CMC GI Surgical Oncology Handbook

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Introduction

This handbook is designed for education and guidance of surgical trainees at Carolinas Medical Center.

Please forward corrections or suggestions to Jonathan.Salo@atriuhealth.org

Part I

Clinical Care

Chapter 1

CMC Inpatient

Colorectal Surgery (Davis/Kasten) and GI Surgical Oncology (Hill/Salo/Squires) will cover Pineville and CMC. For efficiency, the services at each hospital will merge for patient care. Each patient will continue to have an attending surgeon, but rounding and inpatient care will be provided by the service.

1.1 Admissions

Provider group: "GI Surg Onc Attending LCI CMC"

List Attending Surgeon in addition

Patient List is CMC GI Surgical Oncology

1.2 Rounds

Work rounds for both services (CR and SurgOnc) start at 6am in STICU or 11T. Service attendings will be updated after rounds.

1.3 Resident Epic teams:

- GI Surgical Oncology Colorectal LCI CMC
- Colorectal Surgery Pineville

It is critical that you notify service attendings before the start of the month to adjust the resident call schedule. Each "shift" is 5:50am to 6pm. At 6pm the resident Epic Teams will be forwarded to the night team.

Please append a text block to the bottom of each progress note specifying the Epic Team *GI Surgical Oncology Colorectal LCI CMC* for that patient to facilitate communication from nursing.

1.4 Consults

Established patients and directed should be discussed with the attending surgeon.

Unassigned Surgical Oncology: "GI Surg Onc Attending LCI CMC"

In general, benign colorectal consults are staffed by Dr Davis. Esophageal and GE junction staffed by Dr Salo. Adenocarcinoma of distal stomach: Drs Salo/Squires. For other consults, refer to the Epic On Call finder for "GI Surgical Oncology Colorectal Attending"

1.5 Postop Clinic Appt

Postoperative patients are generally seen for a Transition of Care visit within the first week

Discharge appointments are made by sending a message in Canopy the evening prior (preferred) OR the morning of discharge before 8am to:

- LCI CMC GI, Clerical
- Mychal Lacombe (Salo and Squires)
- Rebecca Wicks (Hill)
- Brandon Galloway

Please include the following information in the Epic Message:

- Name of attending
- Ward from which the patient is being discharged
- Desired date for appt @ same time
- Need for bloodwork at first visit
- Other studies to be done after discharge
  - Upper GI
  - Chest X-ray
  - Modified Barium Swallow

Clinic RNs can be reached at: (Hill) 980-442-6146 or (Salo and Squires) 980-442-6143.

For patients likely to go home over the weekend or holidays, please plan to send a canopy message before 3pm on Friday or the day prior.

The scheduler will respond with a message to the discharging resident AND to the ward CNL with the appointment time, which can be included within the discharge summary. Copies of the message will also be sent to clinical nurse leaders:

- 11Tower: Sharon Hood

1.6 Conferences

- GI Tumor Planning Conf Mon 7-8am (via Teams and LCI I 3rd floor Conf Rm)
- Resident Teaching Conf Tues 7-8am 5th floor LCI II. Please review the upcoming clinic schedule and choose a case to present.
- Bone and Soft Tissue Conf Fri 7-8am (via Teams)

1.7 Medicine Consults

For medicine consults, please use "CHG Service Hospitalists CMC" for all *new* consult requests as of 11/2023 due to merging of CHG and Staff Medicine services.

Chapter 2

Pineville Inpatient

2.1 Rounds

Starting time for rounds is variable from day to day. Maddie Georgino will help organize work and timing of rounds, etc.

2.2 Resident Epic teams:

- Colorectal Surgery Pineville

Residents will be assigned to Epic teams by schedule. It is critical that you notify service attendings before the start of the month to adjust the resident Epic schedule. Each "shift" is 5:50am to 6pm. At 6pm the resident Epic Teams will be forwarded to the night team.

Please append a text block to the bottom of each progress note specifying the Epic Team for that patient to facilitate communication from nursing.

2.3 Consults

Established patients and directed should be discussed with the attending surgeon.

2.4 Postop Clinic Appts

Postoperative patients are generally seen for a Transition of Care visit at about two weeks.

Discharge appointments are made by sending a message in Canopy the evening prior (preferred) OR the morning of discharge before 8am to:

- Hale Mock
- Kamisha Wilson
- Madeline Georgino

Please include the following information in the Canopy Message:

- Name of attending
- Ward from which the patient is being discharged
- Desired date for appointment
- Need for Wound Ostomy RN appointment at same time (essential for new stomas)
- Need for bloodwork at first visit
- Other studies to be done after discharge
  - Upper GI
  - Chest X-ray

For patients likely to go home over the weekend or holidays, please plan to send a canopy message before 3pm on Friday or the day prior.

2.5 Conferences

- GI Tumor Planning Conf Monday 7-8am (Teams)
- Resident Teaching Conf 7-8am in Conference Room. Please review the upcoming clinic schedule and choose a case to present.
- Bone and Soft Tissue Conference Friday 7-8am (Teams)

Chapter 3

Rounds

The following format will help speed communication of data on rounds.

ID: One line description: "Mr Glenn: PostOp day 3 after low anterior resection"

24 hour events: Summary of important events in prior 24 hrs

Data Communication (organized by system)

Neuro: Pain control, level of alertness, psychotropic meds, sedatives, and pain meds.

CardioVascular: Vital signs (normal OR cite the range of systolic blood pressures and range of heart rate). Heart rhythm. Cardiac meds. Most recent recommendations of cardiology consult.

Respiratory: Pulmonary exam, oxygen saturation, supplied oxygen, ventilator setting. Results of CXR.

GI: Diet, bowel function, NG output. Drain outputs can often be summarized unless they are unusually high or low (and ready to be removed. New finding of bile in any abdominal drain needs special emphasis. GI meds (eg protonix, Entereg). Tube feed formula, rate and duration (continuous or nocturnal). Status of C Diff tests. Results of JP drain amylase levels (gastroesophageal patients). Results of JP triglycerides or creatinine, if sent,

Renal: Urine output in 24 hours AND in most recent 8 hour shift. Presence (or absence) of Foley catheter and plans for removal, if present. Most recent creatinine. If diuretics administered, dosage and amount of urine output during the shift when it was administered. Most recent potassium in any patient receiving (or about to receive) furosemide (Lasix). Results of Mg and Phos if abnormal.

Heme: Hemoglobin, platelets, DVT prophylaxis. PLEASE CHECK THE MAR SUMMARY DAILY to be certain that the ordered DVT prophylaxis has been given.

ID: WBC, Tmax in past 24 hours, culture results.

Endo: Diabetic regimen, blood sugar range, and amount of sliding scale insulin administered in the prior 24 hours.

Assessment/Plan (organized by Problem List):

Each of the patients problems are addressed with an assessment and plan. Pre-existing medical problems and postoperative complications need to be addressed in the plan. An assessment and plan for each organ system is usually not necessary, except for the most complex patients. Patients active medical problems should be documented on the Patient List for rounds. This helps to remind the team about medical problems which the team is managing:

- Chronic anticoagulation
- Diabetes
- Malnutrition

This problem list-oriented approach will also be helpful to writing problem-oriented notes.

Chapter 4

Progress Notes

Progress notes need to reflect the problems which are being managed by the team. The current medical problems being managed by the team should be added to the problem list for that hospitalization. This will make it easier to generate notes which are oriented to the patient's problem list.

In addition, the progress notes provide a narrative which can later be used to generate the discharge summary (particularly for complex patients). Each day, the event of the hospitalization is carried from note to note. Each day, an additional line is added to the progress note which summarizes events for that day. This makes it possible to see within each Progress Note the pertinent events for the hospitalization. These events would include extubation, re-intubation, positive cultures, dates lines are inserted or removed, dates of removal of NG tubes and drains, and transfer to ward or re-admission to ICU. This chronology assists in treatment decisions ("how old is the IJ line" or "when did we start antibiotics?" or "when is the planned antibiotic stop date"?) but also makes the discharge summary much easier to prepare.

Notes should be forwarded to the patient's attending (unless out of town)

Esophagectomy Events to be Documented:

- Extubation date/time
- NG Removal date
- Chest tube removal date
- MBS date(s) and results (aspiration | penetration)
- ICU DC orders written
- ICU discharge (transfer to ward)

Esophagectomy Complications to be Documented:

N	Delirium
	Stroke
CV	New arrhythmia req Rx
	MI
R	Pneumonia (3 of fever | WBC | infiltrate | abx | sputum cx)
	Effusion req drainage
	Reintubation
	Atelectasis req bronchoscopy
	ARDS
	PE
	Ventilation >48 hours after leaving OR
GI	Anastomotic leak (medical rx | stent | surgery)
	Delayed gastric emptying req botox or NG >7d
	C Diff
GU	Urinary Retention
	Discharge with foley catheter
H	DVT req treatment
	Return to OR
	Return to ICU

Communication

Please add an addendum at the BOTTOM of each progress note which includes a means for contacting the team:

Please message "GI Surgical Oncology Colorectal LCI CMC" via Haiku 24/7. Messages are automatically forwarded to the General Surgery Resident on Call evenings and weekends."

