

Surgical Management of Gastro-Esophageal Reflux Disease and Hiatus Hernia.

Monika Gupta^{1*}, Shankar Dhaka² and Somesh Goyal³

¹GI, HPB & Minimal Invasive Surgeon, Manipal Hospital, Jaipur Rajasthan, India

²Medical Gastroenterologist, Manipal Hospital, Jaipur, Rajasthan, India

³General Surgeon, Manipal Hospital jaipur, RAJASTHAN, India

*Corresponding author

Monika Gupta GI, HPB & Minimal Invasive Surgeon, Manipal Hospital, Jaipur Rajasthan, India.

Received: May 06, 2025; Accepted: May 13, 2025; Published: May 20, 2025

Introduction

Gastro-esophageal reflux disease (GERD) and hiatus hernia (HH) can cause typical symptoms like regurgitation, heartburn with or without dysphagia. Atypical symptoms like chronic cough, asthma, laryngitis and pneumonia occurs less frequently. Other upper gastrointestinal diagnosis like esophageal dysmotility, esophageal ring, diverticulum, esophageal stricture (benign or malignant) should be ruled out with appropriate diagnostic tests. Basic premises of GERD treatment rests on medical treatment with PPIs, but in current era prolonged PPI use is watched and raises concern regarding lifelong usage. Management by Lifestyle measures, Endoscopic measures and Surgical procedures is being seen in new light of literature [1,2].

Pathophysiology & Classification

Gastro-esophageal junction (GEJ) is 2.5-4.5 cm long, located between the lower end of esophagus and cardia of stomach. The lower esophageal sphincter (LES) is functional sphincter that prevents gastric acidic contents from regurgitating into the esophagus. The sphincter action is provided by the angle of His, positive intra-abdominal pressure, intact phreno-esophageal membrane (PEM) and gastric cardia fibers that loop around esophagus to maintain lower esophageal pressure and both crura of diaphragm. GERD occurs when any of these factors get disturbed.

- Weakening or dilatation of crural hiatus and PEM. Defect in PEM lead to herniation of GEJ into mediastinum. When it happens in the circumferential part of PEM, GEJ migrates upwards, leading to type 1 sliding hernia, when PEM weakens partially, GEJ remains below diaphragm but part of stomach herniates leading to type 2 paraesophageal hernia. Migration of GEJ and fundus above diaphragm is called type 3 combined hernia. When stomach lies in the

mediastinum & creates partial or complete volvulus it is called complex hernia.

- Increased intra-abdominal pressure due to obesity or other causes leading to increased acid reflux.
- Trauma to diaphragmatic hiatus leading to increased reflux.
- Post surgical causes e.g. post esophago – gastric operations, where GEJ is reconstructed and placed in chest.

Clinical Presentation

Diagnostic symptoms of GERD and hiatus hernia are heartburn, regurgitation and belching regurgitation typically increases on stooping, weight lifting and after meals.

Atypical Symptoms

GERD is one of the causes of chronic cough as atypical symptom. This atypical symptom arises due to reflux of gastric content into upper airway due to lax esophageal sphincter and/ or large hiatus hernia. All non-GERD causes should be ruled out in these patients before labelling them as atypical GERD cases. Atypical symptoms like chronic cough responds poorly to medical treatment described below. With medications significant cough reduction is seen in only in 12.5–35.8% of patients. In patient with GERD with hiatus hernia studies have shown that frequency of chronic cough can have positive correlation with enlarged hiatus and size of hiatus in GERD with hiatus hernia. Atypical symptoms like chronic cough responds poorly to medical treatment described below. With medications significant cough reduction is seen in only in 12.5–35.8% of patients.

Diagnostic Investigations

Careful history and investigations can lead to diagnosis GERD and hiatus hernia. Endoscopy is recommended after initial

empiric trial of PPI once a day therapy has been given but has not been successful or when atypical chest pain despite negative cardiac evaluation is present. Various grades of esophagitis have been described on UGI endoscopy. Endoscopy distance of >2 cm between diaphragmatic indentation and the Z line and a dumbbell shaped appearance on retroflexion are diagnostic of Hiatus hernia (HH). Barium swallow is not recommended. Reflux testing is recommended when symptoms of GERD present but UGIE is unequivocal or when atypical symptoms are present [2].

CECT abdomen and chest can help in documentation of hiatus size, GEJ displacement and gastric volvulus. Absence of hiatus hernia on CT scan does not rule out lax sphincter or presence of GERD.

Treatment

Initial management of GERD is always medical, comprising of diet modification, weight loss if obese, avoiding smoking, alcohol and trigger foods, avoiding meals within 2 to 3 h before bedtime and 30-45° inclined bed during sleep. Starting proton pump inhibitors 60 min before meals as initial treatment and maintenance of endoscopy proven GERD is recommended compared to H₂ antagonists and/ coating agents. In cases of classic GERD with no alarm symptoms 8-week trial of once-a-day PPI is recommended followed by discontinuing it if improvement is there [2].

Endoscopic Treatment

Endoscopic treatment for GERD is appropriate for early GERD cases and for those with altered anatomy where standard laparoscopic surgical approaches are limited e.g. post operative. There are currently three endoscopic devices approved by the Food and Drug Administration (FDA) in the USA to treat GERD:

1. Stretta for radiofrequency therapy, data for Stretta procedure is insufficient for it to be comparable to surgical antireflux procedures,
2. Transoral Incisionless Fundoplication (TIF) is recommended in patients who have resistant reflux and who do not wish to undergo surgery
3. endoscopic suturing procedures, technically equivalent to laparoscopic antireflux procedures, but long-term results need to be assessed
4. MSA magnetic sphincter augmentation, MSA can be advised as alternative to laparoscopic fundoplication for patients with regurgitation who fail medical management [2].

