

Common Surgeries Made Easy

A Quick Guide for Residents
and Medical Students

Efstathios Karamanos
Editor

 Springer

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To my father, Konstantinos, and my mother, Angeliki, for their unmeasured, endless, and selfless support.

To all the unsung heroes around the world fighting with multiple sclerosis.

*To the infinite white and blue of the Grecian land.
And to all those who like Odysseus, are on their personal quest to find their own Ithaca.*

Special thanks to

Bao-Quynh Julian, MD,

from the Division of Plastic and Reconstructive Surgery, UT Health San Antonio, for the illustrations throughout the book.

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Preface

I vividly remember my first day as an intern in general surgery. It was a gloomy morning, and I was up since 3 a.m., excited to finally be a doctor. My chief resident looked at me and told me: “You go do the inguinal hernia today.” My excitement was swiftly traded with pure terror: How can I be competent when I have no idea what I am supposed to be doing? I spent the next 2 hours researching every possible source I could find but was disappointed to find that there are no clear and precise resources to quickly and efficiently go through the steps of such a common operation. That day was the birth of the idea of the book you have in your hands today.

The present book tries to fulfill a need of medical students during their surgical rotations, of interns looking to understand common surgical procedures, and of chief residents reviewing steps for the most commonly asked operations during board certification. The book is written in a simple fashion, with bullet-point steps to be easy and quick for the reader. It also includes hints about the positioning of the patient and potential pitfalls for every surgery.

On behalf of all the authors, I hope that this book will become an invaluable companion, one that will be inside your white coat pocket, worn from use, and always your ally during the stressful days of surgical rotations and residency.

San Antonio, TX, USA

Efstathios Karamanos

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Part I
Esophagus

Chapter 1

Laparoscopic Nissen Fundoplication



Yasaman Kavousi

Overview

- Dissection through gastrohepatic ligament
- Identify right crus, and dissect posteriorly
- Takedown short gastrics working cranially towards left crus
- Complete circumferential mobilization of esophagus
- Closure of hiatus if needed
- Fundus passed posteriorly and wrap created and sewn in place with 3 stitches

Clinical Pearls

- Replaced left hepatic artery courses through gastrohepatic ligament
- Left vagus nerve courses anterior, right vagus nerve courses posterior
- If not using bougie, can use gastroscope to assess tightness of wrap

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- Patient may have dysphagia immediately postoperatively secondary to swelling, inflammation but will resolve with time

Patient Preparation

Supine with both arms tucked by his/her side.

After induction of general anesthesia, an orogastric tube and an optional urinary catheter are placed.

Anesthesia

General anesthesia.

Operative Steps

1. Pneumoperitoneum is established using a Veress needle technique via a supra-umbilical incision to the left of the midline (refer to chapter regarding abdominal entry).
2. A 10 mm laparoscope is then inserted and the peritoneal space is carefully inspected.
3. The remaining ports are placed sequentially under direct visualization, including a 5 mm self-retaining liver retractor, utilizing a five-port technique.
4. The left lobe of the liver is elevated.
5. The patient is placed in steep reverse Trendelenburg position.
6. With the stomach retracted laterally, dissection commences by dividing the gastrohepatic ligament above the hepatic branch of the vagus (pars flaccida) using the Harmonic scalpel. Care is taken to avoid the left gastric artery, a possible replaced left hepatic artery, and vagal branches.
7. The right diaphragmatic crus is identified and the overlying peritoneal attachments are divided.