Chapter 5

Signout

Evening Signout

The Handoff Tool should be completed for all inpatients, and the responsible attending designated. This tool is critical for the safe care of patients by the nigh team. If there are studies which are pending at the time of signout (CT scan, follow-up Hb), it is critical that a plan be in place for whom to notify with an abnormal or critical study. In general, Drs Hill, Squires, and Salo are always available until 10pm. Attending notification plans (service attending vs covering attending) for unstable patients should be negotiated before nightfall.

Weekend Signout

The senior resident is responsible for making certain that the weekend rounding resident is familiar with the patients, their problems, and the plan of care. A signout email should be prepared Friday afternoon and forwarded to the service attendings by 6pm for their review. This signout can then be edited with the attendings' notes and forwarded to the weekend rounding attending.

Chapter 6

Discharges

Discharge Prescriptions

Prescriptions should be ideally be prepared the day prior to anticipated discharge and sent to the patient's pharmacy. According to North Carolina STOP guidelines, opioid prescriptions for postoperative patients should be for no more than a 7 day supply. At the same time, patients taking narcotics in the hospital should have the same dosages for their outpatient prescription, to avoid patients running out of narcotics between the time of discharge and their first clinic visit.

Note that metoprolol is available in liquid form in the hospital, but is not available for outpatient prescription

Note that in many cases narcotics for patients living in South Carolina a prescription from an attending.

Additional Appointments

If followup appointments in additional to surgical followup are needed, these should be designated on the discharge orders. Particularly:

- Primary Care Physician
- Cardiologist (if new cardiac medicines)
- Co-surgeons (Urology, Thoracic Surgery, GYN)

Discharge Summary

The discharge summary documents important events and complications in the postoperative course and serves to inform the referring physician and primary physician about these events, but also serves as a blueprint for post-discharge treatment planning. Please recognize that the first post-operative visit may be with a resident who may be meeting the patient for the first time. Key items to include:

N	Followup plan for chronic pain management
	Stroke
CV	Postop Arrhythmia? | MI? | CHF?
	If new cardiac meds: Who is managing medications
	If afib: CHADS score and anticoagulation plan
R	Pneumonia? | ARDS? | TRACH?
	Need for home oxygen?
	CXR needed at first postop visit?
GI	Delayed gastric emptying? | leak? | ileus?
	Tube feed regimen
	Diet at discharge (Low residue | Full liquds | Meds with thickened water |NPO)
	New stoma (ileostomy | colostomy)
	Wound care needs (VAc | Prevena)
GU	Urinary Retention
	Discharge with foley catheter
H	Complications: DVT | PE
	Anticoagulation Plan
Endo	Insulin regimen at DC (dose will be in med rec)
ID	Antibiotics at DC
	Return to ICU

Communication

It is essential that discharge summaries be sent to the patient's primary MD and referring physician. Please review the initial consultation note for the names of providers involved in a patient's care.

Chapter 7

Education

The service will host Third- and Fourth-year medical students from Wake Forest University as well as externs.

Student notes should be forwarded to the patient's attending for attestation and signature.

Third year students will have a 'green card' of diagnoses and procedures which need to be checked off (and signed) during the rotation. Students: Please remind the chief resident and attendings about items which remain to be completed..

7.1 Medical Student Duty Hours

Hours:

- Students will not work longer hours than residents on the same service
- Students will not work more than 80 hours/week averaged over 4 weeks.

Breaks: Students will

- have 4 24-hour periods free from assigned activities over a 4 week period
- not work longer than 16 continuous hoours
- have a 8 hour break from clinical/academic hours following a 16-hour shift
- can only work a maximum of 5 sequential overnight shifts

Exams:

- Must be excused no later than midnight prior to the day of the shift or final exam

Holidays:

- Must be excused from responsibilities from 5pm on the day prior to the holiday on the academic calendar through the holiday[1]

7.2 Procedures/Diseases

- Wound Care (VAC/dressing change, identify infection)
- Suture/Staple removal
- Suture Skin
- Foley catheter insertion (adult)
- Insert nasogastric tube (or OG in OR)
- Make an incision, any site
- Participate in intubation, bag mask ventilation in OR
- Xray 3-way of abdomen (interpret)
- Xray chest (interpret)
- Assist with insertion of chest tube or pigtail

7.3 Ask a Resident (5min discussion)

- Abdominal Pain (RUQ)
- Acute Limb Ischemia (vascular disease)
- Diverticulitis
- Neoplastic process (Breast Mass, GI Mass, soft tissue)
- Abdominal wall mass or hernia
- ABC's of trauma, Primary/Secondary survey
- Ileus, small and large bowel obstruction
- Evaluate acute surgical abdomen (participate)
- Post-op fever in surgical inpatient (discuss and participate)
- Post-op pain management (discuss and participate)

7.4 Medical Student Resources

Subcuticular suturing video

7.5 Recommended Resources:[2]

- Essentials of general surgery, 6th edition, [edited by] Peter F. Lawrence
- Surgery: A Case Based Clinical Review (Christian de Virgilio)
- Kaplan Surgery Notes
- NMS Surgery CaseBook
- Surgical Recall (Lorne H. Blackbourne)
- UWorld QBank

[1] From Faculty as Teacher 2023
[2] from Spring 2023 Surgery Syllabus

- Aquifer / Wise-MD
- OnlineMedEd

7.6 SHELF exam

SHELF exam topic areas

7.7 Entrustable Professional Activities

1. Gather a history and perform a physical examination
2. Prioritize a differential diagnosis following a clinical encounter
3. Recommend and interpret common diagnostic and screening tests
4. Enter and discuss orders and prescriptions
5. Document a clinical encounter in the patient record
6. Provide an oral presentation of a clinical encounter
7. Form clinical questions and retrieve evidence to advance patient care
8. Give or receive a patient handover to transition care responsibility
9. Collaborate as a member of an interprofessional team
10. Recognize a patient requiring urgent or emergent care and initiate evaluation and management
11. Obtain informed consent for tests and/or procedures
12. Perform general procedures of a physician
13. Identify system failures and contribute to a culture of safety and improvement

Chapter 8

Salo Clinic

8.1 Clinic Notes

In most cases, a note will already have been started, so first check under the Notes tab.

If note exists, start a new note and use the template ".lcir"

At the "HPI»" prompt, enter history of present illness:

8.1.0.1 Identifier:

- 67M presentation with iron-deficiency anemia. Usual weight 145#
- 73F presentation with 3 months of dysphagia to solids. Usual weight 181#. Weight at presentation 151#
- 44M presentation with 6 weeks of reflux symptoms. Usual weight 165#

Baseline (usual) weight is important for gastroesophageal cancer patients No narrative (this is not a creative writing workshop) Avoid descriptors such as "pleasant" or "unfortunate"

8.1.0.2 Workup

> EGD April 14, 2024 by Dr Larry Pennington: Malignant appearing stricture at 40cm. Pathology (S24-345229) shows poorly-differentiated adenocarcinoma. EUS May 1, 2024 by Dr Andrew Dries. Staged as uT3 N1 PET May 15, 2024: Hypermetabolic lesion in the distal esophagus. No regional lymphadenopathy. No metastatic disease

Each paragraph contains one study: study -> date -> operator -> findings Pathology accession number is helpful for staff to track down outside path

8.1.0.3 Consult Visit

> GI Surgical Oncology consultation June 1, 2024. Taking only liquids. No odynophagia. Hand grip strength R: 31/30/29. ECOG 0. Weight 165#. Still smoking.

8.1.0.4 ECOG performance scale

0 Fully active, able to carry on all activities 1 Ambulatory can do light house work, office work 2 Ambulatory but can't work up and about more than 50% of waking hours 3 Capable of only limited selfcare; confined to bed or chair more than 50% of waking hours 4 Completely disabled; cannot carry on any selfcare; totally confined to bed or chair

8.1.1 Update Problem list

Critical to update problem list for co-morbidities which would affect anesthetic/operative management.

Add details to problem list under "Overview"

8.1.2 Cardiac

History of heart attack? Coronary artery stent? When? Within the last 6mo? Is patient on antiplatelet therapy? Which agents? Date and location of most recent echocardiogram If aortic stenosis: Is valve area <1cm^2? If pulmonary hypertension: Peak pressures? Date and location of stress test. Is there ischemia? Who is cardiologist?

8.1.3 Pulmonary

Prior diagnosis of COPD? Dyspnea at rest? Dyspnea walking up one flight of stairs?
Has patient had recent pulmonary function tests? Is patient on steroids? History of prior lung surgery?

