

# The State of Surgical Treatment of Gastroesophageal Reflux Disease after Five Decades

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Gastroesophageal reflux disease (GERD) is the most common foregut disease in the world and accounts for approximately 75% of all esophageal pathology.<sup>1</sup> The majority of afflicted patients have mild disease and are successfully managed with lifestyle modifications and acid suppression medication.<sup>2</sup> Fortunately, progression of the disease occurs in only 13% of patients over 5 years.<sup>3</sup> The predictors of disease progression are a family history of GERD, esophagitis on baseline endoscopy, failure of esophagitis to heal with acid suppression therapy, the need to escalate the dose of acid suppression therapy to achieve symptomatic relief, and complete dependence on daily proton pump inhibitors (PPIs) to control symptoms.<sup>3</sup> Of these, esophagitis on baseline endoscopy, complete dependency on PPIs to control symptoms, and the need for dose escalation are specific predictors for development of Barrett's metaplasia.<sup>3</sup>

The impetus to identify and counsel patients with progressive disease regarding the need for surgical therapy is critical. This goes largely unheeded by gastroenterologists due to their lack of confidence in the durability of a fundoplication and concern over the side effects of the operation. Consequently, early referral of a patient with symptoms and signs of progressive disease for surgical therapy is resisted. Further, there is widespread concern that not all surgeons are sufficiently experienced in evaluating esophageal patients, many are not knowledgeable enough to select the proper antireflux procedure, and some are not sufficiently trained to properly perform the procedure.<sup>4,5</sup>

Over the last 5 decades, 5 principles of the surgical treatment of GERD have emerged and when followed, lead to a successful outcome in nearly all patients. These principles are: documentation of the diagnosis of GERD;

determination of the status of the lower esophageal sphincter (LES) and esophageal body; identification of the patient who is a proper candidate for surgical therapy; selection of the proper surgical procedure; and surgeon awareness of the technical nuances of the procedure. Application of these principles requires surgeons to hone their cognitive, diagnostic, clinical, and surgical skills regarding reflux disease. Errors can lead to surgical failure and the need for repetitive reoperations with the inherent risk of vagal injury and ischemic damage to esophageal and gastric tissues. The last 5 decades of experience have taught that a successful therapeutic outcome is unlikely after 3 failed antireflux operations.<sup>6-8</sup> Consequently, it is imperative that the first operation be performed for the right diagnosis, on the right patient, and by a knowledgeable and capable surgeon. The objective of this review is to describe the current state of surgical treatment for GERD, to expand on how new knowledge about disease progression and LES function has improved our ability to select the appropriate patient for surgical therapy, and to offer a more personalized surgical approach to these patients.

## METHODS

A review of the past and current literature related to the surgical treatment of GERD was performed. PubMed and personal archives were used to identify seminal papers that have contributed to the current state of surgical care for GERD.

### Principle No 1: Document the diagnosis of GERD

The diagnosis of GERD begins with an insightful patient history obtained by a surgeon who is knowledgeable about foregut disease. A potential surgical patient with the clinical suspicion of GERD needs to have the diagnosis confirmed and the disease characterized by objective tests. These tests include a video esophagram, upper gastrointestinal endoscopy, esophageal motility study, and esophageal pH monitoring. Obtaining these tests is extremely important in all patients in whom surgery is contemplated, and more so in those who suffer from a previously failed antireflux procedure.

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**Abbreviations and Acronyms**

GERD	= gastroesophageal reflux disease
LES	= lower esophageal sphincter
PPI	= proton pump inhibitor
TLESR	= transient lower esophageal sphincter relaxations

