Chapter 18
Failed Antireflux Surgery: Analysis of the Causes and Treatment

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Abstract Even though the technical elements for a successful laparoscopic fundoplication have been clearly identified, 10–15 % of patients will eventually experience recurrence of their symptoms and between 3 and 6 % will need a second antireflux operation.

This chapter describes the work-up necessary to understand the causes of the failure and the treatment alternatives available.

Keywords Gastroesophageal reflux disease • Hiatal hernia • Obesity • Esophageal manometry • Ambulatory pH monitoring • Laparoscopic fundoplication • Redo fundoplication • Roux-en-Y gastric bypass

A laparoscopic fundoplication is a very successful treatment modality for patients with gastroesophageal reflux disease (GERD). Data from specialized centers show control of symptoms in about 85–95 % of patients [1–4]. However, about 15 % of patients eventually experience recurrence of their symptoms, and between 3 and 6 % will need a second antireflux operation [5, 6]. This chapter focuses on the identification of the causes for failure and the treatment alternatives available.

Persistent or Recurrent Symptoms: Why?

The causes for a failed fundoplication can be divided into three groups: (1) wrong indications, (2) wrong preoperative work-up, and (3) failure to execute the proper technical steps.

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Wrong Indications

The current indications for antireflux surgery can be summarized as follows:

- Typical symptoms of GERD such as heartburn and regurgitation not completely responsive to medical therapy
- Extra-esophageal symptoms of GERD characterized by documented high reflux and aspiration, such as cough of unknown origin, idiopathic pulmonary fibrosis, and hoarseness
- Young patients who do not want to be on medical therapy for their entire life
- Patients who have complication secondary to proton pump inhibitors (PPIs) such as osteoporosis, C. difficile infections, pneumonia, or hypomagnesemia with cardiac arrhythmias

On the other hand, patients who have symptoms not responsive to proper medical therapy, patients complaining of bloating, epigastric pain, a strange taste in their mouth, and patients with a normal preoperative ambulatory pH monitoring more likely than not will not be satisfied with their operation.

Wrong Preoperative Work-Up

A proper preoperative work-up should include an accurate clinical history (including the evaluation of the response to PPI therapy), barium swallow, upper endoscopy, esophageal manometry, and ambulatory pH monitoring. Unfortunately, many physicians believe that GERD can be securely diagnosed based on the symptoms reported by the patient and the results of the endoscopy. However, many studies have shown that even typical symptoms such as heartburn and regurgitation have low accuracy, leading to a wrong diagnosis of GERD in 30–50 % of patients [7, 8]. For instance, Patti et al. [7] found that among 822 consecutive patients referred for esophageal function tests because of a clinical diagnosis of GERD (based on symptoms and endoscopic findings), abnormal reflux by pH monitoring was present in 70 % of patients only. Heartburn and regurgitation were equally frequent in both groups of patients with and without GERD, underlying that symptoms alone cannot distinguish between patients with and without pathologic reflux [7]. Many patients with a normal esophageal acid exposure had been treated with expensive medications on the assumption that gastroesophageal reflux was the cause of their symptoms, therefore masking other diagnoses such as irritable bowel syndrome, gallstone disease, and coronary artery disease. In addition, some patients who had been referred for antireflux surgery were found to have primary esophageal motility disorders such as achalasia. Heartburn is in fact experienced by about 40 % of patients with achalasia, but it is due to stasis and fermentation of food in the distal esophagus and not to real gastroesophageal reflux [9]. Unfortunately, these patients are frequently labeled as having “refractory GERD,” and they are treated for long time with PPIs or they

might undergo an antireflux operation if esophageal function tests are not performed. Bello et al. recently analyzed the sensitivity and specificity of symptoms, endoscopy, barium esophagography, and manometry as compared to ambulatory 24 h pH monitoring in 138 patients referred for laparoscopic antireflux surgery (LARS) [10]. Four patients were excluded as were found to have achalasia. Of the remaining 134 patients, 56 (42 %) were found to have a normal pH monitoring and 78 (58 %) had a pathologic amount of reflux. When these two groups were compared, there was no difference in the incidence of symptoms, presence of reflux, and hiatal hernia on esophagogram, endoscopic findings, and esophageal motility. This study clearly indicated that 24 h pH monitoring should be routinely performed in the preoperative work-up of patients sus pected of having GERD in order to avoid unnecessary surgery [10]. The importance of demonstrating the presence of pathologic reflux on pH monitoring was clearly indicated by Campos and colleagues [11]. They showed that the three most important predictors of successful LARS are the presence of typical symptoms such as heartburn, a good relief of symptoms with PPI therapy, and the presence of a pathologic amount of reflux as shown by pH monitoring [11].

