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Review Article

**NARRATIVE REVIEW ON NISSEN FUNDOPLICATION  
PROCEDURE**<sup>1</sup>Zainab Mohammad A Alsinan, <sup>2</sup>Khalid Khader M Alzaylaee, <sup>3</sup>Sultan Mahdi Alqarni**Abstract:**

Gastroesophageal reflux disease is a frequent disease that impacts many individuals in the contemporary period. Treatment for gastroesophageal reflux disease can be medical or surgical. In this review we discuss the surgical fundoplication surgery, indications, techniques and complications. We conducted a narrative review of electronic databases as; (PubMed, Medline, and EMBASE). During the first stage the above databases were searched using the following search criteria. The PubMed database was searched using the MeSH (Medical Subject Headings) term; "Nissen fundoplication procedure", "Gastroesophageal reflux". GERD is a chronic disease that impairs physical and emotional well-being resulting in lowered quality of life. Initial therapy includes lifestyle adjustments and medical therapy, with antireflux medicines. There are various types of anti-reflux procedures that have been quite effective in treating GERD and bring back competence in an otherwise inexperienced LES, while at the same time repairing a possible hiatal hernia. Laparoscopic Nissen fundoplication (LNF) is the gold requirement for medical treatment of severe GERD and leads to roughly 95% patient satisfaction. The LNF uses minimally invasive methods to completely dissect the esophageal hiatus and activate the gastroesophageal junction and esophagus; reduce the herniated gastroesophageal joint, cardia, and body back right into the normal abdominal position; close the hiatal problem; divide the short gastric vessels to enable total mobilization of the gastric fundus; and a 360% fundoplication not under stress.

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**INTRODUCTION:**

Gastro-oesophageal reflux disease (GORD) is coming to be progressively more frequent and its incidence has actually grown in the industrialized world over the last 50 years [1]. Presently, proton pump inhibitors are the most efficient agents in controlling most of the symptoms of GORD [1]. Despite following first guideline recommendations of a 4-8-week trial of proton pump inhibitor (PPIs), 25%- 42% of patients do not accomplish symptomatic relief, and only 25% respond to twice-daily dosing [2]. Numerous empirical studies report adverse associations with chronic PPI use (eg, dementia, osteoporosis, and pneumonia) raising anxieties of lasting use [3].

Surgical treatment may be considered for those with chronic nocturnal symptoms, incomplete symptom control regardless of maximal therapy, refractory pulmonary or ear, nose and throat signs and patient choice of surgical over long-lasting clinical therapy [1]. One of the most common of the anti-reflux procedures utilized to treat GORD is just one of the variants of Nissen's fundoplication, which is currently frequently done as a laparoscopic procedure. Laparoscopic Nissen fundoplication has in the last couple of years been compared with open fundoplication, and numerous researches have revealed them to have similar patient end results, both temporary and longterm. However, some records have actually shown far better end results with laparoscopic treatments in terms of lower morbidity and much better patient satisfaction [4].

Increasingly, numerous surgical procedures are being performed on a day-case basis and this currently consists of laparoscopic Nissen fundoplication, which typically includes an inpatient hospital stay. There are yet, couple of published studies particularly addressing this area. Day-case surgery is an attractive choice for both surgeon and patient. For the surgeon it may help in reducing waiting times and operative cancellations because of inpatient bed shortages, in addition to possibly being more affordable [4]. The avoidance of hospital admission is an important advantage to numerous patients. If day-case fundoplication is shown to be of comparable effectiveness as an inpatient procedure, without a grow in morbidity or death and an appropriate readmission rate, it might be possible to increase the variety of individuals being taken care of in this way.

Gastroesophageal reflux disease is a frequent disease that impacts many individuals in the contemporary period. Treatment for gastroesophageal reflux disease can be medical or surgical. In this review we discuss the surgical fundoplication surgery, indications,

techniques and complications.

**METHODOLOGY:**

We conducted a narrative review of electronic databases as; (PubMed, Medline, and EMBASE). During the first stage the above databases were searched using the following search criteria. The PubMed database was searched using the MeSH (Medical Subject Headings) term; "Nissen fundoplication procedure", "Gastroesophageal reflux". Results were not limited to studies on humans but also studies of rats were included, published in English. conference proceedings, editorials, commentaries and book chapters/book reviews were excluded.

