worsened reflux. Repeat evaluation showed esophagitis, a moderate stricture with angulation at the incisura, and a large amount of retained food.

**Discussion:** The patient was recommended conversion to Roux-en-Y gastric bypass, but was deemed to be a poor candidate due to heavy smoking. Thus, laparoscopic removal of the LINX® device was performed with hiatal hernia repair and gastric stricтурoplasty. Post-operative fluoroscopic evaluation revealed improvement in the stricture, but persistent gastroesophageal reflux. The patient experienced a significant improvement in her symptoms of dysphagia, nausea, and vomiting. However, once smoking cessation is achieved, she may still need a conversion to Roux-en-Y gastric bypass in order to address persistent GERD.

**Conclusion:** Conversion to Roux-en-Y gastric bypass remains the standard approach to treatment of GERD post sleeve gastrectomy. New approaches to this problem, including placement of LINX®, are promising but have not been evaluated for long-term safety and efficacy in the setting of prior bariatric surgery. Careful diagnostic evaluation prior to placement of magnetic sphincter augmentation device should be routinely undertaken. Postoperatively, close long-term follow up is imperative, particularly in patients with prior sleeve gastrectomy. Presence of LINX® in a patient with prior bariatric surgery may lead to worsening symptoms if complications of initial operation are present.

**P458****Effect of Preoperative Clearance Rate of the Esophagus for Surgical Outcomes in Patients with Esophageal Achalasia**

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**Background:** Esophageal achalasia is one of the primary esophageal motility disorders, and the patients suffer from dysphagia, vomiting and chest pain. Timed barium esophagogram (TBE) is a convenient method to assess esophageal clearance, which we usually performed before and after surgery. Meanwhile, laparoscopic Heller-Dor operation (LHD) has been considered worldwide as a gold standard for the surgical management of esophageal achalasia. The aim of this study is to examine the effect of preoperative clearance rate at the lower part of the esophagus on surgical outcomes in patients with esophageal achalasia.

**Patients and Method:** Between August 1994 and April 2017, patients who underwent LHD at our institution were extracted from the database. Out of 557 patients, 398 patients met our inclusion criteria; such as the patients who underwent LHD as an initial operation with complete evaluation with preoperative esophageal clearance by TBE. These patients were divided into three groups by the degree of esophageal clearance (Group A: clearance rate <10%, Group B: 10%? clearance rate <50%, and Group C: 50%? clearance rate). Patients' background, pre- and post-operative symptom scores, and surgical results were compared. Before and after surgery, the standardized questionnaire was used to assess the degree of frequency and severity of symptoms (dysphagia, vomiting, chest pain and heartburn). Moreover, satisfaction with operation was evaluated using the standardized questionnaire. Statistical analysis was performed by using Kruskal-Wallis test or chi-square test, and p-value less than 0.05 was defined as statistically different.

**Results:** Their mean age was 44.3 years and 204 of them were male (51.3%). One hundred and sixty-eight patients (42.2%) were in Group A, 149 (37.4%) in Group B, and 81(20.4%) in Group C. The maximum width of the esophagus in Group C was smaller than that in other groups ( $p=0.0258$ ). As to the pre-operative symptom score, the frequency score of dysphagia was significantly lower in Group C ( $p=0.026$ ), whereas the severity score of chest pain was significantly higher in Group C ( $p=0.0465$ ). Surgical outcomes including the incidence of mucosal injury were not different among the groups. Moreover, the patient satisfaction with LHD was excellent regardless of preoperative esophageal clearance.

**Conclusion:** Preoperative clearance rate at the lower part of the esophagus in patients with esophageal achalasia did not affect the surgical outcomes of LHD, but the characteristics of preoperative symptoms in patients with poor esophageal clearance was low dysphagia and high chest pain.

**P459****Outcomes of Anti-reflux Procedures in Adolescents**

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**Introduction:** Persistent gastroesophageal reflux disease is one of the most frequent indications for abdominal surgery in children, usually in the form of Nissen fundoplication. While outcomes of anti-reflux procedures have been well described in young children and adults, few studies have focused on the adolescent population. The aim of this study is to examine complications, 30-day readmission rates and rates of reoperation in adolescents who have undergone anti-reflux procedures.

**Methods and Procedures:** With institutional review board approval, the New York Statewide Planning and Research Cooperative System database was queried for patients ages 12–17 with ICD-9 procedural codes for anti-reflux procedures between 1995 and 2010. Patients with diagnostic codes for esophageal reflux, esophagitis or hiatal hernia were included; diagnoses of esophageal malignancy, achalasia or obstructed/gangrenous diaphragmatic hernia were excluded. Patient demographics, comorbidities, and complications were identified. 30-day readmission rates and redo anti-reflux procedures were determined from revisit records through 2014. Chi-square tests were utilized to examine the marginal association between categorical variables and having reoperation/30-day readmission.

**Results:** Five hundred-six adolescents underwent anti-reflux procedures between 1995 and 2010. One patient died and was excluded from further analysis. Patients were mostly male (60.8%), white (65.0%) and insured privately (66.7%). Most (63.4%) patients had at least one comorbidity, including paraparesis (30.5%), neurologic disorders (30.7%), and chronic pulmonary disease (23.2%). Sixty-two patients (12.3%) were readmitted within 30 days. Patients' race ( $p<0.005$ ), geographic region ( $p<0.0005$ ) and insurance status ( $p<0.01$ ) were significantly associated with 30-day readmission. The presence of any comorbidity was predictive of 30-day readmission ( $p<0.0001$ ), including paraparesis ( $p=0.001$ ) or other neurological disorders ( $p<0.0001$ ), obesity ( $p<0.05$ ) and deficiency anemia ( $p<0.005$ ). Similarly, the presence of any complication was associated with 30-day readmission ( $p<0.0001$ ), including reoperation for hemorrhage ( $p<0.05$ ), intestinal complications ( $p<0.0001$ ), bacterial infection ( $p=0.0001$ ), respiratory complications ( $p<0.0001$ ) and cardiac arrest ( $p<0.01$ ). Twenty-five patients (5.0%) underwent repeat anti-reflux procedures, with a mean time to reoperation of 706.8 (SD 632.8) days. The only identified risk factor for reoperation was the presence of a coagulopathy ( $p<0.05$ ).

**Conclusions:** Demographics play a substantial role in the outcomes of adolescents undergoing anti-reflux procedures. These patients have a high incidence of comorbid conditions and complications which are associated with readmission. Failure of anti-reflux procedures necessitating eventual reoperation occurs in a considerable number of patients.

Comorbidities	30-day readmission		Reoperation		
	Total (N=505)	(N=62)	p-value	(N=25)	p-value
Any	320 (63.4%)	56 (90.3%)	<0.0001	12 (48.0%)	0.10
Valvular Disease	6 (1.2%)	0 (0.0%)	0.61	0 (0.0%)	1
Paralysis	154 (30.5%)	30 (48.4%)	0.001	6 (24.0%)	0.47
Other neurological disorders	155 (30.7%)	34 (54.8%)	<0.0001	5 (20.0%)	0.23
Chronic pulmonary disease	117 (23.2%)	14 (22.6%)	0.91	4 (16.0%)	0.46
Coagulopathy	6 (1.2%)	2 (3.2%)	0.16	2 (8.0%)	0.03
Obesity	11 (2.2%)	4 (6.5%)	0.03	1 (4.0%)	1
Weight loss	39 (7.7%)	6 (9.7%)	0.54	1 (4.0%)	0.70
Fluid/electrolyte disorders	38 (7.5%)	7 (11.3%)	0.23	2 (8.0%)	1
Deficiency Anemias	13 (2.6%)	5 (8.1%)	0.004	1 (4.0%)	1
<b>Complications</b>					
Any	152 (30.1%)	39 (62.9%)	<0.0001	8 (32.0%)	0.83
Hemorrhage	6 (1.2%)	1 (1.6%)	1	0 (0.0%)	1
Hemorrhage w/ reoperation	3 (0.6%)	2 (3.2%)	0.04	0 (0.0%)	1
Ventilation	40 (7.9%)	18 (29.0%)	<0.0001	0 (0.0%)	0.24
Tracheostomy	29 (5.7%)	13 (21.0%)	<0.0001	0 (0.0%)	0.39
Pneumonia	94 (18.6%)	23 (37.1%)	<0.0001	4 (16.0%)	0.80
Respiratory failure	42 (8.3%)	18 (29.0%)	<0.0001	0 (0.0%)	0.16
Atelectasis	34 (6.7%)	9 (14.5%)	0.009	2 (8.0%)	1
Cardiac arrest	4 (0.8%)	3 (4.8%)	0.007	0 (0.0%)	1
Bacterial infection	20 (4.0%)	8 (12.9%)	0.0001	1 (4.0%)	1
Intestinal	12 (2.4%)	7 (11.3%)	<0.0001	1 (4.0%)	1
Surgical error	26 (5.1%)	5 (8.1%)	0.27	1 (4.0%)	1

**P462****Clinical and Nutritional Outcomes of Laparoscopic Proximal Gastrectomy Reconstructed with Double-Flap Technique for Early Gastric Cancer Located at the Upper Third of the Stomach or Esophagogastric Junction**

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**Background:** Proximal gastrectomy (PG) is indicated for gastric cancer located at the upper third of the stomach or esophagogastric junction (EGJ) to preserve gastric function. However, gastroesophageal reflux (GER) is a serious problem after surgery. We have introduced esophagogastrostomy with double-flap technique (DFT) during laparoscopic proximal gastrectomy (LAPG) to avoid GER, and evaluated the outcome.

**Surgical Techniques:** Reconstruction by DFT in LAPG: After the stomach was resected, the remnant stomach was withdrawn from the upper abdominal incision and a H-shaped double seromuscular flap (3.5 cm × 2.5 cm) was made by dissecting between submucosal and muscular layers at the anterior remnant gastric wall. After creation of the double flap, the posterior esophageal wall (5 cm from the edge) and the anterior gastric wall (superior edge of the mucosal window) were sutured for fixation, and 1.0 cm from the inferior edge of the mucosal window was opened, and the wall of the esophageal edge and the opening of the remnant gastric mucosa were sutured continuously. The anastomosis was fully covered by the seromuscular flaps with suturing.

In LATG, Roux-en-Y reconstruction was performed through a small incision using a circular stapler.

**Methods:** From 2006 to 2014, 72 patients with early gastric cancer (T1) located at the upper third of the stomach or EGJ underwent LAPG (n=51) or LATG (n=21). The type of surgery was selected by the surgeon's preference. Clinical outcome and postoperative nutritional status were evaluated. As evaluation of nutritional status, body mass index (BMI) and psoas muscle index (PMI) which was calculated at the umbilical level by CT scan were used.

**Results:** The operative time of LAPG tended to be longer than LATG (358 vs. 298 min N.S.). The morbidity of LAPG tended to be lower than LATG (7.8 vs. 23.8%). LA classification Grade B or more severe reflux esophagitis was observed in 2 of LAPG (3.9%) and in 1 of LATG (4.8%). The reduction of BMI and PMI of patients undergoing LAPG were significantly prevented three years after the operation compared to those undergoing LATG (BMI 6.1% vs 19.1%:  $p=0.021$ , PMI 7.3% vs 20.9%:  $p<0.001$ ).

**Conclusion:** LAPG reconstructed with double flap technique prevents post-operative GER and better clinical and nutritional outcome, and should be considered instead of LATG for patients with early gastric cancer (T1) located at the upper third of the stomach or EGJ.

**P463**

### **Thoracoscopic Esophagectomy in the Prone Position for Esophageal Cancer: Long-Term and Short-Term Outcomes of 330 Consecutive Patients at a Single Institution**

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**Introduction:** The purpose of this study was to clarify the long-term and short-term outcomes of 330 consecutive patients who underwent thoracoscopic esophagectomy in the prone position using a preceding anterior approach for the resection of esophageal cancer at a single institution. This method was established to make an esophagectomy easier to perform and to achieve better outcomes in terms of safety and curativity.

**Methods and Procedures:** We retrospectively reviewed a database of 673 patients with thoracic esophageal cancer who had undergone a thoracoscopic esophagectomy (TE, 330 patients) or an esophagectomy through thoracotomy (OE, 343 patients) between January 2003 and August 2017. To compare the long-term outcomes of TE and OE, we used a propensity score matching analysis and a Kaplan-Meier survival analysis. To analyze the short-term outcomes of TE, patients were chronologically divided into three groups: a first period group (110 patients), a second period group (110 patients), and a third period group (110 patients). As for thoracoscopic procedure, the esophagus was mobilized from the anterior structure during the first step and from the posterior structure during the second step. The lymph nodes around the esophagus were also dissected anteriorly and posteriorly. The intraoperative factors, the number of dissected lymph nodes, and the incidence of adverse events were compared among the three period groups using a one-way ANOVA or Chi-square test.

**Results:** One hundred and twenty-three patients from each group, for a total of 246 patients, were completely selected and paired. The 5-year survival of the TE patients (67.0%) was not different from that of the OE patients (58.1%) ( $P=0.296$ ). The thoracoscopic times were 227 min, 242 min, and 217 min ( $P<0.05$ ), and the blood losses during the thoracoscopic procedure were 36.2 mL, 44.8 mL, and 19.5 mL ( $P<0.05$ ), respectively, according to the period groups (110 patients each). The mean numbers of harvested lymph nodes in the mediastinum were 22.0, 25.1, and 28.5 ( $P<0.05$ ). The rates of recurrent laryngeal nerve palsy were 23.6%, 32.7%, and 6.4% ( $P<0.001$ ).

**Conclusions:** The long-term outcome of TE patients might not differ from that of OE patients. As for the short-term outcomes, intraoperative factors, quality of lymph node dissection, and reduction of adverse events were best in the third period group. After accumulating more than 220 operations, our method of TE can be regarded as a safe and effective procedure for esophageal cancer surgery.

**P465**

### **Trapezoidal Tunnel Method and Modified Circular Stapling for Safe Anastomosis in Video-Assisted Thoracoscopic Surgery of Esophagus (VATS-E)**

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**Background:** It is also difficult to anastomose using circular stapler in the narrow neck field. To overcome the problem we modified circular stapling for anastomosis. Gastric juice reflux is frequently observed at the esophago-gastric anastomosis. We develop and report trapezoidal tunnel method to reduce the incidence reflux.

**Methods:**

(1) Patients

One hundred thirteen cases (27 in left lateral and 93 in prone position), with esophageal carcinomas underwent VATS-E, respectively. Esophago-gastric anastomosis is performed for 80 cases by modified circular stapling and 3 cases by trapezoidal tunnel method.

(2) Methods

At first the patients are fixed at semi-prone position and esophagectomy is performed in prone position that can be set by rotating and 5 ports are used at the intercostal space (ICS). Esophagectomy and the L.N. dissection are performed with pneumothorax by maintaining CO<sub>2</sub> insufflation.

Esophago-gastric anastomosis is performed as following,

i) Trapezoidal Tunnel Method

Sero-muscular layer of anterior wall in the near top of gastric conduit is peeled from submucosal layer after parallel horizontal incision of sero-muscular layer, and then trapezoidal tunnel of sero-muscular layer is created. The edge of the proximal esophagus is drawn into the tunnel and esophago-gastric submucosa anastomosis is performed. To wrap anastomosis distal side of parallel line is closed.

ii) modified circular stapling

At first the circular stapler is introduced into the gastric conduit and joined to an anvil, and close a little. And then a joined anvil is placed into the proximal esophagus and secured by means of a pursestring suture. The gastric conduit opening is closed by a linear stapler.

**Results:**

1. The rate of anastomotic leak by modified circular stapling was 4.0%.

2. Both anastomotic leakage and reflux are not observed in 3 cases anastomosis by trapezoidal tunnel method.

**Discussion:**

1. Our both anastomotic technique is safe.

2. Gastric juice reflux at the anastomosis might be controllable by trapezoidal tunnel method.

**P464**

### **A Unique Method to Preserve an Aberrant Left Hepatic Artery Encountered During Anti-reflux Surgery**

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**Objective:** To provide an alternative safe surgical technique for hiatal hernia repair in the presence of an Aberrant Left Hepatic Artery (ALHA).

**Summary Background Data:** The presence of an ALHA creates significant technical difficulties as it diminishes the operative field and hinders direct access to the right crus. This impairs the hiatal dissection in 29.8% of cases. It results in failed Nissen fundoplication in 6% of patients. It leads to increased incidence of operative bleeding to 4.1%.

**Method:** We conducted a retrospective chart review of patients who underwent anti-reflux surgery or hiatal hernia repair between March 2016 and August 2017. We reviewed clinical data, operative reports and images, laboratory data and follow-up data. Patients underwent laparoscopic repair of hiatal hernia followed by Transoral Incisionless Fundoplication (TIF). Hiatoxyplasty was performed with Extracorporeal Sliding Arthroscopic Knots (ESAK). These knots are similar to the preformed knot used in the endoloop device. They are performed extracorporeally and advanced with a knot pusher.

**Results:** 102 laparoscopic anti-reflux and hiatal hernia repair procedures were performed by a single surgeon at a high volume anti-reflux program. Six patients (5.7%) had an ALHA. All but one was female. The ALHA was preserved in all cases. Average age was 52 ( $\pm 5.3$ ) years. Average BMI was 30.3 ( $\pm 4.5$ ). The duration of GERD symptoms ranged between (6–25) years. The average use of anti-secretory medications was 16 ( $\pm 7.7$ ) years. DeMeester score averaged 48.6 ( $\pm 22$ ).

Five patients had 300 degrees fundoplication and the remainder had 270 degrees. There was no intraoperative bleeding, mortality or postoperative complications. Patients were discharged the following day after surgery. The liver function tests were normal. All anti-reflux medications were discontinued. The average improvement of GERD Health-Related Quality of life (GERD HRQL), Reflux Symptoms Index (RSI), GERD Symptom Score questionnaires (GESS) was 26.2, 19.4 and 18.4 respectively.

**Discussion:** The combination of using ESAK employed for tight joint spaces and the natural orifice TIF procedure are well engineered to tackle the space limitation created by the presence of an ALHA. This technique allows precise placement of the knots with single insertion of the knot pusher. TIF enable the surgeon to perform adequate partial fundoplication endoscopically thus avoiding the confined surgical field.

**Conclusion:** The combination of using extracorporeal arthroscopic knot tying and TIF is safe, preserves an ALHA in very limited operative field.

**P467**

### **Increasing Operative Times, Not Mesh Utilization Impact Postoperative Outcomes Following Laparoscopic Paraesophageal Hernia Repair**

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**Purpose:** Mesh utilization and its impact on postoperative hernia recurrence following paraesophageal hernia repair remains a polarizing topic. This analysis evaluates the recent trends in laparoscopic paraesophageal hernia repairs and analyzes the impact of operative time on postoperative morbidity.

**Methods:** The 2013–2015 ACS-NSQIP database was queried for primary CPT code for laparoscopic paraesophageal hernia repair with and without mesh (43282/43281). Only elective cases performed by a general surgeon were included. Operative time was grouped into quartiles (80–110, 111–142, 143–185, 186–360 min) and statistical analysis was performed using ANOVA univariate with post-hoc testing and multivariate regression modeling controlling for age, diabetes, renal disease and weight loss. This analysis was powered to detect a greater than 2% difference in outcomes based on mesh utilization. The outcomes of interest were composite morbidity scores and readmission rates within 30 days of surgery.

**Results:** The database identified a cohort of 6,234 laparoscopic paraesophageal hernia repairs performed between 2013 and 2015. Average patient age was 64 years and average patient Body Mass Index was 31. Mesh was utilized in 42% of cases per year and did not change over the study period ( $p=0.367$ ) however mesh utilization was 37%, 40%, 43%, and 49% within operative time quartiles 1–4 respectively ( $p<0.001$ ).

Postoperative morbidity and readmission rates for each operative time quartile were 2.8%, 4.1%, 5.42%, and 6.13% ( $p<0.001$ ) and 4.4%, 5%, 6.2%, and 7.6% ( $p=0.001$ ), respectively. Post-hoc testing indicated statistically significant differences in postoperative morbidity and readmission rates between quartiles 1 and 3/4. Multivariate regression analysis documented operative time as a risk factor for postoperative morbidities and readmission, even after controlling for covariates. Mesh utilization was only significant for a reduction in the rate of venous thromboembolic complications (OR 0.493,  $p=0.027$ ) but did not impact other morbidities or readmission rates.

**Conclusion:** This analysis suggests that patients with higher operative times have increased postoperative morbidity and readmission while mesh utilization does not impact postoperative outcomes, after accounting for the longer operative time of a paraesophageal hernia repair with mesh.

**P468**

**Simultaneous Laparoscopic Pyloroplasty with Insertion of Gastric Stimulator Is a Safe and Viable Palliative Option for Medically Refractory Gastroparesis**

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**Introduction:** Gastroparesis is a chronic gastric motility disorder defined by delayed gastric emptying and symptoms such as nausea, vomiting, bloating and abdominal pain. Surgical options for refractory gastroparesis include pyloroplasty, gastric stimulator insertion, and gastrectomy. The palliation from a pyloroplasty and gastric stimulator may be synergistic, however concerns remain regarding the possibility of stimulator infection when performing both procedures simultaneously. We present our initial experience of combined laparoscopic pyloroplasty and insertion of gastric stimulator.

**Methods:** Gastroparesis patients diagnosed by solid gastric scintigraphy or endoscopic evidence of retained food after prolonged NPO status who underwent combined laparoscopic Heineke-Mikulicz pyloroplasty and gastric stimulator insertion between July 2016 and July 2017 were reviewed. Patient demographics, pre- and post-operative symptom scores and outcomes were collected. Results were analyzed using statistical tests as appropriate. P value <0.05 were considered significant.

**Results:** Seven patients underwent the simultaneous pyloroplasty and gastric stimulator insertion. Six patients (86%) were idiopathic and one patient (14%) was diabetic. One patient was male and six patients were female. Mean age was  $43 \pm 11.5$  years and mean BMI was  $26.7 \pm 3.6$ . All seven patients had failed medical management and all patients were naïve regarding surgical treatment for gastroparesis.

Median hospital stay was  $2 \pm 1$  days. No patients required readmission and no patients experienced immediate post-operative complications, especially gastric stimulator infection. Three patients required revision of the implant—two patients for recurrent symptoms with abnormal impedance readings and one patient for discomfort due to implant position.

Patient symptom scores did improve, although not significantly due to the low number of patients in this pilot study. Overall mean composite score (Gastroparesis Cardinal Symptom Index: GCSI-2W) decreased from  $3.3 \pm 0.61$  to  $2.98 \pm 0.83$  (p value 0.4). Mean duration of follow-up was 5.8 months (1 month–14 months).

**Conclusion:** Combined laparoscopic Heineke-Mikulicz pyloroplasty with placement of gastric stimulator is a safe, minimally invasive procedure suitable for first line surgical treatment of refractory gastroparesis. No evidence of implant infection during the combined procedure was observed. Larger cohort studies are needed to evaluate the potential synergistic effect of simultaneous pyloroplasty and gastric stimulator insertion.

**P473**

**Laparoscopic Gastrectomy for Gastric Cancer is a Safe and Feasible Option Even in Elderly Patients with Advanced Disease**

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**Introduction:** Gastric cancer is one of the most common cancers in the Asian population, with recent literature supporting the laparoscopic approach in early disease. However, the minimally invasive approach in advanced disease is still controversial. The outcomes of laparoscopic gastrectomy in the elderly have also not been extensively studied. We aim to evaluate our institution's short term outcomes of laparoscopic versus open gastrectomy for gastric cancer—with particular focus on advanced disease and elderly patients.

**Methodology:** We prospectively collected the data of all patients who underwent gastrectomies for stomach cancer from 2008 to 2015. All patients underwent a partial or total gastrectomy with D2 lymphadenectomy. The decision for open or laparoscopic approach was decided between surgeon and patient. We excluded patients who underwent palliative resection. All patients were followed up for at least one year post-operatively.

**Results:** There were 164 patients, with 58 open and 106 laparoscopic gastrectomies. There were 9 conversions to open surgery. We stratified our patient population according to age, with 46 (28%) patients younger than 65 years, 50 (30%) patients between 65–74 years, and 68 (41%) patients aged 75 and older. There was no difference in the proportion of patients undergoing laparoscopic versus open gastrectomy when compared across age groups. The laparoscopic group had a significantly longer operative time (268 vs 223 min, p<0.001), with a non-significant trend towards less blood loss (287 vs 330 ml) and shorter length of stay (10 vs 13 days). There was no difference between number of lymph nodes harvested, 30-day morbidity and mortality. When stratified according to age and stage, survival curve analysis performed for laparoscopic versus open gastrectomy showed no difference between disease free or overall survival.

**Conclusion:** The short term outcomes of laparoscopic gastrectomy are comparable to that of open surgery in our institution, even in the elderly patient population with advanced disease. Our experience suggests that laparoscopic gastrectomy for gastric cancer is safe and feasible in experienced hands.

**P474**

**A Study to Assess the Awareness About Global Surgery Among Surgical Residents at a Tertiary Hospital**

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**Introduction:** It was an eye-opener when the lancet brought the attention about global surgery. It is estimated that the deaths due to lack of access to surgery is far greater than deaths due to malaria, tuberculosis and HIV/AIDS put together. There is greater need to stress the importance in developing countries. There is a responsibility at the medical schools to enlighten students about this necessity and arouse interest in concept of global surgery. The students or surgical residents in the future are a great resource to solve this major problem. The first step would be to educate surgical residents. We need to assess the existing awareness about global surgery problem among surgical residents. We can plan a program to train the next generation surgeons.

**Methods and Procedure:** All the surgical residents in our institution (Victoria hospital, Bangalore, India) were enrolled for this study. A total of 212 residents were enrolled. A multiple-choice questionnaire regarding global surgery was designed. The received questionnaire was analyzed to assess the depth of knowledge about global surgery. There were 20 multiple choice questions (MCQ) and an option was provided at the end for feedback and suggestion to improve the global surgery in our country. Each question carried one mark. Score more than 10 was considered the cutoff for pass and those students were termed 'informed'.

**Results:** 91(42.9%) students cleared the cut off score of 10 and were termed 'informed'. Among this group 21 (9%) residents scored 20 marks. 121 (57.07%) students did not cross the cut off and were termed 'non-informed'. Among these 57 (26.8%) students scored 0 marks and did not know anything on the topic. 43 students provided relevant suggestions and opinions to improve global surgery issue.

**Conclusion:** There is a great lacuna in knowledge about global surgery among surgical residents. We need to plan a program integrating global surgery in the syllabus of surgical training. The awareness among residents would arouse interest and participation in the future.

**P475****First Application of an Affordable Laparoscopic Camera System Designed for Low Income Countries: A Feasibility Study**

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**Introduction:** Minimally invasive surgical techniques (MISTS) could have tremendous applications and benefits in resource poor environment. These include but are not limited to short hospital stay, reduced cost of care, and reduced morbidity, especially related to post operative infections. There is growing interest in MISTS in most low and middle income countries (LMIC) but its adoption has remained limited largely due to high cost of initial set-up, lack of technological backup and limited access to training among others. One of the most limiting factors is the maintenance of the vision system. An affordable laparoscopic set-up as an example will therefore go a long way in improving access to MISTS.

**Methods and Procedures:** A common zero-degrees 10 mm scope is attached on the camera of a low price smartphone (Samsung Galaxy J3 2016, Samsung®, Seoul, South Korea). Two elastic bands are used to fix the scope right in front of the main camera on the smartphone. The device is covered with sterile transparent drapes (Tegaderm®, 3M Corporate, St. Paul, MN, USA). A light source is connected with a fiber optic cable for endoscopic use. The image can be seen in real time on a common TV screen through an HDMI connection to the smartphone, with a sterile drape. Holding the vision system through the scope would guarantee to keep the camera in place without issues. To operate in full screen the vision was digitally zoomed at  $\times 1.6$ , without losing quality (that is more related to the intensity of the light). As a collateral project we built a low cost simulator training box with the same camera to train the surgeon, obtaining a high fidelity and affordable simulation setting.

**Results:** We were able to perform the 5 tasks of the Fundamentals of Laparoscopic Surgery curriculum using our vision system with proficiency. In a pig model, we performed a tubal ligation to simulate an appendectomy and we were able to perform basic laparoscopic suturing. No major issue were encountered and small adjustment only were required to have an acceptable, stable and clear view.

**Conclusion:** There is growing interest in minimally invasive surgeries among surgeons in LMIC, but its adoption has remained limited due to reasons such as high cost of initial set-up, lack of technological backup and limited access to training among others. An affordable laparoscopic camera system will therefore go a long way in improving access to MIS in such settings.

**P476****Should Open Cholecystectomy Be Considered in the Setting of Short-Term Humanitarian Missions?**

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**Introduction:** Laparoscopic cholecystectomy has become the standard of care in the US and shows promise in developing countries, but it is not always possible in the setting of a short-term surgical mission. In Peru there exists a large burden of gallbladder disease and limited access to care leading to delays in definitive treatment with some relying on humanitarian organizations for surgery. Surgical missions perform cholecystectomy by open or laparoscopic approach depending on the capacity of the hosting facilities. The aim of this study was compare to these 2 operative approaches in the setting of a surgical mission and identify the main differences.

**Methods:** A retrospective review was performed of all patients undergoing elective cholecystectomy in Trujillo, Peru during 4 one-week surgical missions from 2014 to 2017. Laparoscopic versus open groups were compared for demographics, mortality, in-hospital complications, operative time, and length of stay (LOS). Analysis was by intention to treat.

**Results:** Fifty-seven ISHI patients underwent elective cholecystectomy, 28 laparoscopic and 29 open. There were no deaths or bile duct injuries in our series. Two patients undergoing laparoscopic approach were converted to open (7.1%). Complications, LOS, and gender were similar between the two groups. The laparoscopic group were significantly younger and had a significantly longer operative duration (Table). Long term outcomes were not available for analysis.

**Conclusion:** Laparoscopic and open cholecystectomy appear safe in the setting of short term surgical missions. Neither group suffered major complications. Both had similar immediate outcomes. LOS for both groups was surprisingly similar and shorter than larger series which may possibly due to patient selection. Given similar immediate outcomes and large burden of disease, the open approach should be considered. However, this cost may be extracted in terms of greater pain or longer recovery time for patients, which may outweigh the benefits. Further data is needed to study pain, long term outcomes, and return to work.

	Total (N=57)	Laparoscopic (N=28)	Open (N =29)	p-value
Age (mean±SD years)	44±14	41±15	47±12	0.03*
Operative time (mean±SD minutes)	82±33	95±34	70±27	0.02*
Immediate Complications N (%)	1(1.8)	0	1(3.4)	0.32
Length of stay (mean, range)	0.89(0-4)	0.78(0-2)	1(0-4)	0.25

**P478****Assessment of Camera Centering in Robot-Assisted vs. Laparoscopic Surgery**

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**Introduction:** Minimally invasive surgery relies on optimal camera control for the successful execution of operations. One disadvantage of laparoscopic surgery is that camera control is dependent on a surgical assistant's interpretation of visual cues and ability to predict the next field of focus in addition to verbal commands from the operating physician to provide the optimal view. Robot-assisted minimally invasive surgery provides the operating surgeon the advantage of dictating their field of view. This study aims to utilize a video processing algorithm to determine the incidence of improperly centered field of view in laparoscopic vs. robot-assisted surgery.

**Methods:** In this study, 8 recordings of minimally invasive resection of rectal cancer (4 laparoscopic and 4 robot-assisted surgery) were evaluated. Recordings were input into MATLAB® video processing to generate single frames at each second interval. A single reviewer would indicate the pixel which best determined where the camera should be centered based on positioning of instruments, current action (dissection/hemostasis/traction) depicted in the frame, and previous review of recordings. Pixel locations were recorded for subsequent analysis. Centered views were determined as those with the identified centered position pixel lying within the center quadrant when frames were split into a uniform  $3 \times 3$  grid. In addition, distance of each point to the absolute center of the frame was calculated based on the pixel's x and y positions.

**Results:** Individual operation data was analyzed for percent of centered pixel locations and pixel distance from the center pixel of the frame. Robot-assisted surgery demonstrated higher percentage of centered views over laparoscopic surgery ( $61.5 \pm 5.1$  vs.  $49.7 \pm 7.8$ ;  $p < 0.05$ ). Robot-assisted surgery also demonstrated shorter distances to frame center than laparoscopic surgery ( $123.3 \pm 9.8$  vs.  $144.8 \pm 13.9$ ;  $p < 0.05$ ).

**Conclusion:** Robot-assisted surgery aims to resolve conflicts of cooperation that occur between surgeon and assistant in laparoscopic surgery by enabling manual visual control of the operative field by the operating surgeon. This study demonstrates that by eliminating such conflicts, optimal surgical view is more frequently obtained.

**P479****Quantification of the Air Embolism Hazard with Laparoscopic Valveless Cannula Systems**

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**Background/Objective:** Valveless laparoscopic insufflator systems are marketed for ability to prevent loss of abdominal collapse and desufflation during laparoscopy. However, community surgeons raised concern for possible entrainment of room air, including oxygen (O<sub>2</sub>), with these systems. This study seeks to quantify O<sub>2</sub> and non-medical air entrainment by a laparoscopic valveless cannula system to understand the risk of intraoperative air embolism. A community university collaborative was created to design a model and test this hypothesis.

**Methods:** An artificial abdomen was developed and calibrated to equivalent compliance and intraoperative volume of an average adult abdomen. It was connected to a flow meter, oxygen concentration sensor, and commercially available laparoscopic valveless cannula system. Intraabdominal concentration of oxygen was measured at 0–65 liters per minute (L/min) of insufflated carbon dioxide (CO<sub>2</sub>) leak, as would occur by laparoscopic suctioning. For reference, one model of laparoscopic suction devices created a 42 L gas leak per min. At the test facility, room air measured to be 19.4% O<sub>2</sub>. Microsoft Excel 2016 (Redmond, WA) was utilized for descriptive statistics and data collection.

**Results:** At 0 L/min CO<sub>2</sub> leak, there was minimal (0.4%) oxygen detected intraabdominally. However, when CO<sub>2</sub> leak occurred, as would occur during suction or instrument exchange, increasing amounts of O<sub>2</sub> was detected intraabdominally: 1.73% average measured O<sub>2</sub> concentration at 5 L/min CO<sub>2</sub> leak, 1.62% at 10 L/min CO<sub>2</sub> leak, 1.78% at 15 L/min CO<sub>2</sub> leak, 5.59% at 25 L/min CO<sub>2</sub> leak, 7.89% at 35 L/min CO<sub>2</sub> leak, 8.6% at 45 L/min CO<sub>2</sub> leak, 10.25% at 55 L/min CO<sub>2</sub> leak, and 9.99% at 65 L/min CO<sub>2</sub> leak. The rapid introduction of O<sub>2</sub> and room air was confirmed by comparing the measured, delivered CO<sub>2</sub> volume per minute from the insufflator to the total CO<sub>2</sub> leakage rate—this deficit corroborated the introduction of non-medical room air into the abdomen.

**Conclusion:** Valveless laparoscopic insufflator systems have potential to entrain room air into the abdomen during standard intraoperative use. This represents a significant safety hazard with potential for gas embolism with non-absorbable oxygen and nitrogen.

**P480****Preclinical Testing of Novel “Off-On” Fluorescent Compound for Dual Wavelength Near-Infrared Imaging Using Commercially Available Instrumentation**

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**Background:** Further advance of near-infrared (NIR) imaging capability into greater clinical usefulness will be helped by the development of new targetable agents. To avoid issues related to dose timing and contamination, compounds that become fluorescent only at the site being targeted would be a significant advance. Here we build on earlier laboratory work to show step-wise advance of the agent towards clinical trialling.

**Methods:** A novel agent (NIR-AZA) was tested in ex vivo colorectal specimens using two commercially available systems to determine characteristics in biological tissue. It was then trialled in a large animal cohort (n=4) to determine its performance for both intestinal perfusion assessment and lymph node mapping (both stomach and colon) using again a commercially available optical imaging system and including a direct comparison with indocyanine green.

**Results:** The novel agent was easily detectable in biological tissue in the near infrared wavelength relevant to commercial instrumentation both as a local depot tattoo and as a lymphatic tracing agent. Porcine model trialling again showing excellent detection and tracking characteristics both in the circulation and in gastrointestinal tissue with clear tracking to relevant lymph nodes within minutes evident with the latter. While these studies were non-survival, there was no evidence of local tissue or systemic system toxicity in any case. Direct qualitative and quantitative comparison between *in situ* NIR-AZA and ICG at both intestinal and lymph basin regions showed similar levels of fluorescence.

**Conclusion:** The trial compound underwent successful testing indicating proof of earlier projected potential. This is encouraging for further work to advance to first in human testing.

**P481****Use of an Image Enhancement System (IES) During Laparoscopic Cholecystectomy**

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**Introduction:** Enhanced imaging systems have been developed to alter laparoscopic camera output to facilitate visualization during laparoscopic surgery using several novel imaging modes: Clara mode reduces overexposure and reflections while brightening darker areas of the image; Chroma mode intensifies color contrast to more clearly delineate blood vessels; and a combined Chroma-Clara mode. The IES also allows the surgeon to change imaging modes throughout the procedure as needed to facilitate different portions of the operation. We hypothesized that this technology would enhance visualization of critical structures during laparoscopic cholecystectomy (LC) compared to standard laparoscopic imaging.

**Methods:** Videos and still images from an IES (Karl Storz Endoscopy) were assessed in 12 patients undergoing LC using the four imaging modalities. Three time points were assessed: 1) after adhesions were taken down but before any other dissection; 2) after partial dissection of the hepatocystic triangle; and 3) after establishment of the critical view of safety (CVS). Seven surgeons blinded to the imaging modalities ranked each modality from 1 (best) to 4 (worst) for each of 36 time points (3 dissection points for 12 cases). Structures identified on achievement of the CVS were also analyzed. All statistics were performed using SPSS. Rank data was analyzed with the Friedman and Wilcoxon Signed Rank tests.

**Results:** The median ranks of the Chroma and Chroma-Clara imaging modalities (median [IQR] 2 [1–3] vs 2 (1–2), p=0.07) were not significantly different from each other, but both ranked significantly higher than the Clara and standard modalities (median rank [IQR] 4 [3–4] and 3 [2–3], respectively, p<0.001). Individual surgeon preferences varied; four surgeons preferred Chroma-Clara, two preferred Chroma, one preferred Clara, and none preferred the standard mode. In addition, the cystic artery and cystic duct were visible in all cases after achieving the CVS, but the common bile duct was visible in only 13% of cases.

**Conclusion:** Enhanced imaging system technology provides modalities that were significantly preferred over standard laparoscopic imaging on retrospective review of still and video images during LC. Enhanced imaging modalities should be evaluated further to assess their impact on outcomes of LC and other laparoscopic procedures.

**P482****Laser-Based Intrabiliary Ablation: First In-Vivo Experience**

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**Introduction:** Cholangiocarcinoma is often diagnosed at an unresectable stage. Endoscopic stent placement is generally performed to release the tumor-induced biliary obstruction. However, stents misplacement and migration, tumor tissue ingrowth and cholangitis are relatively frequent complications. Energy-based techniques (radiofrequency ablation and photodynamic therapy) have been proposed as alternatives or in addition to the stent placement, showing controversial results. The use of laser sources in the ablation of the biliary wall has not been investigated so far. This study aims at the evaluation of the optimal power and exposure time to achieve a controlled circumferential intraluminal laser ablation of the common bile duct (CBD).

**Methods:** Through a laparotomy access, the CBD of 4 pigs was exposed and a small choledocotomy was made. A confocal endomicroscopy (CE) scanning (Cellvizio) was performed through the choledocotomy, after injection of 5 ml of sodium fluorescein. The 1.2 mm diameter circumferentially-emitting diode laser probe (940 nm wavelength) was introduced in the CBD. Laser ablation was performed at 7 W during 180s (n=2) or 360s (n=2). The power setting was predetermined on preliminary *ex-vivo* tests on porcine liver specimen. Local temperature control was monitored through a Fiber Bragg Grating, embedded in the laser probe. CE scanning was then repeated. The extent of the ablation was measured on Hematoxylin-Eosin and NADH stained slides.

**Results:** The diameter of the probe was too small to enable a single-shot circumferential ablation. There were no full-thickness perforations. After 50s from turning laser on, the temperature at the application site reached a plateau with minimal oscillations, and remained at mean values of  $61.5 \pm 6.7$  °C during both 3 and 6 min. Histology revealed that the mucosa ablation, at the contact areas, induced a consistent cellular necrosis (NADH-). CE scanning provided real-time images with a specific aspect of the post-ablation mucosa, including an alteration of the normal glandular structure and a general lack of enhanced imaging.

**Conclusions:** The local application of a circumferential laser source induced a precise and safe mucosa ablation with a long-standing increase in temperature in the CBD, in this experimental trial. However, there is a need of an adapted probe, better fitting the diameter of the CBD to enable a single-shot circumferential treatment.

**P483**

### **Real-Time Assessment of Intestinal Perfusion and Lymphatic Flow by Indocyanine Green Fluorescence Image-Guided Laparoscopic Surgery for Colo-Rectal Cancers**

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**Introduction:** Recently major developments in video imaging have been achieved for performing complete mesocolic excisions (CME) or total mesorectum excisions (TME). Indocyanine green (ICG) fluorescence imaging is already contributing greatly to making intraoperative decisions for keeping an intact visceral fascial layer, making suitable mesentery division lines and identifying anastomotic perfusions. The aim of this study is to present our experience with laparoscopic procedures for colo-rectal cancers using ICG fluorescence imaging (LAP ICG-FI).

**Patients and Methods:** We usually use the near-infrared (NIR) laparoscopy (Stryker Corporation, Michigan, USA) for LAP ICG-FI.

[Indocyanine green fluorescent imaging]

Visualization of lymph flow: ICG (2.5 mg/1.0 mL) was injected into the submucosal layer around the tumor at 2 points with a 23-gauge localized injection before the lymph node dissection.

Visualization of blood flow: After complete colorectal mobilization, the mesocolon was completely divided at the planned proximal or distal transection line. Indocyanine green was injected intravenously and the transection location(s) and/or distal rectal stump, if applicable, were re-assessed in fluorescent imaging mode.

**Results:** We experienced 32 LAP ICG-FI cases with colo-rectal cancer patients. Tumor was located at the rectum in 12 of them, at the sigmoid colon in 10, at the transverse colon in 2, at the descending colon in 2, at the ascending colon in 4, and at the cecum in 2. TNM stage was 0-I in 10 patients, II in 9, III in 8, and IV in 5. The median (range) age of the patients was 68 (55–77) years with a median (range) BMI of 24.8 (20–36.4) kg/m<sup>2</sup>. The lymph flow was visualized in 30 patients (94%) intraoperatively. However, a high-quality intraoperative ICG lymphangiogram was achieved in 22 patients (73%). In high-quality lymphangiogram, the lymphatic ducts and lymph nodes were clearly visualized in real time, and this proved useful in keeping an intact visceral fascial layer as well as in making a suitable mesentery division line even in the BMI>30 patients. A high-quality intraoperative ICG angiogram was achieved in all patients. Anastomotic perfusion was satisfactory in all cases. In 2 patients (6.3%), the use of NIR+ICG resulted in revision of the proximal colonic transection point before formation of the anastomosis. There were no postoperative anastomotic leakages. No injection-related adverse effects were reported.

**Conclusion:** LAP ICG-FI is a simple, safe and useful tool to help us complete LAP CME or TME and check real-time anastomotic tissue perfusion.

**P485**

### **Creating Mobile Apps for Surgical Patients: A Scoping Review of the Literature to Identify What Makes Health Apps Effective**

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**Introduction:** Globally, an estimated 500 million smartphone users have tried mobile applications (apps) to improve health and support health behavior changes. Apps specifically targeting surgical patients are increasingly available. The purpose of this study was to identify features and mechanisms of apps that were effective in eliciting a behavioral change in patients, in order to inform evidence-based app development in surgery.

**Methods and Procedures:** We conducted a comprehensive literature search between January 2007 and April 2017 to identify trials investigating the impact of a mobile app intervention on a health behavior in adults. Articles were identified through MEDLINE, Embase, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects, and CENTRAL registry of controlled trials. References of the included articles were screened for additional relevant publications. The behavior change techniques used in each app were classified using the Abraham and Michie taxonomy. Each study was further defined as "successful" or "non-successful" according to whether there was a statistically significant impact on the health behavior of interest.

**Results:** The literature search identified a total of 1521 articles. After full-text review, a total of 81 articles describing 81 apps targeting 31 different aspects of health were identified. Of those, 50 (62%) reported no impact of the app on the health behavior of interest, while 31 (38%) reported statistically significant effects. Of these, 29 (93%) studies reported using behavior change techniques compared to 41 (82%) of the non successful studies ( $p=0.049$ ). The behavior change techniques more often applied in successful compared to non-successful trials were tailored feedback (19 (61%) vs 3 (6%) studies,  $p<0.001$ ), and goal-setting (8 (22%) vs 4 (8%) studies,  $p=0.02$ ). There were no differences in successful and non successful studies in the use of self-monitoring (18 (58%) vs 38 (76%) studies,  $p=0.09$ ), gamification (6 (19%) vs 6 (12%) studies,  $p=0.11$ ) and social comparison (3 (10%) vs 6 (12%) studies  $p=0.76$ ). Only 5 studies specifically targeted surgical patients.

**Conclusions:** Most healthcare applications are not successful in modifying patient behavior, and this review provides insights into the properties of health care apps that were successful. Providing personalized and specific feedback was the most frequently employed behavior change technique in successful trials. With an increasing number of apps targeting surgical patients, this information should inform evidence based app development.

**P486**

### **Incisional Negative Pressure Wound Therapy on High Risk Surgical Patients: One Year Experience**

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**Objective:** To demonstrate that negative pressure therapy can reduce postoperative wound complications on clean closed incisions. A standardized patient selection protocol was created and implemented for utilization of Incisional Negative Pressure Wound Therapy (INPWT) in high risk patients. We present our institutions one-year experience using the innovative protocol.

**Methods:** An institutional protocol was created to identify surgical patients at high risk for incisional complications. Patients undergoing high risk procedures with two or more preoperative risk factors were appropriate candidates for INPWT. The PrevenaTM Incision Management System was used according to the manufacturer's specifications. Medical records were reviewed retrospectively. The primary outcome was incidence of surgical site infection (SSI) within 30 days. The secondary outcomes included cellulitis, wound dehiscence, seroma formation, soft tissue necrosis and mortality.

**Results:** From July 2015 to October 2016, 72 patients suitable for INPWT were identified. Forty-three percent of these patients had more than four preoperative risk factors. The most common preoperative risk factors were perioperative hyperglycemia (72%), malnutrition (61%), obesity (58%) and diabetes (54%). Twenty-six percent of our patients had a BMI  $\geq 40$  kg/m<sup>2</sup>. Laparotomy was the most common surgical procedure (76%) and 44% of the procedures were contaminated or dirty. Four patients developed superficial SSI (5%) and 10 patients developed wound dehiscence (13%) within 30 days of surgery.

**Conclusions:** Our protocol identified and implemented INPWT in high risk patients with excellent wound care outcomes observed. Our initial experience illustrates that INPWT is cost-effective and can reduce incisional complication if used on carefully selected patients.

**P487****Automatic Detection and Recognition of Surgical Tools and Workflow in Laparoscopic Sigmoid Colectomy**

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**Introduction:** Recently, the spread of laparoscopic surgery as a standard treatment and the development of information & communication technology have yielded abundant video data of laparoscopic procedures. These data have been accumulated and we can access them anytime, anywhere. However, the direction of how to use the abundant video data are still unclear. Conventionally, surgical procedures have been performed based on surgeon's subjective decisions and skills, so called "tacit knowledge". For the purpose of objective analysis of laparoscopic procedures in video data, automatic recognition of surgical tools and understanding of surgical workflow must be the first critical step. We used convolutional neural network (CNN) which is the current trend in machine learning and computer vision tasks.

**Methods:** Using video database of laparoscopic sigmoid colectomy in our institute, we performed annotation of tools and phases in every frame of the operating videos. For the tool detection, we annotated bounding boxes for both left and right tools in the videos. Furthermore, phase annotation was performed by watching the videos in consultation with laparoscopic surgeons. The laparoscopic sigmoid colectomy operation passes through 10 phases; 1-Placement of ports and preparation, 2-Dissection of retrorectal space, 3-Medial approach to IMA, 4-Isolation and division of IMA, 5-Medial-to-lateral retromesenteric dissection, 6-Lateral mobilization of left colon, 7-Rectosigmoid mobilization, 8-Division of mesorectum, 9-Rectosigmoid resection and anastomosis, 10-Finishing. We used CNN architecture to perform surgical tool detection and workflow recognition.

**Results:** We totally labeled 8 tools used in the procedures of laparoscopic sigmoid colectomy and successfully developed tool detection system by CNN. As for surgical workflow, average times of phase 1–10 were 11.3, 9.9, 8.7, 5.9, 11.5, 10.2, 8.7, 11.6, 17.8, 2.7 min, respectively. Workflow recognition system using CNN was also successfully developed, while we needed to extract pure operating scenes in advance for efficient recognition outcomes.



**Conclusion:** We've developed tool detection and phase recognition systems using CNN. We need more datasets to improve the detecting ability for future clinical uses.

**P488****Gesture Control for Medical Image Navigation and Remote Control During Laparoscopic Surgery: Efficiency and Face Validity**

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**Introduction:** Surgical environments require special aseptic conditions for direct interaction with the preoperative images and surgical equipment, which hampers the use of traditional input devices. We presented the feasibility of using a natural user interface (NUI) for gesture control combined with voice control to directly interact in a more intuitive and sterile manner with the preoperative images and the integrated operating room (OR) functionalities during laparoscopic surgery. In this study, efficiency and face validity of using this NUI for medical image navigation and remote control during the performance of a set of basic tasks in the OR will be assessed.

**Methods and Procedures:** Twenty experienced laparoscopic surgeons participated in this study. They performed 25 basic tasks in the OR focused on the interaction with a medical image viewer (Osirix; Pixmeo) and with the functionalities of the integrated OR (OR1; Karl Storz). These tasks were carried out by means of traditional manual interaction, using a computer keyboard and mouse and a touching screen, and using a gesture control sensor (MYO armband) in combination with voice commands. This NUI is controlled by the TEDCUBE system (TEDCAS Medical Systems). Time required to complete the tasks using each interaction method was recorded. At the end of the tasks, participants completed a questionnaire for face validation and usability assessment.

**Results:** The use of the NUI required significantly less time than conventional manual control to show preoperative studies and information for surgical support. However, the interaction with the medical image viewer was significantly faster using the traditional input devices. Participants evaluated the NUI as an intuitive, simple and versatile tool that improves sterility during surgical activity. Seventy-five percent of the participants would choose the gesture control system as a method of interaction with the patient's preoperative information during surgery.

**Conclusions:** The presented gesture control system allows surgeons to directly interact with preoperative imaging studies and the functionalities of an integrated OR during surgery maintaining the aseptic conditions. For the traditional manual interaction, it is necessary to take into account the possible reaction time and displacement time of the technician to execute the surgeon's requests. A more personalized medical image viewer is required and with higher integration with the capabilities of the presented gesture control system.

**P489****Retroileal Anastomosis in Hand-Assisted Laparoscopic Left and Sigmoid Colectomies: Experience at a Single Institution**

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**Introduction:** Following a generous left hemicolectomy an anastomosis between the transverse colon and rectum may be required. Extensive mobilization and retroileal routing is sometimes necessary to create a tension-free anastomosis. Retroileal routing is a technique in which a window is created in the ileocolic mesentery. The colon is routed through this window, beneath the ileum, prior to entering the pelvis. Retroileal routing is uncommon and there is no data on this technique when performed in using a hand-assisted laparoscopic technique. The aim of this study was to review our experience with hand-assisted laparoscopic left sided colon resections including retroileal routing of the proximal colon to the rectum.

**Methods and Procedures:** We performed a retrospective review of a single surgeon's experience with hand-assisted laparoscopic left sided resections over a seven-year period from 2008–2015. Indication for operation, basic demographics, BMI, procedure time, short- and long-term morbidity, and mortality were recorded.

**Results:** A total of 340 patients underwent a hand-assisted laparoscopic left sided resection with a colorectal or coloanal anastomosis. Of these, 13 underwent hand-assisted laparoscopic procedures with retroileal routing of the proximal colon. In each case, operations included a midline hand port incision and two 5 mm ports in the lower abdomen. The indications for operation were diverticular disease and neoplasia in nine and four patients respectively. Procedures took an average of 188.6 (128–221) minutes to complete. Postoperative morbidity included intubation for CO<sub>2</sub> retention in one patient and a RLL effusion in another patient. There were no anastomotic leaks and there were no 30-day or 90-day mortalities.

**Conclusion:** Retroileal routing of the colon following left hemicolectomy occurs infrequently. A hand-assisted laparoscopic approach appears to be a safe and efficient in these technically challenging cases.

**P490****Measuring Tension at the Diaphragmatic Crus Closure - Description of a Novel Technique and Initial Findings**

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**Objective:** Approximation of the diaphragmatic crus pillars is a key step in hiatal hernia repair. The dogma of successful hernia repair requires tension free approximation of tissue. There are no techniques described to measure tension across the crus closure. Aim of this study is to describe a novel technique for measuring the tension exerted on crural sutures and report initial findings.

**Methods:** Data was collected at 2 institutions by the same surgeon. After hiatus dissection was complete the crus defect was measured both antero-posterior and transverse dimension. The crus closure sutures were placed posterior and then lateral to the esophagus. The initial suture is started posteriorly with a figure of eight fashion (#1). With each subsequent stitch placed anteriorly (#2 and #3) or laterally (L1, L2) till adequate hiatus closure is achieved. We measured tension on each suture placed as follows. The tails of each suture are brought out via the laparoscopic port, threading them through the Tie Knot® device (LSI surgical). At this point a hemostat is attached to the suture ends, which allows the hook of a Force Gage [Force Ten FDX, Wagner instruments] to measure the force (in Lbf) across the crural suture as the tie knot device is deployed.

**Results:** Hiatus defect measurements and tension measurements were available for 21 and 29 patients respectively. Mean age was 56 years with 8 males. Mean BMI was 26 (20–36). Mean AP 5 m (3–8) and T 2.7 cm (2–5) diameter. The mean measured force across #1=0.9 (0.56–1.25) and #2=0.9 (0.3–1.42). Table 1.

Table 1: AP—anterioposterior diameter (cm), T—transverse diameter (cm), #1 crural suture inferior, #2 crural suture, #3 crural suture, L—lateral.

**Conclusions:** We have described and presented initial findings of a novel method to measure the force required to approximate the hiatus. Hopefully the technique can be standardized and used to determine the degree of tension. Potentially this could facilitate identification of subset of patients who might benefit from crural prosthetic reinforcement.

**P491****Evaluation of a Novel Robotic Camera Navigating System: Using Technology to Improve the Operative Experience**

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**Introduction:** In order to perform certain laparoscopic procedures, a surgeon requires an extra assistant to hold the camera. Problems with this approach include table crowding which leads to poor ergonomics, miscommunication leading to poor image targeting and image stability, and increased cost of having extra staff in the O.R. We wanted to assess if the AutoLap system, a novel robotic laparoscope positioner could address these concerns. This study reports set up time, ergonomics and image stability data using this device.

**Methods and Procedures:** Data included set up time, ergonomics and usability (via nurse, surgeon and camera holder questionnaire) and image stability recorded via the Inertial Measurement Unit (IMU), an attachable sensor, describing linear acceleration (in units gravity [g]) and horizontal acceleration (Angular velocity in rad/s). The 70% noisiest sections of camera movements were removed, leaving the steadiest sections for analysis between human and AutoLap. After 20 warm-up procedures, 26 patients were divided between the human and robotic arm of the study.

**Results:** Angular velocity and linear acceleration were better for the robotic camera holder. Median angular velocity was 0.029 and 0.005 rad/s for human camera holder and AutoLap system, respectively (p-value <0.001). Linear acceleration was 0.011 and 0.007 [g] (p-value 0.015). Positive feedback included greater surgeon comfort (92%) and nursing staff reported improved interaction with surgeon (100%) as well as more efficient procedure (92%) with AutoLap. Negative comments included difficulties connecting the camera to the holder and inefficient device set up. During training cases, the average setup time was 8.25 min with a standard deviation of 3 min. For study cases, the average setup time was 7.27 min+1.25 min. Interestingly, 54% of human camera holders reported discomfort in their arm, back or neck throughout the procedure.

**Conclusions:** The AutoLap system provides improved image stability, staff interactions, and enhanced ergonomic comfort for the surgical team. It also offers cost-savings from decreased staffing requirements for hospitals that routinely use staff camera holders. The system set up of 7–8 min was less variable after 20 cases, representing the learning curve. In addition, our approach identified problems with the system that require improvement by the manufacturer. Notably, we identified significant ergonomic problems for human camera holders, which has been previously described and can be addressed by this device.

**P492****Gastric Leaks Arising After Bariatric Surgery and an Innovative Approach to Closure**

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**Background:** Gastric leaks continue to be a troubling predicament for physicians and patients alike. They are especially concerning after bariatric surgery. Electrolyte abnormalities and dehydration continuously pose a life threatening problem in these patients.

**Methods:** This is an IRB approved retrospective review of our experience with a biologic tissue mesh plug closure of gastric leaks. Our interventional radiology colleagues percutaneously accessed the perigastric collection with a wire and a straight catheter was guided through the gastric wall defect and advanced over the wire until it was intraluminal. The surgeon then placed an endoscope down to the level of the gastric defect. The wire was then retrieved by the endoscope achieving percutaneo-oral wire access. The biologic tissue matrix was then measured and cut to a square and inverted into a cone like structure with a flat straight piece on the open end. The cone patch was then secured to the wire with 0 braided polyglactin suture loop. The wire was then withdrawn back through the gastric defect pulling the plug and patch into position and placement was confirmed by endoscopy.

**Results:** We attempted closure of a gastric leak arising after bariatric surgery in six patients. Five underwent successful deployment while one had premature disconnection of the plug from the wire and could not be deployed. The five who had successful deployment had immediate success and within days resumed enteral intake of liquids and resolution of the leak. Two of the six patients additionally underwent covered stent placement to stent a stenotic area at the incisura angularis from the esophagus to the antrum. This stent was typically removed 1–2 weeks later. There were no complications related to the procedure or the plug. Only one patient has undergone repeat endoscopy to evaluate the status of the plug. In that patient an ulcer at the plug site was visualized one month after the procedure. Three months later endoscopy showed the clean ulcer had shrunk to half of the original ulcer size.

**Conclusion:** This novel minimally invasive technique utilizing IR and endoscopic placement of a biologic mesh plug into gastric leaks after bariatric surgery has been highly successful in treating chronic and subacute gastric leaks. We recommend that these endoscopic techniques be used to close gastric defects prior to operative intervention.

**P493****Reflux-associated Injury of the Remnant Esophagus After Hybrid Ivor Lewis Esophagectomy – Gastrointestinal Function Testing Using the Minimally Invasive laryngopharyngeal PH Probe (Restech) in a Human Reflux Model**

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**Introduction:** Laryngopharyngeal PH monitoring is a relatively new reflux testing device that needs more validation. Previous studies have shown that patients after esophagectomy can ideally serve as a human reflux model. Aim of this study is to further evaluate the acid exposition based on a newly developed minimally invasive laryngopharyngeal PH monitoring device (Restech) and to correlate the results with conventional esophageal pH monitoring.

**Methods:** In our esophageal center of excellence, more than 250 esophageal surgeries are performed annually. All patients undergoing minimally invasive hybrid Ivor Lewis esophagectomy are prospectively entered in our IRB approved database and undergo a routine check-up program with yearly surveillance endoscopies and further exams following surgery. Only patients with a complete check-up program and reflux symptoms were offered inclusion into this study and evaluated using 24-h laryngopharyngeal and concomitant esophageal pH-monitoring. Subsequently, the relationship between the two techniques was evaluated. A total of 75 patients with R0 resection and reflux symptoms after esophagectomy are scheduled to be included in this prospective study.

**Results:** A total of 35 (7 females) patients with a median age of 62 (range 39–80) were recruited from 05/2016 to 09/2017 after minimally invasive Ivor Lewis esophagectomy (median follow up 29 months). Adenocarcinoma was present in 23 patients, squamous cell carcinoma in 12 patients. All patients showed mucosal damage of the esophageal remnant upon endoscopic evaluation. GERD related symptoms were found in all patients: heart burn (70%), dysphagia (42%), regurgitation (72%), cough (19%), hoarseness (7%), globus sensation (30%), and retrosternal pain (60%). A total of 30 patients (86%) had a pathological conventional esophageal pHmetry. In laryngopharyngeal pHmetry, 24 patients (69%) had pathological acid exposure. In these patients, laryngopharyngeal reflux was more present in the upright (100%, mean Ryan Score 109 [range, 10–409]) than in the supine position (23%, mean Ryan Score 15 [range, 2.2–149]). In this human reflux model, esophageal pHmetry correlated well with laryngopharyngeal pHmetry (94%).



**Fig.1 Restech Device, intraoral placement**

**Conclusion:** Patients following esophagectomy and reconstruction with gastric interposition do ideally serve as a human reflux model. Interestingly, laryngopharyngeal reflux phases occur mainly in the upright position. This study helps to further validate laryngopharyngeal pH-metry.

**P494****Experience of Using a Spray-Type Anti-adhesion Barrier in Laparoscopic Surgery for Colorectal Carcinoma**

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**Introduction:** Laparoscopic surgery has spread worldwide and become a standard procedure among many abdominal surgical fields. The incidence of postoperative adhesion, which is a typical postoperative complication, is considered low compared with that after laparotomy, but once complications develop, such as adhesion-induced intestinal obstruction and chronic abdominal pain, the low-invasiveness of laparoscopic surgery may decrease markedly. While we have previously used a sheet-type absorbable barrier to prevent adhesion, it requires a technique in many cases when it is applied in the abdominal cavity. In this study, we used a spray-type absorbable barrier, which is considered simple to apply, as an adhesion-preventing absorbable barrier following laparoscopic surgery.

**Subjects and Methods:** A spray-type absorbable barrier for prevention of adhesion (Ad Spray type L®) was applied to the dissected surface, port region, and beneath the small incised wound in 5 patients who underwent laparoscopic surgery of the large intestine after February 2017. The nozzle is long (334 mm in length) and the angle of the tip is adjustable to some extent, so that the spray could be applied easily to the target region, even in areas in which it would be difficult to secure a work space, by rotating the shaft and finely adjusting the angle of the tip. In order for the barrier to remain in the target region, this preparation must remain viscous after application.

**Discussion:** Approaches for the insertion and affixing of a conventional sheet-type absorbable barrier for the prevention of adhesion has been reported previously by various researchers. The adhesion-preventing absorbable barrier used in this study was a spray type with a long nozzle, which may have been useful because it made the laparoscopic application easy. However, its application requires some experience and time for preparation compared with the use of the sheet type, which could be disadvantageous. Further accumulation of cases, including evaluation of prevention of adhesion after use of the adhesion-preventing absorbable barrier may be necessary.

**P495****Fibrin Versus Cyanoacrylate for Fixation in Laparoscopic Inguinal Hernia Repair**

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**Introduction:** Evidence has demonstrated that biosynthetic glue for laparoscopic inguinal hernia repair results in decreased pain. However, the two glue sub-types (biologic—fibrin based; synthetic—cyanoacrylate based) have never been compared. This study aims to assess the outcomes of those subtypes.

**Method and Procedures:** A systematic review of the MEDLINE database was undertaken. Randomized trials assessing the outcomes of laparoscopic inguinal hernia repair with penetrating and glue fixation methods were considered for inclusion and data analysis. Thirteen trials involving 1633 patients were identified with eight trials utilizing fibrin and five trials utilizing cyanoacrylate.

**Results:** There were no differences in recurrence or wound infection between the glue subtypes when compared individually to penetrating fixation alone or indirectly to each other. There was a significant reduction in urinary retention with fibrin glue when compared to penetrating fixation (OR 0.31, 95% CI 0.12–0.81). No studies utilizing cyanoacrylate analyzed urinary retention as an outcome. There were non-significant trends in reduction of hematoma and seroma for both glue subtypes when compared to penetrating fixation (OR 0.71, 95% Confidence Interval 0.50–1.01).

**Conclusions:** Glue fixation in laparoscopic inguinal hernia repair reduces the incidence of urinary retention and may reduce the rate of hematoma or seroma formation. As there are no differences in outcomes when comparing fibrin or cyanoacrylate glue, surgeons should choose the glue that is available at the lowest cost at their respective institution.

**P496****Feasibility of an Optical Lens System Covering the Range from Macroscopic to Microscopic**

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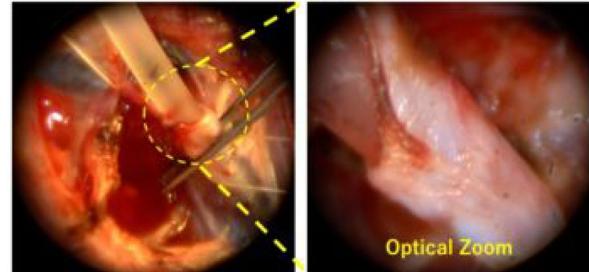
**Introduction:** Magnification of the visual field in laparoscopic surgery is an advantage compared to open surgery. Utilizing this advantage in open surgery may improve the safety of operations. However, improvement of the optical system is necessary to further utilize this advantage. We are developing an optical lens system covering the range from macroscopic to microscopic.

**Methods:** We developed a handheld prototype created by combining the objective lens system of an optical microscope and a telescope lens. A feasibility study using a porcine model was conducted. Macroscopic observation was done at a distance followed by microscopic observation in contact with tissue. First, we observed the operative field macroscopically. We then observed the serosa of the small intestine microscopically, and effects of blood flow occlusion were studied.

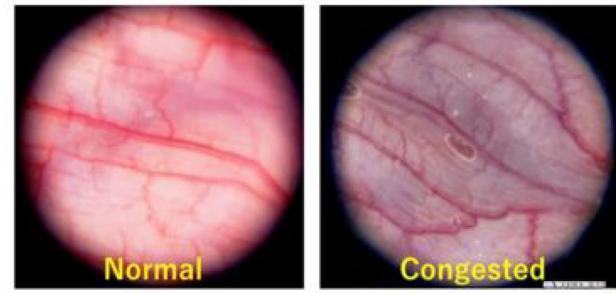
**Results:** (fig.1 and fig.2)

The same visual field as ordinary laparoscopy was achieved during macroscopic observation, while using microscopic observation it was possible to observe the complex peristaltic movements of the intestine. The minute blood vessels of the visceral peritoneum and larger, deeper blood vessels were also observed. When the mesenteric vessels were occluded, changes in peristaltic movement were seen directly. Congestion in blood vessels in the deep layers of the serosa was observed. Improvement in peristalsis and congestion were confirmed by restoring blood flow.

**fig.1) Macroscopic View of the Operative Field**



**fig.2) Microscopic Appearance of the Small Intestinal Serosa**



**Conclusions:** This system enables direct visual observations not possible with conventional optics. This system can be utilized in both laparoscopic and open surgery. The microscopic visual information obtained by this system may help with intra-operative decision making and serve to facilitate safe and precise surgery.

**P497****Novel Fluorescent Dyes For Real-Time, Intraoperative, Organ-Specific Visualization of Biliary and Urinary Systems Using Dual-Color Near-Infrared Imaging**

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**Introduction:** Accurate, real-time visualization is critical for efficient, effective and safe surgery. Although optical imaging using near-infrared (NIR) fluorescence has been used for visualization of anatomic structures and physiologic functions in open and minimally invasive surgeries, its efficacy and adoption remain suboptimal due to the lack of specificity and sensitivity. Herein, we report a novel class of compounds, which are exclusively metabolized in liver or kidney, rapidly excreted into to biliary or urinary systems, and emitted two different NIR fluorescence spectra.

**Methods:** Novel, water-soluble heptamethine cyanines; Compound X (biliary) and Compound Y (urinary), unreactive towards glutathione and the cellular proteome were synthesized, and visualized using real-time, dual-color NIR imaging device. Sprague-dawley rats ( $n=12$ ) and Yorkshire pigs ( $n=9$ ) were used to demonstrate and validate its usefulness, distributed into a control group (ICG; rat  $n=3$ , IRDye800CW rat  $n=3$ ), a biliary group (Compound X; rat  $n=3$ , pig  $n=3$ ), a urinary group (Compound Y; rat  $n=3$ , pig  $n=3$ ), and dual-labeling group (Compound X&Y; rat  $n=3$ , pig  $n=3$ ). Each rat and pig received one or two of the compounds at optimized dose of 0.09-mg/kg intravenously, fluorescence signals and bio-distributions were monitored and recorded over time. The target to background ratio (TBR) was calculated in each target systems and compared to assess sensitivity and specificity.

**Results:** Compound X was rapidly cleared from liver within 15 min after intravenous injection while the fluorescence signals in biliary system lasted up to 1 h both in rats and pigs. Compound Y showed significant renal excretion up to 4 h and the urinary signals remained up to 2 h. They were both highly specific to target organs with TBR values of 4.23 (biliary), 6.32 (urinary) and 1.23 (cf, ICG) at peak signals. These new compounds have approximately 2–3 times higher quantum yields than ICG and 1.75–2.5 times higher specificity to kidney and liver than IRDye800CW. One-way ANOVA showed significant differences between control, biliary, and urinary group ( $p<0.0001$ .) Dual-labeling results also showed a complete separation of these two metabolic systems ( $p=0.008$ ) and a real-time display of these two systems were clearly visualized with pseudo-colored labeling inside the animal body.

**Conclusion:** We report a new generation of organ-specific, real-time fluorescent markers for intraoperative visualization, navigation and potential geo-fencing. These new compounds have significantly higher quantum yields and higher specificity to visualize kidney and/or liver than any currently available reagents.

**P498****Establishing a Novel Design for New Stapler Testing in Bariatric Surgery: A Survival Study in Porcine Models Undergoing Laparoscopic Sleeve Gastrectomy**

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**Background:** Porcine models have been widely accepted for gastrointestinal surgery studies, due to their similarities to human anatomy, histology and physiology. Devices such as laparoscopic staplers have been widely used in bariatrics and are currently the cornerstone of bariatric. There are currently few published articles regarding surgical stapler testing in porcine models by means of a survival design. The purpose of this study is to present a new model for stapler testing in porcines. We present the following study in which we asses a novel stapler's feasibility and safety, and its compatibility to currently used stapler reloads. This novel stapler, the AEON™ Endoscopic Linear Stapler (Lexington Medical Inc., Billerica, MA. Pending FDA approval), has been previously tested In-Vitro and In-Vivo by the Lexington Medical engineering department in matters of mechanical function, staple line bursting pressure, staple formation and hemostasis. Duffy et al. used this instrument for small bowel anastomoses in a two-week survival study in porcine models.

**Methods and Procedures:** Four porcine animal model was used under IACUC protocol for a 29-day survival study held at the FIU (Doral, FL, U.S.A) research facility. All animals underwent sleeve gastrectomy using the novel stapler handle, combined with the Endo GIA™ (Medtronic, Mansfield, MA) 4 mm-staple reloads in two of the animals and AEON™ 4 mm-staple reloads in the remaining two. No reinforcements or oversewing of the staple line was done. These procedures were performed by two bariatric surgeons. Animals were monitored perioperatively by the facility staff as per protocol. The animals were euthanized at day 29. Post-mortem assessments were done blindly. Gross evaluation and comparison of the gastric tube and their staple lines was done, as well as patency, strictures, and staple line integrity.

**Results:** Stapler function was equivalent with both reload brands, no technical issues were encountered. 3–5 firings were used per animal. No intraoperative complications related to stapler function ensued. No postoperative complications were encountered. All animals survived the full length of the study—29 days. All sleeves were patent, no strictures or bowel obstruction were present.

**Conclusions:** In an animal survival study, a follow-up period of 4 weeks appears to be a good benchmark for stapler testing. The use of the novel stapler for gastric resections appears feasible and safe. Further studies such as microscopic examination of the staple lines, might help confirm equivalence, safety and feasibility of these products for the sleeve gastrectomy procedure.

**P499****The Use of a Smoke Evacuation Device Reduces the Risk of Surgical Prep-Associated Fires**

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**Introduction:** The PURPOSE of our study was to evaluate the impact of smoke evacuation devices on operating room fires caused by surgical skin preps. Surgical fires are rare but preventable events that cause devastating injuries. Alcohol-based surgical skin prep serves as the fuel for a fire ignited by electrosurgical instruments. We HYPOTHEZIZED that increasing air exchanges near the tip of the active electrode will reduce the concentration of alcohol thus reducing the incidence of surgical fires.

**Methods:** A standardized, ex vivo model was created with a 15 × 15 cm section of clipped, porcine skin. Surgical skin preparations tested: 70% isopropyl alcohol with 2% chlorhexidine gluconate (CHG-IPA) and 74% isopropyl alcohol with 0.7% iodine povidone (Iodine-IPA). Based upon previous studies, a high-risk situation was replicated with immediate energy activation in the presence of pooled alcohol-based prep. The site was draped to simulate a small surgical procedure with approximately 25 square cm exposed. (Figure 1) A standard and smoke evacuating electro-surgical pencil was activated for 3 s on 30 W coagulation mode in the presence of 21% Oxygen. A standard wall suction was also tested with the tip held 5 cm from the tip of the electrosurgical pencil. A Chi-square test was used to compare differences between groups.

**Results:** Surgical fires were created in 80% (16/20) of the tests with the CHG-IPA and 95% (19/20;  $p=0.34$ ) of the tests with Iodine-IPA. Continuous wall suction did not change the incidence of fire. The smoke evacuation electrosurgical pencil significantly decreased the incidence of fire when compared to the standard pencil and continuous wall suction for both preparations (Table 1). With CHG-IPA, the smoke evacuation electrosurgical pencil decreased the frequency of fire by 81% (Figure 2,  $p<0.001$ ). Similarly, when using Iodine-IPA, the electrosurgical pencil with integrated smoke evacuation demonstrated a 73% decrease in fires (figure 2,  $p<0.001$ ).

**Conclusion:** Alcohol-based skin preps fuel surgical fires. The use of a smoke evacuator electro-surgical pencil reduces the occurrence of surgical fires. Elimination of alcohol-based preps and the use of smoke evacuation devices decrease the risk of operating room fires.

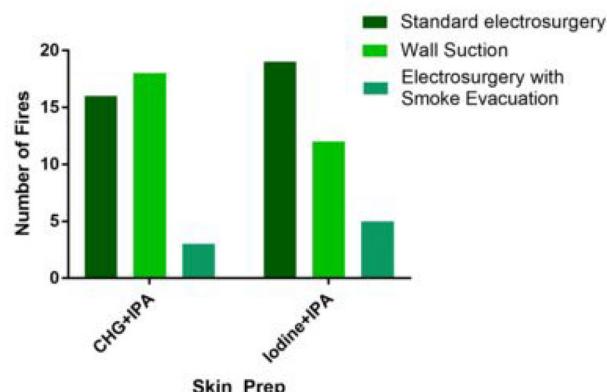
**Table 1: Comparison of Frequency of Fires**

Device	Number of Fires (20 trials)		
	standard electrosurgery	Wall Suction	Electrosurgery with smoke evacuation
CHG+IPA	16	18 <sup>a</sup>	3***
Iodine+IPA	19	12 <sup>a</sup>	5***

\*\*\*  $P<0.001$

$a P>0.3$

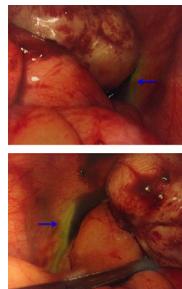
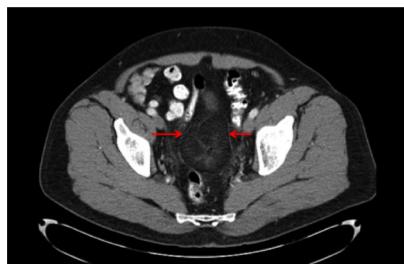
**Figure 1:comparison of Fire Frequency**



**P500****The Ureters Are Lit: Intraureteral Injection of Indocyanine Green for Identification of Ureters in Laparoscopic Surgery**

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Ureteral stents have historically been used in pelvic surgery when anatomical or clinical considerations warrant urological expertise to aid in identifying the ureters. In the colorectal and gynecologic surgery literature, prophylactic ureteral stents appear to increase the ability to detect ureteral injuries while not being shown to prevent such injuries. With the increasingly widespread use of laparoscopy and the robotic platform in complex colorectal and pelvic surgery, the utility of stents remains unclear. One of the limiting factors regarding the use of ureteral stents in minimally invasive surgery is the lack of tactile feedback; the inability of the surgeon to directly palpate the stents. One proposed method to overcome this deficiency has been the use of lighted ureteral stents. Increased operating time, increased cost, and need for specialized equipment are potential drawbacks of lighted stents. An alternative to using lighted stents in minimally-invasive surgery is to directly inject indocyanine green (ICG) into the ureters after cystoscopy-guided placement of ureteral stents. Intraoperative visualization of the ureters is achieved by using either the PINPOINT Endoscopic Fluorescence Imaging System in laparoscopy, or FIREFLY integrated with the robotic platform. It is hoped that the risk of inadvertent ureteral injuries during colorectal and pelvic operations will be minimized using this technique, due to improved visualization of the ureters throughout the procedure. In this case presentation, we describe a novel use of ICG in a patient undergoing a laparoscopic surgery for resection of a  $6.7 \times 8.0 \times 5.1$  cm pelvic mass abutting the bladder, sigmoid colon and left ureter. Preoperatively, there was concern that the mass would be intimately adherent to, or even invading, the bilateral ureters based on CT scan findings. After ureteral injection of ICG, visualization of both ureters was easily achieved at the time of operation, and the procedure proceeded with careful and safe dissection of the mass with visualization of the ureters at all times. Though there is a paucity of studies evaluating the use of ICG in the laparoscopic modality, this technique was safe, easy to employ, inexpensive and very useful to visualize the ureters intraoperatively. Indeed, larger studies with appropriate sample sizes would help to further validate this novel use of ICG.

**P501****Waiting Three Minutes After Application of Alcohol-Based Skin Preparation Does Not Reduce Operating Room Fires**

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**Introduction:** Operating room fires are “never events” that expose the patient to the risk of devastating complications. Our group has previously demonstrated that alcohol-based surgical skin preparations fuel operating room fires. Manufacturer guidelines recommend a three-minute delay after application of alcohol-based preps to decrease the risk of prep pooling and surgical fires. The purpose of this study was to evaluate the efficacy of the three-minute dry time in reducing the incidence of surgical fires.

**Methods and Procedures:** A standardized, ex vivo model was used with a  $15 \times 15$  cm section of clipped, porcine skin. Alcohol-based surgical skin preparations tested were 70% isopropyl alcohol (IPA) with 2% chlorhexidine gluconate (CHG) and 74% IPA with 0.7% iodine povidone-iodine (Iodine-IPA). Nonalcohol-based solutions included 2% chlorhexidine gluconate and 1% povidone-iodine “paint.” An electrosurgical “Bovie” pencil was activated for 3 seconds on 30 Watts coagulation mode in 21% oxygen, both immediately and 3 minutes after skin preparation application, with and without solution pooling.

**Results:** No fires occurred with immediate testing of nonalcohol-based preparations (0/40). Alcohol-based preps created flames on immediate testing in 83% (33/40) of cases when pooling was present. Without pooling, flames occurred in 40% (16/40) of cases on immediate testing. After a 3-minute delay, there was no difference in the incidence of fire when pooling was present (33/40 vs. 33/40,  $p>1$ ). Similarly, there was no difference when pooling was not present (16/40 vs. 14/40,  $p=1$ ). (Table 1)

**Conclusions:** Alcohol-based surgical skin preparations fuel surgical fires. Waiting 3 minutes for drying of the surgical skin prep did not change the incidence of surgical fire (regardless of whether there was pooling of the prep solution). The use of nonalcohol-based skin preps eliminated the risk of fire.

**Table 1: Fire Incidence by Group**

Group Details	Flame	%
<b>Pooling, Immediate</b>		
CHG-IPA (n=20)	17	85.0%
Iodine-IPA (n=20)	16	80.0%
group total (n=40)	33	82.5%
<b>Pooling, 3-minute wait</b>		
CHG-IPA (n=20)	16	80.0%
Iodine-IPA (n=20)	17	85.0%
group total (n=40)	33	82.5%
<b>NO pooling, Immediate</b>		
CHG-IPA (n=20)	9	45.0%
Iodine-IPA (n=20)	7	35.0%
group total (n=40)	16	20.0%
<b>NO pooling, 3-minute wait</b>		
CHG-IPA (n=20)	6	30.0%
Iodine-IPA (n=20)	8	40.0%
group total (n=40)	14	35.0%



**P502****Trocar Site Closure with a Novel Anchor Based (Neoclose®) System Versus Standard Suture Closure: Preliminary Results from a Prospective Randomized Controlled Trial**

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**Introduction:** Laparoscopic port sites are associated with a significant incidence of long-term hernia formation. In addition, closure with closed loop suture may lead to increased post operative pain thereby limiting patient mobility. The development of novel trocar closure systems could offer a pathway towards quality improvement and warrants investigation. We performed a randomized controlled trial comparing a novel anchor based system (Neoclose®) versus standard suture closure.

**Methods:** A prospective randomized controlled trial of 70 patients undergoing port site closure following robotic assisted laparoscopic sleeve gastrectomy or gastric bypass was completed (35 with Neoclose® device and 35 with standard laparoscopic suture closure). Each patient had both the camera port and stapling port closed (70 port sites in each group). Primary outcome measures included the incidence of hernia (6 week ultrasound), time for port site closure, and depth of needle penetration. Secondary outcome measures were analog pain scoring at post op day 1, week 1 and week 6.

**Results:** Physical exam as well as ultrasound evaluation showed no hernias in either group at 6 weeks. When compared to suture closure, the Neoclose® device was associated with shorter closure times ( $20.2 \pm 1.2$  versus  $30.0 \pm 2.4$  s,  $p < 0.001$ ) and needle depth penetration ( $3.3 \pm 0.1$  versus  $5.2 \pm 0.2$  cm,  $p < 0.001$ ). The Neoclose® device was associated with decreased pain at 1 week after the operation (analog pain score  $0.3 \pm 0.1$  versus  $0.9 \pm 0.2$ ,  $p < 0.01$ ). No difference in pain scoring was observed on post operative day 1 or at week 6.

**Conclusions:** Trocar site closure with the Neoclose® device is associated with decreased closure times and needle depth penetration. No difference in the incidence of hernias was identified very early after operation. The Neoclose® device led to decreased pain 1 week after trocar closure which is potentially secondary to decreased tension when compared to closure with closed loop suture. Long term hernia data (1 year) is pending with patients scheduled for follow up physical exams and ultrasounds.

**P504****A Proposal of a Training Curriculum for the Use of the Flexdex Articulated Laparoscopic Needle Driver**

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**Introduction:** Robotic instruments provides a better ergonomics during suturing compared to standard laparoscopy. Minimally invasive procedures with limited need of few suture may benefit from an economically affordable device able to overcome some limitations of laparoscopic suturing. FlexDex surgical recently obtained the FDA approval for human use of its articulated laparoscopic needle driver. The official training provided by the Company (available at <https://flexdex.com/register-for-training>) is a 3 h basic dry lab. The training curriculum as well as the accreditation process is not well structured. No literature is available today on this matter. Our goal was building a dedicated training, to allow a safe and predictable early use in humans.

**Methods and Procedures:** The training module design and implementation was done in our minimally invasive laboratory. In the preliminary phase we define with a small group of residents and research specialists a short list of mandatory concepts to detail showing the instrument. A simple suturing task was then performed by the same group with the new device, laparoscopically and with the robot, available in our lab for training only. A more complex task, based on a dedicated self-designed high-fidelity model of urethral anastomosis was then proposed, exploring different options (one FlexDex only vs two FlexDex, surgeon vs assistant holding the camera). Lastly, we applied the new device in animals to evaluate the usefulness of including simple tasks or entire procedures in the training curriculum.

**Results:** We were able to define a multilevel, adaptable training module including a basic information session, a dry lab with inanimate low- and high-fidelity models and a pig lab. Subjects with different level of expertise (medical student, resident, fellow, expert and very expert surgeon) were involved to have an extensive feedback. However, our main focus was to design a training module for laparoscopic and robotic surgeons, to safely introduce the FlexDex in their practice. The only outcome for this preliminary work was collected through a “post exposure” survey. The expert surgeon that did the entire training was able to give feedback after his first application of the device in humans as well.

**Conclusions:** FlexDex is a promising device, available in the United States in approved facilities only. A minimally invasive lab with high laparoscopic and robotic training experience is the ideal setting to build a curriculum. A first adaptable, multilevel, original, high-fidelity training is proposed to be validated with further studies and could be implementable for accreditation purposes.

**P505**

### Augmenting Spatial Awareness in Laparoscopic Surgery by Immersive Holographic Mixed Reality Navigation Using HoloLens

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**Objectives:** Endoscopic minimally invasive surgery provides a limited field of view, thus requiring a high degree of spatial awareness and orientation. Because of a 2D field of endoscopic view, a surgeon's spatial awareness is diminished. This study aims to evaluate the efficacy of our novel surgical navigation system of immersive holographic mixed reality (MR) using a head-mounted smart glass display HoloLens to enhance spatial awareness of the operating field in laparoscopic surgery. The authors describe a method of registering and overlaying the preoperative MDCT imaging localization of tumors, vessels, and organs onto the real world in the operating theatre through holographic smartglasses in augmented reality (AR).

**Methods:** In this study we included 20 laparoscopic GI, HPB, urology, and gynecologic surgeries using this system. We developed a CT-based patient-specific holographic MR surgical navigating application using HoloLens, that is a pair of see-through monitors built-in head-mounted display.

By reconstructing the patient-specific 3D surface polygons of tumors, vessels, and organs out of the patient's MDCT, MR anatomy was displayed on the see-through glasses three-dimensionally during actual surgery. The HoloLens features an inertial measurement unit which includes an accelerometer, gyroscope, and a magnetometer for environment understanding sensors, an energy-efficient depth camera, a photographic video camera, and an ambient light sensor.

**Results:** The accurate surgical anatomy of size, position, and depth of the tumors, surrounding organs, and vessels during surgeries could be measured using build-in dual infrared light sensors. The exact location between surgical devices and patient's anatomy could be traced on the pair of MR smart-glasses by satellite tracking. The gesture controlled manipulation by surgeons' hands with surgical gloves was useful for intraoperative anatomical references of tumors and vascular position under sterilized environment. It allowed the user to manipulate the spatial attributes of the virtual and real anatomies. This system reduced the length of the operation and discussion time. This could support complex procedures with the help of pre- and intra-operative imaging with better visualization of the surgical anatomy and spatial awareness with visualization of surgical instruments in relation to anatomical landmarks.

**Conclusions:** The immersive holographic MR system provides a real-time 3D interactive perspective of the inside of the patient, accurately guiding the surgeon. This helps spatial awareness of the surgeons in the operating field and has illustrative benefits in surgical planning, simulation, education, and navigation. Enhancing scene visualization is a feasible strategy for augmenting spatial awareness in laparoscopic surgery.

**P506**

### Laparoscopic Cutting and Suturing Using the Radius r2 DRIVE Instruments: Surgical Performance and Ergonomics

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**Introduction:** New handheld devices have been developed in order to address the technical limitations and ergonomic issues present in laparoscopic surgery. The aim of this study is to analyze the surgeon's performance and ergonomics using the Radius r2 DRIVE instruments (Tübingen Scientific Medical, Germany) during the execution of laparoscopic cutting and suturing tasks.

**Methods and Procedures:** Three experienced laparoscopic surgeons performed both an intracorporeal suturing task and a cutting task on a box trainer. Both tasks were repeated three times. A Maryland dissector and a pair of scissors were used for the cutting task. For the suturing task, a Maryland dissector and needle holder were used. Conventional laparoscopic instruments and their equivalent r2 DRIVE instruments were used. The order in the use of the type of instruments was randomized. Execution time and surgeon's ergonomics were assessed. For the latter, surface electromyography (trapezius, deltoid and paravertebral muscles) and the NASA-TLX index were analyzed. For the cutting task, the percentage of the area of deviation from the cutting pattern (% of error) was assessed. The suturing performance was assessed by means of a task-specific validated checklist.

**Results:** Surgeons required more time to perform both laparoscopic tasks using the r2 DRIVE instruments. The use of both instruments had a similar percentage of deviation from the exterior part of the cutting pattern. However, the deviation from the inner part was significantly higher using the r2 DRIVE instruments (Conv:  $7.9 \pm 1.3\%$  vs r2 DRIVE:  $10.8 \pm 2.1\%$ ;  $p < .05$ ). Needle driving was scored lower using the r2 DRIVE instruments, but quality of knot tying was similar to conventional instruments. The use of r2 DRIVE increased the muscle activity of the trapezius muscles bilaterally for both laparoscopic tasks. This muscle activity also increased for the left deltoid muscle during the cutting task. Surgeons stated that the use of r2 DRIVE instruments leads to a higher mental and physical workload when compared to traditional laparoscopic instruments.

**Conclusions:** Despite the novel and ergonomic design of the r2 DRIVE laparoscopic instruments, the results of this study suggest that an improvement in surgical performance and physical workload is required prior their use in an actual surgical setting. Further studies should be done to analyze the use of these instruments during other laparoscopic tasks and procedures. We believe that surgeons need a longer and comprehensive training period with these laparoscopic instruments to reach their full potential in laparoscopic practice.

**P507**

### 3D Printing in Laparoscopic Liver Resections: An Initial Experience

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**Background/Objectives:** 3D printing has been shown to be a useful tool for preoperative planning in various surgical disciplines. However, there are only several single case reports in the field of liver surgery. This is because of problematic visualization of anatomy, difficulties in methodology and—most importantly—high costs limiting implementation of 3D printing. The goal of this study is to evaluate the utility of personalized 3D-printed liver models as routinely used tools in planning and guidance of laparoscopic liver resections.

**Materials and Methods:** Contrast-enhanced computed tomography images of 6 consecutive patients who underwent laparoscopic liver resections in a single centre were acquired and processed. Proper segmentation algorithms were used to obtain virtual models of anatomical structures, including vessels, tumor, gallbladder and liver parenchyma in STL (stereolithography) format. After processing files, models in parts were subsequently printed with desktop Ultimaker 2+ (Ultimaker, Netherlands) 3D printer, using polylactic acid filaments as printing material. All parts were matched together to create a mold, which was later casted with transparent silicone. Models were delivered to surgical teams prior to the surgery as well as used in patients' education.

**Results:** Up to now, six full-sized, transparent, personalized liver models were created before laparoscopic liver resections and used as a tool for preoperative planning and intraoperative guidance. Usefulness of these models has been evaluated qualitatively with surgeons. Operative data was obtained for each patient and it will be used for quantitative analysis in further study phases. Costs of one model varied between \$100 and \$150 and whole process of development took approximately 5 days in every case.

**Conclusions:** 3D-printed models allow precise planning in complex cases of minimally invasive liver surgery by providing high-quality visualization of patient-specific anatomy. Implementation of this technology might potentially lead to clinical benefits, such as reduction of operative time or improvement of short-term outcomes. Having said that, more data is needed to decisively prove these hypotheses.



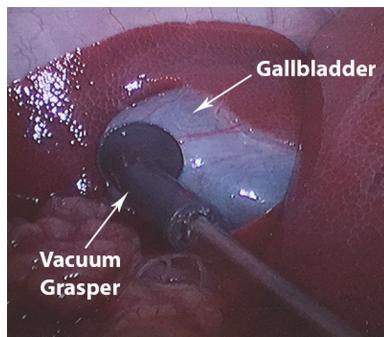
Fig 1. Three different 3D printed liver models. Visible: inferior vena cava and hepatic veins (blue), portal vein (grey), tumor (green).

**P508****A Novel Vacuum Grasper to Reduce Tissue Injury in Laparoscopy**

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**Introduction:** Modern laparoscopic graspers may risk inadvertent injury to tissues, and have been shown to produce crush and puncture injuries. In addition, the force transmitted to the tissues by grasper handles can be highly variable, dependent on the orientation and amount of tissue engaged by the grasper. We have developed a novel vacuum-based laparoscopic grasper designed to reduce tissue injury from grasping. The aim of this study is to compare the incidence and severity of tissue trauma caused by vacuum-based graspers versus standard compressive graspers while manipulating tissue.

**Methods and Procedures:** We performed an *in vivo* surgical porcine study to assess gross and histologic tissue injury after grasping trials. Grasping trials were divided equally between two adult porcine models; 43 samples of small bowel were grasped with a standard atraumatic laparoscopic grasper (Aesculap double-action atraumatic wave grasper) and 85 were grasped with our novel vacuum grasper with varying vacuum head designs (45 for head A, 20 each for heads B and C). Following grasping, the porcine model was allowed to dwell for 2 hours prior to harvest. Gross injury was graded as follows: 1) no injury, 2) ecchymosis only, 3) serosal injury, 4) seromuscular injury, and 5) perforation. Histologic injury was graded as follows: 1) serositis, 2) partial-thickness injury to the muscularis propria (MP), 3) full-thickness MP injury, and 4) full-thickness MP and mucosal injury. Mann-Whitney U test was performed to compare both gross and histologic injury scores between the groups.



**Results:** On gross assessment, no samples were noted to have injury more severe than ecchymoses following grasping. The vacuum grasper was found to cause more ecchymosis (median=2) than the compressive laparoscopic grasper (med.=1,  $U=2591$ ,  $p<0.001$ ). On histologic assessment, the compressive grasper caused significantly more severe injury (med.=3) compared to the vacuum grasper (med.=2,  $U=1355$ ,  $p=0.008$ ). Subgroup analysis showed that heads A (med.=2,  $U=741.5$ ,  $p=0.04$ ) and B (med.=2,  $U=558$ ,  $p=0.047$ ) caused significantly less injury compared to the compressive grasper. Head C (med.=2,  $U=311.5$ ,  $p=0.065$ ) also showed less injury but did not reach statistical significance.



**Conclusion:** This study demonstrates that our novel laparoscopic vacuum grasper produces less tissue trauma than standard compressive graspers. Vacuum-based grasping is a viable alternative for reducing inadvertent tissue injury in laparoscopy.

**P509****Evaluation of the Surgical Performance, Workload and Ergonomics During the Urethrovesical Anastomosis Performed with a Handheld Robotic Needle Holder**

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**Introduction:** The aim of this study is to analyze the surgeon's performance, workload and ergonomics using an ergonomically designed handheld robotic needle holder during laparoscopic urethrovesical anastomosis in an animal model, and comparing it with the use of a conventional laparoscopic needle holder.

**Methods and Procedures:** Six experienced surgeons performed an urethrovesical anastomosis in a porcine model using a handheld robotic needle holder and a conventional laparoscopic axial-handled needle holder (Karl Storz GmbH). The robotic instrument (DEX®, Dextérité Surgical) has an ergonomic handle and a flexible tip with unlimited rotation, providing seven degrees of freedom. The use of the surgical instrument was randomized. For each procedure, an expert surgeon evaluated the surgical performance in a blinded fashion using the Global Operative Assessment of Laparoscopic Skills rating scale. Besides, the quality of the intracorporeal suture was assessed by a validated suturing-specific checklist. The surgeon's posture was recorded and analyzed using the XSens MVN BIOMECH system based on inertial measurement units. The surgeon's workload was evaluated by means of the NASA Task Load Index, a subjective, multidimensional assessment tool. The patency of each anastomosis was assessed using Methylene blue.

**Results:** All urethrovesical anastomoses were completed without complications. Only one anastomosis with the robotic device failed the patency test. Surgeons showed similar surgical skills with both instruments, although they presented greater autonomy with the conventional instruments ( $p=.048$ ). For the suturing performance, the use of the robotic device led to an increase in the number of movements during the needle driving and lower tendency to follow its curvature during the withdrawal maneuver ( $p=.007$ ). The level of workload increased with the robotic device. However, the surgeon's satisfaction with the surgical outcome did not differ using both instruments. The use of the robotic instrument led to similar posture of the shoulder and wrist and better posture of the right elbow ( $p=.026$ ) when compared to the conventional instrument.

**Conclusions:** The use of the robotized needle holder obtained similar results for the surgical performance and surgical outcome of the urethrovesical anastomosis when compared to the conventional instrument. We consider that aspects such as the surgeon's autonomy, dexterity in driving the needle and workload could be improved with a comprehensive training with the new device. Inertial sensors can be an alternative for actual and crowded surgical environments. Surgeons acquired a better body posture using the novel robotic needle holder.

