

ABDOMINAL PAIN - GASTROESOPHAGEAL REFLUX DISEASE

Epidemiology and Pathophysiology

Gastroesophageal reflux disease (GERD) is one of the most commonly encountered benign foregut disorders. Approximately 20-40% of adults in the United States experience chronic GERD symptoms, and these rates are rising rapidly. GERD is the most common gastrointestinal-related disorder that is managed in outpatient primary care clinics.

GERD is defined as a condition which develops when stomach contents reflux into the esophagus causing bothersome symptoms and/or complications. Mechanical failure of the antireflux mechanism is considered the cause of GERD. Mechanical failure can be secondary to functional defects of the lower esophageal sphincter or anatomic defects that result from a hiatal or paraesophageal hernia. These defects can include widening of the diaphragmatic hiatus, disturbance of the angle of His, loss of the gastroesophageal flap valve, displacement of lower esophageal sphincter into the chest, and/or failure of the phrenoesophageal membrane. Symptoms, however, can be accentuated by a variety of factors including dietary habits, eating behaviors, obesity, pregnancy, medications, delayed gastric emptying, altered esophageal mucosal resistance, and/or impaired esophageal clearance.

Signs and Symptoms

Typical GERD symptoms include heartburn, regurgitation, dysphagia, excessive eructation, and epigastric pain. Patients can also present with extra-esophageal symptoms including cough, hoarse voice, sore throat, and/or globus. GERD can present with a wide spectrum of disease severity ranging from mild, intermittent symptoms to severe, daily symptoms with associated esophageal and/or airway damage. For example, severe GERD can contribute to shortness of breath, worsening asthma, and/or recurrent aspiration pneumonia. Chronic symptoms can have a substantial impact on quality of life. Besides causing discomfort, chronic reflux symptoms can lead to loss of sleep and reduced work productivity.

Initial Diagnosis

The initial diagnosis is based on clinical impression gleaned from an appropriate patient history and physical exam. If a patient has bothersome symptoms that are consistent with GERD, initial treatment options can be pursued. The initial, non-operative treatments are detailed later in this module, but these include lifestyle modifications and acid neutralizer or acid suppression medications. In those patients who respond favorably to initial GERD treatments, the diagnosis of GERD becomes more certain.

Initial Management

Lifestyle Modifications

Initial management of GERD should always include lifestyle modifications. These include avoiding trigger foods, avoiding eating immediately prior to lying down, weight loss, smoking cessation, elevating the head of the bed, and avoiding overeating. In most patients, these interventions will produce some improvements in symptoms. However, some patients fail attempts at lifestyle modifications. Some of the patients who fail have such severe GERD that they continue to have significant symptoms despite behavior modifying interventions. Alternatively, some patients are unable to durably implement the recommended behavioral changes and, therefore, continue to have bothersome symptoms.

Medications

Medications should be considered an adjunct to lifestyle modifications for control of GERD symptoms. In addition, medications can be extremely effective for healing of esophageal mucosal damage such as reflux esophagitis.

Antacids

This group of medications neutralizes acid within the stomach. The parietal cells of the stomach, therefore, continue to produce and excrete acid into the gastric lumen, but the acid is then buffered by these agents. These medications are used on-demand and provide rapid relief; however, they have a short duration of effect. Examples of acid neutralizer medications include calcium carbonate, aluminum hydroxide, and magnesium carbonate. These medications are generally well-tolerated, safe, and associated with a low side effect profile. However, these medications are generally only effective for very mild, intermittent reflux symptoms.

Acid Suppression Medications

This group of medications includes Histamine-2 (H2) receptor antagonists and proton pump inhibitors (PPI). These medications suppress the production of gastric acid and are quite effective in reducing symptoms of GERD. In fact, the majority of patients with GERD can be adequately managed on acid suppression therapy. These medications are also very effective for healing acid-related esophageal mucosal damage such as reflux esophagitis. Although these medications can be obtained over-the-counter, there are long-term side effects that have been recognized by the FDA resulting in several warnings. These warnings include an increased risk of osteoporosis, long bone fractures, and *Clostridium difficile* infection. Other risks that have been reported with long-term use of PPI therapy include renal insufficiency and dementia, although the FDA has not yet issued a comment on these reports.

