



Nissen fundoplication: still the gold standard?

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Abstract: Almost 60 years ago, Rudolph Nissen described the fundoplication that bears his name. With some modifications, it is today the operation more commonly performed for the treatment of gastroesophageal reflux disease, and it is still the gold standard to which any new procedure, endoscopic or laparoscopic, must be compared. The success of the operation is based on a careful patients' selection and through pre-operative work-up, and on the respect of key technical elements.

Keywords: Gastroesophageal reflux disease (GERD); hiatal hernia; esophagitis; Barrett's esophagus (BE); esophageal manometry; ambulatory pH monitoring; Nissen fundoplication

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Introduction

Gastroesophageal reflux disease (GERD) affects almost 20% of the population in the United States. Today, proton pump inhibitors (PPIs) are the most frequently prescribed drugs, with an estimated cost of 10 billion dollars per year. Although these medications control heartburn in the majority of patients, other symptoms such as regurgitation and respiratory symptoms often are not controlled, particularly in patients with large hiatal hernias. In addition, potential side effects of these medications have been identified: from osteoporosis secondary to decreased absorption of calcium to nephritis, from pneumonia to major adverse cardiac events. Furthermore, PPI should not be prescribed for patients that have coronary stents and take clopidogrel bisulfate as they counteract its antiplatelet activity.

In these patients, a properly performed laparoscopic fundoplication allows control of both esophageal and extra-esophageal symptoms, avoiding life-long medical therapy.

Three elements are important for the performance of a successful fundoplication: (I) a comprehensive preoperative

work-up; (II) correct indications for the operation, and (III) respect of the key technical elements.

Pre-operative work-up

In 2013, a panel of expert gastroenterologists and surgeons published an evidence and experienced-based consensus that recommended the following tests before proceeding with anti-reflux surgery (1):

- ❖ Symptomatic evaluation: this step identifies typical/esophageal symptoms (heartburn, regurgitation, and dysphagia) and atypical/extra-esophageal symptoms (cough, hoarseness, and enamel erosion). A symptomatic evaluation alone should never be considered enough to plan an operation. Many studies have shown that the presence of symptoms alone, even for typical symptoms such as heartburn, has a low accuracy and leads to a wrong diagnosis of GERD in 30% to 50% of patients (2-4) A good response to PPI is considered an important prognostic factor for the success of a fundoplication (5) whereas

lack of response—usually labeled as “refractory GERD”—should raise the suspicion that the symptoms are caused by a different disease (2,4);

- ❖ Barium swallow: to define the anatomy of the gastroesophageal junction and the presence, size, and type of a hiatal hernia;
- ❖ Upper endoscopy: to determine presence and severity of esophageal mucosal damage;
- ❖ Esophageal manometry: to assess quality of esophageal peristalsis, rule out achalasia, and determines the position of the lower esophageal sphincter (LES) for placement of the catheter for pH monitoring;
- ❖ Ambulatory pH monitoring: this study is considered the gold standard for the diagnosis of GERD, as it establishes the presence of abnormal reflux and the temporal correlation between symptoms and episodes of reflux;
- ❖ Gastric emptying studies and impedance pH should be considered in very few selected patients (6).

Overall, the presence of heartburn, a good response to PPIs, and pathological reflux as shown by pH monitoring are important predictors of a successful outcome of a fundoplication (5).

Indications for the operation

The operation is indicated when patients experience complications of PPI therapy, do not want to take medications for the rest of their lives, or do not have complete control of their symptoms, particularly when regurgitation persists and it is associated with cough or episodes of aspiration pneumonia. Caution must be exerted when there is a complete lack of response to PPI therapy, and patients are labeled as having “refractory GERD”. A complete work-up is of paramount importance to ensure that the symptoms are not caused by other esophageal disorders such as achalasia or eosinophilic esophagitis or by other gastrointestinal diseases such as irritable bowel syndrome or cholelithiasis (2-4). As of today, we do not have evidence suggesting that a fundoplication can halt the progression from Barrett’s metaplasia to high-grade dysplasia and cancer. Therefore, the indications for anti-reflux surgery are for control of symptoms like any other patient.

Key technical elements

The term Nissen fundoplication is widely used to describe a 360° or total fundoplication. Today we feel that it is time to abandon the eponyms such as Nissen, Guarner, Toupet, Hill, and focus on the key technical elements that allow the performance of a fundoplication that controls effectively reflux and lasts over time.

- ❖ Extent of mobilization. Dissection in the mediastinum is particularly important when a hiatal hernia is present. In addition, we do divide the short gastric vessels to create a tension free fundoplication using the anterior and posterior wall of the stomach;
- ❖ Location of gastroesophageal junction after dissection. About 3–4 cm of esophagus must be present below hiatus;
- ❖ Closure of hiatus with non-absorbable sutures. This is a key step as it is known that the diaphragm has a synergistic action with the LES, particularly protecting against episodes of reflux due to bending or cough;
- ❖ Size of bougie. The use of the bougie decreases the incidence of postoperative dysphagia (7). We routinely use a 56F to 60F bougie. Before inserting it, the temperature probe and the orogastric tube are removed, as well as any instrument. It is key to avoid angulation of the gastroesophageal junction, the most vulnerable area for a perforation;
- ❖ The stomach is passed behind the esophagus, and a shoe-shine maneuver is performed to avoid a redundant fundoplication built with the body rather than the fundus of the stomach. A 360° fundoplication is created by placing three stitches of non-absorbable material at 1 cm intervals to approximate the right and left side of the fundoplication. In patients with very severe abnormalities of peristalsis such as achalasia or connective tissue disorders, a partial fundoplication is the procedure of choice, as it is associated with a lower incidence of postoperative dysphagia (6,8).

Although transient dysphagia is common in the initial weeks after fundoplication, long-term dysphagia is rare. As previously reported, the use of a bougie decreases the incidence of postoperative dysphagia. Patterson showed that the incidence of long-term severe postoperative dysphagia was 5% when a bougie was used, but was 14%

when it was not used (7). In addition, transection of the short gastric vessels allows a tension-free fundoplication, with a lower incidence of postoperative dysphagia (9). The presence of dysphagia preoperatively is the best predictor of postoperative dysphagia (10).

Dr. Dallemagne reported the 10-year follow-up of 100 consecutive patients after laparoscopic fundoplication (11). Ninety-three per cent of patients were doing well after Nissen fundoplication. Excellent results were also recently reported among 2,655 patients who underwent laparoscopic fundoplication in Sweden between 2005 and 2014. At median follow-up of 5.6 years, 82.3 were symptom free and off medications (12). In the remaining patients it was not clear if symptoms and use of PPIs were really due to recurrent reflux (13).

In conclusions, laparoscopic Nissen fundoplication is an effective and long-lasting treatment for GERD. Its success is based on a careful evaluation and patient selection, and on an operation that respects the key technical elements that have been already identified. Considering the proven safety and effectiveness of laparoscopic anti-reflux surgery, new endoscopic and laparoscopic anti-reflux procedures should be rigorously studied and cautiously adopted.

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