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Experience of first few cases of hiatus hernia surgery, without modern energy devices, at our institution

Shah Bhavin K

Associate Professor, Department of General surgery, Dhiraj Hospital, Sumandeep Vidhyapeeth

Deval Patel

Senior Resident, Department of General surgery, Dhiraj Hospital, Sumandeep Vidhyapeeth

Aarathi Narayanan

Resident, Department of General surgery, Dhiraj Hospital, Sumandeep Vidhyapeeth

Abstract---Background and objective: Gastro-esophageal reflux disease (GERD) with or without hiatus hernia is the most common benign medical condition of the stomach and esophagus. Our objective was to see results of surgery, when performed in low volume centre, by a general surgeon. Methodology: Our first 8 patients with GERD (with or without hiatus hernia) were operated by Nissen's fundoplication. Prospectively we are describing our experience. Results: As a general surgeon laparoscopic Nissen's fundoplication proved difficult and each time we had to resort to open surgery. No major complication reported till date. Conclusion: Although laparoscopic Nissen's fundoplication has a steep learning curve, open surgery is much easier, faster and results are highly satisfactory. A General surgeon having enough knowledge of G-E junction anatomy should not be afraid of doing open fundoplication.

Keywords---hiatus, hernia, fundoplication, gastro-esophageal junction.

Introduction

Although there is no mechanical valve at GE junction (Figure 1) to prevent reflux of acid in esophagus, a variety of anatomical structures together make a physiological barrier. This together esophageal clearance, and normal gastric

emptying prevent Esophageal injury caused by gastric secretions. The gastroesophageal barrier is composed of two structures that function by different mechanisms.

1. The one-way gastroesophageal flap valve is a musculomucosal fold created by the intraluminal extension of the angle of His. As the stomach fills, the valve is forced against the lesser curvature, thereby preventing reflux.
2. The lower esophageal sphincter (LES) creates a high-pressure zone that remains tonically opposed until the act of swallowing, whereby receptive relaxation occurs. LES is 3-4 cm long and has pressure of 10-25 mmHg. Proper function of these mechanisms depends on their normal anatomic relationship with the diaphragmatic hiatus.

Architecturally, these structures are formed by the collar sling musculature and clasp fibers, which are specialized circular muscles at the level of the GEJ. The collar sling creates a force vector from the greater curve side of the GEJ toward the clasp fibers on the lesser curve. This force vector, along with the muscular thickening, results in the distal high-pressure zone observed during manometry. The collar sling also creates the angle of His and thus the flap valve noted on retroflexion during upper endoscopy. (Figure 2)

Dilation and deformation of the cardia result in attenuation of the collar sling and blunting of the angle of His. The crural widening associated with a hiatal hernia also contributes to this geometric distortion. This physical change leads to an incompetent LES and/or valve with resultant reflux leading to Gastro Esophageal Reflux Disease (GERD). GERD is a clinical syndrome that includes a variety of symptoms and tissue injury patterns associated with abnormal esophageal exposure to gastric and biliary contents.

The clinical presentation can be divided into three categories: Typical symptoms, atypical symptoms, and complications. Typical symptoms are regurgitation and heartburn and sometimes dysphagia. Atypical symptoms include chest pain, hoarseness, and respiratory symptoms, such as asthma, chronic cough, and aspiration pneumonia. Rarely, patients may present with protracted hiccups, night sweats, and erosion of their dental enamel. Complications include erosion ulcers, stricture, Barrett metaplasia, and the malignant complication, esophageal Adenocarcinoma.

Hiatus hernia can be sliding (type 1) 90%, paraesophageal (type 2) 3-5% or mixed (type 3) 5-7%. It is possible for a defective valve and intact LES to coexist. This is thought to be the case in patients with a type I hiatal hernia and the absence of reflux. (Figure 3)

While In sliding hernia surgery is usually indicated when symptoms are not controlled by long term proton pump therapy, all paraesophageal hernias should be surgically repaired due to risk of life threatening complications.

Laparoscopic Nissen's fundoplication is considered as gold standard treatment. (Figure 4)

Materials and Methods

This prospective study was carried out over a period of 5 years at our institute, S.B.K.S. M.I.R.C., Vadodara. 8 patients with GERD were studied from September 2016 to October 2021. All the 8 patients had undergone Nissen's fundoplication. Permission of IRB was not taken as Nissen's fundoplication for GERD is an established technique and it does not include any new drugs.