8.1.4 GI

Prior abdominal surgery? Hernia repair: Prosthetic mesh? Laparoscopic vs open inguinal hernia repair Prior history of bariatric surgery?

8.1.5 Endocrine

If diabetes: Is insulin required? How much? Steroid use?

8.1.6 Renal

If kidney disease, what is baseline creatinine? Dialysis?

8.1.7 Neurologic

History of Stroke? History of TIA? Carotid bruit on exam? History of dementia? Who manages finances? Who makes medical decisions?

8.1.8 Physical Exam

Cardiopulmonary exam Carotid Bruit? Cervical Incision? Cardiac murmur Abdominal incisions - reconcile with past surgical history

8.1.9 Assessment/Plan

Enter assessment/plan after "A/P" prompt Do not erase blue-shaded "Assessment Plan: No problem-specific assessment/plan found for this encounter *Briefly* summarize assessment/plan Dr Salo will add A/P and rationale/evidence base

8.2 Reurn Visit Notes

Use notes template ".lcir" Select HPI text from prior note and use Copy Forward button

8.2.1 Summarize Recent Surgery

- Minimally-invasive esophagectomy July 2, 2024. Benign postoperative course. Discharged on 5 cartons of tube feeds and protein shakes. Pathology (CMCS24-004553): T3 N1 M0 1/26 nodes margins negative
- Postop visit July 14, 2024: Doing well. Staples out. Advance diet. Metoprolol decreased to 25mg daily x 7days-> stop.

Sign notes and forward to Dr Salo

8.3 Postop Care after esophagectomy

8.3.1 Beta blockade and anti-hypertensives

Atrial fibrillation occurs in the postoperative period in 20% of patients. For this reason, beta blockers are used to atrial fibrillation prevention. In the ICU, metoprolol is administered intravenously and is subsequently changed to enteral administration. Because metoprolol also lowers blood pressure, patients on home anti-hypertensives frequently have them held during their hospital stay (and after discharge). At the first postoperative visit, patients who were not treated with beta blockade preoperatively are generally switched from metoprolol back to their home anti-hypertensives.

8.3.2 Weaning Tube Feeds in Diabetics

As outpatients begin eating more orally, their tube feeds are reduced.

Weaning from 5 cans to 4 cans: Easiest method is to maintain the same schedule (16 hours) and reduce insulin dosage by 20%. For instance, the above patient who is on 5 cans at 75mL/hour x 16 hours is receiving 16N + 8R at start of tube feeds and 6 hours later. This patient could be weaned by reducing rate form 75mL/hour x 16 hours to 60mL/hour x 16 hours and reducing insulin to 12N + 6R at the start of tube feeds AND another dose of 12N + 6R after 6 hours.

Weaning from 4 cans to 3 cans: One option is to decrease the duration of tube feeds from 16 hours to 12 hours, while maintaining rate of 60mL/hour. In this case, the insulin dosage could be kept the same at the start of tube feeds, BUT the dose 6 hours after the start of tube feeds could be omitted.

Once patients are on 3 cans per night, further weaning can be accomplished by skipping tube feeds (and insulin) every other night in a “tube feed holiday”. This allows an evening of interrupted sleep and can tend to increase the appetite the morning after tube feeds are held.

Part II

Operating Room

Chapter 9

Colorectal Cases - Hill/Squires

9.1 Preop

ADULT SURG Colorectal ERAS MPP Hill This is what has all of the main ERAS components. Tylenol, gabapentin, Decadron, Alvimopan and heparin are all given in pre-op holding

ADULT STANDING Antimicrobial colorectal In general, I will give Ancef to patients with almost all patients with allergies to PCN. They have to remember the "severe" reaction. If it is a severe reaction, please use the second line antibiotics listed in the power plan.

Type and Screen are not typically needed for colectomy. They will have an antibody screen from office. If antibodies present, then d/w attending

9.2 Intraop

Positioning: Attending will typically position patients personally

Right sided=supine; Left sided=lithotomy; All laparoscopic colon cases will have their arms tucked with a chest tape strap.

NG/OG tubes: usually not needed, unless there is gastric distension. Patients receive multiple oral medicatinos in preop.

Review anesthesia fluid management during time out. 2L max volume, urine output not an accurate indicator.

Chapter 10

CV Port (IJ)

Room Prep

- Slider bed (Skytron 3600B) with head section
- C-Arm
  - Radiology technician alerted to need for C-Arm
  - Will need lead and thyroid shields for everyone in room
- Ultrasound with hockey-stick probe near patient's RIGHT SHOULDER

Instruments - Minor instrument pan

Disposables/Meds

- Confirm choice of port with surgeon. Usual options
  - Bard PowerPort VUE with 8Fr attachable catheter (1708062)
  - Bard PowerPort slim Implanted port (for patients with low BMI)
- Heparin 5mL of 1000U/ml labeled as "1000 U/ml"
- Heparin 5mL of 1000U/ml + 45mL saline labeled as "100 U/ml"
- Local
- If general anesthesia: Marcaine 0.5% with epinephrine
- If MAC: Xylocains 1% with epinephrine
- 1000 drape x3 AND blue paper drapes 4 packs of 2 each = 8 total
- Suture
  - 3-0 Prolene RB-1 double-arm
  - 3-0 Vicryl SH
  - 4-0 Monocryl PS2

Position

- Supine with left arm tucked, right arm on armboard at side.
  - Right arm on armboard in case needed by anesthetist
  - NO shoulder roll
- Foley catheter: usually NOT required – *check with surgeon*

- Lower body Bair Hugger from abdomen to feet with ONE layer of blankets on top of Bair Hugger. Velcro strap on thighs.

Prep

Chloroprep: RIGHT chest, neck to chin and earlobe, shoulder to include deltopectoral groove.

Drape

1000 plastic drapes outline the sterile field for the port. The skin is stretched to avoid a gap between drape and skin. Allow access to the right sternocleidomastoid, right deltopectoral groove, and sternal notch. Blue paper drapes on top of 1000 drapes Transverse drape reversed head-to-foot. Ioban around edges of port field. Skin over SCM is left without Ioban to facilitate ultrasound

Preop evaluation

- Allergies
- Blood thinners or anti-platelet agents
- Hx of prior central lines or ports
- History of neck surgery

Operation

Reverse Trendelenburg

Port pocket is constructed 1cm below and parallel to clavicle 3cm long. It is essential that there is no bleeding in the pocket (to avoid a port pocket hematoma).

Trendelenburg

Ultrasound set up so that the lateral neck appears on the right side of the screen (as if looking towards the feet)

Right internal jugular vein is identified and its course cephalad-caudad marked on the skin.

Finder needle (22Ga) *OR* micropuncture kit passed into IJ. The needle should enter the vein directly beneath the ultrasound probe.

Skin anesthetized and transverse 6mm counter-incision made at needle entry site

Respiration held by anesthesia

16Ga needle passed into IJ under ultrasound. It is essential that the vein is scanned up and down by rolling the the probe to visualize the tip of the needle as it passes inferior.

J Wire passed through 16Ga needle and needle withdrawn

Anesthesia resumes respirations

Ultrasound used to confirm presence of wire within the vein by scanning up and down.

Level bed

Fluoroscopy used to confirm position of wire. Dilator and sheath inserted under fluoroscopic visualization ('live'). C-arm backed away off field.

Tunneler connected to tubing on the end with small numbers. Port collected to tubing on the opposite end. Tubing must come to rest 1mm from the body of the port. Clear plastic collar is pushed over the tubing and the edge must be flush with the body of the port. Tunneler bent into a curve to avoid injury to the carotid artery.

Catheter tunneled from port pocket to counter-incision over SCM. The tunneler path describes a gentle arc to avoid kinking the catheter. The port is moved to the top of the port pocket by traction on the catheter. Tonsil clamp placed at 25cm and fluoroscopy used to evaluate the length of the catheter, which is trimmed with a heavy scissors.

Catheter placed through dilator into central circulation. Peel-away sheath split and removed. Port accessed with straight Huber needle with 100U/ml heparinized saline. Blood is withdrawn into port. Needle is left in the port and the syringe detached.

C-arm is returned to the field to confirm catheter placement. It may be necessary to 'orbit' the C-arm if the catheter overlies the spine.

Syringe with concentrated flush (1000U/ml) is attached to the needle and the port flushed (without aspiration of blood). Syringe and needle are removed.

Port sutured to the underlying pectoralis fascia with 2 sutures of 3-0 Prolene, one forehand and one backhand. Sutures are tied and cut.

The port pocket irrigated and the incision closed with two layers of subcutaneous 3-0 Vicryl followed by subcuticular 4-0 Monocryl. The skin is dressed with Dermabond.