**P510**

### Comparison of Thermal Spread Between Bipolar Vessel Sealing System and Ultrasonic Scissors: Significant Correlation with Postoperative Complications After Thoracoscopic Esophagectomy

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**Introduction:** Temporal and spatial tissue temperature profile in electrosurgical devices, such as ultrasonic scissors and bipolar vessel sealing system, was experimentally measured, and the incidence of postoperative complications after thoracoscopic esophagectomy was assessed according to the electrosurgical devices used.

**Methods and Procedures:** Experiment of thermal spread: Sonicision (Sonic) was used for ultrasonic scissors and LigaSure (LS) was used for bipolar vessel sealing system. Each device was activated in order to cut porcine muscle at room temperature. Temperatures of both the device blade and porcine tissues beside the device were measured using a temperature probe. Each experiment was performed at least three times. Room temperature was 25 degrees. Clinical analysis: The 46 patients who underwent thoracoscopic esophagectomy with 3-field lymph node dissection in the prone position were selected in the study. Incidence of postoperative complications after thoracoscopic esophagectomy was compared according to electrosurgical devices. Bronchoscopy was used for diagnosis of recurrent laryngeal nerve paralysis (RLNP). Sonic and LS was employed in 6 and 40 patients, respectively.

**Results:** Temperature of active blade and tissue pad of Sonic after 3 seconds of activation time was 100 and 68.8 degrees, respectively. That of blade of LS after single activation (approximately 3 seconds) was 44.7 degrees (Sonic vs. LS; P<0.001). Temperature of active blade of Sonic after 10 seconds of activation time increased to 270 degrees. On the other hand, that of blade of LS after three times of activation (approximately 10 seconds) was 52.1 degrees (Sonic vs. LS; P<0.001). Tissue temperature spreads of 1 mm and 2 mm lateral to Sonic were 50.8 and 44.6 degrees, respectively. Those to LS were 39.1 and 31.4 degrees, respectively (Sonic vs. LS; P=0.001). Tissue temperature spread of 1mm ahead to Sonic and LS was 39.2 and 29.2 degrees (P=0.004). Overall postoperative complications occurred in 3 (50%) and 11 (27.5%) in the Sonic and LS group, respectively (P=0.056). Incidence of RLNP and anastomotic leakage was significantly higher in the Sonic group than in the LS group (RLNP, 3 (50%) vs. 6 (15%); P=0.043; anastomotic leakage, 3 (50%) vs. 4 (10%); P=0.010).

**Conclusions:** LS might be beneficial to thoracoscopic esophagectomy in prone position in terms of thermal spread from energy device. Appropriate temporal and spatial distance from electrosurgical devices to important mediastinal structure, such as recurrent laryngeal nerve and tracheobronchial membrane, was required for avoiding postoperative complications.

**P511**

### 3D vs 2D Laparoscopic Surgery: Comparative Assessment

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**Material:** We compared 50 consecutive cases using 3D laparoscopic surgery versus 50 cases of 2D conventional laparoscopic surgery from January to June 2017. All surgical procedures were performed by experienced laparoscopic surgeons using 3D (EinsteinVision system) and HD conventional laparoscopic optic. 3D-Laparoscopic surgery offers the depth perception of the surgical field that is lost with the conventional (2D) laparoscopic surgery, and in many series is reported to be better in terms of surgical performance.

Outcome measures was operation time, surgical performance, blood losses, complications and surgeon satisfaction with the procedure.

**Results:** Cholecystectomy was the most frequent surgery performed with 19 cases (38%); hernia surgery 12 cases (24%); fundoplication 6 cases (12%), appendectomy 4 cases (8%), left colon excision with colo-rectal anastomosis 3 cases(6%), and other 6 cases (12%) which included ovarian cyst excision, liver biopsy, prostatectomy and pediatric surgery. We compared each 3D procedure with a standard laparoscopic case performed by the same surgeon during the time of the study. 3D vs 2D surgical procedures outcome measures are shown in Table 1.

We found better results in operation time, surgical performance and less blood losses in favor of three-dimensional laparoscopy (<0.05).

**Conclusion:** 3D laparoscopy reduces operation time related to better performance during the procedure. Depth perception facilitates dissection, intracorporeal knotting, mesh placement and colo-rectal anastomosis. Surgeons reported better surgical performance and comfort during 3D laparoscopy; there were any reported side effects such as headache or dizziness.

	Op Time 3D vs 2D	Performance 3D vs 2D	Blood Losses 3D vs 2D	Complication 3D vs 2D	Surgeon satisfaction 3D vs 2D	p
cholecystectomy	31.1 - 57.7*	10 - 7.0	4.9 - 13.2*	0 - 8	10 - 7.4	<.05
abd.hernia	32.5 - 74.4*	9.9 - 7.0*	5.8 - 24.4*	0 - 3	10 - 7.5	<.05
inguinal hernia	32.5 - 58.8*	10 - 7.5	4.0 - 11.3*	0 - 1	10 - 7.5	<.05
fundoplication	37.5 - 69.2*	10 - 7.2	3.2 - 10.8*	0 - 2	10 - 7.2	<.05
appendectomy	26.3 - 56.3*	10 - 7.0	3.0 - 10.0*	0 - 1	10 - 7.3	<.05
colon surgery	111.7 - 201.3*	10 - 6.7	9.3 - 21.7*	0 - 1	10 - 7.0	<.05
various	73.3 - 98.3	9.0 - 7.5*	70.8 - 80.8	0 - 1	9.7 - 7.5*	<.05

**P512**

### Can Social Media Be Used as a Surgical Research Tool? Testing Twitter as an Alternative to Traditional Study Surveys

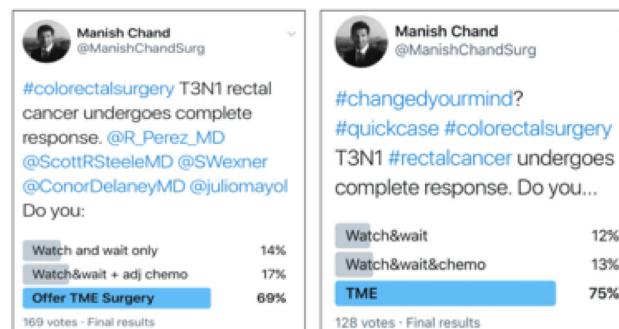
Deborah S Keller, MS, MD<sup>1</sup>, Richard R Brady, FRCS, MD<sup>2</sup>, Manish Chand, FRCS, PhD<sup>3,\*</sup>; <sup>1</sup>Colon & Rectal Surgeons of Central NJ; <sup>2</sup>University College London Hospitals, NHS Foundation Trusts, <sup>3</sup>Newcastle Upon Tyne Hospitals, NHS Foundation Trusts

**Background:** Social media (SoMe) uniquely allows international collaboration, with immediacy and ease of access and communication. In areas where surgical management is contentious, this could be a valuable tool to frame the current state, propose best practices, and possibly guide management in a rapid, cost-effective, global scale. Our goal was to determine the ability to use Twitter—a SoMe platform—as an alternative surgical research tool.

**Methods:** Twitter was used to host an online poll on a pre-selected controversial topic with no current consensus guidelines—pathological complete response in rectal cancer. An influential colorectal surgeon published the survey “T3N1 Rectal Cancer undergoes a complete response” on two separate occasions. Both polls were open for duration of three days. Two methodologies were tested to increase exposure and direct towards relevant participants: first, tagging several worldwide experts, then using the well-established hashtag #colorectalsurgery and publishing during an international surgical conference. The main outcome measure was the feasibility, validity, reproducibility, and methods to further participation of a Twitter survey.

**Results:** The tweet polls were posted three weeks apart. There was no cost and the time required for the process was three minutes, demonstrating the feasibility. Providing three closed options to select from facilitated validity. The poll’s anonymity limited knowledge of the participant’s qualifications, but public comments and “retweets” came from surgeons with experience ranging from trainee to department chair. A robust volume of respondents was observed. The 1st post received 169 votes, 14 “likes”, 13 “retweets”, and 18 comments from a diverse international group (9 countries). All tagged members participated in the forum. The 2nd received 125 votes, 13 “likes”, 14 “retweets”, and 3 comments. The results were reproducible, with the majority favoring 1 option on both occasions (69% and 75%, respectively; p=0.4312). Treatment recommendations, their rationale, and open questions were identified in the thread.

**Conclusions:** SoMe can be used as a research tool, with valid, reproducible, and representative survey results. While exposure was comparable across the two methods, tagging specific members guided experts to provide more opinions than using conference and specialty hashtags. This could expand awareness, education, and possibly affect management in a transparent, cost-effective method. The anonymous nature of respondents limited the ability to make conclusions, but interest and opinion leaders for further study can be easily identified. This demonstrates the potential for SoMe to facilitate international collaborative research.



**P513****Is Fistula Risk Score for Postoperative Pancreatic Fistula Still Applicable in Minimally Invasive Approach of PPPD?**

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**Background:** Despite the technological advancement of a minimally invasive approach to Pylorus-preserving pancreaticoduodenectomy (PPPD), the morbidity is still high. Among the many complications, postoperative pancreatic fistula (POPF) is reported in high incidence rate, which varies from researcher to researcher, and a fistula risk score (FRS) has been developed to predict the POPF. The aim of this study is validate the fistula risk score in minimally invasive approach of PPPD and find the other meaningful parameter for prediction of POPF.

**Method and Materials:** From January 2008 to August 2017, laparoscopy attempted right-sided pancreas resection was performed on 142 patients including robotic reconstruction in the Division of Hepatobiliary and pancreas at Yonsei University Health System. Among them, 43 patients were excluded due to total pancreatectomy (N=15), open conversion (N=12), pancreaticogastronomy and hybrid manual anastomosis (N=12), non-measurable drain and missing data (N=4). POPF grade was defined as revised 2016 International Study Group of Pancreatic Fistula.

**Results:** Among the total patients (N=99), POPF were 51 (51.5%). Biochemical leak were 39 (39.4%) and Grade B was 9 (9.1%), Grade C was 3 (3.0%). FRS 6 was 29 patients and FRS 3 (N=19), FRS 5 (N=14), FRS 1 (N=12). 67 patients were Moderate risk (FRS 3–6) group and 15 patients in low risk group (FRS 1–2). 13 patients in high risk (FRS 7–10), 4 patients in negligible risk (FRS 0). In POPF C, 3 moderate risk patients were included. In POPF B, 8 patients of moderate risk and only one patient in high risk were included. In biochemical leak, 31 moderate risk patients and 7 high risk patients, 1 low risk patient were included. In univariate analysis of POPF (biochemical leak, B and C), soft gland texture (OR 19.056, 95% CI 4.149–87.526, p value 0.000), pancreatic duct size (OR 0.809, 95% CI 0.677–0.966, p-value 0.019) and FRS (OR 1.526, 95% CI 1.228–1.897, p-value 0.000) were statistically significant. In multivariate analysis of Clinically relevant POPF (POPF B, C), body mass index (BMI) was statistically significant (adjusted OR 1.367, 95% CI 1.035–1.806, p-value 0.028). Area under curve (AUC) of BMI was 0.676 in Receiver operating characteristic (ROC) curve (p-value 0.049).

**Conclusions:** Fistula risk score is significant prediction factor of POPF including biochemical leaks. In addition to the previously known FRS variables, our data showed that BMI is an important predictor of POPF with clinical relavancy in a minimally invasive approach of PPPD.

**P514****Laparoscopic Hemi-hepatectomy for Liver Tumor**

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**Introduction:** With progress of surgical technique and devices, laparoscopic liver resection became a realizable option for patients with liver tumor. Major liver resection such as anatomical left or right hemi-hepatectomy has also been introduced in many centers. Herein, we evaluate surgical results of laparoscopic hemi-hepatectomy for liver tumor.

**Patients and Methods:** Until March 2017, 27 consecutive patients who underwent laparoscopic or laparoscope-assisted hemi-hepatectomy (left 18, right: 9) were reviewed and the surgical data such as operation time, blood loss, postoperative complications were analyzed retrospectively.

**Results:** Of the 18 patients underwent left hemi-hepatectomy, 6 cases were primary liver cancer, 6 cases were metastatic tumor, and 6 cases were benign tumor. Pure laparoscopic surgery was performed in 5 cases. The mean blood loss was 203 (30–995) ml, mean operating time was 315 (204–578) minutes and mean postoperative hospital stay was 18 (8–52) days. The rate of postoperative complications was 5.6% (wound infection; n=1). All right hemi-hepatectomy was performed by laparoscope-assisted method. Of the 9 patients underwent right hemi-hepatectomy, 3 cases were primary liver cancer, 3 cases were metastatic tumor, and 3 cases were benign tumor. The mean blood loss was 188 (10–600) ml, mean operating time was 382 (290–514) minutes and mean postoperative hospital stay was 19 (8–48) days. The rate of postoperative complications was 22.2% (biliary stenosis; n=2). The patients with hepatocellular carcinoma were followed up for a median of 68 (29–92) months. Recurrence occurred in 4 cases and none of them had died at the time of follow-up.

**Conclusion:** Laparoscopic hemi-hepatectomy is a safe and effective procedure for the treatment of benign and malignant liver tumors.

**P515****Iatrogenic Biliary Injuries: Long-Term Multidisciplinary Management**

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**Abstract Background:** Iatrogenic biliary injuries are considered as the most serious complications during cholecystectomy. Better outcome of such injuries have been shown in cases managed in a specialized center.

**Objective:** Evaluation of biliary injuries management in major referral hepatobiliary center.

**Patients and Methods:** Four hundred seventy two consecutive patients with post-cholecystectomy biliary injuries were managed with multidisciplinary team (hepatobiliary surgeon, gastroenterologist and radiologist) at major Hepatobiliary center in Egypt over 10 years period using endoscopy in 232 patients, percutaneous techniques in 42 patients and surgery in 198 patients.

**Results:** Endoscopy was very successful initial treatment of 232 patients (49%) with mild/moderate biliary leakage (68%) and biliary stricture (47%) with increased success by addition of percutaneous (Rendezvous technique) in 18 patients (3.8%). However, surgery was needed in 198 (42%) for major duct transection, ligation, major leakage and massive stricture. Surgery was urgently in 62 patients and electively in 136 patients. Hepaticojjunostomy was done in most of cases with transanastomotic stents. One mortality after surgery due to biliary sepsis and postoperative Stricture was in 3 cases (1.5%) treated with percutaneous dilation and stenting.

**Conclusion:** Management of biliary injuries was much better with multidisciplinary care team with initial minimal invasive technique to major surgery in major complex injury encouraging for early referral to highly specialized hepatobiliary center.

**P516****Laparoscopic Hepatic Cyst Operation**

Shahidur Rahman, Professor; Bangabandhu Sheikh Mujib Medical University

**Introduction:** Simple liver cyst is the solitary non parasitic cystic lesion of the liver. Treatment of symptomatic liver cyst varies from simple aspiration to hepatic resection. Each treatment has its own merits and associated complications. Laparoscopic unroofing (fenestration) offers the best balance between efficacy and safety. Polycystic liver disease (PLCD) treatment by this method are less clear because of high failure rate. Liver resection though more effective carries higher risks. Treatment of hydatid disease are controversial.

**Materials and Method:** Simple cyst may be asymptomatic and picked up as incidental findings on ultrasound examination for other abdominal complaints. Few cyst have symptoms of mass effect or with complication effect due to haemorrhage, rupture, infection. On examination liver is palpable. Compression over bile duct give rise to jaundice. The commonest symptoms are pain, early satiety, nausea and vomiting. Simple cyst are more common in female after 50 years of age. The cyst located anteriorly inferiorly and laterally are the ideal case. Investigation like ultrasonography is important. It will help us to detect the cyst nature, will help to differentiate between simple cyst from poly cystic liver disease, from neoplastic liver. In endemic area of hydatid liver disease serological test is mandatory. CT scan is important regarding details information about to localise the cyst, to identify the liver tissue around the cyst, relationship of cyst with the nearby vital structures, number of cyst, calcification and carcinomatous changes in its wall. Aspiration of cyst fluid, biological and cytological examination to rule out the presence of infection, biliary communication and malignancy. Recently, CA 19–9 estimation is helpful for the differentiating the simple cyst from the cystadenoma or carcinoma. For jaundice patient ERCP is important to locate the intraductal polyp causing the biliary obstruction or cyst causes the compression of the biliary tree. For bleeding in cyst MRI is helpful. Carcinoma at epithelial lining may occur.

**Result:** Laparoscopic de-roofing (fenestration) less radical procedure ensures adequate drainage of cyst content into the peritoneal cavity. The cyst wall can be removed using harmonic scalpel so smoked produced and fogging of lens can be minimized. The interior surface inspected with care to exclude neoplastic growth and biliary communication. Whole operative procedure, duration of postoperative recovery, hospital stay is much shorter in this procedure. Large chevron incision can be avoided. No recurrence in two years follow up period. Liver resection and total cystectomy theoretically minimizes the recurrence risk but invoke the a real risk of postoperative complications and death.

**Conclusion:** Careful case selection and meticulous surgical skills are the two major determinants of the outcome.

**P517****Feasibility of Concurrent Laparoscopic Liver Resection and Stoma Closure**

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**Background:** Laparoscopic liver resection (LLR) is increasingly performed and its feasibility has been established in a variety of situations. However, LLR for patients with a history of abdominal surgery is often avoided because of difficulty placing trocars. The aim of this study was to assess the feasibility and safety of concurrent laparoscopic liver resection and stoma closure (SC) in comparison with an open approach.

**Method:** Between April 2008 and September 2017, 4 patients who underwent concurrent LLR and SC (LLR group) were compared with 6 patients who underwent concurrent open liver resection and SC (OLR group). Patient background, characteristics, and perioperative outcomes were compared. In the LLR group, the first port was placed with an Alexis® wound retractor (Applied Medical, USA) and Free Access® (TOP Corporation, Japan) at the abdominal defect made by previous SC. An additional 2 or 3 trocars were placed as needed.

**Results:** All patients in the LLR group were treated using the laparoscopic approach. There were no other significant differences in patient background and characteristics. Operative duration was similar for these groups. Blood loss, complication rate, and hospital stay in the LLR group were significantly decreased compared with the OLR group. Conclusion: In concurrent liver resection and SC, the open approach may require multiple large incisions, but the laparoscopic approach can complete procedures with a stoma wound and a few port wounds. Additionally, use of a platform on the wound for SC enhances safety and efficacy for dissection of intraabdominal adhesions and a clear operative view.

**P519****Pancreatic Neoplasm Enucleation - When Is It Safe? Case Report and Review of the Literature**

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**Introduction:** Solid pseudopapillary tumors are rare neoplasms accounting for 2–3% of pancreatic malignancies with a low risk of recurrence and metastasis. Pancreatic malignancies are less common in pediatric populations, though small case series have identified that pseudopapillary tumors comprise between 20 and 70% of pediatric pancreatic neoplasms. As these tumors have a low risk of metastasis, the mainstay of treatment has remained surgical excision. Several surgical approaches have been described from extensive resections such as pancreaticoduodenectomy to local enucleation. We present a case of enucleation of a large pseudopapillary tumor from the pancreatic head complicated by pancreatic fistula. A literature review was performed given the rarity of this tumor to review surgical approaches, to compare complications and long-term outcomes, and to identify specific strategies to decrease the risk of pancreatic fistula.

**Case Description:** A 13 year-old female presented with 6 months of abdominal pain. Computed tomography identified a right upper quadrant mass felt to be consistent with a lipoma. Follow up CT at 6 months suggested the mass was more likely a Gastrointestinal Stromal Tumor (GIST), and surgical resection was recommended. Enucleation of the mass was chosen in view of a well-circumscribed appearance, clear operative tissue planes, and concern for long-term morbidity of a more extensive resection given the patient's young age. Pathology demonstrated an 8.5 cm pseudopapillary tumor with negative margins. Her post-operative course was complicated by a grade B pancreatic fistula, managed with nutritional support, external drain maintenance, and endoscopic stenting. The patient achieved healing of the pancreatic fistula after four months.

**Results:** Our literature review demonstrates no difference in recurrence, mortality or morbidity between types of surgery. Pancreatic fistula contributed to the majority of postoperative morbidity in all cases. Recommendations for enucleation include small (2–4 cm) tumors with between 2 and 5 mm margin from the main pancreatic duct. Techniques identified to minimize post-operative pancreatic fistula include preoperative imaging of the duct anatomy, preoperative pancreatic stent placement, and intraoperative ultrasound to identify the pancreatic duct. Some literature supports preservation of pancreatic parenchyma, particularly in younger patients, to reduce endocrine and exocrine dysfunction given the low rates of recurrence and metastasis with this rare neoplasm.

**Conclusion:** Our case demonstrates complications of enucleation of a large pseudopapillary tumor with successful multidisciplinary post-operative management. With the risk reduction strategies identified, we suggest that enucleation may be considered for pseudopapillary tumors in younger patients to preserve pancreatic parenchyma and long-term pancreatic function.

**P518****Primary Hepatic Lymphoma: The Importance of Liver Biopsy**

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Primary hepatic lymphoma (PHL) is a very uncommon lymphoproliferative malignancy. It accounts for only 0.4% of all extranodal non-Hodgkin lymphoma and 0.016 % of all cases of non-Hodgkin disease.

The diagnosis is made when there is only liver involvement or when there is minimal non-liver disease. Bone marrow, spleen, or hematologic affection should be excluded to confirm the diagnosis.

We present our experience with two PHL's that were correctly diagnosed thanks to laparoscopic liver biopsy.

67-year-old male admitted because of a 2-month history of right upper quadrant pain and non-measured weight loss. Liver function tests and cholestatic enzymes showed normal values. Serologic tests showed negative results for both HBV (hepatitis B virus) and HCV (hepatitis C virus). CT (computed tomography) scan showed three intrahepatic lesions in segments V, VI, and VII. CT-guided fine needle did not reach the diagnosis so a laparoscopic hepatic biopsy was performed. The final diagnosis was Burkitt-like lymphoma. Chemotherapy with R-CHOP (rituximab, cyclophosphamide, adriamycin, vincristine, and prednisone) modality was started and completed after 6 cycles. It is currently 2 years since the patient was diagnosed and there are no clinical or radiological signs of recurrence.

54-year-old male who complained of diarrhoea and abdominal pain. Chronic HB infection with no viral charge was detected. Ultrasound showed heterogeneity of the whole left hepatic lobe and an MRI was performed. A ten by seven centimeters lesion occupying the left hepatic lobe enhanced in arterial phase was seen suggesting adenoma. Laparoscopic hepatic biopsy was completed to reach a definitive diagnosis. Non-Hodgkin lymphoma follicular type has just been confirmed with the histology and immuno-histochemistry. Chemotherapy with R-CHOP should be started in the following weeks.

PHL's diagnosis is hard to achieve. Fine needle biopsies are frequently negative because of the large area of necrosis. Surgical biopsies are sometimes indispensable to get enough tissue to reach the diagnosis. PHLs are sometimes misdiagnosed as hepatocellular carcinoma because of its relation to HCV meaning a major hepatic resection. That is the reason why we consider that all diagnostic measures should be undertaken to rule out a different type of tumor. Surgical resection is normally not needed in PHLs; as they are chemosensitive lesions. Surgical options usually add unnecessary morbidity and mortality to these patients. Chemotherapy standard treatment for PHL consists on R-CHOP combination.

**P520****Post-splenectomy Portal Venous Thrombosis in Cirrhotic Patients: An Observational Clinical Trial**

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**Background:** Post-splenectomy portal venous thrombosis carries multiple threats to patients' lives. Different variables were identified as risk factors for this complication in cirrhotic patients. The aim of this study was to prospectively assess the incidence, risk factors, clinical presentation and treatment outcomes of post-splenectomy portal venous thrombosis in cirrhotic patients.

**Patients and Methods:** Sixty cirrhotic patients of Child class A submitted to open splenectomy for various indications at my institution during the period from March 2008 to March 2016 were observed, both clinically and by Duplex ultrasound examination for the development of post-splenectomy portal venous thrombosis.

**Results:** Overall, 17 patients (28.3%) developed post-splenectomy portal venous thrombosis at a median interval of 4.5 days (21 hours to 7 days) post-splenectomy. Univariate analysis showed that lower preoperative platelet count ( $P<0.0460$ ), lower preoperative white blood cell count ( $P<0.0001$ ) and wider splenic vein diameter ( $P<0.0001$ ) correlated with post-splenectomy portal venous thrombosis. Multivariate analysis identified lower preoperative white blood cell count [odds ratio (OR): 0.651, 95% confidence interval (CI): 0.245–0.893,  $P<0.005$ ] and wider splenic vein diameter (OR: 2.383, 95% CI: 1.558–3.646,  $P<0.001$ ) as independent risk factors of post-splenectomy portal venous thrombosis. While 16 out of the 17 patients (94%) who had these 2 risk factors developed portal venous thrombosis, only 1 out of the 43 patients (2.3%) who didn't have the same risk factors developed portal venous thrombosis. All 17 patients had complete resolution of their thrombosis on anticoagulation therapy within 3–6 months without complications or mortality.

**Conclusion:** Portal venous thrombosis is a common complication of splenectomy in cirrhotic patients. Patients with low white blood cell count and wide splenic vein diameter are highly susceptible to develop this complication mandating close observation from the 1st postoperative day and immediate anticoagulation after diagnosis.

**P521****Experience for 90 Consecutive Cases of Hybrid Laparoscopic Assisted Pancreaticoduodenectomy**

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**Introduction:** Recent advancements in minimally invasive techniques led to increased effort and interest in laparoscopic pancreatic surgery. Laparoscopic distal pancreatectomy is a widely accepted procedure for left-sided pancreatic lesions. In other cases, the adoption of laparoscopic pancreaticoduodenectomy has been hindered by the technical complexity of laparoscopic reconstruction. Hybrid laparoscopy-assisted pancreaticoduodenectomy (HLAPD) in which pancreaticoduodenal resection is performed laparoscopically, while reconstruction is completed via a small upper midline minilaparotomy, is combines the efficacy of open approach, and the benefits of laparoscopic approach. The purpose of this study is to report our experience of HLAPD and to define the learning curves.

**Methods:** 90 patients with benign and malignant periampullary lesion underwent HLAPD by a single surgeon between July 2007 and May 2017 were retrospectively reviewed. The clinicopathologic variables were prospectively collected and analyzed. The learning curve for HLAPD was assessed using cumulative sum (CUSUM) and risk-adjusted CUSUM (RA-CUSUM) methods.

**Results:** The most common histopathology was pancreatic ductal adenocarcinoma (n=27, 27.8%), followed by intraductal papillary mucinous neoplasia (n=16, 16.5%), ampulla of Vater cancer (n=16, 16.5%), and common bile duct cancer (n=15, 15.5%). The median operation time was 540 min (range, 300–865 min) and the median estimated blood loss was 550 ml. The mean hospital stay was 21.4 days. Complications developed in 25 patients (27.7%). Among them, 13 patients (14.4%) had significant pancreatic fistula [International Study Group on Pancreatic Fistula grade B and C]. Based on the CUSUM and the RA-CUSUM analyses, the learning curve for HLAPD was grouped into four phases: phase I was the initial learning period (cases 1–10), phase II was the technical stabilizing period (cases 11–37), phase III was the second learning period (cases 38–70) and phase IV represented the second stabilizing period (cases 71–90). There was a statistical difference in terms of surgical indication between phase II and III ( $p=0.002$ ).

**Conclusions:** HLAPD is a technically feasible and safe procedure in selected patients. This procedure has benefits of both open and minimally invasive procedure, and could be a stepping-stone for transition from open to purely minimally invasive pancreaticoduodenectomy.

**P522****In Silico Investigation of the ATP7B Protein: Insights from the Role of RCCs Mutation That Effect on Protein Structure and Function**

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**Background:** Wilson's disease is a rare autosomal recessive genetic disorder of copper metabolism, which is characterized by hepatic and neurological disease. The gene ATP7B (on chromosome 13) leads to Wilson's disease is highly expressed in the liver, kidney, and placenta and encodes a transmembrane protein ATPase (ATP7B), which functions as a copper-dependent P-type ATPase.

**Methods:** Here, the rare codons of ATP7B gene and their location in the structure of ATP7B protein was studied with Rare codon calculator (RaCC) (<http://nihserver.mbi.ucla.edu/RaCC/>), ATGme (<http://atgme.org/>), LaTeOm (<http://structure.bioi.uci.ac.cy/lateom.html>) and Sherlock program (<http://ccb.med.usherbrooke.ca/sherloc.php>). RaCC server identified Arg, Leu, Ile, and Pro codons as rare codons.

**Results:** Results showed that CYP152A1 gene have 35 single rare codons of Arg. Additionally, RaCC detected two rare codons of Leu, 13 single rare codons of Ile and 28 rare codon of Pro. ATP7B gene analysis in minmax and sliding\_window algorithm resulted in identification of 16 and 17 rare codon clusters, which shows the difference features of these algorithms in detection of RCC. Analyzing the 3D model of ATP7B protein show that Arg816 residue constitute hydrogen bonds with Glu810 and Glu816 that with mutation of this residue to Ser816 this hydrogen bonds were disrupted and may interfere in the proper folding of this protein. Moreover, the side chain of Arg1228 don't forms any bond with others residues that with mutation to Thr1228 form new hydrogen bond with the side chain of Arg1228. These addition and deletion of hydrogen bonds effects on the folding mechanism of ATP7B protein and interfere with the proper function of the ATP7B position. His1069 forms the hydrogen bonds with the His880 and it seems that this hydrogen bond close together two region of this protein and it seems that has a critical role in the final folding of ATP7B protein.

**Conclusions:** Computational study of diseases such as Wilson's disease and involved genes (ATP7B) help us in understanding of disease's physiopathology and finding new approaches for detection and treatment.

**P523****Unusual Presentation of Pancreatic Stump Leak 4 Months After Distal Pancreatectomy and Splenectomy: A Case Report and Review of Literature**

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Pancreatic stump leak and fistula formation are significant causes of morbidity in patients undergoing distal pancreatectomy (DP), with incidence of 15% to as high as 64% in a large systematic review. We present a case of a 58 year old female, four months status post distal pancreatectomy and splenectomy for pseudopapillary neoplasm of pancreatic tail. Patient presented to our institution with 7 day history of left upper quadrant pain and general malaise. Differential diagnosis on admission was abdominal wall abscess vs incarcerated incisional hernia. Physical exam was positive for severe tenderness to palpation over a ~ 4 cm x 4 cm non reducible mass in left upper quadrant with surrounding skin erythema. Patient underwent a diagnostic laparoscopy and intraoperative findings revealed extensive adhesions to the anterior abdominal wall and a loop of small bowel was found adhered to the previous incision site in left upper quadrant. Upon further dissection we entered a large 10 x 8 cm cavity with saponified caseous material. The saponified material and thick tan fluid were evacuated into an endocatch bag and two large bore Jackson Pratt drains were left within the cavity. Further examination showed that the small intestine was normal with no signs of obstruction or ischemia. Fluid studies and cultures were sent and showed yeast like organisms and negative for acid fast bacillus. We report an unusual presentation of a distal pancreatectomy stump leak in the formation of an intra-abdominal saponified fluid collection four months after the primary procedure. Given the high incidence of pancreatic stump leak and fistula formation after distal pancreatectomy, much effort has been made to identify factors associated with higher incidence of leaks and their usual and unusual presentations, which will be reviewed in this report.

**P524****Totally Laparoscopic Living Donor Right Hepatectomy for Elective Adult-to-Adult Living Donor Liver Transplantation: A Safe and Feasible Approach**

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Initial concerns regarding healthy donor's safety and graft integrity, need for acquiring surgical expertise in both laparoscopic liver surgery and living donor transplantation (LDLT) have delayed the development of laparoscopic donor hepatectomy in adult-to-adult LDLT. However, decreased blood loss, less postoperative pain, shorter length of stay in hospital, and excellent cosmetic outcome have well been validated as the advantage of laparoscopic hepatectomy. Hence, the safety and feasibility for laparoscopic donor should be further investigated.

We present initial experiences and safety for totally laparoscopic living donor right hepatectomy. In 20 cases who received elective living donor right hepatectomy for adult-to-adult LDLT, totally laparoscopic approach was applied from May 2016 up to August 2017. The anatomical variation of portal vein was not considered as an exclusion criteria, but all donors were with Type I portal vein variation. The bile duct anomaly was preoperatively evaluated with magnetic resonance cholangiopancreatography (MRCP) and was never excluded for totally laparoscopic approach. 2D conventional rigid 30° rigid laparoscopic system was used in 2 cases and the remaining 18 cases used 3D flexible laparoscopic system.

In about 40%, hepatic duct anomalies (Type 2, 3a, 3b) were identified. The operation time was from 6 hours to 7 hours. And the time for the graft removal was within 15 minutes. The hepatic duct transection was performed under operative cholangiography via a cystic duct and the patency of left hepatic duct was also confirmed by operative cholangiography. However, during postoperative period, bile leakage was identified in only 1 case and resolved after the biliary stent insertion by ERCP. During operation, there was no transfusion and the inflow control like Pringle maneuver was not used at all. V5 or V8 were reconstructed in 19 cases and large right inferior hepatic vein was prepared for anastomosis in 6 cases. All grafts were removed through the suprapubic transverse incision. Most donors were discharged at 7 days after hepatectomy. During the short-term follow-up period in the donors except this case, complications were not identified. Conclusively, totally laparoscopic right donor hepatectomy in elective adult-to-adult LDLT can be initially attempted after enough experiences of laparoscopic hepatectomy and LDLT. However, the true benefits of totally laparoscopic living donor right hepatectomy should be fully assessed through various experiences from multi-institutes.

**P525**
**Benefits of Simultaneous Totally Laparoscopic Colorectal Surgery and Liver Resection for Colorectal Cancer with Synchronous Liver Metastases**

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**Introduction:** Laparoscopic surgery for colorectal cancer and liver tumors are accepted as alternative procedure to open surgery. However, few studies reported outcomes of laparoscopic simultaneous surgery of these two procedures. The aim of this study was to compare short-term outcomes between laparoscopic and open approach.

**Methods:** Between January 2010 to August 2017, simultaneous laparoscopic cases were retrospectively matched (1:3) to open cases. Peri-operative and short-term outcomes were compared between both groups.

**Results:** Seven patients in laparoscopic group were matched to 21 patients in open group according to age, gender, body mass index, American Society of Anesthesiologists physical status, preoperative laboratory data, and extent of liver resection. Most patients in each group (70%) had left-sided colorectal cancer and minor liver resection (wedge resections for 1–2 metastases). Operative time ( $181 \pm 101.4$  vs  $285 \pm 79.2$  min,  $p=0.04$ ), estimated blood loss ( $107 \pm 57.6$  vs  $552 \pm 365.2$  ml,  $p<0.01$ ) and length of hospital stay ( $10 \pm 6.6$  vs  $18 \pm 12.3$  days,  $p=0.04$ ) were significantly lower in laparoscopic group compared to open group. Peri-operative complication was not significant difference between both groups and there were no mortality. Time to start postoperative systemic chemotherapy trended to be shorter in laparoscopic group compared to open group ( $45 \pm 17.9$  vs  $53 \pm 24.5$  days,  $p=0.49$ ).

**Conclusions:** Simultaneous laparoscopic colorectal surgery and minor liver resection is feasible and safe. However, laparoscopic approach has shorter length of hospital stay compared to open approach.

**P526**
**Neoadjuvant Radiation, But Not Chemotherapy, Increases Pancreatic Fistula Formation Following Pancreaticoduodenectomy**

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**Background:** The role of neoadjuvant chemotherapy on the treatment of pancreatic cancer remains widely controversial. Studies have evaluated its effect on resectability and survival; however, few have studied the consequence of neoadjuvant therapy on surgical outcomes and complications.

**Methods and Procedures:** A retrospective analysis was performed utilizing the targeted pancreas module of the National Surgical Quality Improvement Project (NSQIP) for patients undergoing pancreaticoduodenectomy. Neoadjuvant therapy was defined by chemotherapy and/or radiation in the 30-days before surgery. Patient demographics, operative characteristics, and 30-day outcomes were compared amongst patients undergoing neoadjuvant chemotherapy, radiation, chemoradiation, and no neoadjuvant therapy. Both univariable and multivariable analysis were completed.

**Results:** Pancreaticoduodenectomy was completed in 3,114 patients. 2,635 patients had no neoadjuvant therapy; 207 underwent both chemotherapy and radiation; 256 underwent chemotherapy alone, and 16 underwent radiation alone. There were no differences in demographics or comorbidities. No difference in 30-day mortality was found; however pancreatic fistula formation was affected by neoadjuvant therapy. Neoadjuvant radiation increased fistula formation (OR: 2.4, 95% CI: 1.1–5.2) while neoadjuvant chemotherapy (OR: 0.5, 95% CI: 0.3–0.99) was protective.

**Conclusion:** Neoadjuvant therapy significantly impacts surgical outcomes following pancreaticoduodenectomy. Given that pancreatic fistula formation can delay post-operative chemotherapy, it may be reasonable to refrain from neoadjuvant radiation therapy for patients with resectable and borderline-resectable disease.

	Outcomes following Pancreaticoduodenectomy				
	None N=2635 (%)	Both N=207 (%)	Chemotherapy N=256 (%)	Radiation N=16 (%)	P-value
30-Day Mortality	68 (2.6)	5 (2.4)	8 (3.1)	0 (0)	0.86
Fistula	514 (20)	24 (12)	21 (8.3)	0 (0)	<b>&lt;.001</b>
Return to OR	157 (6)	6 (2.9)	17 (6.6)	0 (0)	0.20
Wound Infection	628 (24)	46 (22)	48 (19)	1 (6.3)	0.11
Pneumonia	127 (4.8)	4 (1.9)	13 (5.1)	0 (0)	0.21
Reintubation	121 (4.6)	7 (3.4)	17 (12)	0 (0)	0.28
Myocardial Infarction	24 (0.9)	4 (1.9)	0 (0)	0 (0)	0.18
DVT/PE	92 (3.5)	9 (4.3)	16 (6)	0 (0)	0.13
Delayed Emptying	430 (17)	27 (14)	32 (13)	3 (19)	0.24
Total Hospital LOS – Days (IQR)	9 (7-14)	8 (7-11)	8 (7-11)	8 (6-11)	<b>&lt;.001</b>

OR: Operating Room, DVT/PE: Deep Vein Thrombosis or Pulmonary Embolism, LOS: Length of Stay, IQR: Interquartile Range, Bold: signifies  $P < .05$

**P528****The Influence of Thickest Triple-Row Stapler on Pancreatic Fistula After Left Side Pancreatectomy**

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**Background:** The use of stapling devices for distal pancreatectomy remains controversial, due to concerns about the development of postoperative pancreatic fistula (POPF). Pancreas thickness might be associated with POPF, but suitable thickness of stapler remains also inconclusive in view of reducing POPF.

**Methods:** We routinely use thickest Endo GIA™ Reloads with Tri-Staple™ (Covidien, North Haven, CT) for pancreas closure during laparoscopic left side pancreatectomy (LP) since 2013. We compared short term surgical results of the consecutive ten patients underwent LP using new stapler (NS) and 20 patients with LP using other type of stapler (OS) focusing on POPF.

**Results:** No patients developed clinically relevant (CR)-POPF in NS group and two patients (10.0%) with OS group experienced CR-POPF. However, there was no difference of CR-POPF between two groups. Pancreas thickness on stapling point were not different between two groups (15.9 mm vs 18.9 mm, p=0.246). In NS group, 3 patients (30.0%) developed a POPF, whereas in OS group, 12 patients (60.0%) developed a POPF. There was also no difference of POPF between 2 groups.

**Conclusion:** The GIA™ Reloads with the thickest Tri-Staple™ allows effective prevention of CR-POPF after distal pancreatectomy. However, there was no advantage over thinner stapler for LP.

**P529****Single-Incision Laparoscopic Hepatectomy: An Analysis of Consecutive 13 Patients**

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**Introduction:** Single-incision laparoscopic hepatectomy (SILH) has been showed feasible and safe in experienced hands for selected patients with benign or malignant liver diseases. There were only small series reported and most of the procedures were minor liver resections. We herein present our experience of SILH during a period of 13 months.

**Methods and Procedures:** Consecutive 13 patients underwent SILH which were performed by two experienced laparoscopic surgeons with straight instruments. Patient characteristics and surgical outcomes were analyzed by reviewing the medical charts.

**Results:** The patient age was  $62.7 \pm 9.2$  (47–78) years with male predominance (8 patients, 61.5%). Six patients (46.2%) had liver cirrhosis proved by pathologic examinations. Nine procedures (69.2%) were indicated for malignancy. Four major hepatectomies (over two segments) and nine minor ones were performed including seven anatomical resections. The abdominal incisions were para- or trans-umbilical except one which was along the old operative scar at lower midline, while most of them (n=12, 92.3%) was within 5 cm in length. Inflow control was carried out by either individual hilar dissection or extraglissonian approach instead of Pringle maneuver. The operations were all accomplished successfully without additional ports or open conversion. The operative time was  $436.5 \pm 178.4$  (163–673) min and the estimated blood loss was  $435.0 \pm 377.2$  (75–1400) mL. Five (38.5 %) patients encountered complications and four of them were classified as Clavien-Dindo grade I. The postoperative length of hospital stay was  $6.1 \pm 2.2$  (4–10) days. There was no mortality.

**Conclusion:** SILH can be performed safely and efficaciously for selected patients with benign and malignant liver diseases including cirrhosis. Not only minor but also major liver resections are feasible. This innovative procedure provides low postoperative pain and fast recovery. Before adopting this demanding technique, surgeons should be familiar with both single-incision laparoscopic surgery and laparoscopic hepatectomy. Better outcomes after the learning curve could be anticipated.

**P530****Laparoscopic Extended Pancreatectomy with En-Bloc Resection of Adjacent Organs or Major Vessels for Left-Sided Pancreatic Ductal Adenocarcinoma: The Results of a Single Center Experience**

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**Background:** Laparoscopic distal pancreatectomy (LDP) has been replacing the open procedure for benign or malignant diseases of the pancreas. However, it is often difficult to apply LDP for pancreatic ductal adenocarcinoma (PDAC) because its aggressive invasion to adjacent organs or major vessels.

**Objectives:** The objective of this study was to report our experiences for laparoscopic extended pancreatectomy with en-bloc resection of adjacent organs or major vessels for left-sided PDAC.

**Methods:** We reviewed data for all consecutive patients undergoing LDP for left-sided PDAC at Asan Medical Center (Seoul, South Korea) between April 2006 and December 2016. The patients who underwent laparoscopic extended pancreatectomy with en-bloc resection of adjacent organs or major vessels were included in analyses.

**Results:** Of total 257 patients, 21 underwent laparoscopic extended pancreatectomy. There were 14 male and 7 female patients with a median age of 64.1 years. Resected adjacent organs or vessels were as following: stomach in 6, duodenum in 1, colon in 4, kidney in 2, superior mesenteric vein in 4, and celiac axis in 4. Median operative duration was 280 minutes, and median length of hospital stay was 9 days. Pathological reports revealed the following: a median tumor size of 3.5 cm, the tumor differentiation (well differentiated in 2, moderately differentiated in 17, and poorly differentiated in 2), T stages (T1 in 1, T3 in 18, and T4 in 2), and N stages (N0 in 10 and N1 in 11). R0 resection was achieved in 6 patients, and most R1 resection were tangential retroperitoneal margins. Postoperatively, clinically relevant postoperative pancreatic fistula was occurred in 2 patients, and there was no 90-day mortality. Median overall survival was 19.6 months and 1 year survival rate was 71.1%.

**Conclusions:** Although laparoscopic surgery has limitations in treating extensive diseases, some selected patients can be applicable for laparoscopic extended pancreatectomy with acceptable complication and survival rates.

**P531****Comparison of Outcomes Between Laparoscopic vs Open Liver Resection for Intermediate Stage (BCLC B) Hepatocellular Carcinoma**

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**Introduction:** The Barcelona Clinic Liver Score (BCLC) currently limits hepatic resection only for small, solitary tumors measuring 2–3 cm with no signs of portal hypertension (PHT) or macrovascular invasion. The aim of this study is to show the benefit of surgical resection, and to compare the peri-operative and long-term outcomes between laparoscopic liver resection (LLR) and open liver resection (OLR) for hepatocellular carcinoma (HCC) classified as intermediate stage (B) under BCLC.

**Methods and Procedures:** From 2004 to 2013, 49 patients staged as intermediate (BCLC B) and who underwent hepatic resection was included. These patients were divided into LLR or OLR. Demographics, tumor characteristics, recurrence rates and over-all survival were compared between the 2 groups.

**Results:** 49 patients were included and grouped into LLR (n=28) and OLR (n=21). The average tumor number was  $2 \pm 1$  for both groups, while the mean tumor size was 4.1 cm and 4.9 cm for the LLR and OLR group, respectively. When compared with OLR, LLR had lower post-operative complication rates (14.3% vs 33.3%, p=0.118) and shorter hospital stay (9 vs 21 days, p=0.103), although the difference was not statistically significant. Overall, recurrence-free and disease-free survival was comparable between LLR and OLR.

**Conclusion:** LLR showed comparable outcomes compared to OLR in the treatment of HCC staged BCLC B. Thus, LLR as well as OLR can be considered in selective patients in the BCLC B group.

**P532****The Application of Minimally Invasive Pancreatic Surgery in Cancer: A Single Institution Experience**

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**Background:** The use of minimally invasive pancreatic surgery (MIPS) in patients with benign tumor is widely accepted. Till now whether this approach is also suitable in cancer patients is still a discussion. Our objective is to determine the clinical benefit of MIPS in cancer patients.

**Methods:** We retrospectively studied all patients underwent MIPS in our institution from May 2010 to January 2017. Demographic and clinical details were retrospectively collected from medical records.

**Results:** Overall, 70 patients were included in the analysis (16 underwent robotic assisted distal pancreatectomy RADP, 26 underwent laparoscopic distal pancreatectomy LDP, 28 underwent total laparoscopic pancreaticoduodenectomy TLPD). Among 70 patients, 31 were malignant tumors, 23 were borderline malignant tumors, 16 were benign diseases. They had comparable perioperative outcomes. In TLPD group, the mean operation time were 413 min (95% CI 374–452), 440 min (95% CI 382–498), 441 min (95% CI 271–611); the mean blood loss were 262 ml (95% CI 175–349), 129 ml (95% CI 83–174), 125 ml (95% CI 13–262); the mean length of hospital stay were 15.7 days (95% CI 7.5–24), 20.6 days (95% CI 1.7 to 42.9), 18.5 days (95% CI 4.7 to 41.7) for malignant, borderline and benign tumors. In RADP and LDP group, the mean operation time were 206 min (95% CI 153–258), 187 min (95% CI 147–226), 175 min (95% CI 128–222); the mean blood loss were 196 ml (95% CI 75–318), 205 ml (95% CI 82–328), 154 ml (95% CI 75–234); the mean length of hospital stay were 16.0 days (95% CI 10.5–21.5), 13.5 days (95% CI 7.2–19.8), 12.3 days (95% CI 9.3–15.2) for malignant, borderline and benign tumors. There was no significant difference in postoperative pancreatic fistula (POPF) rate between cancer patients and the others, 14.3% VS 16%. In pancreatic ductal adenocarcinoma (PDAC) patients groups, R1 resection rate was 18%, one year survival rate was 63.3%, two years survival rate was 36.3%, similar to open pancreatic surgery according to the literature.

**Conclusion:** Based on clinical and oncological outcomes, MIPC is feasible and safe in pancreatic cancer patients. But there still need further follow-up to study the long-term outcome of MIPC in cancer patients.

**P533****Single Port Pancreatic Surgery**

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**Introduction:** Single port surgery has been described since 2009 with cholecystectomy, colectomy, gastrectomy, and others. Nevertheless, few cases are still reported in field of HBP surgery. Herein, we report single port pancreatic surgery developed from our previous experience. We had started single port surgery in 2009, since then we have done more than 850 cases of single port surgery using surgical glove port including cholecystectomy, appendectomy, and colectomy. Because we consider this experience should develop to pancreatic surgery, 73 cases of single port staging laparoscopy for potentially resectable and borderline resectable pancreatic cancer and 15 cases of single port plus one port distal pancreatectomy (SPOP-DP) have been done in our institution.

Single port staging laparoscopy for pancreatic cancer.

Resectability was proved in 63 (86%) out of 73 patients while 10 patients had unresectable factor such as small liver and peritoneal metastases that was not able to detect pre-operatively. The length of hospital days were  $5.0 \pm 4.8$  days and the days to chemotherapy were  $33.1 \pm 2.8$  days.

Single port plus one port distal pancreatectomy (SPOP-DP)

SPOP-DP starts with 1.5 cm skin incision on umbilicus. Subsequently, a wound retractor is installed at umbilical wound. Then, a non-powdered surgical glove (5.5 inches) is put on the wound retractor through which three 5-mm slim trocars and one 12-mm trocar are inserted via each finger tips. A semi-flexible laparoscopic camera is inserted via the middle finger port. 12-mm port is used when laparoscopic US, mechanical stapler, endo intestinal clip or retrieval bag were needed. An additional 5-mm port is inserted at left subcostal lesion mainly used for surgeon's right hand instrument. Gastric posterior wall is fixed to abdominal wall by suture instead of manual retraction. Pre-compression before transection of the pancreas was done using endo intestinal clip before firing.

**Discussion:** As we have seen in these two decades, surgery has dramatically been changed by laparoscopic surgery or robotic surgery. Nevertheless, because of technical difficulty and relatively high post-operative complication rate, introduction of reduced port surgery to HBP surgery has just started. SPOP-DP using endo intestinal clip, glove port and gastric wall hanging method is feasible. But its advantage is not clear so far, multicenter RCT is highly desired to clear the benefit of reduced port surgery for pancreas.

**P534****Comparative Outcome of Laparoscopic and Open Radical Antegrade Modular Pancreatosplenectomy for Left-Sided Pancreatic Cancer**

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**Background:** Radical antegrade modular pancreatosplenectomy (RAMPS) was introduced to improve the tumor-free retroperitoneal margin and achieve adequate lymph node dissection in patients with left-sided pancreatic cancer. Despite recently increasing reports on laparoscopic distal pancreatectomy for pancreatic cancer, there have been few reports with a focus on laparoscopic RAMPS. The aim of this study is to evaluate the safety and oncologic efficacy of laparoscopic RAMPS for left-sided pancreatic cancer by comparing the surgical outcomes of laparoscopic and open surgery.

**Methods:** Between March 2003 and December 2016, 48 patients with left-sided pancreatic cancer underwent open and laparoscopic RAMPS. To overcome selection bias, 38 patients were selected after excluding the patients who required combined resection of other organs. Clinicopathologic and oncologic variables were compared between laparoscopic group ( $n=19$ ) and open group ( $n=19$ ).

**Results:** There were no statistical difference in demographic and pathologic data between two groups. Compared with open group, laparoscopic group had a short hospital stay ( $10.1 \pm 4.1$  vs.  $13.4 \pm 6.3$  days,  $p=0.053$ ) and was more likely to receive adjuvant chemotherapy (89.5% vs. 63.3%,  $p=0.056$ ). The two groups did not differ significantly in terms of operative time, intraoperative blood loss, number of retrieved lymph nodes, resection margin status, and postoperative complications. The recurrence rate and overall survival rates were similar between two groups.

**Conclusion:** This study showed that laparoscopic RAMPS for left-sided pancreatic cancer was associated with shorter postoperative hospital stay and increased use of adjuvant chemotherapy compared to open surgery without compromising the perioperative and oncologic outcomes.

**P535****Sequential Organ Failure Assessment (SOFA) Score is Superior to Classical Scoring Systems in Predicting Severity, Intensive Care Unit Admission and Mortality in Acute Pancreatitis**

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**Introduction:** Scoring systems (SS) are an essential pillar of care in acute pancreatitis (AP) management. We compared six SS (Acute Physiology and Chronic Health Examination (APACHE-II), Bedside Index for Severity in AP (BISAP), Glasgow score, Harmless AP score (HAPS), Ranson's score and Sequential Organ Failure Assessment (SOFA) score) for their utility in predicting severity, intensive care unit (ICU) admission and mortality.

**Methods:** AP patients treated between July 2009 and September 2016 were studied retrospectively. Demographic profile, clinical presentation and discharge outcomes were recorded. Predictive accuracy of six SS was assessed using areas under receiver-operating curve (AUC) with pairwise comparisons.

**Results:** 675 patients were treated for AP. Twenty-two (3.3%) patients were excluded for insufficient data. 383/653 (58.7%) were male and mean age was 58.7 (20–98) years. Most common aetiology was gallstones (61.9%). Mean length of stay was 6.8 (2–92) days. 81 (12.4%) patients had severe AP, 20 (3.1%) required ICU admission and 12 (1.8%) died. Table below shows positive predictive value (PPV), negative predictive value (NPV) and AUC of six SS in predicting outcomes.

	Severity			ICU Admission			Mortality		
	PPV(%)	NPV(%)	AUC	PPV(%)	NPV(%)	AUC	PPV(%)	NPV(%)	AUC
APACHE-II	23.6	95.8	0.782	6.6	100.0	0.809	3.6	100.0	0.779
BISAP	42.6	89.9	0.717	10.6	97.5	0.690	6.4	98.5	0.647
Glasgow	25.6	95.4	0.781	7.0	99.3	0.818	4.1	99.5	0.809
HAPS	18.2	94.4	0.681	5.1	99.3	0.737	2.8	99.3	0.711
Ranson	21.4	98.0	0.848	5.7	100.0	0.946	3.4	100.0	0.917
SOFA	84.6	89.1	0.966	61.5	98.1	0.943	46.2	99.1	0.968

Pairwise comparisons revealed Ranson's ( $p<0.016$ ) and SOFA ( $p<0.024$ ) scores were superior than other SS in predicting all three outcomes. AUC of SOFA was greater than Ranson's score in predicting severity ( $p<0.001$ ), but similar in predicting ICU admission ( $p=0.933$ ) and mortality ( $p=0.150$ ).

**Conclusion:** SOFA score is superior to classical SS in predicting severity, ICU admission, and mortality in AP.

**P536****Multidisciplinary Approach for Management of Necrotizing Pancreatitis: A Case Series**

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**Introduction:** Necrotizing pancreatitis is often a devastating sequelae of acute pancreatitis. Historically several approaches have been described with variable outcome. Open necrosectomy is associated with higher morbidity (95%) and mortality (25%). Endoscopic necrosectomy often is tolerated well but associated with stent migration and multiple procedures. Video-assisted retroperitoneal debridement is tolerated well but associated with severe bleeding if adjacent blood vessels are injured during the procedure leading to severe complications.

**Methods:** In our series, We perform a step up approach by involvement of a multidisciplinary group consisting of general surgeons, gastroenterologists, Infectious disease physicians, critical care internalist, interventional radiologist and nutritional services to formulate a management plan. The necrotized pancreas is initially drained with an IR guided drain, fluid cultures sent for microbiology and treatment with appropriate antibiotics if deemed necessary. The drain is gradually upsized to a 24 Fr sized drain to form a well-defined tract for surgical debridement; A pre-operative CT scan of the abdomen with IV contrast to access the location and proximity of the vasculature around the necrotized pancreas. A collaboration with the interventional radiologist to discuss possible IR embolization of splenic artery prior to surgical debridement. The patient would then undergo video assisted retroperitoneal pancreatic necrosectomy and a sump drain left in-situ at the pancreatic fossa. Post-operative management in the surgical ICU would be lead by the critical care internalist.

**Results:** Three patients were managed by this multidisciplinary approach with excellent outcomes. One patient underwent preoperative IR embolization followed by surgical debridement; second patient underwent embolization immediately following debridement; one patient did not require any embolization but had IR on standby if needed to intervene. Post-operatively all three patients recovered well. They all were tolerating good oral intake and were discharged to rehabilitation facilities.

**Conclusion:** Our preliminary experience demonstrates that an early multidisciplinary plan by various subspecialties can result in a pragmatic and successful approach to this potentially catastrophic condition.

**P537****Laparoscopic Parenchymal Sparing Liver Resections – Are They Feasible? A Systematic Review and Meta-analysis**

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**Introduction:** Liver resection with preservation of as much liver parenchyma as possible is called parenchymal sparing hepatectomy (PSH). PSH has been shown to improve overall survival by increasing the re-resection rate in patients with colorectal liver metastases (CRLM) and recurrence. The caudal-cranial perspective in laparoscopy makes the cranial segments (2, 4a, 7, and 8) more difficult to access. The objective of this systematic review is to analyze feasibility, safety, morbidity, and oncologic outcomes of laparoscopic PSH.

**Methods:** A systematic review of the literature was performed. Medline/PubMed, Scopus, and Cochrane databases were searched. A search strategy was published with the PROSPERO registry. A systematic review was conducted on all cases reported, they were categorized by area of resection and quantitative meta-analysis of operative time, blood loss, length of hospital stay, complications, and R0 resection was performed.

**Results:** Of the 351 studies screened for relevance, 48 studies were selected. Because interventions or endpoints were noncontributory or reporting incomplete, 38 were excluded. Only 10 publications remained, reporting data from 579 patients who underwent laparoscopic PSH. The highest Oxford evidence level was 2b and selective reporting bias was common due to single center and non-controlled reports. Among them, 132 (21.5%) resections were in the cranial segments 2 (1.1%), 4a (5.2%), 7 (6%), and 8 (9.1%), which previously would have required laparoscopic hemi-hepatectomies or sectorectomies. The most common tumor type was CRLM (58%) and the second most common tumor type was hepatocellular carcinoma (16%). Feasibility of laparoscopic PSH was 93%, conversion rate was 7%, and complications were seen in 17% of cases. No perioperative mortality was reported. No standardized reporting format for complications was used across studies. Meta-analysis revealed a weighted average operating time of 385 minutes, estimated blood loss of 463 cc, and length of stay of 8 days. R0 resections were achieved in 91% of cases.

**Conclusion:** Laparoscopic PSH of difficult to reach liver tumors are feasible with acceptable conversion and complication rate, but relatively long operating times and relatively high blood loss. In future studies, data on long term survival and specific tumor type recurrence should be reported and bias reduced.

**P538****Outcomes of Laparoscopic Left Lateral Sectionectomy vs. Open Left Lateral Sectionectomy: Single Center Experience**

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**Purpose:** Laparoscopic surgery has become the mainstream surgical operation due to its stability and feasibility. Even for liver surgery, the laparoscopic approach has become an integral procedure. According to the recent international consensus meeting on laparoscopic liver surgery, laparoscopic left lateral sectionectomy (LLS) might be a new standard of care for left lateral surgical lesions. This study was designed to compare open LLS to laparoscopic LLS.

**Method:** In total, 82 patients who had undergone LLS at Chonnam National University Hwasun Hospital between 2008 and 2015 were enrolled in this study. Among them, 59 patients underwent open LLS and 23 underwent laparoscopic LLS. These two groups were compared according to general characteristics and operative outcomes.

**Results:** The data analysis results showed that laparoscopic liver resection is superior to open liver resection in terms of the amount of bleeding during the operation and the duration of hospital stay. There was no statistical difference between the two groups in terms of operation time ( $p$ -value=0.747). The amount of bleeding during the operation was  $145.5 \pm 149.4$  mL on average for the laparoscopic group and  $320 \pm 243.8$  mL on average for the open group ( $p$ -value=0.005). The mean duration of hospital stay was  $10.7 \pm 5.8$  days for the laparoscopic surgery group and  $12.2 \pm 5.1$  days for the open surgery group ( $p$ -value=0.003).

**Conclusion:** This study showed that laparoscopic LLS is safe and feasible, because it involves less blood loss and a shorter hospital stay. For left lateral lesions, laparoscopic LLS might be the first option to be considered.

**Keywords:** Laparoscopy, Left lateral sectionectomy.

**P539****Outcome Analysis of Pure Laparoscopic Hepatectomy for HCC and Cirrhosis by ICG Immunofluorescence in.- A Propensity Score Analysis**

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**Introduction:** In laparoscopic hepatectomy, the surgeon cannot use their hand to palpate the liver lesion and estimate margin of resection. The use of ICG immunofluorescence technique can show up the liver tumour and has the potential to facilitate a throughout assessment during the operation.

**Method:** Between 2013 and 2016, there were 182 patients undergone pure laparoscopic liver resection for HCC in our hospital. 162 patients had undergone surgery by the conventional laparoscopic approach. 20 patients had laparoscopic hepatectomy with additional ICG immunofluorescence augmented technique.

The surgical outcome was compared with propensity score analysis in a ratio of 1:3.

**Result:** 20 patients had ICG immunofluorescence assisted laparoscopic hepatectomy (Group 1). 60 patients using conventional laparoscopic liver resection with propensity-matched were selected for comparison (Group 2). The median operation time was 200 minutes vs 164 minutes  $p=0.679$ , the median blood loss was 125 ml vs 100 ml ( $p=0.928$ ). 3 additional tumours were identified by ICG technique. 3 patients had suspicious lesion picked up by ICG technique but proven to be benign pathology on frozen section examination. The sensitivity of tumour detection by group 1 was 90%. 100% R0 resection was achieved in Group 1 and Group 2 respectively.

Hospital stay was 5 days vs 4 days ( $p=0.824$ ), post-operative complication was 0 (0%) vs 5 (8.3%) ( $p=0.424$ ) None of the patient developed ICG related complication.

**Conclusion:** In the current study, the new technique showed equally good short-term outcome when compared with conventional laparoscopic hepatectomy. ICG immunofluorescence augmented reality is a promising technique that might facilitate easier identification tumour during laparoscopic hepatectomy.

**P540****Taking the Training Wheels Off: Transitioning from Robotic Assisted to Total Laparoscopic Whipple**

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**Introduction:** There is a substantial learning curve to performing minimally invasive pancreateoduodenectomy (MIS-PD) for surgeons who are trained in open PD. The learning curve to transition from robotic assisted PD (RAPD) to total laparoscopic PD (TLPD) is not well established.

**Methods:** MIS-PDs performed between January 2014 and June 2017 performed by SC as a surgeon or co-surgeon were included for analysis. MIS-PDs were performed using a robotic assisted technique prior to August 2016, and TLPDs were performed subsequently. RAPDs performed prior to 2014 were excluded to limit the comparison to RAPDs after the initial learning curve. Demographics, clinical and pathologic outcomes, operative and post-operative outcomes were compared.

**Results:** A total of 28 RAPDs and 12 TLPDs were scheduled during the study period. There was no statistically significant difference in age, body mass index, or prior abdominal surgery. Median time from initial clinic consultation to surgery was 35 days for the RAPD group versus 15 days in the TLPD group ( $p=0.005$ ). Conversion to laparotomy was required in 4 of 28 patients (14.3%) in the RAPD group versus 2 of 12 patients (16.7%) in the TLPD group ( $p>0.99$ ).

For completed MIS-PDs, there were no statistically significant differences in the operative time (449 minutes for RAPD versus 416 minutes for TLPD,  $p=0.22$ ), adenocarcinoma on pathology (58.3% versus 60.0%,  $p>0.99$ ), tumor size (2.5 cm for both groups), or R0 margin (83.3% vs 100%,  $p=0.30$ ). There were small differences favoring TLPD for estimated blood loss (150 mL for RAPD versus 75 mL for TLPD,  $p<0.001$ ) and nodal harvest (15 versus 20 lymph nodes,  $p=0.045$ ). There was no difference in development of clinically relevant postoperative pancreatic fistula (20.8% versus 20.0%,  $p>0.99$ ), Clavien-Dindo grade III or IV complications (37.5% versus 30.0%,  $p>0.99$ ), length of stay (6.0 versus 5.5 days,  $p=0.67$ ), or 90-day readmission (20.8% versus 50.0%,  $p=0.09$ ). The ratio of the mean cost of RAPD to TLPD was 0.95 for disposable items (95% CI 0.60–2.16) and 1.04 for total operative costs (95% CI 0.81–1.41). There was no 90-day mortality in either group.

**Discussion:** In this single surgeon experience, transitioning from RAPD to TLPD was not associated with an additional learning curve. TLPD in this setting is associated with improved time to resection, and equivalent technical, pathologic, and clinical outcomes.

**P541****Laparoscopic Subtotal Cholecystectomy for Difficult Acute Calculous Cholecystitis**

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**Background:** When the critical view of safety can't be obtained during dissection of Calot's triangle in difficult gallbladder, conversion to open surgery or other "damage control" alternatives as cholecystostomy and subtotal cholecystectomy are recommended to prevent bile duct injury.

**Materials and Methods:** The medical records of all patients presented with acute calculous cholecystitis at our institution during the period from June 2008 to August 2016 were retrospectively reviewed and analyzed.

**Results:** Laparoscopic cholecystectomy was attempted in 71 difficult gallbladders out of 379 patients presenting with acute calculous cholecystitis. In 6 patients (8.5%), conversion to open surgery or laparoscopic cholecystostomy was performed. Laparoscopic subtotal cholecystectomy with dissection and control of the cystic duct was performed for the remaining 65 patients (91.5%) including 50 females (77%) and 15 males (23%) with a mean age of  $42.35 \pm 12.4$  years. The mean operative blood loss was  $45.28 \pm 18.6$  CC and the mean operative time was  $96.3 \pm 24.19$  minutes. There were no operative complications or mortality. The mean hospital stay was  $28 \pm 17.8$  hours. There was no postoperative jaundice, bile leak, intra-abdominal collections or mortality.

**Conclusion:** When surgery is indicated for difficult acute calculous cholecystitis, laparoscopic subtotal cholecystectomy with control of the cystic duct is safe with excellent outcomes. However, if the critical view of safety can't be achieved due to obscured anatomy at Calot's triangle, conversion to open surgery or cholecystostomy must be performed to prevent bile duct injury.

**P542****Nationwide Outcomes After Surgery for Benign Hepatic Tumors**

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**Introduction:** Over the last two decades the increasing incidence of benign liver tumors has led to the expanded need for clinicians to make therapeutic decisions regarding the utilization of open, minimally invasive and ablative techniques. The purpose of this study was to compare outcomes of the management of benign liver disease based on operative approach and pathology.

**Methods:** Patients aged 18 years or older who underwent liver surgery for benign liver tumors from 2010 to 2014 were identified in the Nationwide Readmissions Database. Patients were compared based on liver pathology, resection versus ablation, and an open versus laparoscopic/robotic approach. The outcomes of interest were in-hospital mortality, prolonged length of stay (LOS)  $>7$  days, and readmission within 30-days. Univariable analysis was performed for these outcomes and multivariable logistic regression was performed using the variables with a p-value  $<0.05$  on univariable analysis. Results were weighted for national estimates.

**Results:** There were 6,173 patients undergoing surgery for benign hepatic tumors in the US during the study period. The most common pathology was benign neoplasm (62.1%) followed by hemangioma (28.9%), and congenital cystic disease (9.1%). Resection alone was performed in 72.8%, ablation alone in 21.1%, and resection with ablation in 6.1%. A laparoscopic/robotic approach was used in 10.3% of cases. The overall mortality rate was 0.3%, a prolonged LOS was found in 14.7%, and readmission within 30 days occurred in 8.1%. An increased risk for mortality was found with hemangioma (OR 12.34,  $p=0.03$ ) and congenital cystic disease (OR 11.43,  $p=0.03$ ). Resection with ablation was associated with an increased risk of prolonged LOS (OR 2.22,  $p<0.01$ ), while a laparoscopic/robotic approach was a protective factor for prolonged LOS (OR 0.39,  $p<0.01$ ). Patients treated with ablation alone were at decreased risk for readmission (OR 0.59,  $p<0.01$ ).

**Conclusions:** The surgical management of benign liver tumors continues to be a safe and effective option. Minimally invasive techniques are associated with a decreased length of stay and ablative techniques are associated with decreased readmission rates.

Kim Y, Amini N, He J, Margonis GA, Weiss M, Wolfgang CL, Makary M, Hirose K, Spolverato G, Pawlik TM (2015) National trends in the use of surgery for benign hepatic tumors in the United States. *Surgery* 157:1055–1064.

**P543****Worldwide Variations in Sleeve Gastrectomy Techniques**

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**Introduction:** Laparoscopic Sleeve Gastrectomy is the most commonly weight loss procedures performed worldwide. As such, there is great diversity in the techniques utilized. This study aims to identify and categorize the differences in techniques and assess the need for guidelines in this field.

**Case Description:** Surgeons were surveyed on the techniques they employ on biweekly basis using the International Bariatric Club Facebook group. The survey included sleeve staple line reinforcement, preoperative work up, intraoperative hiatal dissection, bougie size, distance from pylorus to distal staple line, and intraoperative leak testing. Surveys were conducted between May 2017 and July 2017. Each survey was active for 2 weeks after which data was collected. Participants were required to select a single answer per question.

**Discussion:** When surveyed on staple line reinforcement ( $n=305$ ), 122 surgeons used no reinforcement, 103 over-sewed, 43 buttressed, 19 clipped as necessary, 10 over-sewed as necessary. For preoperative work up ( $n=188$ ), 125 utilized routine endoscopy, 9 routinely obtained upper GI series, 2 routinely obtained both endoscopy and upper GI, and 43 employed endoscopy or upper GI series only in patients who were symptomatic. For hiatal dissection ( $n=168$ ), 14 surgeons dissected the hiatus routinely, 116 dissected only when obvious hernias intraoperatively, 32 dissected only if the hernia was detected on preoperative work up, and 1 dissected in the setting of GERD symptoms. For sleeve caliber sizing ( $n=275$ ), bougie  $<32$  F was used by 1 surgeon, bougie size 32F, 34F, 36F were utilized by 86, bougie size 38F and 40F were utilized by 171, bougie  $>40$  F were used by 4, and gastroscopes (34F) were used by 9. With regards to distance from pylorus to where the sleeve staple line was initiated ( $n=207$ ), 44 participants started  $<4$  cm away from pylorus, 159 between 4 and 6 cm, and 4 started  $>6$  cm from pylorus. Finally, for preferred intraoperative leak test during sleeve ( $n=268$ ), methylene blue was used by 133 surgeons, air leak test by 50, 4 used both, and 78 opted for none.

**Conclusion:** This study characterizes the wide varieties in the techniques used during sleeve gastrectomy. A great number of variations exist in every parameter surveyed; however, there is little evidence comparing the effectiveness and safety of these variations. In this setting, further randomized controlled trials are necessary and should be used to construct guidelines to best optimize outcomes in this extremely common and necessary operation.

**P544****Is the Original Hospital the Best Readmission Destination When Complications Occur Following Bariatric Surgery?**

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**Introduction:** Bariatric surgeries are commonly performed in accredited Centers of Excellence, but no consensus exists regarding the optimal readmission destination when complications occurred. Our study aims to examine the impact of care fragmentation on post-operative outcome and evaluate its causes and consequences among patients undergoing 30-day readmission after bariatric surgery.

**Methods:** The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) 2015 database was used to identify patients who experienced 30-day unplanned readmission following bariatric surgery. Non-index readmission was defined as any readmission occurring at a hospital other than the one where initial surgery was performed. Primary outcome was 30-day mortality after surgery. Logistic regressions were used to identify risk factors for non-index readmission and to adjust for confounders in the association between non-index readmission and 30-day mortality.

**Results:** A total of 5,276 patients were identified as experiencing 30-day unplanned readmission following bariatric surgery, among whom 359 (6.8%) were non-index readmissions. Occurrence of postoperative complication during initial hospitalization was the most significant risk factor for non-index readmission (OR 1.36, 95% CI 1.06–1.75, p=0.02) in our multivariate logistic regression. The three most common reasons for readmission were similar within the two comparison groups, including nausea/vomit, abdominal pain and anastomotic leakage. Similar proportion of patients underwent reoperation among the two comparison groups (22.7 vs 20.6%, p=0.362). Even after adjusting for occurrence of complications, being readmitted to a non-index facility was still associated with a 5.2-fold odds of 30-day mortality (95% CI 2.50–10.85, p<.001).

**Conclusion:** Non-index readmission significantly increases the risk of 30-day mortality following bariatric surgery. Patients were more likely to visit a non-index facility if complications occurred during their initial hospitalization. Further patient education is required to reinforce the importance of continuity-of-care during management of bariatric complications and guide patient's decision making in choosing readmission destinations.

**P545****Size Doesn't Matter: Volume of Resected Stomach Does Not Predict Weight Loss 1 Year After Sleeve Gastrectomy**

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**Introduction:** Sleeve gastrectomy has become the most performed bariatric surgery. Removing part of the stomach causes weight loss by restricting food intake and regulating the production of incretins, particularly ghrelin. However, prognostic factors to weight loss after sleeve gastrectomy have been difficult to find. The goal of this research was to study the correlation between the volume of resected stomach and weight loss.

**Methods and Procedures:** Volume of resected stomach of 217 patients undergoing sleeve gastrectomy was measured. A standard laparoscopic technique was used. Calibration was performed tightly around a 28 Fr bougie, and stapling started 4–6 cm from the pylorus. The standardized technique for measurement involved insufflation with a 14G catheter with saline solution to a pressure of 18 cm H<sub>2</sub>O immediately after removal of the specimen. Resected stomach's volume, gender, age, BMI, height and % of total weight loss (%TWL) at 6 months and 1 year were prospectively recorded. Correlation between variables was analyzed with Pearson's test and linear regression models. Comparison between groups was carried on with t-test or Chi-square test as required. A significance level of 0.05 was established.

**Results:** Out of 217 patients, 174 (80.2%) were female. Mean BMI was 45.7±6.2, height 1.62±0.09 m, age 43.9±9.5 years. Average resected stomach was 436.5±120 ml (95% CI 420–452 ml). Volume was significantly larger in men (525 vs 414 ml, p<0.0001). On the bivariate analysis, age and BMI were not correlated to volume, while a moderate correlation was found with height (Pearson r=0.35, P=0.0001; Linear regression F=31.1, P=0.00001, Adj R<sup>2</sup>=0.13; predicted volume 367 ml+4.3 (height in cm)).

Follow up was 87.5% at 6 months and 79.3% at 1 year. No significant correlation was found between remnant volume and %TWL at 1 year (Pearson r=0.16, P=0.016; Linear regression F=5.8, P=0.016, Adj R<sup>2</sup>=0.04).

Patients were divided into two groups according to resected gastric volume [group A ( $\leq$ 400 ml, n=101) and group B ( $>$ 400 ml, n=116)]. After adjusting by gender, BMI and height, there was no significant difference between the two groups in %TWL at 6 months (27.9% vs 29.1%, P=0.2) or %TWL at 1 year (31.6% vs 32.6%, P=0.37).

**Conclusion:** Removed stomach was larger on men than women and its size slightly correlated to height. However, volume of resected stomach did not seem to have an incidence on short term weight loss. Gastric size should not be considered as a prognostic factor for weight loss in patients undergoing sleeve gastrectomy.

**P546****Revised Bariatric Surgery After Initial Laparoscopic Sleeve Gastrectomy: What to Choose**

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**Introduction:** Bariatric surgery has been shown to produce the most predictable weight loss results, with laparoscopic sleeve gastrectomy (LSG) being the most performed procedure as of 2014. However, inadequate weight-loss may present the need for a revisional procedure. The aim of this study is to compare the efficacy of laparoscopic re-sleeve gastrectomy (LRSG), laparoscopic Roux-en-Y gastric bypass (RYGB) and gastric mini-bypass surgery (MGBP) in attaining successful weight loss following initial LSG.

**Methods:** A retrospective analysis was performed on all patients who underwent LSG at Amiri and Royale Hayat Hospital, Kuwait from 2008 to 2017. A list was obtained of those who underwent revisional bariatric surgery after initial LSG, and their demographics were analyzed.

**Results:** A total of 109 patients underwent revisional bariatric surgery, of which 37.6% underwent RYGB, 33.9% underwent LRSG, and 28.4% underwent MGBP. 84% of the patients were female. The mean weight and BMI prior to LSG for the LRSG, RYGB and MGBP patients were 137.1 kg and 49.9 kg/m<sup>2</sup>, 135.2 kg and 50.5 kg/m<sup>2</sup>, and 126.2 kg and 48.3 kg/m<sup>2</sup> respectively. The mean BMI showed a drop from 42.03 to 31.69 (p=0.000) 1 year post revisional surgery for the LRSG group, 42.67–34.74 (p=0.000) for the RYGB group, and from 41.58 to 35.19 in the MGBP group, correlating to an excess weight loss (EWL) of 62.09%, 47.18% and 40.51% respectively. At 2 years post-revisional, LRSG patients showed an increase in BMI to 32.85 (EWL=57.11%), while those that underwent RYGB continued to show a decrease to 30.83 (EWL=67.16%).

**Conclusion:** Revisional bariatric surgery is a safe and effective method for the management of failed primary LSG. Revisional bariatric surgery has also shown to help with the management of comorbidities associated with obesity.

**P547****Relationship of Hemorrhagic Complications with Perioperative Blood Pressure in Bariatric Surgery**

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**Introduction:** The aim of this study is to identify potential risk factors or early indicators, specifically related to perioperative blood pressure, and its association with perioperative hemorrhage in the bariatric population. Laparoscopic bariatric surgery in the United States has been steadily increasing over the past several years. Between 2011 and 2015, the annual number of cases has increased by 24%. Although rare, hemorrhagic complications (HC) occur at a rate of 1–5% and can lead to significant morbidity and mortality. By identifying factors which may place a patient at higher chance of HC, surgeons can potentially mitigate those risks. These modifications could reduce morbidity and limit the requirement of transfusions or reoperations.

**Methods and Procedures:** A retrospective case-control series was performed to include all patients who underwent either laparoscopic sleeve gastrectomy (SG) or laparoscopic Roux-en-Y gastric bypass (GB) in 2016 at a single bariatric center of excellence. A total of 8 patients were identified with perioperative HC. Each patient was matched 2:1 for procedure, body mass index, and medical comorbidities. Peak systolic, diastolic, and mean arterial pressures were compared between groups at time of admission, intraoperative, and during remainder of initial hospital stay. Welch's T-tests were used for comparison between groups.

**Results:** A total of 467 procedures were performed with 383 de novo SG, and 84 de novo GB. Revisional bariatric cases were excluded from the study. HC occurred in 8 (1.7%) total patients, 5 SG and 3 GB. Four patients required operative treatment for HC, 3 were treated laparoscopically and 1 required laparotomy. The mean diastolic pressures at time of arrival on day of surgery was higher in patients who develop HC (p=0.04) and mean peak diastolic pressure intraoperatively was lower in patients who develop HC (p=0.01). There was no statistical difference in peak systolic or mean arterial pressures throughout the hospital stay.

**Conclusions:** Bariatric surgical patients with elevated preoperative diastolic blood pressures are at an increased risk of postoperative HC. Additionally, decreased peak diastolic blood pressures may be an early indication of an HC in bariatric patients.

**P548****Should We Perform Bariatric Surgery at a Younger Age?**

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**Introduction:** Bariatric surgery in the adult population is recognized as one of the most effective treatments for obesity and its comorbidities. Nonetheless, the safety, efficacy, and substantial outcomes of bariatric surgery in young adults are still not well documented. The aim of our study is to evaluate the safety and efficacy of Laparoscopic Sleeve Gastrectomy (LSG) in young adults (<29 years old) versus older adults ( $\geq 30$  years old).

**Methods:** We retrospectively reviewed all patients who underwent bariatric surgery at our institution from 2010 to. Propensity score matching was used in order to balance covariates, matching for common demographics and comorbidities between the younger patient population (<29 years old) and the control group ( $\geq 30$  years old). All tests were two-tailed and performed at a significant level of 0.05. Statistical software R, version 3.1 (2016-06-21) was used for all analyses.

**Results:** Of 1330 patients, 40.07% (n=533) met our inclusion criteria after matching. We found 12.63% (n=119) patients under 29 years old and 43.94% (n=414) patients greater or equal to 30 years old (control group). We observed that our younger population distribution was predominantly Caucasian and Female, 70.58 % (n=84) and 77.31% (n=92) respectively. The mean age was 24.63  $\pm$  3.49 years with a preoperative Body mass index (BMI) of  $45.93 \pm 7.3$  kg/m $^2$  in the younger group compared to  $50.08 \pm 3.49$  years and a BMI of  $44.88 \pm 6.16$  kg/m $^2$  in the control group.

Diagnosis of diabetes and hypertension were present in 22.68% (n=27) and 10.08% (n=12) of our younger group, respectively. No statistical significance was found when assessing the percentage of BMI loss (%EBMIL) at 3 and 6 months follow-up as shown in Table 1. When comparing the %EBMIL at 12 months follow-up, the younger group had 10.39% more EBMIL than the control group ( $P=0.0231$ ). When assessing post-operative complications we observed no statistical significance.

**Conclusions:** Bariatric surgery is equally effective and safe in young adult population demonstrating significant better %EBMIL at 12 months following bariatric surgery. Following prospective studies are needed to elucidate the resolution and behavior of comorbidities in a younger bariatric population.

**Table 1.** Comparison between LSG in <29 years versus  $\geq 30$  years patients after matching

	<29 years (n=119)	$\geq 30$ years (n=414)	P value
Age (Years)	24.63 $\pm$ 3.49	50.08 $\pm$ 10.40	
Sex: Female	77.31% (n=92)	73.67% (n=305)	0.400*
Race: Caucasian	70.58% (n=84)	74.15% (n=307)	0.461 *
Preoperative BMI	45.93 $\pm$ 7.301	44.88 $\pm$ 6.16	0.119 <sup>b</sup>
Diagnosis of DM	22.68% (n=27)	31.40% (n=130)	0.066*
Diagnosis of HTN	10.08% (n=12)	35.26% (n=146)	<0.001 *
<b>BMI</b>			
BMI at 3 months	39.62 $\pm$ 7.13	38.40 $\pm$ 5.86	0.057 <sup>b</sup>
%EBMIL at 3 months	40.56 $\pm$ 14.63	39.95 $\pm$ 11.05	0.625 <sup>b</sup>
BMI at 6 months	33.69 $\pm$ 7.03	33.67 $\pm$ 5.58	0.989 <sup>b</sup>
%EBMIL at 6 months	61.96 $\pm$ 23.98	58.54 $\pm$ 19.70	0.269 <sup>b</sup>
BMI at 12 months	31.23 $\pm$ 7.27	32.15 $\pm$ 5.47	0.473 <sup>b</sup>
%EBMIL at 12 months	74.46 $\pm$ 23.47	64.07 $\pm$ 24.73	0.023*

Mean $\pm$ Standard deviation or Percentage (n-number). \* $\chi^2$ -Chi-square, <sup>b</sup>Unpaired T-Test. HTN=Hypertension. DM=Diabetes Mellitus type 1 or 2. %EBMIL= Percentage of estimated BMI loss.

**P549****Minimally Invasive Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass for Intractable Gastroesophageal Reflux Disease: Short Term Outcome**

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**Background:** Surgical management recommendations for intractable gastroesophageal reflux disease (GERD) after sleeve gastrectomy (SG) remain controversial. This case series demonstrates our experience with treatment of post-operative intractable GERD using minimally invasive conversion of SG to Roux-en-Y gastric bypass (RYGB).

**Patients and Methods:** This is a retrospective review of a prospective data registry (MBSAQIP) from Jan 2016 through Sept 2017. Eleven patients, 10 female and 1 male, were evaluated. Of the 11 surgeries, 7 were laparoscopic, 3 assisted with Xi Da Vinci robot, and 1 assisted with Si Da Vinci Robot. All patients presented with intractable reflux on high dose PPI. Three had a history of aspiration pneumonia. The mean BMI at time of RYGB was  $40.7 \pm 11.1$  kg/m $^2$ . Based on estimated time frames from medical records the mean interval time between sleeve and conversion to RYGB was  $48.2 \pm 17.3$  months. Upper GI series on all eleven patients performed prior to RYGB showed significant reflux. pH studies were done on 4 patients with a mean DeMeester 43.3, pH<4 mean time was 16%. High Resolution Manometry was performed on 3 patients with varied results of esophagogastric junction obstruction, spastic peristalsis, and Ineffective Motility Disorder with abnormal peristalsis.

**Results:** Mean operative time was  $173.3 \pm 62.6$  minutes. There were no conversions to open surgery and no mortality. Mean hospital stay was  $2.54 \pm 1.21$  days. Seven surgeries included a hiatal hernia repair.

Five surgeries included laparoscopic fundectomy of the neofundus. All patients reported complete resolution of GERD symptoms. One developed empyema. Three developed stenosis of gastrojejunostomy. Initial mean BMI was  $41.2 \pm 11.1$  kg/m $^2$ . After a mean follow up of  $5.33 \pm 2.89$  months, mean change in BMI, % total weight loss, and %EBMIL was  $8.64 \pm 7.17$  kg/m $^2$ ,  $13.73 \pm 6.56\%$ ,  $40.1 \pm 14.88\%$ , respectively. One was omitted due to pending results.

**Conclusion:** Several solutions exist for operative management of intractable GERD after SG including redo-sleeve gastrectomy, combined gastrectomy with fundoplication, conversion to gastric bypass or anti-reflux procedures such as LINX. Reports remain small in series and require further study to evaluate the consistency of results. We found minimally invasive conversion of SG to RYGB is a highly effective and safe option for treatment of intractable GERD.

**P550****Prevalence of Esophageal Dysmotility in Asymptomatic Obese Patients**

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**Background:** Obesity is an important health problem affecting more than 500 million people worldwide. Esophageal dysmotility is a gastrointestinal pathology associated with obesity; however, its prevalence and characteristics remain unclear. Esophageal dysmotilities have a high prevalence among obese patients regardless of gastrointestinal symptoms.

**Objective:** To identify the prevalence of esophageal motility disorder in asymptomatic obese patient.

**Materials and Methods:** Prospective study was performed between June 2014 and March 2017. A total of 47 of morbid obese patients who visited the bariatric and metabolic clinic at Rajavithi Hospital (Bangkok, Thailand) underwent preoperative evaluation with high resolution esophageal manometric test with ManoscanTM eso (Smith medical). Tracings were retrospective analysis and reviewed according to Chicago classification criteria for esophageal motility disorders.

**Results:** Among 47 asymptomatic obese participants, twenty five of them were female. The mean age was 32.94 (16–68) years old. Most of the participants were classified as class three obesity or over. The mean BMI was  $53.83$  kg/m $^2$ . No hiatal hernia was found and the anatomy of esophagus was normal in all patients. The mean IRP was 14.59 mmHg. Twenty-one patients (44.68%) demonstrated high IRP over normal limit ( $>15$  mmHg). Four patients demonstrated premature contraction (DL<4.5 second). Hypercontractile esophagus was identified in 2 patients and ineffective motility disorder was found in 5 patients. Two patients were diagnosed as distal esophageal spasms (DES). Two patients were compatible with type 3 achalasia and 19 patients (40.42%) have esophageal outflow obstruction. None of the patient demonstrate incomplete bolus clearance even high IRP or abnormal motility.

**Conclusion:** This study reveals a high prevalence of esophageal dysmotility in asymptomatic Thai obese patients. The most common abnormality were esophageal outflow obstruction and ineffective motility. The Chicago classification of esophageal motility disorder may not suitable among obese population.

**P551****Clinical Outcomes of the Minigastric Bypass vs Roux-en-Y Gastric Bypass- A Meta-analysis of the Literature**Sitembile Lee, MS<sup>1</sup>, Chike Okolocha<sup>1</sup>, Aliu Sanni, MDFACS<sup>2</sup>:<sup>1</sup>Philadelphia College of Osteopathic Medicine GA campus, <sup>2</sup>Eastside Bariatric and General Surgery

**Introduction:** Roux-en-y gastric bypass (RYGB) is the most popular bariatric procedure performed worldwide, accounting for 45% of all bariatric procedures. However, in patients with a body mass index (BMI)  $\geq 60 \text{ kg/m}^2$  (super-super obese) the RYGB procedure can be technically challenging. This has led to the adoption of a single-stage treatment such as one anastomosis (mini) gastric bypass (OAGB/MGB) in the super-super obese patients. Proponents of the OAGB/MGB claim the clinical outcomes are comparable to the RYGB. The aim of this study is to compare the outcomes of the two procedures by examining the literature.

**Methods:** A systematic review was conducted through PubMed to identify relevant studies from 2001 to 2015 with comparative data on RYGB versus OAGB/MGB on super-super obese populations. The primary outcome was the percentage excess weight loss (%EWL). Other outcomes include operative times, complication rates and length of hospital stay. Results were expressed as standard difference in means with standard error. Statistical analysis was done using random-effects meta-analysis to compare the mean value of the two groups (Comprehensive Meta Analysis Version 3.3.070 software; Biostat Inc., Englewood, NJ).

**Results:** Five out of 203 studies were quantitatively assessed and included for meta-analysis. Among the 5 studies, 1003 patients underwent the OAGB/MGB and 916 underwent the RYGB. Patients in the OAGB/MGB group had a higher %EWL ( $0.502 \pm 0.151$ ,  $p=0.001$ ) when compared to the RYGB group. The operative times ( $-1.248 \pm 0.054$ ,  $p<0.05$ ) and length of hospital stay ( $-0.106 \pm 0.051$ ,  $p=0.039$ ) were shorter in the OAGB/MGB patients when compared to the RYGB patients. Post-operative complication rates, early vs late, were similar in both groups ( $-0.031 \pm 0.100$ ,  $p=0.759$ ,  $0.123 \pm 0.288$ ,  $p=0.671$ ) respectively.

**Conclusion:** OAGB/MGB is a safe and effective alternative to RYGB for surgical management of super-super obese patients.

**P552****Which Bariatric Procedure Is Best for Obese Patients with Inflammatory Bowel Disease?**Jingjing L Sherman, MD<sup>1</sup>, Dmitry Nepomnayshy, MD, FACS<sup>2</sup>:<sup>1</sup>Englewood Hospital, <sup>2</sup>Lahey Hospital and Medical Center

**Introduction:** Obesity is becoming more prevalent in patients with inflammatory bowel disease (IBD). The obese body habitus increases the complexity of surgeries that are often needed to treat IBD. Some surgeons may delay definitive surgical treatment because of obesity. Little data exists on bariatric surgery in the obese patient with IBD.

**Methods:** We retrospectively identified 17 patients who had known diagnosis of IBD who underwent bariatric surgery from 2006 to 2016. Demographics and post-operative outcomes were assessed.

**Results:** 17 patients were identified: 8 with ulcerative colitis (UC) and 9 with Crohn's disease (CD). Of the 8 UC patients, none of the patients had surgery for UC and only one was on a biologic. Of the 8 UC patients, 2 had adjustable gastric band (AGB), 1 had gastric bypass and 5 had sleeve gastrectomy. One patient with AGB had it replaced for slip and subsequently removed for dysphagia. UC preoperative BMI average was 43.5. Postoperative BMI was 32.4 with excess weight loss (EWL) of 57%. Average follow up was 23 months.

Of the 9 CD patients, 4 patients had ileocolic resections and one had total proctocolectomy with end ileostomy. One was on Remicade and one on 6MP. Of the CD patients, 5 had AGB, 1 had gastric bypass and 3 had sleeve gastrectomy. One AGB patient had conversion to gastric bypass because of dysphagia and poor weight loss. A second AGB patient had band removal because of dysphagia. CD patients' preoperative BMI average was 43.1. Postoperative BMI was 37.0 with average EWL of 30%. Average follow up was 37 months.

Overall, AGB patients had 17% EWL, sleeves 51% and gastric bypass 74%. Two UC patients had post-operative flares, one immediately post op and one month post-operative. Four of the 7 band patients had dysphagia with one replacement, two removals and one conversion to bypass. There were no leaks, intraabdominal infections, fistulas or wound infections.

**Conclusions:** UC patients appear to have higher excess weight loss compared to Crohn's patients; EWL 57% compared to 30% but was not statistically significant. AGB had poor results in both UC and CD patients. Sleeve gastrectomy and gastric bypass results in effective weight loss for obese patients with IBD. Gastric bypass in IBD patient is controversial, but may be appropriate in the right clinical setting.

**P553****Who Loses Weight? The Impact of Patient Characteristics on Preoperative Weight Loss**

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**Introduction:** Previous studies suggest that modest preoperative weight loss is associated with improved weight loss following bariatric surgery. However, there remains a need to investigate factors which may successfully predict preoperative weight loss among bariatric patients.

**Methods and Procedures:** This analysis included patients who underwent laparoscopic Roux-en-Y gastric bypass (RYGB), sleeve gastrectomy, or gastric banding at an academic medical center in California. Data were measured at patients' consult and preoperative clinical visits. Preoperative weight loss outcomes were categorized as follows: no weight loss, lost weight, or gained weight. Associations between categorical sociodemographic and surgical characteristics and preoperative weight loss outcomes were assessed using the Chi-Square Test of Association. Associations between continuous measures and preoperative weight loss outcomes were assessed using ANOVA. A sub-group analysis was completed among participants who lost weight prior to bariatric surgery. Wilcoxon-Rank-Sum and Kruskal-Wallis tests were used to evaluate associations between patient characteristics and the number of pounds lost.

**Results:** Patients (n=2,597) were predominately ages 45–65 (56%), female (80%), White (53%), and privately insured (68%). Patient race was significantly associated with weight loss outcomes ( $p=0.013$ ): whereas 62% of White patients lost weight prior to surgery, only 54% of Black patients lost preoperative weight. Among privately insured patients, 59% lost weight. In contrast, 64% of patients insured by Medi-Cal/Medicaid lost weight ( $p=0.049$ ). On average, lower baseline excess body weight was associated with no weight loss. Patients who lost preoperative weight (n=1,570) were included in the sub-group analysis. Male sex ( $p<0.001$ ), Black race ( $p<0.001$ ), undergoing laparoscopic RYGB ( $p=0.003$ ), no previous abdominal surgeries ( $p=0.038$ ), upper tertile baseline weight ( $p<0.0001$ ), waist circumference ( $p<.0001$ ), percent body fat ( $p<.01$ ), BMI ( $p<0.0001$ ), excess body weight ( $p<0.0001$ ), and systolic blood pressure ( $p=0.001$ ) were associated with more pounds lost.

**Conclusions:** This study demonstrates various associations between sociodemographic and clinical patient characteristics and preoperative weight loss. Given previous literature indicating the positive relationship between preoperative and postoperative weight loss following bariatric surgery, the results of this study suggest an opportunity to improve preoperative weight loss among specific groups.

**P554****Cost Analysis and Risk Factors for Interval Cholecystectomy Following Bariatric Surgery: A National Study**Yen-Yi Juo, MD, MPH<sup>1</sup>, Usah Khrucharoen, MD<sup>2</sup>, Yijun Chen, MD<sup>1</sup>,<sup>1</sup>Yas Sanaiha, MD<sup>1</sup>, Peyman Benharash, MD<sup>1</sup>, Erik Dutson, MD<sup>1</sup>:<sup>1</sup>UCLA, <sup>2</sup>Veteran Affairs Greater Los Angeles Area

**Background:** Besides rate and extent of weight loss, little is known regarding factors predicting interval cholecystectomy following bariatric surgery, which are important factors in a surgeon's consideration during decision-making regarding whether to perform prophylactic cholecystectomy. In addition, no previous studies have quantified the incremental costs associated with IC. We aim to identify risk factors predicting interval cholecystectomy (IC) following bariatric surgery and quantify its costs.

**Methods:** A retrospective cohort study was performed using the National Readmission Database 2010–2014. Cox proportional hazard analyses were used to identify risk factors for IC. Linear regression models were constructed to examine associations between cholecystectomy timing and cumulative hospitalization costs.

**Results:** An estimated national total of 553,658 patients received bariatric surgery during the study period. Of these, 3.3% received concomitant cholecystectomy (CC). After adjusting for bariatric procedure type, age, gender, complication and length of stay, CC was independently associated with an \$1,589 increase in hospitalization cost (95% Confidence Interval \$1,021–2,158,  $p<0.01$ ). Of patients that received no CC, only 0.06% underwent IC during the up-to-one-year follow-up. Age below 35 ( $p<0.01$ ), female gender ( $p<0.01$ ), and high preoperative BMI ( $p=0.03$ ) were all risk factors for IC. IC was independently associated with a \$1,499 higher cumulative hospitalization cost than CC ( $p<0.01$ , 95% Confidence Interval \$844–\$2,154).

**Conclusions:** Despite the higher absolute cost of IC, its low incidence does not financially justify a routine prophylactic CC approach. In addition, no significant reduction in cholecystectomy-related complications were achieved by performing CC. An individualized approach taking identified risk factors for IC into consideration is recommended when deciding whether to perform prophylactic CC.

**P555****Hospital Factors Associated with One Year Patient-Reported Outcomes Follow-Up Rates After Bariatric Surgery**

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**Background:** Patient-reported outcomes after bariatric surgery are important in understanding the longitudinal effects of surgery. The impact of hospital practices and surgical outcomes on follow-up rates remains unexplored.

**Objective:** To assess the effect of hospital-level practices and 30-day complication rates on 1-year follow-up rates of a standardized patient-reported outcomes survey.