**DISCUSSION:****• PRE-OPERATIVE WORK**

In 2013, a panel of professional gastroenterologists and surgeons published a proof and experienced-based consensus that recommended the following examinations prior to proceeding with anti-reflux surgical treatment [5]:

- Symptomatic examination: this procedure identifies typical/esophageal symptoms (heartburn, regurgitation, and dysphagia) and atypical/extra-esophageal symptoms (coughing, hoarseness, and enamel erosion). A symptomatic examination alone ought to never be taken into consideration enough to intend an operation. Numerous studies have shown that the existence of signs alone, even for regular symptoms such as heartburn, has a low accuracy and brings about an incorrect medical diagnosis of GERD in 30% to 50% of patients [6]. A good reaction to PPI is thought about an essential prognostic element for the success of a fundoplication, whereas lack of reaction-- generally classified as "refractory GERD"-- ought to increase the suspicion that the signs and symptoms are triggered by a different ailment [6].
- Barium swallow: to specify the makeup of the gastroesophageal junction and the existence, dimension, and type of a hiatal hernia;
- Upper endoscopy: to identify the existence and intensity of esophageal mucosal damage;
- Esophageal manometry: to examine top quality of esophageal peristalsis, rule out achalasia, and figures out the setting of the lower esophageal sphincter (LES) for positioning of the catheter for pH monitoring;

- Ambulatory pH tracking: this study is thought about the gold standard for the diagnosis of GERD, as it establishes the presence of unusual reflux and the temporal correlation in between signs and symptoms and episodes of reflux;
- Gastric emptying studies and impedance pH should be thought about in a very couple of picked patients [7].

On the whole, the presence of heartburn, a good reaction to PPIs, and pathological reflux as revealed by pH surveillance are necessary predictors of a successful outcome of a fundoplication [7].

#### • INDICATIONS

The operation is indicated when patients experience difficulties of PPI treatment, do not want to take drugs for the rest of their lives, or do not have complete control of their symptoms, especially when regurgitation persists and it is related to coughing or episodes of aspiration pneumonia. Care must be applied when there is a full absence of response to PPI therapy, and patients are identified as having "refractory GERD". A full work-up is of paramount importance to guarantee that the signs are not caused by other esophageal conditions such as achalasia or eosinophilic esophagitis or by various other gastrointestinal disorders such as irritable bowel syndrome or cholelithiasis [6], [7]. Since today, we do not have evidence recommending that a fundoplication can stop the development from Barrett's metaplasia to high-grade dysplasia and cancer. As a result, the signs for anti-reflux surgical procedure are for control of symptoms like any other patient.

- **SURGICAL TECHNIQUES**
- **Laparoscopic vs open technique for GERD**

A laparoscopic, transabdominal technique is chosen for the large bulk of patients undertaking anti-reflux surgical procedure. Rarely, transthoracic and open abdominal strategies are needed and may be thought about for patients undertaking revision of their previous anti-reflux procedures [8]. However, reoperation surgery usually can be performed laparoscopically. Perioperative morbidity was located to be significantly reduced (65%) after laparoscopic compared with open fundoplication [9]. Laparoscopic fundoplication is associated with longer operative times however much shorter hospital stays [11]. Consequently, conversion rates to open surgical procedure were less than 5% [11]. Laparoscopic fundoplication is liked over open surgical treatment

because it is associated with much shorter hospital stay, lowered pain, postoperative injury infections and stomach wall surface hernia formation [11]. Furthermore, using the laparoscopic method, surgeons have the advantage of seeing all the hiatal frameworks in a magnified fashion. In a 10-year randomized test comparing LNF to standard Nissen fundoplication (CNF or open technique), it was noted that twice as many patients required reoperation after CNF, consisting of a much higher variety of incisional hernia modifications. The 10-year performance of LNF and CNF is similar in regards to improvement of GERD symptoms, PPI use, quality of life, and objective reflux control seen on impedance research studies. Therefore, the long-lasting results from this trial provide degree 1 assistance to using LNF as the surgery of choice for GERD [10]. Regardless of the type of fundoplication performed, the aim of the operation is the same: Re-create and bring back the typical physiologic performance of the LES, reconstruction of the hiatus when needed and repair of any type of hiatal hernia if present.

#### **Partial vs total fundoplication**

In the United States, in comparison to Europe, a 360 ° fundoplication is one of the most typical anti-reflux operations carried out. European surgeons, however, favor a partial fundoplication operation. Lots of possible, randomized, regulated studies have reviewed both 360 ° and 270 ° fundoplication procedures and have actually revealed comparable short- and long-term effectiveness [12], [13]. In spite of these findings, proponents of the Nissen fundoplication argue its superiority over the partial fundoplication. Supporters for the partial fundoplication argue that their patients have less signs and symptoms of bloating and preserve their ability to vomit. In one randomized control research study, there were noted be a greater rate of postoperative dysphagia, flatulence, and bloating in total fundoplication as contrasted to partial fundoplication [13]. There were not, however, substantial differences in between both techniques in the proceeding postoperative occurrence of heartburn, esophagitis or consistent acid reflux. A similar percentage of patients experiencing superb long-term outcomes were seen in both partial and Nissen fundoplication [12], [14]. An additional research reported at 10 years, 89.5% patients who had actually undergone laparoscopic fundoplication were devoid of significant reflux (93.3% after Nissen, 81.8% after Toupet). Hence, Nissen patients did better than Toupet patients, although the distinction was not statistically substantial [12].