Postop Orders

CXR in recovery to confirm central line placement

Chapter 11

Lap Jejunostomy

Room Prep

- EGD cart near patient's LEFT SHOULDER (with ADULT EGD scope)
- If central venous port is placed at the same time:
- Slider bed (Skytron 3600B) with head section
- Radiology technician alerted to need for C-Arm
- BK Ultrasound with hockey-stick probe near patient's RIGHT SHOULDER

Instruments

- 5mm 30 degree scope AND 5mm 0 degree scope
- SRI laparoscopic Pan
- Salo laparoscopic instruments

Disposables/Meds

- Veress needle (with 10mL syringe and saline)
- 5mm Z-thread optical port (3 on table, 2 more in room)
- Transverse drape AND laparoscopy drape
- Confirm choice of port with surgeon. Usual options
  - Bard PowerPort 8Fr xx8062
  - Bard PowerPort 8Fr xx8000 (low profile)
- Heparinized saline: 100U/ml (dilute) and 1000U/ml (concentrated)
- 1000 drape x3 AND blue paper drapes 4 packs of 2 each = 8 total
- Micropuncture kit available/not open (from Anesthesia)
- Jejunostomy tube: MIC 0301-14
- Silk 2-0 on RB-1 needle (on Surgical Oncology suture cart)

Position

- Supine with left arm tucked, right arm on armboard at side.
- Foley catheter: Usually required – *check with surgeon*

- Lower body Bair Hugger on thighs. ONE layer of blankets on top of Bair Hugger. Velcro strap on thighs. NO PILLOW UNDERNEATH LEGS.

Prep

Chloroprep (two sticks) of abdomen (need to keep pubis in field, as well as right anterior superior iliac spine), both costal margins.

If port: RIGHT chest, neck to chin and earlobe, shoulder to include deltopectoral groove

Drape

If central venous port: Perimeter of field draped with 1000 (clear adhesive) drapes. Four 1000 drapes around port site:

- Medial border: From Angle of Louis superiorly along midline to chin.
- Superior border: Inferior to jaw (to allow access to right internal jugular vein and SCM)
- Laterally: From inferior to ear down to right shoulder
- Inferior: From lateral shoulder medially to Angle of Louis

Abdomen: Two 1000 drapes used inferiorly keeping pubis and right anterior inferior iliac spine in field. This is critical as the far inferior/lateral RLQ needs to be in the field for optimal port placement.

Six Blue Paper Drapes around perimeter of field (on top of 1000 drapes)

If central venous port: Transverse sheet TURNED HEAD-TO-FOOT turned at an angle to keep deltopectoral groove and SCM within the field

Laparoscopy drape skewed to inferior and right to keep pubis and right ASIS in the field.

Turn on Bair Hugger only AFTER drapes in place

Indications

Laparoscopic jejunostomy is used for enteral nutrition in patients prior to planned (or possible) esophagectomy or gastrectomy or those for whom the stomach is otherwise not available (ie after esophagectomy or gastrectomy). Patients with metastatic esophageal cancer who need enteral access are generally treated with a gastrostomy, which does not require feeding with a pump

Preop (Resident) Preop orderset: search for “Jejunostomy”

Review Clinical Information (Resident) Review staging scans (especially PET scan) to identify suspicious areas on imaging which need to be investigated at the time of laparoscopy Outpatient anticoagulation use (warfarin, Xaralto, aspirin, Plavix) Review dietitian’s recommendations (how many cans of feeding per day?) If patient is scheduled for central venous port Confirm that a port has

not already been placed Prior history of central venous lines? Confirm location of port placement with surgeon (left vs right)

Operation

If a central venous port is placed, the port is performed first. See IJ Port

Abdominal access is obtained in one of two ways:

Infraumbilical approach using modified Hasson technique. If the peritoneum is not easily entered, a Veress needle is used to insufflate, followed by incision of the fascia with a 15 blade, and a 5mm optical port (Applied Medical Kii Fios First Entry Z-Thread Trocar) Veress needle inserted in LEFT upper quadrant just inferior to costal margin. Abdominal entry with 5mm optical Z-Thread port. 5mm port in right upper quadrant, 5mm port in RLQ just lateral to rectus, 5mm camera port between RUQ and RLQ ports

The transverse colon is now elevated (using the umbilical port, if used) and the ligament of Treitz is identified. The proximal bowel is arranged in a "C" configuration to confirm the proximal and distal ends of bowel.

A site for placement of the jejunostomy is selected on the skin, left lateral and just superior to the umbilicus. A site is selected on the bowel in the most proximal site on the jejunostomy selected which would allow for placement of the jejunostomy without tension, but at least 20cm from ligament of Treitz.

The proximal jejunum is sutured to the anterior abdominal wall with 2-0 silk. This is usually done with a 9 suture which is introduced into the abdomen with a needle driver "Korean Style" or "Paraguayan Style." Two cm distal to this suture, a diamond of sutures is placed around the proposed tube site, and one suture placed distal to avoid torsion. The final arrangement of sutures is one proximal and one distal and 4-6 sutures around the tube. All sutures were marked with hemostatic clips to facilitate replacement of the tube via fluoroscopy should the tube become dislodged.

Using Seldinger technique, a 16Fr Cook catheter introducer kit is placed within the jejunum.

A MIC 14Fr jejunostomy tube (0301-14) with the tabs trimmed with a scalpel, is inserted through the sheath and positioned in the jejunum. The tube was secured with a suture of 0 silk.

If a balloon tube is used, an 18Fr Cook dilater and sheath is used, followed by a MIC 14Fr jejunustomy tube (0200-14) and the balloon inflated with 7mL of sterile WATER.

The tube is secured with 0 silk and dressed with a BioPatch and a Tagederm dressing.

The abdomen is desufflated and the port sites closed with 4-0 Monocryl, followed by dermabond.

After dressings are applied, a Lopez valve is attached with the long Christmas-tree end placed into the jejunostomy tube.

Endoscopy The scope is set up:

Suction and aspiration valves inserted and working Suction tubing attached Biopsy valve attached and not leaking Cart set up for recording by powering on the Stryker SDC digital capture box A bite block is used and the scope lubricated. A neonatal scope may be necessary in patients with a tight stricture. Important findings to record:

Level in cm from the incisors, of the most proximal area of Barrett's esophagus. Level in cm from the incisors of the GE junction Appearance of the GE junction on retroflexed view. Extent of invasion of the tumor into the cardia or fundus. The scope is withdrawn and the hypopharynx suctioned. The liquid from the 'First Step' disinfectant is suctioned through the scope, followed by water.

Chapter 12

Lap Gastrostomy

Room Prep

- EGD cart near patient's LEFT SHOULDER (with NEONATAL EGD scope)
- If central venous port is placed at the same time:
  - Slider bed (Skytron 3600B) with head section
  - Radiology technician alerted to need for C-Arm
  - BK Ultrasound with hockey-stick probe near patient's RIGHT SHOULDER

Instruments

- 5mm 30 degree scope AND 5mm 0 degree scope
- SRI laparoscopic Pan (available)

Disposables/Meds

- Veress needle (with 10mL syringe and saline)
- 5mm Z-thread optical port (3 more in room)
- Transverse drape AND laparoscopy drape
- Confirm choice of port with surgeon. Usual options
  - Bard PowerPort 8Fr xx8062
  - Bard PowerPort 8Fr xx8000 (low profile)
- Heparinized saline: 100U/ml (dilute) and 1000U/ml (concentrated)
- 1000 drape x4 AND blue plastic adhesive drapes 4 packs of 2 each = 8 total
- Micropuncture kit available/not open (from Anesthesia)
- 20Fr Laparoscopic gastrostomy kit in room/not open
- 16Fr MIC gastrostomy tube in room/not open
- Gastrostomy 20Fr Pull PEG (in vending machine)
- GI Anchors ("T-fasteners") in room/not open

Endoscope Setup – Neonatal EGD scope

- Valves attached and working (suction/aspiration/biopsy cap)
- Suction tubing attached
- Connect water bottle to left-hand port
- Gauze sponges, lubricant, plastic "tray" from gauze filled with water
- **Yellow** (small) bite block
- "First step" sanitizer

Anesthesia

- ET Tube taped to left. Head turned to the left on donut
- No EKG electrodes on anterior right chest

Position

- Supine with left arm tucked, right arm on armboard at side.
- Foley catheter: usually NOT required – *check with surgeon*
- Lower body Bair Hugger on thighs. ONE layer of blankets on top of Bair Hugger. Velcro strap on thighs. NO PILLOW UNDERNEATH LEGS.

Prep

Chloroprep (two sticks) of abdomen (need to keep pubis in field, as well as right anterior superior iliac spine), both costal margins.

If port: RIGHT chest, neck to chin and earlobe, shoulder to include deltopectoral groove

Indications

Laparoscopic gastrostomy is used in patients with esophageal obstruction . Gastrostomy feedings are much easier than jejunostomy, as they can be administered via syringe or gravity bag. By contrast, jejunostomy feedings require administration via pump. Gastrostomy is usually done as an outpatient unless there are concerns for refeeding.