Inclusion criteria

All the patients with GERD, irrespective of age and sex were included in the study. Diagnosis was confirmed by upper GI scopy. USG abdomen and pelvis was done to exclude other intra-abdominal pathologies that may mimic these symptoms, including gall stones and pancreatitis. Esophageal manometry and 24 hour pH ambulatory monitoring was not done due to unavailability of these investigations. All the patients underwent preoperative investigations for fitness including Complete Blood Count, Random Blood Sugar, Renal Function Tests, Liver Function Tests, Coagulation profile, X-ray chest, Electrocardiogram and if needed, Echocardiogram and Tread Mill Test. All fit patients were included in the study. Patients were kept admitted until stitch removal and were followed up in OPD. During post-operative period patients were observed for complications like wound infection, gastric fistula, dysphagia, upper abdominal bloating, difficulty in belching and recurrence of GERD symptoms.

- **Technique**

All the Patients were given general anaesthesia. All the patients were given Inj. Cefuroxime 1.5 gm 12 hourly and Inj. Metronidazole 8 hourly for 5 days, First dose is given at the time of incision. A Ryle's tube is introduced if patient is given general anaesthesia and Foley's catheter is introduced in all patients after induction of anaesthesia.

- **Patient positioning and equipments**

The legs abducted with low lithotomy stirrups and knees extended. Monitor is positioned at the head of the table. The patient is firmly affixed to the operating table to cope up with steep head-up position to allow gravity to displace the abdominal viscera from the sub-diaphragmatic region.

Several instruments are recommend, including angled laparoscopes (either 30 or 45 degrees), which allow alternative views of the operative field and adequate visualization of the retrofundic and retro-esophageal regions, Nathanson liver retractor to elevate the left lateral segment of the liver for proper exposure of diaphragm. Atraumatic grasping instruments including Babcock-type are used. Appropriate instrumentation for achieving hemostasis and dividing tissues bloodlessly are game changer. These instruments include bipolar and/or monopolar electrosurgical devices, and ultrasonic coagulation and cutting devices. Also, a flexible endoscope should be available to allow intraluminal evaluation of the esophagus and stomach, should the need arise. (Figure 4)

Access to the abdomen is obtained with a Veress needle. Because the esophagus generally enters the abdomen from a slightly right-to-left orientation, and because the falciform ligament and liver limit the right lateral placement of the port for the surgeon's left hand laparoscope is placed to the left of the midline in a

supraumbilical location approximately 12 cm caudal to the xiphoid process. The patient is then rotated into a severe head-up position, and 3 accessory ports are placed under direct vision. The surgeon operates through the two most cephalad ports, and the assistant operates through the two caudad ports. A Nathanson liver retractor does not require a trocar and is placed through a small epigastric incision. We tried to do dissection in following predefined steps by us.

1. Gastro hepatic ligament divided
2. Phreno-esophageal ligament divided
3. Gastro Phrenic ligament divided
4. Dissection along right side of esophageal wall completed
5. Dissection of anterior and left side of esophageal wall
6. Gastric fungus mobilization by short gastric vessel division, 10 cm, upwards from end of gastroepiploic vessels
7. Retro esophageal mobilization from left side
8. Penrose's drain for traction
9. Fundus passed back and checked for rotational and twist tension.
10. Creating 3.5 cm distal esophagus in abdomen in relaxed position.
11. Approximation of crura by prolene.
12. Creation of a 360-degree fundoplication with use of three or four interrupted permanent sutures, to a length of 2.5 to 3 cm

Results and Observations

8 patients had Nissen's fundoplication for GERD. 2 patients directly underwent open surgery due to relative contraindications to laparoscopy. Other patients were started laparoscopically. We do not have harmonic scalpel or bipolar vessel sealer. 2 patients were converted to open due to hemorrhage from gastro splenic ligament vessels. 2 patients were converted due to difficulty in retro-esophageal dissection, 1 patient was converted to open due to difficulty in identifying anatomy. Especially differentiation between diaphragmatic crura and aorta and 1 patient was converted due to anesthetist request due to developing subcutaneous emphysema on chest. All the patients were kept hospitalized postoperatively until stitch removal.