### Anterior (Dor) vs Nissen fundoplication

Prospective, randomized controlled research studies contrasting 120-degree anterior fundoplication vs Nissen fundoplication revealed anterior fundoplication to be related to less postoperative dysphagia, 74% in the Nissen group and 95% in the former fundoplication group after 24 mo. follow up [14]. Nevertheless, this strategy was shown to be much less reliable for managing reflux with time. Additionally, more patients called for reoperations for reflux control after anterior fundoplication [15].

### Toupet vs Nissen fundoplication

There have been a number of randomized control studies comparing Toupet fundoplication to Nissen fundoplication. Studies have revealed reduced rates of post-operative dysphagia after a Toupet fundoplication when compared to outcomes after a Nissen fundoplication - around 8.5% vs 13.5%

respectively [16]. There were no distinctions, nonetheless, in the percent of patients influenced by heartburn contrasting both procedures [16]. Regarding the operative method, recent findings have actually revealed that the length of the wrap is very important when executing a Toupet fundoplication. For instance, a 3.0 cm Toupet vs 1.5 centimeters Toupet confirmed to far better control reflux. The length of the wrap in a Nissen fundoplication, however, did not affect reflux control, rather mild dysphagia rates were higher for the 3.0 centimeters wrap (8.8%) contrasted to the 1.5 centimeters wrap (21.2%) at the 12-mo follow up [17]. Five years after the operation, mild dysphagia rates in the Nissen fundoplication groups were equivocal, 9.7% in the 1.5 cm cover and 7% in the 3.0 centimeters cover [17]. More degree 1 evidence with longer follow up durations is required to identify whether Nissen fundoplication is superior to Toupet fundoplication in terms of patient results (Table 1).

**Table 1.** Comparison of advantages and disadvantages in different types of fundoplications <sup>[12-17]</sup>.

	<i>Advantages</i>	<i>Disadvantages</i>
<b>Nissen fundoplication</b>	Very effective in controlling reflux over long periods of time	Increased flatulence, bloating and dysphagia
<b>Anterior (Dor) fundoplication</b>	Less postoperative dysphagia	Recurrent symptoms over time requiring more reoperations
<b>Toupet fundoplication</b>	Less postoperative dysphagia	Surgeons need to be mindful of length of wrap as it determines quality of reflux control

### Use of robotic surgery in treating GERD

The use of robot surgery for managing GERD has been shown to be a viable and safe alternative, with similar outcomes when compared to laparoscopy after one year follow up. Robot-assisted LNF is comparable to standard laparoscopy in terms of complications, mortality and size of hospital stay. Robotic Nissen fundoplication is helpful as the doctor has actually improved ergonomics, visualization, convenience, and freedom. The only negative aspects seen with robot assisted surgeries were reported to have longer surgical times (131.3 min vs 91.1 min laparoscopically), and generally greater expenses when contrasted to laparoscopic surgery [18].

### • COMPLICATIONS

Surgical management commonly entails laparoscopic anti-reflux surgeries (LARS) and the repair of any type of existing hiatal hernia. Anti-reflux surgical treatment normally consists of a fundoplication, which is a technique to recreate reduced esophageal

sphincter stress by wrapping the fundus of the stomach around the esophagus in the abdominal area.

### Intraoperative Complications

Pneumothorax is a rare problem of LARS with an occurrence of less than 2%. Usually, it issues of pleural violation without injury to the lung. Co2 will diffuse into the pleural cavity but will certainly be rapidly absorbed and is rarely of clinical consequence. If a pleural violation is identified intraoperatively, the opening should be repaired with suture. If a postoperative breast X-ray shows a pneumothorax, it may be managed cautiously with oxygen treatment. Serial breast X-rays are minimally valuable. They are just suggested in patients that continue to need oxygen treatment or are symptomatic from the pneumothorax, as in lack of breath. Seldom, this is a reason for tension pneumothorax needing chest tube drainage [19].



Gastric or esophageal perforation is an additional difficulty of LARS. Its incidence is less than 1%. If determined intraoperatively, it should be fixed with sutures. Postoperative medical diagnosis usually requires reoperation unless the leak is little or consisted of and the patient is hemodynamically steady [20], [21].

