Hernia

Syringomyelia associated with Chiari I malformation treated with foramen magnum decompression and duraplasty using a polyglycolic acid patch and fibrin glue: A case report.

Authors: Sugawara A., Isu T., Kim K., Matsumoto R., Isobe M., Ogasawara K.

Publication Date: 2010

PMID: 359371446

Abstract

A 31-year-old woman presented with worsening numbness and pain in the arms and chest. Neurological findings at admission were decreased pain sensation and temperature sensation in the arms and chest. Magnetic resonance demonstrated a large cervical syrinx from the level of C4 to Th4 associated with Chiari I malformation. Occipital craniectomy and C1 laminectomy were performed for foramen magnum decompression. Intraoperative ultrasonography, performed after removal of the outer membrane of the dura mater at the level of the foramen magnum, revealed insufficient decompression. Therefore, the dura mater was completely opened and duraplasty was performed with a polyglycolic acid patch and fibrin glue. Sufficient decompression was thus achieved. The neurological symptoms and signs improved within the first postoperative month, and magnetic resonance showed a decrease in the size of the syrinx and no cerebrospinal fluid leakage. In patients undergoing foramen magnum decompression with duraplasty, the use of a polyglycolic acid patch and fibrin glue renders suturing unnecessary and avoids the common complications associated with suture duraplasty.

Clinical evaluation of fibrin glue in the prevention of anastomotic leak and internal hernia after laparoscopic gastric bypass: preliminary results of a prospective, randomized multicenter trial.

Authors: Silecchia G, Boru CE, Mouiel J, Rossi M, Anselmino M, Tacchino RM, Foco M, Gaspari AL, Gentileschi P, Morino M, Toppino M, Basso N

Publication Date: 2006

PMID: 16469211

Abstract

BACKGROUND: Gastro-jejunal anastomotic leak and internal hernia can be life-threatening complications of laparoscopic Roux-en-Y gastric bypass (LRYGBP), ranging from 0.1-4.3% and from 0.8-4.5% respectively. The safety and efficacy of a fibrin glue (Tissucol) was assessed when placed around the anastomoses and over the mesenteric openings for prevention of anastomotic leaks and internal hernias after LRYGBP. METHODS: A prospective, randomized, multicenter, clinical trial commenced in January 2004. Patients with BMI 40-59 kg/m2, aged 21-60 years, undergoing LRYGBP, were randomized into: 1) study group (fibrin glue applied on the gastro-jejunal and jejuno-jejunal anastomoses and the mesenteric openings); 2) control group (no fibrin glue, but suture of the mesenteric openings). 322 patients, 161 for each arm, will be enrolled for an estimated period of 24 months. Sex, age, operative time, time to postoperative oral diet and hospital stay, early and late complications rates are evaluated. An interim evaluation was conducted after 15 months. RESULTS: To April 2005, 204 patients were randomized: 111 in the control group (mean age 39.0+/-11.6 years, BMI 46.4 +/- 8.2) and 93 in the fibrin glue group (mean age 42.9+/-11.7 years, BMI 46.9+/-6.4). There was no mortality or conversion in both groups; no differences in operative time and postoperative hospital stay were recorded. Time to postoperative oral diet was shorter for the fibrin glue group (P = 0.0044). Neither leaks nor internal hernias have occurred in the fibrin glue group. The incidence of leaks (2 cases, 1.8%) and the overall reoperation rate were higher in the control group (P=0.0165). CONCLUSION: The preliminary results suggest that Tissucol application has no adverse effects, is not time-consuming, and may be effective in preventing leaks and internal hernias in morbidly obese patients undergoing LRYGBP.

A Novel Approach to Mesh Fixation in Retrorectus Ventral Hernia Repair Using Fibrin Sealant.

Authors: Moazzez A., Dubina E.D.

Publication Date: 2017

PMID: 617056236

Abstract

Not Available

Mesh Fixation with Fibrin Sealant in Totally Extraperitoneal Hernia Repair.

Authors: Hirsch H., Nagatomo K., Gefen J.

Publication Date: 2017

PMID: 614901973

Abstract

Introduction: Repair of inguinal hernia is a common procedure, but there is a lack of consensus as to the optimal repair technique along with the use of mesh and methods of mesh fixation. The objective of

this study was to evaluate the efficacy and safety of fibrin sealant for mesh fixation in laparoscopic totally extraperitoneal (TEP) inguinal hernia repair. Materials and Methods: A study was conducted of the first 200 patients undergoing TEP hernia repair with mesh fixation using fibrin sealant between March 2012 and January 2014. The primary outcome measures were (1) chronic pain (persisting for >3 months), (2) persistence of hernia (recurrence identified within first 2 weeks postoperatively), (3) hernia recurrence, and (4) any additional perioperative complications. The mean follow-up in the series was 34.4 +/- 6.1 months (range 22.2-44.1). Results: Of the 278 hernias repaired in 204 patients (74 bilateral, 130 unilateral), 38 were recurrent and 240 were primary. Three patients (1.5%) had a persistent hernia, including one with a planned return to the operating room the next day due to poor visualization. Three patients (1.5%) had a hernia recurrence. Twelve patients (5.9%) reported experiencing chronic pain. The remaining complications were minor and resolved over time. Conclusions: TEP repair of inguinal hernia using mesh secured with fibrin sealant can be effectively used to treat primary, recurrent, unilateral, and bilateral inguinal hernias in adults with minimal recurrence rates and complications during almost 3 years of follow-up.

Fibrin sealant for mesh fixation in laparoscopic groin hernia repair does not increase long-term recurrence.

Authors: Fenger A.Q., Helvind N.M., Pommergaard H.-C., Burcharth J., Rosenberg J.

Publication Date: 2016

PMID: 604948794

Abstract

Background: Methods of groin hernia repair include laparoscopic techniques using tissue-penetrating mesh fixation or non-penetrating fixation. Concerns regarding hernia repair include postoperative chronic pain, sexual dysfunction, and recurrence. Earlier estimations of recurrence rates have largely been based on nationwide databases, where reoperation rates have been used as a surrogate measure for recurrence, which may underestimate the true recurrence rates. The aim of this study was to evaluate long-term recurrence in patients who had undergone transabdominal pre-peritoneal (TAPP) laparoscopic groin hernia repair using either fibrin sealant or tacks for mesh fixation. Methods: This study used data from the Danish Hernia Database to create the following cohort: All patients operated laparoscopically for primary groin hernia with a TAPP procedure using fibrin sealant for mesh fixation. These patients were matched 1:2 with patients, where the mesh was fixated using tacks. A validated questionnaire was sent to all included patients to determine recurrence, which was defined as reoperation or clinical diagnosis of recurrence by a physician. Follow-up was from index operation to either reoperation date, date of clinical recurrence diagnosis, or response date. Results: A total of 2273 persons (n = 2340 groins) were included, of which 1535 returned the questionnaire, resulting in a response rate of 66.2 % with a median follow-up time of 31 months (range 0-62). Among these, 114 (7.4 %) recurrences were found, of which 30 (5.8 %) were in the fibrin sealant group and 84 (8.3 %) in the tacks group (p = 0.084). The Cox regression analysis found no difference in recurrence with the use of tacks compared to fibrin sealant (hazard ratio 0.8) [95 % CI (0.5-1.2)]. Conclusion: We found no significant difference in long-term reoperation rates and clinical recurrences in patients undergoing TAPP repair with meshes fixated with fibrin sealant compared with tacks. Copyright © 2015, Springer Science+Business Media New York.

Mesh fixation methods and chronic pain after transabdominal preperitoneal (TAPP) inguinal hernia surgery: a comparison between fibrin sealant and tacks.

Authors: Andresen K., Fenger A.Q., Burcharth J., Pommergaard H.-C., Rosenberg J.

Publication Date: 2017

PMID: 614559323

Abstract

Introduction: Mesh fixation techniques have been associated with pain after groin hernia surgery. The aim of this study was to compare fibrin sealant and tacks for mesh fixation in laparoscopic inguinal hernia repair regarding long-term persistent pain. Methods: Through the Danish Hernia Database, we identified patients operated for groin hernia using the transabdominal preperitoneal laparoscopic technique (TAPP) from 2009 to 2012 with fibrin sealant for mesh fixation. These were matched in a ratio of 1:2 with patients operated with TAPP using tacks. All patients were sent a validated questionnaire (the inguinal pain questionnaire) between March 2013 and June 2014. The primary outcome was pain at follow-up. Results: A total of 1421 patients (84% males) answered the questionnaire (34% fibrin sealant, 66% tacks). The median follow-up was 35 months (range 12-62). Preoperative pain was associated with postoperative pain ($p < 0.005$), which was confirmed by multivariate analysis (OR 1.57 (CI 95% 1.40-1.77)). Furthermore, male gender was protective against postoperative pain (OR 0.47 (CI 95% 0.29-0.74)). A total of 18% in the fibrin sealant group and 20% in the tacks group reported pain during the past week at follow-up, and 6 and 7% reported pain not possible to ignore ($p = 0.44$). No difference was found between the fixation methods regarding getting up from a chair, sitting, or standing for more than 30 min, walking up stairs, driving a car, doing exercise, or the need for postoperative analgesics or postoperative sick leave (all $p > 0.20$). Conclusion: Mesh fixation technique did not affect long-term persistent pain. A large number of patients reported persistent pain regardless of mesh fixation technique, which emphasizes the need for preoperative information. Preoperative pain was a risk factor for persistent pain, whereas male gender was protective.

Fibrin glue versus staple for mesh fixation in laparoscopic transabdominal preperitoneal repair of inguinal hernia: a meta-analysis and systematic review.

Authors: Shi Z., Fan X., Zhai S., Zhong X., Huang D.

Publication Date: 2017

PMID: 611012241

Abstract

Background: The aim of this study was to compare outcomes of mesh fixation using fibrin glue versus staple in laparoscopic transabdominal preperitoneal (TAPP) repair of inguinal hernia. Methods and procedures: Database searches were carried out in PubMed, Embase, Cochrane Library, Web of Science and Cochrane databases until February 2016 using specific search terms. Studies which compared fibrin glue and staple for mesh fixation in laparoscopic transabdominal preperitoneal repair of inguinal hernia were enrolled. Outcomes, including inguinal hernia recurrence, chronic inguinal pain, seroma or hematoma formation and operating time, were measured. Results: Four randomized controlled trials (RCTs, 430 patients) and six non-randomized controlled trials (non-RCTs, 8637 patients) were analyzed. Meta-analysis of the four RCTs showed no significant difference in hernia recurrence (OR 2.10, 95 % CI 0.61, 7.22), seroma or hematoma formation (OR 0.55, 95 % CI 0.27, 1.14) and operating time (SMD 0.80, 95 % CI -0.34, 1.94). Similarly, there was no significant difference in most of the outcomes of the six non-RCTs. Conclusions: Our meta-analysis and systematic review shows that the use of fibrin glue fixation may provide an alternative approach to staple fixation in TAPP inguinal hernia repair without increasing the postoperative morbidity. Large-scale RCTs with long-term follow-up are still needed to further assess postoperative outcomes such as chronic pain and disease recurrence. Copyright © 2016, Springer Science+Business Media New York.

No difference in sexual dysfunction after transabdominal preperitoneal (TAPP) approach for inguinal hernia with fibrin sealant or tacks for mesh fixation.

Authors: Pommergaard H.C., Burcharth J., Andresen K., Fenger A.Q., Rosenberg J.

Publication Date: 2017

PMID: 610775093

Abstract

Background: Postoperative sexual dysfunction in relation to laparoscopic groin hernia surgery may be related to methods of mesh fixation. However, this has not been investigated earlier. Moreover, results regarding sexual dysfunction in females have not been reported systematically. The aim of this study was to compare fibrin sealant versus tacks for fixation of mesh regarding sexual dysfunction in males and females. Methods: Using the Danish Hernia Database, patients operated laparoscopically for groin hernia with a transabdominal preperitoneal (TAPP) procedure with fibrin sealant or tacks for mesh fixation were sent a questionnaire regarding sexual dysfunction. Sexually active patients without recurrence were evaluated in this study. Results: Pain during sexual activity was present in 115 of 1019 (11.3 %) males and 17 of 147 (11.6 %) females. There was no difference between fibrin sealant and tacks for mesh fixation and no difference between genders. Pain intensity, characteristics and origin were comparable between fibrin sealant and tacks for both genders. We found a relationship between a higher rate of sexual dysfunction and lower age for both genders. Conclusion: We found no difference between fibrin sealant and tacks in pain during sexual activity or intensity of pain. However, younger age may be a risk factor for pain during sexual activity. Considering the high rate of postoperative

sexual dysfunction, it is important to include this topic in the preoperative patient information.

Self-gripping mesh versus fibrin glue fixation in laparoscopic inguinal hernia repair: A randomized prospective clinical trial in young and elderly patients.

Authors: Ferrarese A., Bindi M., Rivelli M., Solej M., Enrico S., Martino V.

Publication Date: 2016

PMID: 613771814

Abstract

Laparoscopic transabdominal preperitoneal inguinal hernia repair is a safe and effective technique. In this study we tested the hypothesis that self-gripping mesh used with the laparoscopic approach is comparable to polypropylene mesh in terms of perioperative complications, against a lower overall cost of the procedure. We carried out a prospective randomized trial comparing a group of 30 patients who underwent laparoscopic inguinal hernia repair with self-gripping mesh versus a group of 30 patients who received polypropylene mesh with fibrin glue fixation. There were no statistically significant differences between the two groups with regard to intraoperative variables, early or late intraoperative complications, chronic pain or recurrence. Self-gripping mesh in transabdominal hernia repair was found to be a valid alternative to polypropylene mesh in terms of complications, recurrence and postoperative pain. The cost analysis and comparability of outcomes support the preferential use of self-gripping mesh. Copyright © 2016 Alessia Ferrarese et al. published by De Gruyter Open.

Liquid antiadhesive agents for intraperitoneal hernia repair procedures: Artiss compared to CoSeal and Adept in an IPOM rat model.

Authors: Gruber-Blum S., Fortelny R.H., Keibl C., Brand J., Lechner M., Redl H., Petter-Puchner A.H.

Publication Date: 2016

PMID: 612999062

Abstract

Background: Adhesion formation remains an important issue in hernia surgery. Liquid agents were developed for easy and versatile application, especially in laparoscopy. The aim of this study was to compare the antiadhesive effect of fibrin sealant (FS, Artiss), Icodextrin (ID, Adept) and Polyethylene glycol (PEG, CoSeal) alone and in combination and to evaluate the resulting effect on tissue integration of the mesh. Methods: A total of 56 Sprague-Dawley rats were operated in open IPOM technique. A

middleweight polypropylene mesh of 2 x 2 cm size was implanted and covered with 1: FS, 2: ID, 3: PEG, 4: FS + ID, 5: FS + PEG, 6: PEG + ID, 7: control group, uncovered mesh (n = 8 per treatment/control). Observation period was 30 days. Macroscopic and histological evaluation was performed. Results: Severe adhesions were found in group 2 (ID), group 6 (PEG + ID) and the controls. Best results were achieved with FS alone or FS + ID. Mesh integration in the treatment groups was reduced in comparison with the control group. This is a new finding possibly relevant for the outcome of intraperitoneal mesh repair. Group 6 (PEG + ID) showed an impairment of tissue integration with <50 % of the mesh surface in seven samples. Conclusion: FS alone and in combination with ID yielded excellent adhesion prevention. ID alone did not show significant adhesion prevention after 30 days. Tissue integration of FS-covered meshes was superior to ID or PEG alone or combined. PEG did show adhesion prevention comparable to FS but evoked impaired tissue integration. So Artiss is among the most potent antiadhesive agents in IPOM repair.

Erratum to: Randomized clinical trial of fibrin glue versus tacked fixation in laparoscopic groin hernia repair.

Authors: Tolver M.A., Rosenberg J., Juul P., Bisgaard T.

Publication Date: 2013

PMID: 52634181

Abstract

Not Available

Reply.

Authors: Bun A.Y., Wai E.K.

Publication Date: 2015

PMID: 600661943

Abstract

Not Available

Randomized double-blinded prospective trial of fibrin sealant spray versus mechanical stapling in laparoscopic TEP hernioplasty.

Authors: Berney C.R.

Publication Date: 2015

PMID: 600661413

Abstract

Not Available

First recorded use of hernia mesh fixation solely with fibrin glue.

Authors: Novik B.

Publication Date: 2015

PMID: 604759909

Abstract

Not Available

TAPP hernia repair with 3D mesh and fibrin-glue.

Authors: Popa D.E., Ilco A., Belega A., Vasile D.

Publication Date: 2015

PMID: 71873250

Abstract

Background: since the introduction of TAPP technique for laparoscopic hernia repair, there is a continuous concern about meshes that are easy to be applied and also decrease the incidence of reoccurrence. Fibrin-glue is proved to decrease postoperative chronic pain syndrome that can appear secondary to tacks, even the resorbable ones. Aims: to investigate the benefits of 3D mesh (both from the surgical technique point of view and reoccurrences) and fibrin-glue as fixation tool. Material and Method: we present the first part of a prospective ongoing study, started in 2012, containing 34 patients Results: out of the 34 operations, three were performed in emergency conditions, for incarcerated hernias. Bowel movements started after an average of 1,14 days (for gases) and 2,57 days for stool. GIQLI score (Gastro Intestinal Quality of Life Index) had a median value of 11,42 reported at a maximum value of 144. Duration of the operation was between 55-130 min with a median value of 85 min. Conclusion: anatomically shaped mesh allows an easier application making the surgical technique more facil. Fibrin glue, applied with its laparoscopic special device doesn't seem to be at the origin of any postoperative chronic pain.

Laparoscopic transabdominal inguinal hernia repair: A randomized study of fibrin sealant versus absorbable tack to fix the mesh.

Authors: Agresta F., Tordin C.

Publication Date: 2015

PMID: 71872394

Abstract

Laparoscopic TAPP approach for Inguinal hernia repair is well documented as an excellent choice in numerous studies, with the fibrin glue as the widely used way to fix the mesh. In this report we evaluate a randomized study of 80 of patients operated on with a trans abdominal (TAPP) laparoscopic bilateral inguinal repair focusing on the methods used to fix the mesh and the peritoneal flap: fibrin glue plus absorbable suture versus absorbable stapler. Materials and Methods: Between July 2012 and March 2013, a total of 80 consecutive patients, at 'Civil Hospital' in Adria (RO), underwent Trans- abdominal laparoscopic inguinal hernia repair. In half of them (group A) the mesh and the peritoneal flap were fixed and closed with an absorbable stapler, in the other half (group B) the fibrin glue were used to fix the mesh and the peritoneum was closed with an absorbable suture. Results: The mean operative time was 33.40 (+/-10.3) in the group A and 43.50 (+/-13.2) in the group B ($p<0.005$). All the procedures were done on a Day Surgery basis. In both group there were no conversions to open repair or deaths in both our series. The mean follow-up is 10.5 months. No patients reported severe pain at 10 days at a 3 months follow up. There were no reports of night pain at 30 days. About 90 % of the patients had a return to physical-work capacity within two weeks, the remaining within 30 days maximum. All patients' were completely satisfied at the 3-month follow up. Conclusions: The analysis of the short post-operative outcomes of our experience enabled us to conclude that using an absorbable stapler to fix the mesh and close the peritoneum might be an alternative to glue fixation during a TAPP procedure, taking into account that in experienced hands it allows to spare operative time. It should be incorporated into the surgeon's armamentarium when approaching laparoscopically an inguinal hernia.

Fibrin sealant to assist in umbilical reduction following laparoscopic umbilical hernia repair.

Authors: Ryan D., Daoud I.M.

Publication Date: 2015

PMID: 71871982

Abstract

Objective: Laparoscopic repair of an umbilical hernia provides a quality repair with demonstrated benefits. Patients on occasion are dissatisfied however with the immediate post operative results as the umbilicus is still protruding as a result of a seroma or skin laxity. This is not a problem for an open

repair as one has the ability to suture the umbilical stalk to the fascia or underlying mesh. This is not feasible using laparoscopy. We propose an undescribed method of securing the umbilical skin to the fascia or underlying tissue with use of a fibrin sealant. Description of Methods: In three patients who have undergone standard laparoscopic umbilical hernia repairs we have reduced the umbilical stalk to the underlying fascia or mesh with help of a fibrin sealant. After placement to the mesh and removal of the ports an 11 blade is used to make a small opening in the flaccid umbilical skin. Through the opening four milliliters of a fibrin sealant are injected using a needle tip into the subcutaneous tissue surrounding the umbilicus. The umbilicus is then reduced and packed with gauze. A sterile, nonpermeable dressing is applied. A small needle is then injected into the umbilicus and the air aspirated creating a firm pressure dressing at the umbilicus. This dressing is left in place until the first post operative visit. Preliminary Results: The three patients we have applied this technique to have been pleased with the cosmetic results and none have developed post operative seromas. Conclusions/Expectations: Although the number of patients is small we have seen impressive cosmetic results in the immediate post operative period. We expect that the further use of the technique will continue to show good cosmetic outcomes. In addition, given the obliteration of a potential space with the reduction of the umbilicus we anticipate that patients will have fewer and smaller seromas in the post operative period.