1. Total hospitalization period was average 11 days, two days preoperative and 9 days postoperatively.
2. 2 patients (4%) had minor wound infection, which responded to oral antibiotics.
3. There were no life threatening complications or no instances of deep vein thrombosis, hypostatic pneumonia or myocardial infarction
4. No incidence of gastric fistula, dysphagia, upper abdominal bloating, difficulty in belching and recurrence of GERD symptoms were noted.
5. Average operative time remained 2 hours for pure open surgery, while laparoscopy converted to open cases took average 5 hours.

Discussion

The first report of hiatus hernia was published in 1853 and in 1926 Akeel under proposed term hiatus hernia. First surgery was done in 1919 by Soresi. Link

between hiatus hernia and GERD was made by Allison and Barrett in later half of 20th century. Nissen developed surgery in 1957, which was improved by Donahue and Demesteeer (3). While general surgeons were doing reflux surgery, due to advent of GI surgery as a separate branch, general surgeons are now less familiar with surgeries performed near GE junction. Our study was aimed to know results when surgery is performed in low volume centre (once or twice a year) by general surgeons with limited availability of advanced energy devices. Laparoscopic Nissen's fundoplication has become gold standard surgical treatment. Park in his recent study showed that anti-reflux surgery improves GERD and related symptoms and quality of life (4). Just to be familiar with anatomy and get experience we did first surgery open, with excellent results. Rest 7 surgeries were started laparoscopically. We had experience of doing cholecystectomy and appendicectomy laparoscopically and practice of suturing on simulator. All 7 surgeries were converted to open due to one or other difficulty. Uruk Ates recorded conversion rate of 9.7% (5), while Jaime Ruiz-Tovar recorded conversion rate of 4%. (6) The 100% conversion rate in our study may be due to less familiarity with regional anatomy, less experience in laparoscopy, absence of better energy sources and difficulty in handling intracorporeal suturing. In a 10 year study of 188 patients by Jaime Ruiz comparing laparoscopic and open Nissen fundoplication, both methods were satisfactory and proved equally effective. 6. We avoided 24 hr pH study due to cost restraint. Jayant kumar also avoided this investigation in his study of 58 patients and used it selectively without any problems post-operative results. 1.

Conclusion

Since the advent of laparoscopy and good results of open Nissen fundoplication, in last 20 years, laparoscopic Nissen fundoplication has become gold standard treatment for hiatus hernia and GERD.

1. Laparoscopic Nissen fundoplication has a steep learning curve.
2. Retro-oesophageal dissection is particularly difficult, especially differentiating diaphragmatic crura and aorta, so very high quality camera is a must.
3. Advanced energy sources like harmonic scalpel and ligature greatly facilitates surgery by ease in separating Gastro-splenic ligament.
4. 24 hour pH monitoring study is not a must before hiatus hernia surgery. Clinical symptoms and endoscopic confirmation suffices.
5. Surgeon doing first laparoscopic fundoplication should do it under guidance of experienced laparoscopic surgeon, and it is preferable to have experience of few open surgeries before.
6. Open Nissen fundoplication is a very satisfactory surgery, having extremely low rate of complications and surgeon less experienced in laparoscopy should not hesitate to offer open surgery, except in patient with very narrow costal margin.