**Methods:** Bariatric surgery program coordinators in a statewide quality improvement collaborative were surveyed in June 2017 about their practices for obtaining patient-reported outcomes data one year after surgery. Hospitals were ranked based on their follow-up rates between 2011 and 2015 (accounting for overall performance and improvement). Univariate analysis was used to identify hospital practices associated with higher follow-up rates. Multivariable regression was used to identify independent associations between 30-day outcomes and follow-up rates after adjusting for patient factors.

**Results:** Overall, follow-up rates improved from 2011 ( $33.9\% \pm 14.5\%$ ) to 2015 ( $51.0\% \pm 13.0\%$ ) though there was wide variability between hospitals ( $21.1\% \text{ vs } 77.3\%$  in 2015). Coordinator survey response rate was 100%. Sixty-one percent of all surveyed coordinators perceived that surgeons prioritize high follow-up rates. When asked how long were their patients followed for, 78% of coordinators noted their programs provided lifelong follow-up. Patient reminders about the 1-year survey were used by 67% of programs, mostly during clinic visits (75%). Most programs (83%) had implemented strategies to improve follow-up rates, such as handing out the survey (73%) during clinic visits. Follow-up providers included surgeons (86%), nurse practitioners (56%), and/or registered dietitians (47%). Patient disinterest (81%), loss to follow-up (44%), survey length (36%), and lack of staff/resources (33%) were the factors most commonly perceived as barriers to high follow-up rates. When compared to programs in the bottom quartile of follow-up rates, those in the top quartile were more likely to hand out the survey to patients during clinic visits (100% vs 44.4%;  $p=0.0106$ ) and had lower rates of risk-adjusted severe complications (1.7% vs 2.60%;  $p=0.0481$ ), readmissions (3.96% vs 5.08%;  $p=0.0157$ ), and reoperations (0.75% vs 1.50%;  $p=0.0216$ ).

**Conclusions:** Hospitals vary considerably in their 1-year follow-up rates when seeking patient-reported outcomes data after bariatric surgery. There were also significant differences in program-specific practices for obtaining these data. Hospitals with higher 1-year follow-up rates were more likely to physically hand surveys to patients during a clinic visit and had lower 30-day severe complication, readmission, and reoperation rates. Improved 1-year patient-reported outcomes follow-up after bariatric surgery may be a proxy for higher quality perioperative care.

**P556****Management of Post Gastric Bypass Nesidioblastosis Causing Postprandial Neuroglycopenia**

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Bariatric surgery is gaining popularity not only for its weight loss benefits, but also for its metabolic effects. We present a 44-year-old female patient with symptoms of neuroglycopenia, occurring 11-years post Roux-en-Y gastric bypass surgery. During one of her syncopal episodes, her blood sugar was noted to be 21 mg/dL. Continuous glucose monitoring demonstrated post prandial hypoglycemia, averaging 4 episodes per day, with a maximum of 6 episodes in one day. Upon further evaluation, the lab results of the HbA1c, chromogranin A, somatostatin, and urinary sulfonylurea levels were all normal, with the C-peptide level within the upper limit of normal. CT scan of the abdomen and pelvis did not show any obvious masses in the pancreas, and since the chromogranin A level was normal, it lead to the empiric diagnosis of nesidioblastosis by exclusion. We placed the patient initially on medical management which included a carbohydrate restricted diet of 30 g per meal, eating 6–8 small meals per day, and taking 50 mg of acarbose three times per day. Overall, symptoms have improved, and she has 1–2 episodes per month, compared with about 4 episodes per day. We will also present the data with regards to other invasive treatment options, which are available when medical treatment options have failed, such as gastric bypass reversal versus distal gastrectomy.

**P557****Revised Bariatric Surgery After Vertical Banded Gastroplasty: A Ten Year Experience**

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Vertical banded gastroplasties (VBGs) were a common bariatric procedure in the 1980s but have largely fallen out of favor due to unsatisfactory weight loss and a relatively high incidence of long-term complications such as dysphagia and severe gastroesophageal reflux disease (GERD). One of the ways to address these undesirable effects is to convert to a Roux-en-Y gastric bypass (RYGB). The aim of this study was to assess the safety and efficacy of VBG-to-RYGB conversion.

Outcomes of VBG revisions performed at an academic center between 2008 and 2017 were reviewed. Of the 54 VBG revisions, gastrectomies were created in two patients, two underwent a planned 2-stage conversion, and 50 VBGs were converted to RYGBs. Patients were operated on an average of 24 years after their initial VBG. Presenting symptoms were weight regain ( $n=30, 55.6\%$ ), dysphagia ( $n=29, 53.7\%$ ), or severe GERD ( $n=23, 42.6\%$ ). Fourteen patients (26%) had a gastric staple line dehiscence. Of the 50 VBG to RYGB conversions, 39 were laparoscopic, 5 were converted to open, 4 were open, and 2 were robotic-assisted. Average operative time and length of hospital stay were 305.4 minutes and 9.2 days, respectively. Within the first 3 months post-operatively, twelve (24%) patients required readmission directly related to surgery, while eight (16%) visited the emergency department. Eight patients (16%) required at least one unplanned operation due to complication(s) during the entire follow-up: small bowel obstruction ( $n=3$ , at 1-week, 12-months, and 14-months), necrosis/leak of remnant stomach requiring remnant gastrectomy ( $n=3$ ), tracheostomy for prolonged respiratory failure ( $n=2$ ), bleeding ( $n=1$ ), anastomotic leak ( $n=1$ ), and hemotorax requiring VATS ( $n=1$ ). Four patients (8%) had a contained perforation that was medically managed and five (10%) developed a gastrojejunum anastomosis stricture requiring endoscopic intervention. One patient (1.8%) developed pulmonary embolism. There was no mortality directly related to surgery. Complete resolution or improvement of GERD/dysphagia was appreciated in all patients in the short term follow-up. Patients who presented with weight regain had a mean BMI loss of  $13.2 \pm 8.2$  points in the median follow-up time of 8.5 months up to a year after conversion to RYGB.

In summary, reoperative bariatric surgeries after VBGs are complex, requiring longer operative times and length of stay. Our study found 16% risk of severe complications requiring reoperations, compared to the previously cited 38% in short and long-term complications. Conversion of VBG to RYGB provides excellent relief of severe GERD and dysphagia and is a viable option for significant weight reduction.

**P558****Concomitant Splenectomy Worsens Outcomes of Bariatric Surgery**

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**Introduction:** Bariatric surgery is a safe and effective treatment for severe obesity and its comorbidities. However, concomitant splenectomy is sometimes required due to uncontrolled bleeding during the surgery. Limited literature exists regarding the effects of concurrent splenectomy on outcomes of bariatric surgery. This study aimed to determine these outcomes.

**Methods:** Adult patients with obesity who underwent primary, elective laparoscopic Roux-en-Y gastric bypass (RYGB) or laparoscopic sleeve gastrectomy (LSG) with concomitant splenectomy were identified from the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP, 2015) and National Surgical Quality Improvement Program (NSQIP, 2005–2014) datasets. Using propensity scores (based on 14 baseline variables), patients who underwent primary bariatric surgery were matched 1:10 to a control group (primary LRYGB/LSG without concomitant splenectomy) and thirty-day postoperative outcomes were compared. Continuous variables and categorical variables were categorized as medians with interquartile range (IQR) and counts with percentages, respectively.

**Results:** A total of 451 patients met inclusion criteria, of which 41 patients each underwent a primary bariatric procedure (LRYGB:  $n=31$ ; LSG:  $n=10$ ) with concomitant splenectomy. After propensity matching, patients in the concomitant splenectomy group were similar to the controls with respect to preoperative characteristics. Patients in the concomitant splenectomy group had a higher median operative time (185 min vs. 77 min;  $p<0.01$ ) and postoperative length of stay (2 [IQR 1–3] days vs. 2 [1–2] days;  $p<0.001$ ). The all-cause 30-day morbidity was higher for patients who underwent concomitant splenectomy (14.6% vs. 2.4%;  $p=0.002$ ) when compared to controls. With respect to individual 30-day complications, patients with concomitant splenectomy experienced higher frequency of venous thromboembolism (4.9% vs. 0.5%;  $p=0.04$ ) and infectious complications (12.2% vs. 2.4%;  $p=0.007$ ), including superficial, deep and organ space infection, urinary tract infection, pneumonia, sepsis, and septic shock. While these patients were also more likely to have unplanned 30-day readmission (27.5% vs. 4.2%;  $p<0.001$ ), the rates of mortality (0 vs. 0.1%;  $p>0.99$ ) and return to the operating room (4.9% vs. 1.3%;  $p=0.10$ ) were comparable between the two groups.

**Conclusion:** Concomitant splenectomy for uncontrolled bleeding at the time of primary RYGB and LSG is associated with increased risk of short-term complications including infectious and thrombotic complications.

**P559****Younger Patients Lose More Weight? Single Center 5-Year Experience**

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**Background:** Several previous studies have suggested a correlation between weight loss and age after bariatric surgery.

**Objective:** The aim of our study is to further address age as a preoperative factor to determine the amount of weight loss after bariatric surgery.

**Materials and Methods:** We performed a retrospective analysis of outcomes of a prospectively maintained database of 1,244 obese patients who underwent either sleeve gastrectomy (SG) or Roux-en-Y gastric bypass surgery (RYGB) at our hospital between 2011 and 2015. We analyzed the 3-month, 6-month, and 1-year postoperative percent total body weight loss (%TBWL) of obese patients who underwent bariatric surgery based on their preoperative age.

**Results:** The average age of patients included in the study was 45 years old with a range of 21–78 years. An inverse relationship between preoperative age and postoperative weight loss was observed. Younger patients achieved a higher % TBWL than older patients at the 3-month, 6-month, and 1-year postoperative follow-up. The average %TBWL for all patients at the 3-month, 6-month, and 1-year postoperative follow-up periods were 15.5%, 23.6%, and 28.9%, respectively. At the 1-year follow-up, for every decade increase in age (above the average age of 45), patients lost 4% less TBWL.

**Conclusion:** In our study, younger patients tend to lose a greater amount of %TBWL than older patients after bariatric surgery.

**P560****Bariatric Patient's Positive Perception of Magnetic Surgery**

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**Introduction:** Magnetic Surgery is a recently developed technique assisting in the completion of laparoscopic procedures with reduced number of incisions, therefore providing the potential benefits of even less invasive interventions in terms of postoperative pain, complications, and cosmetic results. Patient perceptions are very important for the clinical practice, as patient involvement in healthcare choices has grown exponentially, especially in terms of elective procedures such as bariatric surgery. The objective of this study was to evaluate the perception of surgery-related factors and a new surgical technique in a bariatric surgery population.

**Methods:** A video-animation and a 22-item anonymous survey were given to the new patients of an academic medical center. The video described in non-medical terms the number and location of incisions used to perform open surgery, conventional laparoscopy, and Magnetic Surgery through a single incision approach. The survey included demographics and questions about the importance of surgery-related factors rated on a 5-point Likert scale. Similarly, patients were asked to compare Magnetic Surgery with conventional laparoscopy and to mark their responses regarding postoperative factors. This cross-sectional study was analyzed using descriptive statistics.

**Results:** 51 patients participated in the survey. The median age was 45 yo (IQR: 36–51) and 74.5% were females. The following responses were encountered when asked about the importance of surgery-related factors:

Factor	Not or slightly	Moderately to very
	important n(%)	important n(%)
Risk of complication	1(2%)	50(98%)
Time to recovery	3(6%)	48(94%)
Postoperative pain	4(8%)	47(92%)
Duration of hospitalization	4(8%)	47(92%)
Cosmesis after surgery	12(23%)	39(77%)

The study population indicated the following responses regarding expectations from magnetic surgery compared to conventional laparoscopy:

	More skilled	About the same	Less skilled	Don't know
Risk of complications	50(98%)	1(2%)	0(0%)	0(0%)
Time to recovery	10(20%)	40(80%)	0(0%)	0(0%)
Postoperative pain	10(20%)	40(80%)	0(0%)	0(0%)
Duration of hospitalization	10(20%)	40(80%)	0(0%)	0(0%)
Cosmesis after surgery	39(77%)	12(23%)	0(0%)	0(0%)

There was no significant evidence of different responses by demographic groups.

Additionally, 90.2% of the population indicated that a surgeon performing Magnetic Surgery should be more skillful than a surgeon performing conventional laparoscopy.

**Conclusion:** This study represents the first report of bariatric patient's perception regarding surgery-related factors. Notably, nearly 80% of the cohort indicated that cosmesis after surgery is an important factor, whereas the responses regarding the rest of the factors were indicated as expected. The bariatric population included in this study had a positive perception of Magnetic Surgery. Furthermore, the population perceived that this technique is associated with better outcomes, better cosmetic results, and higher surgeon dexterity.

**P561****Routine Collection of Patient Reported Outcomes in a Metabolic Surgery Practice: Initial Results**

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**Introduction:** Although much is known regarding medical outcomes of metabolic surgery, less is known regarding quality of life outcomes. We hypothesized that the collection of patient-reported outcomes (PROs) could help us understand quality of life in this patient population. We chose to primarily use Patient Reported Outcomes Measurement Information System (PROMIS) instruments because of their broad applicability, low cost, and ability to use computer-adapted technology to survey.

**Methods:** We implemented the routine collection of PROs as part of clinical care in December, 2015. Patients were offered tablets in clinic, and were asked to complete the surveys at most of their visits. We used computer-adapted technology to decrease the length of time needed to survey. We collected the following PROMIS instruments: Depression, Pain Interference, Physical Function, and Satisfaction with Social Roles. We also collected the GERD-HRQL, a General Health question, and a Current Health Visual Analog Scale (VAS). We retrospectively reviewed our results from December 2015 through September 2017.

**Results:** Our response rate was 70% over the last year of collection. In total, 2166 assessments were completed by 1026 patients. The mean scores in our total patient population were as follows: VAS 59, GERD-HRQL 8, General health 51, Depression 52, Pain 56, Physical Function 43, and Social Roles 46. For PROMIS instruments, the mean for the national population is 50, with 10 as the standard deviation. For the depression and pain scores a higher score is worse, while a higher score indicates better quality of life for social roles and physical function.

**Conclusions:** Routine collection of patient reported outcomes can be implemented in a metabolic surgery clinic. Health-related quality of life appears to be decreased in this patient population compared to the general public. Further work is ongoing to learn about postoperative trends, as well as differential effects of metabolic procedures.

**P562****The Effect of Peri-operative Antibiotic Drug Class on the Resolution Rate of Hypertension After Roux-en-Y Gastric Bypass and Sleeve Gastrectomy.**

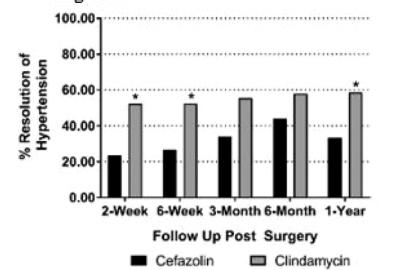
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**Background:** Recent studies have suggested that potential aberrant alterations in the gastrointestinal microbiome contribute to the development of cardiovascular disease, specifically hypertension. Bariatric surgery produces significant sustained weight loss and hypertension resolution likely through multiple mechanisms which include beneficial changes in the gut microbiome. We hypothesized that the type of prophylactic antibiotic given for bariatric surgery could impact the resolution rate of hypertension by altering the post-operative gastrointestinal microbiota.

**Methods:** A retrospective analysis of adult bariatric patients who underwent Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy (SG) between 2012 and 2016 was conducted. Patients were identified through the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program database. The standard antibiotic prophylaxis was cefazolin, or clindamycin in patients with a penicillin allergy. Univariate analyses were performed comparing the differing perioperative antibiotic treatments with resolution of hypertension at 2-week ( $\pm 1$  week), 6-week ( $\pm 2$  weeks), 3-month ( $\pm 2$  weeks), 6-month ( $\pm 6$  weeks), and 1-year ( $\pm 2$  months) follow up appointments. The criteria for resolution of hypertension was no longer requiring medication at time of follow-up.

**Results:** In total, 123 RYGB and 88 SG were included in our analysis. No significant differences were found between cefazolin and clindamycin regarding hypertension resolution rates after SG. There was a significant difference in the resolution of hypertension after RYGB with the use of prophylactic clindamycin or cefazolin. As shown in Figure 1, patients who underwent RYGB and received clindamycin had a significantly higher rate of hypertension resolution compared to cefazolin. This effect started at 2 weeks post-operatively (52.4% vs 23.5% respectively,  $p=0.008$ ) and persisted up to the 1-year (57.9% vs 33.3% respectively,  $p=0.05$ ). We found no significant differences in patient age, sex, number of pre-operative hypertensive medications, pre-operative BMI, or %BMI change after 1 year to account for the significant effect of antibiotic choice on hypertension resolution.

**Conclusion:** This study represents the first clinical report to suggest an impact of the type of antibiotic administered at the time of RYGB on co-morbidity resolution, specifically hypertension. Future studies will be needed to confirm that the mechanism of action for this novel finding is due to the differing modifications of the gastrointestinal microflora population based on the specific peri-operative antibiotic administered.

**Figure 1**

Perioperative antibiotic treatment and hypertension resolution rate after RYGB.

(\* denotes  $p \leq 0.05$ )

**P563****Weight Loss Outcomes of Laparoscopic Adjustable Gastric Band with Plication: A Single Center Experience of 66 Patients with 18-Month Follow-Up**

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**Introduction:** Laparoscopic adjustable gastric band with plication (LAGBP) is a novel bariatric procedure which combines the adjustability of the laparoscopic adjustable gastric band (LAGB) with the restrictive nature of the vertical sleeve gastrectomy (VSG). The addition of plication of the stomach to LAGB should provide better appetite control, more effective weight loss, and greater weight loss potential.

**Objective:** The purpose of the study was to analyze the outcomes of LAGBP at 18 months.

**Setting:** This is a retrospective analysis from one surgeon at a single private institution.

**Methods:** Data from all patients who underwent a primary laparoscopic LAGBP procedure from December 2011 to June 2016 were retrospectively analyzed. Data collected from each patient included age, gender, weight, body mass index (BMI), and excess weight loss (EWL).

**Results:** Sixty-six patients underwent LAGBP. The mean age and BMI was  $44.6 \pm 12.7$  years and  $42.1 \pm 5.1$  kg/m<sup>2</sup>, respectively. All 66 patients were beyond the 18-month postoperative mark. No patient was lost to follow-up. The patients lost an average of 49% and 46.8% excess weight loss (EWL) at 12 months (77.2% follow-up) and 18 months (66.1% follow-up), respectively. Also, the patients lost a mean BMI of 7.7 kg/m<sup>2</sup> and 7.6 kg/m<sup>2</sup> at 12 months and 18 months, respectively. The total number of fills during the study period was 201, and the mean fill volume was  $0.6 \pm 1$  cc. Dysphagia was the most common long-term complication. The mortality rate was 0%.

**Conclusions:** LAGBP is a relatively safe and effective bariatric procedure. In light of recent studies demonstrating poor outcomes following LAGB, LAGBP may prove to be the future for patients desiring a bariatric procedure without resection of the stomach.

**P565****Long Term Results for Gastric Banding as Salvage Procedure for Patients with Weight Loss Failure After Roux-en-Y Gastric Bypass**

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**Introduction:** Laparoscopic Roux-en-Y gastric bypass (RYGB) is a common and effective form of bariatric weight loss surgery. However, a subset of patients will fail to achieve the expected total body weight loss (TBWL) greater than 20% after 12 months or experience significant weight regain despite dietary, psychiatric, and behavioral counseling. Although alternative procedural interventions exist for operative revision after suboptimal RYGB weight loss, laparoscopic adjustable gastric banding (LAGB) provides an option with short operative time, low morbidity, and effective results. We have previously demonstrated that short-term (12-month), and mid-term (24-month) weight loss is achievable with LAGB for failed RYGB. The objective of this study is to report the long term 5 year outcomes of LAGB after RYGB failure.

**Methods and Procedures:** A retrospective review of prospectively collected data before and after RYGB when available, and before and after revision with LAGB was performed. The data included weight, height, body mass index, gender, race, age, operative time, length of stay, postoperative complications, and percentage of total body weight loss.

**Results:** A total of 182 patients (81.3% female, 18.7% male) were included in this study. The mean age of patients undergoing LAGB after RYGB was  $47 \pm 9.98$  years old. The majority of patients (98.4%) underwent gastric band placement laparoscopically, with 2 patients requiring conversion to an open procedure, and 1 planned open approach.

The mean preoperative weight was  $319 \pm 64$  lbs and BMI of  $53 \pm 10$  kg/m<sup>2</sup> before RYGB. After RYGB, patients experienced a mean %TBWL of  $16 \pm 11\%$ , had a weight of  $264 \pm 50$  lbs, and a BMI of  $43 \pm 7$  kg/m<sup>2</sup> before undergoing LAGB an average of 9 years after their first bariatric procedure. At the time of 5 year follow up after LAGB the patients had a %TBWL of  $35 \pm 13\%$ , weight of  $201.9 \pm 46$  lbs, and had a BMI of  $33 \pm 7$  kg/m<sup>2</sup>.

The mean operative time was  $73 \pm 34$  minutes and 85% of patients had a hospital length of stay less than 24 hours.

**Conclusion:** The results of our study have shown that LAGB had good long term data as a revisionary procedure for weight loss failure after RYGB. Patients experienced a satisfactory amount of total body weight loss with reduction in BMI and had a short operative time and length of stay.

**P564****Impact of Mesenteric Defect Closure During Laparoscopic Roux-en-Y Gastric Bypass**

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**Objective:** The internal hernia is a rare but a potentially fatal complication of Laparoscopic Roux-En-Y Gastric Bypass (LRYGB). The aims of this study are 1- To determine the impact of mesenteric defects closure on the incidence of internal hernia after (LRYGB). 2- To determine the symptoms, characteristics and Managements of internal hernia after (LRYGB).

**Methods:** A retrospective study for a total of 2093 (LRYGB) which has been done Since 1998 till December 2013 at Nice University Hospital "L'Archet 2" Department of Digestive surgery and liver transplantation center.

Till December 2004, 421 patients were operated without closing of mesenteric defects (Group A). From January 2005 until December 2013, 1672 patients were operated with closing mesenteric defects at Petersen's Defect (PD) and at level of jejunulo-jejunal anastomosis (JJA), by tight non-absorbable continued sutures (Group B). The incidence of internal Hernia was compared between two periods.

**Results:** From 2093 patients who underwent LRYGB, 20 patients (0.95 %) developed a symptomatic internal hernia that required primary surgical intervention, 7 patients (1.66 %) in (Group A) all at (JJA) versus 13 patients (0.78 %) in (Group B) 6 at (JJA), 5 at (PD) and 2 at (PD, JJA), This incidence was significantly lower in (Group B) ( $P=0.0021$ ). The median interval between (LRYGB) and reoperation is 53 months in group A and 26 months in group B. The median percentage of excess weight loss (%EWL) is 61% vs 67%, respectively ( $p=0.79$ ). 14 patients 70% (5 in group A) were admitted in an emergency with an acute abdominal pain. CT scan was performed in 8 patients 40 % and has shown signs of occlusion in all cases. The most common symptoms were abdominal pain and vomiting. The surgery was performed by laparoscopy in 8 patients 40% and by laparotomy or conversion in 12 patients 60%. In all cases internal hernia was reduced and closed all defects. In only one patient in (group A) small bowel at JJA was resected. There was no mortality and one patient had pneumonia with acute respiratory distress which was treated medically.

**Conclusions:** The closure of mesenteric defects at (LRYGB) by tight non-absorbable continued sutures is recommended because it is associated with a significant reduction in the incidence of internal hernia.

**P566****Severe Life Threatening Gastric Distension with Full Thickness Necrosis 72 Hours Following Placement of a Saline Filled Intragastric Balloon**

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**Background:** Saline filled intragastric balloons have become a common outpatient procedure for the treatment of obesity. Acute dilation, ischemia and necrosis of the stomach has been described in the medical literature. Gastric necrosis from acute gastric dilation is a rare but life-threatening condition, which requires timely diagnosis and management. We present a case of partial gastric ischemia with necrosis 72 hours following placement of a saline filled intragastric balloon. Post-operative complaints of bloating, nausea and vomiting are common complaints following placement of saline filled intragastric balloons and can lead to a delay in diagnosis. Early diagnosis and management is essential in avoiding this life threatening complication.

**Case Report:** A 59 year old woman, BMI 33, comorbid conditions of diabetes mellitus underwent uncomplicated placement of a saline filled intragastric balloon for treatment of obesity. 24 hours after placement the patient complained of cramping and bloating. 48 hours following placement the patient developed vomiting and presented to an emergency room for evaluation. She was found to have blood glucose exceeding 400 and a severely dilated stomach with pneumotasis on CT evaluation. NG tube decompression and ICU management of the severe hyperglycemia was initiated. Removal of the intragastric balloon was delayed 12–14 hours until an appropriate endoscopic retrieval kit could be obtained. Endoscopic retrieval was performed without incident and near complete necrosis of the gastric mucosa was noted. The antrum was the only area spared. 48 hours after retrieval a laparoscopic evaluation of the stomach revealed full thickness necrosis of the entire fundus and greater curve.

Indocyanine Green (ICG) Fluorescent Dye was used to assess vascular integrity of the remaining stomach and to define lines of resection. Resection of the greater curvature was performed using ICG fluorescent dye to ensure that the angle of His was viable and well perfused. The patient had a full recovery and subtotal gastrectomy was avoided.

**Conclusions:** Spontaneous gastric distension exacerbated by gastric outlet obstruction following placement of a saline filled intragastric balloon can occur. Unrecognized this condition can lead to ischemia, necrosis and perforation of the stomach. Appropriate evaluation of patients following placement of intragastric balloons is essential. Recognition of this condition can be delayed due to the complaints of cramping, bloating and vomiting which are typical following placement of saline filled intragastric balloons. Untreated, gastric ischemia and necrosis can lead to early perforation which is associated with a high mortality rate.

**P567**

### Outcomes of Mini Gastric Bypass vs Laparoscopic Sleeve Gastrectomy for Morbid Obesity – A Meta Analysis of the Literature

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**Introduction:** Morbid obesity has become a growing health risk in the United States with up to 40% of Americans suffering with Obesity. Bariatric surgery remains the best treatment for morbid obesity. The recent use of laparoscopic sleeve gastrectomy (LSG) as a single stage procedure has met with great success because of its quick learning curve and minimal postoperative complication rates. However, there are concerns if the LSG is an effective procedure for long-term weight loss. Although criticized at first, the mini-gastric bypass (MGB) surgery has become a great option for morbidly obese patients because of the ability to lose weight with minimal post-op complications. The aim of this review is to assess the outcomes of LSG as it compares to MGB for the management of morbid obesity.

**Methods/Materials:** A systematic review was conducted through PubMed to identify relevant publications from 2006 to 2016 with comparative studies on LSG vs MGB for weight loss in morbidly obese patients. The primary outcome analysed was the percentage of excess weight loss (%EWL). Other outcomes include body mass index (BMI), operative time, postoperative complication rates and remission of diabetes. Results were expressed as standard difference in means with standard error. Statistical analysis was done using fixed-effects meta-analysis to compare the mean value of the two groups and percentage of patients affected by complications or had remission of diabetes to the sample size (Comprehensive Meta-Analysis Version 3.3.070 software; Biostat Inc., Englewood, NJ).

**Results:** Six out of 52 studies were quantitatively assessed and included for this meta-analysis. Among the six studies, 522 patients underwent LSG and 526 patients underwent MGB. The %EWL ( $0.399 \pm 0.066$ ;  $p < 0.001$ ) in the MGB group was significantly higher when compared to the LSG group. Postoperative BMI ( $-0.408 \pm 0.065$ ;  $p < 0.0001$ ) and the operative time ( $-0.850 \pm 0.096$ ;  $p < 0.0001$ ) were significantly lower in the MGB group. The rate of diabetes remission ( $-0.480 \pm 0.122$ ;  $p < 0.0001$ ) was higher in MGB patients. Postoperative complication rates ( $0.079 \pm 0.161$ ;  $p = 0.624$ ) were similar amongst both groups.

**Conclusion:** Mini gastric bypass is more effective in the management of morbid obesity when compared to the sleeve gastrectomy.

**P568**

### A Novel Magnetic Jejunoileal Partial Diversion in Nonhuman Primates: A Step Forward in Translation and Metabolic Surgery

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**Introduction:** We hypothesize that a jejunointestinal anastomosis and partial diversion using Magnanosis, a novel magnetic compression device, is technically feasible and will improve insulin resistance and metabolic syndrome similarly to patients who underwent bariatric surgery. Metabolic surgery has demonstrated improvements in various parameters including insulin resistance, triglyceride levels, and cholesterol. It may be technically feasible to perform a less-invasive operation through partial diversion, and thereby stimulate an increase in incretins from the L-cells of the ileum to glean these benefits.

**Methods and Procedures:** We performed a laparotomy and jejunointestinal partial diversion using Magnanosis in five Rhesus macaques with induced insulin resistance through dietary modifications. After surgery, weight was monitored and a metabolic laboratory evaluation was performed weekly. Timed tests were performed at baseline and again at 3 and 6 weeks postoperatively for triglyceride levels, GLP-1, insulin, glucose, and bile acids. The primates were followed for 8 weeks prior to euthanasia. Results are represented as mean  $\pm$  SEM and all p-values were calculated using a two-sample Student's t-test.

**Results:** All five monkeys successfully underwent surgery without technical or postoperative complications. Mean weight at 8 weeks decreased from baseline  $17.9 \pm 1.2$  kg to  $15.1 \pm 2.0$  kg ( $p = 0.067$ ), for a mean weight loss of 9.6%. At 6 weeks, there was a statistically significant decrease in mean triglyceride levels from  $354.0 \pm 134$  mg/dL to  $83.6 \pm 11.3$  mg/dL ( $p = 9.8 \times 10^{-15}$ ), mean fasting glucose from a baseline of  $68.2 \pm 5.9$  mg/dL to  $60.3 \pm 3.7$  mg/dL ( $p = 0.0066$ ), and fasting insulin from  $96.4 \pm 21.3$   $\mu$ U/mL to  $35.2 \pm 8.2$   $\mu$ U/mL ( $p = 1.7 \times 10^{-6}$ ). At 6 weeks, bile acid levels increased from  $4.4 \pm 1.0$   $\mu$ mol/L to  $6.0 \pm 2.0$   $\mu$ mol/L ( $p = 5.93 \times 10^{-7}$ ). Additionally, at 3 weeks, GLP-1 Active levels increased from the mean baseline value of  $2.1 \pm 0.2$  pg/mL to  $7.0 \pm 1.6$  pg/mL ( $p = 4.5 \times 10^{-7}$ ). At 6 weeks, mean total cholesterol decreased from  $156.8 \pm 11.3$  mg/dL to  $80.0 \pm 15.4$  mg/dL ( $p = 0.023$ ), LDL from  $57.6 \pm 4.8$  mg/dL to  $34.1 \pm 7.9$  mg/dL ( $p = 0.062$ ), and leptin from a baseline of  $53 \pm 3.7$  ng/mL to  $34.5 \pm 7.2$  ng/mL ( $p = 0.032$ ). Due to unanticipated effects of anesthesia during the timed mixed meal tolerance and oral glucose tolerance tests, we were unable to effectively demonstrate an improvement in insulin resistance.

**Conclusions:** The creation of a magnetic jejunointestinal partial diversion in the rhesus monkey is technically feasible, safe, and reproducible. The translational similarities between the rhesus macaque metabolism and humans demonstrated expected improvements in specific metabolic parameters and GLP-1. More definitive tests of insulin resistance and additional markers of metabolic syndrome are necessary to elucidate the mechanism of action, improve future human translation, and further clarify the efficacy of this novel operation for metabolic surgery.

**P569**

### Alcohol/Drug Abuse and Suicidal Tendency Before and After Gastric Bypass Surgery

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**Introduction:** Many studies concerning individuals seeking bariatric surgery indicate a higher prevalence of psychiatric disorder in this population, both before and after surgery, however results are not conclusive. The aim of this study was to investigate changes in psychiatric health after gastric bypass surgery.

**Methods:** Patients within the catchment area of the department of psychiatry of the South Alvsborg Hospital, operated with gastric bypass surgery during 2011–2012 were identified through the Scandinavian quality registry (SORReg). Patients files were examined and psychiatric diagnoses and alcohol/drug abuse were recorded preoperatively and with a follow up time of 5 years.

**Results:** A total of 148 operated patients were identified. 48 of these patients had been in contact with the psychiatric department before or after surgery. 7 patients had attempted suicide preoperatively, but no attempts were made postoperatively, all women. 5 patients attempted suicide postoperatively without a previous history of suicidal attempts, 4 men 1 woman. Four patients with a preoperative history of alcohol abuse were identified, all women. These individuals did not seem to abuse alcohol/drugs postoperatively. Postoperatively 9 patients with an alcohol/drug abuse were identified, 3 men, 6 women. None of them had a former history of abuse. 4 of the patient performing suicidal attempts postoperatively, 3 men 1 woman, had a postoperatively emerging alcohol/drug abuse.

**Conclusion:** Preoperatively known alcohol/drug abuse or suicidal attempts do not seem to predispose for postoperative abusive problems or suicidal behavior. Preoperative identification of individuals prone to alcohol/drug abuse or suicidal attempts seems difficult.

**P570**

### Bringing Patient Choice to Bariatric Surgery: The Predictive Power of Pre-operative Markers for Single Anastomosis Duodenal Switch

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**Introduction:** In the past, our group has popularized models for gastric bypass, sleeve and gastric imbrication. There are currently no models to predict weight loss following Single Anastomosis Duodenal Switch. Surgeons who offer this procedure are left to guess based on their limited experience how their patients will do following surgery. We have developed a simple office based algorithm to predict weight loss following this procedure.

**Method:** 161 patients met the criteria for this study. These patients underwent surgery at a single institution from June 2013 to December 2016. Non-linear Regression analysis was performed to interpolate weight loss at one year. A multilinear regression was run to determine the significant variables. A model was then constructed to predict weight loss after Single Anastomosis Duodenal Switch.

**Results:** BMI, HTN, Gender, and the interaction between HTN and DM were found to affect weight loss. The model achieved a R value of .616 and the average error of prediction in the model was 12.5%EWL.

Effect of variables on weight loss at 1-year	
Variable	Effect on EWL at 1-year
BMI	-1.53% per point BMI
HTN	-6.06%
Gender	-4.97% for females
HTN and DM	-5.06%

**Conclusion:** Today too many surgical practices offer procedures tailored to surgeon instead of the needs of the patient. Using our models predicting postoperative weight loss can be a straightforward process using easily gathered data. All surgeons should be doing this currently in their own practice to allow patient to choose targeted healthcare interventions based on patient's personal goals.

**P571****Is Intra-operative Leak Testing Redundant in Current Bariatric Practice?**

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**Introduction:** There is a long-standing practice of testing anastomosis both in upper and lower GI surgery. Post-operative leaks in bariatric surgery are an uncommon but serious complication increasing morbidity and risk of mortality. The present study looks at the practice of performing an intra-operative leak test during roux-en-y gastric bypass (RYGB) and sleeve gastrectomy (SG). **Methods and Procedures:** The study was divided into two independent phases of six months and 12 months. Data was collected from all patients undergoing SG, RYGB or revision RYGB within those two periods. To confirm the integrity of the staple line all patients underwent a methylene blue and air test intra-operatively. This was followed by a gastrograffin swallow the morning post procedure.

**Results:** Total number of patients in the study was 219. There were four positive intraoperative tests. One patient was a primary RYGB and three patients were undergoing revision RYGB. All were reinforced and subsequent recovery and gastrograffin swallow showed no leak. One revision RYGB had an undetected small bowel injury distal to jejuno-jejunostomy that was not identified on intraoperative or next day imaging.

**Conclusion:** There is little evidence in the literature showing the clinical benefit of intra-operative leak test with bariatric surgery. Our study identified four leaks intra-operatively, all in patients undergoing RYGB. Our study highlights the practice of intra-operative leak testing especially in RYGB may have clinical benefit.

**P573****Online Versus In-Person Education Classes: Effect on Weight Loss After Bariatric Surgery**

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**Objectives:** Successful outcomes after bariatric surgery (BS) require a comprehensive educational program (CEP) focused on post-surgical dietary and lifestyle changes. At our institution, patients must comply with a 4-week Life-After-Surgery program prior to surgery. Since many patients are not able to participate in-person, an online CEP was created to improve accessibility. To evaluate comprehension, a 16-question test is administered at the last preoperative visit to participants of both classes. The primary objective of this study is to evaluate the effectiveness of online versus in-person CEP in terms of comprehension and post-operative weight loss.

**Methods:** Patients who underwent BS from August 2016–May 2017 were retrospectively reviewed at a single institution. All patients who underwent the in-person or online CEP, completed the 16-question test, and had post-operative follow-up for at least 6 months were included. Baseline demographic, operative, and weight data were obtained using the electronic medical record. Percent excess body weight-loss (EBWL) was determined for patients at 2, 8 and 24 weeks after surgery. Student's t-test, Mann-Whitney U, Chi squared, and Fisher's Exact tests were utilized to calculate significance. Independent predictors of EBWL were determined using multiple linear regression. A p-value of <0.05 was considered significant.

**Results:** A total of 95 patients participated in the online (51.58%) or in-person (48.42%) CEP, of which 81% were female, the mean age was  $45.2 \pm 11.4$  years, and the mean pre-operative BMI was  $49.8 \pm 8.2 \text{ kg/m}^2$ . Most had private insurance (77%), while the remainder had Medicaid/Medicare (23%). Although test scores did not differ between the online and in-person courses (78.3% vs 78.6%,  $p=0.9041$ ), scores were higher for patients who took the test <2 months after course completion (81% vs 75%,  $P=0.019$ ) and had private insurance (81% vs 75%,  $P=0.0128$ ). While test scores did not correlate with EBWL at any post-operative time point, significant independent predictors of EBWL at 2-weeks included the in-person CEP ( $p=0.035$ ) and male gender ( $p=0.036$ ).

**Conclusion:** The results demonstrate that test scores did not differ by course type and did not correlate to post-operative EBWL. However, in-person CEP was an independent predictor of improved EBWL at 2 weeks, suggesting an advantage over online courses not captured by the test scores. The difference in scores by insurance status further underscores the importance of optimizing the method of evaluating comprehension. Future studies are required to investigate the effectiveness of these different modalities.

**P572****Confidence Estimate on Bariatric Surgery Time Prediction with Respect to Patient's Comorbidities and Surgical Team**

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**Background:** Prediction of operative time even for a large volume procedure such as bariatric surgery is a difficult task. Surgical time can depend on multiple factors such as patient's comorbidities, preinduction anesthesia preparation, experience and efficiency of the surgeon and his/her assistant amongst other factors. Confidence in predicting surgical time may come with large samples of observation, but its utility in scheduling for a hospital system that has a volume of the order of three to four hundred patients per year with sometimes complex history is doubtful. We conducted our study to assess if there are factors that can help predict time disruption in the OR.

**Method:** We collected data on 70 bariatric surgeries performed by three surgeons from April 2015 to December 2016. Surgeries were performed in the Smart OR, where automated noninvasive tracking methods were used with multiple noninvasive sensors. Our data includes time in OR prior to laparoscopy, laparoscopy, abdominal closure and exiting the OR. We have analyzed factors such as surgeon/assistant, BMI, age, smoking history, cardiopulmonary conditions, previous surgery, etc.

We used multivariate statistical analysis to study our population sample and classified the impact of each factor or their combination with the use of principal component analysis.

We used systematic clustering to identify subpopulations that have significant differences in statistical distribution.

**Result:** The main determinant of total operative time was the surgeon and the level of his assistant. Prior surgeries, BMI and smoking history had a statistically significant impact on the laparoscopic time ( $p$  value <0.05). Removing the impact of various surgeons, we detected four clusters of patients based on more than 15 patient characteristics. We noticed total OR time had two different clusters: one with a standard-deviation of 17–21 min while the other had over 50 min.

**Conclusion:** This study may have practical implications on improving scheduling. The different comorbidities of these bariatric patients helped to stratify patients into these 2 main cluster groups. Better predictability on length of operative procedure can lead to more efficient use of OR time and staff, thus ultimately leading to savings for the hospital. In addition, we used automated noninvasive tracking methods to identify phases of bariatric procedures that will allow more accurate estimated OR time to efficiently schedule cases. The Smart OR, which is equipped with multiple noninvasive sensors, allows for error free tracking and monitoring without human interference.

**P574****Current Analysis of Complications in Bariatric Surgery in the Aging Patient**

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**Introduction:** Bariatric surgery has been demonstrated to be a reliable, safe treatment for obesity and its comorbid conditions. With the aging US population and a longer disability-free life expectancy, the safety of laparoscopic bariatric surgery in an older population warrants further investigation. As the demographics of our population shift the question remains: should elective bariatric operations be routinely offered?

**Methods:** Using the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database, 30-day complications and outcomes were evaluated in patients undergoing RYGB or sleeve gastrectomy. These patients were stratified by age into a mature adult (MA) category (45–64 years of age) and an advanced-age (AA) category (65–80 years of age). Cohorts were matched by co-morbid conditions using propensity score match in SPSS. Patients with similar characteristics based on ASA status, BMI, DM, functional status, and other parameters were selected. The groups were comprised of 2700 individuals for RYGB and 5498 undergoing sleeve gastrectomy.

**Results:** Outcomes in our matched cohorts undergoing bariatric surgery showed that MA and AA patients did not differ significantly when looking at the presence of pre-existing comorbid conditions. However, when patients underwent RYGB the advanced-age group had a higher rate of cardiac complications (MA 0.11% and AA 0.44%,  $p=0.035$ ), pulmonary complications (MA 0.30% and AA 1.04%,  $p=0.001$ ), unplanned ICU admissions (MA 2.04% and AA 3.04%,  $p=0.022$ ), longer lengths of hospitalization (MA  $2.32 \pm 2.64$  and AA  $2.55 \pm 3.51$ ,  $p=0.001$ ) and increased 30-day mortality (MA 0.11% and AA 0.56%,  $p=0.008$ ). Similarly, when patients underwent sleeve gastrectomy the advanced-age group had a higher rate of renal complications (MA 0.11% and AA 0.44%,  $p=0.016$ ), unplanned ICU admissions (MA 0.87% and AA 1.35%,  $p=0.018$ ), operative times (MA  $80.50 \pm 40.5$  and AA  $82.34 \pm 38.9$ ,  $p=0.015$ ), and longer length of stay (MA  $1.81 \pm 2.04$  and AA  $1.91 \pm 1.92$ ,  $p=0.007$ ). The 30-day mortality rates for sleeve gastrectomy were also increased (MA 0.11% and AA 0.31%,  $p=0.022$ ).

**Conclusion:** Although the mortality after RYGB and sleeve gastrectomy is relatively higher in AA patients compared to MA patients, the absolute risk of mortality is low and favorable compared to other abdominal procedures. Sleeve gastrectomy may be a safer choice in a patient of advance-age, as AA patients undergoing RYGB exhibit higher rates of post-operative cardiac and pulmonary complications which may necessitate ICU care. However, it is reasonable and safe to perform RYGB in the AA population with appropriate postoperative cardiac and pulmonary support.

**P575****Inconsistencies in the Reporting of Weight Loss in Bariatric Surgery: A Systematic Review**

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**Introduction:** The objective of this study was to systematically review the bariatric surgery literature to understand how weight loss is reported. The incidence of obesity has increased globally. According to the World Health Organization more than 600 million were obese in 2014. In the last decade, bariatric surgery has been increasingly utilized as an effective treatment option for severely obese patients. Currently, bariatric surgeries are among the most commonly performed operations. The primary outcome of such procedures is weight loss which has been shown to vary according to the type of surgery. However, there are different methods used to report weight loss which makes it difficult to directly compare outcomes between studies. A previous review by Dixon et al. in 2004 revealed a wide heterogeneity in weight loss reporting. However, there have been no recent reviews on the reporting of weight loss in bariatric surgery.

**Methods:** A search of the MEDLINE electronic database was performed for studies published in 2016 using search terms gastric bypass/sleeve gastrectomy, weight, human, and English. Articles were selected by two independent reviewers based on the following inclusion criteria: (1) adult participant ≥18 years; (2) Roux-en-Y gastric bypass or sleeve gastrectomy; (3) randomized controlled trial; (4) with the reporting of weight loss. The search resulted in 109 titles or abstracts after removing duplicates.

**Results:** Seventy-three randomized controlled studies were included. The total number of patients were 5,948 and the majority were female (71.6%). The most commonly performed procedure was Roux-en-Y gastric bypass (82.2%). The mean follow-up period was 23.2 months with 83.6% of the studies having at least one-year follow-up. Preoperatively, most of the studies reported mean body mass index (BMI) (87.7%) and mean weight (65.8%), however, there was wide heterogeneity in the reporting of postoperative weight loss. The following measures were most frequently used: mean BMI (71.2%), mean percentage excess weight loss (41.1%), mean percentage of weight loss (35.6%), and mean weight (32.9%) (Figure 1).

**Conclusion:** We found that the reporting of weight loss following bariatric surgery remains diverse creating difficulties and confusion in comparing weight loss outcomes between bariatric surgery studies. We propose the development of guidelines to unify and simplify the reporting of weight loss in the literature.

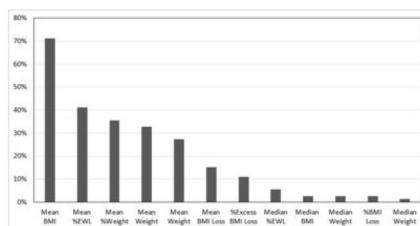


Figure 1. Postoperative reporting of weight loss among studies. BMI, body mass index; EWL, excess weight loss.

**P576****Predictive Factors for Excess Body Weight Loss After Bariatric Surgery in Japanese Obese Patients**

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**Background:** Body weight loss after bariatric surgery is affected by several factors. Diabetes status or preoperative body mass index (BMI) would affect the body weight loss after surgery. Age and sexuality may also be the predictor. Furthermore, the malabsorptive procedure is considered more effective for body weight loss than the restrictive procedure alone. We investigated the contribution of preoperative background data and procedures to the body weight loss after surgery.

**Methods:** This was a multicenter, retrospective study to validate the efficacy of bariatric surgery for morbidly obese patients in Japan. Patients underwent sleeve gastrectomy (LSG) or LSG with duodenal-jejunal bypass (LSG/DJB) in each institution from January 2005 to December 2015, and whose BMI was 35kg/m<sup>2</sup> or more at the first visit were included in this study. We investigated the percent excess body weight loss (%EWL) at 12 months after surgery. Univariate and multivariate analyses were done to evaluate the predictive factors of body weight loss. We defined that %EWL more than 50% as Well Response (WR). Procedures, age, sex, diabetes status including insulin use, and BMI at first visit was collected as predictive factors for body weight loss.

**Results:** Data from 565 cases, including 420 cases of LSG and 145 cases of LSG/DJB, were analyzed. The male to female ratio was 252:313. Mean body weight at first visit was 122.9 kg and mean BMI was 45.0 kg/m<sup>2</sup>. No mortality was observed and Clavien-Dindo grade III or more postoperative complications occurred in 20 cases (3.5%). Of those, 430 cases achieved WR (76.1%). In overall patients, WR rate was significantly higher in patients without diabetes (81.0%) and BMI≤50 kg/m<sup>2</sup> (80.4%), while procedure, sex, and age were not affected to WR rate. However, among patients with diabetes, the procedure and BMI≤50 kg/m<sup>2</sup> was significant factors affected to WR rate in univariate analysis, and the following multivariate analysis revealed that LSG/DJB (OR: 2.04, 95% CI: 1.16–3.59), no insulin use (OR: 1.84, 95% CI: 1.01–3.36), and BMI≤50 kg/m<sup>2</sup> (OR: 2.97, 95% CI: 1.62–5.43) were significant predictive factors for WR. Moreover, among patients both with diabetes and BMI>50 kg/m<sup>2</sup>, the LSG/DJB was the only predictive factor for WR (OR: 2.99, 95% CI: 1.01–8.91).

**Conclusion:** In Japanese obese patients, both LSG and LSG/DJB work effectively for excess body weight loss. However, patients with diabetes or BMI>50 kg/m<sup>2</sup> were the poor prognostic factors. For those with diabetes and BMI>50 kg/m<sup>2</sup>, LSG/DJB would be more effective than LSG alone.

**P577****Factors Associated with Bariatric Surgery Utilization Among Eligible Patients**

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**Background:** Despite its known safety and efficacy, bariatric surgery is an underutilized treatment for morbid obesity in the United States.

**Objective:** Our goal was to identify factors associated with failing to proceed with surgery despite being considered an eligible candidate by a bariatric surgery program.

**Methods:** This is a retrospective study that includes all patients (n=486) who attended a bariatric surgery informational session (BIS) at a single center academic institution in 2015. Eligible candidates were identified after clinical evaluation and multidisciplinary candidacy review (MCR). We compared patients who underwent surgery to those who did not (i.e. dropped out) by evaluating patient-specific, insurance-specific, and bariatric surgery program-specific variables. Univariate analysis and multivariable regression were performed to identify risk factors associated with failing to undergo surgery among eligible candidates.

**Results:** We identified 307 (63%) patients who completed all initial clinical evaluations and underwent MCR. Among these patients, 33 (11%) were deemed poor candidates and surgery was not recommended. Among the remaining eligible candidates, 82 (30%) did not undergo surgery. When compared to patients who underwent surgery (n=192), eligible patients who dropped out had higher rates of coronary artery disease (CAD) (11.0% vs 10.4%; p<0.0001), hypertension (HTN) (63.4% vs 42.7%; p=0.002), active smoking (18.3% vs 7.29%; p=0.007), and a longer waiting period between their BIS and MCR (164 days vs 103 days; p=0.004). In addition, patients who dropped out were more likely to have Medicare (18.75% vs 8.90%; p=0.022) and require 3 months (7.3% vs 1.0%; p=0.01) or 12 months (7.3% vs 2.1%; p=0.07) of medically supervised weight loss documentation (MSWLD). There was also a higher rate of program-specific requirements among patients who dropped out (7.2 vs 5.3 requirements, p<0.0001). Independent risk factors associated with decreased odds of undergoing surgery included: CAD (OR 0.13 [0.02–0.66]; p=0.014), HTN (OR 0.46 [0.24–0.87]; p=0.017), time from BIS to MCR (OR 0.99 [0.99–0.99]; p=0.002), 3 months of MSWLD (OR 0.09 [0.02–0.51]; p=0.007), endocrinology clearance (OR 0.26 [0.09–0.76]; p=0.014), hematology clearance (OR 0.37 [0.14–0.95]; p=0.039), urine drug screen testing (OR 0.31 [0.13–0.72]; p=0.006), required psychotherapy (OR 0.43 [0.20–0.93]; p=0.031), and required extra sessions with the dietitian (OR 0.39 [0.17–0.92]; p=0.032).

**Conclusions:** Approximately one third of patients did not undergo bariatric surgery despite being considered eligible candidates after multidisciplinary review. Dropout rates were independently associated with patient, insurance, and program-specific variables which may represent barriers to care amenable to improvement.

**P578****Revisonal Bariatric Surgery in the Elderly Patients: Assessment of Safety and Efficacy**

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**Introduction:** The elderly are a special subset of the population due to their limited physiological reserve with aging. Revisonal bariatric surgery is becoming more common with increase in primary bariatric procedures. Data on safety, weight loss, and metabolic effects of revisonal bariatric surgery in elderly is limited. The aim of this study was to assess the safety and efficacy of revisonal bariatric surgery in the elderly.

**Methods:** Clinical data of all elderly patients (65 years and above) who underwent elective revisonal bariatric surgery at an academic institute between 2008 and 2014 were reviewed. Demographic data, perioperative variables, and postoperative outcomes were studied.

**Results:** A total of 52 patients were identified with a female predominance (3:1). Mean age was 68 ± 2.8 years. Mean BMI at the time of revisonal surgery was  $39.3 \pm 10.3 \text{ kg/m}^2$ . The primary indication for revisonal surgery included management of postoperative adverse events (n=32, 61.5%) and weight recidivism (n=20, 38.5%). In patients with postoperative complications, the most common indications for revisonal surgery were dysphagia (n=8, 15.4%), marginal ulcer (n=7, 13.5%), gastric outlet obstruction (n=7, 13.5%), and fistula formation (n=5, 9.6%). The most common type of revisions included conversion of vertical banded gastroplasty to Roux-en-Y gastric bypass (RYGB, n=18), revision of RYGB (n=13), conversion of adjustable gastric banding to sleeve gastrectomy (SG, n=6), and SG to RYGB (n=4). Two out of seven (28.6%) patients with 30-day postoperative readmissions had serious complications that required reoperation. One of them underwent small bowel resection for ischemia and the other had thoracotomy for hemotorax evacuation developing secondary to a gastrointestinal fistula. While there was no mortality over the first 30 days postoperatively, two patients died 6 months after surgery due to infectious complications. In the median follow-up time of 20 (interquartile range, 10–38) months, mean weight and BMI changes of  $-15.8 \text{ kg}$  and  $-5.6 \text{ kg/m}^2$  were observed. Twenty-three (44.2%) patients had diabetes at time of revisonal surgery. A mean reduction of  $12.6 \text{ mg/dL}$  in fasting blood glucose and 1.1% in glycated hemoglobin were noted between baseline and last follow-up.

**Conclusion:** Revisonal bariatric surgery in elderly is associated with high complication rates. Our data indicate that revisonal bariatric surgery can potentially alleviate symptoms and resolve complications of primary bariatric surgery. Elderly patients should have their risk stratified and weighed against the benefits of surgery.

**P579****Isolated Left Portal Vein Thrombus After Laparoscopic Sleeve Gastrectomy**

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**Introduction:** Bariatric surgery is the most effective treatment for morbid obesity. Of all available procedures, laparoscopic sleeve gastrectomy (LSG) is now the most popular worldwide. Common complications of LSG include gastroesophageal reflux, stricture, and staple-line leak. Although rare, portomesenteric venous thrombosis (PMVT) and liver retractor-induced injuries are increasingly reported. We present a case of isolated left portal vein thrombus after routine LSG that was likely caused by prolonged compression of left liver lobe by the Nathanson retractor.

**Case Presentation:** A 55-year-old female with a BMI of 39 and biliary colic due to cholelithiasis underwent LSG with hiatal hernia repair and cholecystectomy. She tolerated the procedure without complication and was discharged home on the following day. On postoperative day 9, she presented to the emergency department with fever and epigastric pain. Contrast CT revealed an isolated filling defect within the proximal left portal vein; abdominal Doppler demonstrated an acute thrombus occluding the left portal vein with normal flow in the main and right portal veins. The patient was treated with a 3-month course of therapeutic anticoagulation with lovenox. A complete hematologic workup did not uncover any hypercoagulable conditions. The patient recovered well and remained asymptomatic at her follow-up visit 12 weeks after operation.

**Discussion:** PMVT is a rare surgical complication with multifactorial etiology. In bariatric surgery, evidence suggests LSG elicits more frequent PMVT compared with Roux-en-Y gastric bypass. A 2017 systematic review cited the incidence rate of PMVT as 0.3–1% after LSG. The mechanisms are thought to be due to pneumoperitoneum, procoagulant obese state, manipulation of portomesenteric venous system during division of the gastrocolic ligament, and postoperative dehydration. Liver retraction is paramount during laparoscopic bariatric surgery to provide adequate visualization of the upper stomach and diaphragmatic hiatus. Most methods of liver retraction produce significant pressure on the liver parenchyma by compressing it against the diaphragm. Three types of liver injury have been documented in literature: minor congestion, traumatic parenchymal rupture, and delayed liver necrosis. Uniquely, we propose an additional type of injury—left portal vein thrombosis due to compression of left liver lobe with the Nathanson retractor.

**Conclusion:** The case described herein represents the first documented report of isolated left portal vein thrombosis after LSG. This is a unique presentation of retraction-related liver injury causing PMVT by mechanical compression of liver parenchyma. As surgical procedures increase in duration, intermittent release of liver retraction should be performed at regular intervals.

**P580****Percent Excess Body Weight Loss May Be a Predictor of Internal Hernia Development Following Roux-en-Y Gastric Bypass**

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**Introduction:** Up to 11% of patients experience internal hernia (IH) after laparoscopic Roux-en-Y gastric bypass (RYGB). Studies have shown that antecolic Roux limb orientation, and closure of the mesenteric defect reduce, but do not eliminate, the incidence of IH. We hypothesize that despite operative differences, IH occur more frequently in patients who experience significant weight loss. This study aims to determine whether those patients who present with IH following RYGB experience greater than 70% excess body weight loss (EBWL).

**Methods:** A retrospective chart of all patients who underwent IH repair following RYGB at our institution between Sept 2014 and Sept 2017 was performed. All applicable CPT codes to encompass IH repair were reviewed (n=412). 17 patients with IH repair after RYGB were identified.

**Results:** Of the 17 patients, 16 were female. The mean pre-RYGB weight was 279lbs ( $sd \pm 54.5$ ), BMI  $37.8 \text{ kg/m}^2$  ( $sd \pm 8.7$ ). All procedures but one were performed in an antecolic configuration; the other retrocolic-antogastric. Fifteen cases were laparoscopic and two were open; nine had the jejunal mesenteric defect closed, eight did not. The average weight loss from the time of RYGB to IH presentation was 91.82lbs ( $sd \pm 38.18$ ) and %EBWL from RYGB to the nadir weight was 77% ( $sd \pm 24$ ). When evaluated by t-test, there was no statistical difference in BMI at the time of program initiation, RYGB, or IH presentation, as well as number of pounds lost, %EBWL, or time to IH presentation, when comparing patients for whom the mesenteric defect was closed or not. Average time from RYGB to IH presentation was 4.5 years (range 190–4655 days).

**Conclusion:** In our limited cohort of patients who have presented with internal hernia after RYGB, there was an average of 77% EBWL. This is greater than the average expected %EBWL at our institution and others, suggesting that IH may occur in patients with greater weight loss at a higher frequency. Mesenteric defect closure did not appear to have any influence in this limited cohort, suggesting that weight loss is a stronger factor in IH development. We plan a more extensive evaluation in a larger cohort of patients to determine if greater %EBWL is a predictor of IH formation in patients undergoing RYGB.

**P581****A Nationwide Safety Analysis of Discharge on the First Postoperative Day After Bariatric Surgery in Selected Patients**

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**Introduction:** Introduction of enhanced recovery after surgery (ERAS) pathways has led to early recovery and shorter hospital stay after Laparoscopic Roux-en-Y Gastric Bypass (LRYGB) and Laparoscopic Sleeve Gastrectomy (LSG). This study aims to assess feasibility and outcomes of postoperative day (POD) 1 discharge after LRYGB and LSG from a national database.

**Methods:** Patients who underwent elective primary LRYGB and LSG and were discharged on POD 1 and 2 were extracted from Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) 2015 dataset. A 1:1 propensity score matching was performed between cases with POD1 vs POD2 discharge, and the 30-day outcomes of the propensity-matched cohorts were compared. High risk patients were excluded from the analysis.

**Results:** In total, 80,464 patients met inclusion criteria, and included 8,862 LRYGB and 31,370 LSG cases which were discharged on POD1, and were matched with same number of patients per group that were discharged on POD2. Both groups have similar preoperative characteristics. Within the LRYGB cohort, patients discharged on POD2 had higher all cause morbidity (composite of 26 adverse events, 7.5% vs 6.1%; p<0.001) and 30-days re-intervention (2.0% vs 1.5%; p=0.004) in comparison to patients discharged on POD1. There were no statistical differences with respect to serious morbidity (defined as class IV or V Clavien-Dindo complication, 0.5% vs 0.4%; p=0.15), 30-day readmission (4.9% vs 4.5%; p=0.2) and 30-day reoperation (1.3% vs 1.2%; p=0.7). Within the LSG cohort, patients discharged on POD2 had higher all cause morbidity (4.2% vs 3.4%; p<0.001), serious morbidity (0.4% vs 0.3%; p<0.001), 30-day re-interventions (1.0% vs 0.6%; p≤0.001), and 30-day readmission (2.9% vs 2.5%; p=0.002) in comparison to patients discharged on POD1. There were no statistical differences with respect to 30-day reoperation (0.5% vs 0.6%; p=0.17).

**Conclusion:** Based on available national data, early postoperative outcomes of selected patients discharged on POD1 after LSG and LRYGB were not worse than those discharged on POD2. Early discharge on POD1 may be safe in a selective group of bariatric patients without significant comorbidities.

**P582****Sleeve Gastrectomy as First Line Revisional Procedure After Adjustable Gastric Band: A Single Center Review**

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**Introduction:** As laparoscopic gastric band (LAGB) falls out of favor, a significant number of patients will require revisional surgery including laparoscopic sleeve gastrectomy (LSG) and laparoscopic Roux-en-y gastric bypass (LRYGB). Multiple small sample sized retrospective studies show promising results favoring revisional surgery towards LSG after LAGB.

**Purpose:** The aim of this study was to evaluate a large volume, multi surgeon bariatric surgery center producing the largest sample size to date proving efficacy (% weight loss) and safety of sleeve gastrectomy following band removal in one or two step procedures.

**Methods:** All patients undergoing conversion of LAGB to LRYGB (33) and LSG (291) regardless of one step vs two step conversion from January 2006 to January 2017 were included. A retrospective analysis of our prospectively maintained database was performed to compare outcomes in patients undergoing conversion to LRYBG vs LSG after LAGB to identify the outcomes.

**Results:** A total of 324 patients with LAGB underwent conversional surgery. Median age was 46±10.4, 277 (93.7%) were female. Of these, 33 patients underwent conversion to LRYGB and 291 underwent conversion to LSG. On univariate analysis of LRYGB showed statistically significant (p≤0.05) higher incidence of DM (42% vs 26%), HTN (58% vs 53%), longer length of stay (LOS) (3.1±2.6 vs 1.7±2.1 days), presence of any post-operative complications (27% vs 9%) & Clavien-Dindo class ≥3 (21% vs 8%) than the LSG group. Median weight loss was similar in LRYGB & LSG (16.0±9.1 kg vs 19.6 ± 27.7 kg) (p=0.09). Median LRYGB follow up was 700 days, whereas LSG follow up was 500 days. Multivariate analysis for presence of any complication, showed only LRYGB vs LSG the only statistically significant factor (p=0.014) despite increased comorbidities in that group. Sixteen LAGB to LRYGB were performed in a single stage (5 complications) (31.2%). Sixteen LAGB to LRYGB were in a single stage (5 complications) (29.4%). 162/291 LSG to LSG were performed in a single stage resulting in 15 complications (9.2%), whereas 129/291 completed in a two-step procedure resulted in 12 complications (9.3%).

**Conclusion:** Revisional surgery from LAGB to LSG has comparable weight loss but lower incidence of complications and shorter length of stay as compared to LRYGB. In a center with a high number of patients and experienced surgeons revision to laparoscopic sleeve gastrectomy can be safely performed in one stage procedure.

**P583****The Use of Fluorescence Angiography to Minimize Risk of Ischemia During Laparoscopic Sleeve Gastrectomy**

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**Introduction:** The purpose of the study was to describe the use of intraoperative Indocyanine Green (ICG) fluorescence angiography to identify the blood supply patterns of the stomach and gastroesophageal junction (GEJ). We hypothesized that identifying these vascular patterns may help modifying the surgical technique to prevent ischemia-related postoperative leaks.

**Methods:** 86 patients underwent laparoscopic SG and were examined intraoperatively with ICG fluorescence angiography at an academic center from January 2016 to September 2017. Prior to the construction of the SG, 1mL of ICG was injected intravenously and Pinpoint® technology was used to identify the blood supply of the stomach. Afterwards, the SG was created with attention to preserving the identified blood supply to the GEJ and gastric tube. Finally, 3mL of ICG were injected and Pinpoint® technology was used again to ensure that all the pertinent blood vessels were preserved.

**Results:** 86 patients successfully underwent the procedure with no complications. The following blood supply patterns to the GEJ were found:

PATTERN	%	DESCRIPTION
Right side dominant	30%	Left Gastric Artery
		Accessories from the posterior hepatic ligament
Right side accessory	6%	Accessory Hepatic Artery (6%)
		: Accessory Gastric Artery (6%)
Left side dominant	34%	
Left side accessory	34%	Tributaries from the Left Inferior Phrenic Artery originating from the right side supply
Left side accessory + Accessory Gastric Artery	10%	

The incidence of overall accessory blood supply to the right-side dominant pattern was more common than expected. In about half of the cases where an accessory vessel was found in the gastrohepatic ligament, the blood flow was toward the stomach (and not the liver). Furthermore, the incidence of accessory blood supply from the left side was found in 34% of the cases. 10% of patients had both the left side accessory and accessory gastric artery pattern. In these particular patients, if a concurrent hiatal hernia repair is performed, these accessory blood supplies are at risk of being injured if care is not taken to preserve them, rendering the GEJ relatively ischemic.

**Conclusion:** ICG fluorescence angiography allows determining the major blood supply to the proximal stomach prior to any dissection during sleeve gastrectomy so that an effort can be made to avoid unnecessary injury to these vessels.

**P584****Vagal Nerve Blocking Device Extraction: Case Series and Report of Operative Technique**

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**Introduction:** Vagal nerve blockade with the vBloc device (Enteromedics, St. Paul, MN) has been shown to provide sustained weight loss for patients with moderate obesity at two years. These devices occasionally require removal, however, there have been no published technical recommendations for the safe extraction of these devices. We present a series of patients who have undergone vagal blocking device removal, and report our technique for laparoscopic removal of this device.

**Methods and Procedures:** The medical records of all patients who underwent laparoscopic explantation of a vagal blocking device at a single academic institution from December 2009 to December 2016 were retrospectively reviewed. All patients underwent device placement as part of a multi-center randomized controlled trial. Operative details, length of stay, 30-day post-operative complications and indications for removal were reported. Details of the technical aspects of explantation were carefully examined and reported. In all cases, the device was dissected out using firm traction applied to the lead to elevate it away from the stomach and esophagus, as the device tended to form a dense, fibrotic capsule. The device was removed entirely, unless dense adhesions prevented safe dissection of the most distal tip of the device. Patient demographics, comorbidities, clinical characteristics and perioperative details were collected.

**Results:** Thirty patients were identified. Median age was 54 (37–65) years. Median operative time was 210 (101–498) minutes and median EBL was 28 (5–200) mL. Median time from initial implantation to removal was 41 (11–96) months. Patient-reported reasons for removal included device malfunction (7 patients, 23.3%), neuromodulator site pain (5 patients, 16.7%), heartburn symptoms (11 patients, 36.7%), weight regain or weight loss dissatisfaction (15 patients, 50%), and severe nausea (2 patients, 6.7%). Thirteen patients had dense adhesions at the time of operation (43.3%). One patient had device erosion into the proximal stomach, which was repaired primarily. The highest Clavien-Dindo grade complication was grade II, (2 patients, 6.7%); one superficial trocar site infection and one intraabdominal abscess requiring IV antibiotics. Seroma at the neuromodulator site was the most common complication (7 patients, 23.3%).

**Conclusion:** The vagal nerve blocking device can be safely removed laparoscopically in the hands of experienced foregut surgeons with low 30-day complication rate. Surgeons planning device extraction should be familiar with the details of the configuration and location of the leads, and expect to encounter dense adhesions around the device.

**P585****Routine Drain Placement and Esophagrams No Longer Play a Role in Bariatric Surgery**

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**Background:** Morbid obesity, a common medical concern with significant health risks, has a prevalence of 10.4% among U.S. adults. Bariatric surgery provides effective weight loss for morbidly obese patients with improvement in their comorbid conditions. Traditionally, routine intraoperative drain placement (IDP) and postoperative esophagram (UGIS) were thought to identify early postoperative complications. Recently, these interventions have been scrutinized for their effectiveness. We hypothesized that IDP and postoperative UGIS do not alter outcomes in bariatric surgery and only increase hospital length of stay (LOS).

**Methods:** Two cohorts, each consisting of 100 patients from either 2015 or 2017 were analyzed from our institution. In the 2015 cohort, all patients had IDP and an UGIS on postoperative day 1, prior to starting a clear liquid diet. In the 2017 cohort, no patients had IDP or UGIS, but instead were started on a clear liquid diet on postoperative day 1, in the absence of vomiting. All patients in each cohort underwent either a laparoscopic sleeve gastrectomy or a Roux-en-Y gastric bypass. A retrospective study was performed to analyze whether there was a significant difference in post-operative complications, length of stay, and operating room time between these two cohorts.

**Results:** The average bariatric procedure duration was 85.04 minutes in 2015 as compared to 124.68 minutes in 2017, with a p-value of <0.001. This discrepancy can be attributed to the greater number of surgeons operating in 2017, 8 in 2017 compared to 3 in 2015. The length of stay in 2015 averaged 2.42 days, compared to 1.44 days in 2017, with a p-value of <0.001. For patients with complications, all were Clavien-Dindo Grade 1–2 and did not require any invasive interventions. The complication rate was 0.07 in 2015 and 0.02 in 2017 with a p-value of 0.089 with all complications being early minor ones. The readmission rate within 30 days was the same in both groups, 0.03.

**Conclusion:** Our retrospective study results support the initial hypothesis that IDP and postoperative UGIS do not alter outcomes in bariatric surgery. Moreover, we found that stopping routine use of IDP and UGIS significantly reduced LOS while complication rates remained low. Therefore, we do not recommend routine use of IDP and UGIS in the uncomplicated bariatric patient.

**P586****The Effect of Bariatric Surgery, on Dyslipidemias: Sleeve Gastrectomy vs. Gastric Bypass**

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**Introduction:** Obesity and dyslipidemias are well-known factors that affect the overall cardiovascular risk. Bariatric surgery has shown to have a positive impact on the overall lipid profiles. However, most of the studies are based on Roux-en-Y gastric bypass (RYGB), and only a few analyze the outcomes after Laparoscopic Sleeve Gastrectomy (LSG). Our goal is to determine the overall impact of bariatric surgery, especially LSG, in the lipid profile.

**Methods:** We retrospectively reviewed all the patients who underwent bariatric surgery at our institution from 2010 to 2015. Common demographics and comorbidities were collected as well as lipid profile, hemoglobin A1c and systolic blood pressure (SBP), preoperative and at 12 months follow-up. All tests were two-tailed and performed at a significant level of 0.05. Statistical software R, version 3.3.1 (2016-06-21) was used for all analyses.

**Results:** Of the 1330 patients reviewed, 27% (n=360) met the inclusion criteria. The average age was 52.12±11.86 years, females composed 70.3% (n=253) and Caucasian 76.7% (n=276) of our population. The incidence of Diabetes Mellitus and hypertension was 43.1% (n=155) and 57.5% (n=207), respectively. The most common surgery were respectively LSG 63.1% (n=227) followed by RYGB 20.6% (n=74). Revisional procedures 11.9 (n=43) and Laparoscopic adjustable gastric banding <5% (n=16). The incidence of dyslipidemias calculated preoperatively was of 31.4% (n=113) with high levels of total cholesterol (>200 mg/dL), 38.1% (n=137) with LDL>100 mg/dL, 17.8% (n=64) with HDL<40 mg/dL, and 66.4% (n=239) with Triglycerides>150 mg/dL.

At 12 months follow-up all lipid levels had a statistically significant change (P<0.001). Total cholesterol was decreased 4.6% (8.76 mg/dL), LDL decreased 7.2% (7.79 mg/dL), HDL increased 13.4% (6.93 mg/dL) and triglycerides decreased 32.49% (49.46 mg/dL). The incidence of patients with dyslipidemias was also significantly decreased except for high LDL levels (p=0.23), a summary is presented in Table 1.

When lipids outcomes were compared between the type of surgery, no statistical significance was found between LSG and RYGB patients. Table 2 reflects the summary between the type of surgery, gender, age, race and lipid levels at 12 months follow-up.

**Conclusion:** Patients undergoing bariatric surgery present with a high incidence of dyslipidemias. Bariatric surgery has a positive impact on the lipid profiles at 12 months follow-up. Laparoscopic sleeve gastrectomy has a similar effect on lipid levels when compared to Roux-en-Y gastric bypass. Further studies should be done to better understand these findings.

Table 1. Basic demographics, comorbidities and lipid panel pre-operative and at 12 months follow-up.

	Pre-operative	12 months follow-up	P-Value*
Age (years)	52.12±11.86		
Gender: Female	70.3% (n=253)		
Race: White	76.7% (n=276)		
BMI at procedure (kg/m <sup>2</sup> )	42.71±7.72	31.82±6.18	<0.001
Diagnosis of DM	43.1% (n=155)	22.2% (n=80)	<0.001
Treatment of HTN	57.5% (n=207)	36.1% (n=130)	<0.001
SBP (mmHg)	131.64±16.24	124.38±15.39	<0.001
Tobacco Use	23.9% (n=86)	8.3% (n=30)	<0.001
Total Cholesterol	188.06±44.03	179.3±39.02	<0.001
>200 mg/dL	31.4% (n=113)	22.8% (n=82)	0.010
LDL	106.83±35.57	99.04±30.52	<0.001
>100 mg/dL	38.1% (n=137)	33.6% (n=121)	0.230
TG	152.22±91.17	102.76±60.56	<0.001
>150 mg/dL	66.4% (n=239)	8.1% (n=29)	<0.001
HDL	51.57±17.26	58.50±16.31	<0.001
<40 mg/dL	17.8% (n=64)	9.2% (n=33)	<0.001
HbA <sub>1c</sub> (%)	6.43±1.29	5.41±0.91	<0.001

Mean ± Standard deviation or Percentage (n=number). BMI=Body mass index. DM=Diabetes Mellitus

HTN=Hypertension. SBP=Systolic Blood Pressure. All lipids measurements are in mg/dL.

LDL=Low-density lipoprotein. TG=Triglycerides. HDL=High-density lipoprotein.

\*Chi-square=categorical values; T-Test=continuous variables.

Table 2. Type of surgery, Gender, Race, and Age and differences in lipid values at 12 months

	LSG (n=227)	RYGB (n=73)	P-Value*
Total Cholesterol	-7.76±40.76	-35.36±37.80	0.081
LDL	-5.30±24.30	-14.42±21.77	0.071
TG	-53.69±72.50	-47.67±55.96	0.563
HDL	8.16±11.00	5.58±11.70	0.131
Female	(n=253)	(n=107)	
Total Cholesterol	-11.52±40.32	-8.86±40.44	0.612
LDL	-8.79±32.50	-6.30±36.59	0.669
TG	-44.92±64.79	-67.07±73.94	0.024
HDL	5.74±11.80	4.10±10.00	<0.001
White/Caucasian	(n=276)	(n=67)	
Total Cholesterol	-12.02±40.95	-4.08±36.44	0.395
LDL	-9.02±33.93	-6.37±33.65	0.77
TG	-58.87±71.43	-55.37±63.63	0.002
HDL	7.79±11.35	5.96±10.75	0.351
Age >65	(n=34)	(n=35)	
Total Cholesterol	-3.52±37.59	-3.12±44.16	0.992
LDL	-2.21±38.90	-0.72±34.61	0.303
TG	-39.09±60.88	-54.40±60.41	0.231
HDL	-2.55±33.59	-12.15±41.16	0.201

Mean ± Standard deviation. \*All lipid measurement are in mg/dL.

LDL=Low-density lipoprotein; TG=Triglycerides; HDL=High-density lipoprotein.

\*T-Test, significance <0.05.

**P587**

**Adolescent Metabolic and Bariatric Surgery is Safe But Underutilized – A First Report from MBSAQIP (Metabolic and Bariatric Accreditation and Quality Improvement Program) Accredited Hospitals**

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**Introduction:** The incidence of obesity in adolescents has more than tripled in the past 40 years. However, data on metabolic and bariatric surgery in adolescents is limited. The Teen-LABS consortium has reported outcomes on 160 patients aged 13–18 operated on from 2007 to 2012 at 5 institutions, showing that surgery is safe and effective. 70% were gastric bypass and 30% were sleeve gastrectomies. The MBSAQIP has developed an accreditation pathway for adolescent surgery (defined as age <18). The MBSAQIP captures clinically rich data based on standardized bariatric-specific definitions collected at all participating centers, and captures over 95% of all bariatric operations in the US. Data from year 2015 is now available with the Participant Use File (PUF) allowing publication for adolescent results for the first time. Our objective is to describe the current utilization and safety of bariatric surgery in adolescent patients.

**Methods:** Patients were categorized by age <8 years; 18–21; and >21 years. Patient characteristics, intraoperative data, and 30-day postoperative outcomes were analyzed with univariate analyses and multivariate modeling.

**Results:** See table. 181 operations were performed in adolescents <18 (0.13% of all operations). There were no patients <13; 39 patients aged 13–16; 58 patients aged 16; and 84 patients aged 17. In patients <18, 69% underwent sleeve gastrectomy; 24% underwent gastric bypass.

In comparing the adolescent, young adult, and adult age groups, there were no differences in unadjusted rates of death, major complications, or readmissions.

Multivariable logistic regression revealed no independent effect of adolescence on short-term complications.

**Conclusions:** MBSAQIP data from 181 patients show that bariatric surgery is being performed safely in adolescents. This is the largest real-world, contemporary cohort of adolescent patients analyzed. Adolescent operations remain rare and underutilized. 1 in 13 of adolescents in the US—or about 3.4 million youths—suffer from “extreme obesity” (defined as 120% of the 95th percentile on CDC BMI-for-age growth charts). Only 181 or ~0.005% underwent bariatric surgery in 2015. This is far lower than the ~1% of the 18 million adults estimated to have Class III who undergo bariatric surgery annually. Procedure choice in adolescents mirrors those done in the general population with 69% being sleeve gastrectomies, contrasting with the Teen-LABS cohort from 2007 to 2012 where 70% of adolescent bariatric procedures were gastric bypasses. Increased awareness of the safety and efficacy of metabolic surgery in adolescents is crucial in order that patients may be offered this life-changing intervention.

**P588**

**Sleeve Weight Loss Outcomes Are Easily Predictable Using Common Pre-operative Office Based Markers**

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**Introduction:** Average percent excess weight loss data is commonly discussed preoperatively to guide patient expectations following surgery. However, there is a wide range and variation in weight loss following Vertical Sleeve Gastrectomy. Unfortunately, most surgeons and even fewer patients have heard of using predictive models to help guide their decisions on procedure choice. We have developed a predictive model for Vertical Sleeve Gastrectomy to help patient choice prior to this major life changing decision.

**Method:** 371 SG patients met the criteria for our study. These patients underwent surgery between October 2008 and June 2016. Non-linear regressions were performed to interpolate individual patient weights at one year. Multivariate analysis was used to find factors that effected weight loss. A model was constructed to predict weight loss performance.

**Results:** Variables that affect weight loss were found to be preoperative BMI, age, Hypertension, and Diabetes. Diabetes and Hypertension together were found to significantly effect weight loss.

Variable	Effect of variables on weight loss at 1 year	
	Effect on EWL at 1-year	
BMI	-1.22%	per point BMI
HTN	-1.53%	
DM	-7.31%	
HTN and DM	-12.5%	
Age	-304%	per year

**Conclusion:** Patients weight loss can be accurately predicted by simple preoperative factors. These findings should be used to help patients and surgeons decide if the VSG is an appropriate surgery for each patient. Using this model most patients can avoid failure by choosing an appropriate surgical approach for their personal circumstances.

**P589**

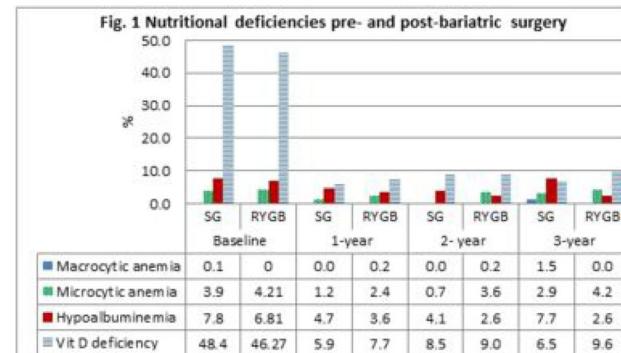
**Does Vitamin D Deficiency Negatively Impact Type 2 Diabetes Remission After Bariatric Surgery?**

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**Introduction:** Studies have suggested that vitamin D plays a role in glucose homeostasis and vitamin D deficiency (VDD) may be associated with lower rates of resolution of T2DM after surgery. This study aims to compare nutritional variables in both sleeve (SG) and bypass surgery (RYGB) in type 2 diabetes mellitus (T2DM) patients, and analyze the relationship between vitamin D levels and T2DM remission post-operatively.

**Methods and Procedures:** Data from the Ontario Bariatric Registry was used for this retrospective study to determine the prevalence of VDD and T2DM remission after Bariatric surgery, followed by analysis of the relationship between these outcomes and other variables during a 3-year follow-up after SG or RYGB.

**Results:** 6,433 Bariatric Registry T2DM patients underwent surgery (RYGB: 5,419 and SG: 1,014) from Jan 2010 to Sept 2017 in Ontario. RYGB was more effective than SG at eliciting complete remission, 69.45% vs. 57.99% at 1-year, and 70.77% vs. 57.04% at 2-year. However at 3-year, rates were similar (RYGB 66.13% and SG 69.23%) but the groups were smaller. The post-operative management reduced the prevalence of VDD (25-hydroxyvitamin D levels <50 nmol/L) from 46.6% at baseline to 9.3% at 3-year visit. Only 20.13% of patients had sufficient vitamin D levels ( $\geq 75$  nmol/L) at baseline vs. 60% at 3-year. Those who underwent T2DM remission were less likely to be VDD at all time points. The rates of VDD appear to be slightly higher in RYGB at each time points. The rates of macrocytic anemia, microcytic anemia and hypoalbuminemia were low and varied depending on surgical procedure, with no relevant increase following surgery (see figure 1).



**Conclusions:** Vitamin D deficiency is prevalent among diabetic patients with obesity presenting for bariatric surgery. The postoperative management was successful in addressing VDD following surgery; those who experienced T2DM remission after surgery were less likely to be VDD. Further prospective studies are needed to explore this relationship.

**P590****Hypertension Resolution After Rapid Weight Loss: A Single Institution Experience**

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**Introduction:** It is well known that morbid obesity is strongly associated with high blood pressure. Cardiovascular risk reduction is a well studied and described result of bariatric surgery. The objective of this study is to quantify hypertension resolution in patients who underwent bariatric surgery at our institution.

**Methods:** We retrospectively reviewed all the patients who underwent either laparoscopic sleeve gastrectomy (LSG) or laparoscopic Roux en Y gastric bypass (LRYGB) at our institution between 2010 and 2015. We selected those patients who were on antihypertensive medical treatment and had a 12-month follow-up. Hypertension resolution was defined as the interruption of any blood pressure medications within the follow-up period. We compared the patients who had resolution of hypertension (group 1) with patients who did not (group 2), based on demographics, comorbidities, and outcomes. Chi-square and student T-test were used for categorical and continuous variables respectively.

**Results:** Out of 1330 patients, 185 (13.9%) patients met the inclusion criteria, out of which, 73 (39.5%) had a complete resolution of hypertension within 12 months. The patient population included in Group 1 was predominantly female n=114 patients (61.8%), diabetic (n=87, 47%), with a mean BMI of  $30.31 \pm 4.45 \text{ kg/m}^2$ , a mean age of  $52.6 \pm 10.7$  years, and a preoperative systolic blood pressure mean of  $131 \pm 14.31 \text{ mmHg}$ . The most common procedure performed was LSG with n=105 (57%).

Comparison between group 1 and group 2 based on age, gender, BMI, and diabetes showed no statistically significant difference. Estimated BMI loss % at 12 months, type of procedure and % EBMIL showed no statistically significant difference between the groups.

**Conclusions:** Rapid weight loss is associated with a drastic reduction of blood pressure. Besides weight loss, we did not identify a clear correlation between risk factors when we compared patients who had resolution of hypertension with patients without resolution. Further prospective studies should be done for better understand these findings.

**P591****Is There Bias Against Bariatric Surgery for HIV Patients? A Survey of Medical Student Perceptions**

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**Introduction:** For many patients, HIV has transformed from a life-threatening illness into a manageable chronic disease. Reflecting trends in the general population, obesity is increasingly prevalent among HIV-positive patients. Surgical intervention has shown the greatest effectiveness in treating obesity. It is unknown, however, whether physician attitudes reflect the changing trends in obesity care for HIV-positive patients.

**Methods and Procedures:** Medical students from the first, second, and fourth years of training were invited to participate in an IRB-approved survey, handed out during didactic sessions, which was designed to assess their knowledge and attitudes regarding bariatric surgery in HIV-positive patients. Self-reported demographic information of respondents was also collected. The outcome of interest was the proportion of correct responses. Univariate and multivariate regression analyses were performed.

**Results:** Surveys were completed by 127 medical students. Demographic covariates included the following: age, sex, race, BMI, and year of training. Age, sex, race, and BMI were not statistically significant in the multivariate model. However, in both univariate and multivariate models, each additional year of training was associated with a significant increase in the proportion of correct responses (multivariate model beta coefficient=0.440, p<0.001).

**Conclusions:** Obese and HIV-positive patients suffer from well-documented stigma in health care. These findings suggest that medical training corrects common misperceptions of obese and HIV-positive patients, and may lead to a better understanding of the appropriateness of bariatric surgery for HIV patients. Whether these attitudes are predictive of referral practices remains to be seen.

**P592****Retrospective Cohort Study Using the MBSAQIP Database to Assess the Safety of Next-Day Discharge Following Bariatric Surgery**

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**Introduction:** The safety of next-day discharge after laparoscopic sleeve gastrectomy (LSG) or laparoscopic roux-en-y gastric bypass (LRYGB) has been examined with varied results and is still a topic for debate. The objective of this study was to determine if next-day discharge after LSG or LRYGB was comparable to standard discharge (i.e. postoperative day [POD] 2) with respect to the odds of readmission and the rates of an adverse event within 30days of surgery.

**Methods and Procedures:** A retrospective cohort study was performed using the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) Participant Use Data File. Patients were selected if they underwent a LSG or LRYGB for morbid obesity between January 1, 2015 and December 31, 2015 and were discharged on either POD 1 or 2. The primary outcome was the odds of readmission within 30days of surgery. For each type of surgery (i.e. LSG or LRYGB), a multivariable logistic regression was performed to obtain an adjusted odds ratio (OR) of a 30-day readmission after next-day discharge. Rates of readmission, complications, reoperation, and death within 30days of surgery were also calculated.

**Results:** Within the LSG group, there were 44428 (52%) and 41106 (48%) patients discharged on POD 1 and 2, respectively. Both groups were comparable with respect to baseline characteristics and had equivalent rates of 30-day readmission (3%), complications (1%), reoperation (0.5%), and death (0.1%). The adjusted OR for a 30-day readmission after next-day discharge was 0.84 ( $p \leq 0.001$ , 95% CI [0.77–0.91]). Insulin-dependent diabetes, BMI over 50, and hypertension requiring medications were significant predictors of a readmission after next-day discharge. Within the LRYGB group, there were 11242 (33%) and 23138 (67%) patients discharged on POD 1 and 2, respectively. Both groups had similar rates of 30-day readmission (5–6%), complications (1–2%), reoperation (1–2%), and death (0.1%). The adjusted OR for a 30-day readmission after next-day discharge was 0.89 ( $p=0.02$ , 95% CI [0.80–0.98]).

**Conclusions:** Based on data from the MBSAQIP registry, patients discharged on POD 1 after LSG or LRYGB did not have a higher odds of a 30-day readmission compared to the standard POD 2 group. Additionally, rates of 30-day readmission, complications, reoperation, and death were essentially equivalent. Bariatric surgeons and patients can be reassured that next-day discharge can be implemented successfully for select patients after uncomplicated LSG or LRYGB to potentially improve patient satisfaction and resource utilization, and reduce costs.

**P593****Perforated Giant Marginal Ulcer While on Chemotherapy: A Case Report**

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**Introduction:** Obesity is a common problem worldwide with numerous associated comorbidities and is associated with an increased risk of developing some cancers. Despite bariatric surgery being associated with a risk reduction for cancer development, some will develop cancer after surgery and little is known about complications which might arise during multimodality cancer treatment. Here we report the case of a 55 year-old female who developed an unusual giant marginal ulcer (MU) post Laparoscopic Roux-en-Y-Gastric Bypass (LRYGB) while receiving systemic chemotherapy for an early stage breast cancer.

**Case Report:** In summary, a 55 year-old female with a preoperative BMI of  $40 \text{ kg/m}^2$  had an uncomplicated LRYGB one year prior to her presentation. She was a non-smoker, was abstinent of alcohol and did not use NSAIDs, steroids or other ulcerogenic medications. Eight months post procedure with a BMI of  $29.1 \text{ kg/m}^2$  she was diagnosed and treated with BCS plus SLNB for a pT2N0M0 ER/PR +ve HER2 –ve breast cancer. One week following her third cycle of docetaxel and cyclophosphamide, she presented with two days of melena, small volume hematemesis and abdominal discomfort. The patient was resuscitated with PRBC, started on a PPI infusion and had free air ruled out on a CXR. Upper endoscopy was complete showing a giant MU at the gastro-jejunal anastomosis, biopsies ruled out malignancy and *H. pylori*. Subsequent CT abdomen/pelvis identified contrast extravasation from the anastomosis confirming a free perforation. Broad spectrum antibiotics were started and a diagnostic laparoscopy complete. A graham patch repair utilizing omentum and abdominal washout were complete with placement of surgical drains. The patient was supported with parenteral nutrition while NPO. Diet was advanced after an upper GI series on post operative day 7 showed no ongoing leak. The patient was discharged on post operative day 13, recovered and although further chemotherapy was discontinued she completed whole breast radiotherapy.

**Conclusion:** To our knowledge this is the first reported case of a perforated giant MU after LRYGB for severe obesity in a patient on systemic chemotherapy with no other risk factors for MU development. Spontaneous small bowel perforation has been documented in patients on chemotherapy without prior abdominal surgery. What is unknown is whether after LRYGB patients are at increased risk of anastomotic or other complications while on chemotherapy and we encourage others to report cases to develop a body of literature on the subject.

**P594****Assessing the Role of Intraoperative Endoscopy During Laparoscopic Sleeve Gastrectomy**

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**Introduction:** Endoscopy is commonly performed during sleeve gastrectomies to evaluate the staple line and assure hemostasis. Many surgeons advocate for its routine use to inspect for leaks and bleeding, which carry significant morbidity and mortality. We aimed to determine the rate of endoscopic identification of staple-line complications and to assess its impact on operative time.

**Methods and Procedures:** An IRB-approved retrospective review of 368 patients who underwent sleeve gastrectomies between 2009 and 2017 was performed. Outcomes were collected. The length of operative time of LSG+endoscopy vs. LSG alone was compared using a two-tailed t-test. The rate of positive endoscopic findings was calculated.

**Results:** Of 368 patients, 85.87% (n=316) had endoscopies. No leaks or bleeding were visualized. Four patients (1.27%) re-presented with leaks and three patients (0.82%) experienced bleeding necessitating reoperation. All patients with complications had normal endoscopies. There was a statistically significant difference in mean operative time between groups ( $p<0.0001$ ).

Table 1:

	LSG+endoscopy	LSG	p-value
Cases	316	52	
Mean age	40.0	42.1	
Female	261 (82.6%)	46 (88.5%)	
Mean pre-operative BMI	44.6	44.7	
Comorbidities			
HTN	150 (47.5%)	25 (48.1%)	
HLD	51 (16.1%)	15 (28.9%)	
T2DM	89 (28.2%)	9 (17.3%)	
OSA	95 (30.0%)	24 (46.2%)	
GERD	29 (9.2%)	11 (21.2%)	
Endoscopic findings			
Positive	0	N/A	
Negative	316 (100%)	N/A	
Mean operative time (mins)	134	107	<0.0001
Leak	4 (1.27%)	0	
Mean time to leak (days)	12.75	N/A	
Bleed	3 (0.82%)	0	
Mean time to bleed (days)	4.33	N/A	

**Conclusion:** Leaks and hemorrhage are early postoperative complications that are not seen intraoperatively in our experience. Furthermore, endoscopy significantly increases mean operative time. Routine use should be left to the discretion of the surgeon but should not be considered an essential step of the sleeve gastrectomy.

**P595****The Role of Cefazolin, Metronidazole and Oral Chlorhexidine Rinse in Reducing Surgical Site Infection Following Bariatric Surgery: A Quality Control Initiative**

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**Objective of the Study:** Surgical site infection (SSI) following bariatric surgery contributes to patient morbidity and additional use of health care resources. We investigated whether a SSI quality control initiative in the form of a refined preoperative antimicrobial protocol affected the rate of SSI following laparoscopic roux-en-y gastric bypass (LRYGB).

**Methods and Procedures:** We reviewed all LRYGB procedures performed between June 2015 and December 2016 at a single bariatric surgery centre of excellence. Two preoperative antimicrobial protocols were compared. Patients undergoing surgery prior to February 2016 received 2 g of cefazolin whereas patients undergoing surgery after February 1, 2016 received a new antimicrobial protocol consisting of 2 g cefazolin, 500 mg metronidazole and 30 ml oral chlorhexidine rinse. The primary outcome was 30 day SSI including superficial SSI, deep incisional SSI and organ/space infection as defined by the Centre for Disease Control. Clinic charts and provincial electronic medical records were reviewed for emergency department visits, microbiology investigations and physician dictations diagnosing SSI. Outcomes were assessed using a students t-test.

**Results:** Two hundred seventy six patients underwent LRYGB of which 167 received the refined antimicrobial protocol and 109 received cefazolin. The refined antimicrobial protocol significantly decreased the rate of deep incisional SSI compared to cefazolin ( $n=1$ , 0.6% vs  $n=5$ , 4.6%;  $p<0.05$ ). The refined antimicrobial protocol resulted in an insignificant overall reduction in the rate of superficial SSI ( $n=12$ , 7.2% vs  $n=13$ , 11.9%;  $p>0.05$ ) and organ/space infection ( $n=0$ , 0.0% vs  $n=2$ , 1.8%;  $p>0.05$ ) respectively.

**Conclusions:** A preoperative antimicrobial protocol using cefazolin, metronidazole and chlorhexidine oral rinse appears to reduce the rate of SSI following LRYGB. This protocol may be most effective to prevent deep incisional SSI. Additional patient cases or alternative study design including a randomized control trial is required to better understand the efficacy of this protocol.

**P596****SIPS is the New Gold Standard for Complications and Diabetes Resolution for Malabsorption Procedures: Mid-Term Outcomes of RYGB vs SIPS at 3 Years**

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**Background:** For many years, the Roux-en-Y Gastric Bypass (RYGB) was considered a good balance of complications and weight loss. According to several short-term studies single anastomosis duodenal switch or stomach intestinal pylorus sparing surgery (SIPS) offers similar to weight loss to RYGB with fewer complications and better diabetes resolution. However, no one has substantiated complication and nutritional differences between these two procedures over the mid-term. This paper seeks to substantiate previous studies and compare complication and nutritional outcomes between RYGB and SIPS.

**Methods:** A retrospective analysis of 798 patients who either had SIPS or RYGB from 2010 to 2016. Complications were gathered for each patient. Nutritional outcomes were measured for each group at 1, 2, and 3 years. Regression analysis was applied to interpolate each patient's weight at 3, 6, 9, 12, 18, 24, and 36 months. These were then compared with t tests, fisher exact tests, and chi squared tests.

**Results:** RYGB and SIPS have statistically similar weight loss at 3, 6, 9, 12, and 36 months. They statistically differ at 18 and 24 months. At 36 months, there is a trend for weight loss difference. There were only statistical differences in nutritional outcomes between the two procedures with calcium at 1 and 3 years and Vitamin D at 1 year. There were statistically significantly more long term major complications, minor complications, reoperations, ulcers, small bowel obstructions, nausea, and vomiting with the RYGB than SIPS.

**Conclusion:** With comparable weight loss and nutritional outcomes, SIPS has fewer short and long-term complications than RYGB and better type 2 diabetes resolution rates.

**P597****Smaller Bougie Size Results in Slightly Improved Weight Loss After Sleeve Gastrectomy. A Retrospective Cohort Study Comparing 60f vs. 34f Bougie Size**

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**Introduction:** Using a smaller size of bougie during sleeve gastrectomy is assumed to have an impact on weight loss and complications. However, there is ongoing debate as to what the appropriate bougie size should be. In this study, we aimed to compare sleeve gastrectomies in patients who underwent surgery using a 34 Fr bougie versus a 60 Fr.

**Methods:** A retrospective analysis of a prospectively maintained database of laparoscopic sleeve gastrectomies (LSG) was performed between January 2006 and March 2015. Data analyzed included bougie size, weight loss, postoperative complications and long-term outcomes.