Review Clinical Information (Resident)

Review staging scans (especially PET scan) to identify suspicious areas on imaging which need to be investigated at the time of laparoscopy Outpatient anticoagulation use (warfarin, Xaralto, aspirin, Plavix) Review dietitian's recommendations (how many cartons per day?)

Drape

If central venous port: Perimeter of field draped with 1000 (clear adhesive) drapes. Four 1000 drapes around port site:

- Medial border: From Angle of Louis superiorly along midline to chin.
- Superior border: Inferior to jaw (to allow access to right internal jugular vein and SCM)
- Laterally: From inferior to ear down to right shoulder

- Inferior: From lateral shoulder medially to Angle of Louis

Abdomen: Blue adhesive drapes used inferiorly keeping pubis and right anterior inferior iliac spine in field. This is critical as the far inferior/lateral RLQ needs to be in the field for optimal port placement if the patient needs a jejunostomy.

Six Blue Adhesive Drapes around perimeter of field (on top of 1000 drapes)

If central venous port: Transverse sheet TURNED HEAD-TO-FOOT turned at an angle to keep deltopectoral groove and SCM within the field

Laparoscopy drape skewed to inferior and right to keep pubis and right ASIS in the field.

Turn on Bair Hugger only AFTER drapes in place

Operation

If a central venous port is placed, the port is performed first. See IJ Port

Abdominal access is obtained in one of two ways:

- Veress needle inserted in left upper quadrant just inferior to costal margin. Abdominal entry with 5mm optical port at lateral border of rectus just superior to umbilicus
- Infraumbilical approach using modified Hasson technique. If the peritoneum is not easily entered, a Veress needle is used to insufflate, followed by incision of the fascia with a 15 blade, and a 5mm optical port

The insufflation pressure is decreased to 4mmHg and the abdomen vented to drop the pressure. A 30 degree scope is passed inferior to the falciform ligament into the left upper quadrant over the lateral segment of liver. The post of the scope is positioned to the left, allowing visualization of the lesser curvature of the stomach with the end of the scope near the left aspect of the falciform.

A site for placement of the gastrostomy is selected on the skin, using a 22Ga needle as a finder. The site is marked, then infiltrated with local anesthetic and a 5mm transverse incision made.

Endoscopy is performed and the following noted:

Level in cm from the incisors, of the most proximal area of Barrett's esophagus. Level in cm from the incisors of the GE junction Appearance of the GE junction on retroflexed view. Extent of invasion of the tumor into the cardia or fundus.

A bite block is positioned (unless the patient is edentulous). The endoscope (usually a neonatal scope) is introduced into the esophagus and the video capture started. If the tumor will not allow passage of the scope, do not force the scope.

Once the scope is passed into the stomach, the fundus and duodenal bulb are suctioned.

Insufflation is then reduced to 4mm and the stomach insufflated to find the optimal location for tube placement which will minimize tension and will avoid

injury to the right gastroepiploic artery. The reduced laparoscopic insufflation pressure allows endoscopic insufflation of the stomach.

Gastrostomy tube placement is done either by Pull or Seldinger technique.

Seldinger Gastrostomy

Four T-fasteners are then used to affix the stomach to the anterior abdominal wall. These are arranged at 8:00, 10:00, 2:00, 4:00 relative to the proposed tube site. T-fasteners are not placed inferior to the tube site to avoid injury to right gastroepiploic vessels.

The J wire is then passed into the stomach, followed by the dilators, up to 20Fr. A 16Fr MIC gastrostomy tube is introduced and the balloon inflated with 5mL of *water*.

Pull Gastrostomy

A 20Fr PULL PEG tube kit is opened. The snare and tube are passed to the upper operator. The snare is passed through the scope and opened in anticipation of the passage of the wire.

The angiocath from the kit is placed into the stomach through the abdominal wall. Once the snare has grasped the angiocath, the needle is withdrawn and the split wire passed through the Angiocath into the stomach. The snare is adjusted to grasp the split wire, which is pulled out through the mouth.

The laparoscopic port site is considered clean. The PEG tube, once it is pulled through the mouth, is considered dirty. The right abdomen is covered with a towel to protect the laparoscopic site.

The recording is now stopped. The split wire is joined to the PEG tube, which is pulled into place by the abdominal operator. The tapered portion of the tube will be the first source of resistance, which may require firm traction. The split wire (and PEG tube) is dropped of the table to the patient's left.

Once the tapered portion of the tube is through the abdominal wall skin, the next point of resistance will be the bumper of the PEG tube passing through the tumor. In general, if a 5mm neonatal scope can pass the tumor, a 20Fr PEG tube can pass as well.

The tube is pulled into position and the measurement at the skin noted. The stomach is aspirated by the upper operator and insufflation is resumed at 8mmHg. Tension on the PEG tube is adjusted to allow apposition of the gastric serosa to the abdominal wall. If the tube is not easily apposed to the abdominal wall, T fasteners ("GI Anchors") must be employed.

The scope is withdrawn and the hypopharynx suctioned. The liquid from the 'First Step' disinfectant is suctioned through the scope, followed by water.

The abdomen is desufflated and the port sites closed with 4-0 Monocryl.

Chapter 13

Subtotal Gastrectomy

Room Prep

- EGD cart near patient's LEFT SHOULDER (with ADULT EGD scope)

Instruments

- 5mm 30 degree scope AND 5mm 0 degree scope
- SRI laparoscopic Pan (available)

Disposables/Meds

- Veress needle (with 10mL syringe and saline)
- 5mm Z-thread optical port
- Robot prostatectomy drape
- 1000 drape x4 AND blue plastic adhesive drapes 2 packs of 2 each = 8 total

Endoscope Setup –Adult EGD scope

- Valves attached and working (suction/aspiration/biopsy cap)
- Suction tubing attached
- Connect water bottle to left-hand port
- Gauze sponges, lubricant, plastic "tray" from gauze filled with water
- **Yellow** (small) bite block
- "First step" sanitizer
- ICG bottle reconstituted with 10ml Water (ask first)
- 25% albumin (to mix with ICG)
  - Will mix 2mL of ICG solution with 5mL of 25% albumin

Position

- Supine arms an arm boards
- Foley catheter
- Bovie pad

- Lower body Bair Hugger on thighs. ONE layer of blankets on top of Bair Hugger. Velcro strap on thighs. NO PILLOW UNDERNEATH LEGS.

Prep

Chloroprep of abdomen from midline at the level of the nipples to the pubis, and table to table

Review Clinical Information (Resident)

Review staging scans (especially PET scan) to identify suspicious areas on imaging which need to be investigated at the time of laparoscopy Outpatient anticoagulation use (warfarin, Xaralto, aspirin, Plavix)

Drape

Abdomen: Four Blue Adhesive Drapes around perimeter of field (on top of 1000 drapes)

3/4 sheet over thighs

Prostate Drape

Operation

Abdominal access is obtained in one of two ways:

- Veress needle inserted in left upper quadrant just inferior to costal margin. Abdominal entry with 5mm optical port at lateral border of rectus just superior to umbilicus
- Infraumbilical approach using modified Hasson technique. If the peritoneum is not easily entered, a Veress needle is used to insufflate, followed by incision of the fascia with a 15 blade, and a 5mm optical port

** Ports**

Location of ports (cephalad-caudad) depends upon proximal extent of tumor.

Abdominal entry in RUQ 8-9cm from midline with OptiView port. This will be upsized to 8mm robot port (#1)

Port #4 as far lateral as possible in LUQ.

Port #3 in LUQ midway between midline and Port #4

Port #2 in midline

Assisting port in LLQ: - 5mm or 12m port inferior to the midway point between Port #3 and Port #4. (Can be used later for robotic stapler port #3A)

Retraction port in RLQ for flexible liver retractor held by Endosopic Bookwalter

Flexible liver retractor can be omitted in very distal lesions. Other options include suspending the lateral sector of liver with a 10cm Penrose drain or using a 0 silk on Keith needle to suspend falciform ligament and distract it to patient's right

Porta Hepatis

- Mark pylorus with cautery by making 2-3 dots 1cm proximal to the pylorus
- Dissect pylorus off porta hepatis
- Mobilize duodenum if needed

** Mobilize Greater Curvature**

Can be done with bipolar + monopolar scissors or Extend vessel sealer Enter lesser sac and check for peritoneal disease posterior to stomach on an anterior surface of pancreas

Chapter 14

Esophagectomy 1 Stage

14.1 Indications

MI Ivor Lewis ("One Stage") esophagectomy is the most common approach to esophagectomy. The patient is positioned in 'corkscrew' position to allow simultaneous access to the abdomen and chest by prepping both abdomen and chest.