Failure to Execute the Proper Technical Steps

The technical steps of a laparoscopic fundoplication have been clearly identified [12]. They include:

- Dissection in the posterior mediastinum in order to have 3–5 cm of esophagus without tension below the diaphragm. This step has reduced tremendously the incidence of a "short esophagus" with the need for a lengthening procedure [13].
- Taking down the short gastric vessels. Even though a prospective and randomized trial performed in Australia comparing the outcome of LARS performed with and without section of the short gastric vessels showed similar symptoms control and incidence of postoperative dysphagia [14], most surgeons feel more comfortable with the section of these vessels. This step changes the geometry of the fundoplication, as it allows the use of both the anterior and posterior gastric walls, avoiding any tension [12].
- Approximation of the right and left pillar of the esophageal crus. This step is important as it avoids herniation of the wrap in the chest and because the diaphragm has a synergistic action with the lower esophageal sphincter protecting particularly against sudden increases in intra-abdominal pressure such as during coughing [15].
- Creation of the wrap over a bougie. The use of a bougie lessens the incidence of postoperative dysphagia. Patterson et al. compared 81 patients in whom a fundoplication was performed over a 56F bougie to 90 patients in whom the bougie was not used. Long-term dysphagia occurred in 17 % of patients in the bougie group and in 31 % of patients in the non-bougie group ($p = 0.047$). Severe dysphagia was present in 5 % and in 14 % of patients, respectively [16].

- Choice of the correct wrap. In the United States in the early 1990s, a "tailored approach" was used, whereby a total fundoplication (360°) was performed in patients with normal motility, while a partial fundoplication (Toupet, 240° posterior; Dor, 180° anterior) was chosen if abnormal peristalsis was present [12, 17]. This approach was based on the data obtained by studies with a very short follow-up that showed that the two procedures were equally effective in controlling symptoms but the partial fundoplication was associated to a lower risk of postoperative dysphagia. Subsequent studies however showed that reflux recurred in about 50 % of patients 5 years after a partial fundoplication [18–20]. In addition it became clear that a total fundoplication could be performed even in patients with dysmotility, without a higher incidence of dysphagia [18–20]. Based on these data, in the United States today, a total fundoplication is the procedure of choice, while a Toupet or a Dor fundoplication are chosen mostly for patients with absent peristalsis such as in achalasia or scleroderma [21, 22]. Interestingly, data from Europe and Australia show similar results for both procedures in terms of reflux control and incidence of postoperative dysphagia [23]. A key step of the operation is to choose the correct part of the stomach to bring around the esophagus and the gastroesophageal junction. If a point too low along the greater curvature is chosen, the surgeon will have the illusion of creating a "floppy" wrap, but will indeed leave part of the stomach above the wrap itself [24]. A shoeshine maneuver helps in avoiding this mistake [1]. The total length of the anterior portion of the wrap should measure about 2 cm, as it has been shown that a longer wrap increases the risk of postoperative dysphagia [25]. This is accomplished by approximating the right and the left sides of the fundoplication with 3 interrupted sutures of nonabsorbable material placed at 1 cm of distance from each other.

Clinical Presentation and Evaluation

A thorough evaluation must be performed in every patient who presents with symptoms after a fundoplication in order to understand the cause and to plan treatment accordingly.

Symptomatic Evaluation

As stressed by Dr. Horgan et al. in their analysis of failures of LARS [26], patients usually present because of (a) heartburn and/or regurgitation (suggestive of recurrent reflux due to an incompetent cardia), (b) dysphagia (suggestive of defective esophageal emptying), and (c) a combination of the two. If the patient is again taking PPI, it is important to assess the response as this has significant therapeutic implications.

Barium Swallow and Endoscopy

The combination of these two tests usually identifies possible anatomic problems such as a herniated wrap or a wrong configuration of the fundoplication.

Esophageal Manometry

This test is important to assess the pressure and relaxation of the lower esophageal sphincter and the quality of the esophageal peristalsis. This is particularly essential if the patient complained preoperatively of severe dysphagia in addition to heartburn to rule out achalasia [10]. Finally, an achalasia-type picture can be caused by a too tight or long fundoplication [27].