**Results:** 281 patients who had LSG were included, of which 200 (71.2%) were female. 179 had their operation with a 60 Fr. Bougie (63.7%). Mean age and body mass index (BMI) were 47.5 years ( $\pm 11.5$ ) and  $44.2 \text{ kg/m}^2$  ( $\pm 3.9$ ), respectively. Mean Follow up time was 22.83 months ( $\pm 8.44$ ). There was no difference in the 2 groups regarding Follow-up rates at 2 years. Basic demographics were the same, and the long-term results were similar between the groups. When looking at excess weight loss the mean was 59.8% ( $\pm 26.6$ ) in the 34f group in comparison to 52.5% ( $\pm 24.6$ ),  $p=0.03$ . No intraoperative complications or mortality occurred. 1 patient (0.3%) suffered short term complications (dehiscence), and 6 (2.1%) from long term complications (like gallbladder disease—4, need for revision—2 and hernia repair—1).

**Discussion and Conclusions:** Controversy exists regarding technical aspects of LSG, including bougie size used to calibrate the sleeve. In our study, a smaller bougie size (34f) had a small improvement in excess weight loss at two years as compared to a larger bougie size (60f). There was no impact on short or long-term results and complications. Longer follow up is needed to determine if this small improvement in excess weight loss remains significant.

**P598****How Do Socioeconomic Factors Affect Outcomes in Bariatric Surgery?**

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**Introduction:** The purpose of this study is to determine the risk factors that contributed to increased postoperative complications, as noted in prior studies within the publicly funded insurance population undergoing bariatric surgery.

**Methods and Procedures:** Data was collected via a retrospective review of the medical records of patients who underwent laparoscopic Roux-en-Y gastric bypass or laparoscopic sleeve gastrectomy from 2010 to 2014 at a single institution. For each patient, data was collected in the following categories: baseline demographics, insurance status, medical comorbidities, immediate complications, re-admissions and associated complications, and follow up out to 3 years.

**Results:** A total of 553 patient charts were reviewed, 513 patients were categorized as private insurance and 40 patients were categorized as public insurance. There was no statistically significant difference in mean patient age (private 46.6 years vs public 48 years), sex (male:female 22%:78% for both groups), or BMI (48 vs 50). There was a statistical significance in relationship status in the categories of single (21% vs 30%), married (61% vs 35%) or living with a partner (3% vs 10%), as well as employment status (78% vs 12%). When comparing comorbid conditions preoperatively there was no difference except for diabetes which was less common in the private insurance group 32% vs 50%. Readmission rates for complications were significantly different as well at 35% vs 55% with public insurance patients having increased complication rates and readmissions. There was no difference in follow up percentages at each time point for the two groups. Interestingly postoperative BMI was significantly different in the two groups until 1 year out (32 vs 34) when the difference disappears.

**Conclusions:** Our current data set confirms prior research that documented higher complication rates in public insurance patient populations without differences in long term results in regards to weight loss. It also shows that the public insurance group is possibly at higher risk for complications and readmissions postoperatively due to the lack of social support at home given that a much higher percentage of them are single or divorced, and lack employment. It is likely that this lack of support at home prompts more frequent readmissions and associated complications.

**P599****Characterizing the Preventable Emergency Department Visit After Bariatric Surgery**

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**Background:** Patients who present to the emergency department (ED) after bariatric surgery may incur significant costs with no additional benefit.

**Objective:** Our goal was to characterize patients who presented to the ED but may have been treated in an alternative setting.

**Methods:** We identified 131 patients who underwent primary bariatric surgery at a single-center academic institution between 2006 and 2016 who also presented to the ED within 30 days of surgery. Preventable ED visits were identified by excluding patients with life-threatening presentations and/or use of emergent ED-specific resources. Patients with preventable ED visits were matched 1:1 to controls (no ED visit) based on age, gender, body mass index, surgery date, surgeon, and procedure type. Perioperative and discharge characteristics were compared between groups. Analyses were performed using Chi-squared, t-test, and logistic regression.

**Results:** A total of 80 patients (61%) were identified as having a preventable ED visit after bariatric surgery. Mean time to ED visit was 13 days after surgery ( $\pm 8$  days). When compared to controls, patients with preventable ED visits had higher incidence of obstructive sleep apnea (63.75% vs. 47.44%;  $p=0.0397$ ), liver disease (22.50% vs. 10.26%;  $p=0.0386$ ), and mobility limitations (5.00% vs. 0.00%;  $p=0.0462$ ), and had more ED visits preoperatively (1.46 vs. 0.29;  $p=0.0001$ ). These patients also had higher incidence of electrolyte abnormalities (67.50% vs. 39.74%;  $p=0.0005$ ), reduced eGFR (5.00% vs. 0.00%;  $p=0.0462$ ) and were more likely to be prescribed non-opioid analgesics (31.25% vs. 15.38%;  $p=0.0189$ ), two or more antiemetics (5.00% vs. 0.00%;  $p=0.0462$ ), or two or more anticoagulant/antiplatelet medications (7.50% vs. 0.00%;  $p=0.0140$ ) at discharge after bariatric surgery. After multivariable logistic regression, independent risk factors associated with preventable ED visits included: anxiolytic prescription at discharge [OR 5.42 (1.58–18.58);  $p=0.007$ ], electrolyte abnormalities [OR 4.31 (1.94–9.60);  $p<0.0001$ ] and leukocytosis [OR 2.23 (1.01–4.93);  $p=0.048$ ] at discharge, and the number of ED visits preoperatively [OR 2.03 (1.34–3.06);  $p=0.001$ ]. There were no differences in operative time, hospital length of stay, provider performing discharge education, timing of first postoperative clinic visit, or standardized phone call. Severe complications, reoperation rates, and 1-year patient reported outcomes did not differ between patients with preventable ED visits and their matched cohort.

**Conclusions:** Preventable ED visits are common after bariatric surgery and are associated with risk factors that can be identified perioperatively. Identifying patients at risk for preventable ED visits and providing earlier follow up may decrease unnecessary ED visits after bariatric surgery.

**P600****Laparoscopic Sleeve Gastrectomy: An Alternative Treatment for the T2DM Morbidly Obese Patient**

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**Introduction:** Gastric bypass has been an acceptable treatment for the morbidly obese patient, with proven efficacy on weight loss and remission of co-morbidities, especially diabetes (T2DM). Laparoscopic sleeve gastrectomy (LSG) is gaining momentum as an alternative procedure for the morbidly obese patient. The aim of this study is to assess the resolution of T2DM by examining HbA1c, BMI, fat %, and % excess weight loss in T2DM patients in our LSG patients.

**Methods:** We performed a retrospective chart review of 33 T2DM patients before and after LSG, analyzing HgA1c, BMI, % weight loss, fat %, and diabetic medications. Data was analyzed by using SPSS version 24. Paired T-test was applied to see the significance of BMI, weight, fat % and HbA1c before and after the procedure.

**Results:** One year following LSG mean BMI decreased significantly from 47.62 to 36.68 ( $p\le0.001$ , CI 9.04–12.83), mean body weight dropped from 132.94 lb to 103.53 lb ( $p\le0.001$ , CI 24.7–34.12), and fat % decreased from 48.93 % to 39.35% ( $p\le0.001$ , CI 6.62–12.74). HbA1c improved significantly from mean 7.15 to 6.20 ( $p\le0.004$ , CI 0.33–1.55). Oral diabetic medications and insulin requirement decreased from 75.8% to 24.2% and 39.4% to 15.2% respectively.

**Conclusion:** Laparoscopic sleeve gastrectomy is an acceptable treatment for the morbidly obese T2DM patient.

**P601****Revision of Sleeve to Bypass: An Effective Procedure Worth the Fight**

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**Introduction:** Gastroesophageal Reflux Disease (GERD) is a known risk following laparoscopic sleeve gastrectomy (LSG), with up to 50% of patients affected by the disease postoperatively. Of these patients, an unknown number progress to medically refractory GERD. Due to their post-surgical anatomy, these patients have limited options for intervention. While endoluminal therapies are available, surgical revision to Roux-en-Y gastric bypass (LRYGB) has become an accepted revisional treatment. Despite this therapeutic option, many payors deny coverage for this treatment. In this study, we report outcomes of revision of LSG to LRYGB and difficulties in obtaining insurance approval for the operation.

**Methods:** We conducted a retrospective review of all patients who underwent a revisional bariatric operation at a single institution between January 2015 and August 2017. We analyzed all patients who underwent conversion of LSG to LRYGB. We collected data on 30-day mortality and morbidities, pre- and postoperative antacid use, and the insurance approval process.

**Results:** Within the study period, we identified 164 patients undergoing revisional bariatric surgery. Seventeen patients had undergone conversion of LSG to LRYGB. All of these patients underwent revision due to GERD refractory to maximal medical therapy. The average body mass index was 37 kg/m<sup>2</sup>, and our average operative time was 184 minutes. One patient required laparoscopic cholecystectomy within 30 days due to acute cholecystitis, and another patient required reoperation for control of staple line bleeding. There were otherwise no 30-day morbidities or readmissions. Fifty nine percent stopped all antacid medication by six months, and 65% stopped by 24 months. Of the 35% percent of patient still on proton pump inhibitor therapy, none of those patients complained of reflux symptoms.

Of non-Medicare patients, 69% were initially denied insurance coverage for revision. Only one plan accounted for all initial approvals. Twenty five percent of denied patients eventually paid out of pocket, and the remaining 75% ultimately secured coverage after an appeal process.

**Conclusion:** Our results indicate that conversion of LSG to LRYGB for intractable GERD is a safe and effective surgical intervention. Despite promising results, insurance coverage for this treatment remains a challenge.

**P602****Prevalence and Predictors of Ulceration, Gastritis, and Stricture in Linear Stapled Roux-en-Y Gastric Bypass Patients**

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**Introduction:** Ulceration and stricture are known complications following Roux-en-Y gastric bypass (RYGB). Often these complications significantly impact the patient's continued care including strictures and marginal ulcers. This study aimed to determine the prevalence of ulceration, gastritis and stricture after linear stapled RYGB and identify predictors that may increase the risk of one or more of these complications.

**Methods:** A single-institution prospectively collected database was reviewed for patients who underwent primary RYGB between 2012 and 2014. The patients were divided according to presence (C) or absence (NC) of a postoperative complication. These were defined as presence of marginal ulcer, gastritis, or stricture during the postoperative period (15.3±8.9 months). Demographics, preoperative BMI, and comorbidities, including diabetes, obstructive sleep apnea, gastroesophageal reflux disease, hypertension and hyperlipidemia were evaluated. Current smokers were excluded (cessation <2 weeks). Steroid and NSAID use, smoking history, history of previous foregut surgery, and occurrence of positive intraoperative leak test were also collected. Statistical analysis was performed using IBM SPSS v23.0, with  $\alpha=0.05$ .

**Results:** 212 patients (NC: N=187, C: N=25) were included in this study. Mean age was 47±7.3 years (NC: 47±11.4, C: 42±11.5 years), 81.8% were female. Our patients had a total complication rate (ulceration, stricture or gastritis) of 11.79%, with 3.30% developing marginal ulceration, 6.60% stricture, and 1.89% having both ulceration and stricture during the follow up period. The average time for marginal ulceration and stricture occurrence was 11 months and 3 months, respectively. None of the patients were diagnosed with gastritis. Logistic regression analysis (N=212) identified patients with a positive intraoperative leak test had increased complication rates (9.56 OR, CI [2.32–39.36]),  $p=0.002$ . Hyperlipidemia was also an independent predictor of complications (6.18 OR, CI [1.69–22.61]),  $p=0.006$ . Older age was protective (0.88 OR, CI [0.82–0.94]),  $p<0.001$ . Gender, race, preoperative BMI, diabetes, obstructive sleep apnea, gastroesophageal reflux disease, hypertension, steroid and NSAID use, and history of previous foregut surgery did not predict complications. Patients with a history of smoking had equivalent risk of never-smokers ( $p=0.169$  cessation within 1 year,  $p=0.187$  cessation >1 year).

**Conclusions:** Marginal ulceration and stricture are common complications after RYGB, with a variety of contributing factors. This study found that the best predictive factors for these complications were a positive intraoperative leak test, previous history of hyperlipidemia, and younger patients. Interestingly, smoking cessation showed a similar risk than non-smokers, and BMI and diabetes did not seem to contribute to the complication rates.

**P603****Swedish Adjustable Gastric Band by Videolaparoscopy: 5 and 10 Years Follow Up**

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**Objective:** To show the results of five and ten years follow up in patients with morbid obesity surgically treated by videolaparoscopy placing a Swedish adjustable gastric band.

**Method:** This is a retrospective study of patients that underwent surgical treatment for obesity through a Swedish adjustable gastric band placed by videolaparoscopy. 80 patients from a single surgeon at 1 bariatric Center in Mendoza, Argentina were evaluated. All patients were evaluated preoperatively by the multidisciplinary team. Mean age was 40. Sex ratio was 83% female 17% male and mean preoperative BMI was 47.13 kg/m<sup>2</sup>.

**Results:** All patients underwent laparoscopic treatment. The average hospital stay was 24 hours. Operative time average was 40 minutes. The average post-operative % EWL at one, five and 10 years was 39.7%, 56.9%, and 34.12%. Follow up was, 75 % at five years and 70% at 10 years. Acute complications: one patient had laceration of the liver, and another developed port infection. Late complications were; erosion (0.9%), slippage (1.3%). Thirty two patients (40%) had a conversion, 28 patients (90%) to RYGB and 4 (10%) to sleeve gastrectomy.

**Conclusions:** The surgical treatment of obesity by placing and adjustable gastric band, results at 10 years are not good in terms of weight loss, complications and the need of conversion to another bariatric procedure. All patients need a well as a strict follow-up in order to get good results.

**P604****Comparing 30-Day Outcomes of Bariatric Surgery in Adolescents vs. Young Adults Using the 2015 MBSAQIP Database**

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**Introduction:** Bariatric surgery in adolescents has been slow to gain acceptance. This study compares the 30-day postoperative outcomes of bariatric surgery between adolescent (13–21 years) and young adult (>21–45 years) patients using the 2015 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database.

**Methods:** Demographic data, comorbidities, operative time, readmissions, reoperations, interventions, hospital stay and postoperative complications were compared in both groups. Subsequent analysis addressing reasons for readmissions comparing both groups was performed. Univariate analyses and multivariate logistical regression models were used to evaluate outcomes of adolescent vs young adult patients at MBSAQIP accredited centers.

**Results:** A total of 85,820 patients were included (2,509 adolescents and 83,311 adults). LSG was the most common bariatric procedure in both groups (67.4% vs 61.2%,  $p<0.001$ ) followed by LRYGB (24.59% vs 25.63%,  $p=0.241$ ) and Laparoscopic adjustable gastric banding (4.22% vs 2.74%,  $p<0.001$ ). Young adult patients frequently had coexisting comorbidities specifically diabetes, hypertension, GERD, hyperlipidemia, sleep apnea, and chronic steroid use, with an ASA score of 3 or greater ( $p<0.001$ ); whereas, the mean BMI in the adolescent cohort was higher (47.38 ± 8.34 vs 45.71 ± 9.09,  $p<0.001$ ). Overall 30-day complication rates were similar between groups; with no significant differences in mortality or hospital stay. Significantly shorter operative times were observed in the adolescent group (83.6 ± 46 vs 88.1 ± 51,  $p<0.001$ ). In Univariate analysis blood transfusions and VTE rates were significantly lower in the adolescent group but there was no difference after risk-adjusted logistic regression analysis. Analysis of readmission data showed lower rates in adolescents compared to young adults (3.67% vs 4.44%  $p=0.06$ ). However, adolescents are more frequently readmitted secondary to gallstone disease (6.3% vs 1.9%,  $p<0.05$ ). The most common reason for readmissions in both groups was nausea and vomiting with fluid/electrolyte depletion, followed by abdominal pain.

**Conclusion:** Adolescent bariatric surgery is feasible and safe, with outcomes similar to that of young adults. LSG is currently the most common bariatric procedure performed in adolescents which is reasonable given the relative lack of co-morbid conditions within this group. Nausea and vomiting are the most common reason of readmission in both groups, but gallstone disease is significantly higher in adolescents, suggesting that this population should be carefully screened for gallbladder disease preoperatively. Further studies regarding long-term results are needed to elucidate long-term outcomes, such as the durability of comorbidity resolutions in adolescent patients.

**P605****Laparoscopic Sleeve Gastrectomy Outcomes Are Similar in Patients Over 65 Compared to Under 35**

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**Background:** Historically, the risk-benefit ratio of bariatric surgery was thought to favor patients under 55 and older patients were denied surgery. Recent studies have demonstrated good bariatric outcomes over 65. How older patients compare to younger, is not well studied.

**Aim:** Rather than compare patients above 65 to below that age, we felt it more valid to have two distinct age groups. We studied our outcomes in patients over 65 undergoing laparoscopic sleeve gastrectomy (LSG) and compared these to a cohort of patients under 35, to evaluate for safety and effectiveness in terms of both weight loss and resolution of preoperative comorbidities.

**Methods:** We conducted a review of a prospectively collected database of patients aged over 65 (Group A) who had a LSG between 2012–2016 and compared them to controls under 35 (Group B). Cases were identified from medical record data by CPT code. Change in body mass index (BMI), complications, resolution of comorbidities and excess body weight loss (EBWL) were compared. Follow-up extended up to 6 months post-operatively.

**Results:** Group A had 64 patients (mean age 68.8, range 66–76) and Group B had 212 (mean age 32, range 18–34). 75% of Group A and 88% of Group B were female ( $p=0.01$ ). Decrease in post-operative BMI averaged 7.6 for Group A versus 10.8 for Group B ( $p<0.001$ ). Mean EBWL was comparable between groups (43% vs 45%,  $p=0.51$ ). Diabetes (DM) resolution, measured by normalization of preoperatively elevated glycosylated hemoglobin, was observed in 52% of patients in Group A and 33% in Group B ( $p=0.11$ ). Hypertension (HTN) resolved in 58% of patients in Group A and 68% in Group B ( $p=0.20$ ) and obstructive sleep apnea (OSA) resolved in 29% of affected patients in Group A and 37% in Group B ( $p=0.44$ ). Mean decrease in triglyceride level was 79.5 mg/dL in Group A versus 40.9 mg/dL in Group B ( $p<0.001$ ). Complication rates were 7.8% for Group A and 4.2% for group B ( $p=0.33$ ), the majority being minor wound complications. 1 myocardial infarction and 1 venous thrombosis (DVT) occurred in Group A while 2 DVTs and 1 case of pancreatitis were the major complications in Group B.

**Conclusions:** LSG results in comparable EBWL and resolution of DM, HTN and OSA in both cohorts. Average BMI decrease favors the younger cohort while improvements in triglyceride level favors the older group. In appropriately selected older patients, LSG has comparable outcomes and rare major complications.

**P606****Compliance with Bariatric Surgery Follow-Up and Weight Loss Outcomes**

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**Introduction:** Many studies have documented poor patient compliance in attending recommended bariatric surgery follow-up visits. The purpose of this study was to evaluate the association of weight loss outcomes with follow-up compliance during the first two years after laparoscopic Roux-en-Y gastric bypass (LRYGB).

**Methods:** Retrospective review was conducted of all adult patients who underwent LRYGB from 2005–2016 at a single institution. Patients were stratified by follow-up compliance at a total of 8 possible postoperative visits: low=1–3 and high=4–8 scheduled bariatric visits. Unadjusted and adjusted analyses were used to compare patient characteristics and compliance. Mixed-effects multivariate linear regression was used to model percent weight loss (%WL) over time by compliance group. Statistical significance was determined by  $p<0.05$ .

**Results:** Of 872 patients, the majority were female (78.2%) and European American (69.7%) with a median age of 43 years (IQR 36–51). There were 357 patients in the low and 515 patients in the high compliance groups. There were no statistically significant differences in age, sex, or race between compliance groups. On adjusted analysis comparing %WL at scheduled bariatric visits, there was no difference in %WL at 1 year follow-up between the groups ( $p=0.85$ ). However, the high compliance group had a significantly greater %WL at 2 years of follow-up ( $p=0.03$ ). When outpatient institutional visits were captured, adjusted analysis demonstrated significantly greater %WL at 1 and 2 years with the high compliance group ( $p<0.01$  and  $p<0.01$ , respectively). On generalized linear models accounting for all scheduled bariatric visits within 2 years and all outpatient institutional visits within 2 years, there was a significant difference in weight loss outcomes with the low compliance group having a lower %WL (all with  $p<0.01$ ).

**Conclusions:** Patients who were more compliant with their post-operative bariatric follow-up visits achieved greater %WL at 2 years following LRYBG. Further studies are needed to determine the reasons for low follow-up compliance and to improve patient outcomes.

**P608****Comparing Complications in Classic Versus Staple First Sleeve Gastrectomy**

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**Background:** Bariatric surgery is a rapidly evolving field with a wide variety of techniques. In its infancy, there were several approaches to restricting intake and/or absorption. Over the past decade, sleeve gastrectomy has become the most commonly performed weight loss surgery, comprising 58.4% of bariatric surgeries performed at this time. Although this surgery is relatively standardized, there are variations in techniques that ought to be investigated in order to optimize this and other surgeries for the bariatric population.

**Objective:** In this retrospective observation study, our goal was to compare the classical sleeve gastrectomy to the staple first technique with respect to outcomes and complications. We compared frequency of complications, including anastomotic leakage, pulmonary embolism, MI, and transfusion requirement. We predicted there is no difference between either surgical approach.

**Methods:** A database was created through a chart review of a single site with two bariatric surgeons. Each surgeon has different surgical approaches to the gastric dissection when performing laparoscopic sleeve gastrectomy. Patients included in the study underwent laparoscopic sleeve gastrectomy in 2014 through 2016 by either of these surgeons.

**Results:** A total of 443 patients underwent laparoscopic sleeve gastrectomy in 2014–2016, 214 via the classic approach and 229 via the staple first approach. The classic approach group consisted of 74.3% females and 25.7% males. The staple first approach group consisted of 76.9% females and 23.1% males. Initial BMI for each group were similar, 42.9 for the classic approach and 43.3 for staple first. There were 12 complications, consisting of re-operations, re-admissions, pulmonary embolism, and intra-abdominal infection. Seven of these patients underwent the classic approach, while five underwent the staple first approach, demonstrating a 3.3% and 2.2% complication rates, respectively.

**Conclusion:** It was found that there is no difference in complication rates between the staple first and classical techniques. Further investigation must be done to compare these and other approaches to the sleeve gastrectomy, as it is rapidly becoming the most popular technique performed in the States.

**P607****The Relationship Between Thyroid Hormone Levels and Bariatric Surgery: A Systematic Review**

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**Introduction:** We aimed to systematically review the literature to study the relationship between thyroid hormone levels and weight loss for patients undergoing bariatric surgery. Thyroid hormones are major regulators of the basal metabolic rate. The imbalance of energy expenditure and energy storage regulated by these hormones play an integral role in metabolic disorders, such as obesity. Several studies have tried to identify the relationship between thyroid hormone levels, obesity, and weight loss.

**Methods and Procedures:** A comprehensive search of MEDLINE, EMBASE, SCOPUS, the Cochrane Library, and Web of Science prior to May 2017 was completed. Title searching was restricted to the following keywords/terms: sleeve gastrectomy/gastric bypass AND thyroid. After removing duplicate titles, 148 primary studies and abstracts were reviewed for inclusion into the systematic review. Inclusion criteria included English studies with five or more patients, age 16 or older, patients undergoing primary bariatric surgery, and outcome reporting of pre- or post-operative weight, TSH, free T4, or free T3. Exclusion criteria included patients diagnosed with overt hyper- or hypo-thyroidism, and patients on thyroid replacement therapy.

**Results:** Sixteen primary studies (N=1556) were included in the systematic review. The average pre-operative BMI was  $46.6 \pm 3.8 \text{ kg/m}^2$ , which decreased to  $32.7 \pm 2.4 \text{ kg/m}^2$  post-operatively (ten studies, n=798). All studies with documented pre- and post-operative TSH levels reported a decrease in TSH following bariatric surgery. The average pre-operative TSH was  $2.6 \pm 1.1 \text{ mU/L}$ , which decreased to  $1.8 \pm 0.4 \text{ mU/L}$  post-operatively (nine studies, n=736). Free T4 levels increased on average by  $0.62 \text{ pmol/L}$  (five studies, n=246), and free T3 levels decreased on average by  $0.57 \text{ pmol/L}$  (two studies, n=34). Two studies identified 79 patients with subclinical hypothyroidism (SH) pre-operatively with an average pre-operative TSH of  $5.69 \text{ mU/L}$  and pre-operative free T4 of  $14.79 \text{ pmol/L}$ . Following RYGB, TSH levels decreased on average by  $2.94 \text{ mU/L}$  into euthyroid range. Four studies found a statistically significant positive correlation between TSH and BMI at baseline. None of the studies found that lower TSH was correlated with greater weight loss.

**Conclusion:** There is a positive correlation between TSH and BMI at baseline, but no predictors of weight loss were identified. Bariatric surgery leads to a decrease in TSH levels. Subclinical hypothyroidism improved or resolved after RYGB. Further research is needed to try to identify potential hormonal predictors of weight loss associated with bariatric surgery.

**P609****Clinical Outcomes of Intensive Medical Treatment vs Sleeve Gastrectomy for Diabetes in Morbid Obesity- A Meta-analysis of the Literature**

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**Introduction:** Diabetes and obesity are known to have a strong correlation as about 90% of type II diabetics are obese. Studies have shown that bariatric surgery in the obese result in optimal glycemic control, reduction of co-morbidities, and often even superior when compared to Intensive Medical Treatment (IMT) in the treatment of diabetes. The aim of this review is to evaluate the outcomes of laparoscopic sleeve gastrectomy (LSG) as it compares to IMT for the treatment of DM in morbid obesity.

**Methods:** A systematic review was conducted through PubMed to identify relevant publications from 2012 to 2016 with comparative studies on LSG and IMT for management of diabetes in morbid obesity. The outcomes analysed included Haemoglobin A1c (HbA1c), Body Mass Index (BMI) reduction and Fasting Plasma Glucose (FPG) mg/dL. Results are expressed as standard difference in means with standard error. Statistical analysis was done using fixed-effects meta-analysis to compare the mean value of the two groups. (Comprehensive Meta-Analysis Version 3.3.070 software; Biostat Inc., Englewood, NJ).

**Results:** Three out of 24 studies were quantitatively assessed and included for this meta-analysis. A total of 53 patients underwent LSG and 56 patients IMT for the control of diabetes. HbA1c ( $-0.77 \pm 0.20$ ;  $p<0.05$ ), BMI reduction ( $-1.72 \pm 0.23$ ;  $p<0.05$ ) and FPG ( $-1.384 \pm 0.25$ ;  $p<0.05$ ) were all significantly lower in the LSG group when compared to the IMT group.

**Conclusion:** Laparoscopic sleeve gastrectomy is more effective in the management of diabetes in morbid obesity when compared to intensive medical treatment.

**P610****A Study of Revision Laparoscopic Gastric Bypass and Sleeve Gastrectomy in a Single Unit**Matthew J Lyon, MD<sup>1</sup>, Kamal Heer, MD<sup>2</sup>, Harish Kumar, MD<sup>1</sup>:<sup>1</sup>University of Queensland, <sup>2</sup>Monash University

**Introduction:** Revision Bariatric Surgery is always considered to be associated with higher complication rates. There is currently controversy in the literature regarding one stage and two stage revisions.

**Methods:** The present study is ongoing longitudinal prospective analysis of data of revision surgery in a single unit. The revision surgery was offered after initial failed or complicated gastric band, sleeve gastrectomy and roux-en-y gastric bypass (RYGB).

**Results:** There were Forty-two individuals who had revision bariatric surgery. The age of the cohort of patients ranged from twenty-six to seventy-five years. Thirty-three were females and nine males. All patients who were hypertensive or diabetic at the time of their initial bariatric operation had a relapse of their co-morbidity prior to their revision surgery.

One Stage Revision	
Band converted to Sleeve Gastrectomy	23
Band converted to RYGB	6
Sleeve Gastrectomy converted to RYGB	4
RYGB to revised RYGB	2
Two Stage Revision	
Band converted to Sleeve Gastrectomy	4
Band Converted to RYGB	3

The two stage revisions patients had their band removed at another facility, had a compilation from the band itself or did not wish for revision surgery initially. Of the two failed bypasses one had a large pouch and very short limbs. The other had a gastro-gastric fistula and ultra short limbs. There were no deaths in this study. One patient who underwent one stage revision of a gastric band to bypass had an iatrogenic small bowel injury that required a second operation. Amelioration of diabetes and hypertension was seen in all who had relapsed. Weight loss was good in all patients except for those undergoing revision from short limbed to long limbed bypass.

**Conclusion:** There is enough evidence that revision surgery is feasible, and can ameliorate metabolic co-morbidities after failed band and sleeve. Two staged surgery is not necessarily safer compared to one stage revision. In the present study an inadvertent iatrogenic injury occurred in one stage revision group but is not true reflection of increased complications.

**P611****The Association Between Preoperative Endoscopic Esophagitis and Post Operative Gerd in Sleeve Gastrectomy Patients**

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**Introduction:** GERD is a common complication after sleeve gastrectomy (SG). The purpose of this study is assess the relationship between pre-operative findings of endoscopic esophagitis and post-operative GERD in SG patients. The hypothesis of this study is that patients with pre-op esophagitis are more likely to have GERD post-op than patients with no esophagitis pre-op.

**Methods:** A retrospective review of 103 SG patients who had pre-operative endoscopy and followed prospectively for at least one year was performed. Patients were divided into two groups based on pre-op endoscopic findings: those with no findings of esophagitis (NE), and those with endoscopic esophagitis, including Barretts (EE). Patients were followed for at least one year, and assessed for usage of a proton pump inhibitor (PPI) usage. The two groups were compared using both student t-test and chi square test.

**Results:** A total of 63 patients did not have any findings of esophagitis on pre-op endoscopy (NE group), and 38 patients had findings of endoscopic esophagitis (EE). There was no difference in pre-operative demographics and post-op weight loss at one year (Table I).

Table I. Group Baseline			
	NE	EE	p-value
Age	45.78	48.24	0.31
BMI	48.74	51.04	0.28
% PPI usage	30%	31.5%	0.92
% weight loss at one year	27%	27%	0.84
% Hiatal hernia repair	4.7%	15.7%	0.1

Follow-up ranged from one to 4 years post-op. The dependency on PPI usage and de novo reflux are shown in Table II.

Table II. Post-op PPI Dependency			
	NE	EE	p-value
% PPI usage post-op	36.5%	36.7%	0.97
De novo GERD post-op	20.9%	23%	0.83
Resolved GERD	15.7%	33.3%	0.25

**Conclusions:** GERD and PPI dependency are common after SG. Patients with pre-op endoscopic esophagitis do not have a higher rate of PPI dependency post-op compared to patients who had no signs of pre-op esophagitis.

**P612****Laparoscopic Sleeve Gastrectomy as a Bridge to Cardiac Transplantation**

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**Introduction:** Body mass index >35 kg/m<sup>2</sup> is a contraindication to placement on the cardiac transplant list. Patients with morbid obesity and end stage cardiac failure may require bariatric surgery in order to access this life-saving procedure.

**Methods:** We performed a retrospective assessment of the outcomes of consecutive morbidly obese patients who underwent laparoscopic sleeve gastrectomy who would otherwise meet eligibility for cardiac transplantation.

**Results:** 4 male patients (age range 28–56 years) underwent laparoscopic sleeve gastrectomy over the period 2016–17. All patients had a left ventricular ejection fraction of less than 15%, one secondary to ischemic cardiomyopathy and the other 3 with familial non-ischemic cardiomyopathy. Two patients had an ICD in situ and the other two had left ventricular assist devices in place at the time of surgery. One patient had previously had a gastric band placed with no weight loss over two years following this procedure.

The median BMI at time of surgery was 51.4 kg/m<sup>2</sup> (range 42.8–61.6). The median length of stay was 5.5 days (range 4–7 days). None of the patients experienced a post-operative complication despite significant co-morbidities in this cohort including hepatitis C related cirrhosis, haemophilia A, previous stroke, previous pulmonary embolism and poorly controlled type 2 diabetes. The median percentage weight loss at 1 year post surgery was 72.2% (range 48.4–88.2%). Two patients successfully underwent cardiac transplant at 8 and 18 months post-op; the other two continue to but have noted a stabilisation of cardiac physiology and improved functional capacity with weight loss.

**Conclusions:** Careful multi-disciplinary management of patients requiring weight loss in order to qualify for cardiac transplantation is feasible and safe with good intermediate outcomes.

**P613****Safety of Metabolic and Bariatric Surgery in Patients with “Super-Super Obesity” (BMI≥60) at MBSAQIP Centers**

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**Introduction:** Patients with “super-super obesity”, defined as a BMI≥60, are at higher risk of weight-related health problems and might benefit more than others from metabolic and bariatric surgery. However, these benefits need to be weighed against the potential for increased operative and perioperative risks. Accurate data regarding these patients is critical to guide procedure choice and informed, shared decision-making.

The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) is a national accreditation and quality improvement program, which captures clinically-rich specialty-specific data for the majority of all bariatric operations in the United States. This is the first analysis of the MBSAQIP Participant Use File (PUF) focusing on this at-risk subpopulation.

**Methods:** All patients who underwent primary elective bariatric operations in 2015 were identified. Patients with a BMI of ≥60 were compared to patients with a BMI <60 with regards to patient characteristics, treatment patterns, and 30-day outcomes. Univariate analyses and multivariable logistic regression were performed.

**Results:** 140,649 patients underwent primary operations in 2015. Of these, 8,082 (5.75%) had a BMI ≥60. Patients with BMI ≥60 were more likely to be male (28.11% vs 20.79%), black (24.68% vs 16.41%), have limited ambulation (6.12% vs 1.79%), and have several comorbid conditions ( $p < 0.0001$ ). They were less likely to undergo sleeve gastrectomy (60.64% vs 66.01%) or band (2.15% vs 3.13%), and more likely to undergo gastric bypass (32.12% vs 28.56%) or other procedures ( $p < 0.0001$ ). The initial approach was similar (88.35% vs 88.53% laparoscopic, 6.57% vs 5.96% robotic, ~0% open). However, rates of conversion to a different approach were higher in patients with BMI ≥60 (0.58% vs 0.23%,  $p < 0.0001$ ). Mean operative time was longer for patients with BMI ≥60 by 10 minutes (87 minutes vs 77 minutes).

Median LOS was 2 days for both groups. BMI≥60 was associated with slightly increased rates of readmission (5.95% vs 4.20%), complications (5.85% vs 4.06%), and death (0.10% vs. 0.45%) ( $p < 0.0001$ ). BMI≥60 was an independent predictor of complications (OR 1.32, 95% CI 1.2–1.46).

**Conclusions:** Metabolic and Bariatric Surgery at MBSAQIP accredited centers is safe for patients with a BMI≥60. However, univariate and multivariate analyses show that short term outcomes are slightly worse than in those with a lower BMI. This somewhat higher rate of complications need to be weighed against the significant benefits from surgery in order to help patients and providers decide if it is best to proceed with metabolic and bariatric surgery.

**P614****The Effect of Fibrin Glue or Suture on Leakage in Patients Undergoing Laparoscopic Sleeve Gastrectomy**

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**Introduction:** Sleeve gastrectomy represents one of the most common surgical procedure used in bariatric surgery. The most feared complication following laparoscopic sleeve gastrectomy is the leak that occurs at the staple line. One method to reduce the risk of leak is the use of reinforcement material at the suture line. In this study, the efficacy of sutures and fibrin glue in the prevention of staple leak has been compared retrospectively.

**Materials and Methods:** A total of 250 patients undergoing LSG between October 2011 and August 2015 at the Medical Faculty of Firat University were retrospectively assessed using the hospital database system records.

**Results:** There were 77 males (31%) and 173 (69%) females, with a mean age of 34 years (range: 16–65 y), and body mass index of 45 kg/m<sup>2</sup>. While no reinforcement material was used in 61 patients (24%) at the suture line, reinforcement sutures or fibrin glue were used in 54 (22%) and 135 (54%) patients, respectively. Postoperative leak occurred in 8 patients (3.2%), and 6 (9.8%) of these had no use of reinforcement material for leak prevention, while additional sutures or fibrin glue had been used in 2 patients, one in each group (0.7%). One patient died due to leak and the consequent development of sepsis (0.4%).

**Discussion:** LSG is increasingly more frequently used in bariatric surgery practice. However, an increase also occurs in the rate of complications. A discrepancy exists in the published literature regarding the benefit of reinforcement the suture line on the risk of leak risk. In our patient series, patients without the use of additional material in the staple line had a significantly increased risk of leak.

**Conclusion:** Despite some controversy, strong evidence exists on the effectiveness of fibrin glue in the prevention of leaks in patients undergoing laparoscopic sleeve gastrectomy.

**P616****Comparison of Web Based and In-House Educational Seminars in Bariatric Surgery Patients**

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**Background:** Comprehensive web and hospital based preparative patient education allow the morbidly obese patients to understand weight loss surgery, its benefits, the necessity of follow up and the risk of weight regain. While the in-house seminars provide a face-to-face interaction with the bariatric program staff, the online seminars are easily accessible and more cost effective. The primary objective of this study is to compare demographics and weight loss surgery outcomes between patients who participated in the online vs in-house preparative seminars.

**Methods:** After obtaining Institutional Review Board approval, a retrospective chart review was performed involving patients who underwent bariatric surgery between January 2015 and December 2016 at a tertiary care center. The patients were divided into two groups based on their choice of educational seminar, online or in-house, prior to their initial consult with a surgeon. Data was collected on age, type of insurance, length of stay (LOS), longest follow up and change in BMI to assess weight loss.

**Results:** One hundred and eighteen patients were included in this study. Eighty patients attended in-house seminar while 38 completed online seminar. The various types of surgery (laparoscopic gastric bypass, sleeve gastrectomy, and band) were similarly represented between the two groups. There was no difference in the type of insurance policy between the groups. Patients who elected to take the in-house seminar were on average 5 years older than those who chose the online course, which was statistically significant ( $p<0.05$ ). There were no differences in LOS, longest follow up after surgery, and weight loss at 12 months between the groups.

Variables	Online	In-House	P-value
Insurance, % (n)			
Private	71% (27)	65% (52)	
Medicaid	18% (7)	20% (16)	
Medicare	11% (4)	15% (12)	0.55
Age, Mean (SD)	43.5 (11.5)	48.6 (10.4)	0.02
Longest follow up in mo, Mean (SD)	13.5 (7.7)	15.6 (8.0)	0.18
Length of stay in days, Mean (SD)	2.1 (1.6)	2.3 (2.9)	0.70
ABMI, Mean (SD)			
Pre-operative to 12 mo	-11.7 (3.1)	-12.4 (3.0)	0.34

**Conclusion:** When comparing bariatric surgery outcomes, there was no difference between patients who received web or hospital based preparative education. Bariatric programs should provide access to online seminars to save resources and cost. However, an in-person seminar should still be available for patients who are not technologically savvy or lack Internet access.

**Keywords:** Bariatric surgery, Patient education, Web based seminar.

**P615****Low-Cost Incisionless Liver Retraction for Laparoscopic Sleeve Gastrectomy. A Prospective Controlled Trial**

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**Background:** Laparoscopic bariatric surgery has been performed safely since 1991. In a persistent search for fewer and smaller scars, single port and acchoscopy surgery or even NOTES have been implemented. The goal of this study is to analyze the safety and feasibility of using a low cost incisionless liver retractor compared to a standard laparoscopic retractor for sleeve gastrectomy.

**Methods and Procedures:** Candidates for sleeve gastrectomy that fulfilled 1991 NIH criteria for bariatric surgery were selected. Those younger than 18 and/or with prior upper-left quadrant surgery were excluded. All patients signed written consent. Patients were randomized 1:1 to either a standard 5 port technique with a fan-type liver retractor through a 5 mm port (group A); or a 4 port technique with the liver retracted by a polypropylene 1 suture passed through the right crura and retrieved at the epigastrum with the use of a fascia closure needle (group B). All surgeries were performed by the same surgeon. Surgery length from insertion of first port to withdrawal of the last was the primary endpoint. Anthropometric data, % of pre-surgical total weight loss (%PTWL), visualization of the surgical field, complications inherent to liver retraction and postoperative morbidity were recorded.

Sample size was calculated to detect a 3-minute difference in surgical time (10% of surgeons previous experience, 31 min, SD=4.4) with an alpha error of 0.05 and a 90% power.

**Results:** One hundred patients were included. Groups were comparable (Group A vs B) in age (42.9 vs 42.7 years); BMI (45.1 vs 44.5 kg/m<sup>2</sup>) and %PTWL (11.9 vs 11.4%). Females accounted for 90% in each group.

Main surgical length was 30.4±4.6 minutes for Group A and 29.6±4.7 minutes for Group B ( $P=0.41$ ). Visualization was considered very good in 80% vs 82%, good in 16% vs 12% and poor in 4% vs 6% ( $P=NS$ ). Two patients from each group (4%) had self-limited bleeding from the liver dew to retraction. No 30-day morbidity was observed in either group.

**Conclusions:** In the ongoing quest for incisionless surgery, liver retraction using a polypropylene suture resulted to be effective and inexpensive. Visualization was comparable to a standard liver retractor. Duration of surgery was similar. This low-cost alternative may eliminate the need for expensive instruments and reduce the number of scars without sacrificing the safety and quality of sleeve gastrectomy.

**P617****Retrospective Cohort Study Using the MBSAQIP Database to Assess the Safety of Bariatric Surgery in the Elderly**

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**Introduction:** The safety of bariatric surgery in the elderly has been studied with conflicting results and is a topic of debate, given the increasing prevalence of obesity within this population. Many surgical centers use age 65 as their cutoff for offering bariatric surgery. The objective of this study was to determine if the outcome of bariatric surgery (laparoscopic sleeve gastrectomy [LSG] or laparoscopic roux-en-y gastric bypass [LRYGB]) in patients age 65 or over was comparable to that in younger patients, with respect to the odds of readmission and the rates of an adverse event within 30 days of surgery.

**Methods and Procedures:** A retrospective cohort study was performed using the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) Participant Use Data File. Patients were selected if they underwent a LSG or LRYGB between January 1 and December 31, 2015. The primary outcome was the odds of readmission within 30 days of surgery. For each type of surgery (i.e. LSG or LRYGB), a multivariable logistic regression was performed to obtain an adjusted odds ratio (OR) of 30-day readmission for patients age 65 or over. Rates of readmission, complications, reoperation, and death within 30 days of surgery were also calculated.

**Results:** Within the LSG group, there were 92699 (94%) patients under age 65 and 5575 (6%) patients age 65 or over. Both groups had similar rates of 30-day readmission (3–4%), reoperation (1%), and death (0.1–0.5%), but the rate of complications was higher in the older group (5% vs. 2%). The adjusted OR for 30-day readmission for patients age 65 or over was 1.13 ( $p=0.08$ , 95% CI [0.99–1.30]).

Within the LRYGB group, there were 40606 (94%) patients under age 65 and 2743 (6%) patients age 65 or over. Both groups had similar rates of 30-day readmission (6–7%), reoperation (3%), and death (0.1–0.5%), but the rate of complications was higher in the older group (11% vs. 6%). The adjusted OR for a 30-day readmission for patients age 65 or over was 1.08 ( $p=0.3$ , 95% CI [0.93–1.26]).

**Conclusions:** Based on MBSAQIP registry data, patients age 65 or over did not have higher odds of a 30-day readmission compared to younger patients after LSG or LRYGB. Rates of 30-day readmission, reoperation, and death were similar, but rates of complications (e.g. pneumonias, unplanned intubations) were higher in the older group. Bariatric surgery in the elderly should therefore be performed only after careful and patient-centered selection processes.

**P618****Reoperative Bariatric Surgery: Analysis of Indications and Outcomes: A Single Center Experience**

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**Introduction:** Revisional bariatric surgery has become more common in recent years. It is to address short and long-term complications of primary bariatric surgery as well as the issue of weight regain. The aim of this study was to retrospectively analyze the indications for reoperation and short-term outcomes in our institution.

**Methods and Procedures:** Between 2011 and 2017, patients who underwent bariatric surgery in our center were included in a prospectively collected database. Demographic data, primary and revisional bariatric procedures, reasons for revisions and outcomes were recorded and reviewed retrospectively.

**Results:** A total of 527 patients underwent bariatric surgery at our institution and 22% of these (n=119) were revisional bariatric surgery. We identified 4 groups of patients according to their primary procedures: Adjustable gastric band (AGB), Roux-en-Y gastric bypass (RYGBP), Vertical band Gastropasty (VBG), and Sleeve gastrectomy (SG). Of the 119 patients, 51 (43%) had AGB as primary procedure. Of those, 55% had their band removed due to food intolerance and severe dysphagia and 37% had a conversion to either RYGBP or Sleeve gastrectomy (SG) due to weight recidivism. In the RYGPBP group (n=38), 53% of the patients presented with late complications. Of these, 45% had an acute presentation (small bowel obstruction, internal hernia, or perforated marginal ulcer) requiring emergency surgery. Only 8% patients needed gastric bypass takedown due to severe hypoglycemia. Weight recidivism was noted in 47% of the patients that necessitated either revising the anastomosis, trimming of the gastric pouch or gastrogastrostomy fistula takedown. In the VBG group (n=14), 79% of the patients experienced weight recidivism that required conversion to RYGB and 21% of the patients required the VBG to be taken down due to obstructive symptoms. In the SG group (n=14), 21% of the patients experienced early complications needing a second procedure. Weight recidivism was found as the most common reason for conversion (50%) to RYGBP. Twenty nine percent of the patients in this group underwent conversion to a RYGBP due to severe de novo GERD.

**Conclusions:** Our results demonstrate various reasons for revisional surgery in our bariatric surgery population. The complications rate after revisional bariatric surgery is low and it should be offered to patients who can benefit from reoperation.

30-Day postoperative outcome	
<b>Complications</b>	13( 11%)
Wound	3
CNS	1
Respiratory	3
Postoperative ileus	1
Other medical	5

**P619****Secondary Surgery After Sleeve Gastrectomy, Roux-en-Y Gastric Bypass vs Biliopancreatic Diversion with Duodenal Switch: A Systematic Review and Meta-analysis**

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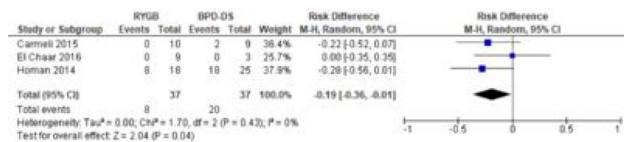
**Introduction:** Our aim was to systematically review the literature to compare weight loss outcomes and safety of secondary surgery after sleeve gastrectomy (SG), particularly between Roux-en-Y gastric bypass (RYGB) and biliopancreatic diversion with duodenal switch (BPD-DS). SG was originally developed as the first part of a two-stage procedure for BPD-DS. However, it is now the most common standalone bariatric surgery performed in the United States.

The majority of SG are done as the sole bariatric operation but in 3%, a second operation is necessary, due to insufficient weight loss, weight regain or reflux. The most common second-stage operations are RYGB at 46% and BPD-DS at 24%. There are a few small case series comparing RYGB to BPD-DS as a secondary surgery after SG. These studies suggest that after failed SG, BPD-DS results in greater weight loss but higher early complication rates than RYGB.

**Methods:** A comprehensive search of MEDLINE, EMBASE, SCOPUS, the Cochrane Library, and Web of Science from 1946 to March 2017 was completed. Title searching was restricted to the following keywords/terms: gastric bypass OR biliopancreatic diversion OR duodenal switch AND sleeve gastrectomy and revision\*/\*conversion\*/secondary/fail\*. Included studies contained  $\geq 5$  adult patients who underwent sleeve gastrectomy followed by RYGB and BPD-DS. Studies had to directly compare RYGB with BPD-DS.

**Results:** Six primary studies (109 patients) were included, four of which underwent meta-analysis. There were 61 second-stage surgeries to RYGB and 48 to BPD-DS. The indications for RYGB were failed weight loss (65.1%), reflux (20.9%), dysphagia (9.3%), or as a planned two-step procedure (4.7%). BPD-DS indications were either failed weight loss (76.6%) or as a planned two-step procedure (23.4%). In three of the studies, mean change in BMI was not significant between BPD-DS and RYGB (11.0 kg/m<sup>2</sup> versus 8.54 kg/m<sup>2</sup>, MD -1.70, CI -6.73 to 3.34, p=0.51). Second-stage BPD-DS had statistically significantly higher rates of malnutrition, vitamin and mineral deficiency compared to second-stage RYGB (54.1% vs. 21.6%, RD -0.19, CI -0.36 to -0.01, p=0.04). However, bleeding, leak, marginal ulceration and reoperation rates were not significantly different.

**Conclusion:** Second-stage BPD-DS and RYGB following SG result in similar BMI change but BPD-DS had significantly higher rates of malnutrition, vitamin or mineral deficiencies. However, sample sizes in this systematic review were small and further studies are needed to clarify differences in weight change and complication rates following second-stage BPD-DS and RYGB.



Malnutrition, mineral and vitamin deficiencies in second-stage RYGB vs BPD-DS after SG.

**P620****The Efficacy of Laparoscopic Sleeve Gastrectomy as a Bridge to Transplantation in Patients with Advanced Heart Failure**

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**Introduction:** Morbid obesity frequently precludes advanced heart failure patients from transplant eligibility. Transplant centers have strict BMI restrictions for candidacy on organ waiting lists, and additionally a relative size match is required between cardiac donors and recipients, further limiting a patient's ability to be transplanted if they are significantly overweight. Obese potential donors who may be a size match to our patient cohort are more likely to have hearts that are not suitable for transplantation. Our aim was to determine if bariatric surgery is effective for meaningful weight loss in advanced heart failure patients, and thus establish their cardiac transplant eligibility.

**Methods:** We performed a retrospective study including end stage heart failure patients not eligible for transplant listing secondary to morbid obesity that underwent laparoscopic sleeve gastrectomy (LSG) at a single institution from 2013–present. Patient demographics, operating time, length of stay, complications, weight loss, changes in medications, and transplant status were reviewed. Results were analyzed by student's t-test.

**Results:** Five patients with advanced heart failure underwent LSG, four of whom had a left-ventricular assist device in place. Mean age was 40.8 (26–53). Mean operating time was 83.5 minutes (66–102 minutes), average length of stay post-operatively was five days (3–8 days). There was a median follow up time of 7.5 months (3–42 months). Mean excessive weight loss at the patient's last visit was 48.83% (77.45%–26.44%), with an average decrease in BMI of  $11.16 \pm 3.85 \text{ kg/m}^2$  ( $p=0.01$ ). Secondary to modification of the stomach and alteration of gastric flora, dosing changes may be necessary in oral medications following LSG. We found patients uniformly required decreased dosing of Coumadin after LSG, with an average daily dose reduction of 36.44%. We had one mortality, related in part to supra-therapeutic anticoagulation perioperatively. One patient underwent successful heart transplantation and 2 additional patients were reactivated on the transplant list.

**Conclusion:** Laparoscopic sleeve gastrectomy is effective in advanced heart failure patients for meaningful weight loss, reactivation to the transplant wait list, and ultimately cardiac transplantation. However, this complex population carries a high perioperative risk and close multidisciplinary collaboration is required. More data is needed to best optimize perioperative management of these patients.

**P621****The Incidence of Fractures Following Bariatric Surgery: A Systematic Review**

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**Introduction:** Bariatric surgery is a highly effective treatment for severe obesity. While its effect on improvement of the metabolic syndrome is well described, its effect on intrinsic bone fragility and fracture propagation is unclear. Therefore, the aims of this systematic review of the literature were to examine (1) the incidence of fracture following bariatric surgery, (2) the association of fracture with the specific bariatric surgical procedure (3) site-specific types of fractures associated with bariatric surgery.

**Methods:** A comprehensive literature search was conducted through Medline, Embase, Scopus, Web of Science, DARE, Cochrane library, and HTA database. The search terms used were gastric bypass, sleeve gastrectomy and fracture.

**Results:** For the systematic review, 8 studies were included (n=42,567 patients). This included no randomized controlled trials. The average patient age was 43.3 years and 24.9% of patients were male. The average follow-up time was 3.66 years. One thousand nine hundred and sixty patients had at least one fracture of any type, and the total absolute number of fractures encountered was 2326. In all, 4.6% of patients who underwent bariatric surgery suffered from a fracture post-operatively. The greatest risk of fractures was associated with Biliopancreatic diversion (BPD) (10.51%), followed by restrictive procedures such as Adjustable Gastric Band (AGB) and Sleeve Gastrectomy (5.71%), with the Roux-en-Y Gastric Bypass having the lowest risk (2.66%). Of the fractures encountered, 1466 (63.03%) were of the lower extremity and pelvis and 763 (32.8%) were of the upper extremity. Only 90 (3.87%) axial skeleton fractures were recorded.

**Conclusion:** It appears that the overall risk of sustaining a fracture of any type after undergoing bariatric surgery is approximately 5 percent after an average follow up of 3.6 years. The greatest risk of fractures is associated with the BPD, with the RYGB being the most favorable. Fractures following bariatric surgeries tend to follow osteoporotic and fragility patterns. Post-operative supplementation of vitamin D, calcium and weight bearing exercises need to be optimized, and long term follow-up studies will be needed to confirm that these interventions will indeed reduce fracture risk following bariatric surgery.

**P622****Premonition is Possible in Bariatric Surgery: Ascertaining One Year Outcomes from Follow Up at Three Months**

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**Introduction:** In the past, there have been many models to help surgeons intervene early after surgery for patients who are not losing adequate weight following bariatric procedures. While many have been made for different surgeries never has a predictive model been created to predict underperformers soon after SIPS. This model seeks to improve patient care helping surgeons know when to advise patients on more options to help them lose weight following the SIPS procedure.

**Methods:** 161 patients met the criteria for this study. These patients underwent surgery at a single institution from June 2013 to December 2016. Non-linear Regression analysis was performed to interpolate weight loss at three months and at one year. A multilinear regression was run to determine the significant variables. A model was then constructed to predict weight loss at one year 3 months after the SIPS procedure.

**Results:** Patients EWL% at three months, preoperative BMI, and the interaction between DM and HTN were found to be significant factors. The model has a R value of .763 and an average error of estimate of 10.6% EWL at one year.

Variable	Effect on EWL% at 1 year
	Effect on EWL% at 1 year
EWL% at 3 months	+.877% per EWL%
Peroperative BMI	-.609 per point BMI
DM and HTN	-7.54%

**Conclusion:** Surgeons can easily predict patient underperformance soon after SIPS. This allows surgeons to give more and alternative help for patients who may not reach their weight loss goals and improve individual patient weight loss.

**P623****The Effect of Robotic Sleeve Gastrectomy with Concomitant Esophagopexy Hiatal Hernia Repair on Gastroesophageal Reflux Disease in Bariatric Patients**

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**Background:** The effect of sleeve gastrectomy on gastroesophageal reflux (GERD) remains controversial. It is currently common practice to perform a hiatal hernia repair (HHR) at the time of the sleeve gastrectomy, however, there are few data on the outcomes of GERD symptoms in these patients. The aim of this study was to evaluate the effect of performing an esophagopexy hiatal hernia repair on GERD symptoms in morbidly obese patients undergoing robotic sleeve gastrectomy (RSG).

**Methods:** A single institution, single surgeon, prospectively maintained database was used to identify patients who underwent RSG and concomitant esophagopexy for hiatal hernia repair from November 2015 to July 2017. Patient characteristics, operative details and postoperative outcomes were analyzed. Primary endpoint was subjective GERD symptoms and recurrence of hiatal hernia.

**Results:** Thirty-seven patients were identified meeting the inclusion criteria (RSG+HHR+esophagopexy) with a mean follow-up of  $28.7 \text{ weeks} \pm 21.1 \text{ weeks}$ . This patient cohort was 86.5% female with a mean age of the patients being  $47.0 \pm 9.5 \text{ years}$ . Mean preoperative BMI was  $40.2 \pm 6.0 \text{ kg/m}^2$ . Preoperative upper gastrointestinal contrast series was performed in 84.0% of the patients with the study showing a hiatal hernia in 71.0% of these patients. Preoperative esophagogastroduodenoscopy (EGD) was performed in 94.5% of the patients with the study showing a hiatal hernia in 56.8% of the patients. Preoperatively, 29.7% of patients had a documented diagnosis of GERD. After RSG with esophagopexy, 64.0% of symptomatic patients had resolution of their GERD symptoms while 36.4% remained symptomatic following the procedure. New onset GERD was seen in 10.8% of patients who did not have a documented diagnosis of GERD pre-operatively. None of the patients experienced recurrence of their hiatal hernia.

**Conclusion:** This study showed that RSG with concomitant esophagopexy hiatal hernia repair improved GERD symptoms in over half of symptomatic patients. However, 10.8% of asymptomatic patients developed new onset GERD symptoms after undergoing the esophagopexy hiatal hernia repair. The resolution of GERD symptoms and new onset GERD rates are similar to the present rates in the literature for patients undergoing sleeve gastrectomy. This suggests that the esophagopexy does not affect GERD, but may impact recurrence rate of the hiatal hernia. Long term follow up of these patients is needed to demonstrate this theory.

**P624**

**Preserving Duodenal-Jejunal (Foregut) Transit Does Not Impair Glucose Tolerance and Diabetes Remission following Gastric Bypass in Type 2 Diabetes Sprague-Dawley Rat Model**

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**Background:** Possible mechanisms underlying diabetes remission following Roux-en-Y gastric bypass (RYGB) include eradication of putative factor(s) with Duodenal-jejunal bypass.

**Objective:** To observe the effects of Duodenal-jejunal transit on glucose tolerance and diabetes remission in gastric bypass rat model.

**Method:** In order to verify the effect of Duodenal-jejunal transit on glucose tolerance and diabetes remission in gastric bypass, twenty-two type-2 diabetes Sprague-Dawley rat model established through high fat diet and low dose Streptozotocin (STZ) administered intraperitoneally were assigned to one of three groups: Gastric Bypass with duodenal-jejunal Transit (GB-DJT n=8), Gastric Bypass without duodenal-jejunal transit (RYGB n=8) and SHAM (n=6). Body weight, food intake, blood glucose, as well as meal-stimulated insulin, and Incretin hormones responses were assessed to ascertain the effect of surgery in all groups. Oral Glucose Tolerance Test (OGTT) and Insulin Tolerance Test (ITT) were conducted three and seven weeks after surgery.

**Results:** Comparing our GB-DJT to the RYGB group, we saw no differences in the mean decline in bodyweight, food intake, and blood glucose 8-weeks after surgery. GB-DJT group exhibited immediate and sustained glucose control throughout the study. GLP-1 and GIP levels were also significantly increased from preoperative level in the GB-DJT group ( $p<0.05$ ). Insulin and GLP-1 Area Under Curve (AUC) as well as Improved Glycemic excursion on OGTT did not differ between GB-DJT and RYGB groups. Outcomes with Sham operation did not differ from preoperative level.

**Conclusion:** Preserving Duodenal-jejunal transit does not impede glucose tolerance and diabetes remission after gastric bypass in Type-2 diabetes Sprague-Dawley rat model.

**P625**

**Is Bariatric Surgery Effective for Comorbidity Resolution in Super Obese Patients?**

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**Background:** Type II Diabetes (T2DM), hypertension (HTN), obstructive sleep apnea (OSA), and hyperlipidemia (HLD) are common comorbidities that are strongly associated with obesity.

**Objective:** The purpose of this study is to assess our experience with super morbidly obese patients and their rate of weight-related comorbidity remission compared to other bariatric patients.

**Methods:** A retrospective analysis of outcomes of a prospectively maintained database was done on 723 obese patients with a diagnosis of at least one or more of the following comorbidities—T2DM, HTN, OSA, or HLD—at the time of initial visit who had undergone either a sleeve gastrectomy (SG) or a Roux-en-Y gastric bypass (RYGB) at our hospital between 2011 and 2015. The patients were stratified based on their preoperative body mass index (BMI) class: BMI 30–49.9 (Group I) vs. BMI 50+ (Group II, super obese).

**Results:** The 6-month follow-up comorbidity remission rates for Group I and Group II were 47.4% and 40% ( $p>0.05$ ) for T2DM; 30.3% and 23.2% ( $p>0.05$ ) for HTN; 75.2% and 73.9% ( $p>0.05$ ) for OSA; and 35.8% and 21.4% ( $p>0.05$ ) for HLD, respectively. The 1-year follow-up comorbidity remission rates for Group I and Group II were 57.6% and 48.3% ( $p>0.05$ ) for T2DM; 37.7% and 25.0% ( $p>0.05$ ) for HTN; 88.4% and 89.1% ( $p>0.05$ ) for OSA; and 39.6% and 39.1% ( $p>0.05$ ) for HLD, respectively. Of the 723 patients, 555 underwent SG and 168 underwent RYGB.

**Conclusion:** In our study, preoperative BMI did not have a significant role in postoperative comorbidity remission rates. Future studies should investigate the effect of other factors such as disease severity and duration.

**P626**

**An Initial Assessment of Pre-operative Coagulation Studies on the First 50 Patients in the Bariatric Program and Their Outcomes at Eastern Health St. John's, Newfoundland**

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Over the past 4 years there have been several bariatric surgeries cancelled secondarily to abnormal pre-operative test results within Eastern Health. These surgeries are often cancelled the day before their scheduled surgery, which does not provide sufficient time to book other patients. The end result is that the OR gets underutilized and the bariatric surgery waitlist grows.

Prior to any major surgery patients are often subjected to a routine screening process, which includes a history and physical along with diagnostic screening tests and screening blood work. A preliminary analysis was done of the first 50 patients through the bariatric surgery program at Eastern Health assessing the coagulation study results and outcomes.

Analysis showed that out of the first 50 patients 2% were found to have a history of bleeding, 10% were using anticoagulants preoperatively, another 2% were noted to have a family history of bleeding. In the preoperative blood work that was done, 30% were found to have an elevated PTT/ INR for which hematology ended up being consulted in 4% of the patients. Overall this did not change the preoperative management of these patients and they went on to have their surgery. Intraoperatively 1 patient was noted to have excessive bleeding and this was found not to be associated with any preoperative elevation in their coagulation studies or family history of bleeding disorders. Post operatively there was bleeding in 1 patient which required transfusion, however this too was found not to be associated with any preoperative elevation in their coagulation studies or family history of bleeding disorders.

Overall this initial analysis showed no difference in operative management or delay in surgery secondarily to abnormal preoperative assessment findings. Further analysis of a larger population of the bariatric surgery program patients is needed in order to determine whether any changes should be made to the preoperative assessment protocol.

**P627**

**Is Discharge Within 1 Day After Gastric Bypass Safe? Results of a Propensity-Matched Analysis from the MBSAQIP Participant Use File**

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**Introduction:** As Roux-en-Y gastric bypass (RYGB) procedures have become safer, postoperative length of stay (LOS) has decreased. Reducing LOS must be balanced by the risks of developing or recognizing postoperative complications outside of a hospital setting, and the risks of readmissions. The national average length of stay after LRYGB is 2.2 days (i.e. being discharged on POD#2), but single institution studies have shown that shorter hospital stays after surgery is safe. The MBSAQIP captures data on all cases performed at participating centers with clinically rich, standardized data collected by audited and trained clinical reviewers. A Participant Use File with patient-level 30-day postoperative outcomes from calendar year 2015 is now available. The objective of this study was to analyze the 30-day postoperative outcomes for patients who were discharged within 1 day after LRYGB, compared to patients who were discharged later.

**Methods:** Patients were categorized within two groups: those discharged within one day after surgery (POD#1 or less) vs those discharged 2–3 days after surgery (POD#2–3). Patients with LOS>3 days were excluded to minimize confounding. Patient characteristics, intraoperative data, and 30-day postoperative outcomes were analyzed with univariate analyses. Propensity matched modeling was done matching on the characteristics of patients discharged on POD#1 earlier.

**Results:** 45,368 nonemergent primary RYGB were performed in 2015. 37,647 (83.0%) were discharged within 3 days of surgery, of which 10,988 patients (24.2% of total) were discharged on POD#1 or earlier and 26,659 patients (58.8% of total) on POD#2–3. Unadjusted postoperative outcomes reveal decreased readmissions in the POD#1 or less group (4.75% vs 6.04%;  $p<0.001$ ), as well as fewer major complications (3.15% vs 4.54%;  $p<0.001$ ). Propensity-matched cohort analysis showed that rates of readmissions in the POD#1 or less group remained lower (4.74% vs 5.75%;  $p=0.004$ ), as did rates of major complications (3.13% vs 4.60%;  $p<0.001$ ).

**Conclusion:** This propensity-matched analysis of patients at MBSAQIP accredited centers reveals that early discharge after LRYGB is now being performed regularly (27% of the time), and is safe in appropriately selected patients. Major complication rates and readmissions rates were actually decreased in patients discharged within one day. This suggests that surgeons who discharge patients by POD#1 are identifying the right patients with an appropriate early postoperative course to discharge within one postoperative day. It does not imply that all patients should be discharged on POD#1, or that early postoperative signs, symptoms or studies should be ignored in making the decision for discharge.

**P628****Comparison of Standard and Long Alimentary Limbs in Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass for Weight Loss**

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**Introduction:** Conversion of sleeve gastrectomy (SG) to Roux-en-Y gastric bypass (RYGB) may be performed either as a planned second stage operation, or as a revisional procedure for weight recidivism. In this setting, the role of a longer alimentary limb in promoting weight loss and reducing comorbidities has not been well established.

**Methods and Procedures:** After IRB approval, patients undergoing conversion of SG to RYGB for weight related issues from 2007 to 2016 were identified. Conversions due to SG complications was excluded. Standard RYGB had a 150-cm alimentary limb, while long limb bypass (LL RYGB) had a 200, 250, 300 or 350-cm alimentary limb. Decision on the alimentary limb length was made by individual surgeon. Demographics, weight loss profile, comorbidities and nutritional status were retrieved and analyzed.

**Results:** Thirty-nine patients meeting the criteria were identified. Seventeen patients underwent standard RYGB, and 22 underwent LL-RYGB. Average time between SG and RYGB was 21 months in the standard group, and 29 months in the long limb group. In the standard RYGB group, average weight and BMI at the time of SG and RYGB were 172 kg, 61 kg/m<sup>2</sup>, and 142 kg, 50 kg/m<sup>2</sup>, respectively. In the LL-RYGB group, average weight and BMI at the time of SG and RYGB were 188 kg, 65 kg/m<sup>2</sup>, and 151 kg, 53 kg/m<sup>2</sup>, respectively. There was no statistical difference between the 2 groups. Absolute weight loss and EWL% for the standard RYGB group were 19 kg and 32% at 6 months and 26 kg and 37% at 1 year follow up. For the LL-RYGB group, they were 17 kg and 22% at 6 months, and 17 kg and 23% at 1 year. Of the 9 standard and 10 LL RYGB patients who still had either diabetes or hypertension at the time of RYGB, 5/9 (56%) and 3/10 (30%) had improvement or resolution of diabetes or hypertension at follow up. Among those with laboratory values available, 64% of standard RYGB and 60% of LL-RYGB patients had postoperative iron deficiency, vitamin D deficiency or both. One patient who had a 250-cm alimentary limb suffered from Wernicke's encephalopathy due to severe thiamine deficiency.

**Conclusion:** When converting from SG to RYGB, an alimentary limb >150 cm may not offer additional benefits in weight loss or resolution of weight related comorbidities. Longer alimentary limbs may also be associated with severe nutritional deficiencies.

**P629****Does Depression Affect Cardio-Metabolic Outcomes in Bariatric Patients?**

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**Introduction:** Patients undergoing bariatric surgery frequently present with various obesity-related psychiatric comorbidities, including depression. Furthermore, previous literature has demonstrated a positive association between depression and cardiovascular disease, and obesity serves as an independent risk factor for cardiovascular disease. However, the relationship between preoperative depression and cardio-metabolic risk factors following bariatric surgery remains unknown.

**Methods and Procedures:** This retrospective analysis utilized data obtained from patients (n=2,420) who underwent bariatric surgery at a single academic medical center in California. Patients underwent either laparoscopic Roux-en-Y gastric bypass or sleeve gastrectomy. Using medical record data, patients were preoperatively categorized as follows: not depressed, history of depression but not currently on anti-depressive medication, and history of depression and presently taking anti-depressive medication. Patient demographic characteristics were obtained preoperatively. Clinical and biochemical risk factors for cardiovascular disease were evaluated preoperatively and 6 and 12 months following bariatric surgery. ANOVA, Kruskal-Wallis, and Chi-square tests were applied where appropriate.

**Results:** In this sample, 59% of patients were not depressed, 21% had a history of depression but were not taking anti-depressive medication preoperatively, and 20% had a history of depression and were taking anti-depressive medication preoperatively. At baseline, depressive history was positively associated with female sex ( $p<.0001$ ), older age ( $p<.0001$ ), White race ( $p<.0001$ ), Medicare insurance ( $p<.0001$ ), previous abdominal surgery ( $p<.0001$ ), length of stay ( $p<.0001$ ), requiring an inferior vena cava filter ( $p=.009$ ), total cholesterol ( $p<.0001$ ), and triglycerides ( $p=.003$ ). On average, patients with a history of depression taking anti-depressive medication weighed less than patients with a history of depression not on medication and patients without depression preoperatively ( $p=.002$ ) and 6 ( $p=.024$ ) and 12 ( $p=.004$ ) months after surgery. After six months of follow-up, preoperative depressive history was positively associated with total cholesterol ( $p=.039$ ), triglycerides ( $p<.0001$ ), HbA1c ( $p=.039$ ), and fasting serum concentrations of insulin ( $p=.017$ ). After 12 months of follow-up, preoperative depressive history was positively associated with higher levels of total cholesterol ( $p=.013$ ), LDL cholesterol ( $p=.021$ ), and triglycerides ( $p=.016$ ).

**Conclusion:** A history of depression prior to surgery was associated with higher levels of total cholesterol and triglycerides at baseline and 6 and 12 months postoperatively. After 12 months, preoperative depressive history was also associated with higher levels of LDL cholesterol. This study suggests that, on average, bariatric patients with comorbid depression have worse lipid profiles prior to—and up to one year after—bariatric surgery relative to counterparts without depression.

**P630****Patients and Operative Risk Factors for Anastomotic Leak After Roux-en-Y Gastric Bypass**

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**Introduction:** Anastomotic leak is one of the most morbid complications of Roux-en-Y gastric bypass (RYGB), yet its risk factors are ill-defined due to the rarity of the complication. We aim to identify both patient- and operative-level risk factors for anastomotic leak after RYGB using a national clinical database.

**Methods:** A retrospective cohort study was performed using the 2015 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database. All adult patients who underwent laparoscopic or open RYGB were included. Multivariate logistic regression models were used to identify patient- and operative-level variables associated with development of anastomotic leakage. Clinically relevant anastomotic leakage is defined as those that required readmission, intervention, or reoperation.

**Results:** Of the 45,109 patients who underwent RYGB, 194 (0.43%) patients experienced anastomotic leak. Of these, 145 (74.7%) required reoperation and 3 (1.6%) patients died. Risk factors included limited preoperative ambulation (OR 2.28, 95% CI 1.11–4.66,  $p=.02$ ), previous foregut surgery (OR 2.4, 95% CI 1.60–3.61,  $p<.01$ ), chronic steroids use (OR 2.59, 95% CI 1.17–5.73,  $p=.02$ ), conversion procedure (OR 4.84, 95% CI 2.21–10.62,  $p<.01$ ), re-do procedure (OR 1.91, 95% CI 1.31–2.78,  $p<.01$ ), and prolonged operative time (OR 1.79, 95% CI 1.32–2.41,  $p<.01$ ).

**Conclusions:** Anastomotic leak is a rare but morbid complication, frequently requiring reoperation. Most identified risk factors appeared to be unmodifiable. Accurate risk stratification is paramount in helping the patient make an informed decision when choosing to undergo bariatric surgery.

**P631****Gastric Band Around Bypass: Should We Recommend?**

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**Introduction:** Weight regain following an initially successful gastric bypass is highly frustrating for the motivated patient. Beginning in 2011, our bariatric surgery practice began seeing patients who had weight regain following gastric bypass. Some of those patients were offered gastric band placement around their gastric pouch.

**Methods:** This is a retrospective review of the 13 sequential gastric bands around gastric bypass patients that were performed between 2011 and 2017 at Cone Health, Wesley Long by Central Carolina Surgery, PA.

**Results:** Thirteen patients underwent placement of a gastric band around their gastric bypass in years 2011 through 2017 at an average 9.5 years after their original bypass. Three patients had a prior open gastric bypass and the rest had been performed laparoscopically and all were single limb Roux en Y. Four of the patients had their original surgery in our group and nine came from elsewhere in the U.S.A. Motivating factors included comorbidity management and one patient needed to achieve weight loss to qualify for a kidney transplant. All patients underwent UGI or endoscopy to assess their pouch and had psych and dietary evaluations. The average age at the time of revision was 49 years (38–69) with an average BMI of 43. The pas flaccida technique was used and the anterior plication was done with the remnant stomach in 12 patients and one patient's pouch was used to plicate. Three patients had posterior crural repairs for hiatal hernias. All procedures were completed laparoscopically and patients were kept overnight for observation. There were no mortalities. First band fills were performed at 6 weeks. The average for follow-up of the group is 2 years with average weight loss of 40 lbs. Overall these patients were not as compliant with follow-up as band only patients. Two of the bands were removed. One had too much weight loss (BMI 18) with severe dysphagia and the other had evolving motility issues and worsening GERD. The patient with ESRD did qualify for transplant but is lost to follow-up. The patient who lost 135 lbs. and had her band removed for severe dysphagia has since regained all of her lost weight.

**Conclusion:** Gastric banding can be performed with low risk to the patient with weight regain after gastric bypass. Sustained weight loss enhancement is marginal. These results do not support recommending this procedure to patients that have weight regain after gastric bypass.

**P632****High Incidence of Hyperammonemia Consistent with Ornithine Transcarbamylase Deficiency After Bariatric Surgery**

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**Introduction:** Hyperammonemia secondary to Ornithine Transcarbamylase (OTC) deficiency is a rare and potentially lethal disorder. The prevalence of OTC deficiency is reported to be 1:14,000 to 1:70,000 in the general population. OTC deficiency has been reported in patients presenting with neurological symptoms after Roux-en-Y gastric bypass (RYGB), and less than 30 cases have been reported in the literature. The aims of this study are to examine the apparent incidence of this uncommon disorder in patients after bariatric surgery and to examine potential predictors of mortality.

**Methods and Procedures:** This is a single center, retrospective study in a large, urban teaching hospital of post-bariatric surgery patients who developed hyperammonemia from January 2012 to August 2017. Elevated plasma ammonia with an elevated urinary orotic acid level is accepted as consistent with a diagnosis of OTC deficiency. All patients in our program are instructed on a post-operative diet containing 60 grams/day of protein. Descriptive and correlative statistics are calculated for all variables.

**Results:** Between January 2012 and August 2017, 1597 bariatric surgical procedures were performed at this single medical center. Seven women with neurological symptoms had plasma ammonia levels above the upper limit of normal range. Their average BMI is 45 kg/m<sup>2</sup>. Two patients underwent vertical sleeve gastrectomy (VSG), 1 underwent VSG with duodenal switch, and 4 underwent RYGB. All patients were hospitalized. The mean peak plasma ammonia level is 142 μmol/L (range: 57–235). The mean urinary orotic acid level is 3.3 mmol/mol creatinine (range: 1.6–7.9). There were 2 patients with no orotic acid level checked, secondary to demise. No patient had clinical features or findings of progressive hepatic failure. There are four mortalities (57.1%). Serum folate and peak lactic acid levels are predictors of mortality with p-values of 0.048 and 0.006 respectively. The apparent incidence of OTC deficiency is 1:319 in post-operative patients.

**Conclusions:** In our post-operative population, hyperammonemia results in a high mortality. Its apparent incidence, secondary to OTC deficiency, amongst bariatric surgery patients is higher than that reported in the general population. Since OTC deficiency is identified after multiple bariatric surgical procedures, further investigation will be important to examine potential mechanisms for its development which may include a genetic predisposition (possibly triggered by nutritional deficiencies), upper gut bacterial overgrowth (supported by elevated serum folate levels), or preexisting, subclinical hepatic dysfunction.

**P634****Acute Kidney Changes Following Laparoscopic Sleeve Gastrectomy**

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**Introduction:** Obesity is an independent risk factor for kidney disease, with as much as 40% of patients undergoing bariatric surgery having some degree of kidney function impairment. In the acute postoperative setting, acute renal injury (AKI) occurs in approximately 1–5% of all hospitalized patients increasing the overall morbidity and mortality. Most studies have assessed the acute renal changes in Roux-en-Y gastric bypass, with scarce evidence regarding Laparoscopic Sleeve gastrectomy. The aim of our study is to determine the incidence of AKI following Laparoscopic sleeve gastrectomy and to describe the acute renal function changes in the first 48 hours after surgery.

**Methods:** We retrospectively reviewed all patients that underwent Laparoscopic Sleeve Gastrectomy (LSG) at our institution from 2010–2015. Common demographics and comorbidities were collected as well as creatinine, preoperatively and up to 48 hours after surgery. The renal function was calculated using the CKD-EPI formula, derived and validated by Levey et al. Acute kidney injury was defined as an increase in serum creatinine by ≥0.3 mg/dL within 48 hours after surgery. All tests were two-tailed and performed at a significant level of 0.05. Statistical software R, version 3.3.1 (2016-06-21) was used for all analyses.

**Results:** Of the 1330 patients reviewed, 16.99% (n=226) patients were identified. The average age was 53.73±12.53 years with 67.3% (n=152) females and 81% (n=189) Caucasians. The incidence of Diabetes Mellitus (DM) and Hypertension (HTN) was 57.96% (n=131) and 50.44% (n=114) respectively. Chronic kidney disease Stage ≥2 (GFR <90ml/min/1.73 m<sup>2</sup>) was found in 41.15% (n=93) of our population. At 48 hours follow-up, levels of creatinine decreased 0.11 mg/dL and the glomerular filtration rate increased 8.4 ml/min showing an improvement in renal function. Patients with preoperative CKD stage ≥2 were found to have a greater decrease in creatinine when compared to normal renal function patients (0.16±0.42 versus 0.076±0.93 P<0.015) and this is reflected as an increase in GFR (19.64±27.12 vs 5.53±8.92 ml/min respectively P<0.001). The overall incidence of acute kidney injury was 1.76% (n=4), all patients having an impaired renal function at baseline and no patients in the normal renal function group developing AKI (Table 1).

**Conclusion:** The impact of Laparoscopic Sleeve Gastrectomy in renal function is evident within the first 48 hours after surgery. Patients undergoing LSG, especially patients with baseline Chronic Kidney Disease Stage ≥2 are at increased risk of developing acute kidney injury in the perioperative setting, special attention has to be made in this category of patients.

Table 1. Comparison between patients with CKD≥2 and normal GFR at 48 hours after surgery.

Difference at 48hrs	CKD≥2 (n=93)	Normal GFR (n=133)	P-Value*
Serum Creatinine (mg/dL)	-0.16±0.42	-0.076±0.93	0.015
GFR (ml/min/1.73m <sup>2</sup> )	19.64±27.12	5.53±8.92	<0.001
Acute kidney injury	4.3% (n=4)	0.0% (n=0)	+
%EBMIL at 12 months	60.50±24.01	80.86±55.21	0.001

Mean±Standard Deviation. CKD= Chronic Kidney Disease. GFR=Glomerular Filtration rate. Stage≥2 = GFR <90ml/min/1.73m<sup>2</sup>. \*T-Test

**P633****Drain Placement in Primary Bariatric Surgery: Helpful or Hindrance?**

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**Introduction:** The use of closed suction drains is associated with poor outcomes in many anastomotic operations and routine use is not recommended. In this context, intraoperative drain placement for primary bariatric surgery remains controversial. Recent studies demonstrate that drains confer no benefit to patients; however, data are limited to descriptive single center experiences with low sample size. In order to characterize this practice gap, and implement evidence based recommendations, we sought to evaluate the use of closed suction drain and outcomes following primary bariatric cases using the MBSAQIP registry.

**Methods:** We used data from the 2015 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) public use file for patients who underwent a non-revisional laparoscopic roux-en-Y gastric bypass (RYGB), laparoscopic sleeve gastrectomy (LSG), or laparoscopic adjustable gastric banding (LAGB). We excluded patients with ASA status greater than 3 or conversion to an open procedure. We analyzed demographics, preoperative comorbidities, procedure type for patients who did and did not undergo drain placement. Adjusted rates of postoperative complications and mortality were then compared based on receipt of postoperative drain placement.

**Results:** Of the 141,404 included patients who underwent laparoscopic bariatric surgery, 33,618 (23.8%) underwent intraoperative drain placement. Drains were more often placed in patients who underwent LRYGB, were older, had higher preoperative BMI, had higher preoperative ASA status, and had more comorbid conditions. After patient level risk adjustment, there was no difference in rates of leaks requiring intervention (0.32% versus 0.26%, p=0.065) or mortality (6.5% versus 5.4%, p=0.206) for patients with and without drains. In patients who underwent drain placement, there were higher rates of transfusion (9.2% versus 5.6%, p<0.001), reoperations for bleeding (0.30% versus 0.18%, p<0.001), all reoperations (4.8% versus 3.9%, p<0.001), and surgical site infections (SSI) (1.0% versus 0.6%, p<0.001).

**Conclusion:** Our analysis demonstrates that nearly one quarter of all laparoscopic bariatric surgery patients undergo drain placement. We found that drain placement is more common in preoperatively higher risk patients and following higher complexity procedures as suggested by associated increased rates of transfusion and reoperations for bleeding. We found no benefit to drain placement in terms of interventions for clinically significant leaks or mortality. Finally, patients who underwent drain placement were more likely to develop SSI suggesting routine placement is not without risk. Although further prospective studies are warranted, our analysis demonstrates that drains have the potential for harm with minimal protective benefit for patients after primary bariatric surgery.

**P635****Laparoscopic Sleeve Gastrectomy for Patients with Metabolic Disease**

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**Objective:** To evaluate laparoscopic sleeve gastrectomy (LSG) to treat the patients suffering from metabolic disease.

**Methods:** Thirty-two patients suffering from metabolic disease were selected to undergo LSG surgery and were enrolled at Beijing Shijitan Hospital between January 2012 to January 2017. The body mass index (BMI), fasting plasma glucose (FPG), glycosylated hemoglobin (HbA1c), serum triglyceride, serum cholesterol and blood pressure of all patients were measured before and at 6 months after surgery. The results were collected and analyzed.

**Results:** 32 patients suffered from metabolic disease underwent LSG surgery successfully (a mean age of 34 years), 12 were male and 20 were female. All of 32 patients suffered from obesity and the mean BMI of them was 40.61±7.66 kg/m<sup>2</sup> before surgery. Among them, 19 patients had type 2 diabetes mellitus (T2DM), 23 patients had hypertriglyceridemia (HTG), 7 patients had hypercholesterolemia (HC) and 16 patients had hypertension. The mean BMI of 32 patients at 6 months after surgery was 30.78±5.51 kg/m<sup>2</sup> and decreased significantly (P<0.05). The mean excess weight loss (EWL%) of 32 patients was 68.97%±26.68% (17% ~ 120%) at 6 months after surgery. The average levels FPG, HbA1c of 19 T2DM patients at 6 months after surgery were 6.52±2.15 mmol/L, 6.89%±1.34% and were lower than those before surgery (3.54±2.01 mmol/L, P=0.000, 1.30%±0.88%, P=0.000). The average serum triglyceride of 23 HTG patients decreased significantly at 6 months after surgery compared that before surgery (2.44±0.67 mmol/L vs. 1.62±0.40 mmol/L, P=0.000). The mean serum cholesterol of 7 HC patients at 6 months after surgery was lower than that before surgery (0.82±0.67 mmol/L, P=0.000) and was in normal range. The blood pressure of 16 hypertensive patients recovered to the normal range at 6 months after surgery. 32 patients were followed up for 6 ~ 28 months, an average period of 14 months. No major complication was found in all patients.

**Conclusions:** This research concludes that LSG is safe and effective to treat the patients who suffered from metabolic disease including obesity, T2DM, HTG, HC and hypertension. The further studies with larger samples are needed.

**Keywords:** Sleeve gastrectomy, Obesity, Type 2 diabetes, Hypertension, Hyperlipidemia.

**P636****The Risk of Developing Atrial Fibrillation Decreases After Rapid Weight Loss Following Bariatric Surgery**

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**Introduction:** The relationship between obesity and atrial fibrillation (AF) has been previously established in the literature. Both conditions have been identified as major global epidemics associated with increased mortality and morbidity. Overweight populations have a higher incidence, prevalence, severity, and progression of AF. Furthermore, subjects with AF have markedly reduced survival compared with subjects without AF. Our goal in this study is to determine the impact of bariatric surgery on the risk of developing Atrial Fibrillation.

**Methods:** We retrospectively reviewed all patients who underwent bariatric surgery at our institution from 2010 to 2015. Common demographics and comorbidities were collected, along with electrocardiograms readings preoperative and at 12 months follow-up. The risk was calculated based on previous criteria published by Schnabel RB, et al. All tests were two-tailed and performed at a significant level of 0.05. Statistical software R, version 3.3.1 (2016-06-21) was used for all analyses.

**Results:** Of the 1330 patients reviewed, 3.6% (n=48) patients met the criteria for inclusion; Females and Caucasians composed 54.2% (n=26) and 72.9% (n=35) of our population respectively. Diabetes was present in 68.8% and Hypertension in 66.7% of our patients. Laparoscopic Sleeve gastrectomy (50% n=24) and Laparoscopic Roux-en-Y gastric bypass (50% n=24) were the two types of surgeries done in our population. The risk of developing atrial fibrillation was calculated preoperatively and found a 7-fold higher risk in females and 4-fold greater risk in males when compared with the ideal risk for each category. At 12 months follow-up the preoperative risk was  $11.14 \pm 15.45\%$  with an absolute risk reduction of 2.03% corresponding to a relative risk reduction of 18.22% with males having a more significant change at 12 months follow-up. These findings and the electrocardiographic changes at 12 months follow-up are better described in Table 1. The percentage of estimated BMI loss in our population was 51.1% at 12 months follow-up.

**Conclusion:** Patients undergoing bariatric surgery have a significantly higher risk of developing atrial fibrillation when compared to the ideal risk. Furthermore, bariatric surgery demonstrated to be effective in decreasing the risk of developing Atrial Fibrillation at 12 months follow-up particularly in males. Further studies may be needed to better assess these findings.

Table 1. Electrocardiographic changes and atrial fibrillation risk

	Preoperative	12 Months Follow-up	P-value*
Age (years)	57.74 ± 11.61		
SBP (mmHg)	128.77 ± 15.56	127.69 ± 18.52	0.710
DBP (mmHg)	75.53 ± 9.43	73.86 ± 10.94	0.312
BMI (kg/m <sup>2</sup> )	42.60 ± 10.27	31.81 ± 7.04	<0.0001
%ΔEBMIL		51.10%	
Atrial fibrillation risk (%)	11.14 ± 15.45%	9.11 ± 13.42%	<0.0001
Female risk (%)	7.22 ± 15.22	6.44 ± 13.97	0.1974
Ideal female risk (%)	0.99		
Male risk (%)	15.78 ± 14.72	12.26 ± 12.32	0.0003
Ideal Male risk (%)	4.68		
Heart rate (bpm)	73.89 ± 13.87	68.53 ± 14.12	0.022
PR Interval (ms)	166.13 ± 26.30	165.23 ± 27.01	0.669
QRS complex (ms)	89.83 ± 9.81	91.23 ± 13.13	0.436
QT interval (ms)	391.15 ± 31.29	400.81 ± 35.88	0.072
Heart murmur	2.08% (n=1)		
Prevalent heart failure	10.41% (n=5)		

Mean±standard deviation. SBP= Systolic blood pressure, DBP= Diastolic blood pressure, %ΔEBMIL= Percentage of estimated BMI loss. Percentage (n-number). \*Paired T-Test. Ideal risk= Comparative Risk for a person of the same age and gender with BMI 20–24.9, Normal SBP (120–129), No Treatment for HTN, PR Interval 160, No significant murmur or prevalent heart failure.

**P637****Evaluation of the Rate of Anastomotic Ulcer Formation After Gastric Bypass Surgery Using the MBSAQIP Database**

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**Background:** Anastomotic ulcer formation is a common problem after gastric bypass. The rate of ulcer formation after surgery is different for each surgeon and surgical technique also seems to make a difference. The MBSAQIP database contains data from all US Centers of Excellence including complication rates.

**Methods:** We queried the MBSAQIP database for the year 2015. This database includes patients that underwent metabolic or bariatric surgery and reports 30 day outcomes.

**Results:** There are a total of 168,093 patients in the 2015 MBSAQIP database. Among this cohort, 53,255 patients had undergone gastric bypass. After implementing eligibility criteria, a total of 44,379 patients were included in the analysis (excluded patients due to repeat procedures 8,821 and age <18). The average age and BMI of the included subjects in this study were 45 years and 45.9 kg/m<sup>2</sup> respectively with majority being females (80%).

The incidence of ulcer in entire cohort was 155 of 44,379 (0.35 %, 95%CI: 0.297%, 0.409%). Among 155 patients with ulcer, 88 (57%) patients had only one procedure, 69 had an intervention (therapeutic or diagnostic endoscopy), 16 had readmission and 3 had reoperation. Sixty five (42%) patients had two procedures with the majority having both readmissions and endoscopy (n=59); and 2 patients had 3 (1%) procedures. The incidence of readmission, intervention and reoperation within 30 days were 6.5%, 2.8% and 2.6% respectively. Ulcer formation was most common in intervention group (11.4%) followed by readmission group (4%) and reoperation group (1.5%). The most common post-operative complications were unplanned ICU admissions 597 (1.4%) followed by transfusions (n=538, 1.2%), post operative UTI (n=211, 0.48%), and pneumonia (n=193, 0.43%). The occurrence of ulcer was associated with unplanned ICU admissions (6.45%), transfusions (5.16 %), post operative UTI (3.87%), sepsis (1.94%) and myocardial infarction (0.65%).

Death occurred in 76 patients with no related cases to marginal ulcers. The risk of ulcer was associated with increased BMI (OR=1.02, p=0.01), presence of percutaneous transluminal cardiac catheterization (PTC) (2.17, p=0.038), histories of DVT (1.72, p=0.085) and PE (2.84, p=0.002).

**Conclusions:** In a nationally reported database, anastomotic ulcer seems to occur rarely in the first month. The large majority are diagnosed and treated endoscopically with minimal need for surgical intervention. The risk of anastomotic ulcer was increased with increased BMI, DVT, PTC, and DVT/PE.

**P638****Hiatal Hernia Repair Prior to Sleeve Gastrectomy Is Superior When Compared to Hiatal Hernia Repair with Sleeve Gastrectomy and Comparable to Gastric Bypass for Treatment of Preoperative GERD**

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**Background:** The Sleeve Gastrectomy (LSG) is the most popular procedure worldwide to treat obesity. Among those that are obese, GERD has a prevalence of 39.8 percent. Many surgeons do not perform LSG in these patients because only 34.6 percent of symptomatic patients showed resolution of GERD-like symptoms after concomitant sleeve gastrectomy with hiatal hernia repair. Many surgeons perform the gastric bypass on GERD patients with hiatal hernias because they believe its superior for the resolution of GERD. When they do this they overlook the many long term complication associated with gastric bypass. Also, many patients do not want the gastric bypass under any circumstances. Surgeons need to be open to finding better way to reduce the high recurrent rates of GERD after LSG.

**Materials and Methods:** This is a single institution, multi-surgeon, retrospective study involving 73 morbidly obese patients in a prospectively kept data base from January of 2015 through July of 2017. These patients all had GERD with preoperatively identified hiatal hernias on EGD. All patients were dependent on anti-reflux medications. There were 9 (12.4%) males and 64 (87.6%) females. BMI ranged from 35 to 63. Hiatal hernias measured from 2 cm to 8 cm.

All LSG patients received a primary crural closure, with or without Gore Bio A mesh placement, at least 6 weeks prior to the sleeve gastrectomy. Post-operatively, patients were interviewed for GERD symptomatology and anti-reflux medication dependency.

**Results:** Of the 73 patients, 53 (72.60%) patients had resolution of GERD-like symptoms and off all anti-reflux medications after the staged hiatal hernia repair and sleeve gastrectomy. 13 patients (17.80%) had improvement of GERD but still dependent on anti-reflux medication. 7 patients (9.60%) had no resolution or improvement of GERD. There was one post-operative complication of laryngospasm with pulmonary edema status post extubation. There were no mortalities in the series.

**Conclusions:** In this study, staged hiatal hernia repair, at least 6 weeks prior to sleeve gastrectomy, doubled the published rate of GERD resolution from 34% to 73%. 90% showed improvement in symptoms at one year. This rate is comparable to GERD resolution after gastric bypass. This may be an alternative approach to hiatal hernias in the morbidly obese patient with gastroesophageal reflux disease who do not want a gastric bypass.

**P639**

### **Does Technique Matter? Transabdominal Versus Transoral Methods of Circular Stapled Gastrojejunostomy in Roux-en-Y Gastric Bypass**

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**Background:** Bariatric surgery is a common procedure in general surgery. Gastric bypass has been performed laparoscopically for over two decades and multiple techniques are described. The circular stapled anastomosis, one of the earliest methods for gastrojejunostomy, is performed in two ways: a transoral method to introduce the anvil and a transabdominal approach developed later. The former technique requires passing the anvil of the circular stapler through the mouth, down the esophagus, and into the gastric pouch. In the latter method, a gastrotomy is made, the anvil is introduced, and the gastrotomy is stapled off, creating the gastric pouch. This study aims to objectively compare the two methods of circular stapled gastrojejunostomy in terms of surgical site infection (SSI) rate.

**Methods:** A retrospective chart review of patients undergoing laparoscopic roux-en-y gastric bypass with one of two surgeons at a bariatric center of excellence in an academic hospital from January 1, 2016 through December 31, 2016 was completed. Data regarding surgical technique, patient demographics, and postoperative complications was collected and maintained in a secure database. T-test, chi-square, and X software were used for analyses where appropriate;  $p<0.05$  was considered significant.

**Results:** A single surgeon performed 51 procedures during this time period, exclusively utilizing a transoral approach for the gastrojejunostomy; the other surgeon performed 91 procedures, exclusively utilizing the transabdominal approach. The two groups were similar with regard to patient BMI (45 versus 46 with  $p$ -value 0.2) and age (49 versus 46 with  $p$ -value 0.26).

Wound complications, including deep and superficial infections as well as seroma formation, were compared between the two groups. With the transoral anastomosis, 3 out of 50 patients formed seromas, 3 out of 50 developed deep infections, and 3 out of 50 had superficial site infections for a rate of 6% each and a total wound complication rate of 18%. In the transabdominal group, 2 out of 91 patients formed seromas, but none developed deep or superficial infections for a total wound complication rate of 2%. This was a statistically significant difference with  $p$ -value <0.001.

**Conclusions:** At this point in the evolution of the roux-en-y gastric bypass, both the transoral and the transabdominal methods are acceptable; however, our study suggests that the transabdominal approach may result in significantly fewer surgical site infections and overall wound complications. Therefore, the results of this study lead to the conclusion that a transabdominal method of circular stapled gastrojejunostomy is superior.

**P640**

### **Laparoscopic Gastric Sleeve Size: Does It Matter?**

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**Introduction:** Laparoscopic sleeve gastrectomy (LSG) has become the most commonly performed procedure in the treatment of morbid obesity, but there is significant variability in its performance. From national database analysis, more restrictive sleeve construction, based on smaller bougie size, has not correlated with greater weight loss. We hypothesize that bougie size is not reflective of actual restriction, or that sleeve restriction does not correlate with weight loss. We performed qualitative and volumetric analysis of immediate post-sleeve contrast studies to determine the association of sleeve restriction with post-operative weight loss and complications.

**Methods:** Between 2010 and 2015, 222 patients underwent immediate post-sleeve contrast studies. Based on standardized vertebral body height assessment by preoperative chest radiograph, sleeve diameter at intervals (including the narrowest point) was measured in mm, and the volume above the narrowest point of the sleeve was calculated. Sleeve shape was assumed as dual-tiered or simple truncated cone based on morphology. Sleeve restriction, morphology and volumetric analysis were associated with clinical outcomes including complications, post-op symptoms, and weight loss at 6 months.