Diagnostic Studies

There are several groups of patients who may require further work-up for GERD. The first group consists of those patients who do not respond to initial GERD treatments. The second group consists of those patients who have some improvement with initial treatments but continue to have significant breakthrough symptoms. Both of these groups of patients should undergo further testing to determine the source of their symptoms.

A third group of patients who require further diagnostic testing includes patients with GERD who wish to pursue antireflux surgery. Patients may pursue antireflux surgery if non-operative GERD treatments are not sufficiently effective. Others may have a desire to avoid long-term acid suppression medications due to medication allergy, medication side effects, or simply a desire to avoid long-term medication side effects. In any case, for these patients, objective documentation of GERD is mandatory prior to surgical intervention.

Diagnostic testing for GERD serves two main purposes. The first objective is to look for objective evidence of GERD. Objective evidence of GERD includes 24-hour ambulatory pH test showing pathologic reflux, EGD evidence of reflux esophagitis, and/or histologic evidence of Barrett's esophagus (intestinal metaplasia with or without dysplasia). The second purpose of the diagnostic testing is to determine if there are other conditions that could be causing the symptoms or other conditions that would preclude operative intervention. For example, a patient with achalasia would often report symptoms very similar to those found with GERD including regurgitation, heartburn, and dysphagia. Although the symptom profile is similar to GERD, performing an antireflux operation on someone with achalasia would be contraindicated and would produce worsening of their symptoms.

Esophagogastroduodenoscopy (EGD)

An EGD is an outpatient procedure and is performed under conscious sedation. The gastroesophageal junction (GEJ) and z-line are the most telling aspects of a GERD evaluation. Inspection of the GEJ and z-line can reveal reflux esophagitis or evidence of Barrett's esophagus. Biopsies of suspected Barrett's esophagus should be performed for histologic confirmation. The presence of reflux esophagitis or Barrett's esophagus is considered objective evidence of pathologic reflux. Further endoscopic examination can confirm a diagnosis of a hiatal or paraesophageal hernia, a patulous lower esophageal sphincter, or an insufficient gastroesophageal flap valve. The other purpose of the EGD is to evaluate for alternative pathology that may explain a patient's symptoms. Examples include eosinophilic esophagitis, peptic ulcers, esophageal or gastric tumor, gastritis, or gastroparesis to name a few. It is important to note that a patient can have severe GERD and have no major abnormal findings on EGD evaluation.

24-hour Ambulatory pH Testing

This test measures acid exposure within the esophagus. It is generally performed off of PPI medications in an effort to confirm and quantify the diagnosis of GERD. Testing is traditionally performed with a catheter-based pH probe. The catheter-based pH probe is inserted transnasally such that the distal probe is located several centimeters above the gastroesophageal junction. The probe is secured into place and the patient is instructed to eat and drink as they normally would. The pH probe stays in place for 24 hours. The probe records the number of times the pH drops below 4 and the total amount of time the pH is below 4. The patient is also instructed to record each instance of reflux symptoms so that this can be correlated with objectively measured reflux events. Alternatively, a wireless pH probe can be endoscopically inserted. The probe stays in place for several days before falling off and passing through the gastrointestinal tract. The main advantage of a wireless probe is patient comfort. The advantage of the catheter-based probe is measurement accuracy and the ability to measure impedance. Impedance measurements can detect non-acid reflux events. In either case, the acid exposure data is often reported as a DeMeester score. A DeMeester score < 14.72 is considered normal acid exposure. A DeMeester score > 14.72 is considered abnormal pathologic acid exposure. Symptom correlation is also reported as a separate measure.

Esophageal Manometry

This test measures the strength and coordination of esophageal motility. The purpose is to determine if there is an esophageal motility disorder. If a significant motility disorder is identified, then this motility disorder, rather than GERD, may be the source of symptoms. The presence of a motility disorder would then require an alternative treatment approach. Additionally, the identification of certain motility disorders in the setting of GERD could change how GERD is treated. For example, certain procedures that increase resistance within the gastroesophageal junction may be contraindicated or have relative contraindications in the setting of certain esophageal motility disorders.