Ambulatory pH Monitoring

If a patient experiences heartburn after a fundoplication, it is usually assumed that the operation has failed, and acid suppressing medications are prescribed [28]. Unfortunately, this approach is wrong in the majority of patients and exposes them to improper and costly medical therapy [29–31]. Many studies have, in fact shown that when patients with recurrent heartburn are tested by ambulatory pH monitoring, abnormal reflux is present in 23–39 % only [29–31]. Based on these data, objective evidence of abnormal esophageal acid exposure should always be documented by esophageal function tests before prescribing acid suppression medications or planning to redo a fundoplication.

Causes of Failure

Horgan and colleagues proposed a very interesting anatomic classification of failures based on the results of the preoperative work-up and the operative findings, providing explanatory figures in their manuscript [26].

Type IA Hernia

Both the gastroesophageal junction (GEJ) and the wrap are located above the diaphragm. Type IB hernia. The wrap is located below the diaphragm while the GEJ is located above. Both anatomic findings can be caused by limited mediastinal

dissection with only 1 or 2 cm of esophagus below the diaphragm, a short esophagus, and inadequate closure of the hiatus. These problems can be avoided by proper dissection in the posterior mediastinum until at least 4 cm of esophagus is located without tension below the diaphragm and by a tight closure of the hiatus by interrupted sutures of nonabsorbable material placed posterior to the esophagus.

Type II Hernia

This occurs when part of the stomach is located above the wrap and it is herniated above the diaphragm. This problem usually is caused by a faulty closure of the hiatus and by a redundant fundoplication. This can occur unintentionally because the surgeon does not realize that a point too low along the greater curvature has been brought around the esophagus or intentionally in the attempt to create a very "floppy" fundoplication. A shoeshine maneuver can avoid this mistake in most cases.

Type III Hernia

This occurs when the body rather than the fundus of the stomach is used to construct the wrap. This represents an exaggeration of a type II problem, even though in this case both the wrap and the GEJ are in a subdiaphragmatic position.

Management

If heartburn is the main complaint and it is well controlled by medications, a second operation can be avoided. It is different however if severe regurgitation and dysphagia are present and a clear anatomic problem has been identified. In these cases, a redo operation is indicated but only after a clear discussion with the patient about the complexity of the procedure, about the risk of damage to the esophagus with potential esophageal resection or to the stomach and vagus nerves, and about the outcome. Finally, while some surgeons feel very comfortable with a laparoscopic approach, others prefer a conventional laparotomy [32, 33]. Regardless of the approach, a step-by-step description of the technique is impossible because of the various amounts of adhesions present and the type of anatomic problems encountered. The first part of the operation involves separating the liver from the stomach, taking down posterior adhesions, and separating the wrap from the pillars of the esophageal crus. Once the dissection is completed, it is essential in the majority of cases to take down the wrap, bringing the fundus of the stomach to its original position in the left upper quadrant. At this point, it is possible to assess the hiatal closure

and the position of the GEJ in respect to the diaphragm. If the GEJ is still too high, more mediastinal dissection must be performed. If after the dissection not enough esophagus is located below the diaphragm, a Collis-Nissen lengthening procedure might be necessary. A 56F–60F bougie should be routinely used before creating a new wrap. A careful shoeshine maneuver should be performed to avoid any redundancy. The choice of the wrap, total versus partial, depends on the quality of esophageal peristalsis and on the condition of the fundus after the dissection is completed. In some patients, however, it might not be advisable to perform another fundoplication. These are morbid obese patients in whom reflux has persisted or recurred because of a high body mass index that has been shown to be an independent factor in the genesis of reflux [34]. This probably occurs because of an increased gradient between the abdomen and the chest [35]. In these patients, a Roux-en-Y gastric bypass is an excellent option. It avoids acid reflux as there are very few parietal cells in the small gastric pouch, and it avoids bile reflux because of the long Roux-en-Y configuration [36, 37].

Outcome

It is important to discuss with the patient that a redo operation is a complex operation with higher morbidity and longer hospital stay as compared to the primary fundoplication [38]. In addition, the success rate is around 65–70 %, clearly lower than that of the primary operation (around 90–95 %). While many studies have shown the feasibility of a redo laparoscopic fundoplication, very few have discussed the long-term results [39, 40]. Dallemagne et al. assessed the outcome of redo laparoscopic fundoplication in 129 consecutive patients by radiology, endoscopy, symptom questionnaire, and quality of life index at a minimum follow-up of 12 months (mean 76 months) [40]. Objective and subjective evaluation showed a failure rate of 41 %, confirming that a laparoscopic repair of a failed fundoplication has a high failure rate that increases over time.

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