The impact of mesh fixation with a collagen-fibrin sealant in a murine ventral hernia model.

Authors: Chen Y., Eraker-Aasland Hansen K., Spasojevic M., Naesgaard J.-M., Ignjatovic D.

Publication Date: 2014

PMID: 372762496

Abstract

INTRODUCTION: Pain and adhesions represent the challenge in hernia surgery. AIM: To investigate mesh fixation and adhesion prevention with a collagen-fibrin sealant. MATERIALS AND METHODS: Twenty-seven male Sprague-Dawley rats were operated twice, to create and repair 2 ventral hernias. Mesh fixation was with collagen-fibrin sealant on 1 side (group I), whereas an additional peritoneal suture was added in group II. On day 60 animals were killed and mesh migration, integration and number, grade and location of adhesions noted. RESULTS: Migration occurred in 12 (44.4%) in group 1 and 3 (11.1%) in group 2, P=0.023. Adhesions developed to 18 (33.3%) meshes. There was no difference in adhesion grade or area for mesh center or edge between the groups (P=0.735 and P=0.829, respectively). Median adhesion grade for mesh center was 1 and edge 3 (range, 0 to 4), P=0.005 and P=0.001, respectively. Granuloma formation was noted in 8 (18.6%) animals; only with suture-fixed mesh. CONCLUSIONS: Mesh fixation with fibrin sealant is not satisfactory, however, adhesion prevention seems to be; adhesions to the edge of the mesh are most severe.

Beneficial effects of fibrin glue (Quixil) versus Lichtenstein conventional technique in inguinal hernia repair: A randomized clinical trial.

Authors: Bracale U., Rovani M., Picardo A., Merola G., Pignata G., Sodo M., Di Salvo E., Ratto E.L., Noceti A., Melillo P., Pecchia L.

Publication Date: 2014

PMID: 52316928

Abstract

Introduction: In inguinal hernia repair, many complications are due to mesh fixation technique. Therefore, new types of atraumatic methods of fixation have been proposed. In this article, we present the results of a prospective multicentric parallel randomized controlled trial aiming to compare two mesh fixation techniques: fibrin sealant (QUIXIL, Omrix Biopharmaceuticals S.A., Belgium) and Lichtenstein technique. Method: Adult patients with primary uncomplicated inguinal hernia were randomized in two groups: fibrin sealant group (FSG) and Lichtenstein group (LTG). The two groups underwent a follow-up of 15 months. Operative time is the primary outcome. Intraoperative and postoperative outcomes were analyzed. Moreover, a differential cost analysis was performed. Patients and evaluators (with exception of the surgeon who treated the patient) were blinded. Results: A total of 102 patients, 50 in FSG and 52 in LTG, were enrolled from January 2009 to June 2010, and two patients were lost to follow-up at the twelfth month. No significant differences in baseline and clinical characteristics were observed in the two groups. Operative time was longer in LTG (median/ interquartile range: 35 min/30-42.5 min vs. 31 min/28-35 min; effect size: 0.65/95 % CI 0.50-0.91; $p < 0.05$). No differences in intraoperative complications were observed. No significant differences were observed in early complication rate (RR = 0.62; $p > 0.05$). Numbness rate was lower in the FSG at 1 week (RR = 0.43; $p < 0.01$) and at 1 month (RR = 0.17; $p < 0.05$). No significant differences were observed after 6 months. Postoperative pain was lower in the FSG at 1 week (0/0-1 vs. 1/0-2; $p < 0.05$) and at 1 month (0/0-0 vs. 0/0-1; $p < 0.05$). Pain disappeared in all patients after 6 months. Analgesic assumption rate was lower in the FSG (RR = 0.42; $p < 0.05$). Twenty per cent of FSG and 9.62 % of LTG patients were discharged within 12 h; 78 % of FSG and 90.38 % of LTG patients were discharged within 24 h. The only one recurrence we observed was in FSG group. About costs, although fibrin sealant needed for one mesh fixation is about 10 times more costly than the needed sutures, the total costs of the two procedures did not change significantly. This was mainly due to reduction in operative time. Conclusions: The use of fibrin sealant determined a significant reduction in short-term numbness rate and postoperative pain. There was no relevant difference in total costs per patient between the two procedures.

Fibrin glue versus stapler fixation in laparoscopic transabdominal inguinal hernia repair: A single center 5-year experience and analysis of the results in the elderly.

Authors: Ferrarese A., Marola S., Surace A., Borello A., Bindi M., Cumbo J., Solej M., Enrico S., Nano M., Martino V.

Publication Date: 2014

PMID: 600204959

Abstract

Introduction: Inguinal hernia surgery is one of the most common surgical procedures performed worldwide. Some studies demonstrated clear advantages of laparoscopic approach in terms of chronic pain, recurrence rate and daily life activities Aim of this study was to compare short and long-terms outcome of tacks and fibrin glue used during laparoscopic transabdominal hernioplasty (TAPP). Methods: This is a retrospective study conducted by our division of General Surgery. From May 2008 to May 2013 we performed 116 hernioplasty with TAPP technique. We compared two groups of patients: a group of 59 patients treated with fibrin glue and a group of 57 patients treated with conventional tacks and the two subgroups of patients over 65 years old. We evaluated: perioperative outcomes, early and late complications. Results: There were no significative difference about length of postoperative stay, time to return to work, recurrence rate and complications. Discussion: This study demonstrates that fibrin glue are same tolerated than tacks by patients and that the glues lead to the same good results during initial follow-up and in long term data also in the elderly. Meticulous preparation of the groin with preservation of spermatic sheet is in our opinion necessary to provide effective pain reduction and a good result in every TAPP procedure. Copyright © 2014 Surgical Associates Ltd.

Laparoscopic fundoplicatio in a case of big hiatal hernia and partial upside down stomach with the use of a resorbable mesh and fibrin glue fixation.

Authors: Fink M.J., Tentschert G., Klaus A.

Publication Date: 2014

PMID: 71479065

Abstract

Introduction: The use of mesh and its fixation in the repair of a big hiatal hernia, especially combined with a transthoracal transposition oft he stomach is in controversial discussion at currant. Method: A 75 years old female patient with a big hiatal hernia and a partial upside down stomach is receiving a laparoscopic fundoplication. To avoid a recurrence, a resorbable synthetic mesh is implanted during the procedure. To lower the rate of complications, the mesh is fixated with fibrin glue only. No staples are used. The operation is video filmed. Results: The video shows the laparoscopic operation of a big hiatal hernia with a partial upside down stomach with the implantation of a resorbable synthetic mesh, fixated only with fibrin glue. Summary: It seems that the use of synthetic resorbable mesh and the fixation with fibrin glue reduces the rate of recurrence and complications in laparoscopic fundoplication in big hiatal hernias.

Laparoscopic paraesophageal hernia repair using a 'U' shaped bioabsorbable mesh with fibrin glue fixation for crural closure reinforcement.

Authors: Koch O.O., Kohler G., Luketina R.R., Rohregger K., Spaun G., Emmanuell K.

Publication Date: 2014

PMID: 71478885

Abstract

Aims: Recurrence of hiatal hernia is frequent after laparoscopic repair. The use of mesh for hiatoplasty has shown to reduce the rate of recurrence, however complications related to mesh have been reported too. GORE BIO-A Tissue reinforcement could be an alternative material to buttress the hiatal closure without the risk of artificial mesh related complications. Methods: Two patients underwent laparoscopic paraesophageal hiatal hernia repair with Nissen fundoplication using a synthetic bioabsorbable mesh. The mesh is composed of a porous, 3-dimensional web of polglycolide and trimethylene carbonate (GORE BioA Tissue Reinforcement). Fibrin glue (TisseelTM) was applied over the suture closure of the crura, then the "U" shaped mesh was placed over the glue and held in place for a few seconds, and then more fibrin glue was placed over the mesh. After hiatoplasty both patients received a Nissen fundoplication. Results: The mesh was easily placed through a 10-mm trocar. Fixation of the prosthetic using fibrin glue could be done readily and fixation was almost immediately. Peri- and postoperative period was without complications. Three months after surgery gastroscopy showed and intact wrap and no recurrence of hiatal hernia. Conclusion: Crural closure reinforcement without any artificial material can be done readily. The device was easy to use and fibrin glue fixation can be done quickly. This type of prosthetic and fixation technique may provide the necessary reinforcement of the hiatal closure without the risk of erosion.

Biomechanical properties of (semi-) synthetic glues for mesh fixation in endoscopic inguinal hernia repair.

Authors: Schug-Pass C., Jacob D.A., Rittinghausen J., Lippert H., Kockerling F.

Publication Date: 2013

PMID: 52256042

Abstract

Purpose: In endoscopic inguinal hernia repair, the use of fibrin glues for mesh fixation instead of staples and sutures can demonstrably reduce postoperative morbidity without increasing the recurrence rate. Various fibrin glues differ in terms of their mesh fixation strength. As an alternative to fibrin glue, there is an increasing trend toward using synthetic glues for mesh fixation in both open and endoscopic inguinal hernia surgery. To date, no studies have been conducted comparing the fixation strength of (semi-) synthetic glues with that of fibrin glues. Here, using a biomechanical model, we compared the adhesive strength of two glues (BioGlue and Glubran) used in surgery with a fibrin glue. Methods: We used light-weight polypropylene meshes (TiMesh light). In each case, the biomechanical stability of five meshes in each group was tested with 2 ml fibrin glue (Evicel), 2 ml BioGlue or 2 ml Glubran (cyanoacrylate). The defect in the muscle tissue used was 4.5 cm in diameter for a mesh size of 10 x 15 cm. Measurements were taken using a standardized stamp penetration test while aiming not to remain under a minimum fixation strength of 32 N. Results: Using Evicel for mesh fixation, an adhesive strength of 64.3 N was achieved. This was significantly greater than that obtained in the absence of fixation (2.9 N, $p < 0.001$) and higher than the requisite value of 32 N. Using Glubran, it was possible

once again to significantly improve the adhesive strength (105.4 N, p = 0.008). The use of BioGlue improved the adhesive strength to 131.7 N, but not significantly so compared with Glubran (p = 0.110). Conclusions: In terms of adhesive strength, (semi-) synthetic glues can be used for mesh fixation instead of fibrin glue and even achieve significantly better adhesive strength than fibrin glue. However, further clinical studies are needed to identify the role of (semi-) synthetic glues compared with fibrin glues in endoscopic inguinal hernia surgery.

A technique for placement of a bioabsorbable prosthesis with fibrin glue fixation for reinforcement of the crural closure during hiatal hernia repair.

Authors: Powell B.S., Wandrey D., Voeller G.R.

Publication Date: 2013

PMID: 52007859

Abstract

Introduction Level 1 data suggest that mesh reinforcement of the crural closure for hiatal hernia repair decreases the recurrence of hernia. The fear of erosion of the prosthetic into the esophagus has kept the use of mesh for hiatal hernia repair from becoming routine. A recent study found several cases of esophageal stenosis/erosion from the use of a biologic mesh. For these reasons, we evaluated a new resorptive prosthetic and new method of fixation of the prosthetic for crural reinforcement during hiatal hernia repair. Methods From February 2009 until December 2010, 70 patients underwent hiatal hernia repair using a synthetic bioabsorbable prosthetic made of polglycolide and teimethylene carbonate (Gore BioA Tissue ReinforcementTM, Flagstaff, AZ). There were 48 patients with paraesophageal hiatal hernias and 22 with large sliding hiatal hernias. In this study, a square piece of mesh just the size to cover the crural closure only was utilized. Fibrin glue (TisseelTM) was applied over the suture closure of the crura, the mesh was then placed over the glue and held in place for several seconds, and then more fibrin glue was applied on top of the mesh. Results The new bioabsorbable polymer mesh was readily placed through a 10-mm trocar, had good handling characteristics laparoscopically, and no pre-operative preparation was required of the prosthetic. The material and the fibrin glue created a very substantial reinforcement of the crural closure, and the average time to place and fix the mesh was approximately 5 min. There were no shortterm complications from the mesh, and no patient has had any significant post-operative sequelae. Conclusion Crural closure reinforcement during hiatal hernia repair can be done readily with this new bioabsorbable polymer-based mesh. Fibrin glue fixation of this new prosthetic can be done quickly and it creates a strong, fixed barrier that may decrease the chance of erosion. Further studies will need to be done to evaluate long-term efficacy and complications associated with its use.

Lower reoperation rates with the use of fibrin sealant versus tacks for mesh fixation.

Authors: Helvind N.M., Andresen K., Rosenberg J.

Publication Date: 2013

PMID: 52608216

Abstract

Background Groin hernia repair may be associated with long-term complications such as chronic pain, believed to result from damage to regional nerves by tissue penetrating mesh fixation. Studies have shown that mesh fixation with fibrin sealant reduces the risk of these long-term complications, but data on recurrence and reoperation rates after the use of fibrin sealant compared with tacks are not available. This study aimed to determine whether fibrin sealant is a safe and feasible alternative to tacks with regard to reoperation rates after laparoscopic groin hernia repair. Methods The current study compared reoperation rates after laparoscopic groin hernia repair between fibrin sealant and tacks used for mesh fixation. The study used data collected prospectively from The National Danish Hernia Database and analyzed 8, 314 laparoscopic groin hernia repairs for reoperation rates. Mesh fixation was performed with fibrin sealant (n = 784) or tacks (n = 7, 530). Results The findings showed a significantly lower reoperation rate for the fibrin sealant than for the tacks (0.89 vs 2.94 %, p = 0.031). The median follow-up period was 17 months (range, 0-44 months) for the fibrin sealant group and 21 months (range, 0-44 months) for the tacks group. Conclusions Fibrin sealant was superior to tacks for mesh fixation in laparoscopic groin hernia repair with regard to reoperation rates. The study could not differentiate between different hernia defect sizes, and future studies should therefore explore whether the superior effect of fibrin sealant applies for all hernia types and sizes.

Comparison of self-gripping mesh with mesh fixation with fibrin-glue in laparoscopic hernia repair (TAPP).

Authors: Cambal M., Zonca P., Hrbaty B.

Publication Date: 2012

PMID: 364873045

Abstract

Comparison of self-gripping mesh with fibrin-glue mesh fixation for laparoscopic hernia repair using TAPP technique. The trial has a prospective randomized design. The primary end-point was the evaluation of pain at 2 days, 1 month, and 3 months after surgery. The pain occurring 3 months after the surgery was considered as chronic pain. We have compared a group of 50 patients with self-gripping mesh with a group of 50 patients with fibrin glue mesh fixation using TAPP technique. There was no statistical difference between the basic group parameters (sex distribution, average age). There was no significant difference between the groups in terms of postoperative pain 1 month and 3 months after the surgery (p>0.05). There was no patient with chronic pain at 3-month follow-up in our trial. The mean operation time was 44 minutes in the group with self-gripping mesh and 48.5 minutes in the group with fibrin glue mesh fixation. There was a significant difference between both groups (p=0.006) Both fixation methods appear to be a well-tolerated alternative to classical methods for mesh fixation with clips. According to our trial there is no difference in the postoperative pain incidence in self-gripping mesh and fibrin glue mesh fixation groups for laparoscopic hernia repair. Our data has showed that self-gripping mesh represents a tendency to a faster technique in comparison with fibrin-glue fixation. Both techniques are easy-to-use. There is no superior technique according to our

trial (Tab. 2, Fig. 2, Ref. 23).

Staple versus fibrin glue fixation in laparoscopic total extraperitoneal repair of inguinal hernia: A systematic review and meta-analysis.

Authors: Kaul A., Hutfless S., Le H., Hamed S.A., Tymitz K., Nguyen H., Marohn M.R.

Publication Date: 2012

PMID: 51872331

Abstract

Background Fixation of mesh is typically performed to minimize risk of recurrence in laparoscopic inguinal hernia repair. Mesh fixation with staples has been implicated as a cause of chronic inguinal pain. Our study aim is to compare mesh fixation using a fibrin sealant versus staple fixation in laparoscopic inguinal hernia and compare outcomes for hernia recurrence and chronic inguinal pain. Methods and procedures PubMed was searched through December 2010 by use of specific search terms. Inclusion criteria were laparoscopic total extraperitoneal repair inguinal hernia repair, and comparison of both mesh fibrin glue fixation and mesh staple fixation. Primary outcomes were inguinal hernia recurrence and chronic inguinal pain. Secondary outcomes were operative time, seroma formation, hospital stay, and time to return to normal activity. Pooled odds ratios (OR) were calculated assuming randomeffects models. Results Four studies were included in the review. A total of 662 repairs were included, of which 394 were mesh fixed by staples or tacks, versus 268 with mesh fixed by fibrin glue. There was no difference in inguinal hernia recurrence with fixation of mesh by staples/tacks versus fibrin glue [OR 2.13; 95% confidence interval (CI) 0.60-7.63]. Chronic inguinal pain (at 3 months) incidence was significantly higher with staple/tack fixation (OR 3.25; 95% CI 1.62-6.49). There was no significant difference in operative time, seroma formation, hospital stay, or time to return to normal activities. Conclusions The meta-analysis does not show an advantage of staple fixation of mesh over fibrin glue fixation in laparoscopic total extraperitoneal inguinal hernia repair. Because fibrin glue mesh fixation with laparoscopic inguinal hernia repair achieves similar hernia recurrence rates compared with staple/tack fixation, but decreased incidence of chronic inguinal pain, it may be the preferred technique.

Sutureless hernioplasty with light-weight mesh and Wbrin glue versus Lichtenstein procedure: A comparison of outcomes focusing on chronic postoperative pain.

Authors: Lionetti R., Neola B., Dilillo S., Bruzzese D., Ferulano G.P.

Publication Date: 2012

PMID: 51568279

Abstract

Purpose Groin hernia is one of the most common disease requiring surgical intervention (8-10% of the male population). Nowadays, the application of prosthetic materials (mesh) is the technique most widely used in hernia repair. Although they are simple and rapid to perform, and lower the risk of recurrence, these techniques may lead to complications. The aim of the present study is to assess the incidence and degree of chronic pain, as well as the impairment in daily life, in two procedures: (1) the "Lichtenstein technique" with polypropylene mesh Wxed with non-absorbable suture, and (2) the "sutureless" technique carried out by using a partially absorbable mesh (light-weight mesh) fastened with Wbrin glue. Methods This was a study conducted over a period of 3 years from July 2006 to July 2009. A total of 148 consecutive male patients suVering from groin hernia were divided randomly into two groups: (1) Group A: patients operated with "sutureless" technique with partially absorbable mesh and plug fastened with 1 ml haemostatic ealant; (2) Group B: patients operated with Lichtenstein technique using non-absorbable mesh and plug anchored with polypropylene suture. Follow-up took place after 7 days, and 1, 6 and 12 months and consisted of examining and questioning patients about chronic pain as well as the amount of time required to return to their normal daily activities. Results No major complications or mortality were observed in either group. In group A there was a faster return to work and daily life activities. Six patients (7.8%) in group B suVered from chronic pain, whereas no patient in group A demonstrated this feature. Conclusions Our experience shows that the combined use of light-weight mesh and Wbrin glue gives signiWcantly better results in terms of postoperative pain and return to daily life.

Comments about the article "open tension-free Lichtenstein repair of inguinal hernia: Use of fibrin glue versus sutures for mesh fixation" by Negro et al.

Authors: Tripoloni D.E., Schierano M.C.

Publication Date: 2012

PMID: 51749637

Abstract

Not Available

Lichtenstein repair of inguinal hernia: Fibrin glue or suture for mesh fixation?.

Authors: Negro P., D'Amore L., Gossetti F.

Publication Date: 2012

PMID: 51737661

Abstract

Not Available

Effects of mesh fixation with collagen-fibrin sealant in a rat ventral hernia model.

Authors: Spasojevic M., Gronvold B. L., Aasland K., Chen Y., Naesgaard J.M., Ignjatovic D.