A video esophagram is performed primarily to outline the anatomy of the esophagus and draw attention to anatomic abnormalities such as the existence, size, and type of a hiatus hernia, and the presence and location of an esophageal diverticulum, stricture, or luminal mass. A sliding hiatus hernia that does not reduce in the upright position raises suspicion of a shortened esophagus.<sup>9</sup> When done with sophistication, a video esophagram can also provide useful information regarding the function of the esophageal body and the LES. This can suggest, but not confirm, the existence of esophageal motility disorders, such as achalasia, scleroderma, localized or diffuse spasm, or ineffective esophageal motility.<sup>10</sup> The video esophagram can also provide a real-time assessment of bolus transport through the esophageal body and LES. This is done by analyzing the passage of liquid and solid barium boluses. The latter are composed of barium mixed with solid food, such as fried hamburger. Slow transport of either type of barium bolus suggests failure of the esophageal body's ability to contract effectively or disruption of its peristaltic waveform. Retrograde bolus escape can be caused by an increase in resistance to esophageal emptying imposed by a poorly relaxing LES. The degree of resistance is reflected by the height of the liquid barium column above the LES in the upright position. If the column fails to clear, the diagnosis of achalasia should be suspected. It can often be difficult to find a radiologist with sufficient knowledge and interest in the radiologic assessment of the esophagus. Consequently, it is often beneficial if the surgeon is present at the time of the examination. Alternatively, a real-time video is helpful in eliminating this need, provided the examination is performed consistently according to a protocol designed by both the radiologist and surgeon.<sup>10</sup>

Endoscopy is used to assess the esophageal mucosa for visual evidence of GERD such as erosive esophagitis, stricture, or Barrett's metaplasia. Suspected areas of Barrett's mucosa should be confirmed with a biopsy and histologic evaluation by a pathologist with experience in foregut histology. Eosinophilic esophagitis is differentiated from reflux esophagitis by the existence of sequential mucosal rings and difficulty in passing the endoscope through a small caliber esophagus.<sup>11</sup> Advanced motility disorders are suggested by a dilated or tortuous distal

esophagus. The finding of an unsuspected mass may uncover an occult carcinoma or leiomyoma of the esophagus. Endoscopy is also helpful to pass and properly position a pH or motility catheter in patients with a tortuous or convoluted esophagus.

An esophageal motility study, conventional or high resolution, is used to confirm the existence of normal esophageal motility or a motility disorder suggested by the video esophagram; assess the wave form and strength of esophageal contractions; determine the pressure, overall length, and abdominal length of the LES,<sup>12</sup> and identify the location of the upper border of the LES in cm from the nares for the placement of the pH probe or capsule for a 24-hour or longer pH monitoring study.<sup>13</sup> It is imperative to be aware that the high resolution motility catheter introduces an error in measuring the position, overall length, and abdominal length of the LES.<sup>14</sup> The most common esophageal motility disorder confused with GERD is achalasia.<sup>15,16</sup> Consequently, without the use of manometry, it is not uncommon for an antireflux procedure to be performed on a patient with early achalasia.<sup>15,16</sup>

Prolonged esophageal pH monitoring measures esophageal acid exposure over a 24- to 48-hour period and confirms the diagnosis of GERD in patients who do not have erosive esophagitis or Barrett's metaplasia. In patients free of erosive esophagitis or Barrett's metaplasia, it is imperative to document the existence of reflux disease with 24-hour pH monitoring even though the patient complains of classic symptoms of heartburn and regurgitation. It is well known that symptoms are not a reliable guide to the presence of disease.<sup>17</sup> Recently, impedance monitoring has been added to 24-hour pH monitoring. It is difficult to make a definitive recommendation regarding its use because there is a paucity of data to support that the addition of impedance has improved outcomes and management of GERD. An expert panel discussion is available on the importance of pH monitoring before antireflux surgery and is a valuable reference for esophageal surgeons.<sup>18</sup>

**Principle No 2: Determine the status of the lower esophageal sphincter and esophageal body**

Discovery of the lower esophageal high pressure zone, or LES as it was later named, led to the realization that almost half of the patients with confirmed GERD have a normal LES on a motility study performed at rest, in the recumbent position, and after an overnight fast.<sup>19</sup> The etiology of reflux in patients with a normal LES is transient openings of the LES when challenged by gastric distention or dilation.<sup>20,21</sup> These events are called transient LES relaxations (TLESRs) and were first described

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