8. The right crus is dissected from its confluence to the median arcuate ligament, where it joins the left crus posterior to the esophagus.
9. The phrenoesophageal membrane is carefully divided anteriorly, perpendicular to the esophagus.
10. The anterior vagus nerve is generally affixed to the esophagus, and the posterior vagus nerve is not visible at this time.
11. Next, the stomach is grasped at the level of the inferior pole of the spleen. The greater omentum is also grasped and retracted laterally.
12. Using the Harmonic scalpel, the short gastric vessels along the greater curvature are divided to the level of the left diaphragmatic crus.
13. The esophagus is freed from the left crus and mobilized circumferentially at the hiatus. Great care is taken to avoid injury to the esophagus, stomach and vagus nerve.
14. The gastroesophageal junction is identified by recognizing the confluence of the longitudinal muscles of the esophagus merging with the sling muscles of the stomach.
15. In the majority of patients, adequate intra-abdominal esophagus is present and an esophageal lengthening procedure is not needed.
16. A 56 French bougie is passed by Anesthesia through the esophagus along the lesser curvature of the stomach.
17. The esophagus is retracted with the help of a penrose drain and the hiatal confluence is closed by bringing the left and right crux together, posterior to the esophagus. The crura are sewn to each other moving from the patient's left side to the right side with interrupted 0 Ethibond suture using the Endostitch device.
18. The fundus of the stomach is then passed behind the esophagus.
19. A shoeshine maneuver is performed to ensure correct alignment, tension, and placement of the wrap.
20. With the bougie in place, a 2 cm 360 degree wrap is created and secured with 3 interrupted 0 Ethibond sutures using the Endostitch device.

21. Sutures are passed from the fundus on the left side of the wrap to the esophagus and then to the fundus on the right side of the wrap. The most distal sutures may incorporate only the fundus to fundus. An additional two sutures may be placed from the fundus on the right side posteriorly to the right crus to further anchor the wrap (Fig. 1.1).
22. The bougie is then removed and the repair is inspected visually to ensure that the wrap is configured correctly.
23. All ports are removed and pneumoperitoneum is evacuated and the skin incisions closed.

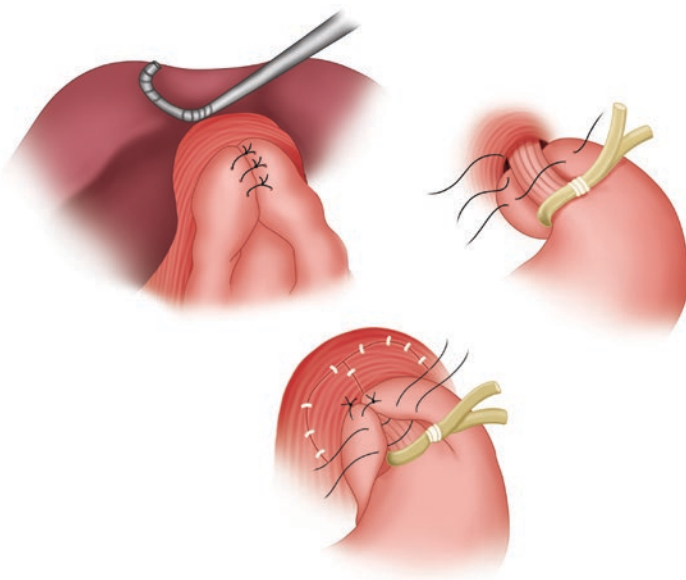


FIGURE 1.1 Three interrupted 0 Ethibond sutures are placed at the fundus of the stomach around a 56 French Bougie

Chapter 2

Minimally Invasive Heller Myotomy



Yasaman Kavousi

Overview

- Dissection through gastrohepatic ligament
- Identify right crus, and dissect posteriorly
- Complete circumferential mobilization of esophagus
- Identify anterior vagus nerve and protect
- Myotomy should extend through muscle to see mucosa
 - 8 cm onto esophagus, and at least 2 cm onto stomach cardia

Clinical Pearls

- Replaced left hepatic artery courses through gastrohepatic ligament
- Left vagus nerve courses anterior, right vagus nerve courses posterior
- If patients need anti-reflux surgery, attending preference for anterior or posterior wrap

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- Anterior wrap benefit: protects the mucosa, and will cover any possible missed mucosal injuries
- Posterior wrap benefits: stents the esophagus open to avoid future dysphagia

Patient Preparation

Supine with both arms tucked by his/her side.

After induction of general anesthesia, an optional urinary catheter is placed.

Anesthesia

General anesthesia.