14.2 Room Prep

Double-decker Back Table

EGD Cart (check w/ Salo regarding adult vs neonatal scope)

Doppler box with foot pedal

BK Ultrasound (with laparoscopic probe)

Walter 'Long Arm' retractor

Salo Positioning Cart:

- Four black side-rail clamps
- Four rectangular lateral positioners
- Yassargil socket
- Well-leg holder (used as an arm holder)

Harmonic Scalpel generator box

Critical supplies (chek prior to pt in room)

- Stapler 25mm DSTXL
- Orvil 25mm
- Stapler 21mm DSTXL

- Orvil 21mm
- Echelon 60mm stapler with 10 gold loads and 2 gray loads
- Gel Port

Anesthesia

- Dual-lumen ETT tube (taped to left)
- Arterial line (left arm will be on arm board)
- Anesthesia may place paraspinal muscle blocks on right side.

14.3 Position

Supine on blue foam pad.

Mark upper midline with skin marker

Foley catheter (with Criticor temp sensor)

Bovie pad

Lower-body Bair Hugger at level of thighs

Hair clipped from abdomen, right chest, and right axilla.

Pre-existing jejunostomy

- Prep into field
- Remove any eschar at site
- Secure to skin inferiorly with 0 silk

Shoulders are shifted to the right in preparation for 'corkscrew' positioning

Lateral positioners positioned with pad extending from greater trochanter inferiorly.

Velcro strap over thighs and over lateral positioners

Yassargil socket attached to headpiece of bed on left side.

Well-leg holder attached to Yassargil socket and used to support right forearm (which will cross body). Right arm crosses body and is supported on well-leg holder.

Lateral positioner placed posterior to spine and scapula to support right chest, allowing access for thoracoscopy.

Arm holder is dropped towards the floor enough that right arm is brought forward.

Prep

Chloroprep (two sticks) of abdomen, right chest, right axilla. Particular attention to prepping as far as possible to the left lateral side and the right lateral side. Nipple prepped into field.

Drape

Proximal right arm draped with 1000 (clear adhesive) drape.

Two blue plastic "U" drapes with center of the "U" on either lateral side with tails forming the perimeter of the field Trauma drape. All of right chest and axilla is kept within the field, as is the lateral aspect of the left upper quadrant. The field does not need to extend inferior to the umbilicus. In general, it is usually possible to keep all of these area in the field without cutting the drape, except in very large patients. Ioban strips (4") aound the periphery of the surgical field after the trauma drape. Laparoscopic cords (gas, light cord, camera) to tower at left shoulder. Suction irrigator brought off field. Laparoscopic LigaSure (2 bars) and Bovie (30/30).

14.3.1 Time Out

Operation header on consent

Tumor location and likelihood of division of esophagus from abdomen (two-phase operation) vs division of esophagus from chest (four-phage operation).

Blood:

- Surgeon's expectation of blood loss
- Availability of blood (type/screen vs type/cross).

Comorbidities:

Cardiopulmonary disease. If echo, ejection fraction and aortic valve area (if abnormal)

Beta blockage: Note whether patient on home beta blockade and if so, whether home medication was taken the morning of surgery.

Anticipated Intraop Problems:

- Possibility of tension left pneumothorax due to carbon dioxide entry into left chest during mediastinal dissection
- Expectation of ventilatory difficulties due to carbon dioxide entry into the right chest Gastric mobilization – Greater Curvature

14.4 Gastric Mobilization

7cm upper midline incision for handport. Incision is centered over pylorus. GelPort inserted, and abdomen insufflated to 15mmHg. Two 5mm ports placed LUQ. Medial LUQ 5mm port placed in angle between left costal margin and superior edge of GelPort ring. Lateral LUQ 5mm port placed as far lateral as possible. Depending upon visualization, a third port may be required between these two and somewhat more inferior.

If feasible, division of gastrocolic omentum starts by delivering transverse colon into GelPort and dividing ligament with cautery and LigaSure in the avascular plane just cephalad to transverse colon. Dissection proceeds as far proximal and

distal and feasible. It is important to avoid damage to the right gastroepiploic artery.

Colon is returned to abdomen and gastricolic ligament divided going using LigaSure, taking care to avoid the colon and the right gastroepiploic artery. For patients with a bulky omentum, it may be helpful to place an additional port in the left mid-quadrant for the camera to facilitate dissection of omentum off the transverse colon. Stomach is retracted to the patient's right with the back of the left hand, placing the gastrocolic ligament (and short gastric arteries) on stretch. Left gastroepippoic artery divided with LigaSure near its origin. Short gastric arteries divided with Ligasure close to spleen. As superior aspect of short gastrics is reached, the dissection plane shifts medially to create a tunnel towards the base of the left crus. This places the most superior short gastric vessels on stretch and facilitates their division. Once all short gastric vessels divided, peritoneum tethering fundus to diaphragm is incised, and fundus brushed medially.

14.4.1 Distal mobilization

Attention is directed to mobilizing the lateral aspect of the duodenum. This can either be accomplished with the camera through a LUQ port and a 45 degree camera or by placing an additional 5mm port in the RLQ. Hook cautery is used to incise the connective tissue lateral and posterior to the duodenum. The gastrocolic ligament is now dissected distally, taking care to preserve the integrity of the right gastroepiploic vessels. An areolar plane generally exists between the fat pad containing the right gastroepiploic vessels and that containing the transverse mesocolon vessels.

14.4.2 Left gastric artery

Lymph nodes around the celiac axis and left gastric artery are now dissected. The extend of dissection depends upon the tumor location and the presence of nodes her either based upon imaging or palpation. Dissection begins on the superior edge of the pancreas, and proceeds superiorly to the right crus. The left gastric (coronary) vein is usually located to the left of the arery and is divided with the LigaSure. In a two-phase approach, the left gastric artery is now divided with a 30mm gray load (2.0mm) Echelon linear stapler. For patients with mid-esophageal tumors, (for whom a four-phase approach is used), if there is any question about the resectability of the tumor, division of the left gastric gastric artery is generally deferred until the second abdominal phase.

14.4.3 Mediastinal dissection

The esophagus is now dissected circumferentially at the gastroesophageal junction. The peritoneum overlying the diaphragm is incised, and circumferential dissection of esopahgus performed. On the left side, it is helpful to distract the left crus laterally with a Prestige clamp placed on the left crus The right

pleura is widely entered in otder to both facilitate the thoracic dissection of the esophagus and placing the conduit into the right chest in preparation for the final thoracic phase. Division of Esophagus (Two-Phase only) In a four-phase approach, the esophagus is divided from the right chest during the first (of two) thoracic phases. In a two-phase approach, the esophagus is divided from the abdomen by reaching up into the mediastinum to divide the esophagus above the tumor. This is only feasible for tumors of the gastroesophageal junction. In a two-phase approach, the esophagus is divided with a 60mm Medium-Thich (Gold) Echelon TriStaple stapler.

14.4.4 Division of Esophagus (Four-Phase)

Penrose Drain (Four-Phase only) In a four-phase approach, the esophagus is divided from the chest. In order to facilitate the thoracic dissection, a 1/4 penrose drain is tied around the distal esophagus and the drain is slid cephalad into the mediastinum. The 'tails' of the drain are directed into the right chest so that they can be grasped from the right chest during the thoracic phase and can be used to provide traction on the esophagus

14.4.5 Entry into right chest

The pneumoperitoneum in the abdomen is vented and the gas pressure turned down to 8mmHg in preparation for the thoracic phase. The bed is rotated to the left 20 degrees. A site for entry in to the left chest is selected just posterior to the tip of the scapula. An incision is made here and a 5mm optical port with a 5mm 0 degree scope used to enter the chest. The chest is insufflated at 8mmHg of carbon dioxide, which helps to both copllapase the lung and depress the diaphragm. Two 12mm ports are placed. The more superior is placed lateral and superior to the nipple. The inferior port is placed just lateral to the diaphragmatic reflection. It is ciritcal to avoid injury to the diaphragm (and liver) with the inferior port placement. A mini-thoracotomy incision is placed along the mid-axillary line, frequently in the same interspace as the inferior/anterior 12mm port. The chest is entered just superior to the rib and the intercostal muscles divided with the LigaSure device to allow the ribs to separate. A narrow Deaver retractor is used to guage the space between the ribs, as the width of the retractor approximates the diameter of the 25mm stapler. A 5mm 'U' port is generally placed as high as possible midway between the scapular tip port and the anterior/superior 12mm port t0o the 4 right 5

Division of Esophagus (Two-Phase) In patients with low-lying tumors, it is possible to divide the esophagus above the tumor from the abdominal approach. This evaluation is facilitated by review of the properative endoscopy (and EUS), and the PET scan, particularly the PET obtained prior to neoadjuvant chemoradiation.