Upper Gastrointestinal (UGI) Contrast Study

This study requires the patient to drink a contrast agent while fluoroscopic images are obtained as the contrast passes through the upper gastrointestinal tract. This test can provide anatomic information such as the presence of a hiatal hernia, a stricture, or a diverticulum. In some cases, it can suggest the presence of a mass lesion or a motility disorder; however, other confirmatory testing would be required to make those diagnoses. It is important to note that this test cannot diagnose GERD. An episode of reflux can be captured on a UGI contrast study, but this does not necessarily mean that the patient suffers from GERD.



UGI contrast study showing a small hiatal hernia

Operative Management

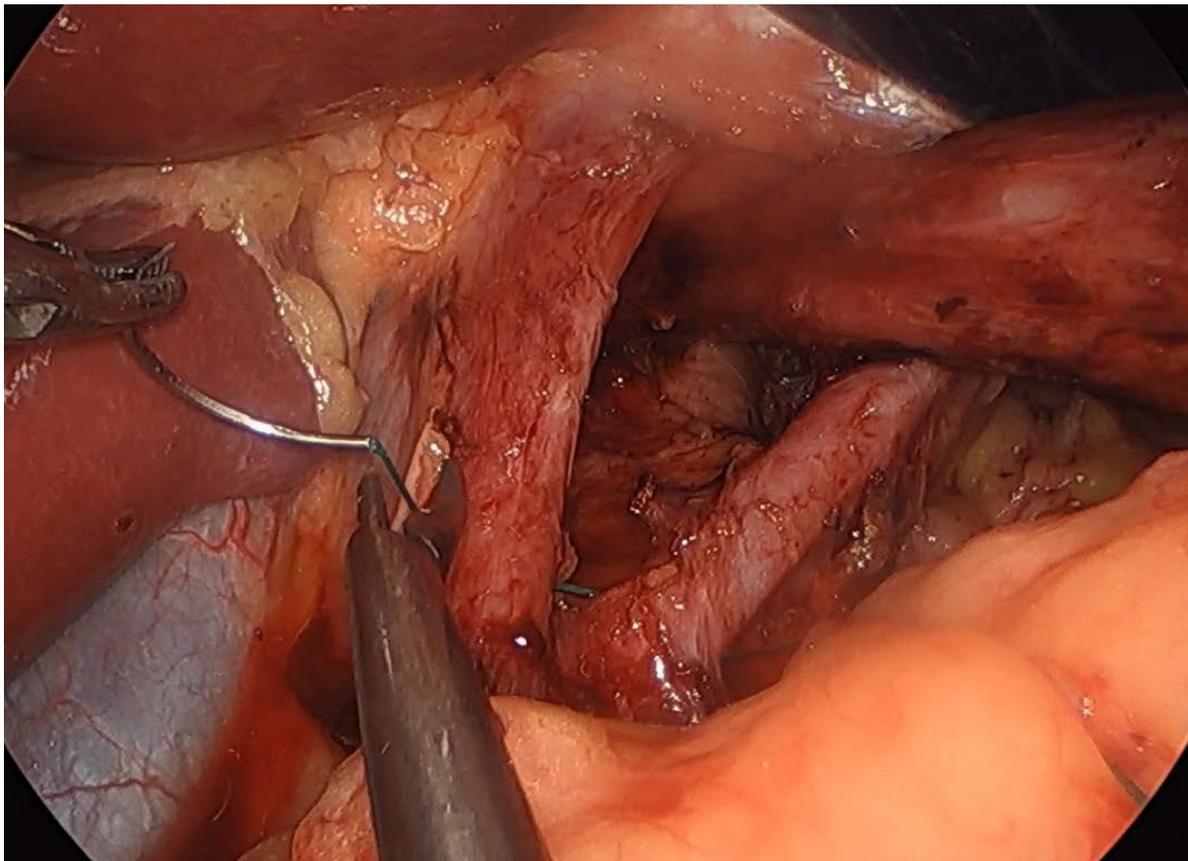
There are several categories of patients who are considered candidates for an antireflux operation. These include patients who have inadequate control of GERD symptoms despite behavioral modifications and maximal medical therapy. Additionally, patients who cannot tolerate acid suppression medications or who have a strong desire to be off of acid suppression medication due to concern for long-term side effects can be considered for antireflux surgery. In