Operative Steps

1. The skin of the lower chest and abdomen is prepped and draped in the usual sterile fashion.
2. The peritoneal cavity is accessed using a Veress needle via a supra-umbilical incision and pneumoperitoneum is established.
3. A 10 mm laparoscope is then inserted, and the intra-peritoneal cavity is evaluated.
4. The laparoscopic ports include either a 5 mm or 10 mm port placed 15 cm below the xiphoid and to the left of the midline. A 30-degree laparoscope is placed through this port and four additional ports are placed: two 5 mm ports below costal margin on each side and 15 cm away from the xiphoid, a 5 mm and 10 mm port on the right side and left side respectively and 10 cm away from the xiphoid and about 3–4 cm away from the midline.

5. The patient is placed in reverse Trendelenburg and a self-retaining liver retractor is placed through the right costal margin port (under the lateral segment of the left lobe of the liver to expose the hiatus). The robot is then docked if the surgery is being performed robotically, and the senior surgeon will scrub out to sit at the console.
6. Dissection begins by incising the gastrohepatic omentum to identify the right diaphragmatic crus.
7. The esophagus is then circumferentially dissected in the mediastinum by clearing the retroesophageal window and identifying the left diaphragmatic crus.
8. The gastroesophageal fat pad is then divided to expose the gastroesophageal junction. The vagus nerve is identified. Care is taken not to injure the nerve.
9. A 56 French bougie is then introduced into the esophagus.
10. The myotomy is then carried out using hook electrocautery. It is extended proximally a distance of 8 cm on the esophagus and distally a distance of 2 cm onto the cardia with care taken not to violate the mucosa (Fig. 2.1).
11. Approximately 50% of the esophageal circumference should be exposed.
12. The bougie is then withdrawn.
13. All ports are removed and pneumoperitoneum is evacuated. The fascia at the 10 mm port sites is closed and the skin is closed.
14. A sterile dressing is applied.

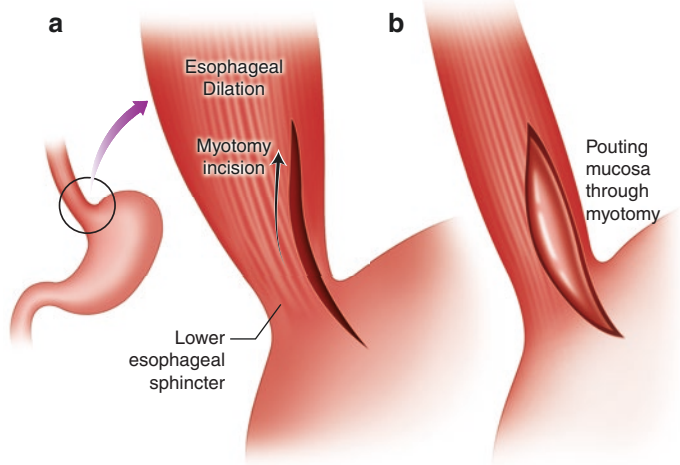


FIGURE 2.1 The Heller myotomy is performed using electrocautery 8 cm proximal to the esophagus and 2 cm distal to the stomach



Chapter 3

Laparoscopic Transabdominal Paraesophageal Hernia Repair

Semeret T. Munie

Overview

- Dissection through gastrohepatic ligament
- Identify right crus, and dissect posteriorly
- Takedown short gastrics working cranially towards left crus
- Complete circumferential mobilization of esophagus
- Hernia sac dissected out of mediastinum
- Hiatus primarily repaired with nonabsorbable sutures
- Anti-reflux procedure is performed

Clinical Pearls

- Replaced left hepatic artery can run through gastrohepatic ligament
- Left vagus nerve courses anterior, right vagus nerve courses posterior

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- If hernia sac not completely resected, significantly increased incidence of recurrence
- Use biologic mesh if you are going to use mesh
- Mesh has better short term outcomes, however no benefit has been shown in long-term outcomes
- Consider placing G-tube to tack stomach in abdomen

Patient Preparation

Supine with the surgeon on the right side of the patient and the assistant on the left.

If using a split leg table set-up, the surgeon stands between the patient's legs with the assistant to the left of the patient.