Publication Date: 2012

PMID: 71482879

Abstract

Introduction: Chronic pain after hernia surgery has lead to research into new possibilities for MESH fixation. Aim: To determine if a collagen-fibrin sealant (Tachosil) provides adequate mesh fixation and prevents adhesions. Method: Sprague Dawley rats were operated 2 times in isofluran anaesthesia. Act one to create 2 ventralhernia (10 mm). Partial abdominal wall excision was made through both rectus muscles. Act two, 2 weeks after was hernia repair with 2x2 cm prolene MESH (Parietene). Fixation was with Tachosil (group 1) while a peritoneal suture was added to the Tachosil on the other side (group2). Eight weeks after hernia repair the rats were sacrificed and MESH migration, adhesion grades, surface and severity scores were registered, both for MESH surface and edges. Results: 31 rats were operated. Four rats were euthanized due to wound dehiscence. The average weight at operations was 526.9 g and 542.6 g, respectively. Adhesions to the net were noted in 18(33.3%) of 54 operations. MESH migration was 37% (group 1) vs. 11% (group 2), p = 0.023. There was no difference in adhesion grade or surface for MESH center or edge adhesions between groups p = 0.993 and p = 0.935, p = 0.22 respectively. Mean adhesion severity score for both groups was 5.7 (1-16). Total adhesion grade was 2.9 +/- 1.2, for center of MESH 2.8 +/- 1.3 and edge3.1 +/- 1.1 (p = 0.013). Conclusion: MESH fixation with Tachosil does not effectively prevent mesh migration, but serves as a good shield for adhesion formation. Modelling of the MESH produces more severe adhesions on the edge.

Laparoscopic fixation of biologic mesh at the hiatus with fibrin or polyethylene glycol sealant in a porcine model.

Authors: Jenkins E.D., Lerdsirisopon S., Costello K.P., Melman L., Greco S.C., Frisella M.M., Matthews B.D., Deeken C.R.

Publication Date: 2011

PMID: 51432507

Abstract

Background The objective of this study was to determine the acute and chronic fixation strengths achieved by fibrin or polyethylene glycol (PEG) sealants to secure biologic mesh at the esophageal hiatus in a porcine model. Methods For this study, 32 female domestic pigs were divided into four

groups of 8 each. The four groups respectively received acute fibrin sealant, acute PEG sealant, chronic fibrin sealant, and chronic PEG sealant. Laparoscopically, a 5.5 x 8.5-cm piece of Biodesign Surgisis Hiatal Hernia Graft (porcine small intestine submucosa) was oriented with the U-shaped cutout around the gastroesophageal junction and the short axis in the craniocaudal direction to simulate hiatal reinforcement with a biologic mesh. The mesh then was secured with 2 ml of either fibrin sealant or PEG sealant. The pigs in the acute groups were maintained alive for 2 h to allow for complete polymerization of the sealants, and the pigs in the chronic group were maintained alive for 14 days. After the pigs were euthanized, specimens of the mesh-tissue interface were subjected to lap shear testing to determine fixation strength, and hematoxylin and eosin (H&E;) stained slides were evaluated for evidence of remodeling. Results No significant differences were observed between the acute and chronic fixation strengths or the remodeling characteristics of the two sealants. However, fixation strength increased significantly over time for both types of sealant. Evidence of remodeling also was significantly more pronounced in the chronic specimens than in the acute specimens. Conclusions This study demonstrated the feasibility of using fibrin or PEG sealants to secure biologic mesh at the hiatus in a porcine model.

Fibrin glue for intraperitoneal laparoscopic mesh fixation: A comparative study in a swine model.

Authors: Clarke T., Katkhouda N., Mason R.J., Cheng B.C., Algra J., Olasky J., Sohn H.J., Moazzez A., Balouch M.

Publication Date: 2011

PMID: 51017265

Abstract

Background: The classic method of mesh fixation in laparoscopic ventral hernia repair is transfascial sutures with tacks. This method has been associated with low recurrence rates, but yields significant morbidity from pain and bleeding. Fibrin glue has been used successfully in inguinal hernia repair with decreased incidence of chronic pain without an increase in recurrence rates, but its utility for laparoscopic ventral hernia repair is unknown. Our aim is to evaluate the efficacy of fibrin glue for laparoscopic mesh fixation to the anterior abdominal wall compared with other fixation methods. Methods: Four different laparoscopic mesh fixation methods were randomly assigned to midline positions along the abdominal wall of 12 female pigs and compared: (1) fibrin glue only (GO), (2) transfascial sutures with tacks (ST), (3) fibrin glue with tacks (GT), and (4) tacks only (TO). At 4 weeks post implantation, tensile strength, adhesions, migration, contraction, and buckling/folding were assessed using Kruskal-Wallis one-way analysis by ranks test. Results: There were no significant differences in tensile strength, adhesions or buckling/folding among the four fixation methods. A significant increase in mean migration (3.3 vs. 0.0 mm, p = 0.03) and percentage contraction (28% vs. 14%, p = 0.02) were identified in the GO group when compared with ST (see Table 3). Conclusions: Mesh fixation using fibrin glue has comparable tensile strength and adhesion rate to sutures with tacks in the swine model. Increased contraction and migration rates associated with fibrin glue alone may be an issue and warrants further study. On the other hand, the GT group showed similar biomechanical characteristics to the other groups and may represent a reasonable alternative to the use of transfascial sutures. © 2010 Springer Science+Business Media, LLC.

Comparing chronic pain between fibrin sealant and suture fixation for bilayer polypropylene mesh inguinal hernioplasty: A randomized clinical trial.

Authors: Wong J.-U., Leung T.-H., Huang C.-C., Huang C.-S.

Publication Date: 2011

PMID: 51435384

Abstract

Background The aim of this study was to compare the postoperative pain, complications, and recurrence after bilayer polypropylene mesh inguinal hernioplasty using fibrin sealant versus sutures for fixation. Methods Patients were assigned randomly to either a mesh fixed with suture group (n = 26) or a mesh fixed with fibrin sealant group (n = 30). Postoperative pain was evaluated with a visual analogue scale at days 1 and 7, and the first, third, and sixth month postoperatively. Complications and hernia recurrence were recorded. Results At each time point after surgery, visual analogue scale pain scores in the fibrin sealant group were lower but there was no statistically significant difference. There were no differences in complications or hernia recurrence between the 2 groups. Conclusions Fibrin sealant is associated with similar rates of complications and recurrence as mesh fixation with sutures. There was no statistical difference in pain 6 months postoperatively between the 2 groups.

Mesh fixation in laparoscopic incisional hernia repair: Glue fixation provides attachment strength similar to absorbable tacks but differs substantially in different meshes.

Authors: Rieder E., Stoiber M., Scheikl V., Poglitsch M., Dal Borgo A., Prager G., Schima H.

Publication Date: 2011

PMID: 51129969

Abstract

Background Laparoscopic ventral hernia repair has gained popularity among minimally invasive surgeons. However, mesh fixation remains a matter of discussion. This study was designed to compare noninvasive fibrin-glue attachment with tack fixation of meshes developed primarily for intra-abdominal use. It was hypothesized that particular mesh structures would substantially influence detachment force. Study Design For initial evaluation, specimens of laminated polypropylene/polydioxanone meshes were anchored to porcine abdominal walls by either helical titanium tacks or absorbable tacks in vitro. A universal tensile-testing machine was used to measure tangential detachment forces (TF). For subsequent experiments of glue fixation, polypropylene/polydioxanone mesh and 4 additional

meshes with diverse particular mesh structure, ie, polyvinylidene fluoride/polypropylene mesh, a titanium-coated polypropylene mesh, a polyester mesh bonded with a resorbable collagen, and a macroporous condensed PTFE mesh were evaluated. Results TF tests revealed that fibrin-glue attachment was not substantially different from that achieved with absorbable tacks (median TF 7.8 Newton [N], range 1.3 to 15.8 N), but only when certain open porous meshes (polyvinylidene fluoride/polypropylene mesh: median 6.2 N, range 3.4 to 10.3 N; titanium-coated polypropylene mesh: median 5.2 N, range 2.1 to 11.7 N) were used. Meshes coated by an anti-adhesive barrier (polypropylene/polydioxanone mesh: median 3.1 N, range 1.7 to 5.8 N; polyester mesh bonded with a resorbable collagen: median 1.3 N, range 0.5 to 1.9 N), or the condensed PTFE mesh (median 3.1 N, range 2.1 to 7.0 N) provided a significantly lower TF ($p < 0.01$). Conclusions Fibrin glue appears to be an appealing noninvasive option for mesh fixation in laparoscopic ventral hernia repair, but only if appropriate meshes are used. Glue can also serve as an adjunct to mechanical fixation to reduce the number of invasive tacks.

A comparative biomechanical evaluation of hernia mesh fixation by fibrin sealant.

Authors: Fortelny R.H., Petter-Puchner A.H., Ferguson J., Gruber-Blum S., Brand J., Mika K., Redl H.

Publication Date: 2011

PMID: 51083037

Abstract

Background: The atraumatic fixation of meshes by fibrin sealant (FS) has been established for both open and laparoscopic techniques of hernia repair. This study was performed to evaluate the use of FS in hernia mesh fixation with different polymerization speed (thrombin concentrations), using commercial hernia meshes, and in two techniques, transabdominal preperitoneal mesh placement (TAPP) and intraperitoneal mesh placement (IPOM). Materials and Methods: A median laparotomy was performed in a pig model and hernia meshes were placed in IPOM and TAPP techniques. After mesh fixation with FS using thrombin concentrations of 4 and 500 IU/mL, maximum shear force before failure was measured at 5, 60, and 120 min. Results: At both thrombin concentrations and in all meshes in which the technique was used, the TAPP method tended to show higher maximum force levels at failure than did the IPOM method. In both TAPP and IPOM techniques and in all meshes, the 4 IU/mL thrombin concentration FS was superior to the 500 IU/mL thrombin concentration sealant. Conclusions: Although both thrombin concentrations are suitable for mesh fixation, lower concentrations allow slower polymerization and better sealant diffusion leading to higher maximum force levels at failure. The TAPP method was biomechanically superior to the IPOM method. There were no major differences between mesh products.

Use of fibrin glue in laparoscopic preperitoneal mesh hernioplasty.

Authors: Blaser A.

Publication Date: 2011

PMID: 70471246

Abstract

Aim: The aim of the study was to compare the morbidity of seroma formation and postoperative neuralgias in laparoscopic extraperitoneal repair of inguinal and femoral hernias before and after using human fibrin glue to favour mesh incorporation. Methods: Between end of june 2008 and december 2009 175 hernioplasty procedures using fibrin glue were analysed to assess morbidity due to seroma formation and postoperative neuralgias and compared to a similar group of formerly operated patients. The primary outcomes were seroma formation and early and late postoperative neuralgias recorded using a visual analog scale (VAS). Secondary outcomes included non specific pain. Results:Assessment took place at 10 days, 1 month, 3 months and 1 year with patients completing either a follow-up visit or responding by phone to a questionary.Mean VAS scores were significantly lower in the fibrin glue group at 10 days and 1 month versus the group without fibrin glue. The mean recovery time for normal physical activity was also shorter in the fibrin glue group compared to the group without fibrin glue. Conclusion: This video shows you our 3 trocarts standardised laparoscopic preperitoneal mesh hernioplasty using fibrin glue. Steps, divided in extraperitoneal space access, dissection, groin hernia individualisation and repair, mesh positioning and fibrin glue use, are distinctly shown. We point out the milestones of each step.

A new technique for laparoscopic ventral hernia repair: Double crown with one /third of tackers and fibrin glue.

Authors: Conde S.M., Aguilar L.T., Moreno A.B., Macias M.S., Garcia D.M., Borrero I.S., Gomez J.C., Cadet H., Padillo J.

Publication Date: 2011

PMID: 70470665

Abstract

Aims: The aim of our study is to present the results of a new technique for laparoscopic ventral hernia repair, based on our experimental animal studies, by reducing tackers to one third, of the number usually used during a standard Double Crown Technique, and fibrin glue. The goal was to reduce the two main complications related to spiral tacks: acute and/or chronic pain and potential problems associated with adhesions to them (related to bowel perforation, intestinal occlusion...). Material and Methods: From October 2007 until January 2010, there have been operated 21 cases using this new technique. We analyzed epidemiological (age, sex, BMI...) and surgical data (time, mesh used, hernia defect ...), as well as potential short-medium term complications. Inclusion criteria were primary or secondary ventral hernias located at midline, far from bones, and defects exceeding 3x3 cm and less than 17x12 cm, what involves the use of meshes with size not exceeding 20x30 cm. Results: Our series of patients (n = 21) had a mean age of 53'52 years, with a 57'14% of females. In all cases, PTFE mesh was placed with a mean operating time of 41'11 minutes. No intraoperative complications were detected. The average postoperative stay was 1'62 days. There was just one readmission of 48 hours due to a paralytic ileus as early post-surgical complication. No recurrences have been detected after a median follow up of 12 months (range 1-27 months). Conclusions: Although number of cases and follow up is still low, we believe this technique has yielded promising results. We confirm that is feasible

to reduce the numbers of tackers during the Double Crown technique to one third, what could be related to a reduction of pain. Fibrin glue is necessary to close the gap among the tackers and to protect the bowel from the tackers by covering them, as we have demonstrated in experimental research. It would be important a longer follow-up of our serie and a prospective randomized trial to study the potential reduction of postoperative pain, once we have demonstrated that recurrences do not increase by reducing mechanical fixation.

Current developments in hernia repair; meshes, adhesives, and tacking.

Authors: Powell B.S., Voeller G.R.

Publication Date: 2010

PMID: 360305017

Abstract

Open and laparoscopic hernia surgery continues to evolve with new products allowing surgeons multiple choices in treating their patients. The evolution towards tension-free techniques in dealing with hernias requires that today's surgeons know the options available in meshes as well as fixation methods in order to have the best outcomes. In recent years, there has been a rapid expansion in the number of meshes available. Currently, there are numerous uncoated, coated, and biologic meshes in production that can be used in hernia repair. This paper will focus on the latest developments in coated meshes that allow for intra-abdominal placement as well as the different types of biologic meshes and their typical uses. Tacking devices for laparoscopic hernia repair now come in titanium as well as absorbable devices. AbsorbaTackTM (Covidien, Norwalk, CT) and SorbafixTM (Davol, Warwick, RI) are two of the newest absorbable tacking devices thought to possibly benefit patients with decreased pain and long-term complications as compared with their titanium counterparts. Adhesives continue to be used more and more for hernia repair, especially in inguinal and paraesophageal hernia repairs. TissucolTM/TisseelTM (Baxter, Deerfield, IL) and EvicelTM (Ethicon, Somerville, NJ) are two types of fibrin glues that are available for use in hernia repair. Practitioners using these biologic adhesives think there is less pain compared with tacking.

A single-surgeon randomized trial comparing sutures, N-butyl-2-cyanoacrylate and human fibrin glue for mesh fixation during primary inguinal hernia repair.

Authors: Testini M., Lissidini G., Poli E., Gurrado A., Lardo D., Piccinni G.

Publication Date: 2010

PMID: 358948165

Abstract

BACKGROUND: We sought to determine the efficacy of sutures, human fibrin glue and N-butyl-2-cyanoacrylate for mesh fixation in patients undergoing the plug and mesh procedure for groin hernia. METHODS: A total of 156 patients with 167 inguinal hernias (11 bilateral) underwent a plug and mesh procedure and were randomly assigned to received either sutures (n = 59 hernias), human fibrin glue (n = 52) or N-butyl-2-cyanoacrylate (n = 56) for mesh fixation. RESULTS: The overall morbidity rate was 38.98% in the suture group, 9.62% in the fibrin glue group and 10.71% in the N-butyl-2-cyanoacrylate group (suture v. fibrin glue, $p < 0.001$; suture v. N-butyl-2-cyanoacrylate, $p < 0.001$). There was no significant difference in morbidity between the fibrin glue and N-butyl-2-cyanoacrylate groups. Overall, short-term morbidity was significantly higher in the suture group (27.12%) than in the fibrin glue (9.62%, $p = 0.01$) or N-butyl-2-cyanoacrylate (8.93%, $p = 0.004$) groups, but there was no significant difference between the fibrin glue and N-butyl-2-cyanoacrylate groups. There was no significant difference between the groups in terms of mean postoperative stay (32.6 h in the suture group v. 30.8 h in the fibrin glue group v. 32.0 h in the N-butyl-2-cyanoacrylate group) or mean time to return to work (20.4 d in the suture group v. 20.3 d in the fibrin glue group v. 19.8 d in the N-butyl-2-cyanoacrylate group). Overall, long-term morbidity was significantly higher in the suture group (11.86%) than in the fibrin glue (0%, $p = 0.001$) or N-butyl-2-cyanoacrylate (1.78%, $p = 0.03$) groups. There was no recurrence in any of the groups. Two cases (3.39%) of chronic groin pain were reported in patients in the suture group. A sensation of extraneous body was reported in 5 (8.47%) patients who received sutures and in 1 (1.78%) patient in the N-butyl-2-cyanoacrylate group; there were no reported cases in the fibrin glue group (suture v. fibrin glue, $p = 0.01$; suture v. N-butyl-2-cyanoacrylate, $p = 0.03$; fibrin glue v. N-butyl-2-cyanoacrylate, $p = 0.30$). CONCLUSION: The use of human fibrin glue or N-butyl-2-cyanoacrylate is better tolerated than sutures in tension-free inguinal open repair using the plug and mesh technique in terms of overall immediate results, and there is a better trend in the long-term data.

Sutureless mesh fibrin glue incisional hernia repair.

Authors: Canziani M., Frattini F., Cavalli M., Agrusti S., Somalvico F., Campanelli G.

Publication Date: 2009

PMID: 360294559

Abstract

The aim of this study is to evaluate the usefulness of sutureless incisional open hernia repair with mesh fixation only using a fibrin glue sealant. From 2002 to 2007, 40 patients underwent surgical recurrent incisional hernia repair, consisting of a sutureless positioning of a retromuscolar-preperitoneal polypropylene stiff mesh, fixed only with 2 ml of human fibrin glue. The average hospitalization period was 3 days; postoperative complications occurred in seven patients: wound infection in four patients and hematoma in three patients. Seroma was not observed. Postoperative pain occurred in two patients, while chronic pain occurred in one patient; the remaining 37 patients were pain-free. The use of an open retromuscolar mesh is an easy, inexpensive and relatively safe method to repair large incisional hernias. In our study the use of fibrin glue sealant demonstrated a low incidence of postoperative pain and short hospitalization.

A comparison of a bovine albumin/glutaraldehyde glue versus fibrin sealant for hernia mesh fixation in experimental onlay and IPOM repair in rats.

Authors: Gruber-Blum S., Petter-Puchner A.H., Mika K., Brand J., Redl H., Ohlinger W., Benesch T., Fortelny R.H.

Publication Date: 2010

PMID: 50932965

Abstract

Background: Research in hernia repair has targeted new atraumatic mesh fixation to reduce major complications such as chronic pain and adhesion formation. The efficacy and safety of two surgical adhesives, viz. Artiss (FS, fibrin sealant containing 4 IU thrombin) and Bioglue (AGG, bovine serum albumin/glutaraldehyde glue), were evaluated in this study. Primary study endpoints were tissue integration, dislocation, and adhesion formation. Foreign-body reaction formed the secondary study endpoint. Methods: Twenty-four polypropylene meshes (VM, Vitamesh) were randomized to four groups (n = 6): two groups of onlay hernia repair (two meshes per animal) with mesh fixation by FS (O-FS) or by AGG (O-AGG), and two groups of IPOM repair (one mesh per animal) with mesh fixation by four sutures and FS (I-FS) or AGG (I-AGG). Eighteen rats underwent surgery. Follow-up was 30 days. Tissue integration, dislocation, seroma formation, inflammation, adhesion formation, and foreign-body reaction were assessed. Results: Meshes fixed with FS (O-FS, I-FS) showed good tissue integration. No dislocation, seroma formation, or macroscopic signs of inflammation were detectable. Adhesion formation of I-FS was significantly milder compared with I-AGG (P = 0.024). A moderate foreign-body reaction without active inflammation was seen histologically in O-FS and I-FS groups. Samples fixed with AGG (O-AGG, I-AGG) showed extensive scar formation. No dislocation and no seroma formation were observed. All of these samples showed moderate to severe signs of inflammation with abscess formation in the six meshes of O-AGG. Histology underlined these findings. Conclusions: The fibrin sealant adhesive showed very good overall results of the primary and secondary outcome parameters. FS is a recommendable atraumatic fixation tool for the surgical onlay technique. AGG provides high adhesive strength, but shows low biocompatibility. Persisting active inflammation was seen in both the O-AGG and I-AGG groups, not favoring its use for these indications.