Declarations

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Conflict of interest: Nil

Ethical approval: taken from SVEIC

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FIGURE 1: ANATOMY OF GASTRO-ESOPHAGEAL JUNCTION²

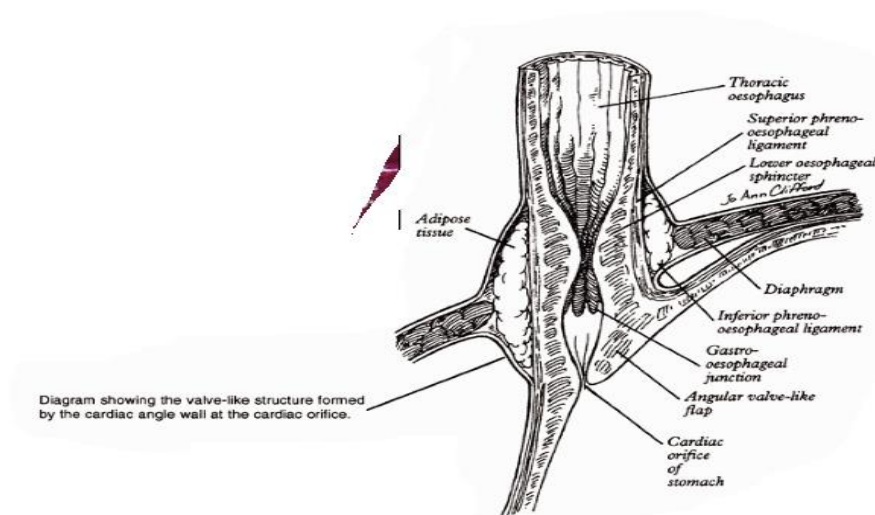
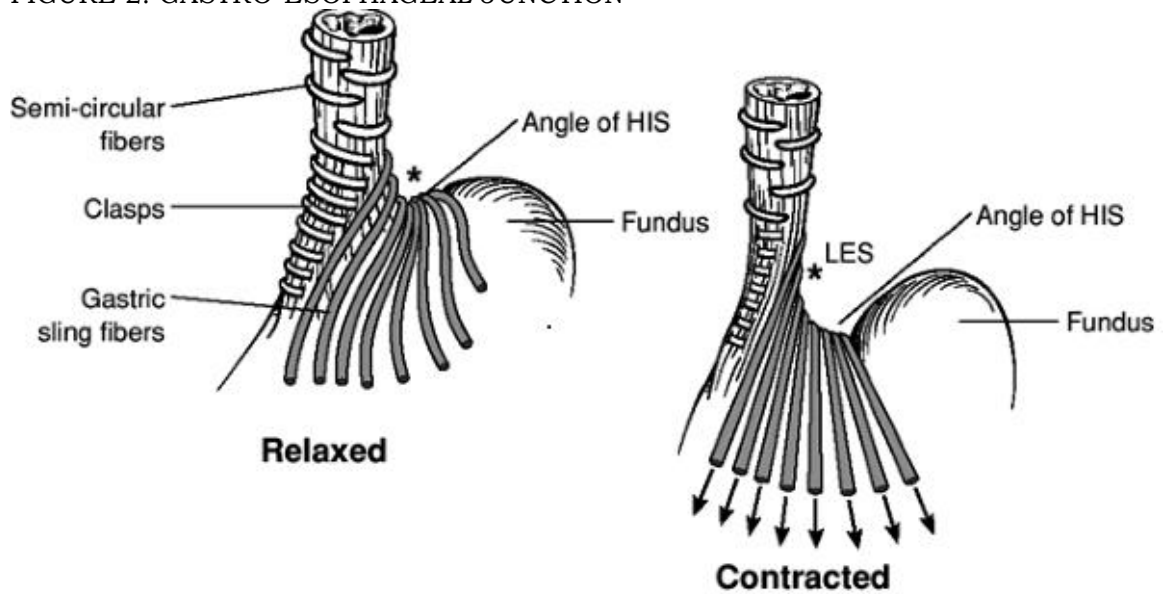