Anesthesia

General anesthesia.

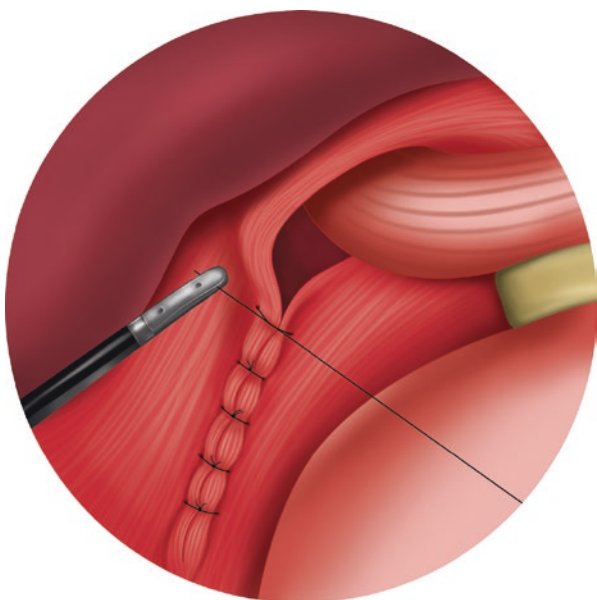
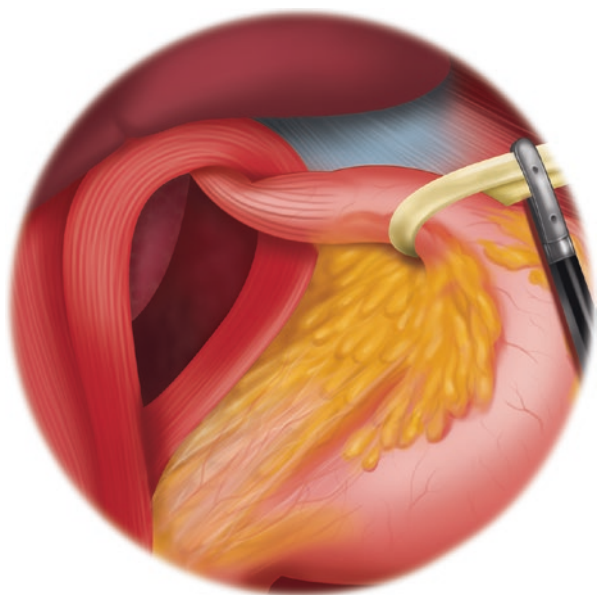
Operative Steps

There may be some variations in port placement and choice of fundoplication based on patient specifics and surgeon choice. This section discusses one option.

1. A Veress needle is used to enter the abdomen at Palmer's point in the left upper quadrant and the abdomen is insufflated to 15 mmHg. Using a 0-degree camera, a 5 mm optical trocar is placed under direct vision at Palmer's point. Three additional 5 mm ports are placed in the upper abdomen along with a liver retractor placed through a subxiphoid incision. The camera is switched to a 5 mm 30-degree laparoscope.
2. The hiatus is visualized and as much of the paraesophageal hernia as possible is reduced back into the abdomen

using atraumatic graspers in a hand-over-hand pull of the stomach into the abdominal cavity.

3. The gastrohepatic ligament is divided with an energy device, exposing the right crus of the diaphragm.
4. The dissection along the diaphragmatic hiatus is continued superiorly and across to the left side, dissecting free the gastrophrenic ligament.
5. The dissection is continued posteriorly in the lesser sac to expose the junction of the right and left crura. Care should be taken to not injure the left gastric artery.
6. A penrose is passed in the retroesophageal space to allow adequate retraction of the gastroesophageal junction.
7. Care should be taken to avoid injury to the anterior/posterior vagus nerves, the aorta posteriorly and the inferior vena cava to the right of the diaphragmatic hiatus.
8. Complete circumferential mobilization, extending into the mediastinum is performed in order to obtain at least 3 cm of the distal esophagus in the abdominal cavity. Rarely, a gastropasty will need to be performed to elongate the intra-abdominal esophagus.
9. At this time a bougie is passed through the mouth and into the esophagus. Care should be taken to avoid esophageal perforation.
10. The esophagus is retracted to the left upper quadrant by the assistant surgeon and the crus of the diaphragm is approximated posteriorly with interrupted non-absorbable suture.
11. An antireflux procedure with either a Nissen fundoplication (360 degree wrap of the fundus of the stomach around the esophagus) or a Toupet fundoplication (270 degree posterior wrap of the fundus around the esophagus) is then performed.
12. The bougie is removed and an optional flexible endoscopy is performed to make sure the fundoplication is not too tight.
13. Laparoscopic ports are then removed and incisions are closed.