Subcutaneous talc and fibrin glue decrease post-operative wound complications after massive open ventral hernia repair with panniculectomy.

Authors: Brintzenhoff R.A., Prabhu A., Getz S., Norton H., Lincourt A., Kercher K., Heniford B.

Publication Date: 2010

PMID: 71483693

Abstract

Introduction: The most common complications of open ventral hernia repair with concomitant abdominal wall reconstruction/panniculectomy (OVHR/AWR) involve wound problems and range from seroma formation to cellulitis/infection to wound breakdown. Following simple open ventral hernia repair, these complications occur in 12-20% and increase to 17-34% when combined with panniculectomy or abdominoplasty. Multiple techniques have been suggested for preventing seroma formation which can lead to more serious wound complications. This study evaluates a novel technique of applying talc and fibrin glue in the large subcutaneous flaps to prevent seroma formation. Methods: A prospectively collected surgical outcomes database was accessed to identify all patients undergoing OVHR/AWR at a single institution from 1999-2009. Patients were divided into two groups based on subcutaneous application of talc and fibrin glue: those that did not receive talc and fibrin glue therapy (PRE) and those that did receive talc and fibrin glue therapy (POST). Demographics, perioperative data, and outcomes were analyzed using standard statistical methods. Results: We identified 106 patients in the PRE group and 25 patients in the POST group. In the PRE group, mean age was 53.7 years (range 24-76), mean BMI was 36.93 (range 22-62) mean ASA was 2.48, mean hernia defect size was 208 cm2 (range 6-1225), mean number of previous hernia repairs was 2.32 (range 0-16), mean LOS was 7.8 days (range 2-46), and mean follow-up was 5.34 months. In the POST group, mean age was 54.6 years (range 32-73), mean BMI was 36.2 (range 21-59), mean ASA was 2.33 mean hernia defect size was 302.3 cm2 (range 7.5-875), mean number of previous hernia repairs was 1.36 (range 0-6), mean LOS was 9.1 days (range 4-29), and mean follow-up was 2.0 months. Of these variables the only one that was statistically different was hernia defect size ($p = 0.0098$). Rate of total wound complications for the PRE and POST groups were 0.64 and 0.28 respectively ($p = 0.083$). For the PRE group, oral antibiotics were prescribed in 25.5%, intravenous antibiotics or drainage of wound infection occurred in 11.3%, seroma intervention occurred in 16%, and wound breakdown occurred in 11.3%. For the POST group, oral antibiotics were used in 8%, intravenous antibiotics or drainage of wound infection occurred in 8%, seroma intervention occurred in 8%, and wound breakdown occurred in 4%. Discussion: In an attempt to decrease wound complications after massive OVHR/AWR, we have begun to treat the large subcutaneous flaps created for the panniculectomy with talc and fibrin glue. (Figure Presented) We found a decreased percentage of wound complications in all categories in the patients that received talc and fibrin glue therapy and a nearly significant reduction in complication risk when considering all wound problems; this is despite the POST group having statistically larger hernias. This early data is very encouraging and suggests that talc and fibrin glue will provide a means to decrease wound complications in massive ventral hernias.

Fixation of mesh to the peritoneum using a fibrin glue: Investigations with a biomechanical model and an experimental laparoscopic porcine model.

Authors: Schug-Pass C., Lippert H., Kockerling F.

Publication Date: 2009

PMID: 50514012

Abstract

Background: In recent years, the use of fibrin glue has become an established practice in several areas of surgical treatment. For example, fibrin glue is used increasingly as an alternative method for mesh

fixation in hernia surgery, significantly helping to reduce the incidence of chronic pain. The experiments in this study were aimed at elucidating the extent to which tack- or suture-based permanent fixation can be replaced by fixation with fibrin glue for laparoscopic intraperitoneal repair of abdominal wall hernias. Methods: In an initial series of experiments conducted with a biomechanical model, the strength of the fibrin glue for fixation of lightweight mesh (TiMesh light) to muscle tissue was compared with its strength of fixation to the peritoneum. In a second series of experiments, mesh was laparoscopically implanted in an established porcine model. Fibrin glue was used for mesh fixation in six animals. Laparoscopic exploration and explantation of the meshes were conducted after 4 months. Planimetric analysis was performed to investigate adhesion and shrinkage of the mesh surface. Results: The strength of fibrin glue for fixation of mesh to the peritoneum was significantly less than for its fixation to muscle tissue (11.86 N vs. 47.88 N; p = 0.001). Three of the implanted meshes were not completely integrated, and two of these were dislocated. On the average, adhesions were seen on 16% of the mesh surfaces. The mesh shrinkage rate was 24.2%. Conclusion: Mesh fixation alone to the undamaged peritoneum in the intraperitoneal region cannot be recommended because of the risk for dislocation. Additional fixation using sutures, tacks, or both is needed until the mesh material is completely integrated.

Surgical tip - a novel method of applying fibrin sealant during repair of divarication of the recti via an abdominoplasty incision.

Authors: Jones G.G., Saour S., Botha A.J., Healy C.M.J.

Publication Date: 2009

PMID: 50346381

Abstract

The use of fibrin sealant to secure the mesh after a hernia repair, and to reduce seroma formation after abdominoplasty, is well recognised. However, delivery of the fibrin sealant post-abdominoplasty has proved technically difficult due to the competing demands of: (1) applying instant pressure to the fibrin sealant-containing cavity and (2) accurate suturing of the skin flaps. A new technique is proposed for the application of the fibrin sealant during abdominoplasty.

Autologous fibrin sealant (FS) in plastic surgery - Review.

Authors: Samonikov T.J., Marcikic G., Georgiev K., Trojic T., Samonikova G., Dobrosavjevic V.

Publication Date: 2009

PMID: 70092380

Abstract

Background: Fibrin sealant also known as fibrin glue (FG) is used in many surgical fields because of its' functional properties and unique physical advantages. The fields of surgical application of FS adhesives are rapidly developing. FS is prepared from the patient's own blood. Autologous use has the advantage of avoiding the risk of transfusion transmitted disease (TTD). Aim: By using dermolipectomy and different techniques of hernioplasty we want to underline that the combining of these two techniques and the use of fibrin sealant at the same patient is a benefit. Material and methods: In the period from October 2007 to October 2008, 11 female patients, at the age of 32 to 48 years, were treated. All of them were submitted to infraumbilical dermolipectomy. Eight of them, having incissional hernia after "sectio cesarea", were treated with implantation of polypropylene mesh-graft, and the remaining three of them, having incisional hernia after dehiscence of local peritonitis as a consequence of appendectomy, were treated with local hernioplasty. Nine of the patients were submitted to a long drain therapy in order to eliminate the lymphatic fluid. These drains produce additional reactive fluid and prolong the initial healing time. In the case of four patients we applied autologous FS and the drains were removed in the fourth post opp day with no seroma sequealae and preventing swelling. The autologous pre-donation red blood cells were also administrated the next post opp day. Conclusion: These surgical techniques are well known procedures, but the use of pre-donatory autologous blood and FS which is physiologically compatible with human tissues, does not induce necrosis or other reactions and make this method safe. Autologous FS has the advantage of avoiding the risk of TTD and makes the operation easier, safer, cheaper and therefore more acceptable for the patients and the surgery teams. Trends in minimal invasive surgery also contribute to the increasing use of this biomaterial.

Fibrin glue fixation of bioactive extracellular matrix mesh compared with soft prolene mesh for laparoscopic hernia repair.

Authors: Edelman D.S.

Publication Date: 2008

PMID: 354735927

Abstract

INTRODUCTION: A comparison between soft prolene mesh and bioactive extracellular matrix prosthetic mesh fixed and secured with fibrin glue was studied. METHODS: A retrospective study of 160 patients operated upon by a single surgeon at the same institution over the past year was reviewed. There were 36 patients who had fibrin glue used as the sole means to fix the mesh in place during laparoscopic hernia repair. The patients were further subdivided into the type of mesh used, age, operative time, and postoperative events, and the results were analyzed. RESULTS: Bioactive extracellular matrix mesh was used in 18 patients and 23 repairs. There were 21 indirect hernias and 2 direct hernias repaired. Age averaged 36 years (17 to 63) and operative time averaged 30 minutes (19 to 45). Three patients experienced mild bladder gburningg and 3 patients had mild groin pain postoperatively. No recurrences have occurred. gSoftg prolene mesh was used in 18 patients and 23 repairs. There were 14 indirect hernias and 9 direct hernias repaired. Age averaged 50 years (35 to 72) and operative time averaged 26 minutes (20 to 40). Three patients had prolonged groin tenderness with or without ecchymosis lasting 3 weeks and 2 patients needed a foley catheter for 1 week for urinary retention. No recurrences have occurred. CONCLUSIONS: Fibrin glue has been used as a fixation technique for laparoscopic hernia repair with mesh. The bioactive extracellular matrix mesh patients

had a slight increased groin/bladder discomfort that subsided in time. Neither group had a hernia recurrence noted over the study time. The use of biologic materials in the repair of hernia is an intriguing concept. It will be needed for studying long-term efficacy.

Laparoscopic repair of inguinal hernia using Surgisis mesh and fibrin sealant.

Authors: Fine A.P.

Publication Date: 2006

PMID: 47071323

Abstract

OBJECTIVE: We tested the hypothesis that laparoscopic inguinal herniorrhaphy using Surgisis mesh secured with fibrin sealant is an effective long-term treatment for repair of inguinal hernia. This case series involved 38 adult patients with 51 inguinal hernias treated in a primary care center. METHODS: Between December 2002 and May 2005, 38 patients with 45 primary and 6 recurrent inguinal hernias were treated with laparoscopic repair by the total extraperitoneal mesh placement (TEP) technique using Surgisis mesh secured into place with fibrin sealant. Postoperative complications, incidence of pain, and recurrence were recorded, as evaluated at 2 weeks, 6 weeks, 1 year, and with a follow-up questionnaire and telephone interview conducted in May and June 2005. RESULTS: The operations were successfully performed on all patients with no complications or revisions to an open procedure. Average follow-up was 13 months (range, 1 to 30). One hernia recurred (second recurrence of unilateral direct hernia), indicating a 2% recurrence rate. CONCLUSIONS: Laparoscopic repair of inguinal hernia using Surgisis mesh secured with fibrin sealant can be effectively used to treat primary, recurrent, direct, indirect, and bilateral inguinal hernias in adults without complications and minimal recurrence within 1-year of follow-up.

Initial experience with the use of fibrin sealant for the fixation of the prosthetic mesh in laparoscopic transabdominal preperitoneal hernia repair.

Authors: Langrehr J.M., Schmidt S.C., Neuhaus P.

Publication Date: 2005

PMID: 41891841

Abstract

INTRODUCTION: Laparoscopic inguinal hernia repair offers more rapid recovery and less pain than with the traditional open approach. However, injury to the nerves of the lumbar plexus with subsequent chronic pain or neuralgia has a reported incidence of 2% during laparoscopic hernia repair, particularly

when the transabdominal preperitoneal technique (TAPP) is used. These complications are inherent to the use of staples for fixation of the mesh. To avoid nerve irritation, we considered the use of fibrin sealant for the fixation of the mesh instead of staples. The aim of this study was to evaluate this technique and to compare the short-term follow-up of these patients with patients who underwent the staple repair technique. This is the first reported use of fibrin sealant in laparoscopic TAPP hernia repair. METHOD: Between September and November 2004, we performed 17 consecutive laparoscopic hernia repairs (TAPP) in 14 patients (3 bilateral hernias) with primary hernias. The prosthetic mesh was fixed (10 x 15 cm) with 1 ml fibrin. The fibrin was applied using a special laparoscopic applicator. The peritoneum was closed with absorbable sutures. The postoperative course of these patients was compared with a cohort of matched patients who received the traditional staple fixation of the prosthetic mesh. RESULTS: Patients were evaluated at a median follow-up of 10.4 months (3.8-16.0 months). All patients underwent postoperative physical examinations. No recurrent hernia was found. There were 2 seromas and one hematoma in the stapled group. In the stapled group, one patient had pain in the area of the lateral femoral cutaneous nerve. There was no postoperative complication in the non-stapled group. CONCLUSION: Fibrin fixation of the mesh during laparoscopic transabdominal preperitoneal inguinal hernia repair is feasible without higher risk of recurrences. In addition the fibrin fixation method may decrease postoperative neuralgia and reduce the incidence of postoperative seromas and hematomas.

Autologous fibrin sealant (Vivostat) for mesh fixation in laparospic transabdominal preperitoneal hernia repair.

Authors: Schmidt S.C., Langrehr J.M.

Publication Date: 2006

PMID: 44348451

Abstract

Background and study aims: The use of fibrin glue derived from humans or animals has been reported as an alternative method of mesh fixation, instead of staples, in inguinal hernia repair. However, fibrin sealants involve the potential risks of virus transmission or immunological reactions to foreign proteins. This risk could be avoided by using autologous fibrin derived from the patient. A feasibility study on the use of autologous fibrin was therefore carried out in patients undergoing laparoscopic transabdominal inguinal hernia repair. Patients and methods: In a series of 10 patients undergoing laparoscopic transabdominal inguinal hernia repair, autologous fibrin was produced from 120 ml of the patient's blood during the hernia repair. The process took an average of 20 min. The perioperative and postoperative results were compared with those in a control group of 20 patients in whom conventional fibrin was used. Results: Producing and applying the autologous fibrin was uncomplicated. No differences in the outcome were observed between the two groups. One patient in the conventional fibrin group developed a seroma. None of the patients reported persistent pain. No recurrences were observed after a mean follow-up period of 9 months (range 6 - 12 months) in the conventional fibrin group and 7 months (range 6 - 8 months) in the autologous fibrin group. Conclusions: This feasibility study suggests that autologous fibrin sealant allowed adequate mesh fixation that did not differ from that in a control group in whom conventional fibrin glue was used. Autologous fibrin may be an interesting alternative for a variety of laparoscopic and endoscopic applications.

Fibrin sealant versus mechanical stapling for mesh fixation during endoscopic extraperitoneal inguinal hernioplasty: A randomized prospective trial.

Authors: Lau H.

Publication Date: 2005

PMID: 41567122

Abstract

Objective: To compare the clinical outcome of simultaneous bilateral endoscopic totally extraperitoneal inguinal hernioplasty (TEP) using fibrin sealant (FS) and mechanical stapling for prosthetic mesh fixation. Summary Background Data: Similar efficacy of FS and mechanical stapling for mesh fixation has been demonstrated in a swine model, but no clinical trial has been conducted to compare the outcomes of TEP using these 2 fixation devices. FS adheres the prosthetic mesh without causing injury to the underlying structures. Whether the application of FS improves early postoperative outcomes, namely, reduction of postoperative pain and seroma formation, has not been examined. Patients and Methods: Between July 2002 and February 2004, a total of 93 patients with 186 inguinal hernias who underwent bilateral TEP were randomized to have mesh fixation by either FS (n = 46) or mechanical stapling (n = 47). The primary endpoints were severity of pain, analgesic requirement, and incidence of seroma. Secondary endpoints were length of hospital stay, number of days required to resume normal outdoor activities and work, recurrence rate, and incidence of chronic pain. Results: The 2 groups were comparable in age, sex, and types of hernia. TEP were successfully performed in all patients. The FS group consumed significantly less analgesics compared with that of the staple group (P = 0.034). There was no significant difference in the postoperative pain score at rest and on coughing from the day of operation to postoperative day 6 between the groups. The incidence of seroma was significantly higher in the FS group (17.4%) than the staple group (5.3%) (P = 0.009). Length of hospital stay and time taken to resume normal activities and work were comparable between the 2 groups. With a median follow-up of 1.2 years, no recurrent hernia has been detected in either group, but the incidence of chronic pain in the staple group (20.0%) was higher than that of the FS group (13.2%) (P = 0.418). Conclusions: This randomized prospective clinical trial demonstrated a significant reduction of analgesic consumption by using FS for mesh fixation during bilateral TEP, but it was associated with an increased incidence of postoperative seroma.

The use of Human Fibrin Glue in the surgical operations.

Authors: Canonico S.

Publication Date: 2003

PMID: 38337524

Abstract

Human Fibrin Glue (HFG) is made of two components contained in separate vials: a freeze dried concentrate of clotting proteins, mainly fibrinogen, Factor XIII and fibronectin (the sealant) and freeze dried thrombin (the catalyst). The first component is reconstituted with an aprotinin solution that inhibits tissue fibrinolysis. The second component (thrombin), available in 500 I.U. concentration, is dissolved with calcium chloride. It is so a set of substances involved in the hemostatic process and in the wound healing, conferring to the product the following important properties: hemostatic and sealing action, through the strengthening of the last step of the physiological coagulation; biostimulation, which favors the formation of new tissue matrix. The indications for the use of human fibrin sealant are numerous and present in all the surgical branches. A randomized controlled trial of 50 patients undergoing hernia repair according to Lichtenstein's technique under local anesthesia was performed. Patients had concurrent coagulopathies as a consequence of liver disease or long-term treatment with anticoagulants for ischemic heart disease or cardiac rhythm disturbances. Coagulopathies were defined according to the following criteria: prothrombin time <10.5 seconds, activated partial thromboplastin time < 21 seconds, and fibrinogen <230 mg/dL. Patients were randomized in a 1:1 ratio with (group A) or without (control group B) use of human fibrin glue. Postoperative hemorrhagic complications were significantly reduced in group A (4%) compared with group B (24%). This study showed that human fibrin glue is effective in preventing local hemorrhagic complications after inguinal hernia repair in patients with concurrent coagulation disorders.

Umbilical herniorrhaphy in cirrhotic patients: A safe approach [1].

Authors: Gubitosi A., Falco P.

Publication Date: 2001

PMID: 32066227

Abstract

Not Available

Effects of fibrin glue and growth factors released from platelets on abdominal hernia repair with a resorbable PGA mesh: Experimental study.

Authors: Zieren J., Castenholz E., Baumgart E., Muller J.M.

Publication Date: 1999

PMID: 29372333

Abstract

Introduction. The purpose of this study was to investigate if the strength and quality of an abdominal wall repair with a resorbable PGA (polyglycolic acid) mesh can be improved by fibrin glue or releasates from platelets. Materials and methods. An abdominal wall defect in the rat was repaired using a PGA mesh in a sublay technique (CG) alone and either with additional fibrin glue (FG) or with platelet releasates (REL). Endpoints were clinical herniation pressure and hydroxyproline concentration (HP) as well as number of fibroblasts and collagen fibers at 7, 14, and 90 days after implantation. Results. In both experimental groups (REL and FG) higher herniation pressures, hydroxyproline contents, and number of fibroblasts/collagen fibers were found at all times of measurement compared to the CG. The PGA mesh alone showed a significant lack of stability after 14 days which can be compensated for by the investigated components. Significant differences ($P < 0.05$) were observed regarding the herniation pressure (REL vs CG at 7 and 14 days; FG vs CG at 14 days) and the number of collagen fibers (REL vs CG at 14 days). Conclusions. These results suggest that the quality of a PGA mesh repair can be improved by application of fibrin glue or platelet releasates in the described experimental setting.

The effect of TISSEEL fibrin sealant on seroma formation following complex abdominal wall hernia repair: a single institutional review and derived cost analysis.

Authors: Azoury SC, Rodriguez-Unda N, Soares KC, Hicks CW, Baltodano PA, Poruk KE, Hu QL, Cooney CM, Cornell P, Burce K, Eckhauser FE

Publication Date: 2015

PMID: 26152522

Abstract

PURPOSE: The authors evaluated the ability of a fibrin sealant (TISSEELTM: Baxter Healthcare Corp, Deerfield, IL, USA) to reduce the incidence of post-operative seroma following abdominal wall hernia repair. METHODS: We performed a 4-year retrospective review of patients undergoing abdominal wall hernia repair, with and without TISSEEL, by a single surgeon (FEE) at The Johns Hopkins Hospital. Demographics, surgical risk factors, operative data and 30-day outcomes, including wound complications and related interventions, were compared. The quantity and cost of Tisseel per case was reviewed. RESULTS: A total of 250 patients were evaluated: 127 in the TISSEEL group and 123 in the non-TISSEEL control group. The average age for both groups was 56.6 years ($P = 0.97$). The majority of patients were female (TISSEEL 52.8%, non-TISSEEL 56.1%, $P = 0.59$) and ASA Class III (TISSEEL 56.7%, non-TISSEEL 58.5%, $P = 0.40$). There was no difference in the average defect size for both groups (TISSEEL 217 +/- 187.6 cm(2), non-TISSEEL 161.3 +/- 141.5 cm(2), $P = 0.36$). Surgical site occurrences occurred in 18.1% of the TISSEEL and 13% of the non-TISSEEL group ($P = 0.27$). There was a trend towards an increased incidence of seroma in the TISSEEL group (TISSEEL 11%, non-TISSEEL 4.9%, $P = 0.07$). A total of $124,472.50 was spent on TISSEEL, at an average cost of $995.78 per case. CONCLUSIONS: In the largest study to date, TISSEELTM application offered no advantage for the reduction of post-operative seroma formation following complex abdominal hernia repair. Moreover, the use of this sealant was associated with significant costs.