After dissection of the mediastinum, a Echelon stapler with a 60mm Medium-Thick (Gold) load is inserted through a 12mm port either placed either through

the GelPort or by upsizing the most lateral LUQ

Construction of Conduit The distal esophagus and stomach is exteriorized through the GelPort. The lesser curvature vessels are divided with the LigaSure 7-9cm cephalad from the pylorus. The stomach is now placed on stretch along the greater curvature. An Echelon Medium-Thick (Gold) stapler is used to construct a 5-6cm wide gastric tube. In constructing the conduit in a patient with a tumor of the GE jnction invading into the cardia, it is important to be certain that the staple line to construct the conduit stays clear of the tumor. Patients with tumors invading the cardia are at risk of a positive distal margin, meaning that microscopic tumor may be left in the wall of the gastric conduit. To make things more complicated, in patients with low-lying esophageal or GE junction tumors, not all of the length of the conduit are needed in order to reach to the level of the esophageal transection. After construction of the anastomosis, the 'extra' cephalad portion of the conduit (near the angle of His) are excised as the 'additional gastric margin.' In order to distinguish which portions of the conduit staple line which will be used to replace the esophagus and those which will be included in the 'additional gastric margin', both sides of the gastric conduit staple line are marked with sutures designated 'A', 'B', 'C', etc proceeding from the Angle of His to the antrum.

The distal esophagus and GE junction are now sent for frozen section.

Feeding jejunostomy The ligament of Trietz is identified and the jejunum is identified 20cm distal and marked with a directional suture. A site is selected to the left of the handport incision. A 16Fr Cook Introducer Kit is used to pass a 16Ga needle, followed by a J wire, through the left rectus muscle. A skin incision 4mm in length is made adjacent to the J wire. The 16Fr dilator and sheath are now passed through the rectus muscle and the dilator and wire removed. A 14Fr Jejunostomy Tube 0301-14 is selected and the 'wings' trimmed off with a scalpel. The jejunostomy tube is passed through the peelaway sheath, which is removed.

A pursestring suture 1.5cm in diameter is placed on the antimesenteric border of the jejunum. The pursestring is started and ends on the lateral aspect. A second 16Fr Cook Introduced Kit is used to introduce the J wire through the center of the pursestring.

Placement of Drains Two (or three) 19Fr full-fluted Blake drains (72230) are placed:

JP1: placed into the left pleura through the hiatus. Drain is brought out through the most lateral 5mm port site on the LUQ JP2: placed into the right pleura through the hiatus. Drain is brought out through the next most medial 5mm LUQ port site JP3: (optional) placed in the abdomen posterior to the left lateral segment of the liver and brought out through the most medial 5mm LUQ port site Transposition of Conduit The gastric conduit is now placed into the right pleura through the mediastinum, with the assistance of a laparoscopic Babcock and gentle pressure on the greater curvature with the fingers.

Entrance into the R chest (Two Phase) For two-phase operations, ports are now placed into the right chest, as stated above . In similar fashion, the inferior pulmonary ligament in dissected and the lung reflected anterior.

Anastomosis The right chest is entered and the right lung reflected anterior with the paddle placed in the superior/anterior port. The gastric conduit is placed into the mediastinum by tucking it medially from the right pleura into the posterior mediastinum, in order to allow the conduit to take the most direct path from the hiatus to the proximal esophagus. Gentle superior tension is now applied to the conduit in order to eliminate redundancy. The paddle retractor is now moved from the anterior/inferior port to the anterior/superior 12mm port and the lung reflected anterior and inferior.

OrVil The OrVil device is now used to place a EEA anvil into the distal esophagus. In general, a 25mm size is selected, unless the patient has particularly small frame, in which case a 21mm size is used. Two stay sutures of 2-0 silk on RB-1 needles are placed in the center of the esophageal staple line 3mm apart. A Harmonic scalpel is used to divide the staple line. The OrVil device is passed through the mouth and is passed through the fenestration in the staple line. The anvil portion of the OrVil is oriented so that the rounded portion is placed against the roof of the mouth. The OrVil is guided into the hypopharynx by pulling on the the tube end of the device. As the anvil approaches the hypopharynx, the jaw is pulled forward to allow passage of the anvil.

The shaft of the anvil is brought through the esophageal staple line, and the tube disconnected from the anvil by cutting the blue sutures.

The superior end of the conduit is opened along the staple line and the DST XL stapler (matching the diameter of the OrVil) introduced through the Alexis device. The stapler shaft is placed into the open end of the gastric conduit and the conduit pulled over it ('sock over shoe'). The stapler spike is brought out through the greater curvature. The anvil is grasped with a Maryland grasper placed through a superior 5mm port and the two components of the stapler are mated and the stapler tightened and fired. The knob of the stapler is rotated two turns counter-clockwise until a click is felt, at which time the anvil will flip. The stapler is withdrawn and the donuts examined and sent for pathologic exam.

The anastomosis is completed by firing a Echelon Medium-Thick (Gold) linear) across the conduit cephalad to the anastomosis. The excess conduit is sent for pathologic exam as 'additional gastric margin.'

NG Tube A Covidien Salem Sump 18Fr nasogastric tube is passed by the anesthetist. A laparoscopic BK ultrasound is used to monitor the passage of the NG tube through the esophagus and into the gastric conduit. The NG tube is passed to the level that all for dots are outside the nose, with the 4th dot at the nares. The NG tube is secured with an AMT bridle.

Chest Tube A 28Fr Blake chest tube is placed through the anterior/inferior

12mm port and is positioned into the posterior mediastinum. JP2 is placed near the gastric conduit. The right lung is re-inflated.

Closure The stapler access port incision is closed with 0 Vicryl to approximate the serratus muscle. The incisions are closed with 4-0 Monocryl followed by Dermabond.

Part III

Esophageal Cancer

Chapter 15

Esophageal Overview

Esophageal cancers can be grouped into 4 treatment categories:

- Superficial → Endoscopic therapy
- Localized → Primary surgery
- Locally Advanced → Trimodality therapy
- Metastatic → Systemic therapy

Patients with minimal dysphagia, no weight loss, and small (<3cm length) tumors are evaluated with endoscopic ultrasound:

- If uT1 on EUS and <2cm in size, endoscopic mucosal resection yields more information and may be therapeutic for tumors with negative margins and without high-risk features.
- If uT2N0 on EUS, and PET scan shows a small tumor (MTV <10cm^3), primary surgery is preferred in patients who are good surgical risks
- If T3 or N+ on EUS, if PET shows no metastatic disease, neoadjuvant therapy is optimal)

Patients with dysphagia to solids or weight loss or tumor length >3cm are unlikely to have T1-2 tumors and can be evaluated with PET scan.

- If PET shows disease confined to the esophagus and regional nodes, trimodality therapy (chemoradiation followed by surgery) is optimal.
- If PET shows metastatic disease, patients are eligible for palliative chemotherapy with radiation for treatment of symptoms of dysphagia.
- If PET shows extra-regional lymph node disease, patient is at high risk for distant disease and can be treated with induction chemotherapy followed by chemoradiation and surgical evaluation.

Chapter 16

EsoCa SCORE - JR

Junior Resident SCORE - Esophageal Neoplasms

Junior Resident SCORE - Esophagectomy

Anatomy

Epidemiology and Prevention

- Worldwide distribution
- Risk factors

Presentation

- Symptoms
- Nutritional consequences

Diagnosis and Staging

- Physical findings
- Role of PET scan
- Role of EUS
- TNM staging system
- Treatment Categories
  - Superficial
  - Localized
  - Locally-advanced
  - Metastatic

Operative Treatment

- Indications for surgery
- Operative anatomy
- Gastric tube construction
- Ivor Lewis

- Transhiatal
- McKeown

Complications

- Postoperative hypovolemia
- Chylothorax
- Anastomotic leak - chest
- Anastomotic leak - neck
- Atrial fibrillation
- Aspiration
- Vocal cord paralysis
- Stomach ischemia

Intraop Decision-making

- Liver metastasis
- Peritoneal lesion

Nonoperative management

- Palliative Radiation
- Esophageal stents

Chapter 17

EsoCa Objectives - Chief

Chief Resident SCORE

Epidemiology and Prevention

- Worldwide distribution
- Risk factors for squamous cell carcinoma
- Risk factors for adenocarcinoma

Presentation

- Symptoms
- Nutritional consequences

Diagnosis and Staging

- Physical findings
- Role of PET scan
- Role of EUS
- TNM staging system
- Treatment Categories
  - Superficial
  - Localized
  - Locally-advanced
  - Metastatic

Multidisciplinary Management

- High-grade dysplasia
- Endoscopic therapy
- Primary surgical therapy
- Trimodality therapy

Operative Mangement

- Ivor Lewis
- Transhiatal
- Left thoracoabdominal
- McKeown
- Alternative conduits
- Complications and their management

References

- CROSS Trial Behind the Knife Podcast
- MAGIC Trial
- FREGAT
- Dutch TIME trial

Chapter 18

Staging

The staging workup begins once a diagnosis is made on endoscopy.