**Results:** The narrowest point of the sleeve was of mean diameter  $8.20 \text{ mm}^3$ , ( $\pm 4.1 \text{ mm}^3$ ). Sleeve restriction was not associated with bougie size (36 Fr,  $7.25 \text{ mm}^3$  vs 42 Fr,  $8.43 \text{ mm}^3$ ;  $p=0.15$ ). There were 13 readmissions (6.8%); readmission was not associated with narrowest point diameter or sleeve volume ( $p=\text{NS}$ ). Obstructive symptoms including reflux occurred in 37%; obstructive symptoms were not associated with sleeve volume ( $19.2 \text{ cm}^3$  with vs  $19.1 \text{ cm}^3$  without;  $p=0.92$ ), narrowest point diameter, or sleeve morphology. The mean total body weight loss at 6 months post-op was 30.3%. Neither narrowest point diameter, sleeve volume, nor sleeve morphology correlated to weight loss at 6 months ( $p=\text{NS}$ ). Overall complications and readmission rate did not correlate with sleeve morphology.

**Conclusions:** Overall, sleeve volume and restriction does not seem to have an impact on reflux symptoms, weight loss at 6 months, or readmission. We also see no association between bougie size and restriction created or complication rate. This brings to question the importance of sleeve size and overall morphology when performing laparoscopic sleeve gastrectomy.

**P641**

### **Variability in Cost for Laparoscopic Sleeve Gastrectomy: A National Analysis**

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**Objective:** Determinants of cost for laparoscopic sleeve gastrectomy (LSG) are poorly defined. We aim to characterize the variability in cost for LSG at the national level and identify which factors are predictive of increased cost.

**Methods:** Using the University HealthSystems Consortium database, we identified 22,035 patients who underwent LSG between 2012–2014. Patients were grouped into tertiles (low, medium, high) according to cost of perioperative stay.

**Results:** Patients undergoing LSG were of similar age and gender across all three groups. High cost patients were more often black (26.7% vs. 22.3% vs. 18.3%,  $p<0.01$ ), insured by Medicare/Medicaid (33.8% vs. 25.5% vs. 19.9%,  $p<0.01$ ) and diagnosed with increased severity of illness (48.3% moderate/major vs. 40.1% vs. 34.3%,  $p<0.01$ ) compared to medium and low cost patients. Although high cost patients were shown to have clinically similar lengths of stay (2 days vs. 2 vs. 2), these patients had higher 30-day readmission rates (5.3% vs. 3.4% vs. 3.1%,  $p<0.01$ ). Interestingly, low cost patients were more often operated on by high volume surgeons (40.3% vs. 34.1% vs. 29.7%,  $p<0.01$ ). On multivariate analysis, black race, government insurance, and increased severity of illness remained significant predictors of increased cost for LSG (all  $p<0.01$ ).

**Conclusion:** Variability in cost for LSGs performed at academic medical centers is significantly associated with patient factors including race, insurance status, and severity of illness. These findings support further research into risk-adjusted bundled reimbursement policies for LSG.

**P642**

### **Standardization of Surgical Technique Reduces Gastroesophageal Reflux Disease After Laparoscopic Sleeve Gastrectomy**

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**Background:** Variability in surgical technique resulting in narrowing at the incisura angularis, twisting along the staple line, and retention of the gastric fundus has been implicated in increased gastroesophageal reflux disease (GERD) following laparoscopic sleeve gastrectomy (LSG). Standardizing creation of the sleeve based on anatomic landmarks may help produce more consistent sleeve anatomy and improve outcomes.

**Methods:** A retrospective review of all patients undergoing LSG from January 2016 to November 2016 at a single institution specializing in bariatric surgery was performed ( $n=271$ ). Patients underwent either traditional LSG with use of a 40F suction bougie to guide creation of the sleeve ( $n=156$ ) or anatomy-based sleeve gastrectomy (ABS,  $n=115$ ). ABS was performed using a gastric clamp to maintain predetermined distances from key landmarks (1 cm from gastroesophageal junction, 3 cm from incisura angularis, 6 cm from pylorus) during stapling. Patient demographics, perioperative characteristics, and post-operative outcomes were compared using chi-square and student's t-tests as required.

**Results:** No significant differences in age, gender, preoperative BMI, or operative time were identified between groups (all  $p>0.05$ ). Similarly, for patients with 6 month follow up, there was no significant difference in prevalence of GERD preoperatively (ABS, 29% vs. bougie, 36%;  $p=0.364$ ). There were no intraoperative complications, reoperations, leaks, or bleeds in either cohort. No significant difference in percent excess weight loss at 6 months was found (ABS, 48.2% vs. bougie, 50.9%;  $p=0.374$ ). Overall, patients undergoing ABS had a significantly lower rate of GERD at least 6 months post-operatively compared to the bougie group (12% vs. 26%;  $p=0.037$ ). In patients without pre-operative GERD, there was no significant difference in the rates of new-onset GERD at least 6 months following LSG (ABS, 9% vs. bougie, 11%;  $p=0.659$ ). For patients with pre-operative GERD, those undergoing ABS achieved significantly higher rates of GERD resolution (ABS, 79% vs. bougie, 49%;  $p=0.030$ ).

**Conclusion:** Standardization of surgical technique by utilizing anatomic landmarks during sleeve creation significantly reduces GERD following LSG.

## P643

**Impact of Impaired Kidney Function on Cardiovascular Risk After Bariatric Surgery: A Matched Control Study**

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**Introduction:** Chronic kidney disease is an important and sometimes underestimated risk factor for cardiovascular disease. Obesity by itself has proven to be detrimental for kidney function and a major factor for cardiovascular disease. Our goal in this study is to establish the impact of impaired kidney disease in the reduction of cardiovascular risk after rapid weight loss following bariatric surgery.

**Methods:** We retrospectively reviewed all patients who underwent bariatric surgery from 2012 to 2015. We assessed kidney function using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) and cardiovascular risk using Framingham Risk Score (FRS) equation pre-operatively and at 3 and 12 months of follow-up. Our population was divided into two groups: Patients with CKD Stage  $\geq 2$  (GFR<90 mL/min) and patients with normal GFR. R version 3.3.1 statistical software was used to determine statistical significance.

**Results:** Of the 1,330 patients reviewed, 22.48% (n=299) met the criteria for CKD-EPI Glomerular filtration rate (GFR) and Framingham Risk Score (FRS) calculations. After matching, 200 patients (15.03%) were left to analyze, 70% (n=140) of which had a Laparoscopic sleeve gastrectomy. Eighty-six patients (43%) had an impaired kidney function (CKD $\geq 2$ ) (Group 1) and 114 patients (57%) had a normal GFR (Group 2). Common demographics and comorbidities after matching are described in Table 1. The mean creatinine in Group 1 was  $1.25 \pm 1.23$  mg/dL versus  $0.68 \pm 0.13$  mg/dL in Group 2 ( $P < 0.001$ ). Glomerular filtration rate was  $66.70 \pm 20.36$  mL/min in Group 1 and  $101.64 \pm 7.82$  in Group 2 ( $P < 0.001$ ). Patients with CKD $\geq 2$  had a significantly greater preoperative cardiovascular risk when compared to normal GFR patients ( $34.35 \pm 23.54$  vs  $26.58 \pm 18.22$  respectively  $P = 0.009$ ). At 12 months of follow-up, the Kidney function improved  $12.82 \pm 19.73$  mL/min in Group 1 and decreased  $5.81 \pm 9.79$  mL/min in Group 2. Furthermore, when the FRS was calculated at 12 months follow-up, patients with impaired kidney function had an absolute risk reduction of 13.05% corresponding to a relative risk reduction (RRR) of 37.3% compared to 9.59% (RRR=36.07%) ( $P = 0.053$ ) in Group 2. The percentage of estimated BMI loss was found to be similar in both groups ( $69.05 \pm 23.86$  and  $67.06 \pm 64.59$  respectively  $P = 0.786$ ).

**Conclusions:** Bariatric surgery, especially LSG, has a positive impact on kidney function particularly in patients with Chronic Kidney disease stage 2 or greater. Despite these patients having a higher preoperative cardiovascular risk, they showed similar risk reduction when compared to patients with normal kidney function at 12 months of follow-up.

**Table 1.** Baseline demographics and characteristics of patients with CKD $\geq 2$  and normal GFR after matching

	CKD $\geq 2$ (N=86)	Normal GFR (N=114)	P value*
Age(years)	$59.67 \pm 8.48$	$57.86 \pm 6.223$	0.082
Gender: Female	65.12% (n=56)	66.67% (n=76)	0.819
Type of Surgery: LSG	70.93% (n=61)	69.30% (n=79)	0.803
Race: Caucasian	93.02% (n=80)	85.96% (n=98)	0.114
Preoperative BMI (kg/m <sup>2</sup> )	$41.48 \pm 4.26$	$41.27 \pm 5.15$	0.756
Diagnosis of Type 2 Diabetes	50.00% (n=43)	39.47% (n=45)	0.138
Diagnosis of Hypertension	72.09% (n=62)	65.79% (n=75)	0.342
SBP (mmHg)	$131.93 \pm 15.16$	$131.79 \pm 15.045$	0.948
Tobacco	38.7% (n=33)	19.29% (n=22)	0.003
Creatinine (mg/dL)	$1.25 \pm 1.23$	$0.68 \pm 0.137$	<0.001
GFR (mL/min)	$66.70 \pm 20.36$	$101.64 \pm 7.82$	<0.001
FRS (%)	$34.35 \pm 23.54$	$26.58 \pm 18.22$	0.009
Heart Age (years)	$78.91 \pm 9.82$	$76.59 \pm 10.95$	0.122

CKD $\geq 2$ : Chronic Kidney Disease Stage  $\geq 2$  (GFR<90 mL/min). Mean $\pm$ Standard deviation or Percentage(n-number). LSG: Laparoscopic Sleeve Gastrectomy. BMI: Body mass index. SBP: Systolic blood pressure. GFR: Glomerular filtration rate (CKD-EPI calculation). FRS: Framingham Risk Score. %EBMIL= Percentage of estimated BMI loss. \*Unpaired T-Test or Chi-Square.

**Table 2.** Differences between preoperative and at 12 months follow-up values.

	CKD $\geq 2$ (n=86)	Normal GFR (n=114)	P-value*
BMI (Kg/m <sup>2</sup> )	$-10.80 \pm 3.64$	$-11.08 \pm 5.02$	0.674
Creatinine (mg/dL)	$-0.24 \pm 0.477$	$0.04 \pm 0.119$	<0.001
GFR (mL/min)	$12.82 \pm 19.73$	$-5.81 \pm 9.79$	<0.001
FRS (%)	$-13.05 \pm 14.43$	$-9.59 \pm 10.66$	0.053
Heart Age (years)	$-7.661 \pm 9.46$	$-8.32 \pm 10.40$	0.634
SBP (mmHg)	$-6.62 \pm 17.4$	$-7.60 \pm 15.14$	0.672
%EBMIL	$69.05 \pm 23.86$	$67.06 \pm 64.59$	0.786

CKD $\geq 2$ : Chronic Kidney Disease Stage  $\geq 2$  (GFR<90 mL/min). SBP: Systolic blood pressure. GFR: Glomerular filtration rate (CKD-EPI calculation). FRS: Framingham Risk Score. %EBMIL= Percentage of estimated BMI loss. \*Unpaired T-Test.

## P644

**Predicting Morbidity in Roux-en-Y Gastric Bypass Patients: A Verified Scoring Tool**

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**Introduction:** We aimed to create a morbidity prediction score for patients undergoing RYGB using MBSA-QIP data.

**Methods and Procedures:** We retrospectively analyzed all RYGB cases in MBSA-QIP during 2015, and identified factors associated with 30-day complications using chi-squared analysis. Multiple logistic regression identified pre-operative factors independently associated with 30-day complication to develop a prediction score, verified using a Cochran Armitage trend test.

**Results:** For 42,849 procedures, there were 3034 (7.1%) with any 30-day complication. Preoperative patient characteristics independently associated with increased risk of morbidity are shown in Table 1. A scoring algorithm was formulated by assigning points based on strength of the odds ratio (Table 1), with the final score a summation of points accrued. The rate of any 30-day complication was evaluated across the range of scores (Table 2). Higher scores were associated with a higher rate of morbidity ( $p < 0.0001$  for each).

Parameter	OR	95% CI	p-value	Number of Points
Female sex	1.21	[1.10, 1.34]	0.0001	1
Black race	1.31	[1.11, 1.45]	<0.0001	1
History of severe COPD	1.29	[1.03, 1.62]	0.028	1
Oxygen dependence	1.42	[1.02, 1.96]	0.036	2
History of PE	1.89	[1.46, 2.45]	<0.0001	4
GERD requiring medication	1.33	[1.23, 1.43]	<0.0001	1
Previous PCI/PTCA	1.42	[1.15, 1.75]	0.0010	2
Use of mobility device	1.35	[1.23, 1.43]	0.0057	1
Previous obesity surgery	1.43	[1.27, 1.61]	<0.0001	2
Therapeutic anticoagulation	1.53	[1.24, 1.89]	<0.0001	2

Score	Complication rate
0	5.3%
1	5.7%
2	7.8%
3	8.6%
4	10.8%
5	12.0%
6	13.4%
7+	21.5%

**Conclusion:** We created and verified a morbidity prediction score for patients undergoing RYGB based on MBSA-QIP data.

**P645****Bariatric Surgery Can Be Safely and Effectively Performed in Patients with Left Ventricular Assist Devices**

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**Introduction:** Severe cardiac disease often warrants mechanical support via a left ventricular assist device to improve cardiac function. While this is an effective way of improving myocardial activity, it works synergistically with weight loss. Studies have suggested that for every 1-kg/m<sup>2</sup> increase in BMI, the risk of developing heart failure increases 5% in men and 7% in women. Obesity, a known risk factor for CAD, alters lipid metabolism leading to atherosclerosis and ischemic cardiomyopathy. In terms of cardiac transplantation, mortality rates are significantly higher in patients with BMI > 35. Data shows that patients that lose at least 3 kg have a significant improvement in LVEF, NYHA class, and quality of life. While other studies have shown that myocardial function in this population has improved following weight reduction surgery, this study looks specifically at patients with LVADs in place. This study aims to show that bariatric surgery is effective and safe, achieving weight loss goals and providing a bridge to transplantation in patients with LVADs.

**Methods:** After obtaining IRB approval, EMR was reviewed for patients with morbid obesity, defined as BMI > 35 with obesity related health conditions, who have LVADs due to depressed cardiac function. Four patients in this group underwent bariatric surgery at Montefiore Medical Center in order to achieve satisfactory weight loss goals.

**Results:** Each patient underwent a Laparoscopic Sleeve Gastrectomy (LSG). Due to significant comorbidities, patients were admitted to the hospital pre-operatively for optimization and management of anticoagulation. Average length of stay post LSG in this group was 4.5 days. Complications post-operatively showed to be related to anticoagulation of the patient. In terms of weight loss analysis, BMI and improvement in health conditions were followed after LSG. Each patient experienced a significant decrease in BMI with end goal of transplantation. Patient 1 and 2 underwent cardiac transplantation within 1 year of LSG. Patient 3 has completed assessment and deemed a transplant candidate at BMI of 32. Six weeks after LSG, patient 4's BMI reduced to 36 from 41, showing promise of transplant candidacy.

	Sex	Cardiac History	NYHA Class	Time of LVAD placement prior to bariatric surgery	Ejection fraction at time of LVAD placement	Age at time of LSG	BMI at time of LSG	Ejection Fraction at time of LSG	Timing of Transplant post LSG	BMI at Transplant
1	M	ICM s/p AICD, VT s/p ablation, CAD s/p CABG, atrial fibrillation, HTN, HLD	II	21 months	30%	63	42.6	25%	8 months	38.09
2	M	HTN, CAD s/p CABG and PCI, NSTEMI, atrial fibrillation, ICM s/p AICD, CVAs/TIs due to cardiac thromboemboli	III	10 months	35%	58	38	30%	5 months	31.82
3	F	Paroxysmal VT, ICM s/p AICD, atrial fibrillation, HLD	II	17 months	20%	52	39.92	"severely decreased"	Listed	Listed at 32
4	F	NICM s/p AICD, atrial fibrillation, RV failure, SVT s/p ablation, HTN	II	20 months	15%	29	41	15%	—	

**P646****The Effect of Helicobacter pylori on Postoperative Outcomes in Patients Undergoing Bariatric Surgery: A Systematic Review and Meta-analysis**

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**Introduction:** The objective of this study was to perform a systematic review to determine the impact of *H. pylori* on patients undergoing bariatric surgery.

*Helicobacter pylori* (HP) is prevalent in up to 50% of the population worldwide with increased rates observed in the bariatric population. Bariatric surgery has seen a rapid expansion over the last 20 years with the growing rates of severe obesity. Higher HP rates are thought to be associated with increased rates of postoperative complications including increased marginal ulceration and leak rates. Accordingly, some bariatric centers have adopted routine pre-operative screening and HP eradication programs. Yet, while HP correlation with gastritis and malignancy has now been well defined, its impact on patients undergoing bariatric surgery remains unclear.

**Methods and Procedures:** A comprehensive literature search from 1946 to July 2017 for both published and unpublished studies was performed using the following key terms: bariatric, gastric bypass, gastric band, sleeve gastrectomy, *Helicobacter pylori*, and *H. pylori*. The search was performed using Medline, EMBASE, Scopus, the Cochrane Library, and Web of Science databases. Included studies were assessed for methodological quality and bias. Abstracts and titles were screened for inclusion by two independent reviewers as per PRISMA guidelines. Outcomes assessed in the meta-analysis included bleeding, anastomotic leak, excess weight loss using the Revman 5.3 software.

**Results:** A total of seven studies with 255 435 subjects were included. Overall, the prevalence of *H. pylori* ranged from 0.13% to 41%. Of patients with *H. pylori*, the weighted mean age was 43.4 years, the weighted mean BMI was 45.0, and 69% were female. Meta-analysis revealed no statistically significant difference for postoperative complications including bleeding (OR 3.05; CI 0.26 to 36.20; P=0.38), leak (OR 1.72; CI 0.09–33.2; P=0.72), EWL at 12 months (MD –1.73; CI –3.61 to 0.16; P=0.07), or hospital LOS. In the lone study assessing marginal ulceration, *H. pylori* infection was found to be the largest independent predictor of development of marginal ulceration.

**Conclusions:** *Helicobacter pylori* infection in patients undergoing bariatric surgery was not found to be adversely associated with bleeding, leak, weight loss or hospital length of stay. It was, however, found to be an independent predictor of marginal ulceration in the single study assessing this outcome. This systematic review suggests that further research to assess the impact of *H. pylori* on bariatric surgery is needed, especially with a focus on marginal ulceration.

	Discharge Status	Complications	Readmission within 30 days
1	POD 3	No	No
2	POD 5	Intraoperative bleeding from L rectus requiring ligation of L inferior epigastric artery Rectus Sheath Hematoma JP drain	Yes POD 8 GIB in setting of supratherapeutic INR
3	POD 6	No	No
4	POD 4	Episode of melena	No

**Conclusion:** Patients with multiple medical problems, not limited to cardiac disease requiring LVADs, can achieve weight loss goals safely by surgical means despite poor surgical candidacy. Complications post LSG were minimal and no different from the other patient groups. While limitations of sample size prevent statistical analysis, this study demonstrates promising outcomes for this high risk group in terms of a gateway to transplantation.

**P647**

**Evaluation of Surgical Line Reinforcement Procedure Effect on the Complications of Laparoscopic Sleeve Gastrectomy: Analysis of the Latest Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) Data, 2015**

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**Introduction:** There has been debates on the effectiveness of staple line reinforcement (SLR) in prevention of leaks in bariatric surgeries specifically Laparoscopic Gastric Sleeve (LGS). The earlier analysis of national data from Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) 2010–2014 was showing that at patient level, the SLR is increasing the rate of the leaks. (1) However it decreased the bleeding rate.

**Method:** We used the most recent national data from MBSAQIP 2015 (2). Univariate analysis and adjusted hierarchical logistic regression model were implemented to evaluate association of leaks with patient related factors as well as operation related measures. Patients with any missing data were excluded from the model.

**Results:** Out of 168093 patients in MBSAQIP 2015 data 98292 (58.5%) had LSG. Data was available for 58876 (59.9%) cases of which 39504 (67.1%) had received SLR. In adjusted model, leaks were only associated with factors (Odds ratio, P-value) such as anticoagulation therapy (5.89, 0.003), history of previous surgery (1.95, 0.24) and bleeding (1.99, <.001). Each 10 minutes increase in operation length was associated with 5% increase in leak (P-value≤.001).

Also bleeding was only associated with anticoagulation therapy (4.5, <.001), staple line check with provocative test (0.63, .001), drain placement (1.4, .008), hyperlipidemia (1.6, <.001) and history of GERD (1.4, .008).

Each 10 minutes increase in operation length was associated with 3% increase in probability of bleeding (P-value=0.02).

SLR was not associated with leaks (p-value=0.75) or bleeding (P-value=0.4) in adjusted model.

**Conclusion:** We found no evidence that SLR procedure might either decrease or increase the incidence of major complications such as bleeding or leaks in laparoscopic sleeve gastrectomy. This finding differs from the previous MBSAQIP results for leaks. Provocative leak test is protective against bleeding by 37%. Operative time was associated with increased risk for both leaking and bleeding.

**References:**

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**P648**

**Nationwide Analysis of Outpatient Laparoscopic Sleeve Gastrectomy and Laparoscopic Gastric Bypass Over the Past Decade: Risk Factors for Morbidity and Readmission**

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**Introduction:** Bariatric patients are discharged frequently within one postoperative day. The aim of this study was to compare the safety of outpatient laparoscopic sleeve gastrectomy (LSG) and Roux-en-Y gastric bypass (LRYGB) and to identify patients at risk for complications.

**Methods and Procedures:** Adult patients with obesity ( $\text{BMI} \geq 35$ ) who underwent an elective outpatient LSG or LRYGB were identified using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database from 2005 to 2015. Multivariable logistic regression analysis was performed to identify risk factors for 30-day overall morbidity and readmission (2011–2015) for each procedure type.

**Results:** 27,423 patients were included, with 58.72% of LSGs and 41.28% LRYGBs. The outpatient rate increased over time for LSG (20.33% in 2010 to 37.34% in 2015,  $p < 0.001$ ) and LRYGB (13.92% in 2005–6 to 19.80% in 2015,  $p < 0.001$ ). In comparison to LSG, LRYGB patients had significantly higher rates of overall morbidity (2.71% vs. 1.85%,  $p < 0.001$ ) and readmission (4.44% vs. 2.62%,  $p < 0.001$ ). LSG: patients with ASA IV–V, dyspnea, steroid use, and bleeding disorder had significantly increased risk of overall morbidity; while black race, COPD, dyspnea and bleeding disorder had significantly increased risk of readmission (TABLE). LRYGB: patients with  $\text{BMI} \geq 50$  and hypertension had increased risk of overall morbidity; while bleeding disorder had increased risk of readmission.

**Conclusion:** Outpatient LSG carries a lower risk for morbidity and readmission than LRYGB. Although morbidity and readmission rates were acceptable for both procedures, patients with the identified risk factors should be more closely monitored. Bleeding disorder posed the greatest risk and may warrant a longer hospital stay.

**TABLE** Factors Associated with 30-Day Overall Morbidity and Readmission

Factors	Overall Morbidity		Readmission	
	LSG	LRYGB	LSG	LRYGB
Age group, years				
<40	Reference	Reference	Reference	Reference
40–49	0.82 (0.60–1.14)	1.11 (0.82–1.49)	0.93 (0.72–1.20)	<b>0.63 (0.46–0.85)</b>
≥50	1.01 (0.75–1.37)	1.18 (0.87–1.61)	1.06 (0.81–1.38)	0.82 (0.61–1.10)
Race	–	–	–	–
White	Reference	Reference	Reference	Reference
Black	<b>0.56 (0.37–0.85)</b>	<b>1.39 (1.09–1.78)</b>	1.31 (0.95–1.80)	–
Other/unknown	0.94 (0.64–1.38)	0.83 (0.55–1.23)	0.70 (0.45–1.09)	–
ASA classification				
I–II	Reference	Reference	Reference	Reference
III	1.05 (0.79–1.40)	1.00 (0.75–1.33)	1.18 (0.93–1.50)	1.18 (0.88–1.59)
IV–V	<b>2.41 (1.35–4.30)</b>	1.06 (0.53–2.12)	1.53 (0.84–2.78)	0.67 (0.28–1.58)
BMI group, kg/m <sup>2</sup>				
35–39.9	Reference	Reference	Reference	Reference
40–44.9	1.40 (1.00–1.95)	1.06 (0.74–1.50)	0.99 (0.75–1.31)	1.09 (0.79–1.52)
45–49.9	1.42 (0.99–2.05)	1.14 (0.79–1.66)	1.08 (0.80–1.46)	0.96 (0.67–1.38)
≥50	1.25 (0.86–1.82)	<b>1.62 (1.14–2.31)</b>	1.09 (0.81–1.48)	1.12 (0.79–1.60)
Current smoker	–	–	1.27 (0.94–1.71)	–
Diabetes	1.24 (0.94–1.63)	1.04 (0.80–1.35)	1.14 (0.89–1.45)	–
History of COPD	1.61 (0.76–3.40)	–	<b>1.98 (1.06–3.66)</b>	–
Hypertension	1.20 (0.92–1.56)	<b>1.41 (1.08–1.83)</b>	1.08 (0.86–1.34)	1.24 (0.96–1.60)
Dyspnea	<b>1.61 (1.19–2.18)</b>	–	<b>1.64 (1.27–2.13)</b>	–
Steroid use	<b>2.02 (1.02–4.01)</b>	–	–	–
Bleeding disorder	<b>2.87 (1.30–6.33)</b>	2.15 (0.86–5.40)	<b>3.32 (1.70–6.49)</b>	<b>3.66 (1.51–8.82)</b>
Prolonged operative time <sup>a</sup>	<b>1.39 (1.09–1.78)</b>	–	1.20 (0.97–1.50)	–

**P649****Bariatric Surgery: The Impact of Socioeconomic Factors and Indigenous Status**

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**Introduction:** The objective of this study is to determine socioeconomic factors that influence access to bariatric treatment and surgery in a publicly-funded healthcare program with a focus on Indigenous populations. Rates of obesity are markedly higher among Indigenous persons, estimated to be 37.8%, compared to 22.6% for non-Indigenous persons. Similarly, rates of diabetes are twice as high among Indigenous Canadians relative to the general population and disease onset frequently occurs at a lower body mass index (BMI) and younger age. In obese patients who are refractory to diet and exercise, bariatric surgery is a viable option, with demonstrated efficacy in sustained weight reduction and in many patients, hyperglycemic remission. The utilization of bariatric surgery in Indigenous populations has not been well documented, however in one study out of the United States, only 0.46% of bariatric surgery was performed on Indigenous patients. An understanding of the socioeconomic drivers underlying this disparity may enable physicians to identify at risk individuals, who may benefit from bariatric treatment.

**Methods:** A retrospective review of prospectively collected data was performed on all severely obese patients ( $BMI \geq 35$ ) discharged from the Edmonton Adult Bariatric Specialty Clinic in 2016. Socioeconomic data include gender, marital status, education, occupation, smoking status, alcohol use, estimated income and Indigenous status. Multivariate logistic regression analysis was performed to determine socioeconomic factors that predict completion of bariatric surgery.

**Results:** Seven-hundred-and-eighty patients met inclusion criteria, of which 0.9% were identified as Indigenous (n=7). Of the Indigenous cohort, all were unemployed, 71.4% were single, 57.1% had completed secondary education and 28.6% had completed college. None of these patients completed bariatric surgery. Due to low numbers, multivariate analysis was not completed for this cohort.

For the whole cohort, 28.8% of patients successfully completed bariatric surgery. The main reasons for not completing the bariatric program were poor attendance (32.7%) and patient decision not to pursue surgery (22.0%). In multivariate analysis, patients who were married (OR 2.04, 95% CI 1.2–3.5), non-smokers (OR 0.30, 95% CI 0.14–0.65), and female (OR 0.33, 95% CI 0.19–0.56) were more likely to complete bariatric surgery. Education, income, and occupation were not predictive of completion.

**Conclusions:** Despite an alarming rate of obesity and diabetes in Indigenous populations, very few Indigenous people are treated in specialized bariatric treatment centers. Further, major socioeconomic factors did not influence successful completion of bariatric surgery. Especially in a public healthcare system, more treatment should be directed at underserved Indigenous populations.

**P650****Prevalence Nonalcoholic Fatty Liver Disease in Patient Undergoing Bariatric Surgery in King Chulalongkorn Memorial Hospital**

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**Background:** Morbid obesity patients have a high prevalence of nonalcoholic fatty liver disease and nonalcoholic steatohepatitis. The incidence is varied. We evaluated the prevalence and predictor of NAFLD/NASH in morbid obesity patient who undergoing bariatric surgery.

**Method:** Retrospective review From January 2014 to August 2017. In morbid obesity patient who undergoing bariatric surgery. Liver biopsy was performed before end of operation. The study variables include age, gender, weight, body mass index, body fat percentage, comorbidity, and blood chemistry from preoperative assessment.

**Result:** 95 patients (48 males and 47 females) were analyzed. The mean age was  $35.7 \pm 10.7$ . The mean body mass index was  $50.9 \pm 11.9$ . Among 95 patients, 85 (83.3%) patients had nonalcoholic fatty liver disease and 17 (17.9%) patients had nonalcoholic steatohepatitis. On univariate analysis, DM, body fat percentage, FBS, HbA1C, TSH, Platelets were correlated with presence NASH. On multivariate analysis, there no one of parameter had statistical significance.

**Conclusion:** The prevalence of NAFLD and NASH in patient who undergoing bariatric surgery was 83.3% and 17.9% respectively. In this study, there no strong predictor correlated with presence NASH.

**P651****Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass: Effects on Body Weight, Diabetes, and Reflux Disease**

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**Introduction:** Revisional bariatric surgery can sometimes be the only resort to improve outcomes and to resolve complications of sleeve gastrectomy (SG). Roux-en-Y gastric bypass (RYGB) is one of the most common revisional procedures done after SG. The aim of this study was to identify the indications for and the effect of revisional RYGB on the body weight, diabetes status and gastroesophageal reflux disease (GERD) post-SG.

**Methods:** Clinical data of 87 patients who underwent conversion of their initial SG to a RYGB at an academic center between 2008 and 2014 were reviewed.

**Results:** Mean age and body mass index (BMI) at the time of conversion of SG to RYGB were  $47.6 \pm 11.6$  years and  $43.4 \pm 13.9 \text{ kg/m}^2$ , respectively. Weight recidivism was the most common indication for revisional surgery (n=53, 60.9%), followed by intractable GERD (n=14, 16.1%), and gastric fistula (n=8, 9.2%). Only 2 (2.3%) patients underwent urgent conversion for management of complications after SG. Three patients had intraoperative complications necessitating blood transfusion. Fourteen (16.1%) patients required readmission within 30 days postoperatively. Six patients (6.9%) required surgical interventions including 2 for gastrointestinal leak, 2 for hemodynamic instability, 1 for a cecal perforation, and 1 for a small bowel obstruction. There were no mortalities within the first year of revisional surgery. In 62 patients with  $BMI > 35 \text{ kg/m}^2$  at the time of revisional surgery, at the median postoperative follow-up of 30 (interquartile range, 14–72) months, a median 6 (interquartile range, 2–9)  $\text{kg/m}^2$  reduction in BMI was observed. Overall, 19 (21.8%) patients had persistent type 2 diabetes at time of revisional surgery. Improvement of diabetes was observed in 15 patients (78.9%) after conversion of SG to RYGB. Among 14 patients with GERD symptoms, subjective symptomatic relief was reported at the last follow-up.

**Conclusion:** Weight recidivism is the most common indication for revision of SG. Conversion of SG to RYGB leads to a median 6  $\text{kg/m}^2$  reduction in BMI. In addition, RYGB would be effective in controlling residual diabetes and GERD after SG. However, conversion of SG to RYGB carries a higher surgical risk than primary RYGB. This emphasizes on the importance of patient selection and preoperative optimization.

**P652****Laparoscopic Mini-Gastric Bypass: An Easy, Safe Approach**

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**Objective:** To evaluate laparoscopic Mini-Gastric Bypass in the treatment of morbid obesity.

**Method:** Three Hundred patients with a mean BMI of  $41.84.5 \text{ kg/m}^2$  underwent a laparoscopic Mini-Gastric Bypass between 2011 to 2016. A laparoscopic approach with five trocar incisions was used to create a long narrow gastric tube; this was then anastomosed ante-colically to a loop of jejunum 200 cm. distal to the ligament of Treitz Peri-operative and short-term follow-up results up to May 2016 are reported.

**Results:**

No	Mean Operative time	Mean Hospital Stay	Minor Complications	Major Complications	Average bypass length	Excess body weight loss	Reversal
300	130 minutes	4 days	7%	1.33%	180 cm	84 %	0.66%

**Conclusion:** Laparoscopic Mini-Gastric Bypass is a easy, safe, and effective procedure in the treatment of morbid obesity in our short term experience.

**P653****Presurgical Gerd Evaluation of the Bariatric Patient. A Cross Sectional Study**

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**Introduction:** Gastroesophageal reflux disease (GERD) is a highly prevalent disease estimated to be present in 10–20% of Western adult population. Obesity has been established as a well-known risk factor. The goal of this study was to evaluate the presence of pre-surgical GERD among the bariatric population.

**Methods and Procedures:** Between March 2014 and June 2017 246 patients underwent 24 hour pH-metry, manometry and upper GI endoscopy as part of a routine screening for GERD. Gender, age, BMI, DeMeester score, lower esophageal sphincter (LES) resting pressure and signs of esophagitis were recorded in a prospectively kept database.

Results were reported as means  $\pm$  standard deviations or 95% confidence intervals (95% CI). Correlation between variables was studied using either Pearson or Spearman correlation tests and simple linear regression. Groups were compared with t-test, and a significance level of 0.05 was set.

**Results:** Mean age was  $43.4 \pm 11.7$  years and BMI  $44.3 \pm 6.3$  kg/m $^2$ , 72.8% were female. Mean DeMeester score was  $48.8$  (95% CI  $41.1$ – $56.6$ ), and mean resting LES pressure was  $11.9$  (95% CI  $11.4$ – $12.5$ ) mmHg. Overall, 62.3% of patients had a DeMeester score higher than  $14.7$  and 34% had a hypotensive LES. In the bivariate analysis, there was no correlation between DeMeester score and BMI, age or gender. Only 10% had signs of esophagitis or Barrett's esophagus. DeMeester score was higher in patients with esophagitis ( $56.9 \pm 12.4$  vs  $47.9 \pm 4.1$ ) although this difference was not statistically significant ( $P=0.48$ ). Out of all patients, 64.4% had either an abnormal DeMeester score or erosive endoscopic signs. Non-erosive reflux disease (NERD) accounted for 54% of all patients and for 86.9% of patients with abnormal pH-metry.

**Conclusions:** Gastroesophageal reflux disease was diagnosed in 64.4% of patients under study for bariatric surgery. Endoscopy should not be relied on as the only diagnostic tool; as 87% of patients with abnormal pH-metry did not have esophagitis. This study suggests that GERD might be more prevalent than expected in the presurgical bariatric population.

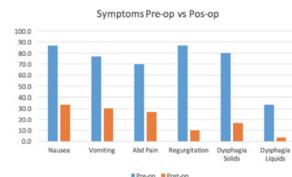
**P654****“BARF Syndrome:” Hiatal Hernias as a Cause of Bloating, Abdominal Pain, Regurgitation or Reflux, and Food Intolerance in the Post-bariatric Surgery Cohort**

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**Background:** The risk of developing a hiatal hernia in the obese population is 4.2 fold compared to patients with a BMI <30. Most hiatal hernias after bariatric surgery are asymptomatic and when symptoms are present they may be difficult to differentiate from overeating or maladaptive eating habits. The aim of this study was to define the risk and symptoms associated with a hiatal hernia in the post-bariatric surgery cohort.

**Methods:** A retrospective review of prospectively collected data for patients who underwent laparoscopic hiatal hernia repair who previously had primary Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy (SG). Data collection spanned a five-year interval (7/2012–6/2017). Preoperative and follow up data were collected from medical records and questionnaires in the clinic or by telephone. Variables obtained include age, gender, psychiatric history, pre-index procedure BMI, pre-hiatal hernia repair BMI, post-hernia repair BMI, pre and post operative symptoms, and associated morbidity. All hiatal hernia repairs were done laparoscopically, with posterior cruroplasty after circumferential hiatal dissection.

**Results:** We identified 30 patients with a symptomatic hiatal hernia who had previously (range: 1–23 years) undergone bariatric surgery. Fourteen RYGB patients presented at a mean of 10.7 years compared to 16 SG patients who presented at a mean of 3.4 years after index procedure. Diagnosis was by a combination of UGI (67%), CT scan (50%) and EGD (27%). Mean follow up was 8.6 months (range: 1–32 months). Laparoscopic hiatal hernia repair was successfully performed in all 30 patients with 0% mortality. Dysphagia and regurgitative symptoms markedly improved in >85% of patients however, nausea, vomiting and abdominal pain were not changed in 20–30% of patients (Figure).



**Conclusion:** Hiatal hernia following bariatric surgery is a rare but important cause of Bloating manifested as nausea and vomiting, Abdominal pain, Regurgitation or Reflux, and Food intolerance or dysphagia (BARF)—and should be further evaluated with imaging or endoscopy when present. Laparoscopic repair of hiatal hernia is warranted and results in resolution of symptoms in the majority of symptomatic patients.

**P655****Mid-Term Outcomes of Sleeve Gastrectomy in Class 1 Obesity Patients, Is It Suitable Procedure?**

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**Introduction:** Sleeve gastrectomy (SG) is the leading weight loss procedure for treating morbid obesity. However, mid-term results of the isolated SG which was performed in lower body mass index (BMI) (30–35) are sparse.

**Methods and Procedures:** We retrospectively reviewed 69 patients who underwent SG in class 1 obesity (30–35 kg/m $^2$ ) from January 2013 to December 2016. SG was performed laparoscopically using Endo-GIA stapler to create a lesser curve gastric tube over a 36-Fr bougie, and continuous sero-serosal suture at resection margin has been added.

**Results:** The age before surgery was  $35.3 \pm 8.1$ . The mean weight and body mass index (BMI) before LSG were  $87.9 \pm 9.3$  kg and  $32.2 \pm 1.5$  kg/m $^2$ . The BMI at first, second, and third year postoperatively was  $22.2 \pm 2.3$ ,  $23.3 \pm 2.6$ , and  $23.8 \pm 2.7$ . The percentage of excess BMI loss (cutoff BMI: 23) at postoperative first, second and third year was  $109.7 \pm 26.3$ ,  $97.1 \pm 29.1$ , and  $90.1 \pm 30.0$ . However, the follow up rate is decreased by postoperative time. There was no 30-day peri-operative mortality and major complications including bleeding and leakage.

**Conclusion:** These finding show that SG is a very effective and safe weight loss option for class 1 obesity. However, proper weight loss concept after SG should be reconsidered to improve health in class 1 obesity. Also, randomized prospective control study between gastric banding and SG, or gastric bypass and SG are needed to confirm long-term weight loss effect and safety of SG in class 1 obesity.

**P656****A Retrospective Analysis of Clinical Outcome of Bariatric Surgery in Morbidly Obese Diabetes Mellitus Patients**

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**Introduction:** Bariatric surgery is a choice of treatment in morbidly obese patients with Diabetes Mellitus (DM) type II who has inadequate control diabetes with medical treatment. This study aims to evaluate the clinical outcome of bariatric surgery in morbidly obese DM patients.

**Methods and Procedures:** Retrospective study of morbidly obese patients with DM type II who underwent bariatric surgery in King Chulalongkorn Memorial Hospital from September 2003 to March 2016 was collected. Pre-operative body mass index (BMI), DM type II remission, blood pressure and lipid profile were compared with data at 1 year after surgery as clinical outcome by chi-square and T-test analysis.

**Results:** A total of 73 patients were included in the analysis. Of all, 43 (58.9%) patients were women and mean (standard deviation, SD) age was  $41.8 \pm 12.2$  years. At 1 year after bariatric surgery compared with pre-operative, 61 (83.6%) patients had DM remission; mean (SD) BMI was  $36.9 \pm 8.9$  kg/m $^2$  vs  $50.9 \pm 10.9$  kg/m $^2$  ( $p<0.001$ ); mean (SD) diastolic blood pressure (DBP) was  $76.7 \pm 13$  mmHg vs  $82.7 \pm 11.1$  mmHg ( $p=0.019$ ); mean (SD) triglyceride (TG) level was  $111.8 \pm 95$  mg/dL vs  $162 \pm 99.1$  mg/dL ( $p<0.001$ ); and mean (SD) HDL level was  $50.8 \pm 11.2$  mg/dL vs  $43.7 \pm 10.7$  mg/dL ( $p<0.001$ ).

**Conclusions:** Bariatric surgery demonstrates BMI, DBP, TG level reduction, and DM remission with increases HDL level significantly at 1 year after surgery. Thus bariatric surgery can be an option for improve quality of life in morbidly obese DM patients.

**P657****Does Age or Preoperative BMI Influence Weight Loss After Bariatric Surgery?**

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**Introduction:** This study was designed to determine whether age or preoperative body mass index (BMI) influenced weight loss in bariatric patients undergoing sleeve gastrectomy (SG).

**Methods and Procedures:** A retrospective chart review was conducted of adult bariatric surgery patients undergoing SG at a single institution from March 2012 to December 2015. Patients were identified using procedure code. Patients who had a previous gastric band were excluded. Demographic variables included age, race, gender, preoperative BMI, American Society of Anesthesiologists (ASA) class, and comorbidities. The outcome measure, percent of excess weight loss (%EWL), was calculated from postoperative weight at 6, 12 and 24 months. 30-day mortality and readmissions were also reported. The %EWL was compared among both age groups (<35 years, 35–50 years, >50 years) and preoperative BMI (<35, 35–40, 40–50, >50). One-way ANOVA or the Kruskal-Wallis test was used to compare continuous data across all groups. Subsequent analysis of categorical data was achieved by Chi-square or Fisher's Exact test. Statistical significance was accepted as  $p<0.05$ .

**Results:** A total of 160 patients (20% male) were analyzed. Average age and preoperative BMI were 45.8 (10.9) years and 44.8 (8.2) kg/m<sup>2</sup>, respectively. Preoperative comorbidities included: diabetes (20.6%), hypertension (46.3%), hyperlipidemia (29.4%), previous myocardial infarction (1.9%), obstructive sleep apnea (30.0%), chronic obstructive pulmonary disease (2.5%), gastroesophageal reflux (30.0%), tobacco use (8.8%). The ASA classes of patients undergoing SG were II (14.4%), III (84.4%), and IV (1.3%). The follow up rate at 6, 12 and 24 months was 86.9%, 44.4%, and 18.8%, respectively. The 30-day mortality and readmission rate were 0% and 4.4%, respectively. The %EWL was not different among age groups at 6, 12 or 24 months for the total, male, or female cohorts. Among preoperative BMI groups, %EWL was not different in any cohort at 12 or 24 months, but was different at 6 months for the total cohort ( $p<0.001$ ) and female cohort ( $p<0.001$ ), and trended toward significance in the male cohort ( $p=0.051$ ). The highest %EWL was found to be in patients with preoperative BMI of 35–40. There was no difference in 30-day mortality or readmissions among groups.

**Conclusions:** We found a significant difference in %EWL in patients undergoing SG at 6 months postoperatively among preoperative BMI groups in the total and female cohorts. Patients with preoperative BMI of 35–40 had the highest %EWL without a difference in 30-day mortality or readmission. Optimal timing for bariatric surgery may be at a BMI of 35–40.

**P658****Effect of Intra-abdominal Pressure on Intracranial Pressure**

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**Introduction:** Obese patients suffer from multiple organ comorbidities which contribute to a shortened lifespan. One of the effects of obesity is thought to be pseudotumor cerebri, which is secondary to increase in intracranial pressure (ICP) in the absence of an obstruction. Over the past two years, we have measured ICP after insufflating with a laparoscopy device. We found that ICP increases dramatically and it correlates with the amount of insufflation in the abdomen. Over the years, there have been studies in obese patients and intra-abdominal pressure. These studies have shown that some obese patients have an intra-abdominal pressure of 15–18 mmHg. Increasing intraabdominal pressure is thought to escalate intracranial pressure (ICP). The objective of this pilot study was to observe change in ICP after the raising intra-abdominal pressure.

**Method:** In this retrospective chart review preliminary study, pressure in each of the patients either normal pressure hydrocephalus or high pressure hydrocephalus receiving a ventricle shunt were measured by manometer. Once the shunt was placed into the ventricle, we attached a manometer to measure the opening pressure. After we accessed the abdominal cavity using the standardoptiview technique, we created a pneumoperitoneum. After achieving an intraabdominal pressure of 15mmhg, were measured the ICP using the manometer.

SPSS software version 24 was used for data analysis. Paired t-test was applied on ICP before and after the procedure.

**Results:** We had included 10 patients (80% female, 20% male) mean body mass index (BMI) 28.433. Their ICP were raised statistically significantly ( $p$ -value<.001, 95%CI –9.348 to –4.51,  $r$ : 0.822) from mean 16.7 mm of Hg to mean 23.63 mm of Hg with each 4.67 mm of Hg standard deviation (SD).

**Conclusion:** The Laparoscopic abdominal procedure raises the ICP. Therefore, we can surmise of increasing intra-abdominal pressure directly increase the ICP. Therefore obese patients who have inherently a high intraabdominal pressure will have higher ICP and This can contribute to pseudotumor cerebri. We are also using this model to study other effects of intrabdominal pressure on other comorbidities.

**P659****The Red Flag: Substance Abuse Predicts Higher Complication Rate and Subsequent Surgical Procedures in Bariatric Patients**

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**Introduction:** The prevalence of substance abuse in bariatric patients has been well-documented in the literature. Several studies have alerted to the development of postoperative substance abuse in a small subset of bariatric patients. However, to what degree substance abuse affects patients' postoperative outcomes and utilization of additional surgical procedures remains unclear.

**Methods:** We performed a retrospective review of a large-scale, state-based longitudinal hospital claims database (SPARCS) with mandatory reporting. All patients undergoing bariatric surgery between 2004 and 2010 were collected and outcomes were followed until 2014. Patients who had a diagnosis code for substance abuse within the previous 5 years before surgery were collected. Patients with revisional surgery, age less than 18, or lack of follow-up were excluded. Rates of subsequent surgery and postoperative outcomes were analyzed. Multivariate analysis was performed to control for procedural and patient variables.

**Results:** A total of 40,994 non-revisional bariatric patients were identified via inpatient and outpatient records. Patients with a previous diagnosis of substance abuse were shown to have longer lengths of stay following the index bariatric surgery (2.56 v. 1.96 days,  $p<0.0001$ ) and higher overall complication rate (7.45% v. 5.28%,  $p<0.0001$ ). Patients with substance abuse were more likely to undergo additional surgery after all types of bariatric procedures ( $p<0.0001$ ). Among all bariatric patients who underwent subsequent surgery, substance abuse patients had a shorter time interval to additional surgery (337 v. 479 days,  $p<0.0001$ ). Substance abuse patients had a higher rate of subsequent laparoscopic cholecystectomy and esophagogastroduodenoscopy (EGD), but no difference in rates of diagnostic laparoscopy or hernia repairs.

**Conclusion:** Bariatric surgery patients with a history of previous substance abuse experience a higher risk of postoperative complications and need for additional surgery, particularly laparoscopic cholecystectomy and EGD. These patients may require additional resources should they be deemed acceptable candidates for bariatric surgery.

**P660****Laparoscopic Sleeve Gastrectomy Has a Lower Risk of Postoperative Bleeding Than Laparoscopic Roux-en-Y Gastric Bypass**

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**Introduction:** Postoperative bleeding represents an infrequent, yet serious complication after bariatric surgery. Differences in the rate of postoperative bleeding reported for the two most common weight loss procedures—laparoscopic Roux-en-Y gastric bypass (LRYGB) and laparoscopic sleeve gastrectomy (LSG)—are ostensibly confounded by patient and surgeon specific preoperative, intraoperative and postoperative factors, in particular, by the utilization of staple line reinforcement or oversewing. With this understanding, we aim to use a large national database to definitively characterize differences in bleeding rates between LSG and LRYGB.

**Methods and Procedures:** The 2015 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) Participant Use Data File (PUF) was queried for patients undergoing primary non-robotic multi-port LRYGB or LSG. Patients at the extremes of age were excluded. Furthermore, only LSG operations without any staple line reinforcement were considered. Postoperative bleeding was taken as any hemorrhage requiring a blood transfusion within 72 hours of surgery or another intervention for bleeding. To account for differences in patient selection, propensity scores on preoperative factors were used to match patients undergoing LRYGB with those undergoing LSG. Subsequent multivariate logistic regression was used to determine the effect of the type of procedure on postoperative bleeding rates, adjusting for intraoperative factors.

**Results:** A total of 168,093 patients from 742 centers were identified in the dataset. After applying our selection criteria, 65,881 patients met inclusion criteria: 43,280 (65.7%) with LRYGB and 22,601 (34.3%) with LSG. A total of 833 (1.3%) patients suffered a postoperative bleeding event, of which 215 (25.8%) required a re-operation. The unadjusted bleeding rate in the LRYGB group was 1.5% and was 0.8% in the LSG group. After propensity score matching and multivariate regression analyses, the odds of post-operative bleeding were 41% lower for patients having LSG compared to those having LRYGB (odds ratio 0.59, 95% confidence interval=0.49–0.72).

**Conclusions:** After appropriate risk-matching, LSG patients have a reduced likelihood of a post-operative bleeding event compared to those undergoing LRYGB. This difference is likely more pronounced with intraoperative securing of the staple line via oversew, buttress or an alternative method. These findings from a large national database represent an important consideration for surgeons and patients alike when evaluating the appropriate bariatric operation.

**P661****The Role of Insurance Type in Bariatric Surgery Outcomes**

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**Background:** Bariatric surgery has shown to be the most effective treatment, with documented improvement in obesity-related comorbidities. The type of health insurance coverage plays an important role in the access to bariatric surgery, but might also affect postoperative outcomes. The objective of this study is to determine whether there is a difference in outcomes based on the type of insurance 12 months after bariatric surgery.

**Methods:** We retrospectively reviewed all the patients that underwent bariatric surgery at our institution from 2010 to 2016. We divided the patients into two groups, based on the type of insurance, Private (group one), and Public (group two). We compared demographics and 12 months outcomes between the groups, using t-test for continuous variables and chi-square for categorical variables. We also compared 12 months estimated BMI loss between 8 different private insurances using ANOVA.

**Results:** Out of 1399 bariatric patients, 507 (36.24%) matched our search criteria. We identified 340 (67%) patients in group one and 167 (32%) in group two. In group one 67.94% (N=231) were females versus 61.07% (N=102) in group two ( $P=0.12$ ). The average age in group one was 46.54 ± 10.81 years and 59.33 ± 12.16 years in group two ( $P<0.001$ ). The percentage of estimated BMI loss (EBMIL%) at 3 months in group one was 41.73 ± 10.99 (N=340) versus 42.16 ± 10.35 (N=167) in group two ( $p=0.674$ ). The EBMIL% at 12 months was 69.80 ± 23.19 (N=340) in group one vs. 62.29 ± 28.63 (N=167) in group two ( $p=0.002$ ). Diagnosis of Diabetes was found in 51.76% (n=176) of the patients in group one versus 73.05 (n=122) in group two ( $p<0.001$ ). Diagnosis of Hypertension was found in 44.70% (n=152) of the patients in group one versus 59.88% (n=100) in group two (0.001).

Comparison between 8 different private insurance subgroups did not show any statistical significance in weight loss patterns.

**Conclusion:** Bariatric patients were more likely to be privately insured. Our study demonstrates that privately insured patients have less comorbidity at baseline, and they are prone to lose more weight compared to publicly insured patients after a 12 months follow-up. Further studies may be needed to better assess these findings.

**Table 1.** Impact of insurance on weight loss. Demographics and outcomes.

	Private Insurance	Public Insurance	P value
BMI at procedure(kg/m <sup>2</sup> )	44.35±7.71 (N=340)	43.51±8.12 (N=167)	0.262 <sup>a</sup>
%EBMI 3 months	41.73 ± 10.99	42.16 ± 10.35	0.674 <sup>a</sup>
%EBMI 12 months	69.80 ± 23.19	62.29 ± 28.63	0.002 <sup>a</sup>
Gender: female	67.94% (n=231)	61.07% (n=102)	0.126 <sup>b</sup>
Race: white	77.94% (n=265)	79.04% (n=132)	0.855 <sup>b</sup>
Age (years)	46.54 ± 10.81	59.33 ± 12.16	<0.001 <sup>a</sup>
Diagnosis of Type 2 Diabetes	51.76% (n=176)	73.05 (n=122)	<0.001 <sup>b</sup>
Diagnosis of Hypertension	44.70% (n=152)	59.88% (n=100)	<0.001 <sup>b</sup>

N=Number. Mean ± Standard deviation or (%) Percentage (N=number). BMI= Body mass index, %EBMIL= Percentage of estimated BMI loss. <sup>a</sup>Unpaired T-Test. <sup>b</sup>Chi-Square.

**P662****Risk Factors for Bleeding Complications Following Bariatric Surgery**

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**Introduction:** Bariatric Surgery remains the most reproducibly efficacious treatment for morbid obesity. Despite the elevated surgical risk generated by obesity-related co-morbidity, complications rates are lower in those undergoing bariatric operations than in those undergoing other types of surgery<sup>1</sup>. Nonetheless, quality measures which may reduce adverse outcomes remain a constant focus.

Bleeding is a perioperative and postoperative sequela that is common to all modalities of surgical practice. Essentially all surgical bleeding complications may be considered potentially-preventable. The objective of our study is to identify factors involved in perioperative care of Bariatric Surgery patients that are predictive of postoperative bleeding.

**Methods:** We performed a retrospective review of patients who underwent a Sleeve Gastrectomy (VSG) or Gastric Bypass (GBP) at Temple University Hospital between 1/1/2010–12/31/2015. Patients with a postoperative bleeding complication were compared to those who did not have postoperative bleeding. Variables in our univariate analysis included patient demographics, medical history, use of staple-line reinforcement, and preoperative, intraoperative, post-anesthesia hemodynamics.

**Results:** 792 index Bariatric operations (541 GBP, 251 SG) were performed during the study period. 40% were Black and 24% Hispanic. There were 214 complications (all cause, 1-year morbidity) in 145 patient patients (18.3%). 12 patients (1.5%) had a postoperative bleeding complication, 1.48% (8) GBP and 1.59% (4) SG. Of those with a bleeding complication, 75% (9) required a re-operation ( $p<0.001$ ) and were more likely to have another complication (33% vs 17%). Gender, race/ethnicity, operative time, staple type, use of staple reinforcement, and type of operation did not significantly impact predisposition to bleeding. Variables that met or trended toward a significant association with postoperative bleeding are listed in Tables 1 & 2. Patients with postoperative bleeding were generally older, had a lower BMI, poorly-controlled perioperative SBP, and used more than one anti-clot medication.

**Conclusion:** Bleeding is a potentially devastating complication following bariatric surgery. Several patient-related, technical, and perioperative variables may be contributing factors. The findings presented here suggest that advanced age, a lower BMI, use of NSAIDs and anti-platelet medications, and perioperative management of hypertension may be associated with bleeding in our ethnically diverse patient cohort. Further research is required to identify independent-predictors for bleeding in this patient population.

**Table 1.** Factors associated with postoperative bleeding risk following bariatric surgery

	Bleeding	No Bleeding	p-value
Age (Mean±SD)	49.00±11.23	42.76 ± 11.44	0.065
BMI (Mean±SD)	44.92 ± 7.70	49.02±8.56	0.097
Intra-op Mean SBP	157.09 ± 15.06	144.44 ± 16.61	0.011*
PACU Mean SBP	156.73 ± 29.57	147.47 ± 17.01	0.077

**Table 2.** Characteristics of patients with bleeding complications

	% of total population	% with bleeding	p-value
History of anti-clot medication use	40.6%	2.2%	0.243
History of >1 anti-clot medication use	8.2%	6.15%	0.013*
History of antihypertensive medication use	51.6%	2.2%	0.146
History of >1 antihypertensive medication use	31.1%	2.0%	0.530

\* = statistical significance

**P663****Effect of Laparoscopic Sleeve Gastrectomy on Lipid Profile in Morbidly Obese and Morbidly Obese Diabetic Patients. A One Year study**

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**Introduction:** Since the Adoption of Laparoscopic Sleeve Gastrectomy (LSG) as a primary procedure in Bariatric surgery, many studies have shown the beneficial metabolic effects on morbidly obese patients. In this study, we analyze the effect of LSG on Lipid profile at one year in both Morbidly Obese (MO) and Morbidly Obese Diabetic (MOD) patients in comparison with lean and diabetic lean control.

**Method:** Between January 2012 and July 2014, 23 MO and 17 MOD patients underwent LSG with 19 Lean Diabetic and 15 Lean Subjects as control. Sample were collected for Total Cholesterol, LDL, HDL cholesterol and Triglycerides (TG) preoperatively then at 7, 15, 30, 60, 90, 180 and 360 days postoperatively.

**Results:** Preoperative BMI, Gender and age were similar in both MO and MOD patients. At one year, both groups have similar EBWL. TG preoperatively was significantly elevated in MOD and MO in comparison with Lean Control. At one year, TG significantly reduced both MOD and MO. HDL cholesterol was significantly low in MOD compared with MO and Lean (0.01, and 0.0001 respectively). At one year, HDL cholesterol was significantly increased in both MOD and MO patients. Preoperatively, no significant difference in LDL and total cholesterol in all four groups. No changes found at one year postoperatively in total and LDL cholesterol in MOD and MO patients.

**Conclusion:** LSG showed significant improvement in HDL cholesterol and TG in MOD and MO patients at one year. NO similar changes were found in total cholesterol and LDL.

**P665****Laparoscopic Mini-Gastric Bypass for Morbid Obesity is Comparable to Sleeve Gastrectomy - A Prospective Study with Short-Term Follow-Up**

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**Introduction:** While Sleeve Gastrectomy (SG) has established itself as the commonest bariatric procedure, single anastomosis mini-gastric bypass (MGB) has become popular with claims of equivalent outcomes as with roux-en-Y gastric bypass (RYGB). Present study was done to compare the intra-operative and post-operative outcomes of MGB as compared to Sleeve Gastrectomy (SG) in the Indian population in a tertiary care teaching hospital.

**Material and Methods:** Between January 2015 and July 2017, 46 patients underwent MGB (Group A—22 cases) and Sleeve Gastrectomy (Group B—24 cases) in a prospective study, including 5 super-obese patients in each group. Data of 40 patients (20 in each group) at 30 months with a follow-up of 3–31 months in LSG and 12–24 months in MGB, was analyzed for peri-operative and post-operative complications, weight loss achieved and resolution of co-morbidities.

**Results:** Both groups were comparable for BMI at baseline [MGB=45.39 kg/m<sup>2</sup> (42.98–58.02) vs. SG=43.67 kg/m<sup>2</sup> (39.9–69.4) p=0.657]. Mean operation time was significantly lower in SG 135.8 vs. 166.8 min, p<0.01 but the mean hospital stay was significantly lower in the MGB (3.4 vs. 5.4 days, p<0.001). Percentage EWL in SG group of 24 patients at 3 months was 42.22 (40.34–44.78) and in 20 patients at 30 months is 70.45 (68.34–72.43). In the MGB group of 22 patients, % EWL at 3 months was 51.23 (47.23–54.01) and in 20 patients at 24 months is 78.74 (76.34–81.23). There were no mortalities in either groups. Two cases of staple line bleeding were seen in SG group, one of which required re-exploration. There was one leak which closed at 8 weeks on conservative management. No complications were noted in the MGB group.

Resolution of co-morbidities like DM, HTN and OSA was observed in both groups while this resolution was observed significantly early at 6, 8 and 2 weeks in the MGB group as compared to 12, 12 and 4 weeks for SG respectively. The mean hemoglobin and Albumin levels showed no significant difference before and after surgery in either groups.

**Conclusions:** MGB achieved superior weight loss at 3 months and 24 months and had a lower complication rate compared with SG. Resolution of co-morbidities was faster in MGB compared with SG. Thus, MGB may be a viable alternative to RYGB as it appears to be better to SG for the treatment of morbidly and super-obese patients.

**P664****Outcomes Following Primary and Revisional Bariatric Surgery by Age Groupings: Results from a National Data Registry**

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**Introduction:** Bariatric surgeons are now performing primary and revisional procedures on the extremes of age. There is controversy surrounding the safety and effectiveness of bariatric surgery among older age groups compared to younger age groups. To address this knowledge gap, we designed a study assessing short-term bariatric surgery outcomes among various age groupings across a large national database.

**Methods and Procedures:** De-identified patient data across 2015 from the MBSAQIP registry was used. Age groupings were organized into young, middle-aged, and older adults (in years) as follows: <40, 40–60, and >60, respectively. The following 30-day outcomes were evaluated between all possible pairwise age groupings: mortality, surgical site infection (SSI), and readmission; logistic regression was used to compare outcomes between age groupings controlling for primary vs. revisional index operation, patient factors, and procedure factors. A p value of <0.05 was deemed statistically significant.

**Results:** A total of 168,058 patients were identified (age range: 13 to >80); 86% (n=144,507) underwent primary bariatric operations while 14% (n=23,551) underwent revisional cases. Older adults had significantly worse outcomes than middle-aged and younger adults, respectively, for over 100 comparisons across all 3 outcomes; in contrast, younger adults had significantly worse outcomes than middle-aged adults for only 14 comparisons across SSI and readmission. For primary bariatric cases, older adults had significantly higher mortality rates than middle-aged and younger adults, respectively, in the following categories: ASA 3, laparoscopic sleeve gastrectomy (LSG), or laparoscopic Roux-en-Y gastric bypass (RYGB). For revisional cases, older adults had significantly higher mortality rates than middle-aged and younger adults, respectively, in the setting of female gender, Caucasian race, or ASA 3. Regarding SSI, older adults undergoing primary RYGB had significantly higher organ space infections compared to younger adults. In addition, older adults who had revisional RYGB had significantly higher deep surgical site infections compared to middle-aged adults. Following primary bariatric cases, older adults had significantly higher readmission rates compared to younger adults in the presence of male gender, Caucasian race, ASA 3, COPD, or after LSG. Following revisional cases, older adults had significantly higher readmission rates than middle-aged and younger adults, respectively, in the setting of pre-operative chronic steroid use.

**Conclusions:** Overall, older adults had worse short-term outcomes compared to their younger counterparts following primary and revisional cases. Further research is required to investigate these findings with the goal of targeting interventions to improve outcomes among bariatric surgical patients.

**P666****Bariatric Surgery in Elderly, What Is the Cut Off Age?**

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**Background:** Surgical treatment of obesity in the elderly remains controversial. As life expectancy increases, more elderly patients fit into the criteria for bariatric surgery. The aim of our study is to evaluate the safety and efficacy of bariatric surgery in elderly patients and determine whether a cut off age for bariatric surgery in the elderly is warranted.

**Methods:** This is a Retrospective study using the MBSAQIP 2015. Data were collected for demographics, Readmissions, and comorbidities. Postoperative outcomes evaluated include Myocardial infarctions, cardiac arrest, postoperative pneumonia, sepsis, unplanned intubations, Urinary tract infections and other complications. Findings were compared between groups and results were calculated using ASPSS 24, Chi Sq. and T-test.

**Results:** The data base includes 168,009 patients, of which 22,339 were >60 years old. Those patients >60 were classified into 3 groups: 60–70 (G60; 20,468 pts) 71–80 (G70; 1871 pts) and >80 (G80; 32 pts). Females comprised the majority of each group (75% G60; 66.6% G70; and 71.9% G80). BMI differed between groups: 42 kg/m<sup>2</sup>+10 in G60; 39.35 kg/m<sup>2</sup>+11.8 in G70; 34.7 kg/m<sup>2</sup>+10 in G80. G80 averaged one comorbidity/patient whereas the other groups had 5 comorbidities/patients. Preoperative incidence of DM, Renal insufficiency, Hypertension, Obstructive sleep apnea and Hyperlipidemia were the least in the G80 group. G80 had the highest incidence of post-operative complications: Acute renal failure (3.1%, p=0.009), Myocardial infarction (3.1%, p=0.000), postoperative pneumonia (6.3%, p=0.001), Sepsis (3.1%, p=0.007), reoperation in the first 30 days (9.4%, p=0.01), Post-Operative UTI (6.3%, p=0.000), unplanned intubation (3.1%, p=0.005), and cases requiring ventilation postoperatively (3.1% p=0.000). G80 had the least incidence of renal insufficiency preoperatively (1.6% in G60, 2.2% in G70 and 0% in G80, p=0.05) but developed the highest rate of postoperative acute renal failure (3.1%). Pre-Operative Pulmonary comorbidities were greatest in G60 and G70. Post-operative ventilation was higher in G70 than G60 (0.5% versus 0.2%, p=0.001).

**Conclusions:** Although the oldest patients in this study had the fewest preoperative comorbidities, they had the highest incidence of complications. Patients over 80 should be approached with caution when considering bariatric surgery. Patients between 60 and 80 should be monitored closely for pulmonary complications. More aggressive pulmonary toilet may be necessary to avoid complications in this group.

**P667****C-Reactive Protein as a Predictor of Postoperative Complications in Bariatric Surgery Patients**

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**Introduction:** The primary objective of this study was to evaluate the utility of CRP in early identification of post-operative complications after bariatric surgery. The ability of this marker to acutely predict post-operative complications in bariatric surgery patients has not been determined.

**Methods:** A retrospective chart review was conducted of adult patients who underwent a primary and revisional laparoscopic Roux-en-Y gastric bypass (LRYGB) or sleeve gastrectomy (LSG) between 2013 and 2017 at a single institution. Patients were identified using the prospective Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program database. CRP levels were drawn on post-operative day one per standard protocol. Univariate analyses were performed to determine the predictive impact of CRP levels on post-operative complications, readmissions, and reoperations.

**Results:** There were 275 patients who underwent bariatric surgery, 222 primary and 53 revisional. Of the 275 patients, 33 (12.0%) had a complication. Patients with a 30-day post-operative complication had higher CRP levels compared to those who did not ( $5.1 \pm 4.7 \text{ mg/dL}$  vs  $2.9 \pm 2.0 \text{ mg/dL}$ ;  $p=0.02$ ) (Table 1). A CRP $\geq 5 \text{ mg/dL}$  had a sensitivity for a complication of 27% and a specificity of 88%. Primary bariatric surgery patients with a post-operative complication had higher CRP levels compared to those who did not ( $4.9 \pm 4.9 \text{ mg/dL}$  vs  $2.8 \pm 1.9 \text{ mg/dL}$ ;  $p=0.008$ ). There was no difference in CRP levels for patients with a 30-day reoperation or readmission. There were no mortalities.

**Conclusions:** Bariatric surgery patients with elevated post-operative CRP levels are at increased risk for 30-day complications. The low sensitivity of a CRP $\geq 5 \text{ mg/dL}$  suggests that a normal CRP level alone does not rule out the possibility of a post-operative complication. However, with its high specificity, there should be an elevated clinical suspicion of a post-operative complication in patients with a CRP $\geq 5 \text{ mg/dL}$ .

**Table 1:** Univariate analysis of CRP levels (mg/dL) and 30-day post-operative outcomes

Variable	n (%)	Yes	No	p value
Complication	33 (12.0)	$5.1 \pm 4.7$	$2.9 \pm 2.0$	0.02*
Primary	20 (9.0)	$4.9 \pm 4.9$	$2.8 \pm 1.9$	0.008*
Revisional	6 (11.3)	$5.4 \pm 4.5$	$3.8 \pm 2.2$	0.36
Reoperation	9 (3.3)	$4.3 \pm 4.0$	$3.1 \pm 2.5$	0.22
Readmission	11 (4.0)	$7.2 \pm 7.4$	$3.0 \pm 2.0$	0.12

Values listed as mean  $\pm$  standard deviation

\*Indicates statistical significance ( $p \leq 0.05$ )

**P668****Single Institution Experience with Minimally Invasive Trans Gastric-Remnant ERCP in Patients with Previous Gastric Bypass**

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**Background:** The obesity epidemic in the United States has been accompanied by surge in bariatric surgery. Nearly 200,000 bariatric procedures were performed in the US in 2015, 23% of which involved Roux-en-Y gastric bypass (RNYGB). While RNYGB has proven an effective tool in combating obesity, it also alters a patient's anatomy in a way that makes traditional ERCP a difficult, if not impossible option for interrogating the common bile duct. One way to approach the post-RNYGB patient with obstructive jaundice is to access the peritoneal cavity via a laparoscopic/robotic approach followed by direct cannulation of the gastric remnant with a laparoscopic port, allowing passage of an endoscope. The aim of this study was to evaluate our single center experience with minimally-invasive transgastric ERCP (TG-ERCP) from 2010 to 2017.

**Methods:** We compiled a list of all patients who underwent laparoscopically or robotically assisted TG-ERCP at our institution from 2010–2017. We then examined patient demographics, procedural details, postoperative outcomes, and success rate, with success defined as cannulation of the ampulla, clearance of obstruction if present (stones/sludge/stenotic ampulla), and completion imaging of the biliary and pancreatic ducts.

**Results:** 40 patients were included in the study. 2 cases were performed robotically (5%), and 38 laparoscopically (95%). ERCP was successful in 36 cases (90%). All 4 unsuccessful attempts were aborted when the endoscopist was unable to pass the scope through a tight pylorus. Median time of operation was 163 minutes (199 minutes if concomitant cholecystectomy was performed, 159 minutes if not). Median length of stay after operation was 2 days (range 1–14 days). Median estimated blood loss (EBL) was 50 mL. Post ERCP pancreatitis occurred in 3 patients (8.3%), and was mild and self limited in all cases. 2 patients had postoperative bleeding requiring transfusion. Both of these had concomitant cholecystectomy.

**Discussion:** In patients with biliary obstruction and anatomy not suitable for traditional ERCP, TG-ERCP is a viable option. It can be performed with a minimally invasive fashion (either laparoscopically or robotically) with a high success rate and low morbidity. As the population of patients who have undergone RNYGB continues to grow, so does the likelihood of encountering one with obstructive jaundice. TG-ERCP, therefore, should be thought of as an essential tool in the armamentarium of the general surgeon.

**P669****Predictors of Laparoscopic Versus Open Inguinal Hernia Repair**

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**Introduction:** Inguinal hernia repair is among the most common procedures performed by general surgeons. Prior investigation indicates an individual surgeon's experience with minimally invasive surgery (MIS) determines utilization. This study aimed to identify the effect of other factors, such as hospital, surgeon and patient demographics, as predictors of laparoscopic versus open inguinal hernia repair.

**Methods:** We conducted a retrospective analysis of 342,814 inguinal hernia repairs performed in adults ( $\geq$ age 18) from 2010–2015, using the Premier Perspective Database. Included were 241,669 open and 101,145 laparoscopic procedures. Multivariable logistic regression was used to estimate the adjusted odds ratio of taking a laparoscopic approach compared to a reference group, with respect to ten demographic variables.

**Results:** Use of laparoscopic MIS versus open inguinal hernia repair increased from 2010–2015 (Table 1). MIS repairs were more likely: if surgeons had larger inguinal hernia repair caseloads ( $\geq$ 45/year; OR=1.57, CI=1.53–1.60,  $p<0.0001$ ), at large hospitals ( $>500$  beds; OR=1.36, CI=1.33–1.39,  $p<0.0001$ ), and in New England (OR=2.38, CI=2.29–2.47,  $p<0.0001$ ). Likelihood of MIS was higher in patients  $<$ age 65 (OR=1.28, CI=1.24–1.31,  $p<0.0001$ ), males (OR=1.31, CI=1.27–1.34,  $p<0.0001$ ), patients with private insurance (OR=1.36, CI=1.33–1.40,  $p<0.0001$ ) and those not White, Black or Hispanic (OR=1.11, CI=1.09–1.14,  $p<0.0001$ ). Likelihood of MIS decreased by 13% with a one-unit increase in Charlson Comorbidity Index (CCI) value (OR=0.876, CI=0.865–0.886,  $p<0.0001$ ). Non-predictors included urban/rural hospital location (OR=1.02, CI=0.10–1.05,  $p=0.06$ ) and hospital teaching status (OR=1.01, CI=0.99–1.03,  $p=0.2084$ ).

**Conclusions:** While the majority of inguinal hernia repairs are still open procedures, use of laparoscopic MIS is rising. Increased surgeon experience with inguinal hernia repair (higher annual caseload) remains a top predictor of MIS, along with hospital size and location. Additional study is necessary to understand links between patient age group, gender, race, insurance type and CCI as predictors of MIS for inguinal hernia repair.

**P670****Comparison of Long Term Surgical Outcomes Between T3 and T4 Level of Thoracoscopic Sympathectomy in Patients with Primary Palmar Hyperhidrosis**

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**Introduction:** Primary palmar hyperhidrosis (PH) is a pathological condition of over perspiration caused by body produces an excessive amount of sweat. This disorder affects to decrease quality of life of patients. Thoracoscopic sympathectomy is minimally invasive and an effective procedure to treat hyperhidrosis. Different of level of sympathectomy has been debate for the best outcomes. Many researchers studied about short term outcomes but no empirical research evidences long term outcomes of thoracoscopic sympathectomy in Thailand. This study purposed to evaluate and compare the long term clinical outcomes between patients who underwent T3 and T4 thoracoscopic sympathectomy for PH with particular attention to patient satisfaction and quality of life.

**Methods and Procedures:** Sixty patients with PH underwent thoracoscopic sympathectomy. Patients were divided into two groups by the level of thoracoscopic sympathectomy as T3 group and T4 group. They were investigated the improvement of sweating, compensatory sweating, satisfaction and quality of life. The long-term investigation was designed to examine clinical outcomes at before surgery, six months after surgery, 1 year after surgery, 3 years after surgery, and last follow up days were compared within group and between of T3 and T4 group. They were subjected to telephone interview using multiple questionnaires to investigate surgery outcomes, degree of satisfaction, and quality of life improvement.

**Results:** Sixty patients responded to the telephone interview. Patients demographic data and also recurrence rate of PH between T3 and T4 group was not significant different ( $p=0.353$ ). Both groups improved severity of sweating without any statistical significant. But the T4 thoracoscopic sympathectomy led to significantly lower incidence of compensatory hyperhidrosis when compared with T3 group at back and trunk sites. The T4 group had higher overall satisfaction than T3 group with was not significantly different. Long term result are followed after 3 years.

**Conclusions:** There was no difference in decreasing severity of sweating between T3 and T4 level of thoracoscopic sympathectomy. Both group equally archived patient satisfaction. But the T4 level of thoracoscopic significantly had lower severity of CH and better quality of life in long term period.

**P671****Ten-Year Outcomes of Pyloroplasty in Adult Gastroparesis**

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**Introduction:** Gastroparesis (GP) is a chronic, debilitating disease that presents with nausea, vomiting, abdominal pain and gas bloat in the setting of delayed gastric emptying without mechanical obstruction. Treatment goals are symptom control and maintenance of nutrition through medical, dietary and surgical therapies. Previously, we reported that minimally invasive pyloroplasty significantly improved patients' symptoms on short-term follow up. The aim of this study is to report the long-term course and outcomes for the same cohort.

**Methods and Procedures:** The 28 patients, who formed the previously published cohort, were contacted and their charts were reviewed. Follow-up visits, symptom severity scores, and any subsequent medical or surgical interventions were collected. Symptoms were assessed using the symptom severity score (SSS) and the gastroparesis cardinal symptom index (GCSI) questionnaires. Success was defined as a SSS of 2 or less.

**Results:** Out of 28 original patients, 15 patients (2 males, 13 females) were available for follow-up (2 patients declined participation, 9 were lost to follow-up, 1 patient was deceased, and 1 was excluded after undergoing esophagectomy for unrelated indication). At a median follow-up of 115 months the initial improvements were stable for a majority of patients. Successful palliation of symptoms was seen in 80% for vomiting, and in 67% for nausea, abdominal pain, and gas bloat. Median total GCSI score was 15 (mild). Only 1 (7%) patient still uses a prokinetic medication. A total of 11 adjunct GP treatment interventions were recorded in 6 patients (40%): (4 percutaneous endoscopic gastrostomy tube (PEG), 3 jejunostomy tube (J-tube), and 4 Gastric stimulator implantation) at some point of their follow-up.

**Conclusion:** Initial palliation of symptoms is stable 10 years following pyloroplasty for gastroparesis. The majority of patients do not require adjunctive surgical interventions. Contemporary algorithms for treatment of gastroparesis should include early surgical intervention.

Patients	15
Age	56 (71-30)
Gender	13:2 (F:M)
BMI	25.6
Patients with adjunct GP interventions	6
PEG	4
Gastric Stimulator	4
J-tube	3
Prokinetics	1
Nausea: 2 or less on SSS	10
vomiting: 2 or less on SSS	12
Abdominal pain: 2 or less on SSS	10
Gas bloat: 2 or less on SSS	10
Median total GCSI	15

BMI: body mass index

**P672****Laparoscopic Management of Pseudocyst of Pancreas in Pediatric Patients**

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**Introduction:** Acute pancreatitis due trauma is commonest cause of pseudocyst in pediatric age. Due to limited literature available and under diagnosis by pediatricians, the true incidence of pseudocyst in 4–12 age group is not known.

**Material and Methods:** Retrospective analysis of 10 pediatric age (4–12 years) patients who underwent laparoscopic cystogastrostomy at distric teaching hospital was done. Patients data, presentation, investigations, operation done and post operative course was studied.

**Result:** Total of 10 patients (8 males & 2 females) had mean age of 6.5 years, mean weight of 25 kg. Etiologies included blunt abdominal trauma (6), idiopathic (3), gallstones (1). Average cyst diameter was 6.5 cm. Laparoscopic cystogastrostomy by transgastric approach was successfully possible in 10 cases with no conversion. Cystogastrostomy was performed using sutures in 5 patients and ultrasonic energy device in 5 patients. Gastrotomy was closed with sutures in all 10 cases. Mean operative time was 98 minutes. Post operative imaging at 3 months revealed no persistence or recurrence of cyst.

**Conclusion:** Minimally invasive laparoscopic approach for chronic pancreatic pseudocyst in pediatric age group is safe and effective strategy and should be adopted as primary modality of treatment.

**P673****Videoscopic Transareolar Thyroidectomy**

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**Introduction:** Videoscopic neck surgery is developing despite the fact that only potential spaces exist in the neck. Gagner first described the endoscopic subtotal parathyroidectomy with constant CO<sub>2</sub> gas insufflations for hyper-parathyroidism in 1996. The cervical approach utilizes small incisions in the neck thus making it cosmetically unacceptable and cannot be used for lesions greater than 4 cm. The axillary approach makes it difficult to visualize the opposite lobe. The anterior chest wall approach utilizes port access at various positions on the anterior chest wall depending on the surgeon. This technique also allows bilateral neck exploration. Hence we have been able to perform total thyroidectomies with central compartment clearance for papillary carcinoma and near-total thyroidectomies for large multinodular goiters,

**Materials and Methods:**

Three incisions  
Subplatysmal plane  
Pneumoinsufflation with carbon dioxide (CO<sub>2</sub>)  
Ports  
Creating a subplatysmal plane  
Dissection begins at the inferior pole  
Posterior dissection  
Clipping superior thyroid vessels  
Specimen freed up  
Thyroid lobectomy was performed in the twenty cases.  
The average blood loss was 40 ml  
Mean operative time was 85 min  
There were no complications and no cases were converted to open.  
There were no cases of recurrent laryngeal nerve injury or postoperative tetany.  
No subcutaneous emphysema, ecchymosis or hypercarbia was observed in any patient.  
All patients were discharged on the second postoperative day except the first on the fifth day.  
In conclusion this approach seems to be safe in case of unilateral lobectomy but early to say it is superior to conventional thyroidectomy especially in total thyroidectomy.

**P674****A Longitudinal Evaluation of Hospital Admission Lengths Following Laparoscopic Sleeve Gastrectomy Performed by a Single Surgeon**

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**Introduction:** Laparoscopic sleeve gastrectomy (LSG) is one of the most commonly performed weight loss surgeries. Prolonged hospital admissions are associated with both increased morbidity and mortality and increased strain on the health care system; studies are now investigating the safety and feasibility of outpatient LSG. This study examined a single surgeon's postoperative admission trends for patients who underwent LSG. The patients were divided into two cohorts based on the date of surgery, and we hypothesize institutional experience has a significant impact on post-operative stay and hospital readmission risk.

**Methods:** This is a retrospective study on LSGs performed by a single surgeon in a tertiary center from 2012–2017. Inclusion criteria: patients >18 years old, BMI >35 with comorbidities or BMI >40, and patient approval by the Bariatric Surgical Program in Victoria, British Columbia. Patients with prior weight-loss surgery were excluded. Patients were discharged home on a care plan involving: nurse and surgeon telephone follow-ups within one week post-surgery. Patients were divided into two cohorts: Cohort A (procedures between 2012–2014 inclusive) and Cohort B (procedures between 2015–2017 inclusive).

**Results:** 323 patients were included in this study: 265 females (82.0%) and 58 males (18.0%). The mean preoperative age was 46.8±10.5 years, and the mean preoperative BMI was 45.4±5.72 kg/m<sup>2</sup>. The average postoperative discharge day for the population was day 1.69±0.85 and the average OR time was 53.9±20.6 minutes.

	Table 1. Patient population of each respective cohort.	
	Cohort A	Cohort B
<b>N</b>	123	200
<b>Female</b>	0.85	0.80
<b>Male</b>	0.15	0.20
<b>Average Age</b>	47.4 ± 11.3	46.4 ± 10.0
<b>Average BMI</b>	44.64 ± 5.70	45.39 ± 5.70

	Table 2. Comparison of average post-operative day (POD) discharge for Cohort A and Cohort B.		
	Cohort A	Cohort B	P value
<b>Average POD</b>	2.32	1.29	<0.05

One patient in Cohort B was re-admitted POD8 with a diagnosis of postoperative edema managed conservatively and is included in the analysis as POD1. A second patient in Cohort B returned to hospital (POD21) for abdominal pain and was managed conservatively as outpatient.

**Conclusion:** There was a significant difference in the average postoperative discharge day between patients in Cohort A and Cohort B who underwent LSG with patients in Cohort B requiring a shorter average admission time. This study suggests that with increasing institutional experience and a postoperative discharge plan, patients undergoing LSG may be discharged on postoperative day one safely.

**P675****Micro-laparoscopic Cholecystectomy. Texas Endosurgery Institute Experience**

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**Introduction:** Minimally invasive techniques have revolutionized the art of the surgical practice. The laparoscopic approach to cholecystectomy has become the gold standard and is the most common laparoscopic general surgery procedure worldwide. In an effort to further enhance the advantages of laparoscopic surgery, even less invasive methods have been attempted, including smaller and fewer incisions. The objective of this study was describing our results of 22 years of needlescopic cholecystectomy.

**Methods:** Since March 1995 all patients that underwent to needlescopic cholecystectomy micro-laparoscopic procedure with instruments of 3 mm were included in this study in a prospective database and the information was analyzed.

**Results:** Between March 1995 and September 2017, 638 needlescopic cholecystectomies have been done at Texas Endosurgery Institute in San Antonio, Texas by a single surgeon. 86% of the patients were female. The average age was 41.9 (range of 14–82 years old). Average operating time was 59.3 minutes (range of 30–200 minutes). The 200-minute operation required laparoscopic CBD exploration, accounting for the extended time. Average estimated blood loss (EBL) was 15 cc (range of 5–50 cc). 2% of cases required conversion to standard 5 mm cholecystectomy and was completed without incidents. All patients were followed up at 2 weeks, 4 weeks, and 6 months after the procedure. Only 1 patient presented with a hernia at the umbilical site. Otherwise no wound, bile duct, bile leak, bleeding or thermal injury complications were identified.

**Conclusions:** Micro-laparoscopic procedures with 3 mm instruments in this specific procedure of Needlescopic cholecystectomy is safe and feasible, and is a cosmetic alternative to the standard laparoscopic cholecystectomy.

**P677****Diagnostic Evaluation of Sentinel Lymph Node Biopsy Using Indocyanine Green and Infrared or Fluorescent Imaging in Gastric Cancer: A Systematic Review and Meta-analysis**

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**Objective of the Study:** Sentinel node navigation surgery (SNNS) in gastric cancer has been investigated for almost two decades in an effort to reduce operative morbidity. Indocyanine green (ICG) with enhanced infrared visualization is one technique with increasing evidence for clinical use. We are the first to systematically review and perform meta-analysis to assess the diagnostic utility of ICG and infrared electronic endoscopy (IREE) or near infrared fluorescent imaging (NIFI) for SNNS exclusively in gastric cancer.

**Methods and Procedures:** A search of electronic databases MEDLINE, EMBASE, SCOPUS, Web of Science and the Cochrane Library using search terms “gastric/stomach” AND “tumor/carcinoma/cancer/neoplasm/adenocarcinoma/malignancy” AND “indocyanine green” was completed in May 2017. All human, English language randomized control trials, non-randomized studies, and case series were evaluated. Articles were selected by two independent reviewers based on the following major inclusion criteria: (1) diagnostic accuracy study design; (2) indocyanine green was injected at tumor site; (3) IREE or NIFI was used for intraoperative visualization. The primary outcomes of interest were identification rate, sensitivity and specificity. 327 titles or abstracts were screened after removing duplicates. The quality of all included studies was assessed using the Quality Assessment of Diagnostic Accuracy Studies-2.

**Results:** Ten full text studies were selected for meta-analysis. A total of 643 patients were identified with the majority of patients possessing T1 tumors (79.8%). Pooled identification rate, diagnostic odds ratio, sensitivity and specificity was 0.99 (0.97–1.0), 380.0 (68.71–2101), 0.87 (0.80–0.93) and 1.00 (0.99–1.00) respectively. The summary receiver operator characteristic for ICG+IREE/NIFI demonstrated a test accuracy of 98.3%. Subgroup analysis found improved test performance for studies with low risk QUADAS-2 scores, studies published after 2010 and submucosal ICG injection. IREE had improved diagnostic odds ratio, sensitivity and identification rate compared to NIFI. Heterogeneity among studies ranged from low ( $I^2 < 25\%$ ) to high ( $I^2 > 75\%$ ).

**Conclusions:** The idea of SNNS in gastric cancer is intriguing because of the potential to limit operative morbidity. We found encouraging results regarding the accuracy, diagnostic odds ratio and specificity of the test. The sensitivity was not optimal but may be improved by a carefully planned and strict protocol to augment the technique. Given the limited number and heterogeneity of studies, our results must be viewed with caution.

**P676****Three-Year Cases Report of Transoral Endoscopic Thyroidectomy Vestibular Approach (TOETVA) in Thyroid Cancer from 2014–2017**

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**Introduction:** Transoral Endoscopic Thyroidectomy Vestibular Approach (TOETVA)’s an upcoming surgical technique. There’re total of 680 TOETVA cases performed in Police General Hospital from March 2014–July 2017. There’s still less report about thyroid cancer cases in TOETVA. This study reviews all cases of thyroid cancer which surgery were performed. There were 47 cases of TOETVA in thyroid cancer and 7 cases of opened thyroidectomy.

**Objective:** To review and report in terms of surgical outcome, complication, post-surgical treatment and recurrence in all cases of thyroid cancer surgery, especially in TOETVA technique.

**Material and Methods:** From March 2014–July 2017 in Police General Hospital, a total of 680 patients underwent TOETVA with 47 cases of TOETVA in thyroid cancer and 7 cases of opened thyroid surgery in thyroid cancer. All patients were recorded in multiple parameters.

**Results:** This study have total of 54 thyroid cancer cases which 7 cases (13%) were male and 47 cases (87%) were female, with an average age of 38.

Most clinical presentation was thyroid mass or nodule which was at 52 cases (96.3%), 1 case (3.7%) was non-toxic goiter and 1 case (3.7%) was Grave disease. The clinical presentation mean time was 2.6 years (2 weeks–13 years). There were 36 cases (66.7%) with a mass at right lobe, 15 cases (27.8%) with a mass at left lobe, and 3 cases (5.6%) with mass at both lobes. The size of thyroid mass was  $3.5 \pm 2.3$  centimeters (1–15 centimeters). There were 49 cases (90.7%) had euthyroid, 1 case (1.8%) had subclinical hyperthyroid, 2 cases (3.7%) had subclinical hypothyroid, and 2 cases (3.7%) had hyperthyroid.

For type of surgery, there were 47 cases (87.04%) of TOETVA surgery and 7 cases (12.96%) of opened total thyroidectomy. Most patients at 41 cases (75.9%) didn’t have any post-operative complication. And there were hypothyroid 5 cases (9.35%), transient hypocalcemia with no symptom 6 cases (11.1%), and transient hoarseness 2 cases (3.7%).

After TOETVA surgery performed, 24 cases (44.4%) were redo completion thyroidectomy, 19 cases (79.2%) were transaxillary completion thyroidectomy, 4 cases (16.7%) were redo TOETVA, and 1 case (4.2%) deny for re-operation. And 18 cases (75%) didn’t have any complication after redo surgery, 3 cases (12.5%) were hypothyroid, 2 cases (8.32%) were hypocalcemia and hypoparathyroid, and 1 case (4.2%) was transient hoarseness.

After did thyroidectomy, ultrasound neck shown that 47 cases had no residual or recurrence thyroid mass, 7 cases had residual thyroid tissue. All cases received radioactive iodine ablation. Radionuclide total body scan showed no evidence of distant functioning metastasis.

**Conclusion:** Three-year short-term followed up TOETVA in thyroid cancer has shown less complication and no recurrence cancer.

**P678****Single Incision Laparoscopic Surgery in a Government Setup**

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**Objective:** To evaluate the feasibility, cost effectiveness and safety of Single incision laparoscopic surgery using routine laparoscopic instruments.

**Method:** 64 cases of acute appendicitis and 56 cases of symptomatic gallstone disease were included in study. 120 cases were enrolled in study and prospective observational study was performed. Ruptured appendicitis/abscess formation were excluded from study. Similarly Empyema Gallbladder/Gallbladder perforation were also excluded.

**Results:** Total 120 cases included: 64 cases of Appendicitis and 56 cases of symptomatic Cholelithiasis.

Mean age of appendectomy group was  $28.71 \pm 9.69$  years and mean age of cholecystectomy group was  $36.71 \pm 10.48$  years. In our study, Mean operative time for SIL Appendectomy was  $42.04 \pm 5.74$  min. Post-operative fever was noted in 10 cases (14.25%). Mean post-operative pain as per VAS score taken after 24 hours, on POD 2 was 2.14. Average post op stay in hospital was 2.14 days, Port site infection occurred in one case (4.17%). Patient satisfaction score obtained on the scale of 1–10 on one month follow up was 7.95, while scar cosmesis score was 7.9.

In our study, 56 cases underwent SIL cholecystectomy, of which 21 were male (36.8%) and 35 were females (41.2%), and mean age of patients was 36.71 yrs. Mean operative time in our study was 75.21 min, Mean post-operative pain taken on POD 2 as per VAS score was 2.91, Mean post-operative hospital stay was 2.1 days, Port site infections occurred in 2 cases. Post-op fever was noted in 6 cases, post-operative patient satisfaction score obtained at 1 month follow up was 7.73 and Scar score of 7.84 on the scale of 0–10. No case required drain placement and conversion.

**Conclusion:** SILS can be performed using conventional laparoscopic instruments especially in a government setup where per capita economic burden to patient will be less. Though it has more operative time, it has comparably less post-operative hospital stay, causes less pain, and has significantly more patient satisfaction regarding post-operative scar and cosmesis.

Since SILS has more patient acceptance and satisfaction, it can be offered to all patients undergoing laparoscopic surgery. It is very useful in government setup where lower economic class of patients will also benefit, irrespective of unavailability of special instruments and financial constraints, as it can be performed using routine laparoscopic instruments.

**P679**

### Efficacy of Laparoscopic Sleeve Gastrectomy and Laparoscopic Roux-en-Y Gastric Bypass and Post-operative Changes in Incretins and Appetite-Controlling Hormones in the Native Hawaiian Population

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**Introduction:** Obesity and its related co-morbidities affect Native Hawaiians at an alarmingly higher rate, particularly when compared to non-Hispanic whites. Laparoscopic Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (LSG) have been shown to be effective therapies for obesity. Their efficacy, effect on diabetes (DM), and effect on the brain-gut axis specifically in the Native Hawaiian (NH) population, however, are not known. This pilot study reports their efficacy and characterizes their effects on fasting blood glucose levels, HbA1c, and changes in the hormonal brain-gut axis to address the impact of obesity and bariatric surgical therapy on this underserved population.

**Methods and Procedures:** Twenty-Six NH patients with DM were prospectively randomized to undergo either RYGB or LSG. Patients were followed for 2 years with primary end points consisting of total weight loss (TWL), percent excess body weight loss (%EBW) and impact on DM as measured by fasting blood glucose (FBS) and HbA1c. In addition, baseline, 1 week, and 1, 6, 12, 18, and 24 months post-operative levels of glucagon-like peptide (GLP-1), peptide YY (PYY), leptin, and ghrelin were collected.

**Results:** A total of 25/26 patients completed follow-up. The %EBW at 1 year for RYGB and LSG were 54% and 49%, respectively. Resolution of DM occurred in 22/25 patients, the remaining three subjects were in the LGS arm. Pre-operative FBS in LRGYB and LSG groups, were 127 and 131, respectively. Pre-operative HbA1c in the RYGB and LSG groups, were 7.06 and 7.15, respectively. FBS at 1 year for RYGB and LSG were 93 and 110, while HbA1c for RYGB and LSG were 5.89 and 6.54, respectively. A consistent post-operative decrease in FBS was only seen in RYGB. RYGB ghrelin percentages increased at 6, 12, and 18 months, while levels decreased in LSG. Leptin percentages decreased in both groups. The PYY levels remained relatively unchanged in both groups. RYGB GLP-1 levels increased at 1 week, 6, 12, and 18 months. LSG GLP-1 trends were similar except at 18 months where GLP-1 levels decreased.

**Conclusion:** RYGB and LSG resulted in equivalent post-surgical weight loss and resolution of DM in the NH population. Ghrelin levels decreased with LSG and increased with RYGB possibly from a compensatory response in RYGB. Leptin and GLP-1 levels decreased in both groups. GLP-1 levels, however, decreased in LSG at 18 months consistent with decrease in %EBW and likely efficacy; suggesting a more durable metabolic response from RYGB.

	RYGB				LSG					
	Mean % dec	1 week	6 mos	12 mos	18 mos	Mean % dec	1 week	6 mos	12 mos	18 mos
Ghrelin	31	-13.3	-39.1	-23.9	-23.9	Ghrelin	-4.72	55.2	5.41	55.9
Leptin	40.5	62.5	65	63.3	34.4	Leptin	29.8	36.4	41.2	
PYY	-16.8	-32.3	-14.5	0.488	15.2	PYY	-0.34	-3.5	16.4	
GLP-1	-357	-405	-137	-130	-266	GLP-1	-157	-209	73.3	
FBS	12.4	15.9	14	14 FBS	10.1	FBS	-18.4	4		
HbA1c	7.32	9	9.1	HbA1c	-4.36	HbA1c	-1.44	-3.88		

Tables:

**P680**

### Surgical and Mid Term Neurological Outcome of Video Assisted Thymectomy in Patients with Myasthenia Gravis: A Prospective Observational Study

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**Objective:** Video assisted thoracoscopic thymectomy (VATS) has emerged as a minimally invasive alternative to the standard transsternal approach. We present herewith the surgical and neurological outcomes after VATS thymectomy in the patients with Myasthenia Gravis.

**Methods:** This is a prospective observational study carried out between April 2012 and May 2017. The primary objective was analysis of surgical and neurological outcomes. All myasthenia gravis patients referred for thymectomy were evaluated, their demographic and disease profile was recorded. Patients were classified according to Osserman classification. Contrast enhanced CT scans were done to rule out thymoma. Ninety out of 98 patients were found suitable and underwent video-assisted thymectomy. Their Operative time, blood loss, conversion rate and post operative parameters like intensive care unit (ICU) stay, inter-costal drainage (ICD) indwelling time, hospital stay were recorded. Neurological outcomes were assessed based on Myasthenia Gravis Foundation of America (MGFA) post intervention status classification. Statistical analysis was done using STATA 14 software.

