Extraluminal Approaches to Gastroesophageal Reflux Disease

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KEYWORDS

• GERD • LINX • Magnetic sphincter augmentation • Fundoplication • EndoStim

KEY POINTS

- Before considering surgical therapy of gastroesophageal reflux disease, it is incumbent on the surgeon to confirm the presence of pathologic reflux, adequate esophageal motility, and the absence of other explanatory or complicating esophageal or gastric diseases.
- The gold standard extraluminal surgical intervention for gastroesophageal reflux disease is complete or partial gastric fundoplication of the esophagus and hiatal hernia repair.
- Novel modalities, including the LINX and EndoStim, offer less invasive and perhaps equivocal or even superior alternatives to fundoplication in appropriately selected patients.

INTRODUCTION

The surgical treatment of gastroesophageal reflux disease (GERD) has been one of the great successes of laparoscopy in the past decades, even in the face of major advances in the medical therapy of the condition. The obesity epidemic and modern behavioral vices make reflux a disease of relatively high prevalence (between 3% and 33%), which coupled with growing concerns of the side effects of popular proton pump inhibitors used to treat the symptoms of the disease make surgical intervention both attractive to and indicated for patients with GERD.[1]

The surgical therapies available to treat GERD have evolved and multiplied over the past decades. The gastric fundoplication, once performed through a thoracic or open transabdominal approach has become in all but the most complicated cases a transabdominal procedure, and now a nearly universally laparoscopic procedure. Options for fundoplication include the complete or partial fundoplication as well as the maturing extraluminal magnetic sphincter augmentation device and the experimental lower esophageal sphincter (LES) stimulation device. In addition to a host of procedures to address the tone of the LES, understanding the importance of the hiatus in the physiology of antireflux surgery is of tantamount importance.[2,3]

DIAGNOSTIC STUDIES

GERD typically presents with well-known symptoms of water-brash, regurgitation, and pyrosis or dysphagia. Atypical symptoms and complaints are also common, including vomiting, chronic cough or laryngitis, and even serious lung or sinus diseases. Some combination of these symptoms is sensitive but not specific for reflux disease.

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The diagnosis of reflux disease requires several key diagnostic studies. We routinely use 4 diagnostic studies. An upper endoscopy (EGD) is key to rule out malignant or anatomic defects of the esophagus or stomach as well as to visualize the distal esophagus and facilitates biopsy of potentially metaplastic or dysplastic tissue. While conducting the EGD, the second test, a pH study is facilitated when a detachable 48-hour to 96-hour pH probe is left on the esophageal wall providing a measurement of esophageal acid exposure. We primarily use the video esophagogram (VEG) to assess motility of the esophagus and as the most sensitive study to diagnose and assess the size of hiatal hernia, particularly those that are small.[4] The fourth routine study is esophageal manometry to formally characterize esophageal motility. Rarely, a symptomatic patient will have symptoms consistent with reflux or other esophageal dysmotility disorder, which results in equivocal or negative DeMeester score, in which case we pursue impedance studies, particularly in cases in which we suspect alkaline reflux. In patients with questionable motility on VEG or manometry, we advocate partial fundoplication. Patients with nausea and vomiting as the predominant symptoms merit a nuclear medicine gastric emptying study to assess for gastroparesis. Failure to adequately diagnose poor gastric emptying or an occult esophageal motility disorder can result in disastrous outcomes for the patient and surgeon.

In patients with a DeMeester score of greater than 14.72, anatomically normal EGD without cancer, and a VEG with adequate motility, we offer a complete fundoplication or magnetic sphincter augmentation. In patients with impaired motility we offer a partial fundoplication, preferentially the posterior 270° wrap. As discussed later, in the most complex patients we consider a Roux-en-Y procedure.

FUNDOPLICATION

GERD is a result of an incompetent LES that results in transient or basal low LES tone.[5] This incompetence is primarily the result of a weak lower esophageal smooth muscle tone, and is contributed to by a laxity of the diaphragmatic crural or a hiatal hernia.[2,3] The object of the fundoplication, regardless of approach or degree is to restore competence of the LES while still allowing successful bolus transport into the stomach. A fundoplication procedure requires the reduction of any hiatal hernia, tightening of the diaphragmatic crura, return of an appropriate length of esophagus into the abdominal cavity, and increasing the pressure of the LES through the creation of a gastric fundoplication of the distal esophagus. These tasks may be accomplished by multiple approaches.

Thoracic Approach

The primary benefit of the thoracic approach is that it allows virgin access to the gastroesophageal junction (GEJ) in patients having undergone multiple or complicated prior abdominal surgeries. The trans-thoracic fundoplication is accomplished through a thoracotomy or video-assisted thoracoscopic surgery via the left chest. In this procedure, the mid to distal esophagus is mobilized, hiatal hernia is reduced, a partial 270° fundoplication is performed, and the hiatus is closed. An esophageal lengthening procedure may occasionally be required.

Open Abdominal Approach

With the proliferation of complex laparoscopic skills, rarely is an open approach to fundoplication indicated outside of the complex reoperation with prohibitive adhesive disease, on occasion of an indication for fundoplication coexisting with an independent indication for laparotomy or in a patient who will not tolerate laparoscopy.

Laparoscopic Abdominal Approach

The preferred and most common approach to accomplishing both primary and redo fundoplication is the laparoscopic approach. Not only does a laparoscopic approach result in less pain, but it facilitates earlier return to function and discharge and is more economical.[6] The real benefit of laparoscopic surgery is that it allows better and more complete visualization of the hiatus, GEJ, and posterior mediastinum than an open abdominal or thoracic approach. The CO_2 pneumoperitoneum also aids in the reduction of the hiatal hernia from the thorax, and if the pleura are violated during hernia reduction, the resulting pneumothorax rarely if ever requires a painful tube thoracostomy. Any of the variety of anterior or posterior partial or complete anterior fundoplication procedures may be accomplished by this approach depending on motility, associated anatomy, and procedures and surgeon or patient preference.

Robotic Fundoplication

Although a robotic approach to fundoplication has been described, we have not found a place for it in the practice of an advanced laparoscopic surgeon. Indications and limitations parallel those of laparoscopy.