The first step is to make a preliminary determination whether the tumor is early stage (and can be treated with endoscopy or primary surgery) or later stage (and treated with chemoradiation followed by surgery or with)

Patients with minimal dysphagia, no weight loss, and tumors with less than 3cm cranio-caudal extent have a reasonable change of being T1 or T2 tumors. Tumors <3cm in length are much more likely to represent T1-2 lesions than those $\geq$ 3cm(Hollis et al. 2017). For these patients, determining the precise T stage is important in their workup, so **endoscopic ultrasound** is the most frequent staging study after diagnosis.

Patients who present with dysphagia are likely to have T3 or T4 disease, which is generally treated with neoadjuvant chemoradiation followed by surgery. Data from Memorial Sloan Kettering [Ripley 226] among 61 patients with esophageal cancer who presented with dysphagia, 54 (89%) were found on EUS to have uT3-4 tumors. On the other hand, among 53 patients without dysphagia, 25 (47%) were uT1-2, and were potentially candidates for primary surgery. Their conclusion was that EUS could be omitted from the workup of patients with dysphagia, but is useful in patients without dysphagia.

PET can be helpful in evaluating patients who may have T1-2 disease, and might be candidates for primary surgical therapy. A comparison of PET and EUS [malik,claxton,1] showed that uT1-2 tumors had median metabolic tumor volume (MTV) of 6.7cm^3, compared with uT3-4 tumors, with a median SUV of 35.7cm^3.

Chapter 19

Nutrition

19.1 Jejunostomy tubes

Jejunostomy tubes are the conventional method used for nutritional support in patients with esophageal cancer who may under surgery in the future. Jejunostomy avoids potential damage to the (future) gastric conduit most commonly used for reconstruction of the esophagus.

19.2 Gastrostomy tubes

PEG in esophageal cancer (Margolis et al. 2003). PEG placement planned in 119/179 patients with new diagnosis of esophageal cancer. Successful in 103/119. No incidence of tumor inoculation metastasis noted. 61 patients underwent surgery and none had difficulty with gastrostomy closure. PEG patients were more likely to complete chemoRT and had better survival at 12 months.

Case report of PEG causing injury to right gastroepiploic artery (Ohnmacht et al. 2006)

Chapter 20

Esophageal Surgery

Part IV

Gastric Cancer

Chapter 21

Hereditary Diffuse Gastric Cancer

HDGC is a syndrome characterized by early-onset diffuse gastric cancer and increased risk of lobular breast cancer.

Hereditary diffuse gastric cancer was first reported in a New Zealand Maori cohort. The genetic cause was subsequently found to the a deletion in the CDH1 gene.

21.0.1 Penetrance estimates for lifetime risk of DGC

The original estimates of lifetime risk of gastric cancer in those with pathogenic CDH1 mutations were made from a population of patients with strong familiy histories of DGC(Hansford et al. 2015), in this group, the cumulative risk of gastric cancer by 80 years of age was estimated to be to be 70% in men and 56% in women.

The lifetime risk of gastric cancer in more modern cohorts(Roberts et al. 2019) (Xicola et al. 2019), in whom a minority of patients have a family history of gastric cancer, are much lower: 42% in men and 33% in women

21.1 Surveillance for CDH1 carriers

Cancer surveillance as an alternative to prophylactic total gastrectomy in hereditary diffuse gastric cancer: a prospective cohort study Bilal Asif, *Amber Leila Sarvestani*, Lauren A Gamble, Sarah G Samaranayake, Amber L Famiglietti, Grace-Ann Fasaye, Martha Quezado, Markku Miettinen, Louis Korman, Christopher Koh, Theo Heller, Jeremy L Davis Summary Background Loss of function variants in CDH1 are the most frequent cause of hereditary

diffuse gastric cancer. Endoscopy is regarded as insufficient for early detection due to the infiltrative phenotype of diffuse-type cancers. Microscopic foci of invasive signet ring cells are pathognomonic of CDH1 and precede development of diffuse gastric cancer. We aimed to assess the safety and effectiveness of endoscopy for cancer interception in individuals with germline CDH1 variants, particularly in those who declined prophylactic total gastrectomy. Methods In this prospective cohort study, we included asymptomatic patients aged 2 years or older with pathogenic or likely pathogenic germline CDH1 variants who underwent endoscopic screening and surveillance at the National Institutes of Health (Bethesda, MD, USA) as part of a natural history study of hereditary gastric cancers (NCT03030404). Endoscopy was done with non-targeted biopsies and one or more targeted biopsy and assessment of focal lesions. Endoscopy findings, pathological data, personal and family cancer history, and demographics were recorded. Procedural morbidity, gastric cancer detection by endoscopy and gastrectomy, and cancer-specific events were assessed. Screening was defined as the initial endoscopy and all subsequent endoscopies were considered surveillance; follow-up endoscopy was at 6 to 12 months. The primary aim was to determine effectiveness of endoscopic surveillance for detection of gastric signet ring cell carcinoma. Findings Between Jan 25, 2017, and Dec 12, 2021, 270 patients (median age 46 · 6 years [IQR 36 · 5–59 · 8], 173 [64%] female participants, 97 [36%] male participants; 250 [93%] were non-Hispanic White, eight [3%] were multiracial, four [2%] were non-Hispanic Black, three [1%] were Hispanic, two [1%] were Asian, and one [<1%] was American Indian or Alaskan Native) with germline CDH1 variants were screened, in whom 467 endoscopies were done as of data cutoff (April 30, 2022). 213 (79%) of 270 patients had a family history of gastric cancer, and 176 (65%) reported a family history of breast cancer. Median follow-up was 31 · 1 months (IQR 17 · 1–42 · 1). 38 803 total gastric biopsy samples were obtained, of which 1163 (3%) were positive for invasive signet ring cell carcinoma. Signet ring cell carcinoma was detected in 76 (63%) of 120 patients who had two or more surveillance endoscopies, of whom 74 had occult cancer detected; the remaining two individuals developed focal ulcerations each corresponding to pT3N0 stage carcinoma. 98 (36%) of 270 patients proceeded to prophylactic total gastrectomy. Among patients who had a prophylactic total gastrectomy after an endoscopy with biopsy samples negative for cancer (42 [43%] of 98), multifocal stage IA gastric carcinoma was detected in 39 (93%). Two (1%) participants died during follow-up, one due to metastatic lobular breast cancer and the other due to underlying cerebrovascular disease, and no participants were diagnosed with advanced stage (III or IV) cancer during follow-up. Interpretation In our cohort, endoscopic cancer surveillance was an acceptable alternative to surgery in individuals with CDH1 variants who declined total gastrectomy. The low rate of incident tumours (>T1a) suggests that…

Advanced (T3) tumors found during endoscopic surveillance all had mucosal abnormalities found at EGD

Consensus guidelines (2020)(Blair et al. 2020) Recommend surveillance in whom

family history of gastric cancer is weak

REcommend 28-30 random biopsies

revirew (**pilonis263?**) Ann rev med 72:263 2022

guidelines (**vanderpost361?**) j med genet 52:361

total gast (**chen2594?**)ann surg oncol 2011:18. kingham

Cambridge: Endoscopic surveillance in HDGC. 145 patients from 76 families with a family history of gastric cancer and CDH1 mutations (see blair and vanderpost). Pathogenic variasnt of CDH1 in 92 (63%). Prophylatic total gastrecromy done in 36 (25%)

During surveilance 58/145 (58%) were found to have invasive signet ring cell carcinoma.

Of those with CDH1 mutations, 53% had (49/91) had invasive signet ring cell carcinoma diagnosed

Invasive signet ring cell carcinoma detected in 6/41 (15%) with no CDH1 pathogenic mutations

Total gastrectom in 36 of whom 32 (89%) had signet ring cell carcinoma on pathology.

Prophylactic total gastrectomy with CDH1 mutation in 28 patients, of whom 26 (93%) had signet ring cell carcinoma.

6/13 invasive signet ring cell carcinoma found on random biopsies later developped visible lesions and underwent gastrectomy (see addpneix p8) progressed to more advanced

Part V

Colon Cancer

Part VI

Rectal Cancer

Part VII

Anal Cancer

Chapter 22

Anal Squamous Cell Carcinoma

NCCN Guidelines

Surgical Clinics Review Article: (Young et al. 2020)

22.1 Chemoradiation

Chemoradiation is now the standard for anal squamous cell carcinoma of the anal canal and for perianal cancers (except for small T1 lesions). Nigro protocol is the standard approach.(Nigro et al. 1983)

22.1.1 Restaging after chemoRT

Based on the results of the ACT-II study, it may be appropriate to follow patients who have not achieved a complete clinical response with persistent anal cancer up to 6 months following completion of radiation therapy and chemotherapy as long as there is no evidence of progressive disease during this period of follow-up. Persistent disease may continue to regress even at 26 weeks from the start of treatment.(James et al. 2013)

Part VIII

Sarcomda

Part IX

Melanoma

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