FIGURE 2: GASTRO-ESOPHAGEAL JUNCTION²FIGURE 3: TYPES OF HIATUS HERNIA^{3,4}

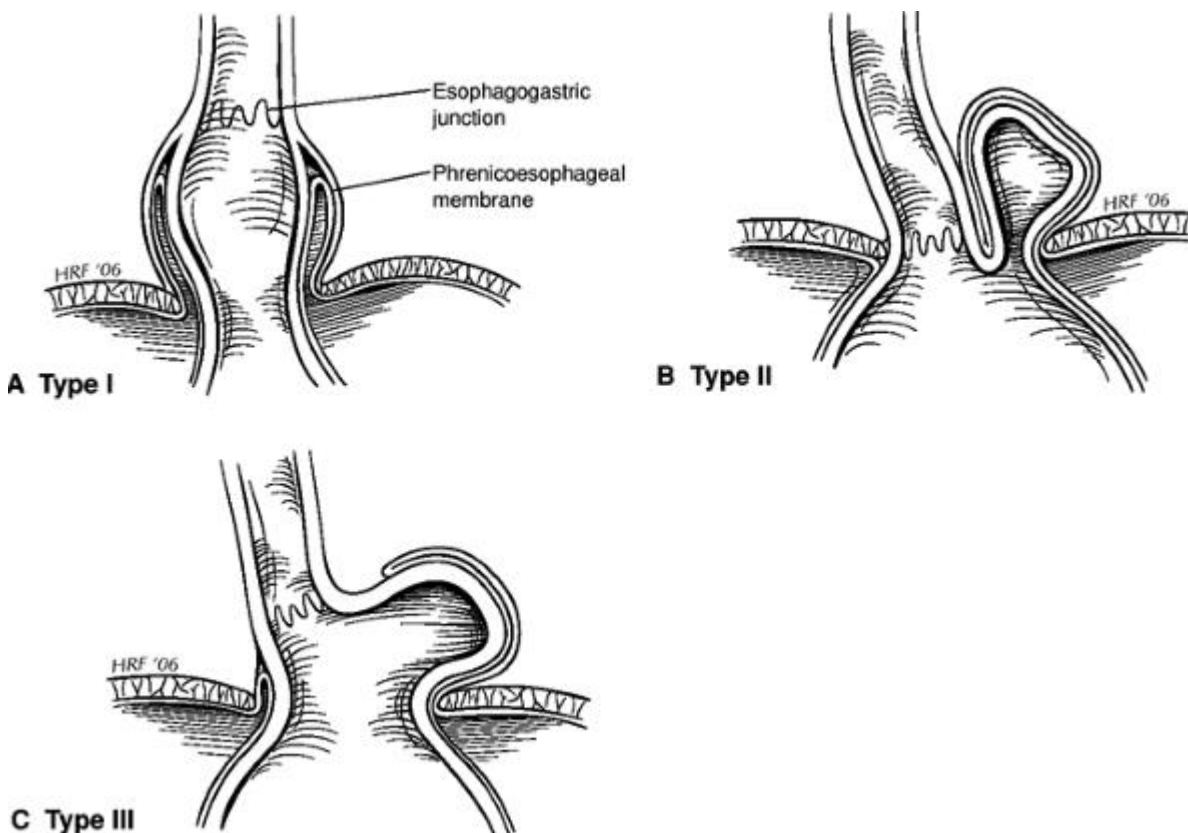


FIGURE 4: NISSANS FUNDOPLICATION^{5,6}

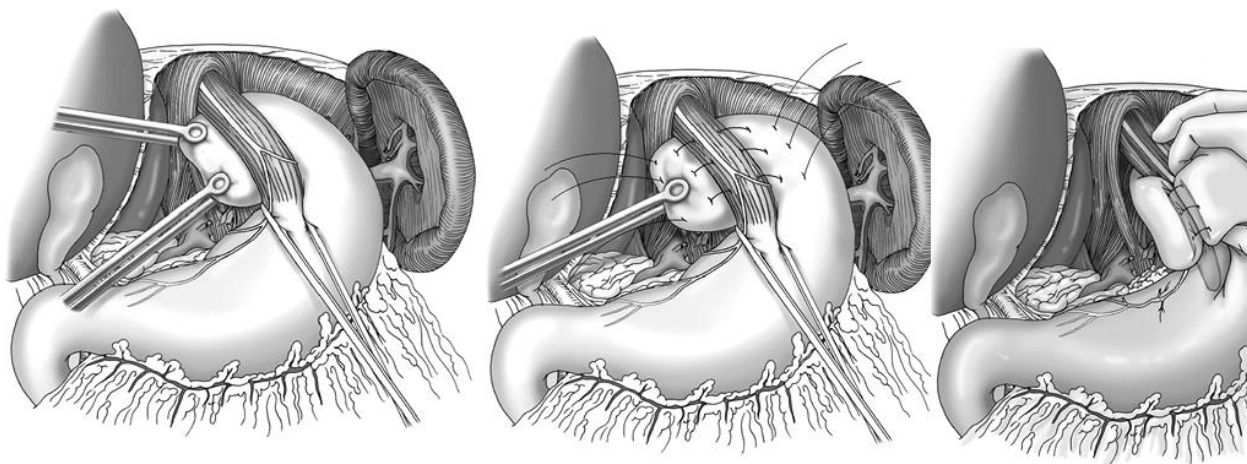


FIGURE 5: PATIENTS POSITIONING^{5,6}

