



Current status of surgery for gastroesophageal reflux disease

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Abstract: Gastroesophageal reflux disease (GERD) is becoming increasingly prevalent worldwide, although with much lower incidence in East Asia compared with Western countries. This review addresses the pathophysiology of gastroesophageal reflux and its surgical therapy. The current status of novel surgical and endoscopic therapies also will be described.

Keywords: Gastroesophageal reflux; fundoplication; endoscopy

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Introduction

Gastroesophageal reflux disease (GERD) is common but varies in prevalence worldwide. It is most prevalent in Western countries, particularly North America, Australia and Western Europe, and lower in Africa and Asia. Time trend studies have shown that symptomatic GERD appears to be increasing in countries at the upper and lower extremes of prevalence, e.g., the United States and China, respectively (1,2).

Patients with GERD present most commonly with symptoms such as heartburn, regurgitation and dysphagia, although patients often have other “atypical” and non-specific symptoms such as cough, hoarseness or chest pain. Understanding regarding the pathogenesis of GERD has evolved over the past 40 years and currently focuses on mechanical impairment of the esophagogastric junction. In a normal esophagogastric junction physiological reflux can occur as a result of transient lower esophageal sphincter relaxation (TLESR), but as impairment develops, such as altered relationships between the lower esophageal sphincter (LES) and the surrounding crural diaphragm, pathologic reflux occurs resulting in reflux symptoms. Prolonged reflux can lead to mucosal disease and complications such as esophagitis and stricture, respiratory sequelae such as chronic cough and pulmonary fibrosis, and metaplastic (Barrett’s esophagus) and neoplastic (adenocarcinoma) transformation (3). Given the broad differential diagnoses

associated with reflux-related symptoms, thorough diagnostic evaluation should be completed before determining options for intervention. Diagnostic testing is directed towards assessing not only LES relaxation but also esophageal motility, gastric emptying as well as establishing whether there are any anatomic changes.

Patient-reported outcomes

In addition to considering outcomes such as complications, mortality and sequelae following any intervention, ongoing assessment of patient quality of life should be included. Although many survey instruments are available, the Gastroesophageal Reflux Disease-Health-Related Quality of Life (GERD-HRQL) scale is utilized widely and has been shown to be reliable and valid (4). This disease-specific instrument can be incorporated into clinical practice with relative ease in order to evaluate patient-related outcomes especially when implementing novel approaches to GERD.

Treatment options

Although the mainstay for treatment of GERD is pharmacologic, several population-based studies have demonstrated a weak association between proton-pump inhibitors and gastric cancer or all-cause mortality (5,6). In addition, current medical therapy addresses acid-induced symptoms but not symptoms related to non-

acid reflux or regurgitation. Surgical treatment for GERD includes a variety of techniques, most notably fundoplication, that attempt to reconstruct the physiologic function (competence) of the LES. Such techniques can be completed through the abdomen or chest, using minimal access (laparoscopy) or open (laparotomy or thoracotomy) exposure, with the most common approach being a laparoscopic 360° posterior (Nissen) fundoplication. The operative steps also include reapproximation of the crura and restoration of intraabdominal esophageal length. Side effects following complete fundoplication include dysphagia and gas-related symptoms (i.e., bloating), but patients who have had a complete fundoplication appear to have less need for antireflux medication, compared to those who have undergone a partial (Toupet) fundoplication (7-9). Longitudinal studies have shown that patients undergoing laparoscopic repair can develop recurrent reflux and require long-term antireflux medication. In addition, a significant portion of patients undergo reoperation (7,10).