**Results:** Ninety patients underwent thoracoscopic thymectomy during the study period. VATS was done through right approach in 47 (53.4%), left approach in 33 (38%) bilateral approach in 6 patients (7%) and subxiphoid approach in 2 (2.2%). There was conversion to open approach in 2 (2.2%) patients due to dense adhesions. Mean operative time was 145.9 min (SD=31.11). No major intra-operative complications occurred. None of the patients had accidental phrenic nerve injury. Only 4 patients needed post operative ICU stay; 2 for 1 day and 2 for 10 days. Median ICD indwelling time was 2 days and median post operative hospital stay was 4 days. There was no mortality. Histology showed 45% thymic hyperplasia, 41% thymoma and 14% normal thymus. The ectopic thymus was found in 20 out of 86 patients (23.2%). At a median follow-up of 32.5 months, 64 patients had completed one year follow up and were analyzed for neurological outcome. Sixteen (25%) patients showed complete stable remission (CSR) and 82.7% patients showed an overall improvement with a significant reduction in dosages of pre-operative medications. Osserman grade 1 and 2a were found to be predictors of CSR.

**Conclusion:** Video-assisted thymectomy is a safe procedure and can be performed with minimal morbidity. It results in significant improvement of symptoms and reduction in drug dosage post-operatively.

**P681**

### Minimally Invasive Pericardic Window, Our Experience, Approaches and Surgical Technique, No More Open Surgery

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**Introduction:** In the year 2009 we started to practice the pericardic window by laparoscopy to diagnostic of head injury hidden in precausal trauma, although luckily for our society, this type of injury has decreased considerably, we have achieved an important number of patients and in the last year we have performed the procedure for another type of pathologies and also diversified the approach route according to the case.

**Objective:** Sharing accumulated experience in 8 years in the pericardic window practice by laparoscopy or thoracoscopy.

#### Material and Methods

#### Description of Cases

**Results:** During this period, we have accomplished 65 cases of laparoscopic pericardial window with two unique ports for the diagnosis of head injury in trauma precordial, additionally there were practiced 15 windows through traumatic trauma of which 4 have been derived in treatment of cardiac injury on this way, without performing open approach. In another scenario, we have performed 8 pericardial spill treatments for different causes by minimally invasive via. No complication or mortality associated with the procedure has been presented.

**Conclusions:** The pericardic window performed by a minimally invasive surgery is an effective, replicable strategy for the management of diagnosis and the medical and traumatic treatment of this pathology. Patient selection is key and work in multidisciplinary groups guarantees good results.

**P682**

### Therapeutic Strategy of Laparoscopic Endoscopic Cooperative Surgery for Gastroduodenal Tumors

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**Introduction:** In locally-treatable gastrointestinal tumors, laparoscopic endoscopic cooperative surgery (LECS) is a minimally-invasive technique that can avoid excessive resection of the gastrointestinal tract.

**Objective:** To share our therapeutic guidelines and surgical technique of LECS for gastroduodenal tumors.

**Subjects:** Nineteen patients who underwent LECS for gastroduodenal tumors (10 patients with gastric tumor and 9 patients with duodenal tumor). [Results] 1) Gastric tumors (9 GIST, 1 glomus): 1. Site of lesion was U (4 patients), M (3), or L (2). 2. Operative procedure was acquired in a stepwise manner from classical LECS (4 patients) to inverted LECS (2) to non-exposed endoscopic wall-inversion surgery: NEWS (4). 3. Operative outcome revealed no postoperative complications. 2) Duodenal tumors (6 adenoma, 2 M cancer, 1 ectopic pancreas): 1. Site of lesion was bulbous duodeni (1 patient), superior part (2), or descending part (6); 2. Operative procedure was ESD followed by laparoscopic continuous suture in a single seromuscular layer for patients with preoperatively confirmed or suspected cancer, or full-thickness resection followed by Albert-Lembert suture along the short axis for patients unable to undergo ESD. In all cases, C-tube was placed to prevent bleeding and perforation at the site of resection due to exposure to bile; 3. Operative outcome included successful endoscopic hemostasis upon bleeding from exposed vessel on postoperative day 4 in 1 patient and anastomotic leak in 1 patient. The event of anastomotic leak resolved after 14 days of bile drainage through C-tube and conservative therapy. Compared with 26 patients who underwent ESD alone, those who underwent LECS had significantly larger diameters of resected specimens and tumors ( $p < 0.05$ ) but no significant difference in the incidence of postoperative bleeding and delayed perforation.

**Conclusion:** For gastroduodenal tumors, LECS is a minimally-invasive and safe therapeutic option as it combines advantages of both laparoscopy and endoscopy. In particular, C-tube placement for bile drainage was effective in reducing exposure of the suture site to bile as well as supporting drainage after anastomotic leak.

**P683**

### A Less Invasive Single Port Laparoscopic Surgery of Transabdominal Preperitoneal Repair for Groin Hernia with One Needle Forceps

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**Introduction:** For the transabdominal preperitoneal repair (TAPP) for groin hernia, single port surgery (SPS) has been reported to reduce the abdominal wall damages. To reduce the length of the umbilical scar and to keep the view of triangulation, we use one needle forceps plus SPS.

**Patients and Methods:** From May 2014 to July 2017, 168 consecutive TAPP patients were retrospectively investigated. There were 139 male and 29 female. We use two 5 mm ports (1 for the scope and 1 for the operator's right hand forceps) through an umbilical multi-channel port and additional 3 mm needle instrument is pierced above the pubic bone. A 5 mm flexible scope allowed us to keep the triangular formation easily. We studied the safety and usefulness of this method from the viewpoints of operation time and the complications.

**Results:** Median operation time of single side hernia (135 cases) was 77 min (38–152) and the bilateral case (33 cases) was 139 min (91–269). Five cases needed one or two additional 5 mm ports, and one case with severe preperitoneal adhesion due to the previous prostate cancer surgery was converted to open method because of the venous bleeding. Other complications were 2 spermatic cord injury and 3 postoperative seroma that required the percutaneous puncture. Umbilical scars and the pierced needle instrument scars became gradually invisible within 1 or 2 months. There were no incisional hernia nor wound infections in our series. These data was comparable to the conventional laparoscopic hernia repairs.

**Conclusions:** Operation scars of this method had better cosmesis than the conventional TAPP or SPS TAPP, and there were no differences between our SPS-TAPP with one needle forceps and conventional method in operation time and the complication rate. Our method was demonstrated as a less invasive approach for laparoscopic groin hernia repair.

**P684**

### Initial Experience with Free Jaw Clip and Free Loop Plus for Reduced-Port Laparoscopic Total and Proximal Gastrectomy

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**Introduction:** We pioneered development of two devices, FJ (Free Jaw) Clip and F (Free) Loop Plus, to assist with reduced port surgery. The devices are made by CHARMANT, a local precision manufacturer.

**Clinical Application:** FJ Clip is a stainless steel that can be used to hold organs in the abdominal cavity. It is available in two sizes: 5 mm and 12 mm. The device is short, it has a strong grasp, and it causes no or only negligible organ damage. We have used FJ Clip in the performance of local gastric excision ( $n=13$ ), colectomy ( $n=8$ ), and cholecystectomy ( $n=50$ ) with no resulting difficulty. F Loop Plus is a 21G stainless steel loop-like device into which we can insert φ0.1 mm NT alloy thread, which we draw out extracorporeally via simple puncture.

Laparoscopic total and proximal gastrectomy. We made a small incision at the umbilicus and inserted a 12-mm camera port and 6-mm metal cannula. We placed two (left and right) epigastric ports. Retraction of the left hepatic lobe was easy with use of the 12-mm FJ Clip and a 6-mm Penrose drain. For #4 lymph node dissection, we used the FJ Clip to grasp the upper part of the stomach, inserted the F Loop Plus from the upper right abdomen. For #6 dissection, we grasped the pyloric vestibule and pulled it leftward. For dissection of the upper edge of the pancreas, we grasped the left gastrica arteriovenous pedicle and pulled it toward the abdomen. The FJ Clip's grasp and traction exerted on the stomach wall were strong and effective, and there was little organ damage. Reconstruction (Roux-Y) or double tract were performed within the abdominal cavity by hand-sewn purse string suture of the esophageal stump, insertion of an anvil, and use of an automated anastomosis device. We have experienced 2 total and 3 proximally cases to date, but there have been no complications, and both intraoperative bleeding and operation time were within normal limits.

**Conclusion:** We believe the FJ Clip and F Loop Plus will replace conventional forceps for various tasks in reduced port gastrectomy.

**P685**

### An Effective Method for Intraoperative Hemorrhage Control During Laparoscopic Partial Splenectomy

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**Abstract:** Background: Intraoperative hemorrhage control is a technical challenge to perform laparoscopic partial splenectomy (LPS). This study evaluated our new strategy with performing intraoperative splenic artery occlusion (ISAO) by bulldog clamp during LPS.

**Methods:** Patients with either focal benign splenic lesion or traumatic splenic rupture who underwent LPS from May 2011 to Sep 2017 at Westchina hospital of Sichuan university were included. All of the operations were performed by a single skilled surgeon. We divided our patients into two groups based on whether ISAO was used. Of them, 28 patients received ISAO for LPS and 26 patients received LPS without ISAO. Surgical skills and safety were evaluated.

**Results:** There were no significant differences in preoperative patients characteristics of the two groups. Significantly less intraoperative blood loss ( $78.1 \pm 34.0$  ml vs  $177.5 \pm 81.3$  ml;  $t=-6.4$ ,  $P=0.001$ ) were observed in group of ISAO. There were no significant differences between the ISAO group and without ISAO group in terms of the operative time ( $112.7 \pm 17$  min vs  $127.4 \pm 40$  min;  $t=-2.4$ ,  $P=0.21$ ), and transfusion rate (0/28, 0/26; Fisher=0, P=1), conversion rate (0/28, 0/26; Fisher=0, P=1), thrombocytosis (0/28, 0/26; Fisher=0, P=1), left subdiaphragmatic effusion (2/28, 2/26; Fisher=0, P=0.66), splenic vein thrombosis (0/28, 0/26; Fisher=0, P=1) and length of postoperative hospital stay ( $5.8 \pm 1.3$  days vs  $6.0 \pm 1.3$  days;  $t=3.58$ ,  $P=0.25$ ).

**Conclusions:** ISAO is technically feasible, safe surgical skills for patients received LPS, and its represents an effective method to decreased intraoperative blood loss.

**P686**

### Modular Laser-Based Endoluminal Ablation of Early Cancers: In-Vivo Dose-Effect Evaluation and Predictive Numerical Modelling

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**Background:** Endoscopic submucosal dissection enables en-bloc removal of early gastrointestinal neoplasms. However, it is technically demanding and time-consuming. Laser-based ablation (LA) techniques, are limited by the lack of depth penetration control and thermal damage (TD) prediction. Our aim was to evaluate a predictive numerical modelling (PNM) of the TD to preoperatively select the optimal power and exposure time enabling a controlled ablation down to the submucosa (SM). Additionally, the ability of confocal endomicroscopy (CE) to provide information on the TD was assessed.

**Methods:** The stomach of 21 Wistar rats (weight  $522 \pm 47$  g) was opened longitudinally. A Nd: YAG continuous laser source (wavelength 1064 nm, fiber surface  $0.28 \text{ mm}^2$ ) was directly applied on the gastric mucosa (M) at 10 randomly chosen spots (total  $n=210$ ). The energy applied ( $J=W \times s$ ) was randomly set, before each new LA, ranging from values of  $2.5-2-1.5-1-0.5$  W, applied during  $12-10-8-6-4-2-1$  s. This window was pre-determined experimentally, after observing that  $3 \text{ W} \times 1 \text{ s}$  and  $2.5 \text{ W} \times 13 \text{ s}$  were constantly leading to a full-thickness perforation. A total of 1050 Hematoxylin-Eosin stained slides, each containing 5 specimens (total  $n=5250$ ) were assessed to measure the damage ratio (R), defined as the ablation depth over the M+SM tissue thickness, using an image analyzer. Effective and safe ablation ( $R \leq 1$ ) was considered when the TD was containing M and SM but sparing muscular and serosa. CE was performed before and after LA. A PNM using finite element analysis with human tissue mechanical and optical properties, was applied and tested for accuracy in predicting the TD.

**Results:** There were no full-thickness perforations. At the histology, there was an increased damage depth per higher J applications. The R value at  $0.5 \text{ J}$  was  $0.57 \pm 0.21$ , and was significantly lower when compared to energies from  $15 \text{ J}$  ( $R=1.2 \pm 0.3$ ;  $p<0.001$ ) up to  $30 \text{ J}$  ( $1.33 \pm 0.31$ ;  $p<0.001$ ). Safe M and SM ablations were achieved applying lower P settings (0.5 and 1 W), at different t values, leading to an MP impairment only in 5 and 20% of the cases, respectively. CE provided relevant images of the TD, consisting in architecture's distortion and disappearance of the gland's contours. The predicted damage depth, demonstrated a significant positive linear correlation with the experimental data (Pearson's r 0.85; 95% CI 0.66–0.94).

**Conclusions:** Low-power laser settings achieved effective and safe ablation of the M and SM in this experimental model. The PNM enabled an accurate prediction of the future ablated layer and CE enabled real-time visualization of the TD. Further studies on larger animal models are required.

**P688****Needlescopic-Assisted Uniportal Thoracoscopic Pulmonary Anatomical Resection for Lung Cancer**Xu-Heng Chiang, MD<sup>1</sup>, Huan-Jang Ko, MD<sup>2</sup>, Shun-Mao Yang, MD<sup>2</sup><sup>1</sup>Division of Thoracic Surgery, Department of Surgery, National Taiwan University Hospital, <sup>2</sup>Division of Thoracic Surgery, Department of Surgery, National Taiwan University Hospital Hsin-Chu Branch

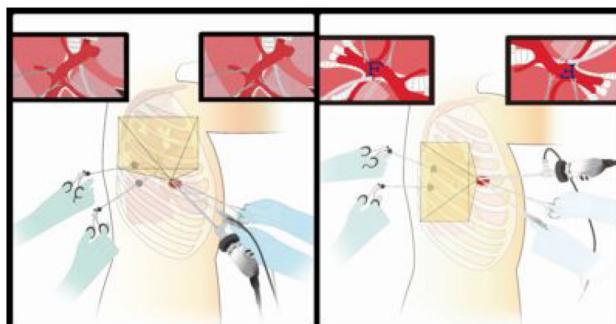
**Introduction:** Pulmonary anatomical resection is considered as standard treatment for early staged lung cancer. Uniportal video-assisted thoracoscopic surgery (uVATS) has recently showed favorable surgical outcomes, but remains technically demanding, especially in a complex procedure such as anatomic segmentectomy. Needlescopic instruments facilitates complex laparoscopic surgeries with nearly painless and scarless postoperative outcomes, however, its utilization of thoracoscopic surgery were mostly for minor procedures such as bullectomy and sympathectomy. We presented our initial experience of lung cancer surgery performed by uniportal VATS and additional needlescopic instruments, and we also compare the operative results with conventional uniportal VATS.

**Methods:** From December 2016 to August 2017, 75 consecutive patients with lung cancer undergoing anatomical lung resections including lobectomies and segmentectomies were reviewed retrospectively. Of these 75 patients, 39 patients received conventional uniportal VATS (uVATS), and 36 patients received needlescopic-assisted uniportal VATS (NA-uVATS). We compared the peri- and post-operative outcomes in these 2 groups.

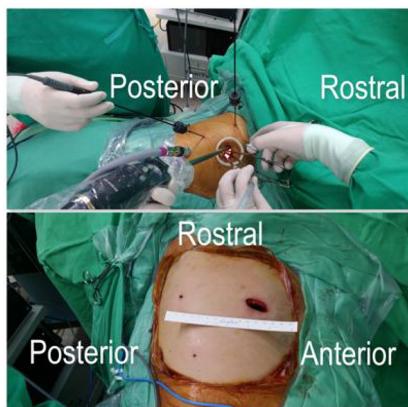
**Results:** There was no significant difference in demographic, anesthetic, or operative characteristics in two groups except for age. The mean operation time was statistically less in the NA-uVATS group ( $198.8 \pm 86.8$  min vs  $159.3 \pm 55.4$  min,  $p=0.023$ ). The intraoperative blood loss was significantly less in the NA-uVATS group ( $143.2 \pm 298.1$  mL vs  $40.9 \pm 56.7$  mL,  $p=0.047$ ). There were two major pulmonary arterial bleeding events and one conversion to thoracotomy in the uVATS group. The hospital stay, duration of chest tube drainage and post-operative pain scale were comparable in the two groups.

**Conclusion:** Under the assistance of additional needlescopic instruments, uniportal VATS can be performed more efficiently and safely without compromising its benefit in less postoperative pain and early recovery.

**Figure 1.** Needlescopic uniportal VATS setting illustration



**Figure 2.** Picture of needlescopic uniportal VATS

**P689****Overlapped Running Suture Method Using Single Knotless Barbed Absorbable Suture Material for Abdominal Wall Closure in Single Incision Laparoscopic Appendectomy: Comparison with Traditional Interrupted Closure Technique**

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**Purpose:** We applied the V-Loc 90 into abdominal wall closure in single incision laparoscopic appendectomy (SILA) from 2014. The aim of our study is to present our experience of abdominal wall wound closure technique using barbed suture in SILA and comparison of perioperative outcomes with conventional method of layer by layer abdominal wall closure after SILA.

**Methods:** From August 2014 to June 2015, SILA was performed on 160 patients with acute appendicitis at the department of surgery, Hallym sacred heart hospital. Under approval of Institutional Review Board, data concerning demographic characteristics, operative outcomes, postoperative complications were compared between both V-loc closure group and conventional layer by layer closure procedures.

In V-loc closure group, after removing the appendix, divided linear alba was closed using unidirectional absorbable barbed suture V-Loc 90 2-0 with continuous running fashion. Begins at the end of incision, and coming back with reinforced running. Subcutaneous closure was also done using same thread, and the subcuticular suture along incision line was performed with remaining portion of V-Loc.

**Results:** The demographic data of patients's characteristics were similar between the two groups. The use of barbed suture significantly reduced the suturing time for abdominal wall closure ( $p=0.014$ ) compared with conventional suture. The postoperative incision length was significantly shorter in V-loc group than conventional group ( $p=0.034$ ). The rate of surgical site infection were similar in both group. No incisional hernia were noted in both group with median follow up periods of 25.2 months. The total costs of the procedure were comparable in both group under Korean DRG system.

**Conclusions:** The use of barbed suture in abdominal wall closure in single port laparoscopic appendectomy is safe, and feasible method, reduces the suturing time, thereby decreasing the total operation time, and incision length with cosmetic effect.

**P690****Minimally Invasive Repair of Morgagni Hernias in Adult Patients**

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**Introduction:** Morgagni hernia is an anteromedial congenital diaphragmatic hernia seen in approximately 1 in 3000 live births and rarely identified in adulthood. Patients may be asymptomatic, have intermittent symptoms, or present acutely with incarceration/obstruction. Given this, surgical repair is recommended, but a standardized technique has not yet been described.

**Methods:** A prospectively collected hernia-specific database was queried for all adult Morgagni hernias performed at a tertiary hernia center. Demographics and peri-operative data were compared.

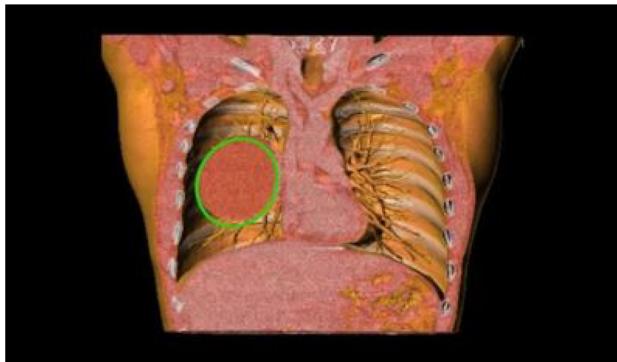
**Results:** From 1/2007 to 8/2017, 15 patients (86.7% female, median age  $63 \pm 13.8$  years, mean BMI  $33.1 \text{ kg/m}^2$ , range  $16.3\text{--}46 \text{ kg/m}^2$ ) were diagnosed with a Morgagni hernia. 86.7% of patients had previous abdominal surgery. The most common presenting symptoms were abdominal pain (66.7%), reflux (40.0%), obstruction (33.3%), or asymptomatic (20%). Two patients (13.3%) presented emergently with acute obstruction. Herniated organ(s) included: stomach (66.7%), colon (40.0%), small bowel (20.0%), omentum (66.7%), and incarcerated falciform/preperitoneal fat (26.7%). Patients underwent a laparoscopic (13) or robotic (2) repair. The most common (66.7%) method of repair included suturing mesh to the diaphragmatic portion of the defect and securing the anterior-inferior edge to anterior abdominal wall with transfascial sutures and/or tacks. Four patients (26.7%) underwent primary repair. Average defect and mesh size was  $37.2 \text{ cm}^2$  and  $226.4 \text{ cm}^2$ , respectively. Three patients (20%) underwent a concomitant paraesophageal hernia repair. Mean EBL and length of stay was 31 mL (range 10–125 mL) and 2.7 days (range 1–7 days). Postoperative morbidity included transient postoperative hypoxemia (2 patients) and pleural effusion (1). There was no mortality, mesh complications or recurrences with a mean follow-up of 36 months.

**Conclusions:** Morgagni hernias patients were more often older, obese, and women. These hernias remained unrepaired in 87% of patients despite their having had previous abdominal surgery. A laparoscopic or robotic approach offers an effective hernia repair with minimal complications, short hospital stay, and excellent long-term results for both elective and acute operations. Mesh repair, sutured to the diaphragm and sutured/tacked to the abdominal wall, appears to be a very successful means to repair larger defects.

**P691****Video Assisted Thoracoscopic Surgery in Pulmonary Hydatidosis**

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**Introduction:** Hydatidosis is a zoonotic disease caused by *Echinococcus granulosus*. It is endemic in the Mediterranean, South America and middle east. It is a systemic disease wherein lungs are the second most common organ involved, after liver. Radio-imaging plays an important role in diagnosing and determining the extent of the disease. Surgical enucleation of cyst has been the classical treatment for this disease. Bilateral lung involvement has been traditionally treated by median sternotomy or a bilateral thoracotomy. Video assisted thoracoscopic surgery (VATS) is an effective surgical approach in such settings.



**Materials and Methods:** At our center, we have operated 67 cases of pulmonary hydatidosis thoracoscopically over the past 3 years. In all cases, area around the cyst was cordoned off with 0.5% Cetrimide soaked gauze pieces. A pericystotomy is performed with ultrasonic shears & the germinal membrane is delivered en masse into an endo-bag. An air leak test after saline instillation into the cavity, is a standard part of the procedure.



For those cases with cysto-bronchial communications, the defect was sealed by either suturing or glue application.

Traditionally, bilateral cases & cysts larger than 10 cm in size were tackled by an open approach. But, in our experience, cyst size, bilaterality & presence of complications are not contraindications for VATS.

All cases are administered perioperative albendazole (400 mg twice a day, administered for three cycles of 21 days each, with a gap of 7 days in between) which helps in preventing recurrence and also takes care of any inadvertent intra-operative spillage.

Pulmonary disease	No. of cases	Duration of surgery (minutes)	Solitary Cyst	Maximum Cyst Size (cms)	Major Complications	Minor Complications
Cysts without bronchial communication	52	104.4	40 (76.9 %)	16.6	3 (5.7 %)	4 (7.6 %)
Cysts with bronchial communication	15	121.5	10 (66.7 %)	14.2	1 (6.6 %)	2 (13.3 %)

**Conclusion:** Traditionally, bilateral cases & cysts larger than 10 cm in size were tackled by an open approach. But, in our experience, cyst size, bilaterality & presence of complications are not contraindications for VATS.

Pulmonary hydatidosis can be treated by VATS in a safe and effective manner. Our literature review has revealed that ours was the first instance where bilaterally pulmonary hydatid cysts were treated in a single sitting thoracoscopically.

**P692****Laparoscopy for Traumatic Injury: A Review of Cases in a Level II Trauma Center**

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**Introduction:** Minimally invasive surgery (MIS) is the standard approach for most of the surgical procedures performed by general surgeons. Traditionally the majority of operations for trauma are performed open due to the complexity of the cases, however, trauma surgeons are expanding their armamentarium to include MIS in a variety of acute procedures. We report our experience with the application of laparoscopy in a variety of trauma cases.

**Methods:** A retrospective review of trauma cases performed between 1/2012–1/2016. During that time 52 laparoscopic cases were performed after traumatic injury. Patient demographics, injury severity (ISS), injury mechanisms, the types of procedures and outcomes will be described. Means and standard deviations were calculated and t test were performed. A p value of <0.05 was statistically significant.

**Results:** Demographics- A total of 52 trauma cases were performed laparoscopically during the study period. The majority were male, n=43 and the age was 29 SD 11. Obesity was documented in 30%, hypertension or CAD was in 20%, and substance abuse was in 44%. Blunt trauma was in 35% and penetrating 65%. The ISS was 15 SD 9.

**Surgical Procedures:** The majority, 85%, of the procedures were completed laparoscopically. Non-therapeutic laparoscopy was performed in 36%. Repair of diaphragmatic or traumatic abdominal wall hernias were 29%. Hematoma evacuation and control of bleeding was 15%. Control of solid organ bleeding and repair was performed in 11%. Intestinal repair occurred in 9%. For the cases that required open conversion ISS was 20 SD 7 vs. laparoscopic cases ISS was 12 SD 9, p=0.04.

**Outcomes:** The overall length of stay was 5 days SD 6. There was n=1 late death in a poly-trauma patient that required open conversion for complex solid organ and intestinal injuries. There was n=1 case of a community acquired pneumonia, and n=1 case of a recurrent pneumothorax.

**Conclusions:** A descriptive series of trauma operations approached with MIS techniques is described. This cohort had high injury severity and a predominance of comorbid conditions. Laparoscopy was successfully applied in the majority of cases for a variety of therapeutic procedures and mortality and morbidity was low. MIS is safe and is gaining momentum for application in traumatic injury.

**P693****Laparoscopic Assisted Distal Gastrectomy with Billroth I Reconstruction by Using Circular Stapler**

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**Objectives:** Laparoscopic distal gastrectomy for early gastric cancer is a standard treatment in Japan described in guidelines. The surgical procedure has been shifting from laparoscopic assisted to complete laparoscopic surgery. In this study, we evaluated the outcomes and safety of the laparoscopic assisted distal gastrectomy.

**Methods:** For the marking of the oral side transecting line, the clipping at oral side of cancer lesion was performed by gastro-endoscopy before surgery. The lymph node dissection (D1+/D2) is performed laparoscopically. As the dissection of the pancreatic superior region, the assistant hold the left gastric artery and keep the good view by retracting the pancreas. The common hepatic artery and proximal side of splenic artery are exposed. Both sides of the left gastric artery and vein are exposed. Left gastric vein and left gastric artery are cut after clipping and sealing. Lymph node dissection of hepato-duodenal ligament is done and right gastric artery is cut after clipping and sealing. Minor curvature of upper gastric wall is exposed (No 1, 3 dissection). Billroth I reconstruction by the Circular Stapler (CDH) is performed. Through the upper median incision with 5 cm, operator pulls out the stomach and transects the oral side of stomach with linear stapler after palpating the clips. Duodenum is transected after purse string suture. Gastroduodenal anastomosis is performed by CDH.

**Results:** Two hundred cases were analyzed. The operation time, blood loss and the conversion to open surgery rate were 175 minutes, 40 ml, and 1.0%, respectively. As postoperative complications, anastomotic failure, pancreatic fistula and postoperative bleeding were 2%, 1.5% and 1%, respectively. The reoperation rate was 2%. One surgical death due to cerebral infarction was experienced. There were no patients with pPM (pathological proximal margin) positive and too much PM distance. Frequency of abdominal wall incisional hernia and ileus were 1% and 0%, respectively.

**Conclusion:** Although there is the disadvantage that small laparotomy can be made in the upper abdomen, laparoscopic assisted distal gastrectomy with Billroth I reconstruction in our procedure is enough good from the viewpoint of the precision of proximal margin, and the incidence of serious complications.

**P694****Proximal Gastrectomy with Jejunal Interposition for Early Gastric Cancer of Upper Body of the Stomach**

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**Objective:** We previously reported the usefulness of open proximal gastrectomy with jejunal interposition (OPG-IP). To provide less invasive surgery and improve postoperative QOL, we have introduced laparoscopic proximal gastrectomy with jejunal interposition (LPG-IP). Here we report the procedure and short outcome.

**Patients and Methods:** Early gastric cancer patients (CT1, N0) who received open total gastrectomy (OTG) (41 patients) or OPG-IP (24 patients) between 2008 and 2013 were retrospectively analyzed. Perioperative complications, body weight change, and QOL scores were measured by SF36 or GRSR before and after operation. We also analyzed 10 early gastric cancer patients who received LPG-IP with 8cm jejunal interposition. Anastomosis procedure was overlap method for esophagojejunostomy and gastrojejunostomy, FEEA for jejuno-jejunostomy.

**Results:** The comparison between OTG/OPG-IP shows no significant difference in perioperative complications and QOL scores, significant smaller body weight loss in OPG-IP group. LPG-IP group also shows good result in short term outcomes.

**Consideration:** As comparison in open surgery implies superiority in jejunal interposition, we have introduced LPG-IP. Esophagogastostomy after proximal gastrectomy is simple but has a risk for sever GERD symptoms, no optimal procedure for reconstruction after proximal gastrectomy has yet been established. Although laparoscopic jejunal interposition is relatively complicated in procedure, we can safely perform in combination with common anastomosis techniques.

**Conclusion:** Body weight loss in OTG-IP group is smaller compared to OTG group, which implies jejunal interposition method is useful to improve postoperative QOL. Although long term observation is necessary, LPG-IP can be safely performed and useful to improve postoperative QOL of proximal gastrectomy.

**P697****Neurolysis of the Celiac Plejo by Laparoscopy in a Patient with Gastrointestinal Cancer, Our Experience in the Simplification of the Technique**

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**Introduction:** The celiac plexus is a structure located in the retroperitoneum, at the level of the lumbar vertebra, which is located in the prevertebral region and has sympathetic fibers. Patients with advanced gastrointestinal cancer and associated pain, one of the management strategies is pain control. Neurolysis of the celiac plexus by laparoscopy was first reported in humans in 2006 in patients with advanced pancreatic adenocarcinoma with excellent results. Experience will be shown in the simplification of the technique for the procedure.

**Method:** Neurolysis of the celiac plexa was performed in 89 patients with advanced gastrointestinal cancer, stomach 52%, pancreas 23% liver 14% other 11%, no complications associated with the procedure, pain improvement was achieved in 80% of patients after process. The standardization of the technique by laparoscopy and its simplification, has made this procedure that is replicable and safe.

**Description of the technique:** patient in French position, technique of 3 trocars, umbilical trocar 10 mm and 2 trocars of 5 mm paraumbilical, staging laparoscopy is performed and sampling if necessary, is identified in the region of the lower curvature of the stomach, the celiac trunk and the emergence of the left gastric artery are identified and 20cc of 90% alcohol diluted to the medium in the lateral fatty bearing are instilled through a percutaneous 22 under direct vision, verifying the non-arterial instillation of the alcohol. There were no complications related to the procedure.

**Results:** We report the experience of one group who underwent celiac plexa neurolysis in 89 patients with advanced gastrointestinal cancer, gastric cancer 52%, pancreatic cancer 23%, liver cancer 14% and another 11%. The most frequent pathology report was adenocarcinoma, 80% of the patients were managed at 24 hours with sustained effects, up to 6 months of follow-up. With a significant decrease in pain medication. Only 1 patient required new laparoscopic neurolysis because of difficult-to-manage pain. The operative time of this procedure was 30 minutes. The standardization of the technique, the use of low cost inputs, makes this type of procedure easily replicable with good results in pain management in cancer patients.

**Conclusions:** MIS is offered as one of the fundamental tools for the management of palliative procedures in gastrointestinal cancer. Neurolysis of the celiac plexa with standardization of the technique, use of low cost elements, and the surgeon's skills make this procedure an option of management and control of pain in patients with advanced gastrointestinal cancer, is easily replicable, economical and insurance.

**P696****Mini-TAPP Technique as an Alternative for Inguinal Hernia Repair**

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**Introduction:** Minilaparoscopy (Mini) is a modality of minimally invasive surgery that attempts to produce less surgical trauma to the abdominal wall by reducing the diameter of surgical instruments to 3 mm. Searching for better outcomes in inguinal hernia repair, surgeons have looked for new and less invasive alternatives such as single-incision surgery, single-port surgery and Mini. Minilaparoscopic transabdominal preperitoneal hernia repair (Mini-TAPP) demonstrates some of the known advantages of Mini general surgery procedures such as enhanced visualization, improved dexterity and great cosmetic outcome. It is safe and reproducible since it does not differ from standard laparoscopy. The purpose of this report is to describe our first experience with Mini-TAPP technique to treat inguinal hernia at The American British Cowdry Medical Center in Mexico City.

**Methods and Procedures:** An observational, retrospective and descriptive study was performed including 24 patients who were treated at The American British Cowdry Medical Center in Mexico City, from March 2013 to July 2015. We included patients that presented with unilateral or bilateral inguinal hernia. Exclusion criteria were patients sustaining giant inguino-scrotal hernia, and patient refusing to undergo minilaparoscopic surgery. All patients signed an informed written consent. Mini-TAPP technique was used as the standard treatment in all cases. All procedures were performed by the same surgeon. Operative time, use of analgesics, time to discharge, complications, and conversion to standard 5 mm instruments or open surgery were registered. Prisma 6 Software.

**Results:** Twenty four consecutive patients were operated at The ABC Medical Center in Mexico City. Mean age was 47.5 years (19–94 years). There were 16 males and 8 females. Seven patients presented with unilateral hernia, while 17 had bilateral disease. A total of 41 inguinal hernias were minilaparoscopically treated. Average operative time per hernia was 48.2 minutes (40–160 minutes, including bilateral procedures). Mean hospital stay was 26 hours (24–36 hours). Only one patient required the use of opioids in addition to ketorolac. There were no conversion to regular laparoscopy neither to open approach. There were no major surgical complications.

**Conclusions:** Our results confirm that Mini-TAPP technique appears to be safe, simple and reproducible. It features advantages over standard laparoscopic surgery as it allows for better visualization, enhances dexterity and produces great cosmetic results. It might cause less pain and faster recovery since abdominal wall trauma is limited. Comparative, randomized trials with adequate sample must be performed to address our hypothesis.

**P698****Comparison Between Laparoscopic Cholecystectomy by Hem-O-Lock Clips Versus Metallic Clips: A Prospective Randomized Study**

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**Background:** The non-absorbable polymer clip offers a solution to the disadvantage of traditional metallic clip. Due to its metallic property, it is not only expensive but also causes artifacts on imaging studies and often migrates into CBD. This study compares the traditional standard metallic clip with Hem-O-Lock used in laparoscopic cholecystectomy (LC) in regard of the safety and efficacy?

**Material and Methods:** This study includes 40 patients who underwent LC implementing metallic clip (MC) and 40 patients implementing Hem-O-Lock clips (HOL). Both clips were applied to cystic duct and artery, then the gallbladder was dissected from the liver bed by diathermy. The intraoperative and postoperative parameters were collected including duration of the operation and complications?

**Results:** The median operative time was not statistically different between the MC and the HC group (89.33 vs 86.17 minutes, respectively;  $p=0.96$ ) with no significantly less incidence of bile spillage (9 vs. 8,  $p=0.956$ ). No statistically significant difference was found in the incidence of postoperative complications between both groups (1 vs. 2,  $p=0.97$ ). No postoperative bile leakage was encountered in both groups.

**Conclusion:** Hem-O-Lock clip provides a complete hemobiliary stasis and a secure cystic duct and artery control. Its cost effectiveness is also attractive while provides efficacy equivalent to that of the standard metallic clip.

**P699**

### Comparing the Short-Term Outcomes Between Solo Single-Incision Distal Gastrectomy (SIDG) and Conventional Multiport Laparoscopic Distal Gastrectomy (MLDG) for Early Gastric Cancer (EGC): A Propensity Score-Matched Analysis

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**Introduction:** Single port laparoscopic distal gastrectomy (SPDG) usually requires an operator and a camera assistant. When performing SPDG, an experienced camera assistant is needed for stable images. However, due to the lack of skilled camera assistants, we started the solo surgery with mechanical camera holder. The aim of the study is to compare the short-term outcomes between solo SPDG and conventional multiport laparoscopic distal gastrectomy (MLDG) for gastric cancer.

**Methods:** From January 2014 to December 2016, a total of 938 consecutive patients with early gastric cancer underwent solo SPDG (n=103) and MLDG (n=835) performed by same surgical team. Solo SPDG can be defined as practice in which a surgeon operates alone using camera holder. MLDG usually requires two or three surgical assistants. The inclusion criteria in this study were (i) pathologic proven stage I-II gastric cancer (ii) no other malignancy (iii) more than D1 lymph node dissection (iv) R0 surgery. One-to-two propensity score matching was performed to compensate for the differences between two groups.

**Results:** After the propensity score matching, solo SPDG (n=99) and MLDG (n=198) patients were selected. Mean operation time ( $120 \pm 35.3$  vs  $178 \pm 53.4$  mins,  $p=0.001$ ) and estimated blood loss (EBL) ( $24.6 \pm 47.4$  vs  $46.7 \pm 66.5$  ml,  $p=0.001$ ) were significantly lower in the solo SPDG group than in the MLDG group. The hospital stay and the use of pain control were similar between the two groups. Although the initiation of semi fluid diet was similar, the time to first flatus was earlier in the solo SPDG. ( $3.04 \pm 0.85$  vs  $3.39 \pm 0.78$  days,  $p=0.001$ ). The postoperative inflammatory markers (White blood cells, Serum C-reactive proteins) were similar in both groups. The early (<30day) complication rates in solo SPDG and MLDG were 7.1% and 3.0% ( $p=0.13$ ). The late ( $\geq 30$ days) complication rates in solo SPDG and MLDG were 7.1% and 3.5% ( $p=0.24$ ).

**Conclusion:** This study demonstrated that solo SPDG performed by experienced laparoscopic surgeons is safe and feasible for early gastric cancer comparing with MLDG. Solo SPDG is expected to have promising potential treatment method for early gastric cancer.

**P700**

### Laparoscopic Approach in Blunt Traumatic Diaphragmatic Injury

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**Introduction:** Most of the blunt thoracoabdominal injury patients always have multiple organ injuries. Plan of definite treatment depends on the preoperative diagnosis. In isolating diaphragmatic traumatic injury without others organ injury laparoscopic approach is helpful, decrease a length of hospital stay as well as decrease a wound complication. Authors describe the laparoscopic treatment of the patient who had rupture of a diaphragm from blunt trauma in an emergency setting. **Methods and Procedures:** A 56 years old man presented with motor vehicle accident and mechanism of injury was blunt thoracoabdominal injury. He complains about chest tightness and tachycardia. Complete evaluation and CT scan were performed. Stomach was herniated to the left chest and diaphragmatic ruptured was found neither others great vessels nor solid organs injury. The laparoscopic approach was desired and left diaphragm was repair by non-absorbable sutured without intraoperative complication.

**Results:** The patient has been discharged 4 days post-operative with full recovery. Chest x-ray was taken before discharge, in out-patient department 2 weeks as well as 6 months after discharge which shown no diaphragmatic herniation.

**Conclusion(s):** Laparoscopic approach in isolated traumatic ruptured diaphragm patients is safe and should be considered.

**P701**

### Short-Term Outcome of Laparoscopy-Assisted Distal Gastrectomy with Roux-en-Y Reconstruction Through Mini-Laparotomy for Gastric Cancer

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Since 1991, we have introduced laparoscopy-assisted distal gastrectomy (LADG) with B-I reconstruction through mini-laparotomy. Regarding to reconstruction, Roux-en Y reconstruction are also one of the choice in LADG, however, the technical feasibility has not been well documented so far.

The purpose of this study was to compare the short-term outcome of LADG with Roux-en-Y reconstruction through mini-laparotomy compared to that of LADG with B-I anastomosis. Between 1994 and 2014, 440 patients who underwent LADG for gastric cancer in Oita University were enrolled in this retrospective study. Since 2005, the Roux-en-Y reconstruction has been performed as a standard method in our department. These patients were divided two groups based on anastomosis; Roux-en-Y (R-Y) group (n=246) and Billroth I (B-I) group (n=194). Baseline characteristics, operative results (including complications) and pathological results were evaluated. There were a considerably greater number of patients with advanced clinical stage and having  $\geq T3$  invasion in the R-Y group. Estimated blood loss was lower in R-Y than in B-I ( $P<0.001$ ) and operative time was longer in R-Y than in B-I ( $P<0.001$ ). There were no significant differences in all grade intra-operative complications ( $P=0.441$ ). In addition, there were no significant differences in all grade post-operative complications between the two groups except internal hernia. Hospital mortality was 0% in each group.

LADG with R-Y reconstruction through mini-laparotomy was technically feasible as well as LADG with B-I anastomosis.

**P702**

### Utilization of Laparoscopy Associated with Blunt Abdominal Trauma: The Nationwide Inpatient Sample 2004–2014

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**Introduction:** The incidence of trauma and its heavy burden upon the healthcare system remain strong. Paradigm shifts in the management of these cases has, however, improved the mortality in such cases. It can be expected that improvements in management, when combined with the benefits of laparoscopy, will demonstrate positive impacts upon treatment outcomes.

**Methods:** The Nationwide Inpatient Sample was referenced for inpatient stays for the years 2004 to 2014. Abdominal trauma cases were selected and identified as hollow (HO) or solid organ (SO) type, and as blunt or penetrating. The trauma subset was then scanned for the presence of discrete laparoscopic procedures, laparotomy, and converted cases, and flagged accordingly. The rates of laparoscopic (LC), open (OC), and converted cases (CC) were calculated at statistically evaluated using SAS 9.2.

**Results:** From 2004 to 2014, 117,158 cases presented as abdominally located blunt trauma. The majority of cases involved SO injury (85%). The LC use in these patients increased 196% from 2004 to 2014 ( $0.48 \pm 0.06$  to  $1.42 \pm 0.14$ ,  $p<.0001$ ), whereas in HO the rate of LC increased 149% ( $3.75 \pm 0.4$  to  $8.1 \pm 0.76$ ,  $p<.0001$ ). OC remained stable over the study period with no significant difference in utilization, currently at  $2.1 \pm 0.2\%$  and  $5.3 \pm 0.6\%$ , for SO and HO, respectively. The number of CC increased 180% for SO (from  $0.41 \pm 0.06$  to  $1.2 \pm 0.1\%$ ,  $p<.0346$ ) and 83% for HO ( $2.45 \pm 0.35$  to  $4.5 \pm 0.57$ ,  $p<.0001$ ). Details of utilization of different surgical approaches in patients with HO and SO injuries are presented in tables below

	Procedure	2004		2014		p value
		Mean	SE	Mean	SE	
Hollow Viscus Organs	laparoscopic	0.0375	0.00434	0.0806	0.00751	<.0001
	open	0.0547	0.0052	0.0532	0.00619	NS
	lap exploration	0.0162	0.00288	0.0304	0.00474	<.006
	converted	0.0245	0.00353	0.0449	0.00571	<.001
Solid Organs	laparoscopic	0.00479	0.00064	0.0142	0.00136	<.0001
	open	0.0223	0.00136	0.021	0.00165	NS
	lap exploration	0.00257	0.00047	0.00648	0.00092	<.0001
	converted	0.00411	0.00059	0.0115	0.00123	<.0001

**Conclusion:** Utilization of laparoscopy in treatment of intraabdominal solid and hollow organs injury increases over time. Although current analysis based on available HCUP NIS data include any procedures done during post-traumatic hospitalization, its results can lead to conclusion that minimally invasive technique is being utilized in increased fashion.

**P703****Risk Factors and Characteristics of Incisional Hernia After Elective Single-Incision Laparoscopic Colorectal Surgery**

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**Introduction:** Single incision laparoscopic (SIL) surgery is a laparoscopic procedure which leaves a single small incision in navel, and has been reported to be less invasive than and as safe and efficient as the conventional multiport laparoscopic (MPL) surgery. The long-term rate of incisional hernia after SILS colectomy is unknown, and the risk factors of incisional hernia formation is not fully elucidated.

**Methods and Procedures:** This is a retrospective from a prospectively collected database. The investigation took place in a high-volume multidisciplinary tertiary private hospital in Japan. The patients who had elective SIL colectomy without conversion to open/ MPL or ileo/colostomy from 2009 to 2015 were included.

**Results:** 661 patients were included with a median follow-up of 1094 (range 120–1806) days. 55 patients (8.3%) were diagnosed as incisional hernia, and the median interval from operation to the diagnosis was 329 (120–1806) days. On univariate analyses, age >70 years ( $P=0.0364$ ), ASA PS  $\geq 3$  ( $P=0.0454$ ), BMI >25 ( $P<0.0001$ ), depth of abdominal wall at the umbilical level >20 mm ( $P=0.0079$ ), thorough lymph node dissection ( $P=0.0348$ ) were risk factors, but other factors; gender, the history of smoking, diabetes mellitus, pre-operative prognostic nutritional index, tumor size, incisional length, operation time, operation mode or superficial surgical site infection were not statistically significant. On multivariate analyses, BMI >25 ( $P=0.0002$ ) was the risk factor of incisional hernia.

**Conclusions:** The incidence rate of incisional hernia after SIL colectomy was within permissible range, and high BMI was its risk factor.

**P704****Laparoscopy in the Management of an Acute Abdomen Due to Bowel Compromise**

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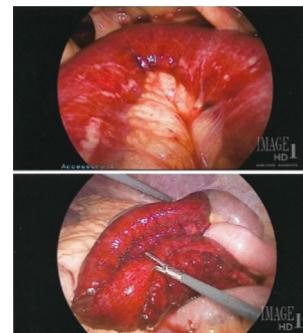
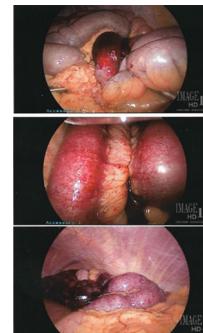
**Introduction:** Laparoscopic approach in the acute surgical care setting continues to be underutilized. We aim to report the successful diagnostic and therapeutic use of laparoscopy in the management of a nontoxic patient presenting with acute abdomen and to highlight the benefits of a minimally invasive approach without added morbidity.

**Case Report:** Presented is a 52-year-old male with history of CAD s/p CABGx4 two years prior and no abdominal surgical history who presented to the ED with sudden onset severe, diffuse, abdominal pain of six-hour duration with N/V. There was no trauma to the abdomen. He had mild-moderate hypertension, but was otherwise hemodynamically stable. On examination, the patient was in severe distress and writhing in pain. FAST exam was unable to be performed secondary to pain. CTA of the abdomen revealed mesenteric abnormalities with associated small bowel edema in the RLQ suspicious for small bowel ischemia. He was taken to the OR for diagnostic laparoscopy. He was found to have an omental adhesive band to the abdominal wall with herniation of the small bowel through the small opening. Approximately 70 cm of ischemic, nonviable small bowel was resected and anastomosed intracorporeally. He tolerated the procedure well and was discharged home on post-operative day 3.

**Discussion:** Primary omental related internal herniation of small bowel is exceedingly rare. There have been only few cases reported in the literature (1, 2, 3, 4). Two were diagnosed on exploratory laparotomy, one on diagnostic laparoscopy and one at autopsy. The one who underwent diagnostic laparoscopy did not require bowel resection. In presenting this case, we hope to illustrate the role of laparoscopy in the management of acute abdominal pain due to bowel compromise.

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**P705****Cases of Laparoscopic-Endoscopic Cooperative Surgery for Duodenal Tumors**

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**Introduction:** Laparoscopic-endoscopic cooperative surgery (LECS) is a minimally invasive surgical technique that combines the advantages of laparoscopic surgery and endoscopic treatment. LECS has been developed for the treatment of gastric submucosal tumors and can be applied to superficial duodenal tumors. Here, we describe the use of LECS for duodenal mucosal tumors.

**Methods:** Forty lesions (35 patients) were successfully resected en bloc, but one case was partially resected and needed additional operation (pancreaticoduodenectomy). The median operative time was 281 min. The median postoperative hospital stay was 12.6 d. Histological examination of the tumors revealed 27 carcinomas, 12 adenomas, and 1 carcinoid. Complications occurred in 8 (23%) patients, viz., SSI (two patients), pancreatic fistula (two patients), bleeding (two patients), passing failure (one patient), and cholangitis (one patient). However, no severe postoperative complications (Clavien-Dindo classification grade 3 or higher) were reported in these cases.

**Conclusion:** Our cases showed that duodenal tumor resection using LECS enables curability through a minimally invasive procedure that offers the advantages of both laparoscopic surgery and endoscopic treatment.

**P708****Endoscopic Thyroid Lobectomy: Our Early Experience at Tertiary Care Hospitals of Lahore, Pakistan**

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**Background:** Conventional Thyroid Lobectomy leaves an unpleasant neck scar. Endoscopic thyroidectomy was first applied by Huschner in 1997. Amongst the best endoscopic techniques is the one we use, referred to as the endoscopic axillary-breast-shoulder approach (ABSA) innovated by Dr. Luong.

**Objective:** To examine the safety, feasibility and cosmetic outcome of endoscopic thyroid lobectomy.

**Patients and Methods:** We performed endoscopic lobectomy in 3 patients at SGRH Lahore, from May 2016 to 8th September 2016 & 5 patients in LGH from 9th September to 31st July 2017. We adopted axillary-breast-shoulder approach. Inclusion criteria were age 18–45 years, solitary nodule less than 4 cm and benign FNAC. Exclusion criteria were multiple nodules, solitary nodule more than 4 cm, age more than 45 years, malignant FNAC, recurrent goiter and co-morbidity like DM, HTN, IHD, COPD. The parameters studied were the conversion rate, operative time, hospital stay, complications, cosmetic outcome and patient satisfaction. The results were analyzed to draw rational conclusion.

**Results:** Successful endoscopic lobectomy was performed in almost all cases with conversion to open in only one case. The mean operative time was 90 minutes. No preoperative injury was inflicted. One case sustained minor skin burns which healed without any residual scar. No postoperative complication developed. All patients were discharged after 24 hours. Excellent cosmetic outcome achieved in all patients leading to their optimum satisfaction.

**Conclusion:** Endoscopic thyroid lobectomy is a safe and feasible procedure with satisfactory cosmetic outcome for benign solitary thyroid nodules in selected patients.

**P707****Totally Laparoscopic Total Gastrectomy Versus Laparoscopy-Assisted Total Gastrectomy for Gastric Cancer: A Meta-analysis of Prospective and Retrospective Studies**

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**Background:** The benefits of totally laparoscopic total gastrectomy (TLTG) over laparoscopy assisted total gastrectomy (LATG) in operative outcomes and complications still remain controversial. This study aimed to compare the outcomes of TLTG with those of LATG by using a meta-analysis.

**Methods:** We searched PubMed, EMBASE, and Cochrane library in May, 2016 to locate prospective or retrospective studies on surgical outcomes of TLTG versus LATG. The outcome measures were postoperative complications such as anastomosis leakage and anastomosis stenosis, operation time, blood loss, time to flatus, time to first oral intake, and postoperative hospital stay. We calculated a pooled odds ratio (OR) with its 95% confidence interval (CI) for dichotomous variables and a weighted mean difference (WMD) with its 95% CI for continuous variables based on a random-effects model.

**Results:** Out of 948 articles, nine studies meeting the predetermined selection criteria were included in the final analysis. In this meta-analysis, the results showed that the operating time was substantially shorter in TLTG group than in LATG group (WMD=−13.44, 95%CI −25.93 to 0.95). Also, compare with LATG, TLTG showed less intraoperative blood loss (WMD=−16.25, 95% CI −29.25 to 3.25) and smaller incision length (WMD=−2.74, 95% CI −4.60 to 0.89). There was no significant difference between TLTG and LATG in the complication rate such as anastomosis leakage and stricture as well as bleeding. Also, no significant difference was observed in bowel recovery, number of retrieved lymph node, and proximal margin.

**Conclusion:** This meta-analysis showed that TLTG is superior to LATG in operating time, intraoperative blood loss and incision length and is similar in complication rate, bowel recovery, number of retrieved lymph node, and proximal margin. Further randomized controlled trials are needed to confirm the superiority of TLTG over LATG.

**P709****Patient Characteristics Associated with Successful Cessation of Tube Feeds in Malnourished Patients with Gastroparesis**

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**Introduction:** Surgical referrals for refractory gastroparesis (GP) are becoming more common as medical options are limited. Supplemental intestinal alimentation via feeding jejunostomy tubes (JT) is required to treat underlying malnutrition in only the most severe cases. The aim of this study was to determine predictive factors associated with successful restoration of oral nutrition after insertion of a JT for patients with severe malnutrition associated with GP.

**Methods and Procedures:** Retrospective chart review of all patients referred to our surgical practice for refractory GP from November 2007 to October 2016. Patients treated with a JT were identified. Baseline demographics, comorbidities, objective studies, symptom scores and operative details were recorded. The primary outcome was successful return to independent oral intake defined as removal of the feeding tube without additional supplementation (SUCCESS) and those that remained JT dependent (FAILURE). Univariate analysis was performed followed by logistic regression to identify independent predictors for the primary outcome.

**Results:** Forty-six out of 555 (8%) patients referred for GP required JT insertion to treat malnutrition. Etiology of GP included: 67% Idiopathic, 22% Diabetic, 11% Post-surgical. Thirty-six patients (78%) reported severe daily symptoms. Twenty-five patients (55%) had successful return to oral intake while 21 (45%) required prolonged feeding access, reinsertion of a JT or TPN initiation. On multivariate analysis patients who had a pyloroplasty ( $p=0.003$ , OR 6.6) and those who were married ( $p=0.043$ , OR 3.8) were found to be independent predictors of successful discontinuation of tube feedings. On subgroup analysis 4-hour gastric emptying time normalized after pyloroplasty ( $p=0.008$ ) in patients which had a successful re-initiation of oral intake while persistent gastric emptying refractory to pyloroplasty was associated with failure. The group of patients who underwent pyloroplasty did not differ in terms of demographics, marital status ( $p=0.192$ ) and preoperative gastric emptying ( $p=0.492$ ) from those who did not. GP etiology ( $p=0.585$ ) psychiatric conditions ( $p=0.277$ ) and substance abuse ( $p=0.354$ ) were not associated with failure to return to independent oral intake.

**Conclusions:** Malnutrition requiring feeding JT tubes is a rare complication of gastroparesis. When the disease has progressed to this stage, successful return of oral alimentation is achieved in half of the patients. Pyloroplasty seems to substantially increase the likelihood of liberation from tube feeds and should be considered at the time of JT placement.

Variable	SUCCESS 25 (55%)	FAILURE 21 (45%)	P-value (Univariate)	P-value (Multivariate)
Gender				
Male	7 (28%)	5 (24%)	0.508	
Female	18 (72%)	16 (76%)		
Preoperative BMI	26.9 (+/-5.9)	23.4 (+/-5.8)	0.048	
Marital status				
Married	18 (72%)	13 (62%)	0.022	0.043
Single	7 (28%)	8 (38%)		
Pyloroplasty				
Pyloroplasty	23 (90%)	11 (53%)	0.003	0.003
No Pyloroplasty	2 (10%)	10 (47%)		
4 hour Preoperative Gastric Emptying	38.4% (+/-28.4)	47.2% (+/-47.2)	0.409	
4 hour Gastric Emptying After Pyloroplasty	9.0% (+/-4.6)	24.0% (+/-6.1)	0.008	
Gastric stimulator				
Gastric stimulator	12 (48%)	5 (24%)	0.082	
No Gastric stimulator	13 (52%)	16 (76%)		
Fundoplication				
Fundoplication	16 (62%)	5 (24%)	0.010	0.299
No Fundoplication	9 (38%)	16 (76%)		
Subtotal Gastrectomy	2 (10%)	3 (12%)	0.192	

**P710****Laparoscopic Transabdominal Repair of Morgagni Hernia**

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**Introduction:** Morgagni hernias are a rare finding in the adult population, and represent 1–3% of all congenital diaphragmatic hernias. Multiple approaches to these rare hernias have been described in the literature. Here we present a novel technique of laparoscopic trans-abdominal repair using a combination of the Endo-Close device (Medtronic, Minneapolis, MN) and the TI-KNOT (LSI Solutions, Victor, NY.)

**Methods:** In a patient with a large left anterior diaphragmatic defect we performed trans-abdominal suturing utilizing the Endo-Close to perform primary closure of the defect, using the TI-KNOT to secure the pledged sutures along the anterior fascia. Due to the size of the defect ( $7 \times 10$  cm) this primary repair was buttressed with polyester mesh.

In a second patient with a smaller ( $6 \times 8$  cm) classic right-sided anterior diaphragmatic defect we similarly performed laparoscopic trans-abdominal suturing using the Endo-Close to traverse both the anterior and posterior fascia and the TI-KNOT to secure the sutures in order to perform a primary repair of the hernia. Both patients presented had an uneventful postoperative course and no indication of recurrence at 4 months.

**Conclusions:** Morgagni hernias present unique technical challenges. In our experience the combined use of trans-abdominal suture with laparoscopic knot replacement device allowed for completion of both cases laparoscopically with minimal tension on the repairs.

**P712****New Minimally Invasive Surgical Approaches: Notes, Single Port, Minilaparoscopy, Robotic Surgery: Which Is the Preferred Choice Among Medical Students?**

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**Objective:** To identify the preference among medical students of the following surgical approaches: open surgery, conventional laparoscopy, minilaparoscopy (MINI), Single incision laparoscopic surgery (SILS), natural orifice transluminal endoscopic surgery (NOTES), and robotic surgery.

**Methods:** An online google questionnaire was filled by 111 medical students of different years in medical school. Before answering the questionnaire, they watched an online video showing the different techniques, its advantages and disadvantages. The questionnaire consisted of 18 questions about the hypothetical situation where the participants were going to be submitted to an elective cholecystectomy and they could decide which technique they would prefer. All statistical analysis was performed using the R software program, version 3.3.1. The Chi-squared test was performed for categorical variables where appropriate. A p value  $<0.05$  was statistically significant.

**Results:** One hundred and eleven medical students answered the survey. 60 (54.05%) were female and 51 men. Most of the students were between 19 to 22 years old (54.95%). They were in the first four years of medical school. When asked if they would consider NOTES or Single incision even if they know that they are new procedures and with not completely established security standards, 84.68% (94) agreed that they wouldn't consider with no difference between gender ( $p=0.920$ ). When asked if only conventional laparoscopy, robotics or MINI were offered, which one they would choose: 85% of women and 62.75% men chose MINI first ( $p=0.025$ ). About the factors that they would consider the most important when choosing the surgical technique, they answered safety first (57.66%), followed by the surgeon's experience with the procedure (29.73%), with no statistically significant result between genders ( $p=0.529$ ). When asked if they would consider an open technique even with the other techniques available and compared according to their year in medical school, students closer to finishing medical school would not consider it, with a statistically significant result ( $p=0.036$ ). Regarding the most important factors they would consider and compared by year in medical school, safety and experience of the surgeon performed best, with a statistically significant result ( $p<0.05$ ).

**Conclusion:** Among the available surgical approaches, minilaparoscopy tends to be the preference among women medical students who considered safety the most important aspect. The closer they get to the end to medical school, the less they consider the open technique.

**P711****Feasibility of Concomitant Laparoscopic Splenectomy and Cholecystectomy in Situs Inversus Totalis: First Case Report Worldwide**

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**Introduction:** Situs inversus totalis is a rare anomaly characterized by transposition of organs to the opposite site of the body. Combined Laparoscopic Splenectomy and cholecystectomy in those patients is technically more demanding and needs reorientation of visual-motor skills.

**Presentation of Case:** Herein, we report a 16 year old girl presented with yellowish discoloration and left hypochondrium and epigastric pain diagnosed as Hereditary Spherocytosis (HS). The patient had not been diagnosed as situs inversus totalis before. The patient exhibit a left sided "Murphy's sign" and spleen palpable in right hypochondrium. Diagnosis of situs inversus totalis was confirmed with Ultrasound, Computerized Tomography (CT) and Magnetic Resonant Image (MRI) with enlarged right sided spleen and presence of multiple gall bladder stones with no intra or extrabiliary duct dilatation. The patient underwent combined laparoscopic Splenectomy and cholecystectomy as treatment of Hereditary Spherocytosis (HS).

**Discussion:** Feasibility and technical difficulty in diagnosis and treatment of such case pose challenge problem due to the contra lateral disposition of the viscera. Difficulty is the laparoscopic technique encountered in skeletonizing the structures in Calot's triangle, which consume extra time than normally located gall bladder with right sided standing surgeon and the position changed to left sided standing surgeon during splenectomy. In review up to date medical literature this is the first case reported worldwide.

**Conclusion:** Provided that the technique is performed by an experienced surgical team, concomitant laparoscopic splenectomy and cholecystectomy in situs inversus totalis is a safe and feasible procedure and may be considered for coexisting spleen and gallbladder disease as in Hereditary Spherocytosis (HS) as changes in anatomical disposition of organ not only influence the localization of symptoms and signs arising from a diseased organ but also imposes special demands on the diagnosis and surgical skills of the surgeon.

**P714****Linx – Single-Institution Review of Magnetic Augmentation Device for Gastroesophageal Reflux Disease Treatment**

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**Introduction:** LINX procedure is emerging as an excellent option for the management of reflux disease, and has been rapidly gaining popularity on a worldwide scale. In this case series, we present our single institution experience with 75 patients following their LINX procedure and their associated short-term outcomes.

**Methods:** With IRB approval, we retrospectively reviewed all LINX procedures performed from 2014–2017. Cases were organized into a data registry and reviewed in order to analyze demographic data, procedure length, hospital stay time, and to evaluate dysphagia and elimination of PPI use at 6 week, 6 month, and 1 year intervals. Patients were excluded from the study if they were identified to have had any additional procedures performed concomitantly with LINX procedure in order help ensure homogeneous data entry.

**Results:** A total of 75 patients (n=75) qualified for analysis. The studied population included 29 males (38.7%) and 46 females (61.3%). Average age 53.6 years (male 49.6, female 56.1). Average BMI 30.5 (male 29.4, female 31.2). Average Demeester score was 41.2 during preoperative evaluation (54/75 evaluated). Average procedure length was 68.6 minutes. Average hospital length of stay was 0.99 days, with all patients tolerating a regular diet prior to discharge. Our 30-day readmission rate was 1/75 (1.3%). 5/75 (6.7%) patients required repeat EGD evaluation for either recurrence of symptoms or impacted food bolus. At 6 week follow-up, 25/75 patients (33%) complained of dysphagia and 65/75 patients (87%) had eliminated PPI from their daily medication regimen. At 6 month follow-up, 13/62 patients (21%) complained of dysphagia and 54/62 patients (87%) had eliminated PPIs. At 1 year follow-up, 5/44 patients (11%) complained of dysphagia and 5/44 patients (89%) had eliminated PPIs.

**Conclusion:** As a recently introduced surgical option, no long-term data exists detailing the LINX procedure ultimate success rates and complication profile. We conclude that the LINX procedure has demonstrated satisfactory 1 year outcomes after implantation. While larger power and more long term follow up will be needed to draw absolute conclusions relative to the LINX procedures impact on reflux management, we offer our early data to the growing body of information regarding the LINX procedures effectiveness and outcomes.

**P715****Mini-laparoscopic vs Traditional Laparoscopic Cholecystectomy: Preliminary Report**

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**Introduction:** Laparoscopy is evolving towards less invasiveness. Not only the quality and ergonomics but also the diameter of the instruments is improving. The use of thinner instruments has been hypothesized to reduce pain and increase cosmesis. Since the introduction of mini-laparoscopic cholecystectomy (MLC) in 1997, it gained little interest that could be attributed to decreased durability of the reduced size instruments, poorer optical resolution and smaller jaws of the instrument tips.

Our aim was to compare the outcomes of MLC with traditional laparoscopic cholecystectomy (TLC).

**Methods and Procedures:** From 6 February 2016 to 26 October 2016 patients who were performed MLC were included to this study. As a comparison group, patients who were performed TLC during the same time period were retrieved. Open and robotic cholecystectomies were excluded. Data were recovered retrospectively from a prospective registry. The variables studied were operation time (OT), blood loss, length of hospital stay (LOS), early (<30 day) complication rate, and postoperative pain (visual analog scale (VAS) score). MLCs were performed using one 10-mm, one 5-mm, and two 2.4-mm ports (cumulative port size 19.8-mm). TLCs were performed using one 10-mm and three 5-mm ports (cumulative port size 25-mm).

**Results:** A total of 16 MLC and 75 TLC were performed during the study period. Mean age was  $41 \pm 12.36$  and  $46 \pm 14.86$  for MLC and TLC patients, respectively ( $p=0.203$ ). Groups were similar regarding gender distribution. The average operating time was  $47 \pm 15.15$  and  $70 \pm 40.04$  min in the MLC and TLC groups, respectively ( $p=0.021$ ). The average blood loss was  $1.88 \pm 1.86$  and  $10 \pm 22.19$  mL ( $p=0.005$ ), LOS was  $1.19 \pm 0.40$  and  $1.47 \pm 1.09$  days, and VAS score was  $30 \pm 19.66$  and  $32 \pm 21.59$  in the MLC and TLC groups, respectively. No patients were converted to open. There were two postoperative complications in TLC patients ( $p=1$ ). One developed choledocholithiasis on postoperative day one and after ERCP the course was uneventful. The other patient developed choledocholithiasis and acute pancreatitis on the sixth postoperative day and was treated conservatively. The stone in the ampulla had fallen by itself without a need for ERCP.

**Conclusion:** According to the preliminary results of this study, MLC is a safe and feasible technique for the management of laparoscopic cholecystectomy. Further comparative studies are needed before any conclusive statements.

**P716****Single-Incision Plus One Additional Port Laparoscopic Surgery for Colorectal Cancer with Transanal Specimen Extraction: A Comparative Study**

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**Background:** Extension of the single incision for the purpose of specimen removal in single-incision plus one additional port laparoscopic surgery (SILS+1) can undermine the merits of SILS +1, either by increasing wound-related morbidity or by destroying cosmesis.

**Methods:** We retrospectively analyzed the clinical outcomes of patients underwent elective SILS +1 anterior resection, either with transanal specimen extraction (TASE, n=25) or transumbilical specimen extraction (TUSE, n=77), for colorectal cancer from January 2014 to June 2017. This study included patients with a tumor diameter less than 5 cm, measured by preoperative computer tomography.

**Results:** Both groups were similar in patient's basic information and oncologic condition. Most surgical data and postoperative clinical variables were comparable between TASE and TUSE group, except for Increasing operative time in TASE ( $210.2 \pm 45.7$  vs.  $167 \pm 43.4$  min,  $P=0.032$ ) and reducing wound complications in TASE (0% vs 14.6%,  $p=0.043$ ). Dosage requirement of narcotic analgesics was not inferior in TASE group compare to TUSE group. No significant differences were observed in conversion rate, perioperative and overall morbidity between the two groups.

**Conclusion:** Although SILS+1 with TASE prolonged operative time compare to with TUSE, implement of TASE is expected to provide benefit of reduced wound-related morbidity in patients with a tumor diameter less than 5 cm.

**P718****Laparoscopic Morgagni Hernia Repair in Infant with Sutures and Ethicon Secure Strap Device**

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**Purpose:** Morgagni hernia (MH) is a rare condition. MH is less than 6% of surgically treated diaphragmatic hernias in infants. There is no specific symptom for the Maorgagni hernia. Open surgical repair was the golden stander before the introduction of the laparoscopic surgery in the children and infant. There are many different laparoscopic techniques for MH repair have been reported.

I report laparoscopic repair of MH in five infants using primary sutures closure with intra-corporeal knot tying and Ethicon secure strap device. This study is an evaluation of the safety and efficacy of this new laparoscopic technique of MH repair in infants with its short-term outcomes follow up. Patients and methods: Five infants with MHs underwent laparoscopic repair by hernia sac excision then two primary sutures, non-absorbable proline through the full thickness of the anterior abdominal wall and the posterior rim of the defect, intra corporeal sutures knot tying, Ethicon secure strap device which was used to complete the colures of the defect. There was no insertion of chest tube or drain.

**Results:** Five infants with MH were operated upon. There were 4 males and 1 female. All cases were left side MH, Male-female ratio was 4:1. Intraoperative and postoperative analgesia requirement was Minimal (Paracetamole 100 mg/kg/rectal suppository/12 hours for the first 24 hours). Ceftriaxone 50 mg/kg single dose at the anesthesia induction. All operations were completed laparoscopic. All infants started and tolerated oral regular feeding with in 24 hours from surgery.

None of the patients developed intraoperative or postoperative complications. The maximum follow-up was 36 months (mean, 17 months). All patients are in good health without recurrence or port site compilation.

**Conclusion:** This easy save technique of MH repair is reducing the operative time and postoperative hospital stay. It is minimizes the need of postoperative analgesia, anti biotic. The early oral feeding is also a good benefit.

**P719****The Learning Curve of Transumbilical Single Port Laparoscopic Appendectomy**

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**Introduction:** Transumbilical single port laparoscopic appendectomy (TSPLA) is the most popularized single port surgery in the world. It provides more cosmetic benefits than conventional laparoscopic surgery. However, single port appendectomy requires longer operation time and advanced surgical skills. We aimed to investigate the learning curve for TSPLA.

**Material and Methods:** Data were collected from patients who underwent TSPLA by single surgeon Between March 2013 and February 2016. The learning curve were analyzed using a cumulative sum control chart (CUSUM) for operation time and complication.

**Results:** A total of 109 patients were included in this study. Mean operation time is  $61.6 \pm 20.61$  minutes. There was no open or multi-port conversion. Based on CUSUM for operation time, learning curve were 31 cases.

**Conclusions:** TSPLA is a safe and effective alternative procedure. The learning curve could be overcome safely without major complications. Our results suggest that the 31 cases are sufficient to achieve surgical skills for TSPLA.

**P720****A Prospective Study of Short Term Perioperative Suprapubic Urinary Catheters in Laparoscopic Colectomy**

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**Introduction:** In Japan, transurethral balloon catheters (TUC) are currently inserted in most surgical patients to maintain a urine outflow route and to measure the urine output both intraoperatively and postoperatively. However, TUC insertion not only causes postoperative pain but can also lead to urinary tract infections. Temporary suprapubic catheters (SPC) are used in the field of obstetrics and gynecology as a method of postoperative management to avoid performing transurethral procedures. In the field of surgery, especially in laparoscopic surgery, SPC also considered how it would be a useful way to reduce patient suffering. Here we report our prospective study on whether an SPC can be safely inserted as a substitute for TUC during laparoscopic-assisted colectomy.

**Subjects and Methods:** The subjects in this study were patients who underwent laparoscopic surgery for primary colorectal cancer from 2014 to 2015, and who would normally have had their urinary balloon catheter removed early after surgery. During surgery, an Angiomed cystostomy set was installed for patients who gave their consent to participate in this study as an alternative to a urinary balloon catheter. We prospectively collected patient information including sex and age, in addition to other perioperative data, such as, time required for cystostomy, complications accompanying cystostomy, sense of discomfort or pain associated with the vesical fistula after surgery, the time of the removal of the vesical fistula, the frequency of releasing the vesical fistula, postoperative complications.

**Results:** Our subjects included 52 cases who gave their informed consent to have an SPC inserted. An SPC was inserted into the remaining 45 case. The mean surgical duration was 229 min, and the SPC insertion was performed at a mean of 137 min after the start of surgery. Insertion required a mean duration of 158.2 s. The bladder of one case (2.2%) was perforated, and hematuria was observed at the time of insertion in two cases (4.4%), but surgery completed without any incident. Six out of 42 cases (13.3%) demonstrated neither urinary urgency nor independent urination on the day the catheter was clamped. However, the clamp was released two to four times, and draining of an average of 586 mL urine, urinary urgency, and independent urination were confirmed 2–4 days later.

**Conclusion:** SPC is a procedure that avoids crossing the urethra and its associated disadvantages. Here we were able to demonstrate that the procedure can be safely used in laparoscopic surgery patients.

**P721****Incisional Hernia Repair After Liver Transplant: A Single Institution Short-Term Outcomes**

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**Background:** The incidence of incisional hernias after liver transplants is reported to vary from 4% to 20%, and considerably affects patients' quality of life. Obesity and immunosuppression can increase both the incidence and the recurrence of incisional hernias in this population. We present our short-term experience with hernia repair in this patient population.

**Methods:** We retrospectively reviewed all the patients who underwent incisional hernia repair from November 2012 to May 2017 at Cleveland Clinic Florida. We then identified those who previously underwent an orthotopic liver transplant and we reported demographics, technique, and outcomes.

**Results:** Out of 280 patients who underwent incisional hernia repair we identified 4 patients (1.4%) who previously received a liver transplant. There were 3 males and one female. The average age was 58.25 (49–66), mean BMI was 32.16 kg/m<sup>2</sup> (30.27–33.75). Mean interval from transplant to hernia repair was 969 days (370–2151). Two patients had a previous attempt of hernia repair, one with mesh. One patient did not have any immunosuppression due to HIV infection, whereas the other were on cyclosporine, tacrolimus and/or mycophenolate mofetil. There were two laparoscopic and two open cases, mean operative time was 169.25 minutes (111–311), mean blood loss was 85 ml (20–200). Mesh used were biological porcine dermis in one case, polypropylene with absorbable hydrogel barrier in three cases. Mean mesh length and width were 27 cm (20–33) and 28.25 cm (25–33) respectively. One patient underwent a component separation, though none of the patients had the fascial defect closed. There were no intra-operative complications. Three patients were readmitted for hyperkalemia, abdominal pain, and seroma respectively. Neither recurrences nor reoperations were reported. Mean follow-up was 75.5 days (17–136).

**Conclusion:** Post liver transplant incisional hernia repair is feasible either laparoscopic or in an open fashion. Because of the size and location of the defect, fascial closure is unlikely achievable. The use of standard techniques and materials give a similar result of the non-transplant population.

**P722****Technique of Esophagojejunostomy Using OrVil After Laparoscopy Assisted Total Gastrectomy for Gastric Cancer**

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**Introduction:** During esophagojejunostomy using a circular stapler after laparoscopy assisted total gastrectomy (LATG), placement of the anvil head via the transabdominal approach proved difficult. The authors report on a method modified for laparoscopy-assisted, esophagojejunostomy performed by placing the pretitled anvil head (OrVil) via the transoral approach.

**Methods and Procedures:** Between January 2013 and August 2017, esophagojejunostomy was performed using OrVil in 98 patients after LATG. The anesthesiologist introduced the anvil while observing its passage through the pharynx. During the anastomosis, we kept the jejunum fixed in position with a silicone band Lig-A-Loops, thereby preventing the intestine from slipping off the shaft of the stapler.

**Results:** Esophagojejunostomy using the OrVil was achieved successfully in all patients. No other complications, such as hypopharyngeal perforation and/or esophageal mucosal injury, occurred during passage. The postoperative complications of anastomosis were leakage in two patients and stenosis in 4 patients, in whom mild relief was achieved using a bougie.

**Conclusion:** Esophagojejunostomy using the OrVil is a simple and safe technique.

**P723****Minimal Invasive Techniques Together with Modern Intensive Care Decreases Mortality in Severe Necrotising Pancreatitis**

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**Introduction:** Severe pancreatitis with necrosis has traditionally been treated with laparotomy and surgical necrosectomy, often resulting in high morbidity and mortality. During recent years, standard of care has shifted towards minimal invasive interventions seemingly decreasing morbidity and mortality. Simultaneously intensive care has evolved and contributes to better treatment results.

**Methods:** Retrospective study of case files comparing two time periods; 2000–2005 (previous group) with 2010–2015 (recent group) in a single centre. Severe pancreatitis was defined as organ failure for >48 hours. Patients with verified pancreatitis and >48 hours in the ICU were included. Patient age, total hospital stay, ICU stay, surgical or minimal invasive interventions and mortality were recorded. All interventions related to the same episode of pancreatitis were included. Minimal invasive interventions include transgastric and percutaneous drainages.

**Results:** A total of 66 patients were identified, 38 in the previous group and 28 in the recent group. There were no differences in age (median 58, 5 (16–82)), time in ICU (median 5 (2–67)) or total hospital stay (median 22 (2–224)) between the groups.

During 2000–2005 5/38 patients had an acute open necrosectomy and 2 patients had an acute laparotomy due to colonic perforation/colonic obstruction. 3/38 received a percutaneous drainage. Two patients were operated with cyst marsupialization and necrosectomy at a later stage. In the recent group no open necrosectomies were performed but 3/28 patients had a laparotomy due to colonic perforation. 11/28 had a minimal invasive drainage; 5 transgastric, 3 percutaneous and 3 combined.

There was a significant difference in mortality between the two time-periods, 10/38 patients died during 2000–2005 and 1/28 died during 2010–2015 ( $p=0.01$ ). Those who died were significantly older (69 years (51–79)) than the survivors (69 y (51–79)) ( $p=0.01$ ). Five of the patients who died in the previous group died without any intervention. 4/5 of those who had an acute open necrosectomy died. Surgical necrosectomy correlated significantly with mortality ( $p=0.002$ ). The only patient who died in the recent group died without any intervention. None of the 11 patients receiving minimal invasive drainage in this group died.

**Conclusion:** Mortality due to severe necrotising pancreatitis has decreased significantly with the introduction of minimal invasive techniques for drainage of pancreatic necrosis and abscesses. The simultaneous improvements in intensive care regimes may also contribute to better survival for these patients.

**P724****Treatment for Anastomotic Leakage After Minimally Invasive Ivor Lewis Esophagectomy**

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**Introduction:** Anastomotic leakage (AL) is a life threatening complication after minimally invasive Ivor Lewis esophagectomy (MIE ILE) and has diverse treatment strategies such as conservative treatment, endoscopic treatment and surgery. However, there is no consensus on which treatment strategy is best. The aim of this study was to analyse various therapeutic strategies for AL and their outcomes.

**Methods and Procedures:** This retrospective multicentre study was performed in three high-volume hospitals. All patients that developed AL after tMIE ILE in the period of January 2011–July 2016 were included. The different endoscopic (stenting, clipping and suction-drainage) and surgical treatments and their success-rate were described; success was defined as clinical improvement after primary treatment. Primary endpoint was the time until oral feeding was resumed. Secondary endpoints were hospital stay and the total amount of surgical, endoscopic and radiologic interventions.

**Results:** In total 83 patients that developed AL were identified; four patients received antibiotics only. In the remaining 79 patient, endoscopic treatment was performed as primary treatment in 53%; 47% received primary surgical treatment. Basic variables were similar in these groups. Median postoperative day of diagnosis of AL was day 7 in the endoscopic-group and day 5 in the surgical-group ( $p=0.038$ ). Admission to the ICU as a result of the leakage was necessary in 52% in the endoscopic-group versus 95% in the surgical-group ( $p<0.001$ ). However, median ICU-stay was significantly shorter in the endoscopic-group (7 days versus 12 days,  $p=0.020$ ). Success-rate of the primary treatment was similar; 76% and 73% respectively ( $p=0.743$ ). Primary and secondary endpoints were comparable for both the endoscopic- and surgical-group; median time until oral feeding was resumed was 36 days and 31 days respectively ( $p=0.232$ ), median total hospital stay 36 days and 40 days respectively ( $p=0.378$ ) and the median number of interventions was 5 in both groups ( $p=0.378$ ).

**Conclusion:** Endoscopic treatment appears to be a safe and efficient therapy for AL after tMIE ILE. A patient-tailored approach based on the condition of the patient and the morphology of the leak can be adapted to avoid surgery in a selection of patients. This may prevent surgical re-operations and reduce ICU admissions.

**P725****Rational Lymph Node Dissection Around Left Recurrent Laryngeal Nerve in Esophageal Cancer Surgery by Thoracoscopic Procedure**

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**Background:** Lymph node (LN) dissection around recurrent laryngeal nerve (RLN) is one of the most important and difficult procedure in esophageal cancer surgery because of high rate of LN metastasis and risk of RLN palsy. Especially around left RLN, the surgical area is far and narrow by thoracic approach which tends to results in insufficient LN dissection. Therefore, we tried to remove this LN by imaging lymphatic chain to dissect sufficient LN.

**Surgical Procedure:** We perform thoracoscopic esophagectomy by semi-prone position using 6–10 mmHg thoracic air pressure. After dissection of right RLN LN, middle and lower esophagus, encircle the esophagus at the level of bifurcation of bronchus and pull toward right side by tape to dissect the dorsal and left side of upper esophagus. Dissect the tissue including left RLN LN from trachea by pulling esophagus up to dorsal side and try to move this tissue toward dorsal side of left RLN so that this RLN LN tissue can recognize as the “lymphatic chain”. To increase the mobility of esophagus, cut the esophagus at the level of aortic arch and pull further up this upper esophagus to dorsal side. Cut the esophageal branch of RLN and separate this lymphatic chain from RLN. At the end of thoracic procedure, this lymphatic chain is attached to upper esophagus. After the upper esophagus has pulled out from cervical site, lymphatic chain can easily recognize at the esophageal wall.

**Result:** We performed this lymphatic chain procedure in 88 cases. To evaluate this procedure, 106 cases of conventional method by same prone positioned esophagectomy was used for control. There was no statistical difference between these two groups in amount of blood loss (lymphatic chain conventional=45ml; 55ml,  $p=0.524$ ), rate of RLN palsy (14.8%; 14.2%,  $p=1.00$ ). Although the thoracic operation time was extended in some degree (291 min: 270 min,  $p=0.005$ ), number of dissected LN was increased (2.9:1.9,  $p=0.004$ ) and recurrence along left RLN has been relatively fewer by this method (4.5%; 7.5%  $p=0.552$ ).

**Conclusion:** LN dissection around left RLN would be easy and sufficient by imaging lymphatic chain. Further improvement is needed to secure this procedure and further evaluation should be done to support this data.

**P726****Laparoscopic Management of Hydrocele-en-bissac - A Rare Case Report and Review of Literature**

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**Introduction:** Hydrocele-en-bissac, also called abdomino-scrotal hydrocele, is an extremely rare clinical entity. Until now only 94 cases in adults and fewer than 20 cases in children have been reported in world literature, with surgical management being the only option. An innovative, minimally invasive laparoscopic excision of the abdominal sac was performed and the scrotal component was managed by Jaboulay's Procedure. This is probably the first case report in world literature describing laparoscopic management of hydrocele-en-bissac.

**Case Report:** A 50 year old male presented with complaints of bilateral hydrocele and swelling in right lower abdomen since one year. Computed tomography of the abdomen revealed an encysted hypodense lesion with enhancing walls along the right side of pelvis, anterior to the psoas muscle and extending through the internal ring into the right inguinal region upto the scrotal sac; measuring 14.1 cm × 3.6 cm suggestive of an encysted hydrocele of cord associated with hydrocele of both scrotal sacs.

On diagnostic laparoscopy, an intra-abdominal cystic swelling separate from the bowel was found in relation to the cord extending into the right inguinal canal suggestive of hydrocele-en-bissac. Peritoneal sac was dissected and distal end of the abdominal sac was ligated with polyglactin suture. The sac was then excised and delivered out through one of the ports. Jaboulay's procedure of eversion of sac was done for the scrotal component of the hydrocele-en-bissac on the right and hydrocele on the left side. Histopathology report was consistent with encysted hydrocele of cord.

**Discussion:** Hydrocele-en-bissac was first described by Dupuytren in 1834. Jacobson classified it as an infantile hydrocele with intra-abdominal extension. Some theories postulate that hydrocele-en-bissac occurs as a result of increased intaluminal pressure confined to a proximally closed process vaginalis; this increased pressure allows extension into the retroperitoneal space through the internal ring causing both abdominal and scrotal swellings.

**Conclusion:** In the era of minimally invasive surgery, the benefit of laparoscopy was offered to the patient for excision of the abdominal component of hydrocele-en-bissac with better cosmetic outcome. Laparoscopic approach offers a safe and effective treatment modality with early recovery to this rare clinical entity.

**P727****Changes in Surgical Procedures for Achalasia at Our Institution**

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**Background and Objective:** In our institution, laparoscopic Heller-Dor procedure (LHD) has been the first-line surgical procedure for achalasia since the introduction in August 1994. In January 2016, per-oral endoscopic myotomy (POEM) was started, taking into patients' needs into consideration. Since then, treatment options have expanded to include balloon dilation, conventional LHD, LHD by reduced port surgery (RPS), LHD by needlescopic surgery (NS), and POEM. Here, we report changes we have observed in surgical procedures since the introduction of POEM.

**Subjects and Methods:** The subjects were 46 patients (mean age  $47.5 \pm 14.0$  years, 24 women) who underwent surgery for achalasia from January 2016 to May 2017. After explaining the advantages and disadvantages, the choice of surgical procedure was left up to the patient.

**Results:** The breakdown of the surgical procedures was LHD (including 1 RPS and 13 NS):POEM =31:15. While intraoperative complications (esophageal mucosal injury, injuring of esophageal longitudinal muscles) were observed in LHD and POEM one patient each, while dysphagia improved in all patients. Postoperative reflux esophagitis was observed in 5 patients with POEM (33%), which was significantly higher than 2 patients (6%) in LHD ( $p=0.0173$ ). Moreover, all reflux esophagitis in each case was mild (Los Angeles classification: Grade A).

**Conclusion:** While one-third of patients underwent POEM, reflux esophagitis occurred at a higher rate in POEM as compared to LHD.

**P729**

### **Short-Term Outcome of Serosal and Muscular Layers Incision Technique in Laparoscopic Surgery for Gastric Gastrointestinal Stromal Tumors**

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**Background:** Laparoscopic surgery for gastric gastrointestinal stromal tumors (GISTs) has been widely adapted because of its less invasiveness. Excessive gastric resection may result in postoperative deformity of the stomach, with consequent gastric stasis in food uptake. To minimize the resection of stomach tissue, especially for lesions close to the esophagogastric junction or pyloric ring, we have developed laparoscopic wedge resection (LWR) with the serosal and muscular layers incision technique (SAMIT) for gastric gastrointestinal stromal tumors. This SAMIT is simple and does not require special devices.

**Purpose:** The purpose of this study was to clarify whether LWR with SAMIT for gastric GISTs is technically feasible in term of short-term outcome.

**Patients and Methods:** Between 2001 and 2014, 37 patients who underwent LWR for gastric GIST in Oita University were enrolled in this retrospective study. These patients were divided two groups based on LWR with SAMIT; SAMIT group (n=14) and LWR without SAMIT; non-SAMIT group (n=23). Baseline characteristics, operative results including complications and pathological results were compared between the two groups.

**Results:** There was no significant difference in the age, gender and tumor growth type between the two groups. For lesions located less than 2 cm from the esophagogastric junction, the frequency of SAMIT was significantly higher than that of non-SAMIT. In operative results, the mean operative time was significantly longer in the SAMIT group. Regarding to intraoperative complications, there was no event in SAMIT group. In contrast, bleeding occurred in one case in non-SAMIT group. Regarding to postoperative complications, stenosis occurred in 1 case for middle stomach lesions in SAMIT group. This stenosis could be improved by endoscopic ballooning. Histological examination revealed that adequate oncological resection was performed in all cases.

**Conclusions:** LWR with SAMIT for gastric GISTs was feasible in terms of short-term outcome. This technique could be useful for treating gastric gastrointestinal stromal tumors, including those close to the esophagogastric junction or pyloric ring.

**P730**

### **Implementing Anti-bleeding Policy in Laparoscopic Sleeve Gastrectomy**

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**Introduction:** blood pressure control during stomach resection and suture reinforcement of the stapler line have been shown in a randomized trial to minimize hemorrhagic complications in laparoscopic sleeve gastrectomy (LSG). The purpose of this study is to evaluate patient outcome after implementing this anti-bleeding policy for patients outside of a clinical trial.

**Methods:** all patients who went through LSG in our department between 4/2014 to 12/2016 have been evaluated for bleeding complications, after implementation of anti-bleeding policy; blood pressure was controlled to 140 mmHg during stomach resection and staple line was reinforced throughout it's length with a running 3-0 absorbable v-lock suture. Drains were used selectively.

**Results:** out of 308 patients who went through the procedure 9 (2.9%) suffered hemorrhagic complications: 7 patients had? Hb>2gr%. 7 patients received 1–3 red blood PC's. No patients were re-operated for bleeding. 2 patients were re-admitted for infected hematoma and had CT guided drainage. One patient (0.3%) suffered from leak.

**Conclusion:** implementation of anti-bleeding policy in LSG is very effective. There is no need to use expensive buttress material to achieve these results. Drains can be used selectively. The impact of this policy on leak rate needs to be evaluated in a larger cohort.

**P731**

### **Increased Adenoma Per Colonoscopy (APC) Rate Following Colonoscopy Skills Improvement (CSI) Program**

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The Canadian Association of Gastroenterology (CAG) CSI program was implemented across Canada as part of the Skills Enhancement for Endoscopy initiative, with a goal of improving colonoscopy quality. This study aims to assess impacts on adenoma detection.

We conducted a retrospective cohort study that included 17 endoscopists practicing in a tertiary referral center. Endoscopists underwent CSI training between October 2014 and December 2015. Fifty procedures immediately prior to, immediately after, and eight months after completion of training were included for each endoscopist. Data were extracted from the electronic medical record and entered into SPSS for analysis. Student's T-test was used to compare groups for continuous data, and chi-squared tests were used for categorical data.

Data were collected for 2533 procedures. Patient groups pre, post, and eight months after CSI training were comparable in terms of age (60.1 yrs, 60.3 yrs, and 60.1 yrs), sex (56.9% female v. 50.8% female v. 54.5% female), indication, and completion rate (94.0% v. 94.3% v. 94.4%). Polyps were removed from 1222 (48.2%) patients. There was a non-significant trend towards a higher adenoma detection rate immediately after training was complete (31.8% v. 33.4%, p=0.517) and at the eight month timepoint (31.8% v. 35.5%, p=0.118). The mean APC rate showed a non-significant increase between the pre and post training groups (1.42 v. 1.59, p=0.188). This became statistically significant at the eight month timepoint (1.42 v. 2.00, p<0.001).

Participation in the CSI program is associated with a higher APC rate.

**P733**

### **It's in the Bag; Can Stoma Output Predict Acute Kidney Injury in New Ostomates?**

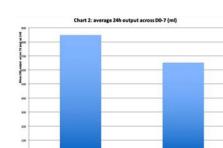
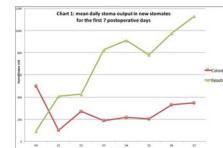
**Robert Fearn, MRCP, MSc, MBChB, Swathi Rajagopal, MBBS; Homerton University Hospital NHS Foundation Trust**

**Background:** Colorectal surgery for benign and malignant conditions commonly results in the formation of an excretory stoma with population prevalence rates as high as 2–4 per thousand. Ostomates are prone to complications, including acute kidney injury (AKI) and hospital readmissions. We aimed to quantify stoma output in the first 7 days following a new stoma formation in order to determine its relationship to acute kidney injury and readmissions.

**Methods:** We retrospectively analysed consecutive new stoma patients at our unit between August 2015–July 2017 using electronic records. Daily stoma output for the first 7 postoperative days was tabulated. We recorded biochemical evidence of acute kidney injury during index admission or up to 3 months post-discharge and readmission within 30 days.

**Results:** 67 new stoma patients were included, aged 20–89 years, median 61, 34 male. Colostomy formation was performed in 18 patients with 49 ileostomies. Documentation of stoma output was variable with on average 66% of patients having volume recorded on any given day. This appeared to be worse in days 1–2 (7.5% and 39% respectively) than days 3–7 (59–72%). Mean daily colostomy output over the first 7 days was 236 ml/d (95% CI 117–355 ml) whilst mean ileostomy output was 692 ml/d (535–848 ml). Colostomy output stabilised rapidly, whilst ileostomy output increased progressively throughout the first 7 postoperative days as can be seen in Chart 1. Twelve patients (18%) developed AKI during index admission. Length of stay was significantly greater in the AKI group at 34 (95% CI 30–38) days vs 15 (11–19) days. Highest daily stoma output was non significantly higher in the AKI group 1612 ml (95% CI 636–2,588 ml) vs 1,122 (857–1,387 ml) as was mean daily stoma output at 800 ml (337–1,263 ml) vs 549 ml (312–786 ml) (Chart 2). Seventeen patients (25%) were readmitted for any reason, 7 (9%) specifically for AKI. In total 13 patients (19%) developed AKI within three months of their stoma surgery only 3 of whom had developed AKI during their index admission. All patients who developed AKI following their index admission were ileostomy patients.

**Conclusion:** Acute kidney injury in new stoma patients is associated with prolonged hospital stay and readmissions with associated morbidity and healthcare costs. Heostomy patients are more likely to suffer these complications and elevated stoma output volumes during the index admission may signal those at most risk. This study underlines the importance of accurate monitoring of ostomy output. Improved training and emerging technologies may help to address this issue.



**P734****Bariatric Surgery with Zero Perioperative Mortality in a Teaching Institution**

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**Introduction:** Laparoscopic bariatric surgery is well accepted for the treatment of morbid obesity. The purpose of this study was to evaluate its feasibility and provide an update on improved safety of bariatric procedures performed in a teaching institution with minimal morbidity and mortality.

**Methods and Procedures:** Perioperative data from a detailed, prospectively collected database was analyzed for each bariatric procedure as well as for all procedures collectively. All patients were evaluated in a multidisciplinary setting using the same clinical pathways. All patients met the NIH criteria for bariatric surgery. All operations were performed by a single surgeon (PG) with the assistance of surgical residents. In this study we used perioperative mortality and reoperations as the ultimate outcomes studied, since they represent the most important and visible quality and safety measures.

**Results:** Between August 2001 and August 2017, 2315 consecutive laparoscopic bariatric operations were performed, including 706 primary Roux-en-Y gastric bypasses (RYGB), 429 primary adjustable gastric bands (LAGB), 901 primary sleeve gastrectomies (LSG) and 279 secondary bariatric surgeries and revisions. All bariatric procedures were approached laparoscopically (1814 procedures were stapled and 501 were nonstapled). The mean patient age was 38 years (16–73), females represented 85% and mean BMI was 48.2 kg/m<sup>2</sup> (35–73). There were no perioperative mortalities, no conversions to open surgery and no intraoperative blood transfusions. There were two major intraoperative complications (hypopharyngeal perforation-1, malignant hyperthermia-1). Mean hospital stay was 1.45 days (1–40 days). Eleven patients (0.47%, 10 in gastric bypass group and one in LSG group) required 30-day reoperations for postoperative complications (staple line gastrointestinal bleeding-5, anastomotic leak-1, strangulated post site hernia-1, unexplained severe abdominal pain-1, intestinal obstruction-2, and intrabdominal abscess-1). There were no long term (1-year) mortalities in patients that required reoperation. There was one transfer to another institution. The dynamics of further improving safety was such that there was no complication on the recent consecutive 127 stapled procedures and the mean hospital stay was 1.1 days (1–4 days). Detailed subgroup analyses will be provided.

**Conclusions:** With well-controlled and structured pre-, intra-, and post-operative care, laparoscopic bariatric surgery can be performed with minimal reoperations and zero mortality in a teaching institution. Such favorable outcomes further optimize the benefits of bariatric surgery and may encourage more potential patients and referring primary physicians to pursue bariatric surgery as a preferred and optimal therapeutic management of morbidly obese patients.

**P736****Does Concomitant Placement of a Feeding Jejunostomy Tube During Esophagectomy Affect Quality Outcomes?**

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**Background:** Placement of a feeding jejunostomy tube (FJ) is often performed during esophagectomy. Few studies, however, have sought to determine whether concomitant placement affects postoperative outcomes of esophagectomy.

**Materials and Methods:** The American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) database was queried using current procedural terminology (CPT) billing codes to identify all patients who underwent elective esophagectomy secondary to cancer between 2012 and 2014. Subgroup analysis was performed to determine whether there was any difference based on neck, chest, or an enteric/colonic transposition anastomosis. Patient demographics, comorbidities, operative characteristics and postoperative complications were compared using Chi-squared and Wilcoxon–Mann–Whitney test.

**Results:** A total of 3051 cases were identified. FJ placement was concomitantly placed in 1794 (59%). Overall, the thirty-day-postoperative mortality did not differ between the two groups (2.6% for patients with FJ versus 2.0% without, P = 0.258). The readmission rate, return to OR, LOS, and wound infection rates were similar. The mean operative time was longer in those undergoing concomitant FJ (375 min for patients with FJ versus 335 min without, P = 0.0001). Postoperative pneumonia, and UTI were higher in patients undergoing FJ placement during esophagectomy. Upon subgroup analysis, when a cervical anastomosis was performed, the rate of superficial SSI was 6.4% in the FJ group versus 10% in the non-FJ group.

**Conclusion:** Although FJ placement during esophagectomy is associated with increased operative time, pneumonia, and UTI, our analysis of data from NSQIP suggest that FJ placement is not associated with increased mortality, debilitating postoperative morbidity, readmission, or increased length of stay. When a cervical anastomosis is performed, FJ placement is associated with a lower rate of superficial SSI.