Chapter 4

Minimally Invasive Ivor Lewis Esophagectomy



Yasaman Kavousi

Overview

- Dissection through gastrohepatic ligament
- Identify right crus, and dissect posteriorly
- Divide gastrocolic ligament to enter lesser sac
- Mobilize stomach from pylorus to left crus, dividing short gastrics
- Preserve right gastroepiploic arcade, divide left gastroepiploic arcade
- Expose celiac axis and dissect nodal tissue
- Dissection continues cephalad to free esophagus
- Create gastric conduit using endostapler
- Create loop jejunostomy for feeding access
- Convert to thoracoscopic portion
- Take down inferior pulmonary ligament
- Mobilize esophagus from hiatus to thoracic inlet
- Azygous vein identified and divided
- Divide esophagus at carina, and bring conduit into chest, then esophagus divided proximally

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- Esophagogastrostomy created with stapler, then oversewn
- Chest tube placed

Clinical Pearls

- Replaced left hepatic artery courses through gastrohepatic ligament
- Right gastroepiploic is the vascular pedicle for neoesophagus

Patient Preparation

1. Abdominal portion: Supine with both arms out and foot-board in place.
2. Thoracic portion: Left lateral decubitus with right arm extended over patient.

Preoperative foley placement and weight-based venous thromboembolism prophylaxis.

Anesthesia

General anesthesia via a double-lumen endotracheal tube.

Operative Steps

Abdominal Portion

1. An esophagogastroscopy is performed with a flexible endoscope to confirm the tumor location, and to assess the stomach's appropriateness to be used as a conduit.
2. With the patient in a supine position, the abdomen and lower chest are prepped and draped in the usual sterile fashion.

3. A 10 mm incision is then made to the left and superior to the umbilicus. The peritoneal cavity is then accessed using a Veress needle and pneumoperitoneum is established.
4. The intraperitoneal cavity is inspected for any evidence of metastatic disease using a 30-degree laparoscope.
5. Standard laparoscopic ports are then placed, including a self-retaining liver retractor.
6. Dissection is started by incising the gastrohepatic omentum to identify the right diaphragmatic crus.
7. The gastroesophageal junction is freed from the hiatus by dissecting up the right crus and extending the dissection to the left crus until the esophagus is dissected circumferentially from the mediastinum.
8. Using the Harmonic scalpel, the gastrocolic ligament is then divided lateral to the right gastroepiploic arcade to enter the lesser sac.
9. The greater curve of the stomach is then mobilized from the level of pylorus all the way to the left crus, taking down the short gastric arteries, with care taken to preserve the right gastroepiploic arcade.
10. The retroperitoneal attachments are taken down and the stomach is retracted superiorly and to the right to expose the celiac vessels. Any celiac and gastric nodal tissue is sent for pathology.
11. The left gastric artery is then isolated and divided using a vascular load of the EndoGIA stapler.
12. A penrose drain is then cut and placed around the esophagus to aid in retraction.
13. The right pleural space is then entered and the penrose drain is placed in the right pleural space to be retrieved during the thoracoscopic portion of the procedure.
14. The pylorus is then identified, and using an endostitch device, two 0-Ethibond stay sutures (superior and inferior) are placed along the horizontal axis of the pylorus to provide cephalad-caudal retraction. Two hundred units of botulinum toxin is then injected into the pylorus.