An additional consideration for determining the operative strategy is whether the patient has an associated hiatal hernia and evidence of esophageal shortening. Patients with hiatal hernia can experience symptoms attributable to gastroesophageal reflux as well as obstructive symptoms including early satiety and dysphagia, occult gastrointestinal blood loss or dyspnea. Patients with a long-standing hiatal hernia, particularly those with a large sliding (type I) or combined sliding and paraesophageal hiatal hernia (type III or IV), are more likely to have esophageal shortening. Esophageal length can be assessed radiographically and endoscopically although the definition, prevalence and operative management of shortening are controversial and topics of ongoing debate. At the time of operation, if the esophagogastric junction cannot be reduced below the esophageal hiatus without tension, intraoperative maneuvers such as extensive mobilization of the mediastinal esophagus and lengthening gastroplasty may be necessary to restore adequate length of intraabdominal esophagus suitable for subsequent fundoplication (11). Roux-en-Y gastric bypass (RYGB) can be considered for patients with increased body mass index and symptoms of gastroesophageal reflux, or those with severe esophageal dysmotility as seen among patients with systemic sclerosis (12).

Novel surgical therapy

The magnetic sphincter augmentation device (MSAD) (LINX, Torax Medical, Shoreview, MN, USA) consists of

a band of magnetic beads encased in titanium connected by discontinuous titanium wire segments. The device, placed laparoscopically, is designed to increase the resting pressure of the LES, preventing reflux while allowing passage of a solid or liquid bolus with minimal dysphagia. In addition, gas or vomitus can pass retrograde, limiting the symptoms of gas bloat or retching that can occur following complete fundoplication. The rate of these sequelae at short-term (1-year) follow-up have been reported to be lower, although not statistically significant, than in patients undergoing surgical fundoplication, in terms of bloating, postoperative dysphagia and freedom from proton pump inhibitor (PPI) therapy. Contraindications to placing this device include the presence of large combined-type hiatal hernias, esophageal dysmotility and severe erosive esophagitis. Although the device has been shown to be safe and effective in retrospective or prospective case-control studies, there are no data regarding long-term outcomes. In addition, device erosion and migration requiring its removal has been reported (13-15).

Electrical augmentation of the LES, or electrical stimulation therapy, has been described as an alternative surgical approach. A bipolar stimulation lead with two electrodes is placed laparoscopically at the anterior aspect of the lower esophagus. The lead is controlled by an implantable generator with external programmer in order to deliver mild electrical signals to the LES in order to restore its normal function. Although case series have been reported, as with MSAD implantation, there have been no randomized studies to date evaluating the efficacy of this approach (14,15).

Endoscopic options

Radiofrequency ablation appears to be a suitable endoscopic approach for patients with symptomatic GERD. The Stretta system (Restech, San Diego, CA, USA) utilizes a balloon catheter to deliver radiofrequency energy in order to elicit fibrosis, nerve ablation and increased wall thickness. The device has United States Food and Drug Administration approval and has been studied in several clinical trials with long-term follow-up that demonstrate reduced PPI usage with improved quality of life and continued efficacy (16,17).

Endoluminal fundoplication

Transoral incisionless fundoplication (TIF) can be performed by two different systems: EsophyX (EndoGastric

Solutions, Redmond, WA, USA) and the Medigus Ultrasonic Surgical Endostapler (MUSE, Medigus, Ltd., Omer, Israel). Both systems utilize the flexible esophagoscope placed into retroflexion in order to deploy either polypropylene fasteners (EsophyX) or gastric staples (MUSE) in order to create a partial fundoplication. These systems cannot be used for patients who have large hiatal hernias. Clinical trials to date have evaluated this technology for patients with typical symptoms of GERD and have excluded patients with Los Angeles grade C or D esophagitis and those with Barrett's esophagus (16,18,19).

Summary

GERD is increasing worldwide particularly in Western countries but also in East Asia, where it remains relatively uncommon. While surgical fundoplication remains the preferred treatment especially for patients with severe esophagitis or large hiatal hernias, this approach also can cause postoperative dysphagia or bloating. With further evaluation, novel technologies, delivered by laparoscopy or endoluminally, may be suitable in select patients with uncomplicated GERD. Careful monitoring of results, included patient-reported outcomes, is essential when considering whether to incorporate new techniques or technology into practice.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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