A prospective randomised trial comparing mesh types and fixation in totally extraperitoneal inguinal hernia repairs.

Authors: Cristaudo A, Nayak A, Martin S, Adib R, Martin I

Publication Date: 2015

PMID: 25845302

Abstract

The totally extraperitoneal (TEP) approach for surgical repair of inguinal hernias has emerged as a popular technique. We conducted a prospective randomised trial to compare patient comfort scores using different mesh types and fixation using this technique. Over a 14 month period, 146 patients underwent 232 TEP inguinal hernia repairs. We compared the comfort scores of patients who underwent these procedures using different types of mesh and fixation. A non-absorbable 15 x 10 cm anatomical mesh fixed with absorbable tacks (Control group) was compared with either a non-absorbable 15 x 10 cm folding slit mesh with absorbable tacks (Group 2), a partially-absorbable 15 x 10 cm mesh with absorbable tacks (Group 3) or a non-absorbable 15 x 10 cm anatomical mesh fixed with 2 ml fibrin sealant (Group 4). Outcomes were compared at 1, 2, 4 and 12 weeks using the Carolina Comfort Scale (CCS) scores. At 1, 2, 4 and 12 weeks, the median global CCS scores were low for all treatment groups. Statistically significant differences were seen only for median CCS scores and subscores with the use of partially-absorbable mesh with absorbable tacks (Group 3) at weeks 2 and 4. However, these were no longer significant at week 12. In this study, the TEP inguinal hernia repair with minimal fixation results in low CCS scores. There were no statistical differences in CCS scores when comparing types of mesh, configuration of the mesh or fixation methods.

Biomechanical evaluation of fixation properties of fibrin glue for ventral incisional hernia repair.

Authors: Stoikes N, Sharpe J, Tasneem H, Roan E, Paulus E, Powell B, Webb D, Handorf C, Eckstein E, Fabian T, Voeller G

Publication Date: 2015

PMID: 24062143

Abstract

INTRODUCTION: Use of adhesives for mesh fixation in hernia is increasing. There has been minimal study of mesh incorporation and interface strength with adhesive fixation for ventral hernia repair. The purpose of this study was to evaluate the fixation properties of fibrin glue as it compared to suture fixation of mesh in an onlay position. METHODS: Twenty-four mongrel pigs were divided into three study arms based on time points for biomechanical evaluation: 24 h (n = 8), 7 days (n = 8), and 14 days

(n = 8). Initial procedures included placement of two 4 x 6 cm pieces of wide-pore polypropylene mesh in an onlay position. One was fixated with 4 ml of fibrin glue and the other with four interrupted 2-0 polypropylene sutures. The shear strength of fixation was evaluated using a uniaxial testing device along with histological evaluation. Maximum force was normalized by the width of the mesh. RESULTS: Mesh-tissue interface of glued and sutured specimens at 7 and 14 days did not fail in our testing configuration. Only at the 24-h time point the mesh detached from the tissue, and the sutured interface (10.4 N/cm) was significantly stronger than glued interface (4.9 N/cm, p = 0.004). Histopathologic and gross evaluations of the specimens revealed similar histologic features at all time points for both glued and sutured specimens. CONCLUSIONS: With mesh in the onlay position, fixation to the abdominal wall occurs quickly. Though sutures were stronger at 24 h, as early as 1 week, the strength of the fixation exceeded the tissue or the mesh strength in our testing configuration for both glue and suture groups. Fixation strength is independent of technique at the latter time points. There are potential clinical advantages to the exclusive use of fibrin glue for fixation including acute post-operative pain, chronic post-operative pain, and recurrence for ventral incisional hernia repair.

A meta-analysis examining the use of fibrin glue mesh fixation versus suture mesh fixation in open inguinal hernia repair. [Review]

Authors: Liu H, Zheng X, Gu Y, Guo S

Publication Date: 2014

PMID: 25592242

Abstract

BACKGROUND: The aim of this study was to systematically analyze the randomized trials comparing fibrin glue mesh fixation with suture mesh fixation in open inguinal hernia repair. METHODS: Information was collected from a literature search using PubMed, Springer, Cochrane Library database and reference lists. The methodological quality of included publications was evaluated. Statistical analysis was performed using Review Manager Version 5.2.5 software. RESULTS: Nine articles were identified for inclusion: four randomized controlled trials (RCTs) and five prospective observational clinical studies. All the trials were considered to be of fair quality. The results showed that there was a lower incidence of chronic pain (RR 0.42, 95% CI 0.22-0.79, I(2) 11%; p < 0.01), and hematoma/seroma (RR 0.43, 95% CI 0.21-0.87, I(2) 0%; p < 0.05) in the fibrin glue mesh fixation group. However, the results of meta-analysis revealed that the incidence of recurrence or urinary problems between the two procedures were similar. CONCLUSIONS: During the 6-15 months follow-up, fibrin glue mesh fixation is a feasible alternative for mesh fixation with sutures in open inguinal hernia repair. However, the poor quality of the included trials limits the evidence; rigorously designed trials are warranted to confirm this conclusion.

Human fibrin glue sealing versus suture polypropylene fixation in Lichtenstein inguinal herniorrhaphy: a prospective observational study.

Authors: Damiano G, Gioviale MC, Palumbo VD, Spinelli G, Buscemi S, Ficarella S, Bruno A, Tomasello G, Lo Monte AI

Publication Date: 2014

PMID: 25375054

Abstract

BACKGROUND: Patients who underwent primary inguinal hernia repair still report a high rate of postoperative pain after operation due to the effect of mesh fixation by suture.An alternative is the use of human fibrin glue. We compared the two techniques. METHODS: 468 patients randomly underwent primary inguinal hernia Lichtenstein repair fixing the mesh by suture or by human fibrin glue (HFG); in both cases the mesh was fixed to the posterior wall of the inguinal canal and to the inguinal ligament. RESULTS: No significant differences were recorded between the two groups in terms of complications, while the sutureless technique reduces the operative time and the postoperative pain. CONCLUSIONS: A widespread technique for the treatment of inguinal hernia is the application of a mesh using Lichtenstein procedure. The prosthesis can be fixed by traditional suture or using a new method of sutureless fixation with adhesive materials that shows an excellent local tolerability and lack of adverse effects and contraindications. Copyright Celsius.

Prevention of subcutaneous seroma formation in open ventral hernia repair using a new low-thrombin fibrin sealant.

Authors: Kohler G, Koch OO, Antoniou SA, Lechner M, Mayer F, Emmanuel K

Publication Date: 2014

PMID: 24981370

Abstract

BACKGROUND: Seroma formation is a frequent postoperative complication following open ventral hernia repair (OVHR), especially in cases requiring wide subcutaneous dissection (WSD). The aim of this study was to evaluate the effectiveness of a new low-thrombin fibrin sealant for seroma prevention. METHODS: A total of 60 consecutive patients with median incisional hernias who required OVHR with WSD of at least 100 cm(2) were included in the prospective non-randomized study. The fibrin glue group (FG) comprised 30 patients who had undergone OVHR with sublay mesh placement as well as subcutaneous application of low-thrombin fibrin sealant. This cohort of patients was compared with a control group (CG) of 30 consecutive patients who had previously undergone OVHR without prevention of seroma formation with regard to outcome measures such as seroma formations and wound complications. RESULTS: Though the median extent of subcutaneous dead space was larger in the FG than in the CG (229 vs.174 cm(2); $p = 0.012$), seroma formation occurred in three of the FG versus 16 of the CG patients ($p = 0.003$). Postoperative wound complications occurred in two of the FG versus nine of the CG patients ($p = 0.002$). Four patients in the CG and none in the FG required re-operation within 30 days ($p < 0.001$). CONCLUSION: The use of a new low-thrombin fibrin glue demonstrated a protective effect against formation of seromas and decreased the rate of wound complications in OVHR, with consecutive shorter length of hospital stay (5.8 vs. 10.4 days; $p = 0.04$).

The role of fibrin glue polypropylene mesh fixation in open inguinal hernia repair.

Authors: Odobasic A, Krdzalic G, Hodzic M, Hasukic S, Sehanovic A, Odobasic A

Publication Date: 2014

PMID: 24937929

Abstract

UNLABELLED: The aim of this study was to compare two methods of polypropylene mesh fixation for inguinal hernia repair according to Lichtenstein using fibrin glue and suture fixation. MATERIAL AND METHODS: The study included 60 patients with unilateral inguinal hernia, divided into two groups of 30 patients--Suture fixation and fibrin glue fixation. All patients were analyzed according to: age, gender, body mass index (BMI), indication for surgery--the type, localization and size of the hernia, preoperative level of pain and the type of surgery. Overall postoperative complications and the patient's ability to return to regular activities were followed for 3 months. RESULTS AND DISCUSSION: Statistically significant difference in the duration of surgery, pain intensity and complications ($p < 0.05$) were verified between method A, the group of patients whose inguinal hernia was repaired using polypropylene mesh-fibrin glue and method B, where inguinal hernia was repaired with polypropylene mesh using suture fixation. Given the clinical research, this systematic review of existing results on the comparative effectiveness, will help in making important medical decisions about options for surgical treatment of inguinal hernia. CONCLUSIONS: The results of this study may impact decision making process for recommendations of methods of treatment by professional associations, making appropriate decisions on hospital procurement of materials, as well as coverage of health funds and insurance.

Use of human fibrin glue (Tisseel) versus staples for mesh fixation in laparoscopic transabdominal preperitoneal hernioplasty (TISTA): a randomized controlled trial (NCT01641718).

Authors: Muller SA, Warschkow R, Beutner U, Luthi C, Ukegjini K, Schmied BM, Tarantino I

Publication Date: 2014

PMID: 24690207

Abstract

BACKGROUND: Inguinal hernia repair is one of the most common surgical procedures worldwide. This procedure is increasingly performed with endoscopic techniques (laparoscopy). Many surgeons prefer to cover the hernia gap with a mesh to prevent recurrence. The mesh must be fixed tightly, but without tension. During laparoscopic surgery, the mesh is generally fixed with staples or tissue glue. However, staples often cause pain at the staple sites, and they can cause scarring of the abdominal wall, which

can lead to chronic pain. We designed a trial that aims to determine whether mesh fixation with glue might cause less postoperative pain than fixation with staples during a transabdominal preperitoneal patch plastic repair. METHODS/DESIGN: The TISTA trial is a prospective, randomized, controlled, single-center trial with a two-by-two parallel design. All patients and outcome-assessors will be blinded to treatment allocations. For eligibility, patients must be male, >=18 years old, and scheduled for laparoscopic repair of a primary inguinal hernia. One group comprises patients with a unilateral inguinal hernia that will be randomized to receive mesh fixation with either tissue glue or staples. The second group comprises patients with bilateral inguinal hernias. They will be randomized to receive mesh fixation with tissue glue either on the right or the left side and with staples on the other side. The primary endpoint will be pain under physical stress, measured at 24 h after surgery. Pain will be rated by the patient based on a numeric rating scale from 0 to 10, where 10 equals the worst pain imaginable. A total of 82 patients will be recruited (58 patients with unilateral inguinal hernias and 24 patients with bilateral hernias). This number is estimated to provide 90% power for detecting a pain reduction of one point on a numeric rating scale, with a standard deviation of one. DISCUSSION: Patients with bilateral hernias will receive two meshes, one fixed with glue, and the other fixed with staples. This design will eliminate the inter-individual bias inherent in comparing pain measurements between two groups of patients. TRIAL REGISTRATION: ClinicalTrials.gov: NCT01641718.

Randomized double-blinded prospective trial of fibrin sealant spray versus mechanical stapling in laparoscopic total extraperitoneal hernioplasty.[Erratum appears in Ann Surg. 2014 Aug;260(2):408 Note: Melissa, Chan Shannon [corrected to Chan, Melissa Shannon]; Bun, Teoh Anthony Yuen [corrected to Teoh, Anthony Yuen Bun]; Wing, Chan Kin [corrected to Chan, Kin Wing]; Chung, Tang Yiu [corrected to Tang, Yiu Chung]; Tat, Leong Heng [corrected to Leong, Heng Tat]]

Authors: Chan MS, Teoh AY, Chan KW, Tang YC, Ng EK, Leong HT

Publication Date: 2014

PMID: 24045438

Abstract

OBJECTIVE: The aim of the current study was to compare the clinical outcomes of mesh fixation with fibrin sealant (FS) spray or mechanical stapling (MS) in laparoscopic total extraperitoneal hernioplasty (TEP). BACKGROUND: The most appropriate method of mesh fixation is uncertain. METHODS: Between June 2007 and June 2011, consecutive patients with primary reducible unilateral inguinal hernia who underwent day-case laparoscopic TEP were recruited. Outcome parameters included the incidence of acute and chronic pain, recurrence rates, morbidity rates, analgesic requirements,

quality-of-life (QOL) scores, and direct cost. RESULTS: During the study period, 130 patients were included in the study. Patients in the MS group had significantly worse pain scores on the day after operation (P = 0.006). Analgesic requirements were similar between the 2 groups (P = 0.558). At 6 months, no significant differences in the incidence of chronic pain were observed (at rest, after coughing or cycling). The incidence of seroma formation was similar between the 2 groups (P = 0.64), and no recurrences were observed at 1 year. No differences in the QOL scores were detected. The direct cost of the entire hospitalization in the FS group was less expensive (P < 0.001). CONCLUSIONS: FS and MS are both effective methods of providing mesh fixation. FS was associated with reduced acute pain but not chronic pain. The rates of seroma formation were similar. However, the use of FS for mesh fixation was less expensive. [corrected].

Preliminary report of a sutureless onlay technique for incisional hernia repair using fibrin glue alone for mesh fixation.

Authors: Stoikes N, Webb D, Powell B, Voeller G

Publication Date: 2013

PMID: 24165253

Abstract

The Rives repair for ventral/incisional (V/I) hernias involves sublay mesh placement requiring retrorectus dissection and transfascial stitches. Chevrel described a repair by onlaying mesh after a unique primary fascial closure. Although Chevrel fixated mesh to the anterior fascia with sutures, he used fibrin glue for fascial closure reinforcement. We describe an onlay technique with mesh fixated to the anterior fascia solely with fibrin glue without suture fixation. From January 2010 to January 2012, 50 patients underwent a V/I hernia onlay technique with fibrin glue mesh fixation. Records were reviewed for technical details, demographics, mesh characteristics, and postoperative outcomes. Primary fascial closure with interrupted permanent suture was done with or without myofascial advancement flaps. Onlay polypropylene mesh was placed providing 8 cm of overlap. Fibrin glue was applied over the prosthesis and subcutaneous drains were placed. Mean age was 62.4 years. Mean body mass index was 30.1 kg/m(2). Average mesh size was 14.5 cm x 19.1 cm. Mean operative time was 144.4 minutes (range, 38 to 316 minutes). Mean discharge was postoperative Day 2.9 (range, 0 to 15 days). Morbidity included eight seromas, one hematoma, and three wound infections. Seventeen patients required components separation. Mean follow-up was 19.5 months with no recurrences. This is the first series describing fibrin glue alone for mesh fixation for V/I hernia repair. It allows for immediate prosthesis fixation to the anterior fascia. Early results are promising. Potential advantages include less operative time, less technical difficulty, and less long-term pain. A prospective trial is needed to evaluate this approach.

Transporous hernia mesh fixation with fibrin sealant in an in vitro model of spray application.

Authors: Brand J, Gruber-Blum S, Gruber K, Fortelny RH, Redl H, Petter-Puchner AH

Publication Date: 2013

PMID: 23566443

Abstract

BACKGROUND: The spray application of fibrin sealant (FS) is widely used for atraumatic mesh fixation in open and laparoscopic hernia surgery. Studies focusing on the optimization of sealant distribution are rare. This study elucidates the impact of spray distance and pressure, the thrombin concentration of the FS, as well as the mesh design on the spray process and the resulting sealant distribution. Furthermore, the effect of interrupting the spray process on sealant distribution was investigated. MATERIAL AND METHODS: Three different meshes were sprayed in a vertical test arrangement with 0.4 mL FS. Fibrin sealants containing 4 and 500 IU/mL thrombin (Tisseel and Artiss; Vienna, Austria) provided by Baxter Biosciences were used. The application distances varied from 5 to 8 cm. The relative fibrin sealant distribution on the individual mesh surfaces was evaluated and compared, as well as loss of FS and patterns of clot formation. RESULTS: Spray distances between 5 and 8 cm led to a homogenous sealant distribution. Lower thrombin concentrations led to significant losses of FS due to slower polymerization. Differences of the fibrin sealant distribution and mesh pore sizes were found. No differences between continuous and discontinuous application were observed. CONCLUSION: The spray application of FS provides a uniform sealant film in a defined range of distances. However, design and pore size of different meshes substantially impact sealant distribution. These findings should be considered when selecting prosthesis for hernia repair. In general, the amount of sealant should not exceed 0.08 mL per cm(2) to avoid obstruction of mesh pores.

Randomized clinical trial of fibrin glue versus tacked fixation in laparoscopic groin hernia repair.[Erratum appears in Surg Endosc. 2013 Aug;27(8):2734]

Authors: Tolver MA, Rosenberg J, Juul P, Bisgaard T

Publication Date: 2013

PMID: 23355162

Abstract

BACKGROUND: Preliminary studies have indicated clinical advantages of mesh fixation using fibrin glue in transabdominal preperitoneal groin hernia repair (TAPP) compared with tack fixation. The aim of this randomized double-blinded, controlled, clinical trial is to compare fibrin glue with tacks fixation of mesh during TAPP. METHODS: One hundred and twelve men with unilateral inguinal hernia were enrolled. Primary outcome was pain during coughing on postoperative day 1. Secondary outcomes were postoperative scores of pain at rest, discomfort, and fatigue (day 1 and cumulated day 0-3), incidence of moderate/severe nausea and/or vomiting, foreign-body sensation, and recurrence after 6 months. Outcome measures were assessed by visual analogue scale (VAS, 0-100 mm), verbal rating scale (no, light, moderate or severe) and numerical rating scales (NRS, 1-10). RESULTS: One hundred patients were available for analysis. The fibrin group (n = 50) had significantly less pain during coughing on day 1 compared with the tacks group (n = 50) [median 23 (range 0-80) vs 35 (2-100) mm]

(p = 0.020). Moreover, day 1 scores and all cumulated scores of pain during rest, discomfort, and fatigue were significantly lower in the fibrin group compared with the tacks group (all p-values <= 0.02). There was no significant difference in the incidence of nausea and/or vomiting (p > 0.05) or recurrence (fibrin glue n = 2, tacks n = 0, p = 0.241). Incidence of foreign-body sensation was significantly lower in the fibrin group at 1 month (p = 0.006). CONCLUSIONS: Fibrin glue compared with tacks fixation improved the early postoperative outcome after TAPP. The trial was registered at clinicaltrials.gov NCT01000116.

Mesh fixation with fibrin sealant during endoscopic totally extraperitoneal inguinal hernia approach: a review of 640 repairs.

Authors: Berney CR, Yeo AE

Publication Date: 2013

PMID: 23344667

Abstract

PURPOSE: Endoscopic repair of inguinal hernia can decrease the incidence of chronic groin pain. Staple mesh fixation is the surgical technique preferentially used but may also cause residual pain. Although a substantial number of specialists advocate no mesh fixations, concerns are that this could lead to an increase in recurrence rates. This study aimed to assess the safety and the effectiveness of fibrin sealant, as an alternative technique to staple mesh fixation after totally extraperitoneal (TEP) inguinal hernia repair. METHODS: A total of 472 patients underwent elective TEP inguinal hernia repair between February 2005 and July 2011. Mesh fixation was achieved using fibrin sealant. Patients were reviewed postoperatively at Week 2, Week 6, and Month 6. Patient satisfaction was assessed in a subgroup of 116 patients using a comprehensive scoring system designed for hernia repairs, and pain was assessed using a standard Visual Analog pain Scale. RESULTS: No conversion to open surgery was observed. There were two cases of major morbidities and no mortality. Three months after surgery, only three patients (0.6 %) experienced chronic groin or testicular discomfort. At Week 6, 98.9 % of the patients were either satisfied or very satisfied with their outcome, and 96.8 % denied any residual pain. Finally, only six hernia recurrences (0.9 %) were reported, of which five occurred during the first months of the study. CONCLUSIONS: Fibrin sealant is safe and reliable for mesh fixation of inguinal hernia during TEP repair with a very high satisfaction index and limited risk of developing chronic pain.