**P738****Laparoscopic and Open Distal Gastrectomy for Gastric Cancer in Elderly Patients**

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**Introduction:** The aim of this study was to assess the safety and efficacy of laparoscopic and open distal gastrectomy (LDG and ODG) each other in elderly patients with gastric cancer compared with the short-term outcome in the nonelderly.

**Materials and Methods:** We reviewed 439 patients who underwent distal gastrectomy between January 2013 and October 2016. Of these, LDG was performed 280 patients and ODG was performed 159. We compared elderly patients (aged 75 years or more) with younger patients in each operative procedure. (LDG: elderly 71, younger 209; ODG: elderly 73, younger 86) Preoperative comorbidity and surgical results were analyzed. Multivariate analysis was performed to detect predictive factors for postoperative complications.

**Results:** In both LDG and ODG groups, the operative time and amount of blood loss did not differ, while comorbidity was more common in elderly patients than in the nonelderly, and there were fewer retrieved lymph nodes in elderly patients. The incidence of all postoperative complications did not differ between both groups in each procedure, and there were no significant differences in the time to first flatus or postoperative hospital stay. However, in terms of specific postoperative complications, respiratory complications were more frequently observed in elderly group with ODG significantly ( $p=0.034$ ), while not with LDG group. In multivariable analysis, age was not independent predictor of postoperative complications.

**Conclusion:** ODG for elderly patients requires attention particularly in postoperative respiratory complications. LDG is a safe and less invasive treatment for gastric cancer in elderly patients who have greater comorbidity.

**P739****Examining the Role of Preoperative Ineffective Esophageal Motility in Laparoscopic Fundoplication Outcomes**

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**Introduction:** Patients suffering from gastroesophageal reflux disease (GERD) may elect to undergo antireflux surgery (ARS). Our aim was to compare postoperative quality of life outcomes between patients who did and did not exhibit ineffective esophageal motility (IEM) before undergoing laparoscopic fundoplication.

**Methods and Procedures:** A retrospective review of a prospectively maintained database identified patients who underwent laparoscopic fundoplication between 2009–2016. All cases were performed by one of four surgeons at a single institution. Laparoscopic Nissen, Toupet, and Dor fundoplications were studied.

All patients underwent preoperative manometry. Cohorts were defined according to % ineffective clearance reported in manometry results; the first cohort is considered ‘normal’, with less than 30% ineffective clearance. The second, third and fourth cohorts exhibited IEM with ≥30%, ≥50%, and 100% ineffective clearance respectively. Quality of life outcomes were measured using Short Form-36 (SF-36), Gastroesophageal Reflux Disease-Health Related Quality of Life (GERD-HRQL), Dysphagia scores, and Reflux Severity Index (RSI) surveys administered preoperatively and at 3 weeks, 6 months, 1 year, and 2 years postoperatively. Comparisons between cohorts were made using Fisher’s Exact and Wilcoxon Rank-Sum tests.

**Results:** A cohort of 282 patients underwent ARS between 2009–2016 and agreed to participate in the study. Demographic variables including gender, BMI, and smoking status were similar between all cohorts. Patients with 30%, 50%, and 100% ineffective clearance were more likely to receive a Toupet vs a Nissen fundoplication (Table 1). A higher percentage of patients with effective clearance underwent concurrent hiatal hernia repair, and the distribution of hernia type varied between cohorts (Table 2). There were no significant differences in complications or recurrence rates. Preoperative quality of life measures did not vary between the cohorts nor did postoperative scores at three weeks or six months. Patients with 100% ineffective clearance exhibited worse GERD-HRQL scores one and two years postoperatively (1 year—effective: 5.6, 100% ineffective: 8.5  $p=0.045$ , 2 years—effective: 7.4, 100% ineffective: 11.0  $p=0.046$ ). Likewise, patients with 30% ineffective clearance showed worse GERD-HRQL scores at one year (effective: 5.6, >30% ineffective: 9.5  $p=0.036$ ).

**Conclusion:** Preoperative ineffective esophageal motility was shown to result in comparable short-term quality of life following ARS. However, GERD-HRQL scores at one and two years showed worse outcomes in patients with preoperative IEM.

Table 1

% Ineffective Clearance	<30%		>30%		>50%		100%	
	%	p-value	%	p-value	%	p-value	%	p-value
Nissen	84.6	40.7	<.0001	32.4	<.0001	36.0	<.0001	
Toupet	13.2	53.7	<.0001	64.7	<.0001	64.0	<.0001	
Dor	0.9	0.0	0.4898	0.0	0.7569	0.0	0.8118	

Table 2

Hernia Type	<30%		>30%		>50%		100%	
	%	p-value	%	p-value	%	p-value	%	p-value
1	30.0	24.4	20.6	16.0	16.0	12.0	12.0	0.0075
2	1.4	1.1	5.9	4.6	8.9	6.3	4.0	
3	60.1	46.1	0.0200	38.2	0.2223	40.0	0.0608	
4	7.5	14.6	8.8	12.0	0.0	0.0	0.0	
5	0.9	2.4	0.0	0.0	0.0	0.0	0.0	

**P740****Robotic Surgery as Part of Oncologically Adequate IPMN Treatment: Indications, Short and Long Term Results**

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**Introduction:** to evaluate the role of robotic assisted surgery as part of an appropriate patient work-up and treatment of IPMN and its consistency in terms of perioperative and long term results. Few reports described singular minimally invasive procedures for IPMN. This study aims to describe a comprehensive, oncologically adequate treatment of IPMN in a minimally invasive unit with an extremely high robotic penetrance.

**Methods and Procedures:** we retrospectively analyze our database of resected IPMN between 2008 and 2017. This case series includes consecutive, unselected patients: all candidates with a preoperative diagnosis of IPMN were approached robotically.

**Results:** among 142 robot assisted pancreatic resections, we identified 13 patients with IPMN. One was excluded for having less than 6 months follow-up, so 12 patients were included and analyzed. They underwent duodenopancreatectomy in 7 cases, distal pancreatectomy in 4 cases and central pancreatectomy in 1. All but one indications followed the most updated available guidelines (Sendai from 2008 to 2012 and Fukuoka from 2012 to 2017; American Gastroenterology Association guidelines were used for comparison only). One patient was operated even if the guidelines were suggesting to follow up, because of a strong familiar cancer history. The final pathology for this patient was high grade dysplasia. In another patient we were inside Fukoka's recommendations, but outside AGA guidelines and the final pathology was adenoma in chronic pancreatitis. Postoperative morbidity was 16.7 (2 low grade complications, one grade A pancreatic fistula, now considered a biochemical leakage only) and mortality was zero. One conversions to open surgery occurred only: a DP in Jehovah's witness with a bulky mass behind the portal vein. The mean follow up was 40 months (range: 10–68), with only one loss to follow up after 12 months for a high grade dysplasia.

**Conclusion:** in hepatobiliary pancreatic minimally invasive centers the treatment of IPMN can be grant following the same principles of major cancer centers, with comparable results. Large unbiased studies are needed to evaluate if a minimally invasive approach could modify the ratio between operated and surveilled patients.

**P742****The Feasibility of Laparoscopic Surgery for Primary Tumor Resection in Patients with Metastatic Colorectal Cancer**

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**Introduction:** Laparoscopic surgery has also developed as a commonly accepted surgical procedure for advanced colorectal cancer. There are conflicting data on the influence of laparoscopic surgery on survival benefits. However, advantages of primary tumor resection by the laparoscopic surgery in patients with metastatic colorectal cancer are still obscure. The aim of this study was to compare the long-term outcomes of laparoscopic surgery with those of open surgery in patients with metastatic colorectal cancer.

**Methods and Procedures:** We retrospectively reviewed a total 149 consecutive stage IV patients who underwent primary tumor resection of colorectal cancer between January 2007 and December 2014.

**Results:** The median duration of observation was 21±23.4 months. The five-year overall survival rate was 12.1% in all patients with stage IV colorectal cancer, with median survival times of 23 months. Of 149 patients, 44 underwent laparoscopic surgery and 105 underwent open surgery. There were no deaths within 30 days after surgery in the laparoscopic group. Five patients (17.2%) in the laparoscopic group required conversion to open surgery because of bulky tumors. Seven patients (15.9%) in the laparoscopic group required conversion to open surgery because of bulky tumors. The five-year overall survival rate was 6.8% in the laparoscopic group and 14.5% in the open group, with median survival times of 30 and 21 months, respectively ( $P=0.22$ ). Although the median survival times of laparoscopic surgery were longer than open surgery, laparoscopic surgery was not significantly associated with the overall survival.

**Conclusion:** Laparoscopic surgery seems to be a safe and feasible option, with long-term benefit for primary tumor resection with metastatic colorectal cancer, but optimal treatment has yet to be defined.

**P741****Reducing the Use of Catheters, Tubes and Imaging After Hiatal Hernia Surgery Significantly Reduces Length of Hospital Stay**

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**Introduction:** Historically, standard post-operative management of patients undergoing laparoscopic hiatal hernia surgery has been placement of a foley catheter and nasogastric tube (NGT) at the time of surgery with removal early on postoperative day (POD) one, at which time an upper-gastrointestinal series study (UGI) would be performed. We initiated a quality improvement project, seeking to assess if we could safely forego placement of foley and NGT along with the UGI, unless clinically indicated. Our aim was to determine if this decreased overall length of stay (LOS), and how often and which demographic of patients needed placement of foley or NGT postoperatively.

**Methods and Procedures:** We reviewed patients who had undergone laparoscopic hiatal hernia surgery between 2010 and 2016 under a single thoracic surgeon. Patients were excluded for poor esophageal motility (peristalsis <70%), previous esophageal surgery, and presence of a paraesophageal hernia (PEH) with over 50% of the stomach contained in the chest. Eligible patients were further stratified into two groups: fast track and non-fast track. Fast track was defined as patients who left the operating room (OR) with no foley or NGT, and did not receive a routine UGI on POD one. Non-fast track was defined as patients who left the OR with a foley and NGT and received a routine UGI on POD one. LOS was measured in hours from the start of surgery to the time of discharge.

**Results:** Of the 75 patients included, 42 were categorized as fast track and 33 as non-fast track. The two groups were similar in terms of age, gender, BMI and ASA; however, the fast track group had fewer paraesophageal hernias and shorter surgery times [Table]. The hospital LOS, however, was significantly shorter in the fast track group, even though there were more postoperative urinary catheters utilized. No patients in fast track group needed an NGT placed or UGI ordered during initial stay.

	Fast Track (n=42)	Non-Fast Track (n=33)	p Value
Hernia Size (cm)	3.9	4.0	0.931
% Sliding hiatal hernia / paraesophageal hernia (n)	79% / 21% (33/9)	52% / 48% (17/16)	<b>0.014</b>
Length of surgery (hour:minutes)	1:14	1:54	<b>&lt;0.001</b>
Postoperative urinary catheter placement	6	1	0.206
Length of stay (hours)	32	48	<b>&lt;0.001</b>
Emergency room visits	6	2	0.442
Readmissions	2	1	0.830

**Conclusion:** In more straightforward laparoscopic hiatal hernia surgery, surgeons can safely forego NGT and foley placement, as well as UGI evaluation the following morning. These initiatives may translate to a quicker discharge from the ward, and may allow safe transition to performing these cases in 24 hour ambulatory outpatient setting. Further evaluation of additional interventions and patient education to decrease LOS are underway.

**P743****Effect of Educational Intervention on Adenoma Detection Rate (ADR) for Colonoscopy in St. John's, NL**

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The Canadian Association of Gastroenterology (CAG) has implemented the Colonoscopy Skills Improvement (CSI) program across Canada with a goal of improving colonoscopy quality. The programs' efficacy has not yet been formally assessed.

This retrospective cohort study was performed on fourteen endoscopists practicing in a tertiary referral center who have undergone CSI training between October 2014 and December 2015. Procedural data were collected before and after CSI training. Data were extracted from the electronic medical record (EMR) and entered into SPSS version 20.0 for analysis. Student's T-test was used to compare groups for continuous data; Chi-squared tests were used for categorical data.

Data were collected for a total of 3783 procedures; 2383 were done before CSI training and 1400 procedures since CSI training. Our sample size provided 80% power to detect a mean difference in ADR improvement of 5%. The most common indication for colonoscopy was family history of colorectal cancer in 970 (25.6%) patients. While age (58.0 yrs v. 60.1 yrs, p<0.001) and gender (43.4% male v. 46.9% male, p=0.035) were similar, they were statistically different between groups. Groups were comparable in terms of indication, and completion rate (92.6% v. 94.2%).

ADR improved significantly after completing the course (23.5% v. 35%, p<0.001). An improvement was also noted in both polyp detection (37.6% v. 52.9%, p<0.001) and polyp removal (36.1% v. 50.4%, p<0.001).

We have seen a significant increase in ADR at our institution since implementing the CSI program.

**P744**

### **Assessing the Risk of Postoperative Small Bowel Obstruction Across Minimally Invasive Surgery Platforms in Colorectal Surgery**

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**Background:** Minimally invasive surgery (MIS) has proven benefits over open colorectal surgery, including a lower incidence of postoperative complications. Even with MIS, postoperative ileus and small bowel obstructions (POI/SBO) remain a common and costly complication. Thus, efforts to address and decrease the incidence are warranted. Little evaluation has been performed on their rates across different MIS approaches. Our goal was to evaluate the incidence and associated factors for POI/SBO across laparoscopic and robotic approaches.

**Methods:** Review of a prospectively-maintained departmental database for elective colorectal resection cases performed at a major tertiary referral center from 2010–2016 was performed. Eligible patients who had minimally invasive surgery were stratified in multiport laparoscopic and robotic cohorts, and included if they had POI/SBO after surgery. Comparative analysis assessed the demographic, perioperative, and postoperative outcomes. The main outcome measures were the incidence rate, associated variables, and time to ileus/ SBO across the MIS platforms.

**Results:** During the study period 4161 total patients were reviewed—3856 laparoscopic and 305 robotic. Postoperatively, 512 (13.28%) laparoscopic and 49 (16.07%) robotic patients suffered from POI/SBO. Within this cohort, there were no significant differences in age, gender, BMI, or comorbidity across approaches. More robotic patients had prior abdominal operations ( $p<0.05$ ). The main indication for operation differed across the laparoscopic and robotic groups—Inflammatory bowel disease and colorectal cancer, respectively ( $p<0.05$ ). The main procedure performed was a segmental resection in the laparoscopic and an LAR in the robotic group ( $p<0.05$ ). In both groups, extensive lysis of adhesions, midline extraction, and extracorporeal anastomosis were associated with development of POI/SBO. With POI/SBO, the index length of stay (LOS) was longer in the laparoscopic cohort (6.42 vs. 5.72 days,  $p<0.05$ ). The laparoscopic group also had significantly more 30-day readmissions (10.74% vs. 4.08%), a higher reoperation rate (19.14% vs. 8.16%), and longer LOS for the readmission episode than the robotic group (4.24 vs. 1.50 days) (all  $p<0.05$ ). Laparoscopic SBO occur significantly later after the index procedure than robotic SBO (24.67 vs. 6.01 months,  $p<0.05$ ).

**Conclusions:** The rate of POI/SBO is considerable and comparable across laparoscopic and robotic approaches. However, there are distinct differences in the severity, time to occurrence, and impact on quality measures, such as LOS and readmissions between laparoscopic and robotics. This information could be an important factor in which approach the surgeon chooses, as well as affecting the value proposition of the different technologies in colorectal surgery.

**P745**

### **Long-Term Results of Laparoscopic Splenectomy for Immune Thrombocytopenia**

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**Purpose:** Laparoscopic splenectomy (LS) has been recognized as the standard therapy for patients with medically refractory immune thrombocytopenia (ITP). The short-term results after LS have been reported, however the long-term results of LS remain unknown. The aim of this study was to evaluate the short- and long-term results in patients underwent LS.

**Methods:** From May 1993 to August 2017, twenty-three patients who underwent LS for refractory ITP in our institute were retrospectively reviewed. Laparoscopic surgical procedure was standard with using laparoscopic linear stapler. Responses to surgery were evaluated a month after the operation based upon the American Society of Hematology 2011 evidence-based practice guidelines for ITP.

**Results:** There was no open conversion in this study. The mean operation time and blood loss were 151 min and 64 g, respectively. There was no case using blood transfusion during and after operation. With regard to complications, one patient (4%) had a postoperative pancreatic fistula that did not require percutaneous drainage. Positive responses, including the complete and partial remissions, were achieved in 78% (18/23). The mean follow-up duration was 89 months, and the 5-, 10-, and 15-year relapse-free survival rates were 94% for all three time points.

**Conclusions:** The present study demonstrated that LS for ITP can provide good long-term outcomes.

**P747**

### **Wound Complications in 463 Consecutive Transumbilical Single Port Laparoscopic Cholecystectomy**

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**Objective:** To evaluate the wound complication rate in patients undergoing transumbilical single port laparoscopic cholecystectomy (SP-C).

**Background:** SP-C is said to be less invasive than conventional laparoscopic cholecystectomy. However, SP-C is performed less commonly compared to conventional laparoscopic cholecystectomy. One of the reasons for this is concern over wound complications including the umbilical hernia after SP-C. A higher wound complication rate related to transumbilical incision has been reported in some studies.

**Methods:** 463 consecutive SP-C were performed by a single surgeon between May, 2009 and February, 2017. Two cases of conversion from SP-C to open surgery were excluded. All procedures were followed postoperatively for a minimum of months, and wound complications such as bleeding, fat lysis, infection, or hernia were recorded. Patients were classified as having a wound complication or not.

**Results:** Pure transumbilical SP-C was completed 94.6%, additional trocars were used in 5.0%, and the rate of conversion to open surgery was 0.4%. After a median follow-up of 32.1 (range, 6–50) months, 14 wound complications (3.0%) had occurred (bleeding 0%/fat lysis 2.0%/infection 0.7%/hernia 0.4%, respectively). Factors associated with wound complications were higher body mass index and longer skin incisions. Furthermore, a learning curve effect was noted after 200 procedures.

**Conclusions:** The incidence of would complications is acceptably low with SP-C.

**P749****Post Surgery Debriefing - Impact on Safety Quality & Teaching**

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A novel post surgery debriefing process, in a general surgery department in a 550 bed public hospital in Israel, was developed and practiced during 24 months. The process relates to pre-operative preparation, to surgical equipment problems, to functional issues related to other OR partners (Anesthesiologists, nurses etc.) and to personal conduct of the surgeon during the procedure itself. It is aimed to define the problem, why did it occur and to suggest a lesson for the future. The results of this process prove to have affected safety issues as well as efficiency with regard to multiple OR functions and most important as a learning & teaching methodology. We shall describe the 6 stages of the process, the compliance characteristics and its actual results.

**P751****Safety and Utilization of Robotic-Assisted Metabolic and Bariatric Surgery at MBSAQIP Centers**

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**Introduction:** Minimally invasive techniques have greatly improved outcomes in bariatric surgery. Recently, robotic-assisted techniques have been increasingly adopted. Relatively little published data is available regarding the use, safety, and value of robotics in bariatric surgery at a population level. The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) collects clinically-rich data for the majority of all bariatric operations performed in the United States. Trained collectors record data related to the surgical approach (including laparoscopic or robotic), as well as conversion to alternative approaches. We used the first Participant Use File (PUF) from the MBSAQIP to examine the current use and safety of robotic-assistance in bariatric surgery at a national level.

**Methods:** All patients who underwent primary elective bariatric operations were identified. Univariate statistics were compared between patients who received different approaches. To examine the effects of robotic-assistance more carefully, a subset of patients was selected who underwent the most common operations (sleeve gastrectomy or gastric bypass) via either robotic or conventional laparoscopic approach. Multivariable logistic regression was performed to determine the independent effect of robotic vs conventional laparoscopic approach on complications.

**Results:** 140,649 patients who underwent elective primary bariatric operations in 2015 were identified. Of those, the initial approach was laparoscopic for 124,169 (88.28%), robotic-assisted for 8,773 (6.24%), and "laparoscopic-assisted" for 6,413 (4.56%). Few cases performed with hand assist, NOTES, or single-incision. Utilization of robotics was highest for BPD/DS (227 of 1,051 cases, 21.6%). The greatest number of robotic-assisted cases were sleeve gastrectomy (5,539 of 92,406, 5.99%) and gastric bypass (2,904 of 36,076 cases, 7.18%).

Relatively few operations were converted to a different approach (see table). Operative time was longer when using robotic approaches for both sleeve (74.01 vs 102.39 minutes, p<0.0001) and bypass (116.62 vs 152.68, p<0.0001). Postoperative LOS was no shorter when using robotic-assistance (see table). Unadjusted 30-day outcomes revealed slightly higher rates of readmission for both operations when using robotic-assistance (see table), and slightly higher rates of complications after robotic sleeve gastrectomy (3.91% vs. 3.06%, p<0.001). Multivariable modeling showed no significant impact of robotic-assistance vs conventional laparoscopy on major complications or death (OR 1.1, 95% CI 0.99–1.22).

**Conclusions:** Robotic-assisted bariatric surgery is being performed for over 6% of all cases. This analysis of the MBSAQIP data demonstrates that the rate of conversion to open surgery is low, and that robotic surgery is safe, though operative times are longer. The benefit over conventional laparoscopy cannot be seen in this data set.

Robotic vs laparoscopic bariatric surgery, by operation (n=120,330)						
	Sleeve gastrectomy (n=87,330; 69.14%)		Roux-en-Y gastric bypass (n=18,980; 30.86%)			
	Laparoscopic (93.60%)	Robotic (6.34%)	p value*	Laparoscopic (92.55%)	Robotic (7.45%)	p value*
<b>Patient characteristics (selected)</b>						
Female	78.03%	79.62%	0.82	79.50%	79.44%	0.945
Race			>0.001			>0.001
White	73.54%	74.96%		78.70%	78.17%	
Black	18.29%	18.34%		14.33%	15.32%	
Other	8.17%	6.10%		8.97%	5.51%	
Previous obesity or foregut surgery	2.00%	1.30%	<0.001	1.08%	1.21%	0.052
ASA Class						0.005
I-II	26.37%	24.01%		17.59%	28.17%	
III	70.37%	72.54%		77.69%	15.32%	
IV-V	3.36%	3.43%		4.73%	3.45%	
BMI (Mean, SD)	45.31 (8.31)	45.58 (8.53)	<0.001	46.46 (8.40)	46.21 (8.48)	<0.001
Other factors including comorbid conditions, assistant level of training were examined and omitted from this table due to space constraints.						
<b>Perioperative findings</b>						
Approach converted	0.08%	0.70%	<0.001	0.23%	0.41%	<0.001
Final approach if converted from initial						
Laparoscopic	—	92.31%		—	83.33%	
Robotic	7.69%	—		13.25%	—	
Open	76.92%	7.69%		72.29%	16.67%	
Off Time - minutes (Mean, SD)	74.01	132.39	<0.001	116.62	152.68	<0.001
Postoperative LOS - days (Mean, SD)	1.71 (1.95)	1.81 (2.02)	<0.001	2.35 (2.47)	2.18 (2.31)	0.885
<b>30-day outcomes (selected)</b>						
Readmission	3.88%	4.17%	0.002	6.23%	7.35%	0.048
Any major complication	3.08%	3.91%	<0.001	6.41%	6.30%	0.821

\*Student's t test or Fisher's exact test

\*\*SD, standard deviation

**P752****The Relevance of Gastric Cancer Biomarkers in Pre-and Post-chemotherapy in Clinical Practice**

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Gastric stomach cancer is a rapid major cause of cancer-related death globally, have higher incidence in men and it is noticeable by its heterogeneity. A lot of studies have expressed out the molecular basis of this cancer, include pathogenesis, invasion and metastasis. The invention of new technologies has help to bring out several novel biomarkers that have diagnostic and prognostic value. Therefore, this review centers on biomarkers for the early diagnosis, treatment and prognosis of gastric cancer, elaborate the clinical important of serum tumor markers in a patient with this cancer as well as checking the growths, prognosis together with epigenetic changes and genetic polymorphisms.

A deep and rigorous search was carried out in Pub Med/MEDLINE using specific words; “gastric cancer”, with “tumor marker”. Our search yielded 4947 important reports about related topic from books and articles that were published before the end of September 2016.

Conclusively, Scientists are utilizing time and resource to salvage this nemesis which is of global burden. Classical and Novel biomarkers are important for treatment as well as pre-post diagnosis of GC. Major causes for this disease are cigarette smoking, infection by helicobacter pylori, atrophic gastritis, male sex, and high salt intake. The treatment of which early diagnosis is of important to the management, after pathological diagnoses by stage prognosis and metastatic setting, although the outcome proved not so good includes chemotherapy, and oral medication are oxaliplatin, capecitabine, cisplatin and 5- fluorouracil (5-FU).

**P754****Timing of Appendectomy: How Long Is Too Long? An ACS Risk Calculator Based Analysis of Outcomes**

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**Introduction:** Emergent appendectomy is the standard of care in USA based on tradition rooted in theory that delaying surgery allows for progression of disease and poorer outcomes. Antibiotic treatment alone has been shown feasible in the treatment of uncomplicated appendicitis. In clinical practice surgical treatment can be delayed due to a multitude of medical and logistical reasons. This study evaluates the relation between timing of surgery to outcomes.

**Methods and Procedures:** 120 consecutive adult patients undergoing appendectomy in a teaching community hospital were risk stratified using the ACS Risk Calculator. Time from imaging to incision defined early and delayed groups. Statistical analysis was used to determine association between risk level, timing of surgery and outcomes.

**Results:** 79% of patients in this study were considered high risk. Average time to incision was 9.7 hours. Shorter time to incision was associated with a statistically significant lower length of stay ( $p<0.05$ ). For every 12 hours in surgery delay, one day was added to the length of stay. No statistical difference was found between time to incision and other outcome variables of clinical complications, conversion to open appendectomy or frequency of complicated appendicitis. Length of stay was longer than predicted by ACS risk calculator in both high and low risk groups.

**P755****A Multidisciplinary, Obesity-Focused Approach Improves Diagnosis of Obesity-Related Illnesses: A New Paradigm for the Care of Patients with Obesity**

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**Introduction:** Patients suffering from the burden of obesity are at significant risk for medical problems that lead to premature death and disability. We hypothesize that a multidisciplinary bariatric team will be better equipped to recognize and diagnose these conditions. This study hopes to quantify that a patient focused approach leads to increased recognition of obesity-associated comorbidities, thus improving quality of care and surgical outcomes.

**Methods and Procedure:** A retrospective medical chart review of patients who underwent bariatric surgery from 12/1/15 to 12/1/16 was performed comparing patient problem lists obtained from their primary care providers upon entry into the bariatric program, and the final problem list generated after evaluation by the program's multidisciplinary team. The total number and specific comorbidities identified before and after multidisciplinary team evaluation was analyzed with a paired t-test and MANOVA, respectively. Comparison of the number of comorbidities identified against specific patient demographics was conducted using paired t-test.

**Results:** A total of 120 patient charts were selected and 100 met inclusion criteria. The sample consisted of 68% women and 32% men; the mean age was 46.5; the mean BMI was 51.2; 87% were morbidly obese (BMI > 40) and 13% were obese (BMI 30.0–39.9). The total number of comorbidities identified after evaluation by a multidisciplinary team was significantly greater ( $p=0.00$ ), with the average number of comorbidities diagnosed before and after being 3.65 and 6.61, respectively. A significant increase ( $p<0.05$ ) in the identification of comorbidities before and after evaluation were noted for all demographics, and no disparities regarding gender, age, marital status, employment status, BMI, or ethnicity where identified.

**Conclusion:** Patients with obesity unknowingly suffer from many obesity-associated comorbidities simply because their health care providers have failed to recognize the existence of these conditions. Surprisingly, this include diseases that are highly associated with obesity, such as OSA and T2DM, for which obese patients should be screened. Although the root of this dereliction is yet to be determined, insufficient obesity-focused education and inherent weight bias among providers must be considered. Assessment by a multidisciplinary bariatric team resulted in the identification and treatment of an increased number of comorbidities in this patient population. Increased recognition of obesity-related comorbidities improves quality of care, which can translate into improved surgical outcomes.

Obesity-Related Comorbidities	Mean Number of Comorbidities per Patient		F	p-value ( $p<0.05$ )
	BEFORE Multi-Disciplinary Team Evaluation	AFTER Multi-Disciplinary Team Evaluation		
<b>Cardiac</b>				
• Anemia	0.09	0.24	9.01	0.00
• Arrhythmia	0.04	0.11	7.46	0.01
• Cardiomyopathy	0.01	0.01	0.00	1.00
• CHF	0.02	0.02	0.00	1.00
• CAD	0.06	0.06	0.00	1.00
• Hyperlipidemia	0.34	0.37	0.31	0.58
• Hypertension	0.59	0.66	2.94	0.09
<b>Pulmonary</b>				
• Asthma	0.11	0.26	12.13	0.00
• COPD	0.01	0.01	0.00	1.00
• Dyspnea	0.07	0.26	12.99	0.00
• OSA	0.32	0.71	64.12	0.00
• Pulmonary Hypertension	0.00	0.02	2.02	0.16
• Respiratory Failure	0.01	0.02	1.00	0.32
• Smoking	0.33	0.55	20.77	0.00
<b>Gastrointestinal</b>				
• GERD	0.04	0.19	17.53	0.00
• Non-Alcoholic Fatty Liver	0.07	0.14	5.71	0.02
<b>Endocrine</b>				
• Hypothyroidism	0.07	0.14	5.71	0.02
• T2DM	0.43	0.62	20.63	0.00
<b>Psychosocial</b>				
• Alcohol Abuse	0.11	0.18	5.71	0.02
• Anxiety	0.02	0.09	7.46	0.01
• Depression	0.19	0.35	13.33	0.00
• Methamphetamine-use	0.03	0.01	2.02	0.16
<b>Other</b>				
• Cancer	0.04	0.04	0.00	1.00
• Chronic Kidney Disease	0.02	0.05	1.81	0.18
• Chronic Pain	0.29	0.40	4.31	0.04
• Edema	0.09	0.06	1.00	0.32
• Fatigue	0.02	0.02	0.00	1.00
• Hernia (Abdominal Wall)	0.02	0.09	7.46	0.01
• Osteoarthritis	0.16	0.27	4.72	0.03
• Vitamin D Deficiency	0.04	0.64	125.38	0.00

**P756**

### Comparision of Perioperative and Survival Outcomes of Laparoscopic Versus Open Gastrectomy After Preoperative Chemotherapy: A Propensity Score-Matched Analysis

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**Introduction:** Comparisons of laparoscopy-assisted gastrectomy (LAG) and open gastrectomy (OG) in the setting of neoadjuvant chemotherapy (NACT) are lacking. The present study was performed to investigate the short-term and long-term outcomes of LAG versus OG following preoperative chemotherapy.

**Methods and Procedures:** A prospectively maintained database of patients with gastric cancer who underwent LAG or OG following NACT from February 2012 to December 2014 was retrospectively reviewed. Adjustment for potential selection bias in the surgical approach was made with propensity score-matched (PSM) analysis. Perioperative and survival outcomes were compared between the LAG and OG groups.

**Results:** In total, 174 patients were identified from the database. After PSM analysis, 45 patients who underwent OG were one-to-one matched to 45 patients who underwent LAG in the setting of NACT. These two groups had similar outcomes in terms of intra- and postoperative complications and 3-year overall survival. However, the LAG group had a longer operation time ( $P=0.031$ ) and lower estimated blood loss ( $P=0.001$ ). Moreover, compared with patients in the OG group, those in the LAG group had fewer days until first ambulation ( $P=0.028$ ), first flatus ( $P=0.015$ ), first liquid diet ( $P=0.035$ ), and first soft diet ( $P=0.024$ ) and a shorter postoperative hospital stay ( $P=0.041$ ). Additionally, despite an equivalent total number of retrieved lymph nodes between the two groups, the OG group had marginally more lymph nodes dissected from the splenic hilum ( $P=0.032$ ) and splenic artery area ( $P=0.020$ ).

**Conclusion:** The present study indicates that LAG performed by well-qualified surgeons for treatment of locally advanced gastric cancer after preoperative chemotherapy is as acceptable as OG in terms of oncological outcomes.

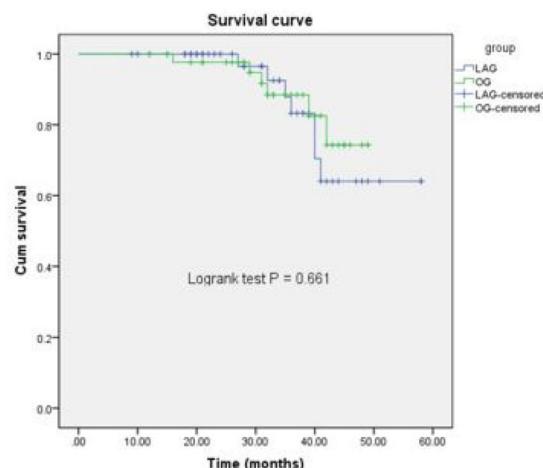


Figure 1. Kaplan–Meier survival curve by surgical approach after PSM

**P757**

### Outcomes of Laparoscopic Antireflux Surgery for Gastroesophageal Reflux Disease: Effectiveness and Economic Benefits

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**Purpose:** Laparoscopic antireflux surgery (ARS) is an alternative treatment option for gastroesophageal reflux disease (GERD) in the world. However, the effectiveness and economic feasibility of ARS versus medical treatment is unknown. This study was performed to evaluate the effectiveness and economic benefits of ARS.

**Methods:** Nine patients with GERD were treated using laparoscopic ARS between 2012 and 2016. Surgical results and total cost for surgery were reviewed.

**Results:** Seven men and 2 women were enrolled. Preoperatively, typical symptoms were present in 9 patients, while atypical symptoms were present in 5 patients. One patient underwent partial fundoplication due to absent peristalsis and the other underwent Nissen fundoplication. Postoperatively, typical symptoms were controlled in 9 of 9 patients, while atypical symptoms were controlled in 4 of 5 patients. Overall, at 6 months after surgery, 3 reported partial resolution of GERD symptoms, with 6 achieving complete control. The average cost of ARS for nine patients was \$840 USD.

**Conclusion:** Laparoscopic ARS is effective for controlling typical and atypical GERD symptoms. The cost of ARS may be more economical over the long term compared to medical treatment.

**P758**

### Short-Term Outcomes of Laparoscopy Assisted Gastrectomy in Elderly Patients. -Is It Really Safe in Elderly Patients?

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**Background:** As the population age becomes higher, laparoscopy assisted gastrectomy (LAG) is applied to elderly patients as well as young patients. Since laparoscopic surgery is reported to affect respiration and circulation, we should take indication of LAG for elderly patients into consideration carefully. Indication of LAG for elderly patients, however, is still controversial. The aim of this study is to assess the safety and validity of LAG for elderly patients.

**Method:** Medical records were retrospectively reviewed for 94 patients who underwent LAG for gastric cancer between 2009 and 2016. In this study, patients over 75 years of age were defined as elderly patients. Patients were divided into two groups according to age; group A (age  $\geq 75$ , n=28), group B (age <75, n=66). Preoperative characteristics and postoperative outcomes were analyzed. Two-tailed Student's t test and/or Pearson's chi-square test were used for statistical analysis.

**Results:** There were no significant differences in male/female ratio and body mass index between two groups. Number of patients whose ASA physical status was  $\geq 3$ , and/or performance status was  $\geq 3$  did not differ. Serum albumin level (4.04 vs 4.3 g/dl,  $p=0.045$ ) and hemoglobin (13.0 vs 14.1 g/dl,  $p=0.006$ ) were significantly lower in group A. The type of procedures were as follows; distal gastrectomy (85.7 vs 75.8 %,  $p=0.281$ ), total gastrectomy (14.3 vs 22.7 %,  $p=0.351$ ), proximal gastrectomy (0 vs 1.5 %,  $p=0.246$ ). Intra-operative blood loss, operating time, and number of harvested lymph nodes did not differ between the two groups. As for postoperative complications such as intra-abdominal abscess (7.4 vs 6.1%,  $p=0.844$ ), anastomotic leakage (0 vs 3.0%,  $p=0.352$ ), significant difference was not observed between the two groups. In addition, respiratory and cardiovascular complication was not observed in elderly patients. Incidence of Clavien-Dindo classification  $\geq$ grade 3 (3.6 vs 3.0 %,  $p=0.891$ ), and postoperative hospital stay (10.5 vs 10.0 days,  $p=0.985$ ) did not differ.

**Conclusion:** Short-term outcomes of LAG in elderly patients were not different from those in young patients. These results suggest that LAG could be an alternative operation indicated for patients with comorbidities.

**P760****The Essential Role of the Transcystic Duct Tube (C-Tube) During Laparoscopic Common Bile Duct Exploration (LCBDE)**

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**Introduction:** Laparoscopic common bile duct exploration (LCBDE) is a standard surgical procedure for the treatment of common bile duct stones (CBDs). However, there are some problems associated with CBD drainage after operations even if performing with the primary closure. Therefore, we developed a new drainage tube, C-tube, which contributes to shorter drainage periods and reduces perioperative complications.

**Method:** C-tube is a type of bile drainage tube which is fixed to the cystic duct with an elastic band. Closing the duct with an elastic band as soon as C-tube is removed prevents bile leakage from the stump of the cystic duct. The essential roles of this tube include: 1. Assisting suturing during operations, 2. Use during intra- and post-operative cholangiography, 3. Assisting post-operative endoscopic sphincterotomy when necessary. Between March 2004 to December 2016, 519 patients treated with LCBDE using C-tube were retrospectively reviewed. The points evaluated were: operation time, blood loss, post-operative day of C-tube removal, length of hospital stays, CBD stone clearance rate, missed and recurrent stone rate, morbidity and mortality.

**Results:** 550 patients were treated for CBDs. 519 patients were treated with LCBDE, 18 patients with laparotomy, 13 patients' treatment was converted to laparotomy. Of all CBDs treatments, LCBDE was used in 90% of cases, including EST+LC. Mean operation times, postoperative C-tube removal days and hospital stays were  $194 \pm 60$  min,  $4.6 \pm 2.5$  days,  $8.1 \pm 7.2$  days respectively. Mean blood loss was  $27 \pm 45$  mL. The CBD clearance rate was 98%. Morbidity included pancreatitis (0.2%) and bile leakage (0.6%). The missed stone rate was 1.7%. The recurrence rate was 4.1%. The mortality rate was 0.4%. There were no major CBD strictures or life threatening bile leakage.

**Conclusion:** C-tube is a safe and feasible drainage tube for use during LCBDE, and plays an important role in reducing life-threatening complications in post LCBDE patients.

**P761****Improving Excellence: Interventions to Improve Follow-Up in a Bariatric Center of Excellence**

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**Introduction:** Current guidelines recommend a multidisciplinary bariatric follow-up program for a minimum of 2 years. This has, however, been a continuous challenge. Follow-up data is widely varied, but rates average about 50% at one year and 30% at two years. Despite having an above average follow-up; we instituted an extensive system of phone calls and letters reminding patients of their scheduled and annual visits. The objective of this quality analysis study is to determine if our interventions have improved follow-up.

**Methods and Procedures:** We analyzed data from patients who underwent sleeve gastrectomy (SG) or gastric bypass (RYGB). We included patients from 2-years prior to our intervention and compared this with patients who had follow-up after implementation. We excluded patients having revisions, gastric banding, and patients whose primary surgeon had left during the data collection period. We analyzed demographics and follow-up rates at 1, 3, 6, 12, and 24 months. Chi-square test was used to evaluate for significance, and results were corrected for multiple comparison.

**Results:** 435 patients met inclusion criteria in the pre-intervention group, and 836 in the post-intervention group. Of those, 418 were analyzed for the 2 year follow-up visit. The pre-intervention group had 62 males, 373 females, and an average age of 37. Approximately 1/3 of the surgeries performed were SG, 2/3 were RYGB. The post-intervention group had 127 males, 709 females, average age of 38. Approximately half of the post-intervention cases were SG while the rest were RYGB.

Average Follow-Up			
Visit	Pre-Intervention	Post-Intervention	P-Value
1 Month	98.9%	98.9%	0.91
3 Month	80.9%	90.4%	<0.00001
6 Month	66.2%	91.4%	<0.00001
12 Month	58.4%	63.0%	0.11
24 Month	57.2%	51.4%	0.09

**Conclusion:** Bariatric surgery is a useful tool in aiding weight loss and improving comorbidities. It is essential that patients receive long-term follow-up and monitoring to achieve these goals. Our program now uses a system of phone call reminders for scheduled visits, as well as calls and letters for annual visits. It has been very effective in improving short term follow-up. Further work is needed, however, to improve long-term follow-up. Consideration could be given to other innovative methods to improve follow-up.

**P762****Surgeon's Evaluation of an Intraoperative Microbreaks Web-App**

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**Introduction:** Intraoperative microbreaks with exercises may address surgeon work-related musculoskeletal symptoms. Most of the surgeons (87%) in a recent multi-site study wanted microbreaks incorporated into their operating room (OR) routine. However, previous microbreaks were associated with low disruption levels. Identifying the effects of updated intraoperative microbreaks delivered through an internet application (web-app) on workload and workflow were needed. This study aimed to evaluate the impact of a web-app to guide intraoperative microbreaks with updated exercises on surgeon workload, fatigue and workflow.

**Methods:** General surgeons at a tertiary medical institute consented to test the microbreaks web-app in ORs. Microbreaks are short periodic intraoperative exercises (~1 minute) aimed at counteracting strain due to surgeon's assumed OR postures. Each surgeon chose an appropriate time interval between exercises (between 20 and 55 minutes). When the interval elapsed, an escalating alarm sounded. Surgeons could use the "snooze" feature to postpone exercises at inopportune times, or choose to perform exercises without breaking scrub. Microbreaks were tested on operative days where minimum operative duration was 1.5 hours, and the participating surgeon completed >70% of each procedure. At the end of each surgical day, surgeons completed a survey focused on workload and microbreaks' primary and secondary outcomes. Workload questions were modified NASA Task Load Index (physical demand, mental demand, and complexity) and procedural difficulty on 0–10 (10=maximum impact) scales. Primary outcomes were the impact of microbreaks on surgeons' physical performance, mental focus, pain/discomfort and fatigue with checkboxes for improved, no change and diminished. Secondary outcomes were microbreaks impact on distraction level and workflow disruption using a 0–10 (10=maximum impact) scale. Descriptive statistics were calculated for median and interquartile ranges (IQR) of these responses.

**Results:** Seven surgeons (3 male, 4 female), with a median (IQR) surgical experience of 8 (5.5, 17) years, completed ten surgical days with a median (IQR) operative duration of 367 (283, 533) minutes/surgical day. The median number of microbreaks/surgical day was 6. The median (IQR) for mental demand, physical demand, surgical complexity and difficulty are shown in Table 1. Following each surgical day, surgeons reported 10/10 improved physical performance, 9/10 improved mental focus with one reporting no change, 10/10 improved pain/discomfort and 10/10 improved fatigue. Surgeons' reported median (IQR) microbreaks impact was 0.5 (0, 1.75) on distraction and 1 (0, 1.5) on the OR workflow disruption.

**Conclusions:** Web-app microbreaks helped reduce body pain/discomfort, fatigue and improved mental focus and physical performance with minimal disruption.

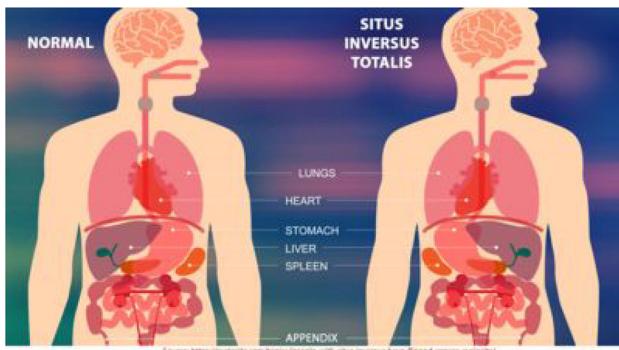
Table 1

Post-surgical Day Question	Median	IQR
How mentally demanding were your surgeries today?	6	4.0-9.0
How physically demanding were your surgeries today?	7.5	4.25-9.75
How complex were your surgeries today?	7	4.25-10
What was the degree of difficulty (patient-based) of your surgeries today?	7	5.25-9.5

**P763****Situs Inversus: Tricks to Improve Ergonomic Challenges During Laparoscopic Surgery**

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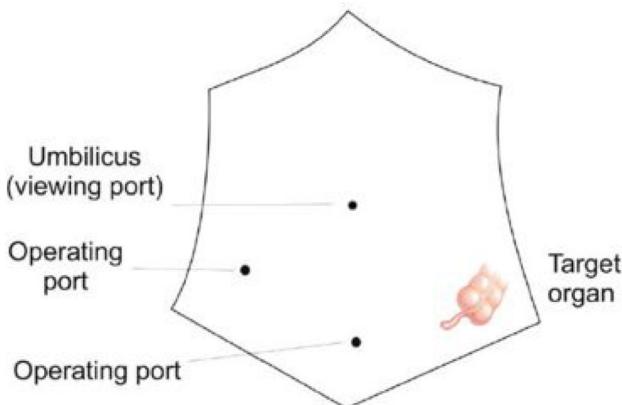
**Introduction:** Situs Inversus Totalis (SIT) is inherited in an autosomal recessive fashion with complete abnormal transposition of thoracic & abdominal viscera. Its incidence varies from 1 in 1400 to 35000 live births. For those undergoing surgery, laparoscopic approach is preferred as it avoids inappropriate incisions. However, due to mirroring of the viscera, the surgeon faces constant visio-spatial disorientation during laparoscopy.



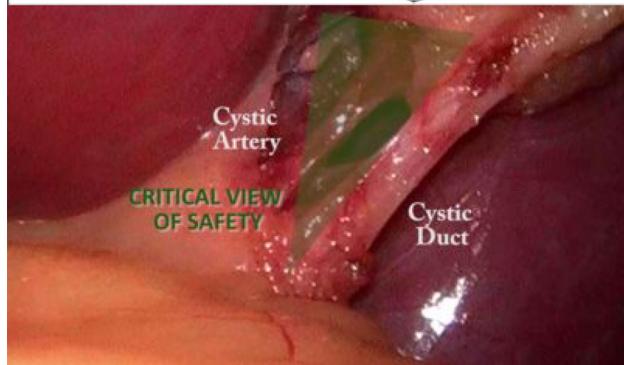
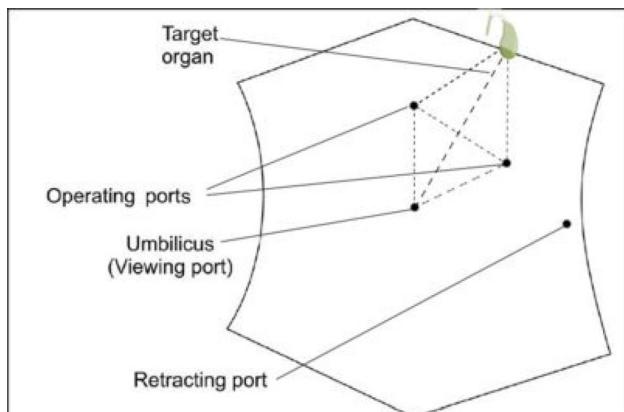
Our objective is to devise methods for proper port placement to overcome the ergonomic challenges.

**Procedure:** 3 patients with SIT were operated laparoscopically in our hospital in the period of May 2016 to November 2017, 2 males suffering from cholelithiasis without cholecystitis and 1 female with acute appendicitis. After thorough review of literature and proper planning, the patients were posted for surgery.

For laparoscopic appendectomy, a thorough initial diagnostic survey is performed on introducing a scope through the umbilical port and confirming the exact location of the appendix. The two working ports are introduced accordingly, which is usually a mirror image of the standard port sites. The appendix was visualised in the left iliac fossa and after meticulous dissection, the appendix and mesoappendix were divided using an endostapler. The operative time was 43 minutes and there were no intraoperative or postoperative complications.



The port placement for laparoscopic cholecystectomy in such a case is trickier as the anatomical variation and the contralateral disposition of the biliary tree demand an accurate dissection and exposure of the biliary structures to avoid iatrogenic injuries. It is important to conform to the principles of triangulation during port placement. The mirror image of 4-port placement is convenient for left-handed surgeons. Whereas, to make the procedure comfortable for right-handed surgeons, the working ports need to be shifted caudally with the surgeon standing between the patient's legs. The mean operative time was 54 minutes and there were no minor or major intraoperative or postoperative complications.



**Conclusion:** Ergonomic comfort is vital to a smooth procedure. While mirroring ports suffice for appendectomy, all other procedures require forethought for port placement. It should be noted that ambidexterity is a desirable skill in the operating room for a laparoscopic surgeon.

**P764****“How to Be a Surgeon and Not Dying Trying” Control of Basic Physiological Parameters in Perioperative Phase, in Surgeons from Punta Del Este, Uruguay. Descriptive Pilot Study**

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**Introduction:** There is a sense by the surgical community that the surgeon career and surgery itself is an unhealthy work or at least it creates stress and disturbances in the quality of life of surgeons. But there has been little study of the subject not only in our Country but also in the region and throughout the world. There is interest in studying the biological factors altered during the surgical procedure, which is novel in our field, in the region and has limited literature at international level.

**Objective:** Assessment of changes in basic physiological parameters, blood pressure and heart rate of surgeons during a coordinated surgery.

**Material and Method:** N: 15 general surgeons. A short survey and measurement table was carried out: surgeons from Punta del Este, Uruguay, were studied. Main study variables: heart rate and blood pressure. A Timex frequency band and sensor was used, placing the sensor within the 15 preoperative minutes, was used to measure the heart rate (HR). Second main variable: blood pressure (BP) with manual measurement sleeve. Preoperative BP and immediate postoperative BP were measured, we were not able to measure intraoperative BP due to the lack of consent of the surgeons involved for the use of other devices different from the heart rate band. Secondary variables: years from graduation, years of practice, age, body mass index (BMI), number of medical co-morbidities, number of jobs, sleeping hours the night before. We took measurements to surgeons during a laparoscopic cholecystectomy.

**Results:** The mean preoperative heart rate was 77.8 bpm. The mean minimum intraoperative heart rate was 86 bpm. The mean maximum intraoperative heart rate was 115.2 bpm (86% with tachycardia at the surgery). The mean immediate postoperative heart rate was 89.5 bpm. The mean heart rate 15 minutes after the postoperative phase was 80.1 bpm. At the immediate preoperative phase 53% of surgeons had elevated BP level (usual normotensives). At the immediate postoperative phase 73% of surgeons had elevated BP level. One of the surgeons had to be treated in the emergency room since he had up to 250 mmhg in his systolic bp.

**Conclusions:** According to our study, the small number of subjects in the study were affected adversely when vital signs were measured. Only one subject whom exercises regularly didn't present abnormal values. We concluded that indeed our surgical job is an stressful event and it affected all of the subjects except the healthiest one.

**765****Overview of Junior Resident’s Level of Fatigue and of Calls Received During On-Call Nights in General Surgery at Centre Hospitalier Universitaire de Sherbrooke (CHUS)**

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**Introduction:** It is known that surgical residents suffer from sleep deprivation. No recent study evaluated the type and number of calls received at night. Lately, burn out, depression and suicide have been the subject of interest in studies and media because of the higher rate among the residents compared to general population. The objective of our study is to evaluate junior resident's level of fatigue and the quantity and quality of calls received during on-call nights in general surgery at CHUS.

**Methods and Procedure:** Transversal study conducted on 17 junior residents that were on-call in general surgery at the CHUS between April 25 and August 27, 2017. The participants detailed all the calls received between 11 pm and 6 am on an database created on the application HandDBase and completed a daily calendar of their on-call night noting all the tasks they did every half hour (surgery/consultation/sleep). The level of fatigue was evaluated at the end of the night at 8 am with a visual analog of sleep scale on a score over 5 points.

**Results:** The level of fatigue 4/5 (tired) or 5/5 (exhausted) was reached in closed to 50% of the on-call nights. The median number of calls by night was 3 and the median duration of sleep was only 3.3 hours. The median length of uninterrupted sleep was 2.5 hours by night. Among the total 110 nights and 384 calls analyzed, 15% were “not pertinent” and 10% were “reportable in the morning”. More than 28% of the nights had at least one call “not pertinent” or “reportable in the morning” that have interrupted the junior resident's sleep. The level of fatigue was significantly correlated to the number of calls received during the night (Spearman's rho=+0.380, p<0.001) and to the number of uninterrupted hours of sleep (Spearman's rho=-0.687, p<0.001).

**Conclusion:** The level of fatigue is very high among the junior residents in general surgery. Many of the calls received during the night are not pertinent or could have been delayed to the morning. Our results lead us to the conclusion that interventions and recommendations should be made to raise nurses and resident's awareness about the situation to reduce the unnecessary calls and the level of fatigue of the residents. We hope that on-call resident sleep will be better preserved and that will result in fewer health issues for them (burn out, depression, suicide).

**P766****Without Interruptions: Does Twitter Level the Playing Field?**

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**Introduction:** Frequent interruption of women in conversation has long been noted anecdotally, and studies confirm that women are interrupted more often than men. Such interruptions can diminish perceptions of authority and compromise women's self-confidence. On Twitter, users cannot be interrupted in the same way they can be in live conversation. Thus the platform may provide a means for women to overcome this obstacle. To determine the degree to which women surgeon leaders utilize Twitter compared to their male colleagues, we examined the Twitter accounts and activity of the leaders of three national surgical societies.

**Methods and Procedures:** Lists of surgeons holding leadership positions in three surgical societies; the American College of Surgeons, the Academic Association of Surgery, and the Society of American Gastrointestinal and Endoscopic Surgeons, were obtained and duplicate names were deleted. Table 1 details the organizations and leadership positions included. The Twitter accounts of these leaders were then identified and confirmed by reviewing the accounts for surgical content. Account duration was calculated from the join date. The number of tweets, accounts following, followers, and likes were recorded for each account. Outliers were defined as two standard deviations from the mean.

**Results:** One hundred sixty-eight men and 64 women surgeon leaders were identified. Forty-nine percent of the men and 66% of the women were found to have Twitter accounts. Mean account durations for men and women were similar, 4.6 years and 4.1 years, respectively. Outliers for total tweets (7 men, 1 women), accounts following (5 men), followers (2 men), and likes (3 men) were excluded from analyses. Almost all positive outliers were men. There were no negative outliers. Overall, excluding the outliers, there were no significant differences between men and women in any metric.

**Conclusion:** Among leaders in the surgical organizations analyzed, a higher percentage of women than men have Twitter accounts. Those with the greatest number of tweets, accounts following, followers, and likes, however, are overwhelmingly male. Thus, although women in this sample were more likely than the men to have Twitter accounts, men were more likely to gain influence through their accounts. Increasing women's influence in this public forum may position them as much-needed role models for the current and next generations. Surgical societies may help reduce the disparity in women's representation in surgical fields through education of their members on how to use social media.

**Table 1.** Organizations and leadership positions included

Organization	Leadership positions included
Association of Academic Surgery	Officers, Executive Council, Representatives
American College of Surgeons	Officers, Board of Regents
Society of American Gastrointestinal and Endoscopic Surgeons	Officers and Board of Governors

**P767****Gender Disparity in Bariatric Surgery Research**

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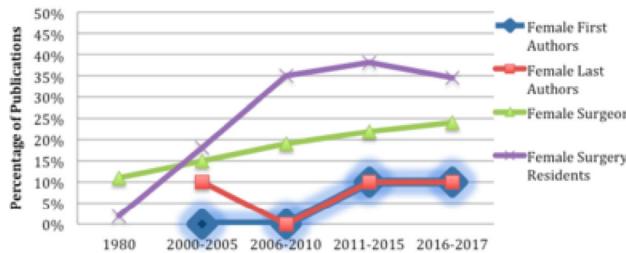
**Introduction:** Although the number of female surgeons and surgery residents has increased over time, women remain under-represented in surgery and academic surgery leadership positions (24%). Surgical research and publications are used as a determinant of hiring and promotion. We hypothesize that among bariatric surgery research, female surgeons are highly under-represented.

**Methods:** Pubmed was searched for bariatric surgery related publications in four different time periods: 2000–2005, 2006–2010, 2011–2015 and 2016–2017. Articles were randomly selected and the gender of the first and last authors determined.

**Results:** Of the bariatric surgery publications reviewed, only 5% of first authors and 7.5% of last authors were female surgeons. Even though the proportion of female authors has increased over time, this is not proportional to the increase in the number of female surgeons or surgery residents (Figure 1).

**Discussion:** Female surgeons are under-represented in bariatric surgery research. The number of female surgeons and residents has a continuous up trend over the last few decades, yet this is not reflected in the number of female authors in bariatric surgery. Although this has improved over time, the improvement has been slow and inadequate.

**Figure 1: Female Surgeons, Residents, and Female Authorship in Laparoscopic Bariatric Surgery Research Over Time**

**P768****A National Survey of Disabilities of the Arm, Shoulder, and Hand Between Open, Laparoscopic and Robotic Surgical Approaches**

Priscila R Armijo, MD, Crystal Krause, PhD, Ka-Chun Siu, PhD, Dmitry Oleynikov, MD; University of Nebraska Medical Center

**Introduction:** The aim of this study was to determine to determine the impact and prevalence of musculoskeletal upper-limb disorders in surgeons performing open (OPEN), laparoscopic (LAP) and robotic-assisted (RA) procedures.

**Methods:** An anonymous REDCap survey was sent to the SAGES Committee Members and to all surgeons currently practicing at our institution. The survey included surgeon demographics, surgical focus, procedures performed, and years in practice. Our survey also included the validated Quick-DASH (Disabilities of the Arm, Shoulder, and Hand) Questionnaire for upper-limb symptoms and the ability to perform certain physical activities. The QuickDASH is scored into two components: disability/symptom score, and the optional work module, which represent the impact of disability on daily activities and work responsibilities, respectively. Both scores range from 0–100, with a higher score indicating greater disability. Surgeons were grouped according surgical focus (OPEN, LAP, or RA), and comparisons were made between groups. Surveys with more than 10% of responses missing were excluded. Statistical analysis were done using SPSS 23.0, with  $\alpha=0.05$ .

**Results:** 156 completed surveys were evaluated (OPEN: N=23, LAP: N=96, RA: N=37). The survey response rate was 50%. 76.9% of respondents were general surgeons, and mean age was 45  $\pm$  9.49 years. Surgeons reported an average of  $30 \pm 16.7$  cases performed per month, with a mean of  $7.5 \pm 3.1$  practicing years. Prevalence of pain in the upper limb was similar between groups (OPEN: 60.9%, LAP: 42.7%, RA: 51.4%,  $p=0.253$ ). Likewise, there were no differences in the mean disability (OPEN:  $3.95 \pm 4.6$ , LAP:  $6.62 \pm 8.49$ , RA:  $7.18 \pm 8.15$ ,  $p=0.275$ ) or mean work (OPEN:  $1.08 \pm 4.06$ , LAP:  $3.77 \pm 7.82$ , RA:  $4.22 \pm 9.08$ ,  $p=0.265$ ) scores between groups. However, a positive correlation was seen between age and disability scores for LAP ( $p=0.034$ ) and RA ( $p=0.042$ ). Similarly, there was a positive correlation between mean work scores and reported pain in the upper-limb for LAP and RA, both  $p<0.001$ .

**Conclusions:** This nationwide survey revealed a similar prevalence of pain in the upper-limb among surgeons performing open, laparoscopic and robotic-assisted procedures. Likewise, similar disability scores were reported between the three surgical groups. Older surgeons performing laparoscopic and robotic-assisted approaches reported a higher impact of upper-limb problems interfering with their daily activities, unlike open surgeons. Among all surgeons who reported pain in the upper-limb, laparoscopic and robotic surgeons were more likely to report that this pain interferes with their work activities. Future studies will assess injuries in the neck and back of the surgeon, and evaluate its impact on the surgeon's work.

**P769****An Analysis of Subjective and Objective Fatigue Between Laparoscopic and Robotic Surgical Skills Practice**

Priscila R Armijo, MD, Chun-Kai Huang, PhD, Gurteshwar Rana, MD, Dmitry Oleynikov, MD, Ka-Chun Siu, PhD; University of Nebraska Medical Center

**Introduction:** The aim of this study was to determine how objectively-measured and self-reported fatigue of the upper-limb differ between laparoscopic and robotic surgical training environments.

**Methods:** Surgeons at the 2016 SAGES Conference Learning Center, and at our institution were enrolled. Two surgical skills practical environments were utilized: 1) a laparoscopic training-box environment (FLS) and 2) the Mimic® dV-trainer (MIMIC). Two standardized surgical tasks were chosen for both environments: peg transfer, and needle passing. Each task was performed twice. Objective fatigue was evaluated by muscle activation and fatigue, and comparisons were made between FLS and MIMIC, for each surgical task. Muscle activation of the upper trapezius, anterior deltoid, flexor carpi radialis, and extensor digitorum were recorded during practice using surface electromyography (EMG; TrignoTM, Delsys, Inc., Boston, MA). The maximal voluntary contraction (MVC) was obtained to normalize muscle effort as %MVC. The median frequency (MDF) was calculated to assess muscle fatigue. Subjective fatigue was self-reported by completing the validated 10-scale score Piper Fatigue Scale-12 (PFS-12) before and after practice. Statistical analysis was done using SPSS v23.0, with  $\alpha=0.05$ .

**Results:** This abstract represented the performance of 15 trainees (FLS: N=8, MIMIC: N=7) as part of larger cohort of the study. For peg transfer, EMG analysis revealed that MIMIC had a significant increase in mean muscle activation for the upper trapezius and anterior deltoid, both  $p<0.001$ . Conversely, practice with FLS led to significantly more muscle fatigue than MIMIC for the same muscle groups (upper trapezius:  $p=0.028$ , anterior deltoid:  $p=0.015$ ), represented by a significantly lower MDF. Similarly, for needle passing, MIMIC had a significant increase in mean muscle activation for the upper trapezius ( $p=0.034$ ) and anterior deltoid ( $p=0.031$ ), but practice with FLS significantly induced more muscle fatigue effort for anterior deltoid ( $p=0.004$ ). Survey analysis revealed a significant decrease in self-reported fatigue after performing FLS tasks (before:  $3.85 \pm 1.66$ , after:  $3.05 \pm 1.54$ ,  $p=0.044$ ), but no difference after MIMIC tasks (before:  $4.00 \pm 2.27$ , after:  $4.22 \pm 2.56$ ,  $p=0.417$ ).

**Conclusions:** Although different muscle groups are preferentially required in the performance of FLS and MIMIC, our analysis for both surgical tasks showed practice with MIMIC required more activation of shoulder muscles, whereas practice with FLS could lead more muscle fatigue for the same muscle groups. Interestingly, surgeons reported improved or no change in perceived fatigue after the tasks, despite of having an increase in muscular activation and effort. Subjective self-report fatigue might not truly reflect the level of fatigue when trainees practice surgical tasks using FLS or MIMIC.

**P770****The Prevalence of Musculoskeletal Injuries in Bariatric Surgeons**

Salman Al Sabah, Eliana Al Haddad; Amiri Hospital

**Objective:** To investigate the prevalence of musculoskeletal (MSK) injuries in bariatric surgeons around the world.

**Background:** As the popularity of bariatric surgery increases, efforts into improving its patient safety and decreasing its invasiveness have also been on the rise. However, with this shift towards minimal invasiveness, surgeon ergonomic constraints have been imposed, with a recent report showing a 73–88% prevalence of physical complaints in surgeons performing laparoscopic surgeries.

**Methods:** A web-based survey was designed and sent out to bariatric surgeons around the world. Participants were queried about professional background, primary practice setting, and various issues related to bariatric surgeries and MSK injuries.

**Results:** There were 113 responses returned from surgeons from 34 countries around the world. 68.5% of the surgeons have had more than 10 years of experience in laparoscopic surgery, 65.8% in open and 0.9% in robotic surgery. 66% of participants reported that they have experienced some level of discomfort/pain attributed to surgical reasons, causing the case load to decrease in 27.2% of the surgeons. It was seen that the back was the most affected area in those performing open surgery, while shoulders and back were equally as affected in those performing laparoscopic, and the neck for those performing robotic, with 29.4% of the surgeons reporting that this pain has affected their task accuracy/surgical performance. A higher percentage of females than males reported pain in the neck, back and shoulder area when performing laparoscopic procedures. Supine positioning of patients evoked more discomfort in the wrists, while the French position caused more discomfort in the back region. Only 57.7% sought medical treatment for their MSK problem, of which 6.35% had to undergo surgery for their issue, and 55.6% of those felt that the treatment resolved their problem.

**Conclusion:** MSK injuries and pain are a common occurrence among the population of bariatric surgeons, and has the ability to hinder performance at work. Therefore, it is of importance to investigate ways in which to improve ergonomics for these surgeons as to improve quality of life.

**P771****3D Laparoscopic Versus Robotic Gastrectomy for Gastric Cancer: Comparisons of Short-Term Surgical Outcomes**

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**Background:** 3D laparoscopic (3D-LAG) and robot-assisted gastrectomy (RAG) are both new minimally invasive surgical therapies for gastric cancer. In this study, we aimed to compare the short-term surgical outcomes between 3D-LAG and RAG.

**Methods:** Between June 2015 and June 2017, 164 patients who underwent 3D-LAG (n=99) or RAG (n=65) for gastric cancer were enrolled. The clinicopathological factors and short-term surgical outcomes were compared with retrospectively analysis.

**Results:** The clinicopathological factors between the two groups were well matched. Postoperative recovery factors including the days of first flatus, days of eating liquid diet and hospital stay were similar. The rate of postoperative complications between the two groups were with no statistical differences (3D-LAG: 4.5% versus RAG: 5.3%, P=0.583). The rate of positive margins, rate of R0 resection and number of harvested lymph nodes were all similar (P=0.218, P=0.698 and P=0.556). However, 3D-LAG was associated with less blood loss (P=0.014) and shorter operative time (P<0.001). In the subgroups of patients with total gastrectomy, 3D-LAG had less blood loss and shorter operative time than RAG (P=0.006 and P<0.001), while for distal gastrectomy, blood loss and operative time showed no statistical differences.

**Conclusions:** This study suggests that 3D-LAG is a novel and acceptable surgical technology in terms of surgical and oncological outcomes. 3D-LAG is a promising approach for gastric cancer therapy, with less blood loss, shorter operative time and satisfied postoperative complication rate.

**P772****Robotic Colorectal Surgery Is Going Towards Centralization: A Nationwide Analysis**

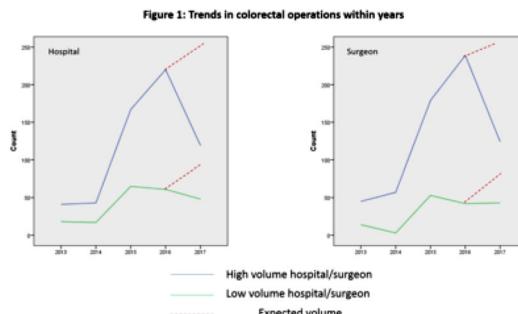
Eren Esen, MD, Erman Aytac, MD, Ilknur Erenler Bayraktar, MD, Bilgi Bacca, MD, Ismail Hamzaoglu, MD, Tayfun Karahasanoglu, MD; Department of General Surgery, Acibadem Mehmet Ali Aydinlar University School of Medicine

**Introduction:** Robotic techniques have been developed to facilitate application of minimally invasive techniques and to overcome limitations of laparoscopy. While robotic surgery has been performed almost for two decades, data about the trends and adoption of robots in colorectal practice is scarce. This study aimed to show implementation of robotic technology in colorectal surgery.

**Methods:** Patients underwent robotic surgery between the beginning of 2013 to first half of 2017 in Turkey were included. Data were obtained from a prospectively maintained database. Patient, surgeon and hospital identifiers were encrypted. Parameters were operation type, operation year, robotic system used (S, Si, Xi), hospital volume and surgeon volume. High volume robotic colorectal hospital and surgeon was defined as the caseload within the forth interquartile (75th–100th) based on the median value.

**Results:** There were 799 colorectal procedures. 47 surgeons performed robotic colorectal surgery at 25 hospitals. 341 (42.7%) and 458 (57.3%) procedures were performed with the S-Si and Xi platforms respectively. 2 hospitals have both of the Si and Xi platforms. 4 hospitals are the Si, 8 hospitals are the Xi hospital currently. The number of robotic colorectal operations increased gradually by years (Figure 1). The median numbers of colorectal procedures were 13 (range 1–171) and 5 (range 1–151) per hospital and per surgeon respectively. There were 12 high volume ( $\geq 23$  cases) robotic colorectal surgeons (HVRCS). There were 6 high volume ( $\geq 40$  cases) robotic colorectal hospitals (HVRCH). HVRCS performed 644 (81%) of the all cases. Among those HVRCS, the numbers of Si and Xi users were 7 and 5 respectively. The surgeons who performed more than 11 procedures continued to use robot in their practice except one surgeon who stopped at 27. Only 2 left colectomies and no right colonic resection were performed before introduction of the Xi platform.

**Conclusions:** Robotic practice in the field of colorectal surgery has been going towards monopolarization which seems reasonable to achieve better outcomes by increasing caseload per hospital/surgeon. Majority of the surgeons abandoned robotic practice without reaching baseline learning curve levels.

**P773****First 100 Robotic Cases and Implementation of a Robotics Curriculum in a General Surgery Residency**

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**Introduction:** The use of robotic technology is rapidly increasing among general surgeons but is not being routinely taught in general surgery residency. We aimed to evaluate our first 100 robotic cases during which time we developed a robotic surgery curriculum incorporating residents.

**Methods:** The first 100 robotic cases performed at our institution from 2016–2017 by two surgeons were analyzed. A residency curriculum was developed and instituted after the first 6 months. It consisted of online modules offered by Intuitive Surgical resulting in certification, simulator training, hands on workshops for cannula placement, docking, instrument exchange, camera clutching and other introductory tasks. Patient demographics, type of procedure, resident involvement, total operative and console times, comorbid conditions and complications were evaluated. Unpaired t tests were performed for statistical analysis.

**Results:** 66 females and 34 males comprised this series with an average age of 44 years  $\pm 12$ . The majority of patients, 71% had comorbidities, with a predominance of hypertension, 59% and diabetes, 37%. The bariatric patients had an average BMI of  $48 \pm 10$ .

A variety of procedures were performed including hernias, foregut and bariatric. Residents participated in 40% of cases. There were no differences in total operative and console times in cases with residents except bariatric procedures. There were 3 complications in this series; postoperative ileus, gallbladder fossa hematoma and an enterotomy. There was one early conversion to open in a complex foregut case and no deaths in this series.

	Cholecystectomy	Sleeve Gastrectomy	RYGB	Revised bariatric	Inguinal hernia	Ventral hernia	Paraesophageal hernia	Heller myotomy
# of Cases	30	22	5	4	18	16	4	1
Resident Involvement	67% (20/30)	55% (12/22)	40% (2/5)	50% (2/4)	22% (4/18)	38% (6/16)	25% (1/4)	0
Total OR time without resident (min)	58 $\pm$ 19	91 $\pm$ 28	193 $\pm$ 29	230 $\pm$ 12	155 $\pm$ 75	172 $\pm$ 82	277 $\pm$ 93	99
Total OR time with resident (min)	64 $\pm$ 34	111 $\pm$ 28	214 $\pm$ 23	119 $\pm$ 6	127 $\pm$ 42	179 $\pm$ 64	250	n/a
p value	0.5	0.1	0.5	0.007	0.5	0.8	0.7	
Console Time without resident (min)	24 $\pm$ 10	44 $\pm$ 9	130 $\pm$ 9	156 $\pm$ 13	94 $\pm$ 49	116 $\pm$ 64	218 $\pm$ 86	50
Console time with resident (min)	34 $\pm$ 28	65 $\pm$ 22	104 $\pm$ 44	56 $\pm$ 2	75 $\pm$ 32	126 $\pm$ 53	196	n/a
p value	0.16	0.01	0.4	0.008	0.5	0.7	0.7	

**Conclusions:** We report our initial experience of robotics in a variety of general surgery and complex foregut cases. The implementation of a robotic surgery program and residency curriculum was safe with similar outcomes related to operative times and complications. As MIS expands with the application of robotics in general surgery, residency curriculums will need to be revised. Further data is needed to determine residency learning curves between robotics and laparoscopy.

**P774****Cost Analysis of Robotic Assisted Surgery vs Laparoscopy in General Surgery**

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**Background:** Robotic surgery has made a large impact in the fields of urology and gynecology. Its use is significantly increasing in the fields of general and bariatric surgery. Evidence remains unclear as to the clinical impact on outcomes, and significant questions remain as to the impact of cost. Our goal was to evaluate the economic impact of robotic surgeries in general and bariatric surgery at our institution.

**Methods:** This study is a retrospective analysis of minimally invasive general and bariatric procedures done at a single institution from January 2016 through June 2017. We performed a cost and reimbursement analysis of robotic versus conventional laparoscopic surgery. The cost evaluation included operative time, operating room costs, length of stay and overall hospital expenses. In addition, we looked at reimbursement and the contribution margin per cpc code.

**Results:** Our study included a total of 1927 patients who underwent 1716 laparoscopic and 211 robot assisted general and bariatric surgeries. The average time duration for laparoscopic surgeries was 138 minutes vs 248 minutes for robot assisted. We performed a cost analysis which showed an average total cost of \$8,955 for laparoscopic and an average of \$15,319 for robot assisted. The total reimbursements were \$19,631 for laparoscopic and \$21,949 for robot assisted. This translated to an average contribution margin of \$10,676 for laparoscopic vs \$6,630 for robot assisted. For general surgery we found an average cost of laparoscopic \$7,675 vs robot assisted \$9,436, with a contribution margin of \$7,761 laparoscopic vs \$3,473 robot assisted. For bariatric surgeries we found an average contribution margin of \$14,149 for laparoscopic vs \$6,165 for robot assisted.

**Conclusions:** Robotic surgery has been associated with higher costs and longer operative times. In this economic climate of increased cost awareness with institutions under increasing financial pressures, judicious use of resources becomes important when determining surgical approach. Although cost of robot assisted surgery may decrease with time, other quality factors may be important in patient selection. Although there is no clear evidence that institutions lose money with robot assisted surgery, in our experience the contribution margin is lower with robot assisted surgery as compared to conventional laparoscopy.

**P775****Is Robotic Cholecystectomy Too Expensive for an Acute Care Surgery Service?**

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**Objectives:** To determine if the use of the surgical robot can add value to the Acute Care Surgery service at a busy academic hospital by studying OR time, length of stay, complications, and hospital costs.

**Methods:** We reviewed a prospectively collected Acute Care Surgery registry at a large (>500 bed) adult university hospital over 9 months. Cases from two acute care surgeons with privileges for open, laparoscopic, and robotic cases were included. Operative technique (laparoscopic versus robotic) could not be randomized as trained robotic personnel are available only on weekdays. We collected data on demographics, indication for surgery, nutritional status, comorbidities, OR time, postoperative complications, length of stay, and costs from the day of surgery until discharge. We analyzed our data in SPSS 22 (IBM Inc., Armonk NY) and utilized Student's T test and Chi-Square. We also performed a linear regression analysis to determine the effect of OR time, robotic surgery, and diagnosis on operating room costs and postoperative length of stay.

**Results:** 37 laparoscopic and 14 robotic cholecystectomies were performed. Demographic parameters (age, gender, medical comorbidities, preoperative albumin and BMI, surgical history and smoking) were comparable. Primary diagnosis was significantly different (Chi-square 0.05), driven by more acute cholecystitis in the laparoscopic group. 0/14 robotic cases and 5/37 (13.5%, p = 0.305) laparoscopic cases were converted to open (2 for adhesions, 2 for failure to progress, and 1 for visualization of anatomy). There was no difference in the incidence of postoperative complications. Operative time was similar ( $158 \pm 38$  min [robot] vs.  $135 \pm 62$  min [lap], p=0.125). There was a trend toward shorter postoperative length of stay in the robotic group ( $1.4 \pm 1.4$  days vs.  $2.4 \pm 2.6$  days, p=0.087) but this was not significant even after adjusting for OR time and diagnosis. Robotic procedures had higher unadjusted OR costs ( $\$3490 \pm \$934$  vs.  $\$2190 \pm \$831$ , p<0.001). After adjusting for OR time and diagnosis, robotic surgery was associated with a \$980 increase in costs [95% CI \$648, \$1310, p<0.001].

**Conclusions:** Robotic cholecystectomy can be safely performed on an ACS service with minimal risk of conversion. Robotic surgery is independently associated with increased OR cost, but individual hospital systems must decide if this additional cost outweighs increased robot utilization and training benefits for physicians and staff.

**P776****Robotic Abdominal Wall Hernia Repairs: Technical Considerations And Lessons Learned**

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**Introduction:** The robotic platform offers several advantages for abdominal wall hernia repairs. Here, we describe our initial outcomes with various types of abdominal wall hernia operations performed using the da Vinci Xi® robot.

**Materials and Procedures:** Retrospective review of 204 patients who underwent robotic abdominal wall hernia repairs (rAWHR) between March 2015 to August 2017 at a single academic institution performed by two surgeons. Data examined included age, gender, body mass index (BMI), hernia type/size, American Society of Anesthesiologist (ASA) score, operative time, estimated blood loss (EBL), length of stay (LOS) and post-operative complications. All hernias were repaired with mesh. Inguinal hernias (including femoral) were repaired using a transabdominal preperitoneal (TAPP) technique. Ventral and incisional hernias were closed primarily and reinforced with preperitoneal, retrorectus or intraperitoneal onlay mesh.

**Results:** Most patients had ASA scores of 2 (54.2%) or 3 (33.9%). Inguinal hernia repairs (IHRs) comprised the majority (59.3%) of cases (71.9% male, mean age 55.5, mean BMI 26.2). There were 103 unilateral IHRs with an average operative time of  $97.2 \pm 55.5$  min and an average EBL of 19.8 ml. There were 18 bilateral IHRs with an average operative time of  $132.4 \pm 49.9$  min and average EBL of 19.8 ml. Thirteen IHRs were combined with umbilical hernias and two with incisional hernias. Average operative time for combined procedures was 152.8 min and average EBL was 29.7 ml. Fifty-five incisional hernias were repaired robotically (56.3% male, mean age 54.5, mean BMI 28.9), four of which were retrorectus and two of those required transversus abdominis release. Median hernia size was 6 cm (2–13 cm). Mean operative time was  $132.9 \pm 57.4$  min and average EBL was 31.5 ml. Twenty-three ventral/umbilical hernias were repaired robotically (52.2% male, mean age 45.4, mean BMI 28.8, median size 2.5 cm (1–4 cm), mean operative time 89.7 ± 29.5 min, average EBL 13.3 ml). One Spigelian hernia (operative time 99 min, EBL 20 ml) and one parastomal hernia (operative time 117 min, EBL 200 ml) were repaired robotically.

There were no major complications and only 1 groin seroma requiring percutaneous aspiration. Nine patients required >24 hour LOS.

**Conclusions:** The da Vinci Xi® robot allows for multi-quadrant surgery and facile intracorporeal suturing which is uniquely suited for AWHRs. The feasibility and safety of rAWHRs is similar to laparoscopic hernia surgery in terms of operative times, blood loss, LOS and complications.

**P777****Robotic Inguinal Hernia Repair Is Superior to Open or Laparoscopic Inguinal Hernia Repair: A National Data Base Review**

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**Introduction:** Many publications have focused on single surgeon or single center data comparing the three different approaches to inguinal hernia repair. The aim of this study is to evaluate patient outcomes including complications, length of stay (LOS) and pain medication utilization of patients who underwent an open (OIHR), laparoscopic (LIHR) or robotic (RIHR) inguinal hernia repair using a national database.

**Methods:** The Vizient clinical database resource manager (CDB/RM) was queried using ICD-9 and ICD-10 procedure and diagnosis codes for patients who underwent each inguinal hernia repair approach from October 2013 to June 2017. Only patients who underwent elective procedures, and classified as minor or moderate risk severity were included. Severity was defined by a validated clinical algorithm that assesses 29 comorbidities, patient demographics and major diagnosis. Complications, 30-day readmission, mortality, LOS, and intra-hospital opiate utilization were analyzed using IBM SPSS v.23.0. Median tests with post-hoc pairwise comparisons. Fischer's exact and Pearson's chi-squared test with Bonferroni correction were applied where appropriate, with  $\alpha=0.05$ .

**Results:** 3,547 patients (OIHR: N=2,413, LIHR: N=540, RIHR: N=594) met the criteria and were included in the study. Majority of patients were male (OIHR: 84.1%, LIHR: 80.4%, RIHR: 95.3%), older than 51 years (OIHR: 81.5%, LIHR: 81.7%, RIHR: 95.3%), and Caucasian (OIHR: 75.7%, LIHR: 77.0%, RIHR: 81.5%). RIHR had the lowest rate of overall complications (0.67%) compared to both IHR (4.44%) and OIHR (3.85%),  $p<0.05$ . Whereas OIHR had the highest postoperative infection rate (8.33%), versus IHR (0.56%) and RIHR (0.0%),  $p<0.05$ . OIHR had also longer length of stay ( $3.57 \pm 4.1$  days) when compared to both groups (LIHR:  $2.2 \pm 2.13$  days, RIHR:  $1.75 \pm 1.62$  days),  $p<0.001$ . OIHR had a significantly higher 30-day readmission rate (3.61%) compared to the robotic approach (0.84%),  $p=0.001$ . Mortality rates were similar between groups (OIHR: 0.21%, LIHR: 0.19%, RIHR: 0.17%),  $p=0.081$ . Opiate use was significantly higher in the OIHR group (96.0%), compared to both LIHR (93.1%), and RIHR (93.8%),  $p=0.004$ .

**Conclusion:** This study demonstrates improved outcomes of robotic inguinal hernia repair compared to an open or laparoscopic approach. Robotic hernia repair showed overall lower 30-day complication and readmission rates, and shortened LOS. While open approach had the highest rate of opiate use, no difference was seen in those rates between laparoscopic and robotic repairs. Research determining the role of robotic-assisted inguinal hernia repair continues to evolve as database capture provides more perspective. Further studies are needed to assess whether surgeon or patient selection contribute to those outcomes.

**P778**

### Robotic Versus Laparoscopic Distal Gastrectomy with D2 Lymphadenectomy in Overweight Gastric Cancer Patients: Surgical Outcomes and Learning Curve Comparison

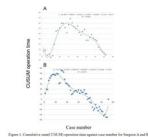
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**Introduction:** Minimal invasive surgery has now been rapidly applied in early and advanced gastric cancer (GC), even in overweight GC patients that are technically challenging. However, the role of robotic assisted gastrectomy (RAG) in overweight GC patients has rarely been investigated. This study aimed to compare safety, feasibility and the learning curve of robotic and laparoscopic gastrectomy with D2 lymphadenectomy in overweight Chinese GC patients.

**Methods and Procedures:** Between July 2015 and November 2016, we retrospectively investigated 186 consecutive overweight GC patients ( $BMI \geq 24$ ) underwent distal gastrectomy with D2 lymphadenectomy (81 for RAG and 105 for LAG) performed by two surgeons. The clinicopathological and surgical features were compared between groups. The cutoff point for initial phase (phase I) and stable phase (phase II) were determined by cumulative sum (CUSUM) curve of operation time.

**Results:** Generally, the surgical outcomes including postoperative complication rate, duration of postoperative hospital stay and lymph nodes harvest in the overweight patients have comparable results between RAG and LAG groups. The cutoff determining phase I and II according to the CUSUM figure for RAG group was 15 and 10 cases for surgeon A and B, respectively. And comparison analysis showed that the operation time of phase II RAG was significantly shorter (Surgeon A:  $311.3 \pm 63.2$  vs  $272.3 \pm 44.8$  min,  $p=0.035$ ; Surgeon B:  $238.3 \pm 64.8$  vs  $280.5 \pm 48.5$  min,  $p=0.027$ ) than phase I. And more lymph nodes (Surgeon A:  $29.4 \pm 9.1$  vs  $24.0 \pm 6.2$ ,  $p=0.045$ ; Surgeon B:  $31.2 \pm 8.6$  vs  $25.8 \pm 6.3$ ,  $p=0.023$ ) were retrieved and less estimated blood loss (Surgeon A:  $155.2 \pm 115.6$  vs  $231.6 \pm 174.5$  mL,  $p=0.035$ ; Surgeon B:  $117.8 \pm 89.6$  vs  $181.5 \pm 116.2$  mL,  $p=0.018$ ) were observed in phase II than phase I while other major clinical features remains insignificant.

**Conclusions:** Our study showed that robotic assisted gastrectomy is a safe and feasible surgical procedure for overweight Chinese GC patients with D2 lymphadenectomy, especially after the initial learning phase. The duration difference of initial phase between different surgeons might indicate a short learning process in robotic distal gastrectomy for an experienced surgeon.

**P779**

### Robotic-Assisted Transabdominal Preperitoneal Inguinal Herniorrhaphy: A Single-Center Experience Including Perioperative Morbidity and Short-Term Outcomes

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**Introduction:** The aim of this study was to report the perioperative morbidity and short-term outcomes of a case series of robotic-assisted laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repairs.

**Methods and Procedures:** A retrospective review (January through December 2015) of 104 patients who underwent either unilateral or bilateral robotic-assisted laparoscopic TAPP inguinal herniorrhaphy by two attending surgeons was performed. Patient demographics, perioperative morbidity, operative time, and follow-up data were analyzed.

**Results:** Patient demographics are summarized in Table 1. Mean operative times for unilateral and bilateral inguinal herniorrhaphy were  $87.5 \pm 20.8$  and  $129.0 \pm 37.6$  minutes, respectively. Mean robot console times for unilateral and bilateral inguinal herniorrhaphy were  $70.0 \pm 25.1$  and  $113.0 \pm 39.8$  minutes, respectively. Postoperative complications included urinary retention (6.7%), conversion to open repair (1%), and delayed reoperation (1.9%). No major bleeding, surgical site infection (SSI), or mortality was observed. At first follow-up visit ( $19 \pm 6$  days), symptoms/signs included groin/scrotal swelling (8%), seroma (7%), groin pain (3%), burning (3%), numbness (1%), and persistent urinary retention (1%). 12% of patients required a second follow-up visit. Two patients underwent reoperation for suspected recurrence but instead a cord lipoma was found without a hernia defect.

**Conclusions:** Robotic-assisted TAPP inguinal herniorrhaphy can be performed with operative times and short-term outcomes similar to those published for open technique. The robotic-assisted TAPP inguinal herniorrhaphy is a safe and an efficient minimally invasive surgical option with lower SSI risk and better cosmetic results.

Table 1. Patient Demographics and Intraoperative Data

Parameters	Unilateral (n=81)	Bilateral (n=53)	Overall (n=104)
Age, years	54±10	54±14	54±11
Male, %	94.1	98.1	96.2
Body mass index, kg/m <sup>2</sup>	29.5±4.9	27.3±4.5	28.4±4.8
Previous abdominal surgery, %	23.5	32.1	27.9
Recurrent inguinal hernia, %	1.9	13.7	7.7
Operative time, min	87.5±20.8	129.0±37.6	108.1±37.0
Console time, min	70.0±25.1	113.0±39.8	91.0±39.4

**P780**

### Identifying Curriculum Gap in Fundamentals of Robotic Surgery and Fundamental Skills of Robotic Surgery: Handling Adverse Events

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**Introduction:** The Fundamentals of Robotic Surgery (FRS) and Fundamentals Skills of Robotic Surgery (FSRS) are universal curriculums covering a range of topics to assure a high level of surgical skills for optimal patient outcomes. This assurance of skills should include management and response to adverse events. Thus, we reviewed FRS and FSRS to identify any gaps in educational contents pertaining to how surgical teams are trained to handle adverse events in robotic surgery.

**Methods and Procedures:** We conducted a literature search through Google Scholar, Journal of Robotic Surgery, and PLOS One on FRS and FSRS from 2010 to 2017. We reviewed 65 articles on preparing medical professionals in handling adverse events during robotic surgeries. Besides the two curriculums, we also surveyed the literature on the characteristics of the adverse events and responses of the medical team. This literature survey provided a basis for recommending additional education contents to FRS and FSRS.

**Results:** In our review, the FRS contains 4 modules consisting of an introduction to robotic surgery, with cognitive, psychomotor, and team training/communication skills. Meanwhile, the FSRS contains 16 different tasks, half of which on human-machine interaction and another half on operative interaction. Both curriculums appear to lack contents on managing adverse events in robotic surgery. According to FDA data, 4,798 adverse events were reported per 100,000 surgeries, of which (i) 40% relates to broken pieces of surgical instruments falling into patients, (ii) 19.1% pertains to burning holes in tissue from electric arching, and (iii) 16.9% relates to unexpected operations of the instrument such as power outage and issues with electrosurgical units. Thus, medical professionals should be trained to manage common adverse events in robotic surgery. For FRS, augmenting the five current scenarios in the communication section with common adverse events (i.e., broken pieces falling into patients) would minimize complications under abnormal circumstances. For FSRS, the most logical method would be augmenting the Operative Interaction tasks with adverse events to train medical professionals.

**Conclusion:** We discovered universal curriculums on robotic surgery lack education contents for training medical professionals to manage adverse events and out of the 4,798 procedures, 4382 (91.3%) pertained to device malfunction. To protect the patient's health, universal curriculums must incorporate contents preparing medical professionals in responding to adverse events, particularly device malfunctions, during robotic surgeries.

**P781**

### Laparoscopic Cholecystectomy Utilizing the New Senhance Robotic System – Proof of Safety and Feasability

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**Introduction:** This retrospective study was performed to evaluate the safety and feasibility of the new Senhance robotic system (Transenterix) for laparoscopic cholecystectomies. We report the first single-institutional experience utilizing this new robotic platform.

**Methods:** Approximately 20 robotic cholecystectomies were performed using the Senhance robotic system. The Senhance surgical system is a new robotic platform that consists of a cockpit, manipulator arm and a connection node (Figure 1). This new system provides robotic surgery with numerous advantages including eye-tracking camera control system, haptic feedback, reusable endoscopic instruments, and a high configuration versatility due to total independency of the manipulator arms. Patients were between 18 and 80 years of age, eligible for a laparoscopic procedure with general anesthesia, had no life-threatening disease with a life-expectancy of less than 12 month and a BMI < 40. A retrospective review of a variety of prospectively collected pre-, peri- and postoperative data including but not limited to patient demographics, intraoperative as well as postoperative complications was performed. Cholecystectomies were performed by expert level laparoscopic surgeons.

**Results:** The standard laparoscopic technique and setup was easily applicable to the Senhance robotic system for this particular surgery. Operative time and perioperative complications were comparable to reports of standard laparoscopic cholecystectomies. There was no significant learning curve detected in our case series.

**Conclusion:** We report the first experience with laparoscopic cholecystectomies using the new Senhance robotic system. There were no major perioperative complications and operative time was comparable to standard laparoscopic cholecystectomies well reported in the literature. This case series suggests that the Senhance robotic system can be safely and easily used for laparoscopic cholecystectomies by experienced laparoscopic surgeons.



**P782****Robotic-Assisted Pyloroplasty for Refractory Gastroparesis**

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**Introduction:** Gastroparesis is a chronic gastric motility disorder that is difficult to treat and results in a poor quality of life for affected patients. Treatment options are typically focused on medical therapy, and primarily involve pro-motility agents. Surgical options include gastric stimulator implantation, subtotal gastrectomy, and pyloroplasty. Pyloroplasty has been a recent focus for the surgical treatment of gastroparesis, particularly utilizing minimally invasive approaches. Here we report our experience with minimally invasive robotic-assisted pyloroplasty.

**Study Design:** We have implemented a clinical quality improvement (CQI) effort in an attempt to better measure and improve outcomes for patients who have refractory gastroparesis. We analyzed 15 patients who underwent robotic-assisted pyloroplasty for refractory gastroparesis from December 2015 to July 2017. Patient factors, treatment factors, and outcome measures were collected in an attempt to gain insight and to generate ideas to potentially improve outcomes.

**Results:** There were no operative complications. Six patients (40%) had failed gastric pacemaker placement prior to intervention. Nine patients (60%) reported improvement in their symptoms and overall quality of life. Four patients (26%) reported no improvement in symptoms and required additional intervention for symptom control and supportive care (one underwent roux-en-Y gastric bypass, three underwent laparoscopic jejunostomy feeding tube placement to maintain nutrition).

**Conclusion:** Robotic-assisted pyloroplasty is a safe option that improves symptoms and quality of life in 60% of our patients. Several of our patients underwent additional surgery due to ongoing symptoms. Based on this analysis of data, ideas will be generated in an attempt to improve outcomes in these patients.

**P784****Robotic Approach to Non-Midline Abdominal Wall Hernias: A Single Institution Experience from a High Volume Center**

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**Introduction:** The objective of our study was to evaluate our experience with robotically repaired non-midline abdominal wall hernias at a high-volume robotic surgery program. We also will discuss the technical advantages of the use of robotic technology in repair of these unusual hernias which have typically had higher recurrence rates than midline hernias. Laparoscopic approach for lateral ventral abdominal wall hernia (spigelian) and lumbar hernia has been described, however the success of robotic assisted repair for these hernias has yet to be determined.

**Methods:** A retrospective case analysis of all robotic abdominal hernia cases between June 2016 and June 2017 at an academic institution with a single high volume robotic surgeon was performed. The operative details of robotic repair of non-midline abdominal hernias, patient demographics, length of stay and smoking status were recorded and analyzed. The technical advantages of the use of robotic technology for example circumferential fixation of the mesh, ease of intracorporeal suturing, and the use of wristed instruments to gain better angles for posterior fascial release were evaluated.

**Results:** A total of 11 cases were identified. The average age of the patients was 54.3 years (range 25–74 years) and patients were predominantly female (91%). Spigelian hernias represented 73% (n=8) and lumbar hernias 27% (n=3). All patients had primary closure of their defect and 7 patients (64%) had a posterior myofascial release performed. Mesh types placed included polypropylene uncoated (n=7), polypropylene coated (n=3), and biologic (n=1). With uncoated polypropylene mesh placed had peritoneum closed over the mesh. The average length of stay was 1.9 days (Range 0–6 days). There were no recurrences identified over a mean follow up period of 3.1 months (range 0.5–13.2 months).

**Conclusion:** Robotic assisted repair of non-midline abdominal wall hernias is a viable option in the elective setting with no recurrences noted in this case series. The technical advantages of using robotic technology were identified and discussed in detail. These advantages theoretically improve outcomes in these patients however further analysis on long-term outcome and costs will have to be determined in future studies.

**P783****Injury to the Surgeon in Robotic Surgery**

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**Background:** The ergonomic benefits of robotic surgery for the health of the surgeon are widely touted as benefits of this technique, though concern remains over a perception of increased risk of injury to patients, particularly in the novice robotic surgeon. Injury to the bedside surgeon and assistants due to robotic movement can also occur, though not previously reported. We describe a finger fracture to the bedside surgeon due to entrapment between robotic arms and discuss potential risks to the surgeon in robotic procedures.

**Procedure:** A distal pancreatectomy and splenectomy was performed utilizing the DaVinci SI system (Intuitive Surgical, Inc., Sunnyvale, CA). During the operation, hemorrhage was encountered which required an instrument exchange that was delayed by self-testing failures. After the instrument was validated and advanced into the field by the bedside surgeon, the operator abruptly took control of the device to reposition. The external portion of the active arm was then rapidly and forcefully propelled laterally toward a stationary retracting arm. The bedside surgeon's hand was still engaged on the instrument being inserted and became trapped between the two arms, leading to a right middle finger crush injury.

**Results:** The bedside surgeon sustained a fracture to the distal phalanx at the insertion of the flexor tendon with significant hyperextension of the joint. There was temporary paresthesia of the fingertip. While flexor tendon function was preserved and surgery was not required, the surgeon was required to maintain continuous splinting and was unable to return to full duty for a total of 13 weeks. The surgeon has mild residual hyperextension.

**Conclusions:** While complications to the patient have previously been attributed to the robotic platform, this case demonstrates that there are other inherent hazards to members of the operative team. As is natural with all indirect visual surgical techniques, the operator becomes intensely focused on the internal view and instruments in the field. This spatial separation is accentuated on the robotic platform as the isolated console provides a complete visual field immersion, no tactile feedback, and a disconnect between the rapid, sizeable outward arm motions need to produce small internal movements. Given the need for maximum dexterity internally, the device doesn't have external proximity sensors to prevent arm-arm or arm-operator collisions. While many bedside operators report anecdotes of collisions with the device, this case reveals the forces involved at the human-machine interface can lead to more significant injuries.