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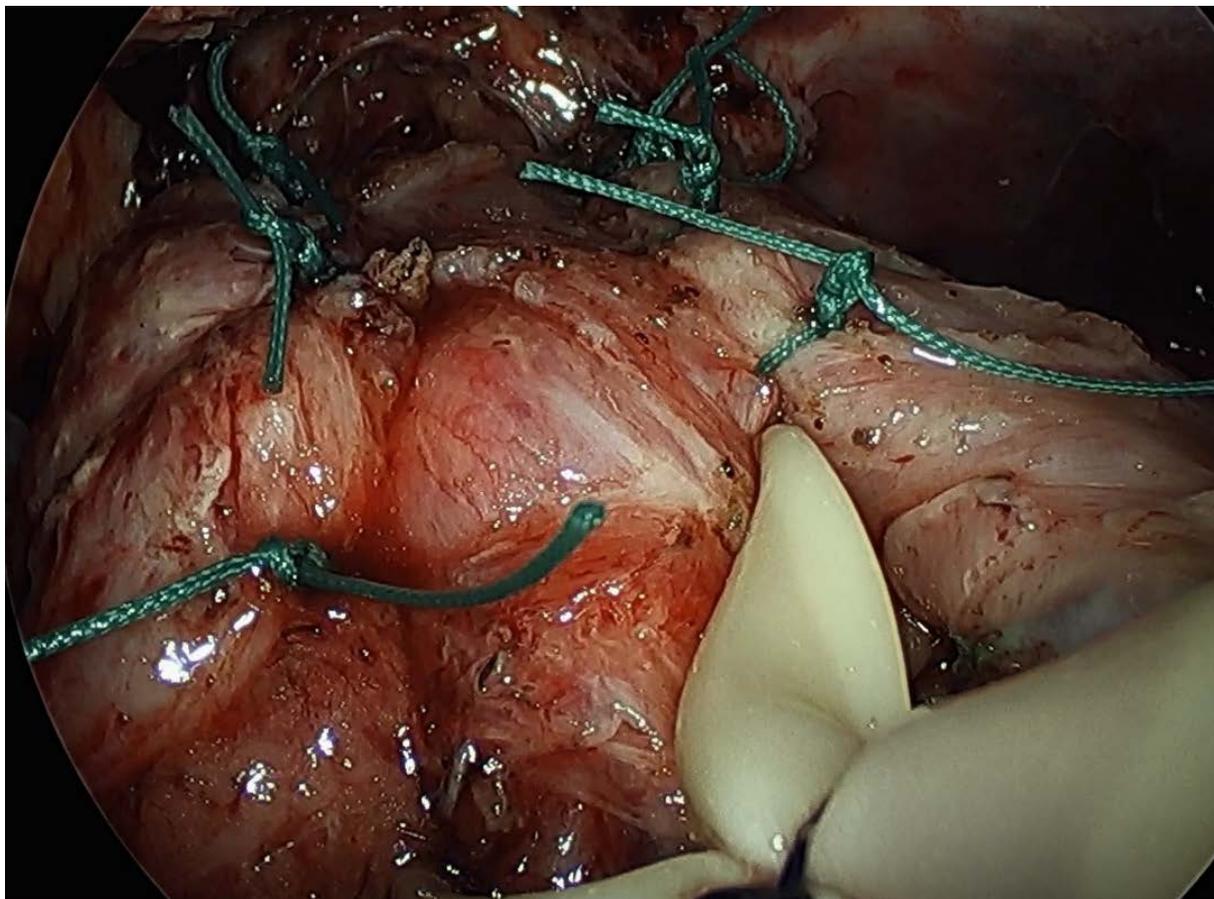
any case, all patients who are considering antireflux surgery **MUST** have objective evidence of GERD as described above.

Fundoplication

The fundoplication is the gold standard anti-reflux operation. In appropriately selected patients, the efficacy and durability are excellent. The intent of a fundoplication is to reestablish and accentuate the angle of His, thus, recreating a gastroesophageal flap valve. Many different types of fundoplication have been described during the last century; however, two types remain in widespread use for the primary treatment of GERD. The most commonly performed fundoplication in the United States is a Nissen fundoplication. This technique involves using the fundus of the stomach to create a 360-degree wrap around the distal esophagus. The other commonly utilized fundoplication is a Toupet. The Toupet fundoplication involves a 270-degree posterior wrap of the fundus around the distal esophagus. Both types are typically performed laparoscopically and both are very effective at reestablishing a mechanical barrier to reflux. Patients report improved symptoms, GERD medications are usually eliminated or, at worst, reduced, and patient quality of life scores improve. Side effects can include dysphagia, bloating, flatulence, inability to belch, and inability to vomit. Fundoplication remains the treatment of choice for patients with a large hiatal hernia, a paraesophageal hernia, and/or severe refractory esophagitis.