The battle between biological and synthetic meshes in ventral hernia repair.

Authors: Montgomery A

Publication Date: 2013

PMID: 23314566

Abstract

Not Available

Post-operative benefits of Tisseel()/Tissucol () for mesh fixation in patients undergoing Lichtenstein inguinal hernia repair: secondary results from the TIMELI trial.

Authors: Campanelli G, Pascual MH, Hoeferlin A, Rosenberg J, Champault G, Kingsnorth A, Bagot d'Arc M, Miserez M

Publication Date: 2014

PMID: 24889273

Abstract

PURPOSE: The Tisseel/Tissucol for mesh fixation in Lichtenstein hernia repair (TIMELI) study showed that mesh fixation with human fibrin sealant during inguinal hernia repair significantly reduced moderate-severe complications of pain 12 months post-operatively compared with sutures. Further analyses may assist surgeons by investigating predictors of post-surgical complications and identifying patients that may benefit from Tisseel/Tissucol intervention. METHODS: Univariate and multivariate analyses identified risk factors for combined pain, numbness and groin discomfort (PND) visual analogue scale (VAS) score 12 months post-operatively. Variables tested were: fixation method, age, employment status, physical activity, nerve handling, PND VAS score at pre-operative visit and 1 week post-operatively. The effect of fixation technique on separate PND outcomes 12 months post-surgery was also assessed. Analyses included the intention-to-treat (ITT) population and a subpopulation with pre-operative PND VAS > 30 mm. RESULTS: 316 patients were included in the ITT, with 130 patients in the subpopulation with pre-operative PND VAS > 30. Multivariate analysis identified mesh fixation with sutures, worsening pre-operative PND and worsening PND 1 week post-surgery as significant predictors of 12-month PND in the ITT population; mesh fixation with sutures was a significant predictor of 12-month PND in the pre-operative PND VAS > 30 subpopulation ($p < 0.05$). Mesh fixation with Tisseel/Tissucol resulted in significantly less numbness and a lower intensity of groin discomfort compared with sutures at 12 months; there was no difference in pain between the treatment groups. CONCLUSIONS: Pre-operative discomfort may be an important predictor of post-operative pain, numbness and discomfort. Tisseel/Tissucol may improve long-term morbidity over conventional sutures in these patients.

Clinical outcome and quality of life in 100 consecutive laparoscopic totally extra-peritoneal (TEP) groin hernia repairs using fibrin glue (TisseelTM): a United Kingdom experience.

Authors: Shah NS, Bandara AI, Sheen AJ

Publication Date: 2012

PMID: 22752685

Abstract

PURPOSE: The use of fibrin sealant (FS) (TisseelTM) for mesh fixation in patients undergoing laparoscopic groin hernia surgery is a well-recognised technique in Europe, but no study to date has examined effect on quality of life (QoL) on patients undergoing FS mesh fixation. A prospective study was therefore conducted to examine the effects on QoL of patients undergoing laparoscopic groin hernia surgery using FS in the United Kingdom. MATERIALS AND METHODS: Between March 2007 and January 2011, all patients undergoing laparoscopic total extra preperitoneal (TEP) groin hernia repair using FS were included in the study. A validated hernia questionnaire from The Royal College of Surgeons of England supplemented by the EORTC QLQ C-30 to assess the pre- and postoperative QoL, pain scores and health outcome measures was used. All the patient's demographics, duration of surgery, size of hernia, recurrence, morbidity and hospital stay were recorded. RESULTS: Data from 92 patients (87 males and 5 females) with a median age of 46 years (range, 19-82 years) was collected for the study (response rate of 92/121, 73 %). A total of 58 patients (63 %) had a unilateral and 34 patients (37 %) a bilateral hernia repair, of which 6 (7 %) were recurrent inguinal hernia. The mean operating time for a unilateral hernia was 36 min (30-62), and that for a bilateral hernia was 59 min (51-83). There were no conversions to open surgery out of the 92 patients included with the recorded morbidity of 7 %. There were no early recurrences. Eighty-nine patients (98 %) of patients were discharged in the first 24 h after surgery. There was a significant statistical difference recorded in patients visual analogue pain score (VAS 0-10) before and after surgery ($P < 0.0001$, Mann-Whitney U test). The physical, emotional, social and health components of the questionnaire were statistically significant pre- and postoperatively ($P < 0.001$ Mann-Whitney U test). CONCLUSION: Groin hernia TEP repair with FS fixation did not have a detrimental effect on QoL and pain scores. In addition, the low early recurrence rate provided good evidence of the mesh fixation properties of FS. FS can therefore be continued to be recommended, as an alternative fixation method in laparoscopic groin hernia surgery.

Hernioplasty in elderly high-risk adults: efficacy of fibrin glue.

Authors: Casarotto A, Militello V, Piatto G, Gruppo M, Militello C

Publication Date: 2012

PMID: 22691003

Abstract

Not Available

Evaluation of fibrin sealant for biologic mesh fixation at the hiatus in a porcine model.

Authors: Krpata DM, Blatnik JA, Harth KC, Phillips MS, Novitsky YW, Rosen MJ

Publication Date: 2012

PMID: 22538698

Abstract

BACKGROUND: The ideal method to secure biologic mesh during laparoscopic hiatal hernia repair remains uncertain. Suture or tack fixation can be technically difficult, and serious cardiovascular complications have been reported. Fibrin sealant (FS) offers a potential solution to this problem. We hypothesized that FS provides comparable mesh fixation to suture repair during laparoscopic mesh hiatoplasty. STUDY DESIGN: Using a porcine model, laparoscopic hiatal hernia repair was performed with suture reapproximation of the crura and reinforcement with an acellular porcine dermal matrix. Prior to repair, animals were randomized to mesh fixation with sutures (S) or FS. After 30-day survival, an esophagram was performed, the diaphragm harvested, and mesh position, fixation, and incorporation were evaluated histologically and biomechanically using a T-peel test. RESULTS: Twenty (10 S and 10 FS) laparoscopic hiatal hernia repairs were performed. Total operative time was significantly less in the FS group (74.7 versus 127.0 min, $p < 0.01$). There were no instances of mesh migration in any animal. Mean peel force did not differ significantly between the S and FS groups (0.21 vs. 0.18 N/mm, respectively; $p = 0.49$). There was no significant difference in cellular repopularization or inflammatory changes around the mesh. CONCLUSIONS: Fibrin sealant offers a reasonable alternative to suturing biologic mesh during laparoscopic hiatal hernia repair with equivalent mesh fixation. At 30 days it provides adhesive strength similar to suture fixation, while significantly reducing operative time.

Use of fibrin sealant (Tisseel/Tissucol) in hernia repair: a systematic review. [Review]

Authors: Fortelny RH, Petter-Puchner AH, Glaser KS, Redl H

Publication Date: 2012

PMID: 22278103

Abstract

BACKGROUND: Abdominal wall and inguinal hernia repair are the most frequently performed surgical procedures in the United States and Europe. However, traditional methods of mesh fixation are associated with a number of problems including substantial risks of recurrence and of postoperative and chronic pain. The aim of this systematic review is to summarize the clinical safety and efficacy of Tisseel/Tissucol fibrin sealant for hernia mesh fixation. METHODS: A PubMed title/abstract search was conducted using the following terms: (fibrin glue OR fibrin sealant OR Tisseel OR Tissucol) AND hernia repair. The bibliographies of the publications identified in the search were reviewed for additional references. RESULTS: There were 36 Tisseel/Tissucol studies included in this review involving 5,993 patients undergoing surgery for hernia. In open repair of inguinal hernias, Tisseel compared favorably with traditional methods of mesh fixation, being associated with shorter operative times and hospital stays and a lower incidence of chronic pain. Similarly, after laparoscopic/endoscopic inguinal hernia

repair, Tisseel/Tissucol was associated with less use of postoperative analgesics and less acute and chronic postoperative pain than tissue-penetrating mesh-fixation methods. Other end points of concern to surgeons and patients are the risks of inguinal hernia recurrence and of complications such as hematoma formation and intraoperative bleeding. Comparative studies show that Tisseel/Tissucol does not increase the risk of these outcomes and may, in fact, decrease the risk compared with tissue-penetrating fixation methods. When used in the repair of incisional hernias, Tisseel/Tissucol significantly decreased both postoperative morbidity and duration of hospital stay. CONCLUSIONS: Clinical evidence published to date supports the use of Tisseel/Tissucol as an option for mesh fixation in open and laparoscopic/endoscopic repair of inguinal and incisional hernias. Guidelines of the International Endohernia Society recommend fibrin sealant mesh fixation, especially in inguinal hernia repair. Nonfixation is reserved for selected cases.

The role of fibrin glue in decreasing chronic pain in laparoscopic totally extraperitoneal (TEP) inguinal hernia repair: a single surgeon's experience.

Authors: Khaleal F, Berney C

Publication Date: 2011

PMID: 21342387

Abstract

BACKGROUND: Chronic pain is a disturbing severe complication of mesh inguinal hernia repair. Its risk, incidence, severity and its aetiologies vary widely in the literatures. It is well established that laparoscopic repair has decreased the incidence of chronic pain, but only to a certain degree. The main source of pain with this approach is staple fixation. Different ways of fixation were sought to avoid this problem. METHODS: A review of the data collected prospectively, the cohort included 233 consecutive patients who underwent totally extraperitoneal (TEP) inguinal hernia repair by a single surgeon who used fibrin glue (Tisseel) to fix the mesh in all cases. Patients were reviewed by the original surgeon at 2 weeks and 6-12 weeks post-operatively, but also at 6 months in the first year of the study, and selectively then after if pain was reported by the patient. Data was reviewed and analysed by the researcher as part of quality assurance. RESULTS: During the period from February 2005 to September 2008, 233 consecutive patients underwent 309 TEP inguinal hernia repairs. The mean age was 44.9 years. There was no conversion to open surgery. There was no mortality and only one major morbidity. In total, eight patients were complaining of mild intermittent discomfort (2 in the groins and 6 in the testicles) on their second post-operative review, but had no complaint at 6 months following their surgery. Chronic groin pain occurred in only one patient (0.43%). CONCLUSIONS: The use of fibrin glue is a safe and reliable way of mesh fixation in inguinal hernia repair, with very limited risk of developing chronic pain.

Evaluation of intraperitoneal placement of absorbable and nonabsorbable barrier coated mesh secured with fibrin sealant in a New Zealand white

rabbit model.

Authors: Jenkins ED, Melman L, Desai S, Brown SR, Frisella MM, Deeken CR, Matthews BD

Publication Date: 2011

PMID: 20652323

Abstract

BACKGROUND: This study aimed to evaluate the acute and chronic fixation strength of fibrin sealant (FS) as an alternative method of fixation for laparoscopic ventral hernia repair (LVHR). METHODS: Representative mesh types for LVHR included one nonabsorbable barrier mesh (Composix) and three absorbable barrier meshes (Sepramesh, Proceed, and Parietex composite). Macroporous polypropylene mesh (Prolite Ultra) served as the control mesh. Three methods of fixation were used, namely, 0-polypropylene suture+FS (ARTISS 4 IU), FS alone (ARTISS), and tacks alone, to secure 3x4-cm pieces of mesh (10 of each combination) to the peritoneal surface of New Zealand white rabbit abdominal wall. After 2 h of incubation at 37 degreeC, specimens underwent acute testing. Subsequently, a chronic phase was completed using the aforementioned fixation methods (10 of each combination), in which two 4x4-cm pieces of mesh were secured intraperitoneally in each of 75 New Zealand white rabbits, which survived 8 weeks until they were sacrificed. A transparent grid overlay was used to measure the mesh and adhesion area. Adhesion tenacity was characterized using the Garrard adhesion scale. In both the acute and chronic samples, a 3x3-cm area of mesh-tissue interface underwent lap shear testing at a rate of 0.42 mm/s using a tensiometer (Instron 5542). The maximum load sustained by the mesh-tissue construct was recorded as the acute fixation strength in newtons (N). Data are given as means+/-standard error of the mean. Statistical significance ($p<0.05$) was determined using a one-way analysis of variance (ANOVA) with Fisher's least significant difference (LSD) posttest or a nonparametric Kruskal-Wallis test (adhesion scores). RESULTS: The acute fixation strength was significantly greater for all the meshes secured with either suture+FS or tacks alone than for FS alone ($p<0.001$ for all comparisons). All the meshes except Proceed demonstrated greater acute fixation strength with suture+FS than with tacks alone ($p<=0.016$). Composix achieved greater acute fixation with suture+FS than all the other meshes ($p<=0.022$). Acute fixation with suture + FS was greater for Parietex Composite and ProLite Ultra than for Proceed ($p<=0.015$). When the animals were sacrificed, 48 of 50 meshes fixed with FS alone were insufficiently affixed to the abdominal wall, which may have resulted in hernia recurrence in a hernia model. The chronic fixation strength was greater for all the mesh types with either suture+FS or tacks only than with FS alone ($p<=0.0005$). The chronic fixation strength was greater with suture+FS than with tacks for Proceed and ProLite Ultra ($p<=0.013$). Neither mesh area nor adhesion tenacity differed significantly with any mesh/fixation method combination. CONCLUSIONS: In a chronic rabbit model of LVHR, fixation strength with FS alone was inadequate for selected nonabsorbable and absorbable barrier-coated meshes. The acute and chronic fixation strengths of suture+FS were equivalent or superior to the fixation strength of tacks alone. Using a combination of suture and FS for mesh fixation in LVHR may provide adequate fixation while decreasing postoperative pain due to spiral titanium tacks. In this preclinical series, mesh secured to the peritoneal surface by FS alone may have led to early recurrence.

[Hiatoplasty reinforcement by means of a lightweight titanized polypropylene mesh fixed with fibrin glue]. [German]

Authors: Kanellos D, Moesta KT, Schug-Pass C, Kockerling F

Publication Date: 2011

PMID: 20309806

Abstract

INTRODUCTION: Suture-based hiatoplasty is associated with a high recurrence rate. Using meshes of different shapes and materials to reinforce these sutures reduces the risk of recurrences. On the other hand morbidity attributable to the suture and tack fixation of these meshes has been observed during the development phase of these techniques. Moreover, there are some experimental and clinical data about mesh migration into the oesophageus. For this reason we analysed the outcome of our patients who underwent a mesh-reinforced hiatoplasty with a lightweight titanised polypropylene mesh fixed by fibrin glue. PATIENTS AND METHODS: All the patients who under-went a mesh-reinforcement between 3 / 2006 and 12 / 2007 were collected retrospectively. The hiatoplasty was reinforced by means of a lightweight titanised polypropylene mesh that had been designed especially for that purpose (TiSure, GfE). Mesh fixation was performed with 2 mL of fibrin glue (Tissucol, Baxter). Postoperative data were elucidated for all patients via their general practitioner or by interviewing the patients by telephone using a dedicated questionnaire. RESULTS: 26 patients with a median age of 58 years and a median BMI of 27.5 kg / m2 underwent laparoscopic mesh-reinforced hiatoplasty. There were 15 axial and 11 paraoesophageal hernias, in 5 cases with upside-down stomach and in 4 cases recurrent hernias. 15 patients underwent an additional dorsal 270degree-fundoplication, the remaining 11 patients had a fundophrenicopexy, with conversion taking place in 2 cases. The median follow-up was 34.3 months. 3 patients suffered from dysphagia, 1 of them had to be re-operated and has been free of symptoms since then. 2 patients suffered from mild gastrooesophageal reflux which was treated conservatively. So far no mesh migration and no recurrences have been seen. CONCLUSIONS: Despite the short observation time, this study indicates the patients are not exposed to any danger by the lightweight titanised polypropylene mesh. Moreover, the mesh appears to enhance hiatorrhaphy safety even in the presence of extensive hiatal hernias as well as in the case of an upside-down stomach.

Evaluation of acute fixation strength for mechanical tacking devices and fibrin sealant versus polypropylene suture for laparoscopic ventral hernia repair.

Authors: Melman L, Jenkins ED, Deeken CR, Brodt MD, Brown SR, Brunt LM, Eagon JC, Frisella M, Matthews BD

Publication Date: 2010

PMID: 20817641

Abstract

BACKGROUND: The purpose of this comparative study is to evaluate the acute fixation strength of mechanical tacking devices and fibrin sealant against polypropylene suture for laparoscopic ventral hernia repair. METHODS: Three metallic mechanical tacking devices (ProTack, Salute, EndoANCHOR), 4 absorbable tacking devices (AbsorbaTack, PermaSorb, I-Clip, and SorbaFix), and 2 types of fibrin sealant (Tisseel, Artiss) were compared with 0-polypropylene suture. Three constructs from each device or an amount of sealant sufficient to cover a 3 x 3 cm(2) area were used to affix a 4 x 3 cm piece of absorbable barrier-coated mesh (Proceed, Ethicon, Inc) to the peritoneal surface of porcine abdominal wall. Ten samples were completed for each fixation modality. Acute fixation strength was measured via a lap shear test on an Instron tensiometer. RESULTS: Acute fixation strength was significantly greater for suture (59.7 7.2 N) compared with all laparoscopic tacking devices and to fibrin sealant ($P < .001$ for all comparisons). Protack (29.5 +/- 2.8 N) was stronger than Absorbatack (13.2 +/- 3.7 N; $P = .029$). Protack, Permasorb, SorbaFix, and I-clip were stronger than fibrin sealant ($P < .05$ for all comparisons). CONCLUSIONS: The acute fixation strengths of metallic or absorbable tacks as well as fibrin sealant are all significantly less than that achieved with polypropylene suture. These factors should be considered in selecting the type of mechanical fixation for patients undergoing laparoscopic ventral hernia repair.

Fibrin sealant for mesh fixation in endoscopic inguinal hernia repair: is there enough evidence for its routine use?. [Review]

Authors: Schafer M, Vuilleumier H, Di Mare L, Demartines N

Publication Date: 2010

PMID: 20729686

Abstract

Fibrin sealing has recently evolved as a new technique for mesh fixation in endoscopic inguinal hernia repair. A comprehensive Medline search was carried out evaluating fibrin sealant for mesh fixation, and finally 12 studies were included (3 randomized trials, 3 nonrandomized trials, and 6 case series). The trials were assessed for operative time, seroma formation, recovery time, recurrence rate, and acute and chronic pain.There was a trend toward decreased operative times for fibrin sealing compared with mechanical stapling; however, the results for seroma formation remained contradictory. The most important finding was the reduced postoperative pain. Recovery times were lower after fibrin sealing and the recurrence rates showed no differences.Fibrin sealing for mesh fixation in the endoscopic inguinal hernia surgery is a promising alternative to mechanical stapling, which can be safely applied. As the overall quality of published data remains poor, further well-designed studies are needed until fibrin sealing can replace mechanical stapling as a new standard for mesh fixation.

Inguinal-scrotal hernias in young patients: is laparoscopic repair a possible answer? Preliminary results of a single-institution experience with a transabdominal preperitoneal approach.

Authors: Agresta F, Mazzarolo G, Balbi P, Bedin N

Publication Date: 2010

PMID: 20490584

Abstract

OBJECTIVES: The laparoscopic trans-abdominal preperitoneal (TAPP) approach to inguinal hernia repair is well documented as an excellent choice in numerous studies, especially when conducted by an experienced surgeon. Its full list of specific indications is still under debate. Generally, the repair of scrotal hernias demands a higher level of experience on the part of the surgeon, irrespective of the applied surgical technique. In this report, we evaluate our preliminary experience of TAPP laparoscopic repair for inguinoscrotal hernias in young patients in a Community Hospital setting, focusing on the feasibility of the technique and the incidence of complications. MATERIALS AND METHODS: Between January 2008 and January 2009 a total of ten consecutive young patients at the "Civil Hospital" in Vittorio Veneto (TV), underwent TAPP laparoscopic repair of bilateral inguinoscrotal hernias. RESULTS: The overall mean operative time was 65 (+/-15) min. All procedures were performed on a day surgery basis. There were no conversions to open repair, no mortality/morbidity or relapsing hernias. The mean follow-up was 14 (+/-2) months. No patients reported severe pain at 10 days, There were no reports of night pain at 30 days. All patients had a return to physical-work capacity within 14 days. All patients were completely satisfied at the 3-month follow up. CONCLUSIONS: Analysis of the short-term post-operative outcomes of our experience enabled us to conclude that, in the proper setting, TAPP can be performed for inguinoscrotal hernia repair with an efficiency comparable to that of normal inguinal hernia repair.