**P785****Open Versus Robotic Inguinal Hernia Repair: Is There a Superior Approach?**

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The inguinal hernia repair has seen several critical improvements in recent times due to the implementation of new techniques, including laparoscopic repair, as well as robotic repair. With over 600,000 inguinal hernia repairs performed annually, it is important to identify the safest and most patient-friendly method. For surgeons, robotic assisted laparoscopic surgery is gaining in popularity for its dexterity and 3D visualization. But despite the growing interest in robotic hernia repairs, there is a scarcity of literature to support its superiority over open inguinal hernia repair. This study hypothesizes that patients who undergo robot assisted laparoscopic inguinal hernia repair will have decreased immediate post-operative pain, shorter recovery room stays, decreased narcotic requirement, and overall decreased pain at follow up compared to open inguinal hernia repair.

In this study, we performed a retrospective analysis of patients who underwent either an open or robotic assisted laparoscopic inguinal hernia repair at Stamford Hospital, from July 2015–July 2017. The following characteristics were analyzed for both subsets of patients: gender, BMI, type of repair, operative time, recovery room time, immediate post-operative pain, and post-operative pain at follow up. Our study demonstrated longer average operative time for patients undergoing robotic hernia repair compared to open repair, which was statistically significant ( $p$  value = <0.05). Patients who underwent robotic inguinal hernia repair spent less time in the recovery room compared to patient who underwent open repair. In addition, patients in the robotic hernia group required less narcotics in the recovery room compared to patients who underwent open repair ( $p$  value = <0.05). There was no statistically significant difference between lengths of hospital stay between the two groups.

This study highlights several possible advantages of robotic inguinal hernia repair, including lower post-operative pain scores, less narcotic usage required in the post-operative period, as well as shorter recovery room time. The results from this study should increase interest in investigating the superiority of robotic inguinal hernia repair. Future plans for study involve comparing robotic to laparoscopic repair. In addition, we plan to continue to follow the study patients to look at additional qualitative metrics, including time to return to work and time to return to daily activities.

**P786****A Contemporary Analysis of Outcomes and Cost Data in Laparoscopic and Robotic-Assisted Approaches of Major Lung and Esophageal Surgery**

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**Introduction:** A New England Journal Of Medicine Analysis of 900,000 Robotic Assisted Surgery (RAS) procedures showed this approach increased costs by approximately \$3,200 over Laparoscopy-Assisted (LA) surgery. We hypothesize experience has led to increased efficiency and reduced cost differential between approaches. Our objective was to contemporarily report outcomes on 30-day mortality, reoperation, total, fixed, and variable costs.

**Method:** 2001 patients underwent esophagectomy and thoracic procedures between November 2006 and July 2017. Patients were matched into cohorts by procedure type. Outcomes were analyzed using unpaired t-test and Fisher's Exact test.

**Results:** Cost data was available for 447 patients undergoing RAS or LA procedures. Significant increases in equipment, labor, and overhead costs resulted with RAS vs. LA. Variable-labor and variable-overhead costs were significantly higher in LA procedures. Higher supply costs and longer procedure time was seen with RAS in all cohorts however, total 30-day costs were not significantly different in any group.

**Conclusion:** RAS led to significant increases in fixed, variable, and supply costs, yet overall 30-day costs were not statistically different when comparing RAS to conventional LA approaches.

Table-1.								
	Esophagectomy		Major-Lung		Minor-Lung			
	LA N=11	RAS N=18	P-value	LA N=297	RAS N=32	P-value	LA N=63	RAS N=26
30-day-Cost	49,777	57,927	0.3354	27,191	21,820	0.9711	21,541	14,105
Direct-Equipment	1,939	2,094	0.5545	1,202	1,165	0.4107	945	708
Direct-Labor	3,084	3,117	0.9547	1,466	996	0.3352	1,159	558
Direct-Overhead	1,591	2,027	0.1766	861	947	0.0031	672	586
Variable-Labor	9,768	10,844	0.5805	5,647	3,392	0.0018	4,507	1,887
Variable-Overhead	3,394	3,501	0.8607	1,939	1,136	0.0013	1,584	630
Supply	9,897	14,480	0.0197	4,913	5,466	0.0024	3,834	4,445
								0.0004

**P788****Stray Energy in the Robotic System – Minimal and Without Clinical Impact**

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**Objective:** Stray energy transfer from surgical energy-based devices is a recognized mechanism for complications during laparoscopic operations. With the increasing use of the surgical robot for laparoscopic operations, characterizing stray energy transfer in robotic surgery is vital. The goal of this study was to quantify stray energy transfer within the robotic system by measuring energy transfer, heat transfer, and histologic cell damage in comparison to laparoscopic surgery.

**Methods:** A live porcine model was used with laparoscopic and robotic ports (DaVinci Si Robotic Surgery platform, Intuitive Surgical, Sunnyvale, CA) placed in standard cholecystectomy fashion. Energy transfer through the instrument was measured directly (milliamps) during activation with an oscilloscope. A thermal camera was used to measure surface temperature change nearest the tip of the instrument expected to absorb stray energy (inactive electrode: assistant grasper or camera). A standard L-hook was activated without touching tissue (open air activation) for five seconds on 30 W coag mode (Force FX Generator, Covidien, Boulder, CO). The inactive electrode was placed touching small bowel to simulate accidental thermal injury. The bowel tissue at the site of temperature change was immediately resected and examined histologically for tissue injury. Student t-tests were used for all comparisons with a p-value less than 0.05 considered statistically significant.

**Results:** Comparison of the laparoscopic and robotic techniques are displayed in Table 1. Energy transfer was quantified using energy leak (per mA), which in these tests averaged 1.18 degree Celsius change (95% CI 1.05–1.31) at the inactive electrode. Surface temperature heated to a maximum of 5.5 degrees Celsius, more in the robotic system than laparoscopy but still clinically negligible. Pathology results from in vivo testing showed only thermal injury to the serosa without deeper mural injury.

**Conclusions:** Stray energy transfer occurs in both laparoscopic and robotic surgery in amounts that are measurable but without clinical relevance. The average change in tissue temperature is less than 2 degrees Celsius laparoscopically and less than 6 degrees robotically. While the robotic surgery appears to transfer more stray energy, no significant bowel injuries were caused in either group.

Instrument tested	Average change in temperature (degrees C)	p-value
Camera	Laparoscopic	1.4
	Robotic	0.52
Grasper	Laparoscopic	0.15*
	Robotic	<0.0001

\*Tested at 80 watts coagulation mode

**P787****The Short-Term Outcomes of the Robotic Surgery for Rectal Cancer**

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**Introduction:** Robotic surgery remains a novel technique in the field of colorectal surgery in Japan. Several small series have examined its safety and feasibility for colorectal surgery. Our aim was to analyze our entire experience and short-term outcomes with robotic surgery for rectal cancer since its introduction at the former and the present institution. We assert that this approach is feasible and safe for the patients with rectal cancer.

**Material and Methods:** This is a retrospective analysis of prospectively gathered data for all patients who underwent robotic surgery for rectal cancer with the use of single docking technique of Da Vinci S or Si system between November 2012 and September 2017. Clinical, operative and pathologic factors were reviewed and analyzed.

**Results:** Seventy patients underwent robotic surgery for rectal cancer during the study period. The locations of tumor were 26 upper rectum, 44 lower rectum. The procedure were as follow, high anterior resection in 6, low anterior resection in 51, ISR in 6, APR in 7 patients. Eight patients underwent bilateral lymph nodes dissection (LLND). The procedures were performed successfully in all cases. Mean age was 66.5 years, and 70% of the patients were men, and the mean body mass index was 22.5 (range, 18.5–29.4) kg/m<sup>2</sup>. Median operative duration was 321 (190–666) minutes. Median blood loss was 15 (0–270) ml. Median postoperative stay was 13 (6–16) days. Mean harvest lymph node number was 17.0 (5–37). Surgical margins were negative in all cases. There was one conversion due to bleeding during the LLND and anastomotic leakage occurred in two patients. Morbidity was 17%. There was no mortality postoperatively in this series.

**Conclusion:** In early series of the selected patients, this technique appears to be feasible and safe when performed by surgeons skilled in laparoscopic colorectal surgery. These findings support the use of a robotic approach for patients requiring rectal surgery.

**P789****Robot Assistance Can Improve the Performance of Laparoscopic Extensive Concomitant Adhesiolysis: Results from a Large Observational Study**

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**Introduction:** In the huge and exponentially increasing amount of laparoscopic and robotic publications in general surgery, role of adhesiolysis (AL) is underestimated: even if considered as conversion reason in some series, most of them are not included in the outcomes for early conversion or a priori open approach. Our goal is to clarify if the robot can increase the number of successful minimally invasive approaches in patients needing extensive AL.

**Methods and procedures:** our prospectively collected, IRB approved database was retrospectively queried for concomitant extensive adhesiolysis, performed by the same surgeon.

**Results:** we identified 113 cases of extensive AL meeting all the requirements, from October 2007 to March 2017. Ninety-two patients underwent minimally invasive AL (58 robot assisted, 34 pure laparoscopic). The conversion rate was significantly different in the two groups with a corrected p of 0.05. The Odds Ratio was 4.75, with a risk ratio of 2.13 (0.95 C.I.: 1.28–3.54). No other perioperative factors showed significance, so that a multivariate analysis was not beneficial. No mortality and no misdiagnosed perforations from our database and during medical record review were recorded. In the robotic group, conversion was always related to enterointestinal adhesions and never to parietal adhesions. In the laparoscopic group 7 patients were converted. Among those, 4 AL failures were due to parietal adhesions. We had a total of 5 iatrogenic injuries, with no difference in the two groups. 4 of those were minor deserosalizations with only 1 full thickness injury in the laparoscopic group. For patients in which the Veress technique failed we found an augmented risk (almost twice) of iatrogenic injury during AL.

**Conclusions:** We described a better performance in treating intraperitoneal adhesions in the robotic group, with a lower conversion rate, without any increase in iatrogenic injury. The robot was found to be extremely effective in omental and parietal AL, with no failures for this type of adhesions.

**P790****Robotic Versus Laparoscopic Colectomy: A Case Matched Study**

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**Introduction:** Colorectal surgery has recently had the steepest rise in rate of adoption of the robotic approach. However, there is still no consensus on its merit compared with laparoscopic colectomies. We compared our short term outcomes of case matched robotic and laparoscopic colectomies.

**Methods and Procedures:** We included our first 55 robotic colectomies through retrospective review of a prospective database of patients between February 2014 and July 2017. These patients were matched with 55 laparoscopic colectomies based on operation type, age, body mass index (BMI), American Society of Anesthesiology (ASA) score, and a conglomerate of relevant risk factors: obesity, diabetes, renal failure, pulmonary, and cardiac diseases. Outcomes compared were operative time, conversion rate, overall complications, gastrointestinal (GI) related complications (wound infection, abdominal abscess, anastomotic leak, ileus and small bowel obstruction), hospital length of stay, and 30-day re-admission rate. Two sample t-test was used and  $p < 0.05$  was considered statistically significant.

**Results:** Fifty-five robotic colectomies were matched with 55 laparoscopic counterparts based on type of operation: right colectomy ( $n=28$ ), sigmoidectomy ( $n=46$ ), low anterior resection ( $n=26$ ), proctocolectomy ( $n=4$ ), transverse colectomy ( $n=2$ ), abdominoperineal resection ( $n=2$ ), and total abdominal colectomy ( $n=2$ ). Robotic and laparoscopic colectomies had no significant difference in mean age (63.6 vs 62.5,  $p=0.75$ ), mean BMI (27.8 vs 27.5,  $p=0.85$ ), mean ASA score (2.5 vs 2.7,  $p=0.17$ ), or mean number of risk factors (0.95 vs 1.00,  $p=0.80$ ). While mean length of operation in minutes was similar (229 vs 218,  $p=0.50$ ), robotic cases had significantly lower conversion rate (0% vs 9.1%,  $p=0.02$ ). Overall postoperative complication rate (36.4% vs 45.5%,  $p=0.33$ ), gastrointestinal complication rate (29.1% vs 34.6%,  $p=0.54$ ), mean postoperative stay in days (9.2 vs 9.4,  $p=0.93$ ), and 30 day readmissions (12.7% vs 9.1%,  $p=0.54$ ) were also similar.

**Conclusion:** Our early experience with robotic colorectal surgery reveals lower conversion rate but similar short-term outcomes compared to the laparoscopic approach. Further advantages of robotic surgery may become apparent in experienced hands.

**P792****Financial Impact of Robotic Assisted Bariatric Surgery Versus Conventional Laparoscopy**

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**Background:** Use of the Da Vinci robot system is increasing in the field of bariatric surgery. Questions that remain unanswered are the clinical impact on outcomes, and the impact of cost. Our study was to evaluate the economic impact of robotics in bariatric surgery.

**Methods:** We retrospectively analyzed bariatric operations done at our institution from January 2016 through June 2017. We analyzed the cost of conventional laparoscopy versus robot assisted procedures including operative time, operating room costs, length of stay, and overall hospital expenses. In addition, we looked at the reimbursements for laparoscopic versus robotic surgeries as well as the contribution margin based on cpt code.

**Results:** Our study included a total of 492 bariatric patients who underwent 422 laparoscopic and 70 robot assisted operations including sleeve gastrectomy and bypasses. A cohort analysis demonstrated baseline similarities in BMI and comorbidities with the exception of patients with COPD who were more likely to undergo robot assisted surgery. In addition, the average length of hospital stay did not significantly differ. The average time duration for laparoscopic sleeve gastrectomy was 127 minutes vs 174 minutes for robot assisted. We performed a cost analysis which showed an average total cost of \$7,024 for laparoscopic sleeve gastrectomy and an average of \$11,680 for robotic assisted. The total reimbursements were \$21,587 for laparoscopic sleeve gastrectomy and \$18,310 for robot assisted. This translated to an average contribution margin of \$14,564 for laparoscopic vs \$6,630 for robot assisted. We analyzed these differences for bypasses as well. Laparoscopic bypasses averaged 193 minutes laparoscopically vs 330 robotically. We found an average cost of laparoscopic \$11,366 vs robot assisted \$17,032, with a contribution margin of \$13,734 laparoscopic vs \$5,701 robot assisted.

**Conclusions:** In our study we noted increased operative times with robot assisted operations, especially bypasses which could be explained by increased use of the robotic system for difficult cases such as revisional bypasses. The impact of cost is especially important in this financial climate, and judicious use of resources becomes important when determining surgical approach. In our experience the contribution margin is lower with robot assisted surgery as compared to conventional laparoscopy. Though the cost of robot assisted surgery may decrease with time, patient selection, complication rates, patient safety, and surgeon ergonomics will play an important role in determining when to perform robot assisted surgery.

**P791****Robotic-Like Suturing Without a Robotic Surgical System**

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**Background:** Although the high cost and steep learning curve of implementing a Robotic Surgical program are well established, the adoption rate of robotic surgical systems in general surgery continues to grow, with suture-intensive procedures driving this adoption. The core enabling technologies of the daVinci "robotic" System are the intuitively controlled wristed instruments and 3D laparoscopic vision. We aimed to evaluate if "robotic-like" functionality may be achieved through the integration of two novel technologies, the FlexDex Needle Driver (FlexDex Surgical, a University of Michigan) and ENDOEYE FLEX 3D (Olympus, Tokyo, Japan).

**Method:** Surgeon training on the FlexDex Needle Driver combined with ENDOEYE FLEX 3D laparoscopic system was conducted at our institution in May 2017. Several hours of training in a laparoscopic training box were completed to ensure competency and accuracy. Focusing on preparing for procedures where general surgeons are commonly using the daVinci System. We performed an initial case series in June 2017, we have over 50 cases in our experience. This included inginal hernias, ventral hernias and reflux procedures. We assessed if technical obstacles of laparoscopic suturing were decreased and if laparoscopic skills overall were improved. Surgical outcomes were compared relative to our historic values; we assessed procedure time and operating room efficiency, including set up and turn-over times.

**Results:** Overall, the 3D/FlexDex system permitted a greater improvement in working speed, superior optical visualization, and better suture handling compared to standard laparoscopy. All surgeries were completed without any complications. Historically, we considered laparoscopic suturing to be complicated and inefficient. We relied on tacking devices for mesh fixation, suturing was previously completed with large cumbersome straight laparoscopic devices. However, with FlexDex and ENDOEYE FLEX 3D, tacking devices have been eliminated and suturing technique improved. The mean total procedure times remained comparable for inguinal and hiatal hernia surgeries, and slightly longer for ventral hernias. Operating room efficiency, including mean set up and turn-over times also remained unchanged. The acquisition cost for both the Olympus ENDOEYE FLEX 3D laparoscopic imaging system and the disposable cost of the FlexDex Needle Driver are comparable to contemporary instruments.

**Conclusion:** In our initial experience, the 3D/FlexDex system promises significant improvement in laparoscopic skills through intuitive control, a short learning curve and eliminating technical obstacles of laparoscopic suturing. Furthermore, it offers robot-like suturing while avoiding the associated cost and complexity of a robotic surgical system.

**P793****Robotic Hernia Repair - A Comparative Analysis with Its Laparoscopic Counterpart. A Single Surgeon's Experience**

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**Background:** The foundation of innovation in surgery is driven by the inherent desire to yield an increasingly efficient surgical approached with decreased morbidity and mortality. The advancements of laparoscopy have made a tremendous impact in hernia surgery, and it has largely replaced open surgical repair. In this regard, a novel technical approach is being explored through the robotic platform. This study compares a single physician's experience with inguinal and ventral hernias, being repaired laparoscopically and robotically, with respect to duration of surgery, intraoperative costs, length of stay (LOS), and postoperative complications.

**Methods:** A single center, single surgeon retrospective review was conducted sampling data from January 2017 to August 2017 examining ventral and inguinal hernia repairs.

**Results:** Data was extrapolated from 13 inguinal hernia repairs, 6 were robotic (RIH) and 7 were laparoscopic (LIH). Average OR time for RIH was 127 minutes compared to LIH which was 85 minutes. Average intraoperative cost for RIH was \$1,110 compared to LIH which was \$890. Of note, one LIH was converted to open, whereas none of the RIH required conversion. Average LOS was 9.16 hours for RIH compared to 11.6 hours for LIH. Postoperative pain at one week follow up was the same between both groups. Two postoperative surgical site occurrences (SSO) occurred in the LIH group (2 groin seromas), whereas no SSOs occurred in the RIH group. Eleven ventral hernia repairs were examined, 7 were robotic (RVH) and 4 were laparoscopic (LVH). Average OR time for RVH was 132 minutes compared to 65 minutes for LVH. Average intraoperative cost for RVH was \$1,492 compared to LVH which was \$1,264. No procedure from either group required conversion to open. Average LOS was 9.86 hours for RVH, and 13.5 hours for LVH. Again, postoperative pain was the same at one week follow up for both groups. There were no postoperative complications noted in either cohort.

**Conclusion:** Operative time and procedural costs for RVH and RIH repairs were shown to be longer and more expensive when compared to their laparoscopic counterparts. However, with increased operative experience using the robotic platform, surgical time did show a decreasing trend. Length of stay was similar between robotic and laparoscopic cohorts. Postoperative pain and complications were comparable between robotic and laparoscopic groups. In conclusion, we found that the robotic platform offers an acceptable approach to inguinal and ventral hernia repairs.

**P794****Robotic Transanal Minimally Invasive Rectal Mucosa Harvest**

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**Introduction:** Buccal mucosal grafts (BMG) are traditionally used in urethral reconstruction. There may be insufficient BMG for applications requiring large amounts of graft, such as urethral stricture after gender affirming phalloplasty. Rectal mucosa is an alternative with less post-operative pain, no impairment in eating and speaking, and larger graft dimension. Laparoscopic transanal minimally invasive surgery (TAMIS) has been described by our group. Due to the technical challenges of harvesting a sizable graft within a confined space, we adopted a new approach using the Intuitive da Vinci Xi® system. We demonstrate the feasibility and safety of a novel technique of Robotic TAMIS (R-TAMIS) in the harvest of rectal mucosa for the purpose of onlay graft urethroplasty.

**Methods and Procedures:** IRB approval was obtained. Three female-to-male transgender adults (age range: 33–53 years) presenting with post-phalloplasty urethral strictures underwent robotic rectal mucosal harvest. The procedure was first rehearsed on an inanimate model using bovine colon. The surgery was performed under general anesthesia with the patient in lithotomy position. The GelPOINT Path Transanal Access Platform was used. The rectal mucosa was harvested by the robotic instruments after submucosal hydrodissection. Specimen size harvested correlated with clinical surface area needed for urethral reconstruction. Following specimen retrieval, flexible sigmoidoscopy was used to ensure hemostasis. The rectal mucosa graft was placed as an onlay for urethroplasty.

**Results:** There were no intraoperative or postoperative complications. Average graft size was 3 × 12 cm (range: 8–15 cm). Every case had excellent graft take for reconstruction. All patients recovered without morbidity or mortality. They reported minimal postoperative pain and all regained bowel function on the first postoperative day. All reported significantly less postoperative pain and greater quality of life in comparison to prior BMG harvests. The procedure has been refined to increase efficiency and decrease operative time by maintaining adequate insufflation, retraction of the mucosal graft, and maintaining graft integrity.

**Conclusions:** To our knowledge, this is the first use of R-TAMIS for harvest of rectal mucosal graft. Our preliminary series indicates the robotic approach is feasible and safe. It constitutes a promising minimally-invasive technique to employ in urethral reconstruction. Demonstrated feasibility and avoidance of the challenging recovery associated with BMG harvest warrants further application and long-term evaluation of this procedure. Prospective studies evaluating graft success, donor site morbidity and long-term outcomes are needed.

**P795****Robotic General Surgery Service Impact on Resident Operative Times**

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**Introduction:** The proportion of robotic minimally invasive procedures that are being performed annually is growing rapidly, specifically in the field of general surgery. A robotic approach to minimally invasive procedures potentially confers a number of benefits ranging from a magnified viewing field to greater attenuation and translation of hand movements leading to improved stability and maneuverability. It is paramount that a robust curriculum is designed for training surgical residents in robotic techniques. The aim of this project is to assess the current state of robotic surgery training at the Ohio State University, with specific regard to whether it is currently temporally effective in addition to establishing a baseline against which the robotic surgery curriculum can be compared.

**Methods and Procedures:** Data were obtained for 199 cases performed at the Ohio State University Hospital East, between January and September of 2017. Case time, date, type, and attending surgeon were recorded and tracked for review. Of the 199 cases, 72 were cholecystectomies, 40 were unilateral inguinal hernia repairs, and 36 were bilateral inguinal hernia repairs—for a total of 148 procedures included in the analysis. Chief Residents were trained in two-month blocks, beginning in January of 2017. Mean console operative times for the first and second months were compared for cholecystectomies as well as unilateral and bilateral inguinal hernia repairs.

**Results:** Mean console time decreased for cholecystectomies (~9.0%; N=72), bilateral (~16.0%; N=36) and unilateral (~1.5%; N=40) inguinal hernia repairs from month one to month two. There was a large amount of variance across training blocks, but there was a systematic improvement in operative time across the training period. Average operation length was shortest for cholecystectomies (m=66.8 min), followed by unilateral inguinal hernia repairs (m=85.3 min), and finally bilateral inguinal hernia repairs (m=111.2 min).

**Discussion:** This preliminary data suggests that residents are able to decrease their robotic operation time over the course of the two-month rotation. Although sample sizes were relatively small for each block, the consistency of the trend supports this conclusion. Further data collection will allow for more precise estimates in the future, and stronger conclusions to be drawn. These results show that rapid improvement is possible and provide motivation to establish robotic surgery curricula for general surgery residents nationally.

**P796****Does Robotic System Have Advantages Over Laparoscopic System for Distal Pancreatectomy?**

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**Background:** Laparoscopic distal pancreatectomy (DLP) has been the best choice for the treatment of left-sided pancreatic lesions. Robotic systems provide an advanced surgical technique for minimally invasive surgery. Therefore, we compared the perioperative and short-term oncologic outcomes of robot-assisted DLP (RA-DLP) and conventional DLP.

**Methods:** A retrospective analysis was conducted of all consecutive minimally invasive distal pancreatectomy cases performed by a single surgeon at Asan Medical Center between October 2015 and October 2016.

**Results:** A total of 91 consecutive patients underwent minimally invasive distal pancreatectomy (DLP n=61; RA-DLP n=30). Most common pathologic finding was pancreatic ductal adenocarcinomas (36 cases). There was no in-hospital mortality or cases of conversion to open surgery in this study. Spleen-preserving approach was performed more often in the RA-DLP (95%) than the DLP (77.8%) groups ( $p=0.132$ ). Both groups showed no difference in complication rate (10% vs. 18%), postoperative hospital stay ( $7.6 \pm 2.6$  vs.  $8.4 \pm 3.1$  days), and readmission rate (6.7% vs. 3.3%). Operative time was significantly longer in the RA-DLP group ( $171.2 \pm 50.4$  vs.  $144.3 \pm 50.1$ ,  $p=0.02$ ). In a subgroup analysis on patients with completed spleen-preserving approach, there was no significant difference in operative time between the RA-DLP and DLP groups ( $165 \pm 56.3$  vs.  $139 \pm 36.5$  min,  $p=0.14$ ). Both groups showed no significant differences in the total number of lymph nodes, number of positive lymph nodes, tumor differentiation, tumor stage, and resection margins.

**Conclusions:** RA-DLP is a safe and feasible approach that has an advantage of performing spleen-preserving distal pancreatectomy, with perioperative and short-term oncologic outcomes comparable to those of DLP.

**P797****Robot-Assisted ALPPS Technique**

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**Objective:** First described in 2012, Associating Liver Partition and Portal Vein Ligation for Staged hepatectomy (ALPPS) procedure is a two-staged resection of advanced primary and metastatic liver tumors predicated on the regenerative capacity of the liver. Our aim is to highlight the technique of performing a robot-assisted ALPPS procedure.

**Methods:** A 69-year-old male with rectal cancer status post low anterior resection and metachronous liver tumor burden dominating the right hemi-liver along with small satellite lesions occupying segments 4a/b and segment 2 presented following completion of systemic chemotherapy with eight cycles of FOLFOX and bevacizumab. Preoperative CT volumetrics demonstrated a future liver remnant/total liver volume ration (FLR) of 27% (not taking into account the volume of liver parenchyma that needed removal/ablation to address the segment 2 lesion). Right portal vein embolization was not feasible secondary to the proximity and size of the right hemi-liver tumor burden relative to the right portal vein. The pre-operative planned procedure was a right trisectionectomy and microwave ablation of the segment 2 lesion.

**Results:** Using the da Vinci Xi Surgical System (Intuitive Surgical, Inc.) the right portal vein was dissected, doubly-ligated, and divided. The liver parenchyma was split from the inferior edge to the dome 5 mm medial to the falciform ligament and down to the middle hepatic vein which was preserved to maintain adequate venous outflow. The patient was discharged home on post-operative day two. On post-operative day six, CT volumetrics demonstrated a FLR of 47%. On post-operative day seven, a second stage ALPPS procedure was performed where the right hepatic artery, middle and right hepatic veins and right hepatic duct were ligated and divided. Segments 4a/b, 5, 6, 7 and 8 were removed. The patient was discharged home on post-operative day five. Surgical pathology confirmed negative margins.

**Conclusion:** Robot-assisted ALPPS procedure is a feasible alternative to a laparoscopic or an open procedure when performed in high volume centers with advanced robotic expertise.

**P798****The Impact of Simulation Training for Residents Participating in Robotic Surgery**

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**Introduction:** The primary aim of this study was to determine how three types of simulation impacted resident comfort level with various aspects of robotic surgery. As robotic surgery increases in prevalence, it is necessary for residents to become facile with this technology during training.

**Methods and Procedures:** Surgery residents at a single institution were surveyed in September 2017. They were asked to answer demographic questions and rate their comfort level (0=not comfortable, 10=very comfortable) with aspects of robotic surgery. Paired t-tests and Wilcoxon tests were used to assess whether there were changes in comfort level before and after labs, and Chi-square goodness of fit tests were used to assess whether dry lab (using inanimate objects), wet lab (using a porcine model), or simulator modules were thought to be most helpful in obtaining specific robotic skills.

**Results:** The survey response rate was 73% (n=32). Ninety-one percent of residents felt that robotic surgery is not intuitive. Prior to simulation, 94% of residents felt inadequately prepared to safely operate on the robotic console. Following simulation, 100% felt better prepared and more confident to participate in robotic surgery.

Among residents that participated in a dry lab (n=25), on average residents reported a 3.8 point increase in comfort docking the robot ( $p<0.0001$ ) and a 2.9 point increase in comfort being bedside assistant after the lab ( $p<0.0001$ ). Among those who participated in a wet lab (n=20), on average a 2.3 point increase was seen in comfort docking the robot ( $p=0.0003$ ), a 1.7 point increase was seen in comfort being bedside assistant ( $p=0.003$ ), and a 2.2 point increase was seen in comfort operating on the console after the lab ( $p<0.0001$ ). No significant difference in console comfort was seen across PGY level, and no differences in skill improvement were seen across gender.

While residents did not report a preference for simulation type in learning how to adjust the camera ( $p=0.15$ ) or handle robotic instruments ( $p=0.61$ ), they reported that simulator modules were most helpful for learning electrocautery ( $p=0.009$ ) and that the wet lab was most helpful for learning both suturing ( $p=0.002$ ) and stapling ( $p=0.002$ ).

**Conclusions:** In order to be functional at the bedside and safely operate on the console, residents should have the ability to practice skills in a simulated environment. All 3 types of simulation studied had a positive impact on resident comfort and skill acquisition. Therefore, simulation should be considered an integral part of resident education.

**P799****Value of a Dual Console in the Introduction of Robot-Assisted Colectomy**

Yoshiyuki Sakamoto, PhD, Hajime Morohashi, PhD, Takuya Miura, PhD, Kentarou Satou, MD, Kenichi Hakamada, PhD; Hirosaki University

**Introduction:** Robot-assisted colectomy may compensate for some of the disadvantages of conventional laparoscopic surgery by providing detailed high-vision three-dimensional images and magnified vision, forceps joint function, and preventing hand tremors. These attributes of robot surgery may be particularly useful when accurate R0 resection and nerve preservation are required in cases of rectal resection. We performed robot-assisted colectomy for the first time in January 2016. For the first 4 patients whom we treated (the first-stage group), we invited a visiting expert from a high-volume center to perform the procedure jointly with our hospital's surgeons by using a dual console. For the subsequent 6 patients (the second-stage group), the procedure was performed by our hospital staff alone. In this report, we describe our experience of introduction of robot-assisted colectomy and discuss issues for the future.

**Patients and Methods:** The operative procedure was sigmoid colectomy, low anterior resection, and intersphincteric resection. The median number of lymph nodes dissected was 15.6. The mean operating time was 337 minutes for the first-stage group and 365 minutes for the second-stage group. The median console time was 206 minutes for the first-stage group and 193 minutes for the second-stage group, with no significant differences between the two groups. The mean operating time other than console time was 127 minutes for the first-stage group and 171 minutes for the second-stage group, significantly longer in the latter group. The mean amount of hemorrhage was 15.5 g in the first-stage group and 31 g in the second-stage group. No significant differences were found between the two groups in the mean length of postoperative hospital stay. None of the patients in either group developed a complication of Clavien-Dindo grade III or higher.

**Conclusions:** The use of Dual Console system was particularly useful for the introduction of robot-assisted surgery in our hospital. For the patients whom we treated, we found almost no difference in console time between the first- and second-stage groups. The high-quality instruction received via the dual console was considered to have had a beneficial effect on the operators' learning curve. However, the operations that were set up other than console time, such as roll-in and docking, took significantly longer in the second-stage group when the proctor was not present, and more experience is necessary to reduce the time required for set-up. As this procedure is used in more cases, the focus should be clarifying the advantages of robot-assisted surgery.

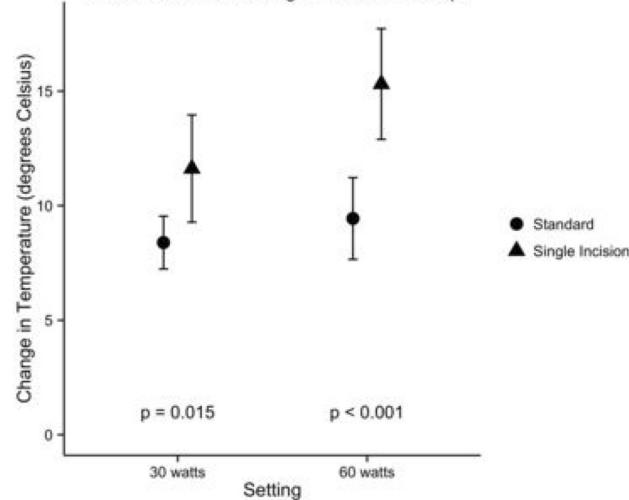
**P800****Stray Energy Transfer Comparison Between Single Incision Robotic Surgery and Standard Robotic Surgery**

Douglas M Overbey, MD, MPH, Thomas Robinson, Heather Carmichael, Brandon Chapman, Edward Jones; University of Colorado

**Objective:** Stray energy transfer from the monopolar "Bovie" instrument has been shown to cause unintended thermal injuries during laparoscopic surgery. Our prior work demonstrated increased stray energy transfer during single incision laparoscopic surgery in comparison to traditional laparoscopy. However, stray energy transfer during robotic single incision surgery has not been examined. The PURPOSE of this study was to quantify stray energy transfer with a standard (multiport) robotic surgery and compare this to single incision robotic surgery.

**Methods:** The DaVinci Si model (Intuitive Surgical, Sunnyvale, CA) was tested in standard and single-site configurations. A live porcine model was used to compare stray energy transfer in vivo. Temperature of small bowel tissue adjacent to the instrument expected to absorb stray energy (assistant grasper) was measured using a thermal camera after a 5 second open air activation in coagulation mode (ForceTriad Generator, Covidien, Boulder, CO). Select specimens from each trial were immediately resected and evaluated for histologic thermal injury. Experiments were repeated 20 times based to detect an expected difference of five degrees. Student t-tests were used for all comparisons with significance set at 0.05.

**Results:** Stray energy transfer was higher in the single incision setup compared to the traditional setup (Figure 1). Stray energy in the assistant grasper caused  $8.4 \pm 1.6$  °C of temperature change in the standard configuration, and  $11.6 \pm 3.3$  °C in the single incision configuration ( $p=0.015$ ). Doubling energy output to 60W amplified the same finding, with  $9.4 \pm 2.5$  °C of temperature change in the standard configuration and  $15.3 \pm 3.4$  °C in the single incision configuration ( $p<0.001$ ). Despite the changes in surface temperature, coagulation necrosis did not extend beyond the serosa on histologic examination.

**Standard versus Single Incision Setup**

**Conclusions:** More stray energy transfers to the assistant grasper during single incision robotic surgery than during multiport robotic surgery. This increases tissue temperatures by more than 15 degrees Celsius but does not result in full thickness bowel injury. Surgeons can decrease the risk of stray energy complications by avoiding single incision surgery and utilizing low power settings.

**P802****Robotic Pancreas-Sparing Treatment of Pancreatic Neuroendocrine Tumors: Three Case Reports and Review of the Literature**

Alessandra Marano, Giorgio Giraudo, Stefano Giaccardi, Desiree Cianfocca, Diego Sasia, Felice Borghi; Santa Croce e Carle Hospital

**Introduction:** Pancreas-sparing resections would be the ideal procedure in case of small pancreatic neuroendocrine tumors (p-NETs) reducing the risk of exocrine and endocrine insufficiency. Compared to standard resection, this type of surgery is safe and feasible without increasing the risk of postoperative complications except the overall rate of clinical pancreatic fistula (PF), which did not result in higher mortality or overall morbidity. Robotic surgery for p-NETs enucleation has been rarely described but initial experiences have shown that this approach is associated with favorable outcomes. The aim of this study is to describe three cases of dV®Si™ pancreatic enucleation for p-NETs located in the uncinate process, in the body and in the posterior aspect of the tail of the pancreas, respectively. A brief review of the literature regarding the application of robotics for p-NETs enucleation is also included.

**Methods and Procedures:** This study includes patients undergoing dV®Si™ enucleation for p-NETs with a maximum diameter no more than 2 cm and a distance between tumor and main pancreatic duct (MPD) greater than 2 mm. At surgery, exposure of the pancreas was achieved by separation and traction of the gastrocolic and gastropancreatic ligaments. The pancreas was explored: an intraoperative ultrasound was used ensuring negative margins and leaving the MPD intact. Thus, a cross-stitch through the tumor was made routinely in order to pull the tumor. Enucleoresection was carried out with monopolar scissors and bipolar forceps. The tumor was placed into a specimen bag and removed from the trocar port. A drain was always left.

**Results:** Median total operative time was 178 min. No conversion neither intraoperative complications occurred. Median length of stay was 4.6 days. Two patients presented a PF grade A (classification ISGPF) while a PF grade B occurred in case of pancreatic tail NET enucleation. Final pathology revealed two insulinomas and one non-functioning NET of the pancreatic body. At a median follow-up of 15 months no pancreatic insufficiency, reoperation or tumour reoccurrence was observed in all cases.

**Conclusion(s):** The robotic approach for the treatment of p-NETs is safe and feasible and, in selected cases, it may extend the indications of minimally invasive pancreatic-sparing surgery. In particular, the robotic approach provides a more precise dissection and may ensure negative margins and the MPD intact. These preliminary results are consistent with literature data about over 100 robotic pancreatic enucleations for p-NETs that shows favourable surgical outcomes, especially if compared with those of open surgery.

**P803****Single Docking Robotic Total Mesorectal Excision—A Single Institution Standardized Stepwise Approach on the First 100 Cases**

Alessandra Marano, Maria Carmela Giuffrida, Luca Pellegrino, Gaspare Cannata, Diego Sasia, Danilo Donati, Felice Borghi; Santa Croce e Carle Hospital

**Introduction:** Rectal cancer continues to be a surgical challenge. New technologies must be incorporated into practice and, at the same time, oncologic surgery and overall outcomes must be improved. The use of da Vinci robotic surgery systems has spread rapidly in the field of rectal cancer treatment showing several technical advantages and favorable outcome compared to laparoscopy. Since the introduction of the robotic platform in our Institution in 2013, we have adopted a single-docking robotic technique for rectal resection. The aim of this study is to present our standardized technique and to analyse the clinical outcomes of the first 100 robotic rectal procedures.

**Methods and Procedures:** Prospectively collected data reviewed from 100 consecutive patients who underwent single docking totally robotic (da Vinci® Si™) dissection for rectal cancer resection between June 2013 and August 2017 under ERAS program. Robotic rectal surgery was performed without changing the position of the robotic cart but only the robotic arms are repositioned between two phases: 1) vascular ligation, and sigmoid colon to splenic flexure mobilization; and 2) pelvic TME.

**Results:** There were 66 men (66%) and the median age was 68 years (range 24–92). Thirty-five patients had neo-adjuvant chemoradiotherapy whilst 15 patients had BMI >30. Procedures performed included anterior resection (n=95) and abdominoperitoneal resection (n=5). Protective ileostomy was performed in 50 patients. The median operating time was 270 min (range 160–604). There was one conversion and two intra-operative complications (one bladder lesion and one ureteral lesion, respectively). Median length of stay was 3.5 days (range, 3–42), and readmission rate was 7%. Thirty-day mortality was zero. Anastomotic leak rate was 7%, and all patients except by one were managed conservatively. The mean lymph node harvested was 14 ( $SD \pm 8.3$ ). Radial margin was negative in all patients. At median follow-up of 21 months, there were no local recurrences.

**Conclusion(s):** The single docking robotic technique is a safe and feasible approach for rectal surgery: in our study it has demonstrated favourable clinical outcomes and the adoption of a standardized stepwise approach was useful especially during the initial learning phase. To the best of our knowledge, this is the largest series from Italy to report this standardized approach and the short-term clinical and oncological outcomes.

**P804****Robotic Single-Site Cholecystectomy of 520 Cases: Surgical Outcomes and Comparing with Laparoscopic Single-Site Procedure**

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Single-site laparoscopic cholecystectomy (SSLC) still has some difficulties, such as clashing of instruments and loss of triangulation. So, this has not been widely used. Single-site surgery with the robotic platform (da Vinci Si, Intuitive Surgical Inc.) was introduced to enable the surgeon to perform the precise and comfortable movement. This system provides fine visualization and avoids instruments collisions. The purpose was to evaluate feasibility and efficacy of robotic single-site cholecystectomy (RSSC) compared to SSLC. The medical records of patients who received RSSC, from Aug 2014 to July 2017, were reviewed retrospectively comparing to SILC, from Jan 2013 to March 2015. All surgeries were consecutively performed by two experienced surgeon.

The mean age in the RSSC group (n=520) was  $48.0 \pm 10.1$  years, and BMI was  $23.9 \pm 3.6$ . SSLC group (n=110) was  $36.4 \pm 9.6$  year and BMI  $21.8 \pm 2.4$ . The proportion of patients with high BMI (>25) was high in RSSC group ( $p<0.001$ ). There was female (RSSC 74.1%, SSLC 92.7%) and cholelithiasis (RSSC 72.2%, SSLC 67.4%) dominant with proportion and Indications for surgery. Total operation time of RSSC was  $46.9 \pm 12.1$  minutes, and significantly shorter than was  $53.4 \pm 16.6$  minutes for SSLC. For RSSC, mean docking time from incision to completion of docking procedure was 7.1 min (range 5–20), and console time was 17.8 min (range 5–65). In both group, there was no any case with requiring open conversion. In RSSC, 3 cases were converted laparoscopic 4-ports procedure. Reason for conversion was inability to visualization of vascular structure and to traction gallbladder because of severe inflammation. In SSLC, 3 cases converted to 3-ports laparoscopic procedure and 5 cases required one additional port. The length of stay was shorter in RSSC group (RSSC  $3.3 \pm 1.7$ , SSLC  $4.0 \pm 1.8$ ). There was no significant difference in the postoperative pain score. In both group, there was no critical complications including hepatic artery injury or bile duct injury. Intraoperative bile spillage was occurred 7.4% in SSLC, 5.4% in RSSC. Wound complications were less than 2% in both groups. Incisional hernia occurred one case in each group. RSSC is safe and feasible procedures. With accumulating of experience, RSSC had more short operative time than SSLC. Comparing to SSLC, RSSC is relatively suitable to acute gallbladder disease and high BMI and requires a minimal learning curve to transition from traditional multiport to single-port robotic cholecystectomy.

**P805****Initial Experience Using da Vinci Xi Robot in Colorectal Surgery**

Anna R Spivak, DO, John Marks, MD; Lankenau Medical Center

**Introduction:** The Xi robot has been developed to facilitate multiquadrant abdominal surgery. This report presents initial experience to evaluate feasibility and safety of Xi robot in colorectal surgery.

**Methods:** All cases performed on Xi robot were prospectively entered into a robotic database that was queried for colorectal cases performed from July 2015–September 2017. 136 cases were identified. Demographics, perioperative, and postoperative data were analyzed.

**Results:** Patient population included 50.9% women, mean age 61.3 years (18–89), mean BMI  $27.9 \text{ kg/m}^2$  (16–48). Preoperative diagnosis included cancer (47%), diverticulitis (34%), polyps (9%), rectal prolapse (5%), ulcerative colitis (2%), other (3%). 39.4% had at least one previous abdominal surgery. 65% of procedures were in the pelvis. Of 28 patients with rectal cancer, 75% underwent neoadjuvant radiation. Total mesorectal excision (TME) was done in 25 cases (24%). See table for procedure distribution.

Complete/near complete TME was achieved in 92% of cases. Incomplete TMEs had previous TEM surgery or radiation. Intraoperative complications were encountered in 2 cases (1.9%), requiring conversion to laparoscopy. None were converted to open. Mean length of largest incision 4.7 cm. Median EBL 55 ml. There was no mortality. There were 10 (9.6%) immediate postoperative morbidities: postoperative abscess, bowel perforation, two postoperative bleeds, two hernias, two hematomas, SMV thrombosis, small bowel obstruction. Perioperative blood transfusions were required in 2.8% of cases. There was one anastomotic leak. Median time from surgery to low residue diet and discharge was 3 days.

**Conclusion:** Initial experience shows robotic colorectal resection with da Vinci Xi robot to be a reasonable and safe option in oncologic and benign diagnosis.

Procedure	Number of cases	Percentage
<b>Deep Pelvic Dissection Cases</b>		
Abdominoperineal resection	7	5%
Low Anterior Resection	71	52%
Total Abdominal Colectomy	2	2%
Rectopexy	6	4%
Hartmann's Reversal	2	2%
<b>Total</b>	<b>88</b>	<b>65%</b>
Left Colectomy	29	21%
Righ Colectomy	17	12%
Exploratory Laparotomy	1	1%
Colostomy	1	1%
<b>Total Cases</b>	<b>136</b>	<b>100%</b>

**P807****Learning Curve for Robotic Sleeve Gastrectomy and Roux-en-Y Gastric Bypass: Achieving Equivalence to Laparoscopy**

Katherine D Gray, MD, Adham Elmously, MD, Michael P Choi, MD, Patrick T Dolan, MD, Gregory Dakin, MD, Alfons Pomp, MD, Cheguevara Afaneh, MD; New York-Presbyterian-Cornell

**Introduction:** The robotic platform is increasingly utilized for bariatric procedures, but the learning curve has not been well described. We aimed to evaluate perioperative morbidity and operative times for robotic sleeve gastrectomy (RSG) and robotic Roux-en-Y gastric bypass (RRYGB) based on number of procedures performed.

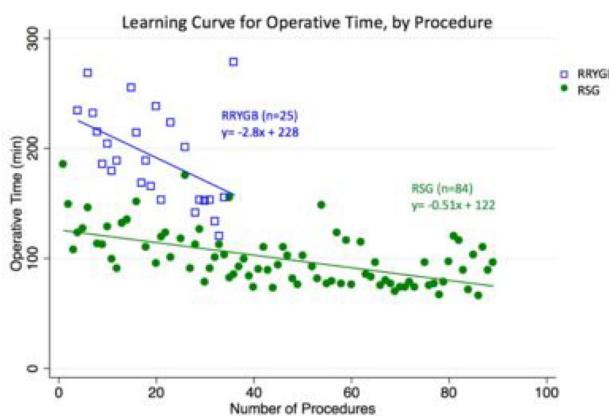
**Methods and Procedures:** Retrospective review was conducted of all adult patients undergoing RSG or RRYGB by a minimally invasive fellowship-trained surgeon in his first two years of attending practice at a Bariatric Center of Excellence (2015–2017). Linear regression fit lines over number of procedures performed were constructed to describe learning curves for RSG and RRYGB. Operative time was compared within procedure to our institutional averages for patients undergoing laparoscopic sleeve gastrectomy (LGS) or laparoscopic Roux-en-Y gastric bypass (LRYGB). Residents and fellows participated in an analogous fashion in both arms of the study, and patients undergoing re-operative bariatric surgery were excluded.

**Results:** A total of 109 patients undergoing RSG (n=84) or RRYGB (n=25) were included. For the overall robotic cohort, median age was 38 (range 19–69), 36% were American Society of Anesthesiologists (ASA) score 2, 60% were ASA score 3, and mean body mass index (BMI) was 46±7 with no differences between procedures.

There were no conversions to open. There was one patient with portal vein thrombosis after RSG which occurred in the 84th RSG and one patient who underwent re-operation in the immediate post-operative period for hemorrhage at the gastro-jejunal anastomosis in the RRYGB group; this occurred in the 8th RRYGB. There were no leaks, strictures, or mortalities in either group. Mean length of stay was 2 days±1 for RSG with no difference based on number of procedures performed. In the RRYGB group, LOS decreased after the first five procedures from 3 days±1 to 2 days±(p=0.04).

For both procedures, operative time decreased by number of procedures performed (Figure). Equivalence to LSG in operative time (118 minutes±40) was reached after eight robotic procedures; equivalence to LRYGB in operative time (169 minutes±47) was reached after twenty-two robotic procedures.

**Conclusions:** We show that equivalence in operative time to LSG and LRYGB was rapidly achieved using the robotic platform by a fellowship-trained bariatric surgeon in an institution's first years of robotic bariatric practice. Perioperative morbidity was minimal throughout the study period.

**P808****Robotic Restorative Proctocolectomy for Ulcerative Colitis: Initial Experience**

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**Introduction:** Total and completion robotic restorative proctocolectomy with ileal J-pouch anal anastomosis (RRP-IPAA) for ulcerative colitis (UC) is an emerging technique which requires advanced technical setup and operative dexterity to perform pelvic and multi quadrant surgery. In this study, we present our initial experience on RRP-IPAA.

**Materials and Methods:** Patients undergoing total and completion RRP-IPAA between January 2015–July 2017 were included. The da-Vinci Xi® was used for the operations. Age, gender, body mass index (BMI), ASA score, indication for surgery, urgency of procedure, type of procedure, docking number, operation time, estimated blood loss, complications, short ( $\leq 30$  days) and long term ( $>30$  days) complications were evaluated.

**Results:** 19 patients (7 females) were included. Median age was 28. Median BMI was 23, median ASA score was 2. Total and completion RRP-IPAA were performed for 9 and 10 patients respectively. The indications were as follows: medical refractory UC (n=12), cancer/dysplasia (n=2), fulminant colitis (n=2), toxic megacolon (n=1), medical treatment resulting in growth retardation (n=1), medical treatment refractory bleeding (n=1). 1 patient with toxic megacolon had an emergent operation. The median docking number was 1 and 3 for completion and total RRP-IPAA respectively. Median operative time was 330 minutes. Median blood loss was 100 ml. All patients had a stapled ileal J pouch anal anastomosis. All patients had a diverting loop ileostomy at the time of IPAA creation. No intraoperative complications were observed. No conversion to open surgery was needed. The median time to flatus was 1 day. The median time to oral intake was 1 day. 1 patient had a laparotomy on postoperative day 12 due to intra-abdominal bleeding. 1 patient had a bleeding from ileostomy which was treated endoscopically. Superficial surgical site infection was observed in 3 patients. 1 patient had a pouchitis managed with oral antibiotics. 1 patient had an ileus responded to conservative treatment. 1 patient had a per-anal bleeding stopped spontaneously. 1 patient had a urinary tract infection responded to antibiotics. 2 patients had pouchitis, 1 patient had a perianal fistula requiring a loop ileostomy and a parastomal hernia was developed in another patient in long term follow up. No mortality was observed during the study period.

**Conclusions:** Our experience reveals that total or completion RRP-IPAA is a safe and feasible option for surgical treatment of UC. The Xi platform facilitates multi quadrant surgery and enables to perform a total restorative proctocolectomy in the same setting.

**P809****Robotic Roux-en-Y Gastric Bypass Is Associated with Increased Operative Time with No Difference in Early Morbidity**

Tyler Cohn, MD, Jie Yang, PhD, Jihye Park, MS, Salvatore Docimo, DO, Andrew Bates, MD, Aurora Pryor, MD, Konstantinos Spaniolas, MD; Stony Brook University

**Introduction:** Current evidence regarding the benefit of robotic (RRYGB) over laparoscopic (LRYGB) gastric bypass is unclear. The aim of this study was to compare 30-day postoperative outcomes of RRYGB and LRYGB.

**Methods:** The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) public use file for 2015 was used to identify patients that underwent gastric bypass. Patients were compared based on surgical approach (laparoscopic or robotic) and type of intervention (primary or revisional). Propensity score matching was used to control for baseline differences in race, American Society of Anesthesiology (ASA) class, age, body mass index (BMI), presence of co-morbidities, functional status, and presence of any complication in order to assess procedural duration, anastomotic/staple line leak, and 30-day events (readmission, re-operation, re-intervention, and mortality).

**Results:** 42,503 patients were identified that underwent gastric bypass. Of these, 35,354 underwent primary LRYGB, 2,869 underwent primary RRYGB, 3,925 underwent revisional LRYGB, and 355 underwent revisional RRYGB. For primary procedures, patients undergoing RRYGB were more likely to be older (mean age 46±17 vs 45±18 years,  $p<0.0001$ ), white (78.3% vs 76.6%,  $p<0.0001$ ), and have a lower BMI (44.7±10.4 vs 44.9±10.2 kg/m<sup>2</sup>,  $p=0.0299$ ) than the LRYGB group. For revisional procedures, only ASA class (ASA III/IV 74.57% [RRYGB] vs 75.23% [LRYGB],  $p=0.0003$ ) and pre-operative BMI (40.9±9.9 [RRYGB] vs 41.9±9.8 kg/m<sup>2</sup> [LRYGB],  $p=0.0374$ ) were significantly different between the two groups. 2,858 pairs undergoing primary and 354 pairs undergoing revisional procedures were successfully matched. Robotic gastric bypass was associated with a significantly longer operation length than laparoscopic gastric bypass for both primary (median difference 31 minutes,  $p<0.0001$ ) and revisional (median difference 47 minutes,  $p<0.0001$ ) procedures. In patients undergoing primary bypass, there was a trend towards increased 30-day readmission (6.6% vs 5.5%,  $p=0.0848$ ) and 30-day re-intervention (2.9% vs 2.1%,  $p=0.0673$ ) rates in the RRYGB group. Overall, there were no significant differences in anastomotic/staple line leak, 30-day readmission, re-operation, re-intervention, total event, and mortality rates between matched cohorts.

**Conclusion:** When controlling for patient characteristics, those undergoing primary and revisional LRYGB and RRYGB had no difference in early morbidity. Despite the prolonged operative duration, the robotic approach was not associated with any clinical benefit or increased complications for primary or revisional gastric bypass surgery. Further studies are needed to compare long-term outcomes as well as the difference in costs that accompany the combination of longer operation length and use of robotic equipment.

**P810****Robotic Repair of Giant Hiatal Hernia: A Good Option for “Frail” Patients**

Federico Gheza, MD, Ileana Skalamera, MD, Alberto Mangano, MD, Mario A Masrur, MD, Pier C Giulianotti, MD, FACS; UIC

**Introduction:** Giant hiatal hernia (GHH) accounts for 5% of all hiatal hernias and are usually defined by the presence of at least 30% of the stomach in the thoracic cavity. Currently, the robotic technique is performed for selected patients. GHH is commonly seen in elderly and obese patients which are usually exposed to a higher morbidity and recurrence rate. Our aim is to study the robotic approach of giant hiatal hernias in these “frail” patients.

**Methods and procedures:** Our prospectively collected, IRB approved database was queried between June 2008 and September 2016. Preoperative risk factors were collected. We focused on perioperative outcomes and in hospital complication rate.

**Results:** Thirty-three patients underwent robot assisted giant hiatal hernia repair at our Institution. 13 patients (40%) were 70 years and older and 15 patients (46%) had a BMI higher than. There were no significant differences in patient characteristics between the groups. No patient underwent conversion to open or standard laparoscopy. No mortality was observed and no transfusions were needed. Four patients (12%) had a complication, two of them were older than 70 years old. Three of the four patient (75%) that had a complication were obese. There were no statistical differences in mortality, morbidity neither reoperation rate between the groups.

**Conclusions:** In our experience the robotic repair of giant hiatal hernia is related to a low complication rate, without any difference in patients with preoperative risk factors. For this reason robotic assistance can be considered a good option for giant hernias in fragile patients.

**P811****Impact of Developing Robotic Technology on Nationwide Practice of General Surgery**

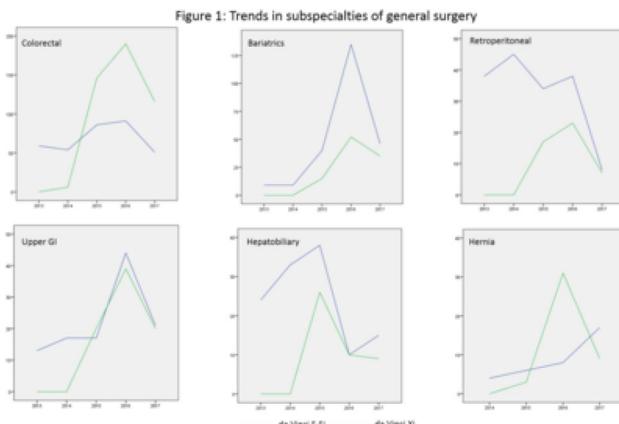
Eren Esen, MD, Erman Aytac, MD, Ilknur Erenler Bayraktar, MD, Bilgi Bacı, MD, Ismail Hamzaoglu, MD, Tayfun Karahasanoğlu, MD; Department of General Surgery, Acibadem Mehmet Ali Aydinlar University School of Medicine

**Introduction:** Robotic technique is the advanced and developing form of minimally invasive surgery. Limited data exist about course and current condition of robot use in general surgery. In this study, we aimed to assess adoption of evolving robots in the field of general surgery.

**Methods:** Robotic operations between January 2013 to July 2017 in Turkey were included. Data were obtained from a prospectively maintained database. Patient, surgeon and hospital identifiers were encrypted. Study parameters were operation type, operation year, robotic system used (S, Si, Xi), hospital volume and surgeon volume.

**Results:** 12151 robotic operations were performed in 32 hospitals in Turkey. The number of certified general surgeons on robotic surgery were 74. 1887 general surgery [Colorectal (42.3%), bariatrics (18.1%), retroperitoneal (11.2%), upper gastrointestinal (10.1%) hepatobiliary (8.7%), hernia (4.1%), others (5.4%)] procedures were performed. 56.5% and 43.5% of them were with S-Si and Xi platforms respectively. The median numbers of procedures were 33 (range 3–290) and 7 (range 1–276) cases per hospital and per general surgeon respectively. The high volume surgeons (higher than 75th percentile) performed 1462 (77%) of the cases. The Xi platform has been the main tool for colorectal surgery only (Figure 1).

**Conclusions:** While Xi platform significantly increased caseload in general surgery by facilitating performance of colorectal surgery, its preference in other general surgical fields is not superior to Si. Considering its visual superiority and financial benefits, sustaining Si seems feasible from institutional perspective if colorectal surgery is not one of the high-volume departments in a hospital.

**P812****Laparoscopic Inguinal Hernia Repair (TAPP) – First Experience with the New Senhance Robotic System**

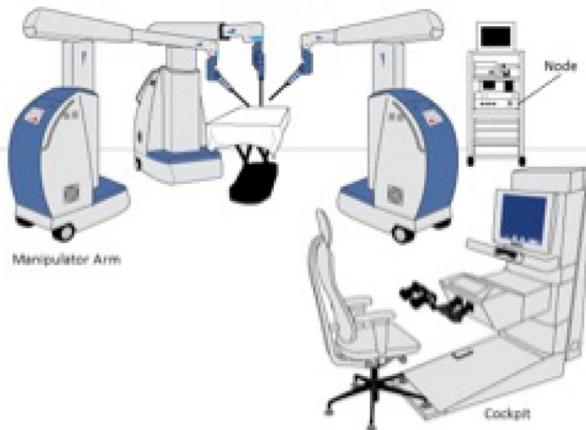
Robin Schmitz, MD<sup>1</sup>, Justin Barr, MD, PhD<sup>1</sup>, Dietmar Stephan, MD<sup>2</sup>, Frank Willeke, MD, PhD<sup>2</sup>, Sabino Zani, MD<sup>1</sup>; <sup>1</sup>Duke University, <sup>2</sup>St. Marienhospital, Siegen, Germany

**Introduction:** This retrospective study was performed to evaluate the safety and feasibility of the new Senhance robotic system (Transenterix) for inguinal hernia repairs using the transabdominal preperitoneal approach. Our series is the first experience in the field of general surgery utilizing this new robotic platform.

**Methods:** From March to September 2017, 76 inguinal hernia repairs in 64 patients were performed using the Senhance robotic system. The Senhance surgical system is a new robotic platform that consists of a cockpit, manipulator arm and a connection node (Figure 1). This new system provides robotic surgery with numerous advantages including eye-tracking camera control system, haptic feedback, reusable endoscopic instruments, and a high configuration versatility due to total independency of the manipulator arms. Patients were between 18 and 90 years of age, eligible for a laparoscopic procedure with general anesthesia, had no life-threatening disease with a life-expectancy of less than 12 month and a BMI < 40. A retrospective chart review was performed for a variety of pre-, peri- and postoperative data including but not limited to patient demographics, hernia characteristics, intraoperative and postoperative complications.

**Results:** 54 male and 10 female patients were included in the study. Median age was 56.5 years (range 22–86 years), and median BMI was 25.9 (range 19.5–31.8 kg/m<sup>2</sup>). Median docking time was 7 minutes (range 2–21 minutes), and median operative time was 48 minutes (range 18–142 minutes). Two cases were converted to standard laparoscopic surgery due to robot malfunction and intraoperative bleeding respectively. One patient developed a postop seroma that did not require any further intervention.

**Conclusion:** We report the first series of laparoscopic inguinal hernia repairs using the new Senhance robotic system. Compared to previously published conventional laparoscopic or robotic TAPP hernia repairs these data suggest similar outcomes in operative time and perioperative complications. Additionally there was no significant learning curve detected due to its intuitive applicability. Therefor the Senhance robotic system can be safely and easily used for TAPP hernia repairs by experienced laparoscopic surgeons.



**P813****Robotically-Assisted Takedown of Colocutaneous Fistula That Resulted from Misplaced Bladder Sling**

I. Bulent Cetindag, MD<sup>1</sup>, Jane He, MD<sup>1</sup>, Hassan Imran, MD<sup>1</sup>, Jason Rexroth, MD<sup>2</sup>; <sup>1</sup>University of Iowa / Mercy Medical Center, <sup>2</sup>Mercy Medical Center

This is a video presentation of 51 years old female, who presented with suprapubic pain and mass to Gynecology office. She has a history of robotic hysterectomy and bladder sling operation 4 years ago. This was complicated with peritonitis and long ICU stay, due to what she was called "bowel injury" but treated only conservatively with antibiotics and subsequent abscess drainages at that time. She has occasional appearing nodule and pain at the left suprapubic region. CT ordered by Gynecology read as abdominal wall hernia with long sigmoid diverticuli in hernia. Also there was small amount of subcutaneous air at the tip of herniated diverticuli.

After antibiotic treatment and improvement, colonoscopy shows, actually the diverticuli is the limb of the sling going through the sigmoid and anchored in subcutaneous fat on abdominal wall which represents colocutaneous fistula as gets infected. Clip was placed on sling and repeat imaging confirmed that the location of this sling fits to location of so called "hernia".

The sling limb was resected robotically and colon was repaired with side stapling of colonic wall. The abdominal wall defect is repaired with long term absorbable suture. As far as we have found, the presentation and treatment of this complication is unique and could not find a similar case to guide us for the plan.

**P814****Minimally Invasive Robotic Ivor Lewis Esophagectomy: ICG Fluorescence Gastric Mobilization with 5 mm Scope and Thoracic Robotic Assisted Esophagectomy with Circular Stapled Anastomosis – Modular Step Up Approach for Safe Introduction of New Technology**

Hans F Fuchs, MD, Rolf Lambertz, MD, Wolfgang Schroeder, MD, Jessica Leers, MD, Christiane Bruns, MD; University of Cologne, Department of General Surgery

**Introduction:** The use of robotic technology in abdominal surgery in Europe is rapidly increasing. Aim of this study is to evaluate the introduction of new technologies in a center of excellence for upper gastrointestinal surgery.

**Methods:** A standardized teaching protocol of a complete OR team was performed in simulation and animal models at the center for the future of surgery (San Diego, CA) and IRCAD (Strasbourg, France) to receive certification as console surgeons. Starting 02/2017 the davinci xi and stryker ICG laparoscopy systems were introduced at our academic center (certified center of excellence for surgery of the upper gastrointestinal tract, n>250 esophageal cases/year). After simple training procedures based on our minimally invasive expertise were performed, difficulty was increased based on a modular step up approach to finally perform robotic thoracic assisted Ivor Lewis esophagectomy. **Results:** From 02/2017–09/2017, a total of 30 cases were performed: cholecystectomy, n=8; right colectomy, n=1; fundoplication, n=3; splenectomy, n=1; Heller myotomy n=4; gastric mobilization, n=5; gastrectomy, n=1; pancreatic tail resection, n=1; thoracic esophagectomy, n=7). All cases were performed safely without operation-associated complications. Level of difficulty was increased based on our modular step up approach without quality compromises. Video documentation using the new technology is provided.

Fig.1 ICG gastric mobilization with Stryker 5mm scope

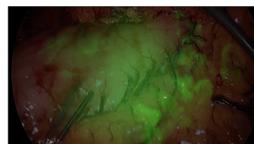


Fig.2 Radical thoracic robotic assisted esophagectomy (tracheal bifurcation)



**Conclusion:** The standardized training protocol and the University of Cologne modular step up approach allowed safe introduction of the new technology used. All cases were performed safely without operation-associated complications.

**P815****Feasibility and Perioperative Outcomes of Robotic-Assisted Surgery in the Management of Crohn's Disease: Real-World Evidence**

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**Introduction:** Crohn's disease is an incurable inflammatory disorder that can affect the entire gastrointestinal tract. While medical management is considered first-line treatment, approximately 70% of patients with Crohn's disease require surgery within 10 years of their initial diagnosis. Traditionally, surgery has been performed via an open approach with poor adoption of minimally invasive technique. The aim of this study is to demonstrate the feasibility of robotic-assisted approach as a minimally invasive option for surgical management of Crohn's disease and compare the perioperative outcomes with traditional laparotomy.

**Methods:** Patients who underwent elective resection of the intestine for Crohn's disease by robotic-assisted or laparotomy approach from 2011 to Q3 2015 were identified using ICD-9 codes from Premier Healthcare Database. All the procedures were performed by either general surgeons or colorectal surgeons. Since hospital characteristics were comparable between the two cohorts before propensity-score matching, 1:1 matching was performed using patient characteristics such as age, gender, race, Charlson index score and year of the surgery to create comparable cohorts. Sample selection and creation of analytic variables were performed using Instant Health Data (IHD) platform (BHE, Boston, MA). All tests were two-sided, with statistical significance set at a value of p<0.05. Statistical analyses were undertaken with R-statistical software, version 3.2.1.

**Results:** There were 3,641 patients who received elective segmental intestinal resection for Crohn's disease. 1910 (52.5%) were performed by laparotomy and 109 (3%) were performed by robotic-assisted approach. Patient characteristics, such as age, gender and Charlson score, were comparable after propensity-score matching. Post-matched comparison between cohorts (N=108 in each cohort) showed that robotic-assisted cases were longer (mean of 240.7 min vs. 181 min, p<0.0001), but had shorter length of stay by a median of 2 days and a lower 30-day complication rate (24 % vs. 38%, p=0.039). Transfusion rates and rate of ileus were similar between the two cohorts.

**Conclusion:** This nationwide real-world comparison of contemporary surgical approaches for segmental bowel resection for Crohn's disease demonstrates that the robotic-assisted approach is feasible and a viable minimally invasive option for selected patients. Although the mean operative time was longer, the robotic-assisted approach offers the benefits of shorter length of stay and lower 30-day complication rate when compared to laparotomy.

**P816****Predictors of Robotic Versus Laparoscopic Inguinal Hernia Repair**

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**Introduction:** The advent of robotic-assisted surgery has added an additional decision point in the minimally invasive (MIS) treatment of inguinal hernias. The goal of this study is to identify the patient, surgeon, and hospital demographic predictors of robotic inguinal hernia repair.

**Methods:** We conducted a retrospective analysis of 102,241 MIS inguinal hernia repairs (1,096 robotic, 101,145 laparoscopic) from 2010 through 2015 with data collected in the Premier Hospital Database. Patient, surgeon, and hospital demographics of robotic and laparoscopic inguinal hernia repairs were compared. The adjusted odds ratio of receiving a robotic procedure was calculated for each of the demographic factors using a multivariable logistic regression model. Statistical significance was defined as  $p < 0.05$ . SAS software version 9.4 was used for statistical analysis.

**Results:** The odds of a procedure being robotic increased from 2010 through 2015 (Table 1). Age  $< 65$  was not a predictor of a robotic procedure ( $OR = 1.69$ ,  $CI = 1.40-2.05$ ,  $p < 0.0001$ ). Females were more likely to receive a robotic procedure ( $OR = 1.69$ ,  $CI = 1.40-2.05$ ,  $p < 0.0001$ ). Compared to white patients, black patients were more likely ( $OR = 1.33$ ,  $CI = 1.06-1.68$ ,  $p = 0.0138$ ), and other race patients were less likely ( $OR = 0.47$ ,  $CI = 0.38-0.58$ ,  $p < 0.0001$ ) to receive a robotic procedure. Compared to Medicare insurance, patients with all other types of insurance were more likely to receive a robotic repair (Table 2). Surgeons with the lowest annual volume were the most likely to perform robotic procedures (Table 3). Non-teaching ( $OR = 1.81$ ,  $CI = 1.53-2.13$ ,  $p < 0.0001$ ), larger (Table 4), and rural ( $OR = 1.27$ ,  $CI = 1.03-1.57$ ,  $p = 0.025$ ) hospitals were more likely to perform robotic procedures.

**Conclusions:** The utilization of robotic inguinal hernia repair is rapidly increasing. Further research is necessary to investigate the apparent tendency toward selection of socioeconomically disadvantaged patients (black, Medicaid, uninsured) for robotic procedures.

Year	OR	95% CI	p-value
2010	Reference		
2011	1.19	0.52-2.73	<0.0001
2012	2.89	1.39-6.03	0.6826
2013	9.91	5.01-19.62	0.0046
2014	19.85	10.13-38.91	<0.0001
2015	49.38	25.34-96.21	<0.0001

Table 1. Odds ratio by year.

Insurance	OR	95% CI	p-value
Medicare	Reference		
Other	1.41	1.01-1.97	0.0442
Managed Care	1.48	1.15-1.90	0.0002
Uninsured	1.87	1.23-2.83	0.0032
Medicaid	1.91	1.41-2.61	<0.0001

Table 2. Odds ratio by insurance.

Volume	OR	95% CI	p-value
≤15	Reference		
16-29	0.48	0.40-0.57	<0.0001
30-44	0.78	0.65-0.94	0.0078
≥45	0.62	0.52-0.74	<0.0001

Table 3. Odds ratio by surgeon volume.

Bed Size	OR	95% CI	p-value
<300	Reference		
300-500	1.95	1.66-2.30	<0.0001
>500	3.57	2.96-4.18	<0.0001

Table 4. Odds ratio by hospital size.

**P817****Robot Assisted Gastrectomy Using da Vinci Surgical System (DVSS) for Resectable Gastric Cancer**

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<sup>1</sup>Department of Surgery, Hamamatsu University School of Medicine, <sup>2</sup>Hamamatsu University School of Medicine

**Background:** Robot-assisted surgery using da Vinci Surgical System (DVSS) is thought to have many advantages over conventional laparoscopic surgery. It was reported that the use of the surgical robot might reduce surgery-related complications, then a multi-institutional historically controlled prospective cohort study on the feasibility, safety, effectiveness and economical efficiency of robotic gastrectomy (RG) for resectable gastric cancer was conducted in Japan. This study evaluated the safety of RG using DVSS Xi.

**Methods:** This single-center, prospective phase II study included patients with resectable gastric cancer (UMIN000019366). The primary endpoint was the incidence of post-operative complications greater than Grade III according to Clavien-Dindo classification during one month after surgery. The secondary endpoints included all adverse events and completion rate of robotic surgery.

**Results:** From Oct 2014 to Jan 2017, 22 patients were enrolled for this study. The incidence of post-operative complication greater than grade III was 0%. The overall incidence of adverse events was 18.1% (grade I: 13.6%, grade II: 4.5%). No patient required conversion to laparoscopic or open surgery; thus, the RG completion rate was 100%.

**Conclusion:** This study suggested the introduction of RG using DVSS Xi for gastric cancer seems to be safe and feasible.

**P818****Open Surgeons Are Reluctant to Switch to Robotic Surgery: A Sages Robotic Task Force Survey**

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**Introduction:** While robotic companies continue to aggressively market and promote the use of robots in general surgery, little is known about how this technology is employed by general surgeons, and what is expected of this technology from both novice and experts in the field. The aim of this study is to evaluate the needs of general surgeons who are new to robotic surgery and the needs of established robotic surgeons.

**Methods:** The SAGES Robotic Task Force Survey, a one-page survey, was designed and sent electronically to all SAGES members. Questions regarding fellowship training, area of expertise, robotic simulation and in clinical case use, services offered in the current hospital, mentorship, likelihood of switching to a different approach, and expectations for the robot were included in the survey. Two groups were created based on previous use of daVinci® System in a clinical scenario, or not. Statistical analysis was conducted using IBM SPSS v.23.0.0, using Fischer's exact and Pearson's chi-squared tests where appropriate.

**Results:** 201 SAGES members answered the Survey. Surprisingly, 157 respondents (78%) had used the daVinci® in a clinical setting. Among these, 122 (78%) had additional fellowship training, compared to 27 (13%) in the non-clinical use group,  $p = 0.048$ . Of all surgeons with additional fellowship training, the great majority (26%) had specialization in advanced GI, MIS and Bariatric Surgery, followed by Colorectal (10%). Most surgeons are performing less than 10 cases per month using the robotic System, and with the majority of cases performed using the platform being hernia repairs (24%), followed by foregut-related procedures (20%). Interestingly, from all the surgeons who replied the Survey, only 11.3% are planning to switch from open procedures to its robot counterpart, whereas 38.1% are planning to adopt robotic-assisted procedures rather than laparoscopy.

**Conclusions:** The majority of SAGES members who responded to the survey have used the daVinci® in a clinical setting in the past. Surgeons who stated they perform mainly laparoscopic procedures were likely to continue to adopt robotic techniques, whereas those who perform open hernia repair for example were not very likely to switch to robotic approach. While the use of the robot may be enabling surgeons who used to perform mostly open procedures in the urology or gynecology fields, laparoscopic skills predict robotic utilization in general surgery. Hernia and foregut appear to be the most common procedures that are being utilized.

**P819****Robotic Inguinal Hernia Repair - A Review of Current Literature**

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**Background:** Inguinal hernia repair is one of the most common general surgery procedures with over 600,000 performed annually in the United States. When compared to traditional open inguinal hernia repair (OIH), laparoscopic inguinal hernia repair (LIHR) has been associated with faster postoperative recovery rates and lower postoperative pain. With advances in the robotic platform, robotic inguinal hernia repair (RIHR) is an available technique that is currently being explored. This study examines LIHR and RIHR as described in literature to see if one is superior to the other.

**Study Design:** Search terms: "Inguinal Hernia Repair" "Robotic Inguinal Hernia Repair," "Laparoscopic Inguinal Hernia Repair."

A systematic search was performed in August 2017 of Medline, PubMed, and relevant journals using the above-listed search terms. Out of 80 articles found, only 8 were suitable for this content review.

**Results:** Operative time in RIHR averaged 99 minutes as compared to 68 minutes in LIHR. Patients undergoing RIHR had an average complication rate of 5% with a recurrence rate of 0.06%. For obese patients, a lower percentage experienced postoperative complications when undergoing RIHR as compared to OIHR (unadjusted: 2.7% vs. 11.5%, p=0.005; and matched: 3.2 % vs. 10.8%, p=0.047), with bilateral robotic repairs more easily conducted in obese patients (unadjusted 29.7% vs. 16.8%, p=0.019; and unadjusted 35.1% vs. 11.5%, p<0.0001-respectively). More complicated procedures were performed using R-TAPP (n=11 vs. n=1, p=0.0001) with nearly identical (69.12 ±35.13 min, R-TAPP; 69.05±26.31, L-TEP) intraoperative and postoperative complication rates. Similarly, average pain scores in recovery (2.5 vs 3.8, p=0.02) were significantly less after R-TAPP. However, mean operative time (77.5 vs 60.7 min, p=0.001) and room time (109.3 vs 93.0 min, p=0.001) were longer but with less recovery time and reported pain. Surgical complications including hematomas (3.9%), seromas (2.6%), and trocar site infection (1.3%) resolved with antibiotics, with a 2.6% postoperative complication rate.

**Conclusion:** RIHR repair is a safe alternative to LIHR, with fewer postoperative complications and a faster recovery time. However, operative time as well as OR room time is significantly longer, which may increase overall cost. Further high quality randomized controlled trials are needed to assess efficacy and outcomes of RIHR.

**P820****Totally Robotic Single Anastomosis Gastric Bypass is Safe and Feasible Compared to Laparoscopic Approach**

Patricio Cal, MD, Luciano Deluca, MD, Tomas Jakob, MD, Gonzalo Crosbie, MD, Ezequiel Fernandez, MD; Hospital Churruca

**Introduction:** Single anastomosis gastric bypass (SAGB) has become a commonly performed primary bariatric surgery. Laparoscopic has been the preferred approach, and reports on robotic SAGB are scarce.

Our goal was to assess the feasibility and safety of totally robotic SAGB and compare it to the laparoscopic technique.

**Methods and Procedures:** From January 2016 to September 2017 all SAGB performed were compared. Laparoscopic or robotic approach were chosen on a schedule availability basis. Data was collected prospectively and it involved anthropometric data, presence of type 2 diabetes mellitus (T2DM), % of preoperative total weight loss (%PTWL), surgical time, postoperative length of stay, 30-day complications, and need for readmission or reoperation.

Comparison between groups was carried on with t-test for continuous data and with Chi-square test for dichotomous variables. A P lower than 0.05 was considered significant.

**Results:** Overall 131 SAGB were performed, 111 laparoscopic and 20 robotic. A long and thin gastric pouch was created calibrated by a 27 Fr Bougin and a 2.5 cm antecolic antegastric gastrojejunal (GJ) anastomosis was performed 200–250 cm distal to the ligament of Treitz, using a linear stapler for the laparoscopic and totally manual for robotic patients.

Groups (laparoscopic vs robotic) were comparable regarding age (46 vs 45.3 years, P=0.77), BMI (48.1 vs 47 kg/m<sup>2</sup>, P=0.53), %PTWL (13.6 vs 16.9 %, P=0.29) and % with T2DM (51 vs 35%, P=0.2). There were fewer men in the laparoscopic group (20.2 vs 45%, P=0.015).

Surgical length was significantly higher for the robotic group (145±30.6 min) compared to laparoscopic (63.5±11.9 min, P<0.0001). Comparing the first 5 and the last 5 robotic surgeries, the last 5 were significantly shorter (107 vs 168 min). There were no conversions. Length of stay was 1.05 days in each group.

There were 6 (5.4%) major complications in the laparoscopic group: 3 bleedings from the GJ anastomosis, one of which required reoperation, 1 severe dumping syndrome, 1 GERD requiring revision and 1 GJ stricture that underwent relaparoscopy. The only complication (5%) in the robotic group was an acute pancreatitis.

Readmission rate was 5% in both groups and reoperation rate was 3% for laparoscopic and 0% for robotic surgeries.

**Conclusions:** Totally robotic SAGB with manual gastro jejunal anastomosis was safe and feasible in this early experience compared to laparoscopic approach. Surgeries took longer in the robotic assisted group, although a shorter time was achieved with training.

**P821****Multi Degrees of Freedom Manipulator with Mantle Tube for Assisting Endoscopic and Laparoscopic Surgical Operations**

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<sup>2</sup>Department of surgery, Jichi Medical University

In the complex laparoscopic surgical procedure, there is a problem such as that the laparoscope and the surgical instruments interfere with each other because multiple instruments is concentrated in one place. This problem is significantly appear in the laparoendoscopic single site surgery.

Therefore we suggested multi degrees of freedom (DOF) manipulator with mantle tube for assisting laparoendoscopic surgery, which manipulator has two flexion and one telescopic mechanisms actuated by wire. It is possible to insert any thin surgical instruments such an endoscope the mantle tube of the multi DOF manipulator, which the manipulator can let those surgical instruments access the operative field from different axis with other instruments. The use of this manipulator has two advantages, one of which is avoidance of fighting between instruments and laparoscope. The other is that become possible to ensure a satisfactory field of vision in the operative field.

In this report, we assumed that this multi-DOF manipulator is used as laparoendoscopy. In order to evaluate the performance of this manipulator, the operation time of the test in the abdominal cavity simulator (FASOTEC Inc.) was measured. The test is a contact test to multiple-targets, which is a test that bring a forceps contact multiple-targets in the abdominal cavity simulator according to the defined pattern. As a general comparison and evaluation target for this measurement result, it is compared with the case using the same access method as the conventional rigid endoscope. In this test, the number of contacts between forceps and laparoendoscope were recorded by using electrical device.

Subjects (n=10) are adult men who trained the peg transfer in the above simulator. It was compared of total operating times of the test and the field of vision obtaining each device. From these results, using the suggested manipulator device rather than using rigid laparoscope a satisfactory field of vision is obtained, and it is possible to short the operating time approximately 4 seconds, and to small the number of contacts significantly. Therefore it was shown that the effectiveness using the suggested manipulator device. For this reason, use of this device is expected to facilitate the complex surgical operation.

Additionally, it is performed para ablative operation of swine liver tissue in the abdominal cavity simulator, as previous step of clinical test. The operative field in this test was surveyed, the refinements of this manipulator for improvement performance were described in this report.



**P823****Step by Step Anatomic Mapping During Laparoscopic Trans-abdominal Adrenalectomy Lateral Flank Approach**

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**Introduction:** We examined anatomic structures visible at each step of laparoscopic right and left adrenalectomy (LA).

**Methods:** Full videos of left (N=12) and right (N=5) LA were reviewed by two surgeons. Major anatomical structures seen at each operative step were recorded. Steps analyzed were: Right adrenalectomy: Step 1) mobilize liver; 2) medial dissection; 3) adrenal vein isolation; 4) inferior dissection; 5) adrenal off kidney; 6) detachment. Left adrenalectomy: Step 1) division splenorenal ligament; 2) develop plane pancreas/kidney; 3) mobilization medial/lateral borders adrenal; 4) adrenal vein isolatin; 5) dissection adrenal off kidney; 6) detachment. Structures were identified as YES/NO and results expressed as percentage total N of cases seen at each step.

**Results:** Structures identified at each step are shown (table). Not all were the same on both sides due to differences in the anatomy.

**Conclusions:** Relevant anatomic structures can be seen in a high percentage of cases of LA at most steps after initial mobilization. For right adrenalectomy, the IVC, and left adrenalectomy, the pancreas and splenic vessels are seen early and should be positively identified throughout to prevent injury.

Right adrenalectomy (N=5) Step	Adrenal/tumor	Kidney	IVC	Adrenal vein	Adrenal arteries	Psoas
1	20%	20%	100%	20%	0	0
2	80%	80%	100%	80%	80%	0
3	100%	80%	100%	100%	80%	40%
4	100%	100%	NA	100%	100%	
5/6	100%	100%	100%	NA	NA	100%

Left Adrenalectomy (N=12) Step	Adrenal/tumor	Tail pancreas	Splenic artery/vein	Kidney	Renal vein	Adrenal vein	Adrenal arteries
1	25%	100%	100%	50%	0	0	0
2	83.3%	100%	100%	83.3%	0	50%	0
3	100%	100%	100%	100%	0	83.3%	91.6%
4	100%	100%	100%	100%	91.6%	100%	100%
5/6	100%	100%	100%	100%	91.6%	NA	NA

NA=not applicable.

**P824****Trans-oral Endoscopic Parathyroidectomy Through Vestibular Approach: Our 2 Year Experience**

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**Objective:** Natural orifice transluminal endoscopic surgery for neck surgeries has become increasing popular. Thus, an innovative transoral endoscopic parathyroidectomy through vestibular approach (TOEPVA) was developed for primary hyperparathyroidism (PHPT). We aim to review our 2 year experience of this approach.

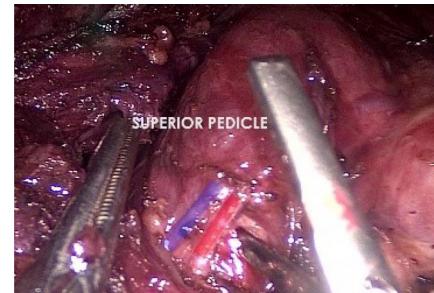
**Method:** Parathyroid adenoma was localised using combined Sestamibi and CT scan. Incisions were made at the oral vestibule under the inferior lip. A 10-mm trocar was inserted through the center of the oral vestibule with two 5-mm trocars above incisors. The subplatysmal space was created down to the sternal notch, and carbon dioxide was insufflated at pressure 6 mmHg to maintain the working space. Parathyroidectomy was performed using laparoscopic instruments. Intraoperative parathormone levels were measured 10 minutes after excision of gland. Primary end-points were the success rate in achieving the cure from hyperparathyroid state and hypocalcaemia rate. Secondary end-points were operating time, scar length, pain intensity assessed by the visual-analogue scale, analgesia request rate, analgesic consumption, quality of life within 7 postoperative days (SF-36), cosmetic satisfaction, duration of postoperative hospitalization, and cost-effectiveness analysis.

**Sestamibi Scan**  
(14.5 mCi of  $^{99m}$ Tc-MIBI)



3.2 Hours

Abnormal tracer concentration in left lobe



**Result:**

No of cases	Mean Operative time(min)	Conversion to Open	Average post op day 1 VAS score	Analgesic requirement (days)	Mean Hospital stay	Cure rate at 12 months (%)
11	104(88-127)	0	2.2	1	2.73	95

One patient experienced a transient recurrent laryngeal nerve palsy which was spontaneously resolved within 1 month. No permanent recurrent laryngeal nerve injury was found. Serum calcium level returned to normal range in all patients. The serum parathyroid hormone level of the PHPT at 30 days was  $36.38 \pm 7.1$  pg/mL (range 27.7–46.5).

Postoperative cosmetic outcome was excellent. No mental nerve injury or infection was found.

**Conclusion:** With highly sensitive localising Sestamibi and CT scans, focussed exploration is the current standard of treatment. Among all minimally invasive surgeries, TOEPVA is a feasible, safe, and almost pain-free surgical option when combined with Intraoperative Parathormone monitoring for patients with hyperparathyroidism, especially those with cosmetic concerns.

**P825****Four Newly Invented Surgical Instruments for Gasless Endoscopic Thyroid Surgery for 17 Years**

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**Background and Methods:** We have performed approximately 200 cases of gasless endoscopic thyroid surgery since 1999 for 17 years. This surgery was performed through a small subclavian incision and using a wire traction and inserting an endoscope. We have modified and improved our surgical techniques by inventing various surgical instruments. Here we introduce four newly invented surgical instruments, chronologically.

**Results:** We made U-retractor (2000), U-trocars (2005), U-Kelly forceps (2008), and U-suction tube retractor (2013). All surgical instruments were modified from conventional surgical instruments. The U-retractor was a piercing retractor, each end of which had a sharp tip and a retractor. This retractor was inserted from the 3-cm working port outside the body and retracted the muscles effectively. The U-trocars was reversely set from inside to outside to make the working space wider. The U-Kelly forceps which had a special ratchet were made to dissect loose connective tissue around the thyroid gland avoiding injury of the recurrent laryngeal nerve. The U-suction tube retractor facilitated a wider working port and eliminated the mist created by the ultrasonically activated scalpel effectively. Recent data showed no difference of operative time, hoarseness, blood loss and hospital stay between conventional thyroid lobectomy and gasless endoscopic lobectomy.

**Conclusion:** Gasless endoscopic thyroid surgery has been improved in the last 17 years. This procedure made the excision of not only benign thyroid tumors but also small thyroid carcinomas. This operation is still cost effective, because almost all surgical instruments are reusable and is a satisfactory experience to both the patients and surgeons.

**P827****Approach to Retroperitoneal Tumors: Surgery; as a Cornerstone in Treatment for Overall Survey**

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**Objective:** To put forward the importance of complete (R0) resection for the treatment of retroperitoneal tumors increasing overall survey.

**Methods:** In this study; 30 patients having the diagnosis of retroperitoneal tumors with different histopathological subtypes whom were hospitalized in Emergency Surgery Department of İstanbul Medical Faculty between the years of 2009 and 2017 were evaluated retrospectively. The database of the department was analyzed. Operational backgrounds, histopathological results, radiological evaluations, and assessments about relapses, and overall survey were obtained from the medical archive.

**Results:** The average follow-up time was 2, 5 years. All of the patients included into the study were undergone operations. The average time of hospital stay was calculated as 15 days. 4 of the patients were found to have positive surgical margins in their histopathological evaluations. Overall mortality rate of the study was 20% (6/30). We have observed a direct correlation between complete (R0) resection and disease-free survival. Patients having relapses had worse prognosis in terms of overall survey (44% mortality rate). After having done the statistical evaluation, surgery was found to be the main determining factor for the assessment of overall survey.

**Conclusion:** Reference to an experienced and multidisciplinary surgical center after an early diagnosis has upmost importance for the treatment of retroperitoneal tumors. Surgical approach constitutes the main element in the management. Overall survey is directly correlated with complete (R0) resection.

**P828****Technical Refinements of Reduced Port Laparoscopic Splenectomy for Splenomegaly**

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**Aim:** While conventional multiport laparoscopic splenectomy has become gold standard for some hematological or splenic diseases, reduced-port laparoscopic splenectomy (RPLS) including single-incision laparoscopic splenectomy (SILS) is regarded as highly challenging. Herein, we describe the technical refinements for safe RPLS especially for patient with splenomegaly.

**Methods:** In all cases, access was achieved via a 2.5-cm mini-laparotomy at the umbilicus into which a SILS™ Port or E-Z Access® with three 5-mm trocars was placed. A 5-mm flexible scope, an articulating grasper, and straight instruments were used. Our RPLS is characterized by the followings: a) early ligation of the splenic artery to shrink the spleen, b) application of our original "tug exposure technique," which provides good exposure of the splenic hilum by retracting (tugging) the spleen with a cloth tape, and c) safe introduction of stapler under the guidance with a flat drain into the splenic hilum.

**Results:** 27 RPLS patients (12 men and 15 women, 43±19 years old) comprised hematological disorder (n=12), splenic disease (n=12), and liver cirrhosis (n=3). In 24 patients (89%), RPLS was successfully completed: SILS in 22 and SILS plus one additional port only in 2 patients. Conversion to open surgery was necessary in 3 patients including 1 liver cirrhosis with remarkable collateral varicose veins around the spleen. Operation time and blood loss were 214±78 min and 166±312 g, respectively. Weight of the extracted spleen was heavier than normal and 341±286 g (maximum 960 g). No intra- or postoperative complication occurred. The postoperative scar was nearly invisible.

**Conclusions:** RPLS might safely be performed even for splenomegaly (up to 1,000 g). However, care should be taken for cirrhotic patient with collateral veins. RPLS can be the procedure of choice even in the patients with splenomegaly and who are concerned about postoperative cosmesis.

**P829****Feasibility Study of Laparoscopic Sentinel Node Biopsy for Early Gastric Cancer**

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**Background:** We have performed sentinel node (SN) biopsy for SN navigation surgery (SNNS) by laparotomy from 2002, and previously reported an optimal detection method of SNs under laparotomy for the complicated lymphatic flow of the stomach (J Exp Clin Cancer Res. 2008). The aim of this feasibility study was to evaluate laparoscopic SN biopsy for laparoscopic SNNS in early gastric cancer patients.

**Subjects and Methods:** This study includes 13 patients with cT1N0M0 (primary tumor <4 cm) gastric cancer who underwent laparoscopic SN biopsy in conjunction with radioisotope and dye methods between Jan. 2010 and Jul. 2011. First, we looked for green-dyed SNs after injection of indocyanine green (ICG) without near-infrared light system, and then tried to detect the radioactivity of SNs using a hand-held gamma probe inserted through a small incision at the umbilical port. After the areas where SNs were distributed were resected, a gastrectomy with prophylactic lymphadenectomy was performed according to the gastric cancer treatment guidelines of the Japanese Gastric Cancer Association. We looked for undetected SNs in the resected specimen at the back table.

**Results:** Among 13 cases, there were 11 (85%) in which SNs were not detected in the resected specimen. There were 2 cases in whom SNs were detected in the resected specimen. In both cases, the primary tumors were located in the middle and greater curvature of the stomach. In Case 1, laparoscopic SN biopsy identified the left (4sb) and right (4d) greater-curvature lymph node (LN)s as SNs, however, lesser-curvature (3) and infrapyloric (6) LN s remained as SNs in the resected specimen. In Case 2, the left (4sb) and right (4d) greater-curvature LN s were identified as SNs intraoperatively, while the lesser-curvature (3) LN remained as an SN in the resected specimen. The SNs overlooked with laparoscopic SN biopsy method were detected by radioisotope only. No cases had LN metastasis, and the 5-year relapse-free survival rate of these 13 patients was 100%.

**Conclusions:** Our feasibility study of laparoscopic sentinel node biopsy for early gastric cancer showed that we should search for SNs of the lesser curvature carefully even if the primary lesion is located at the greater curvature.

**P830****Indocyanine Green Assisted Laparoscopic Partial Nephrectomy**

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**Introduction:** Indocyanine green is a water soluble nontoxic compound exhibiting near infrared fluorescence at a wavelength of 800 nm.

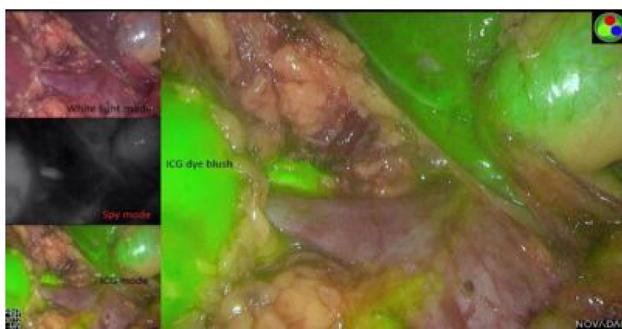
Partial nephrectomy is a nephron sparing surgery & the surgical treatment of choice for renal mass in:

- a patient with a solitary kidney
- compromised contralateral kidney
- bilateral renal masses
- small localised renal tumours in patients with a normal contralateral kidney

This surgery helps in secondarily improving renal function and long-term survival.

Indocyanine fluorescence helps in assessing vascular flow, tissue perfusion and aberrant anatomy and thereby leads to lower conversion rates in partial nephrectomy.

We aim to present our experience in 44 patients who underwent partial nephrectomy over 7 years.



**Materials and Methods:** Of the 44 partial nephrectomies performed at our institution, 24 were done by laparoscopic approach alone and rest 20 by Indocyanine green dye administration as an adjunct to laparoscopic approach.

Pinpoint ICG system with 4 effective modes provides real time endoscopic visible and near infrared fluorescence imaging. It combines image on same plane enabling coupling of images and simultaneous dissection without switching to normal white light mode while dissection.

**Result:**

Approach	Mean operative time (in mins)	Minor bleeding	Major bleeding	Conversion to open	Reactionary haemorrhage
Laparoscopic approach(n=24)	160	4	2	2	1
ICG pinpoint approach(n=20)	144	1	0	0	1

**Conclusion:** Indocyanine fluorescence is a safe & feasible adjunct to laparoscopic partial nephrectomy. It helps in selective clamping, achieving “zero ischemia”, helping renal function recover faster post-operatively. Identification of renal vasculature and tumour margins improve the surgeon’s ability & speed to perform this procedure effectively.

**P831****Standardized Use of Energy Devices May Improve Perioperative Outcome in Laparoscopic Liver Resection**

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**Background:** Laparoscopic liver resection (LLR) is becoming widespread. However, the use of devices in LLR has not yet been standardized for various facilities and operators. This study investigated whether Standardized use of devices in LLR improves perioperative outcome.

**Methods:** Between 2008 and 2017, of 260 patients who underwent LLR for whole hepatoma in our facility, 176 underwent LLR for a solitary hepatoma and were divided into “before standardization” (BS; n=147) and “after standardization” (AS) groups (n=29). Patient background, characteristics, and perioperative outcomes were compared between these groups.

**Procedure:** We chose the devices according to phases of liver transection. A soft-coagulation monopolar device was used for marking surface. An ultrasonically activated device was used for transection of the liver surface within a 2-cm depth. Crash and sealing with BiClamp were indicated for deep-phase transection. The Cavitron Ultrasonic Surgical Aspirator was used if the lesion was close to the major Glisson’s sheath or the major hepatic vein.

**Results:** No significant differences in the patients’ background were found between the two groups. The operative durations were 128 min (60–312 min) and 203 min (50–470 min) in the AS and BS groups, respectively, with a significant difference ( $p<0.001$ ). The blood loss volumes were 5 cc (0–150 cc) and 30 cc (0–850 cc), respectively ( $p=0.0548$ ). The lengths of hospital stay after LLR were 5 days (range, 3–7 days) and 6 days (2–21 days), respectively, with a significant difference ( $p=0.0012$ ). A postoperative complication higher than grade III of the Clavien-Dindo classification occurred in none of the patients in the AS group and in 8 patients in the BS group ( $p=0.365$ ).

**Conclusion:** LLR requires the use of various energy devices. However, standardization of the use of energy devices may improve perioperative outcomes such as operative duration, blood loss, complications, and hospital stay associated with LLR.