Laparoscopic hiatal hernia repair



Toupet fundoplication

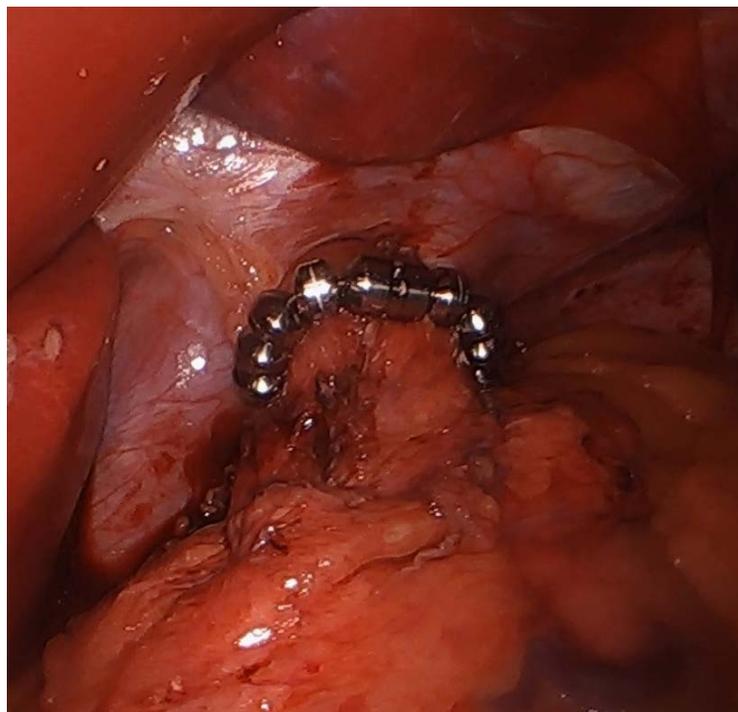
Magnetic Sphincter Augmentation

The magnetic sphincter is a surgically implanted device that is intended to restore the dynamic function of the lower esophageal sphincter. The device is a “bracelet” of interconnected magnetic beads that is surgically implanted around the lower esophageal sphincter. The magnetic beads are attracted to each other, thus, simulating a closed sphincter. Standard pressures generated by esophageal peristalsis are strong enough to propel a food or fluid bolus through the lower esophageal sphincter by pushing the magnetic beads apart. When the beads are pushed apart, the esophageal lumen diameter increases to allow bolus passage. Once the bolus passes, the magnets pull back together recreating the reflux barrier. Standard resting gastric pressures are not high enough to overcome the magnetic force, thus, preventing reflux of gastric contents. This device is very effective at reestablishing a mechanical barrier to reflux. Patients report improved symptoms, GERD medications are usually eliminated or, at worst, reduced, and patient quality of life scores improve. Advantages of this device include a smaller operation and a lower side effect profile than a fundoplication. This operation is also reversible or can be converted to a fundoplication if a patient is dissatisfied with their result. Although the side effect profile is less than fundoplication, side effects still exist with this device. Side effects can include dysphagia, bloating, and chest pain. Although results are quite promising, magnetic sphincter augment was only FDA approved in 2013, so long-term data is still accruing.

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Magnetic sphincter augmentation device



**Magnetic sphincter augmentation device implanted
around esophagus below the diaphragm**

Trans-oral Incisionless Fundoplication (TIF)

The TIF is a procedure in which a fundoplication is performed entirely endoscopically. An endoscopic stapling device is attached to the end of an endoscope and the fundoplication is formed from within the stomach. The goals are similar to the goals of a standard fundoplication: to accentuate the angle of His and to recreate a gastroesophageal flap valve. The TIF procedure offers a less invasive option that may carry a lower side effect profile than a standard fundoplication. It has been shown to improve control of GERD symptoms and reduce the need for PPI medications; however, long-term efficacy has not yet been established. It is generally considered an option for those patients with mild GERD symptoms and either no hiatal hernia or a small (< 2 cm) hiatal hernia.

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