Mesh fixation with fibrin glue (Tissucol/Tisseel) in hernia repair dependent on the mesh structure--is there an optimum fibrin-mesh combination?--investigations on a biomechanical model.

Authors: Schug-Pass C, Lippert H, Kockerling F

Publication Date: 2010

PMID: 19184090

Abstract

BACKGROUND: Because of its hemostatic and adhesive properties, fibrin glue has been used in many areas of surgical treatment in recent years. One example is hernia repair, where fibrin gluing has become increasingly established as an alternative method for mesh fixation. Clinically, fixation with fibrin glue shows a reduced postoperative complication rate compared to other fixation methods (staples, sutures), particularly with regard to pain. MATERIALS AND METHODS: Six different lightweight meshes were tested: TiMesh light, TiMesh extralight, Parietene light, Ultrapro, Optilene LP,

and BARD Soft Mesh. Two millimeters Tissucol was used for fixation. Five meshes from each group were tested on muscular tissue with and without fibrin glue. The defined defect was 4.5 cm in diameter. The biomechanical measurements were taken in a standardized way using a materials testing machine. The minimum fixation strength required was 32 N, calculated from a corresponding model. RESULTS: The fixation strength measurements without fibrin glue gave a mean value for all 30 meshes of 2.98 N with a SD of 0.92 N. This was far below the 32 N required. With fibrin glue, the mean of all the measurements (30 meshes) was 61.86 +/- 23.0 N (min 34.9 N, max 97.3 N). The lowest value was recorded for Ultrapro (34.9 +/- 12.5 N). All the other meshes had a significantly higher fixation strength when fixed with fibrin glue than Ultrapro ($p = 0.001$). The best results were found for Optilene LP, and this was significantly better than all the other meshes (97.3 +/- 8.9 N; $p < 0.001$). CONCLUSION: Given the adequate stability and superior biocompatibility of lightweight large pore monofilament polypropylene meshes, heavyweight polypropylene meshes should no longer be used. It is possible to achieve adequate fixation of the meshes using fibrin glue. However, careful consideration should be given to the particular structure of the mesh in each case. Not every mesh is equally suitable for this purpose.

Fibrin sealant (Tissucol) for the fixation of hiatal mesh in the repair of giant paraesophageal hernia: a case report.

Authors: Fortelny RH, Petter-Puchner AH, Glaser KS

Publication Date: 2009

PMID: 19542837

Abstract

INTRODUCTION: The use of hiatal meshes for the repair of giant paraesophageal hernias (GPH) is associated with a significantly decreased rate of recurrences compared with mesh free techniques. Many surgeons refrain from mesh implantation at the gastroesophageal junction owing to reported complications, such as mesh migration, strictures, and risks of tack or suture placement. This case report presents the laparoscopic application of a titanium-coated mesh (TiSure, GfE, Germany) designated for hiatal repair, with fibrin sealant fixation (Tissucol, Baxter, Austria) in a patient with GPH. METHODS: A patient (male, 59 y) presented at our outpatient department with a 3-year history of epigastric pain and decreasing lung capacity. A GPH with an intrathoracic upside-down stomach had already been radiologically diagnosed 3 years before admission. In elective laparoscopy, the stomach was repositioned and the crura of the diaphragm were approximated with nonresorbable sutures. The defect was reinforced with a preshaped titanium-coated mesh and fibrin sealant (2 mL) applied with a 45 degree angled tip laparoscopic spraying device. No perforating fixation device was used for mesh fixation itself. The patient was discharged on the seventeenth postoperative (postOP) day. The clinical follow-up included the assessment of postOP pain with a visual analog score and a confirmative computed tomography scan 6 months after surgery. RESULTS: The patient has fully recovered, showing no recurrence or adverse effects 1 year postOP. DISCUSSION: Based on previous good results from own experimental trials, the mesh sealing approach in hiatal hernia repair was performed clinically, yielding an excellent result in this case. Multicenter trials to assess the full impact of FS mesh fixation in combination with macroporous hiatal meshes seem mandatory.

Laparoscopic intraperitoneal mesh fixation with fibrin sealant (Tisseel) vs. titanium tacks: a randomised controlled experimental study in pigs.

Authors: Eriksen JR, Bech JI, Linnemann D, Rosenberg J

Publication Date: 2008

PMID: 18483783

Abstract

BACKGROUND: The main reason for hospital stay after laparoscopic ventral hernia repair (LVHR) is probably pain, which also causes a lengthening of the patient's time to assume normal daily activities and work. It is likely that titanium tacks may be the main contributing factor to early (and maybe chronic) pain after LVHR. Therefore, non-invasive and patient-friendly mesh fixation methods must be considered. The present study was designed to investigate the technical applicability, safety and effect of Tisseel for intraperitoneal mesh fixation. METHODS: Nine 40-kg Danish Landrace female pigs had two pieces of MotifMESH and two pieces of Proceed mesh fixed in the intraperitoneal position by a laparoscopic technique. The two pieces of the same mesh were fixed with fibrin glue (Tisseel) and titanium tacks, respectively. All pigs were euthanised on the 30th postoperative day and the mesh-tissue samples were tested for strength of ingrowth (peel test), adhesion formation, mesh shrinkage and examined for histological alterations. RESULTS: No meshes were displaced from their initial position at autopsy, but we observed two cases of mesh folding that could have resulted in hernia recurrence in real patients. There were no significant differences in the strength of ingrowth between different mesh types or fixation methods, measured as peel work per area of mesh (J/m2) and peak force per width of mesh (Nmax/cm). The Proceed mesh shrank by 11% compared to 4% for the MotifMESH mesh ($p = 0.002$). There was no difference in the grade of adhesions (%) between fixation methods ($p = 0.794$) or different mesh types ($p = 0.296$). In the same fashion, there was no difference in the strength of adhesions (grades 0-4) between the two fixation methods or different mesh types ($p > 0.5$, chi2 test). There was no significant difference in the formation of fibrosis or inflammation between the different meshes or fixation methods. All samples showed significant foreign-body reaction with giant cells. CONCLUSION: Our results suggest that the laparoscopic fixation of an intraperitoneal mesh with Tisseel is safe and technically feasible in a pig model. There is still no evidence that fibrin-sealing alone is appropriate for intraperitoneal mesh fixation in hernia repair, but the technique might become an alternative or supplement to mechanical mesh fixation. Until then, further experimental research in animal hernia models with larger meshes is needed, especially with a focus on mesh folding and displacement.

Comparing fibrin sealant with staples for mesh fixation in laparoscopic transabdominal hernia repair: a case control-study.

Authors: Ceccarelli G, Casciola L, Pisanelli MC, Bartoli A, Di Zitti L, Spaziani A, Biancafarina A, Stefanoni M, Patriti A

Publication Date: 2008

PMID: 17623245

Abstract

BACKGROUND: Laparoscopic hernia repair is not as popular as cholecystectomy. We have performed more than 3,000 laparoscopic herniorrhaphies using the trans-abdominal (TAPP) technique. To prevent recurrences we fix the polypropylene mesh with staples. The use of fibrin glue for graft fixation is a possible alternative. METHODS: We have performed 3,130 laparoscopic hernia repairs over 14 years. For mesh fixation we used titanium clips and observed a small number of complications. In July 2003 we started using fibrin glue (Tissucol(R)). The purpose of this retrospective longitudinal study was to evaluate if the use of fibrin sealant was as safe and effective as conventional stapling and if there were differences in post-operative pain, complications and recurrences. RESULTS: From July 2003 to June 2006 we performed 823 laparoscopic herniorrhaphies. Fibrin glue (Tissucol(R)) was used in 88 cases. Two homogeneous groups of 68 patients (83 cases) treated with fibrin glue and 68 patients (87 cases) where the mesh was fixed with staples, were compared. Patients with relevant associated diseases or large inguino-scrotal hernias were excluded. Operative times were longer in the group treated with fibrin glue with a mean of 35 minutes (range 22-65 mins) compared to the group treated with staples (25 minutes, range 14-50 mins). The time of hospital stay was the same (24 hours). Post-operative complications, that were more frequent in the stapled group, included trocar site pain, hematomas, intra-operative bleedings and incisional hernias. No significant difference was observed concerning seromas, chronic pain and recurrence rate. CONCLUSIONS: Less post-operative pain, and a faster return to usual activities are the main advantages of laparoscopic repair compared to the traditional approach. The use of fibrin sealant reduces in our experience the risk of post- and intra-operative complications such as bleeding and incisional hernia; recurrence rates are similar, but the operative time is longer.

Biomechanical analyses of mesh fixation in TAPP and TEP hernia repair.

Authors: Schwab R, Schumacher O, Junge K, Binnebosel M, Klinge U, Becker HP, Schumpelick V

Publication Date: 2008

PMID: 17623239

Abstract

BACKGROUND: Reliable laparoscopic fixation of meshes prior to their fibrous incorporation is intended to minimize recurrences following transabdominal preperitoneal hernia repair (TAPP) and totally extraperitoneal repair (TEP) repair of inguinal hernias. However, suture-, tack- and staple-based fixation systems are associated with postoperative chronic inguinal pain. Initial fixation with fibrin sealant offers an atraumatic alternative, but there is little data demonstrating directly whether fibrin-based mesh adhesion provides adequate biomechanical stability for repair of inguinal hernia by TAPP and TEP. METHODS: Using a newly developed, standardized simulation model for abdominal wall hernias, sublay repairs were performed with six different types of commercially available hernia mesh. The biomechanical stability achieved, and the protection afforded by the mesh-hernia overlap, were compared for three different techniques: nonfixation, point-by-point suture fixation, and fibrin sealant fixation. RESULTS: Mesh dislocation from the repaired hernia defect was consistently seen

with nonfixation. This was reliably prevented with all six mesh types when fixed using either sutures or fibrin sealant. The highest stress resistance across the whole abdominal wall was found following superficial fixation with fibrin sealant across the mesh types. There was a highly statistically significant improvement in fixation stability with fibrin sealant versus fixation using eight single sutures ($p = 0.008$), as assessed by the range of achievable peak pressure stress up to 200 mmHg. CONCLUSIONS: To ensure long-term freedom from recurrence, intraoperative mesh-hernia overlap must be retained. This can be achieved with fibrin sealant up to the incorporation of the mesh - without trauma and with biomechanical stability.

Use of human fibrin glue (tissucol) versus staples for mesh fixation in laparoscopic transabdominal preperitoneal hernioplasty.

Authors: Fortelny RH, Glaser KS, Petter-Puchner AH

Publication Date: 2007

PMID: 17968186

Abstract

Not Available

Re: Spray application of fibrin glue as risk factor for subcutaneous emphysema in laparoscopic transabdominal inguinal hernia repair.

Authors: Agresta F

Publication Date: 2007

PMID: 17581477

Abstract

Not Available

Randomized clinical trial of Lichtenstein's operation versus mesh plug for inguinal hernia repair (Br J Surg 2007; 94: 36-41).

Authors: Muzi MG, Nigro C, Cadeddu F, Andreoli F, Farinon AM

Publication Date: 2007

PMID: 17443861

Abstract

Not Available

Preliminary experience using fibrin glue for mesh fixation in 250 patients undergoing minilaparoscopic transabdominal preperitoneal hernia repair.

Authors: Santoro E, Agresta F, Buscaglia F, Mulieri G, Mazzarolo G, Bedin N, Mulieri M

Publication Date: 2007

PMID: 17362171

Abstract

PURPOSE: Fibrin glue for mesh fixation has been proposed to prevent the risk of nerve injury in inguinal hernia repair. We retrospectively evaluated a series of 250 patients who underwent minilaparoscopic transabdominal preperitorneal (miniTAPP) hernioplasty (using trocars, optics, and instruments <10 mm in diameter) in whom mesh fixation was achieved using 2 mL of fibrin glue. We considered the feasibility of the technique and the incidence of complications, especially those possibly related to mesh fixation. We also compared the results with an earlier series of 245 patients in whom tacks were used to fix the mesh. MATERIALS AND METHODS: Between April 2004 and November 2005, 250 patients underwent bilateral or unilateral miniTAPP hernioplasty with instruments, optics, and trocars smaller than 10 mm and meshes fixed by fibrin glue. RESULTS: The mean overall operative time was 52.25 +/- 15.2 min. All the procedures were done as day surgeries. We registered one intraoperative bladder lesion and 15 cases of seroma. There were no relapses, prosthesis rejection, or infection. The mean follow-up was 13.2 +/- 6.1 months (range, 5-24 months). CONCLUSION: On the basis of our initial experience, miniTAPP hernioplasty with a fibrin glue is feasible, effective, and easy to perform in experienced hands, with good results without higher risk of recurrence. In addition, the fibrin fixation method seems to decrease postoperative neuralgia and reduced the incidence of postoperative seromas and hematomas.

Experimental comparison of type of Tissucol dilution and composite mesh (Parietex) for laparoscopic repair of groin and abdominal hernia: observational study conducted in a university laboratory.

Authors: Olmi S, Addis A, Domeneghini C, Scaini A, Croce E

Publication Date: 2007

PMID: 17297571

Abstract

PURPOSE: The primary objective of this observational study was to determine the best possible dilution of fibrin glue (Tissucol) to employ for prosthesis fixing in laparoscopic treatment of abdominal wall defects and, secondly, to assess its feasibility and safety. MATERIALS AND METHODS: This study was carried out in a university experimental animal laboratory in accordance with all international laws, ethics regulations and quality criteria associated with animal experiments. The tests were carried out on two pigs, using four samples of mesh (Parietex). All meshes were fixed using two different Tissucol dilutions (standard with distilled water and that with calcium chloride). Follow-up evaluations were at 15 days after 30 days, with the latter consisting of traction tests and a biopsy for histological analysis. RESULTS: No post-operative complications were observed. The collagen-coated polyester meshes showed 0% adhesions, and reperitonealization had ensued after 15 days. We saw no shrinkage or migration of any of the meshes. Histopathological analyses confirmed a greater stability, greater tissue integration and the largest number of fibroblasts in meshes fixed with a 1/10 Tissucol dilution without calcium chloride. CONCLUSIONS: This observational study using animals showed that the 1/10 standard dilution - not that with calcium chloride - provided the best fixation and integration and prevented the formation of intraperitoneal adhesions, provided a hydrophilic collagen film-covered mesh was used.

Fibrin sealant for mesh fixation in Lichtenstein repair: biomechanical analysis of different techniques.

Authors: Schwab R, Schumacher O, Junge K, Binnebosel M, Klinge U, Schumpelick V

Publication Date: 2007

PMID: 17252181

Abstract

BACKGROUND: Mesh fixation using sealants is becoming increasingly popular in hernia surgery. Fibrin sealant is an atraumatic alternative to suture or stapler fixation and is currently the most frequently used sealant. There are currently no biomechanical data available for evaluation of the quality of adhesion achieved with fibrin sealant during Lichtenstein hernia repair. METHODS: Five different suture and sealant techniques were evaluated and compared during simulated Lichtenstein hernia repair in an established, standardised biomechanical model for abdominal wall hernias. RESULTS: Significantly greater stability was achieved with fibrin sealant fixation of meshes than with point-by-point suture fixation. Fibrin adhesion protected meshes from dislocation at least as well as suture fixation with additional running-suture closure of the hernia orifice. Fibrin mesh fixation combined with additional support from running-suture hernia closure was significantly ($P < \text{or} = 0.002$) superior to all other methods. CONCLUSIONS: On the basis of these favourable biomechanical properties, mesh fixation using fibrin sealant can be recommended for use in onlay repair of transinguinal hernias.

Use of human fibrin glue (Tissucol) versus staples for mesh fixation in laparoscopic transabdominal preperitoneal hernioplasty: a prospective, randomized study.

Authors: Lovisetto F, Zonta S, Rota E, Mazzilli M, Bardone M, Bottero L, Faillace G, Longoni M

Publication Date: 2007

PMID: 17245175

Abstract

OBJECTIVE: The aim of this study was to compare the morbidity of fixation of prosthetic meshes using Tissucol fibrin glue versus staples in laparoscopic transabdominal preperitoneal (TAPP) repair of inguinal and femoral hernias. SUMMARY BACKGROUND DATA: In patients undergoing laparoscopic hernia repair, fixation of mesh prostheses with staples may affect inguinocrural nerves causing early postoperative neuralgia and chronic neuralgia. METHODS: Between June 2003 and February 2005, 197 patients with inguinal or femoral hernia were enrolled in this prospective, randomized study, to assess morbidity following hernia repair with staples (n = 98) or Tissucol (n = 99). The primary outcomes were early postoperative and late neuralgia recorded using a visual analog scale (VAS). The effects of neuralgia on functional status were evaluated using the modified SF-36 questionnaire. Secondary outcomes included complications such as nonspecific pain and recurrence. RESULTS: Assessments took place at 1, 3, 6, and 12 months, with all patients completing each follow-up visit. Mean VAS scores were significantly lower in the Tissucol group versus the staples group (MANOVA, $P < 0.05$). Higher scores for the modified SF-36 questionnaire at 1 month were demonstrated in the Tissucol group compared with the staples group (23.2 and 22.6, respectively; $P < 0.05$). The mean recovery time for normal physical activity was significantly shorter in the Tissucol group compared with the staples group (7.9 vs. 9.1 day, respectively; $P < 0.001$). One recurrence was seen in the fibrin glue group, which was attributable to a technical error in fixation of the mesh. CONCLUSIONS: The use of Tissucol provides distinct advantages in laparoscopic treatment of inguinal/femoral hernias compared with conventional TAPP, including a lower incidence of postoperative neuralgia and an earlier resumption of physical and social activities.

Use of fibrin glue (Tissucol) in laparoscopic repair of abdominal wall defects: preliminary experience.

Authors: Olmi S, Scaini A, Erba L, Croce E

Publication Date: 2007

PMID: 17177079

Abstract

INTRODUCTION: The aim of this study was to establish the efficacy and tolerability of human fibrin glue (Tissucol) for the nontraumatic fixation of a composite prosthesis (Parietex) in the laparoscopic repair of small to medium-sized incisional hernias and primary defects of the abdominal wall. MATERIALS AND METHODS: From October 2003 to October 2005, 40 patients underwent laparoscopic repair at the hands of one surgeon with expertise in laparoscopic surgery; all meshes were implanted in an intraperitoneal position. Follow-up visits were scheduled for 7 days and 1, 6, and 12 months. These included assessments for pain and postoperative complications. RESULTS: Forty patients (24 females, 16 males) with a mean age of 50 years (range, 26-65 years) and a mean Body Mass Index (BMI) of 27 (range 25 to 30) were included in the study. Sixteen patients had incisional hernias, and 24 had primary defects. The size of the defects varied from 2 to 7 cm. Adhesiolysis was necessary in 92.5% of cases (25/40). There were no intraoperative complications or conversions. After a mean follow-up of 16 months (range, 3-24 months), no postoperative complications were observed. The mean surgical intervention time was 36 min (range, 12-40 min), with an average hospitalization time of 1 day. CONCLUSIONS: The use of fibrin glue in the present study provided stable and uniform fixation of the prosthesis and minimized intraoperative and postoperative complications. Consequently, laparoscopic treatment of small to medium-sized abdominal defects using this approach is our therapeutic option of choice.

Fibrin glue for mesh fixation in laparoscopic transabdominal preperitoneal (TAPP) hernia repair: indications, technique, and outcomes.

Authors: Olmi S, Erba L, Bertolini A, Scaini A, Croce E

Publication Date: 2006

PMID: 17063297

Abstract

BACKGROUND: The efficacy and safety of prosthesis fixation were studied by means of fibrin glue (Tissucol, Baxter Healthcare) during laparoscopic transabdominal preperitoneal (TAPP) treatment of inguinal and femoral hernias. METHODS: Between September 2001 and December 2004, fibrin glue was used for mesh fixation during TAPP. RESULTS: In this study, 320 hernias were treated for 230 patients (225 men and 5 women) with an average age of 45 years (range, 20-75 years). No perioperative complications were observed. After an average follow-up period of 26 months (range, 1-40 months), the only postoperative complications observed were six seromas (1.8%) and one trocar-site hematoma (0.3%). The mean operating time was 30 min for unilateral hernias and 50 min for bilateral hernias, whether primary or recurrent. Patients usually were discharged the day after surgery and returned to work after 5 days. CONCLUSIONS: The authors' experience demonstrates that fibrin glue (Tissucol) is an effective method for mesh fixation during TAPP.