A splenic injury may occur throughout the mobilization of the fundus intraoperatively. This injury is typically parenchymal and might need splenectomy. A rarer difficulty is a postoperative splenic infarction because of unintended coagulation of branches from the main splenic artery. This injury happens throughout the division of the brief gastric arteries.

### Postoperative Complications

A feeling of gastric distention, nausea, and even failure to intake liquids following a LARS can occur. These results are believed to be multifactorial. They include a mechanical obstacle at the gastroesophageal junction that protects against belching as well as vagal nerve fiber injury resulting in relative gastroparesis. This is a typical postoperative impact; however it persists in few patients. If an individual has consistent nausea with insufficient oral consumption, an abdominal X-ray must be acquired. If there is evidence of gastric distention, a nasogastric tube must be placed to decompress the stomach briefly. Really rarely do patients need further treatments [22].

A momentary mild postoperative dysphagia is exceptive after LARS. It is second to the anticipated postoperative edema at the fundoplication site. An even more rare etiology is a hematoma at the wrap site which generally creates a lot more severe dysphagia. However, it is also self-limited. Mild dysphagia is normal during the very first 2 to 4 weeks postoperatively. If the patient can tolerate liquids in very early postoperative care with moderate subjective dysphagia, they need to be enjoyed without intervention. If the patient cannot endure liquids to maintain themselves hydrated, a top gastrointestinal series ought to be gotten. This series will dismiss anatomical problems such as a postoperative hiatal hernia. If the patient has subjective dysphagia for more than 3 months postoperatively, a top gastrointestinal series needs to likewise be obtained. Right now, if the top gastrointestinal is regular, an esophagogastroduodenoscopy with balloon expansion of the gastroesophageal joint should be executed [23].

Less than 10% of patients have frequent signs after a LARS [24]. All patients with recurring or persistent

signs and symptoms must be reviewed with ambulatory pH researches and manometry. If there is evidence of distal esophageal acid exposure, then an upper gastrointestinal esophagram and an esophagogastroduodenoscopy should be performed. If a diagnosis of reoccurring gastroesophageal reflux ailment without physiological reasons is made, treatment with proton pump preventions need to be started. If there is no alleviation of signs and symptoms, reoperation is required [25].

A slipped wrap is second to technological mistakes throughout surgical treatment. Preventative procedures include adding sutures to the diaphragm and full mobilization of the fundus and esophagus, with at least 2 to 3 cm of the intra-abdominal esophagus. These steps help prevent wrapping the fundus onto the stomach rather than the fundus onto the esophagus. The Nissen fundoplication can slip caudally in the postoperative duration. This slip may happen immediately postoperatively or progressively. Caudal slippage results in the acid-producing tummy being incorporated in the cover, thus bring about increased reflux and serious esophagitis, gastritis, or ulcer development. Medical diagnosis is made with barium top gastrointestinal collection and esophagogastroduodenoscopy. The necessary treatment is reoperative; the surgeon needs to redo the fundoplication.

### CONCLUSION:

GERD is a chronic disease that impairs physical and emotional well-being resulting in lowered quality of life. Initial therapy includes lifestyle adjustments and medical therapy, with antireflux medicines.

There are various types of anti-reflux procedures that have been quite effective in treating GERD and bring back competence in an otherwise inexperienced LES, while at the same time repairing a possible hiatal hernia. Laparoscopic Nissen fundoplication (LNF) is the gold requirement for medical treatment of severe GERD and leads to roughly 95% patient satisfaction. The LNF uses minimally invasive methods to completely dissect the esophageal hiatus and activate the gastroesophageal junction and esophagus; reduce the herniated gastroesophageal joint, cardia, and body back right into the normal abdominal position; close the hiatal problem; divide the short gastric vessels to enable total mobilization of the gastric fundus; and a 360% fundoplication not under stress. This enables re-creation of the 4 significant parts of a qualified lower esophageal sphincter (LES). Cost-utility analysis comparing LNF to PPIs have revealed that LNF to be a much more efficient long-lasting approach. Nevertheless, LNF is a practically exacting procedure and not without unfavorable results.

Longer-term postoperative damaging events can occur in 15%- 20% of patients, including gas-bloat syndrome, dysphagia, inability to belch, diarrhea, vagal nerve injury, and gastric dysmotility. Robotic Nissen fundoplication is likewise very helpful with excellent outcomes, however expense more. Before entertaining a surgical strategy, it is very important that the surgeon take all necessary preoperative steps to make certain surgery is the ideal choice for the patient.

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