Autologous fibrin sealant (Vivostat) for mesh fixation in laparoscopic transabdominal preperitoneal hernia repair.

Authors: Schmidt SC, Langrehr JM

Publication Date: 2006

PMID: 17001576

Abstract

BACKGROUND AND STUDY AIMS: The use of fibrin glue derived from humans or animals has been reported as an alternative method of mesh fixation, instead of staples, in inguinal hernia repair. However, fibrin sealants involve the potential risks of virus transmission or immunological reactions to foreign proteins. This risk could be avoided by using autologous fibrin derived from the patient. A feasibility study on the use of autologous fibrin was therefore carried out in patients undergoing laparoscopic transabdominal inguinal hernia repair. PATIENTS AND METHODS: In a series of 10 patients undergoing laparoscopic transabdominal inguinal hernia repair, autologous fibrin was produced from 120 ml of the patient's blood during the hernia repair. The process took an average of 20 min. The perioperative and postoperative results were compared with those in a control group of 20 patients in whom conventional fibrin was used. RESULTS: Producing and applying the autologous fibrin was uncomplicated. No differences in the outcome were observed between the two groups. One patient in the conventional fibrin group developed a seroma. None of the patients reported persistent pain. No recurrences were observed after a mean follow-up period of 9 months (range 6 - 12 months) in the conventional fibrin group and 7 months (range 6 - 8 months) in the autologous fibrin group. CONCLUSIONS: This feasibility study suggests that autologous fibrin sealant allowed adequate mesh fixation that did not differ from that in a control group in whom conventional fibrin glue was used. Autologous fibrin may be an interesting alternative for a variety of laparoscopic and endoscopic applications.

Less chronic pain following mesh fixation using a fibrin sealant in TEP inguinal hernia repair.

Authors: Schwab R, Willms A, Kroger A, Becker HP

Publication Date: 2006

PMID: 16554980

Abstract

Endoscopic hernia repair methods have become increasingly popular over the past 15 years. The postulated main advantages of the endoscopic technique are less postoperative pain, early recovery and lower recurrence rates. Fixation of the endoscopic mesh seems to be necessary to minimize the risk of recurrence. Stapling has been implicated to cause chronic inguinal pain syndromes. We performed a retrospective study on male patients who were endoscopically operated on primary inguinal hernias. Our aim was to clarify whether mesh fixation using a fibrin sealant is as safe and reliable as conventional stapling. Additionally, we compared the prevalence of chronic inguinal pain. A standardized population of 133 male patients (mean age 55.9 years) with 186 (80 unilateral; 53 bilateral) consecutive primary laparoscopic total extraperitoneal inguinal hernia repairs was assigned to two groups, depending on whether stapling or a fibrin sealant had been used for mesh fixation. A retrospective case control study was performed to conduct statistical analysis based on the following

parameters: recurrence, complications, chronic inguinal pain, foreign body sensation and numbness. Hernia repairs numbering 173 (staples n=87; fibrin n=86) were followed up for a mean duration of 23.7 (11-47) months. The prevalence of chronic inguinal pain was significantly (P=0.002; Fisher exact test) higher in the stapled group-20.7% than in the fibrin sealant group with a prevalence of 4.7%. In terms of recurrence rate, complications and foreign body sensation, fewer patients were affected in the fibrin group than in the reference population, although the differences were not statistically significant. There were no major complications in either of the groups. The mean postoperative stay in hospital was 1.4 days. Fibrin sealing is as effective as stapling in providing secure mesh fixation. The fibrin group displayed a statistically significant lower prevalence of chronic pain syndromes. Mesh sealing provides adequate fixation and reduces the risk of chronic inguinal pain as a complication of the intervention.

[Use of fibrin glue (Tissucol) for mesh fixation in laparoscopic transabdominal hernia repair]. [Italian]

Authors: Olmi S, Erba L, Bertolini A, Scaini A, Mastropasqua E, Conti M, Croce E

Publication Date: 2005

PMID: 16400772

Abstract

The aim of this study was to demonstrate the efficacy and safety and report the results of prosthesis fixation by means of fibrin glue during laparoscopic treatment of inguinal and femoral hernias. From September 2001 to December 2004 we employed fibrin glue (Tissucol, Baxter, Maurepas) as a means of fixation during a transabdominal preperitoneal procedure in 230 patients (225 M, 5 F) with an average age of 45 years (range: 20-75) presenting a total of 320 hernias: 140/230 (60.8%) were monolateral and 90 (39.2%) bilateral; 267/320 hernias (83.6%) were primary and 53 (16.4%) recurrent. We had no perioperative complications. After an average follow-up of 26 months (range: 1-40) the only postoperative complications we encountered were 6 seromas (1.8%) and 1 trocar-site haematoma (0.3%). None of the patients developed scrotal haematomas. None of the patients complained of immediate or subsequent paraesthesia or cruralgia. No recurrences have occurred to date. The mean operative time was 30 minutes for monolateral hernias (range: 15-45) and about 50 minutes for bilateral hernias (range: 30-75). This was true of both primary and recurrent hernias. Patients are usually discharged on day 1 postoperatively. In the absence of pain, working activities are resumed after 5 days and sports can be practiced after 10 days. In our experience, fibrin glue (Tissucol) is the best way of fixing the mesh during a transabdominal preperitoneal procedure. It is better than mechanical devices because, though guaranteeing prosthetic stability, it is completely non-traumatic and presents none of the problems of metal clips.

Laparoscopic bilateral hernia repair using fibrin sealant: technical report of two cases.

Authors: Topgul K, Anadol AZ, Gungor B, Malazgirt Z

Publication Date: 2005

PMID: 16366875

Abstract

Minimally invasive surgery is widely used in hernia repair given its advantages such as minimal disturbance to the surrounding tissues, shorter hospital stay, and promising long-term results. Efforts are still being made to make this minimally invasive procedure even more minimal. New tissue adhesives avoid the use of foreign materials and the postoperative pain that might be attributed to staples. We present the first two cases of bilateral inguinal hernia repair performed with a totally extraperitoneal procedure using fibrin sealant instead of staples for the fixation of the mesh.

Fibrin sealing versus stapling of hernia meshes in an onlay model in the rat.

Authors: Petter-Puchner AH, Fortelny R, Mittermayr R, Ohlinger W, Redl H

Publication Date: 2005

PMID: 16075158

Abstract

Incisional and inguinal hernia repair are among the most common procedures of general surgery. Mesh fixation by means of staples or sutures may lead to severe complications. The use of fibrin sealant (FS) has been suggested as alternative, but data on biocompatibility and adhesive strength of FS in combination with macroporous meshes is limited. Ventral hernia (n = 8 per group) was treated in rats in onlay technique with two types of meshes, fibrin sealed or stapled. TI-Mesh (TMxl) extralight and VYPROII (VPII) were tested 17 days post op. No failure in mechanical tests (tensile and burst strength) occurred in sealed or stapled meshes. Histology revealed equally good tissue integration and neovascularization in all groups. Fibrin sealant yields excellent fixation in experimental hernia repair. This rat model is suitable for testing meshes and fixation techniques.

Mesothelial cell sheets cultured on fibrin gel prevent adhesion formation in an intestinal hernia model.

Authors: Takazawa R, Yamato M, Kageyama Y, Okano T, Kihara K

Publication Date: 2005

PMID: 15869438

Abstract

In the present study, we examined a novel technique to prevent adhesion formation in a rat intestinal hernia model with mesothelial cell sheets cultured on fibrin gel. Mesothelial cells were obtained from isologous rats by enzymatic disaggregation of mesentery and cultured on fibrin gel. Electron microscopy revealed that these cultured cells form contiguous monolayer cell sheets with

well-developed microvilli. These tissue-engineered constructs were grafted in vivo to an intestinal hernia model that results in regular surgical adhesions without treatment. Five days postgrafting, rats were sacrificed. Adhesion formation was not observed in rats grafted with the constructs, whereas severe adhesions were observed in all control rats. Constructs seeded with mesothelial cells isolated from EGFP-transgenic rats clearly revealed that grafted mesothelial cells remained at the host tissue site even after fibrin scaffold degradation. These cells developed more abundant microvilli in vivo than those in vitro. These results show that cultured mesothelial cell sheets are effective in preventing adhesion formation and should reduce postoperative complications caused by adhesion formation.

Tisseel versus tack staples as mesh fixation in totally extraperitoneal laparoscopic repair of groin hernias: a retrospective analysis.

Authors: Topart P, Vandenbroucke F, Lozac'h P

Publication Date: 2005

PMID: 15759187

Abstract

BACKGROUND: The laparoscopic repair of groin hernias generally involves mesh fixation to avoid displacement and recurrence. Fixation usually uses staples that can lead to nerve injury and chronic postoperative pain. Laparoscopic repairs are associated with a risk of chronic pain of up to 22.5%. The use of fibrin glue (Tisseel) may represent an alternative method of mesh fixation preventing the risk of nerve injury. METHODS: Sixty-six patients had groin hernia repair using a totally extraperitoneal (TEP) laparoscopic procedure. Mesh fixation was achieved using 2 ml of fibrin glue. Comparison was made with an earlier series of 102 patients operated on according to the same procedure in which mesh fixation used tack staples. Complications, length of stay, recurrence, and postoperative chronic pain were assessed. RESULTS: No difference was found between the two series, except there was a significantly higher rate of postoperative chronic pain in the staples series (14.7 vs 4.5%, p = 0.037) and there was one recurrence (1.5%) in the fibrin glue group of patients. CONCLUSIONS: Fibrin glue achieved an adequate mesh fixation with a lower incidence of chronic postoperative pain. Although a prospective randomized study is needed, Tisseel appears to be an alternative to staples for mesh fixation and may help reduce the postoperative pain problems after hernia repair.

Tissucol application in dermolipectomy and incisional hernia repair.

Authors: Fernandez Lobato R, Garcia Septiem J, Ortega Deballon P, Martin Lucas FJ, Ruiz de Adana JC, Limones Esteban M

Publication Date: 2001

PMID: 12056469

Abstract

Biological adhesives have a lot of applications in surgical procedures. Here we present a prospective study with the aim of analyzing results of the application of Tissucol between the muscle layers and subcutaneous tissue after incisional hernia repair with polypropylene mesh and associated dermolipectomy. We assess clinical and technical parameters, local morbidity, and hospital stay. Fifty-six patients were divided into two groups. Patients with whom we used fibrin glue were older, with more obesity ($P < 0.005$) with associated diseases, and their incisional hernias were larger and more complicated to repair. Patients in the Tissucol group developed less local morbidity (hematomas or abscesses; $P < 0.01$), had a shorter mean hospital stay ($P < 0.01$), and required less wound care. The use of Tissucol improves the results of surgical repair of large abdominal incisional hernias repaired by mesh placement and dermolipectomy, and it decreases global morbidity and hospital stay are reduced.

Use of fibrin sealant for prosthetic mesh fixation in laparoscopic extraperitoneal inguinal hernia repair.

Authors: Katkhouda N, Mavor E, Friedlander MH, Mason RJ, Kiyabu M, Grant SW, Achanta K, Kirkman EL, Narayanan K, Essani R

Publication Date: 2001

PMID: 11141220

Abstract

OBJECTIVE: To evaluate the efficacy of mesh fixation with fibrin sealant (FS) in laparoscopic preperitoneal inguinal hernia repair and to compare it with stapled fixation. SUMMARY BACKGROUND DATA: Laparoscopic hernia repair involves the fixation of the prosthetic mesh in the preperitoneal space with staples to avoid displacement leading to recurrence. The use of staples is associated with a small but significant number of complications, mainly nerve injury and hematomas. FS (Tisseel) is a biodegradable adhesive obtained by a combination of human-derived fibrinogen and thrombin, duplicating the last step of the coagulation cascade. It can be used as an alternative method of fixation. METHODS: A prosthetic mesh was placed laparoscopically into the preperitoneal space in both groins in 25 female pigs and fixed with either FS or staples or left without fixation. The method of fixation was chosen by randomization. The pigs were killed after 12 days to assess early graft incorporation. The following outcome measures were evaluated: macroscopic findings, including graft alignment and motion, tensile strength between the grafts and surrounding tissues, and histologic findings (fibrous reaction and inflammatory response). RESULTS: The procedures were completed laparoscopically in 49 sites. Eighteen grafts were fixed with FS and 16 with staples; 15 were not fixed. There was no significant difference in graft motion between the FS and stapled groups, but the nonfixed mesh had significantly more graft motion than in either of the fixed groups. There was no significant difference in median tensile strength between the FS and stapled groups. The tensile strength in the nonfixed group was significantly lower than the other two groups. FS triggered a significantly stronger fibrous reaction and inflammatory response than in the stapled and control groups. No infection related to method of fixation was observed in any group. CONCLUSION: An adequate mesh fixation in the extraperitoneal inguinal area can be accomplished using FS. This method is mechanically equivalent to the fixation achieved by staples and superior to nonfixed grafts. Biologic soft fixation with FS will prevent early graft migration and will avoid the complications associated with staple use.

Prevention of subcutaneous seroma formation in open ventral hernia repair by using a new lowthrombin fibrin sealant.

Authors: Kohler G., Koch O., Emmanuel K.

Publication Date: 2014

PMID: 71550628

Abstract

Background: Seroma formation is a frequent postoperative complication following open ventral hernia repair (OVHR), especially in cases requiring wide subcutaneous dissection (WSD). The aim of this study was to evaluate the effectiveness of a new low- thrombin fibrin sealant for seroma prevention. Methods: Twenty consecutive patients with median incisional hernias who required OVHR with WSD > 100 cm^2 were included in the study. Ten patients comprised the fibrin glue group (FG) and received either a sublay mesh or an open intraperitoneal onlay mesh (IPOM) repair with ventral fascial closure, as well as a subcutaneous application of low- thrombin fibrin sealant. This cohort of patients was compared to a control group (CG) of 10 consecutive patients undergoing previously OVHR without prevention of seroma formation with regard to outcome measures such as seroma formations, wound complications, seroma aspirations or unplanned re-operations, and length of hospital stay. Results: Though the median extent of subcutaneous dead space was larger in the FG than in the CG (266 vs. 174 cm^2; $p = 0.012$) seroma formation occurred in none of the FG vs. 4 of the CG patients ($p = 0.003$). Postoperative complications occurred in 1of the FG vs. 4 of the CG patients ($p = 0.05$). Three patients of the CG and none of the FG required a re-operation within 30 days ($p < 0.001$). Conclusions: The use of a new low- thrombin fibrin glue demonstrated a protective effect against formation of seromas and decreased the rate of wound complications in OVHR.

Influence of fibrin sealant in preventing postoperative seroma and normalizing the abdominal wall after laparoscopic repair of ventral hernia.

Authors: Morales-Conde S., Suarez-Artacho G., Socas M., Barranco A.

Publication Date: 2013

PMID: 52490618

Abstract

Background: Seroma after laparoscopic ventral hernia repair (LVHR) has been related to certain complications of the technique, such as recurrences and postoperative pain. The aim of this study was to assess whether percutaneous application of fibrin sealant in the hernia sac after LVHR reduces the incidence and volume of the postoperative seroma, and to analyze whether the percentage of patients achieving complete normalization of the abdominal wall increases. Methods: Prospective and

comparative study. Patients were distributed into 2 control-case groups. Group 1 comprised patients submitted to LVHR using the double crown technique and a compressing bandage as the only method for prevent seroma. Group 2 comprised patients admitted to LVHR using the same technique together with percutaneous injection of fibrin sealant in the sac, and later applying the same bandage. Patients were examined clinically and radiologically at 7 days, 1 month, and 3 months after surgery. Results: Twenty-five patients were included in each group. There were significant differences in the incidence of seroma by the day 7 after surgery (92 % in group 1 vs. 64 % in group 2, p = 0.017) and by 1 month (72 % in group 1 vs. 28 % in group 2, p = 0.002). The difference was also significant regarding the achievement of normalization of the abdominal wall by day 7 (24 % in group 1 vs. 52 % in group 2, p = 0.041) and by month 1 (64 % in group 1 vs. 88 % in group 2, p = 0.047) after operation. Volume of seroma was larger among patients of group 1 after the week (p = 0.002) and 1 month after operation (p = 0.001). Conclusions: Fibrin sealant application after LVHR reduces the incidence and volume of the seroma 7 days and 1 month after surgery. The treated patients obtain a larger normalization of the abdominal wall 1 week and 1 month after the operation.

Simple technique to manage redundant skin after laparoscopic ventral hernia repair.

Authors: Karim M.A., Ali A.

Publication Date: 2013

PMID: 370142143

Abstract

The redundant skin left behind after laparoscopic ventral hernia repair overlies a dead space that is a potential site for seroma formation. This predisposes patients to surgical-site infection and compromises the cosmetic outcome of the procedure, which is a key feature of the minimally invasive approach. We present a simple technique to deal with this problem. This technique was used in six patients who underwent laparoscopic ventral hernia repair. Two patients were men and four were women. At the end of the procedure, glue (fibrin sealant) was injected in the dead space underneath the redundant skin and pressure was applied for some time; this attached the excessive skin to the underlying tissue. This obliterated the potential dead space, reducing the chances of seroma formation, and improved the cosmetic outcome of the procedure. Patients were reviewed 8 weeks after the procedure, and their body contours had returned to normal, with no skin redundancy. Minimally invasive surgery offers the advantage of a shorter hospital stay, faster recovery and improved cosmetic outcome, achieving better patient satisfaction as a result. This simple technique at the end of laparoscopic ventral hernia repair, in which the redundant skin is attached to the underlying tissue, improves the immediate postoperative cosmetic outcome and also obliterates any potential dead space for seroma formation.

Closure of ascites leaks with fibrin glue injection in patients with end-stage liver disease.

Authors: Sadik K.W., Laibstain S., Northup P.G., Kashmer D., Schmitt T.M., Bonatti H.J.R.

Publication Date: 2011

PMID: 362401499

Abstract

Background: Ascites leaks (AL) in patients with end-stage liver disease (ESLD) are associated with significant morbidity and mortality regardless if they are medically or surgically managed. Patients and Methods: In a pilot study, 14 ESLD patients with AL underwent treatment with fibrin glue injection around the leak after failing conservative therapy. The end point of this study was the cessation of AL in the short term and the maintenance of a leak-free abdomen in the long term, allowing for medical optimization of the patients. Results: Median age of the 10 men and 4 women was 50 (range 26-67) years. Underlying ESLDs were chronic hepatitis C (n=5), alcoholic LD (n=2), cryptogenic cirrhosis (n=2), and miscellaneous (n=5). There were six leaking incisions posthernia repair (three umbilical and three inguinal), two leaking/ruptured umbilical hernias, four leaking paracentesis sites, one leaking Jackson-Pratt (JP) drain canal, and one leaking laparoscopic trocar site. Average AL volume per day was 1000 (range 400-2000) mL. All leaks were immediately resolved with a 3-5 mL fibrin glue injection. Five recurred and required a second injection (four within 24 hours). Mental status improved in 7 patients (West Haven Criteria: grade II to I [n=6], grade III to I [n=1]). Median model of end-stage liver disease scores improved from 23 (range 8-33) to 20 (range 14-26). There were no infections, bleeds, or other injection-related complications. Average follow-up for these patients was 441.6 days (range 2-852). Five patients underwent liver transplant (LT) median 15 (range 4-270) days postinjection; 2 of them died. Another 3 patients died (2 from sepsis and 1 from metastatic cancer). Conclusion: Fibrin glue injection for the control of AL is a simple and safe bedside procedure that quickly controls AL, allowing for patient recovery in anticipation of further care.

[Fibrin sealant in tension free hernioplasty: our experience]. [Italian]

Authors: Benfatto G, Benfatto SM, Strazzanti A, Giovinetto RM, Jiryis A, Salina GM, Mugavero F, Zanghi G, Giovinetto A

Publication Date: 2006

PMID: 17147855

Abstract

The aim of this study was to prove that it is possible to fix mesh sutureless with Tissucol in the Lichtenstein procedure. The mesh fixation with Tissucol was done in 28 patients. Respect the traditional Lichtenstein technique, which was done in the remaining 28 patients, the advantages of using Tissucol are: no surgical trauma, total mesh fixation, no pain, reduced morbidity and reduced costs. Furthermore it is a safe and reproducible method. The results are promising, even if the verification goes more carried out with consisting casuistics and longer follow-up.