Various trials have been done but most trials are focused on technical feasibility of these procedures and on comparison of endoscopic procedure to lifelong PPI or total fundoplication. Studies on durability of these procedures with long term results are still awaited.

Indications of Surgery

Antireflux surgery performed by an experienced surgeon as an option for long-term treatment of patients with

- objective evidence of GERD.
- severe reflux esophagitis (LA grade C or D).
- large hiatal hernias.
- persistent, troublesome GERD.

- atypical GERD symptoms.
- Along with esophago gastric operations where reconstruction of GEJ is essential.
- along with obesity surgery - RYGB as an option to treat GERD in obese patients who are candidates for this procedure and who are willing to accept its risks and requirements for lifestyle alterations.

Principles of Anti Reflux Surgery

The basic principles of antireflux surgery are

Restoration of GEJ in abdomen, approx 2.5-4 cm well below diaphragm

Anatomical or biological mesh closure of hiatal defect.

Recreation of angle restoration of sphincter function and prevention of reflux by using fundal wrap.

Surgery for GERD can be Categorized into

- Therapeutic: as primary operation after proper indications.
- Preventive: Following sleeve gastrectomy and Hiatus hernia surgery.
- Degree of wrap -
- Complete fundoplication- 360° Nissen's fundoplication
- partial fundoplication-namely Toupet (270°), Watson (anterior partial 180°), Dor (anterior 90°)
- Approach: Open or laparoscopic.
- Preference in hiatal closure-Anatomical suture repair or mesh repair of hiatus.

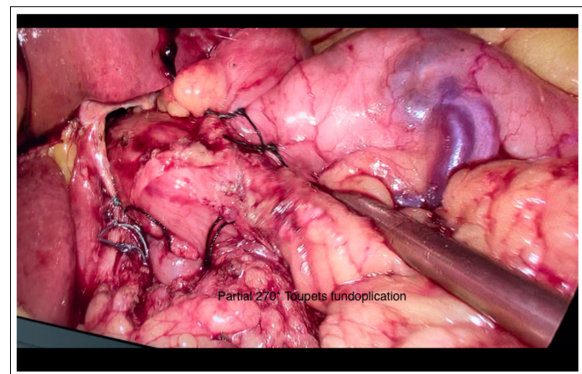


Figure 1: 270° Toupet's Fundoplication



Figure 2: Reasonably Tight Hiatal Closure

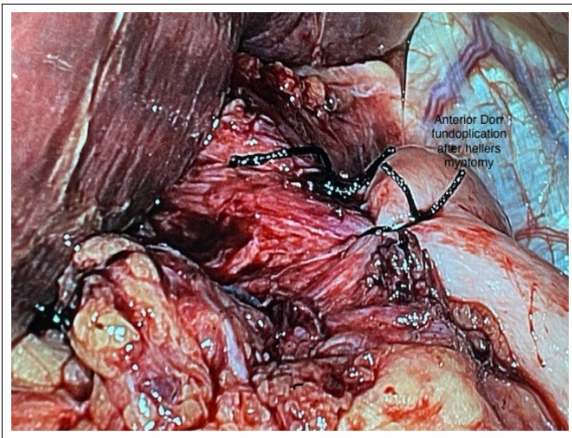


Figure 3: Heller's Myotomy with Anterior Dor's Fundoplication

However basic premises of discussion about surgery of fundoplication remains on partial (<360°) or complete fundoplication partial fundoplication is namely Toupet (270°), Watson (anterior partial 180°), Dor (anterior 90°) complete (360° Nissen's) fundoplication.

Nissen's Fundoplication

The basic principles of Nissen's fundoplication are dissection of crural hiatus, repair of crural hiatus keeping reasonable laxity around esophagus so as to prevent migration of GEJ in chest but simultaneously not creating tight hiatus which can create dysphagia. In total fundoplication after hiatal dissection and replacement of stomach and GEJ inside abdomen 360° wrap is created and 2.5-4.5 cm circumferential area of high pressure is created at GEJ with wrap of gastric fundus. If the hiatal defect is more than 5 cm or tissues are weak to hold stitches one may choose to fix a composite or biological mesh to hiatal defect with sutures, one should discourage putting tackers in that area, due to propensity of tackers to cause pain and erosion. After hiatal repair 360° floppy fundoplication is done to create artificial GEJ sphincter for prevention of reflux by fixing fundus of stomach around GEJ. One may choose one or two hiatal or diaphragmatic anchoring stitches to wrapped fundus.

Partial Fundoplication

These types of fundoplication have same principles of hiatus closure as Nissen's fundoplication, but the degree and position of wrap differs as one can guess from the respective names of these operations. Partial fundoplication are namely Toupet's (270°), Watson's (anterior partial 180°), Dor's (anterior 90°) fundoplication.

Advantages of Surgery are

Avoidance of life long dependence on PPI, prevention of reflux improvement in quality of life. So laparoscopic anti reflux surgery is rated superior to lifelong PPI therapy provided that mechanical adverse effects like bloating, dysphasia and failure to burp are prevented.

The research on various surgical options rotated around prevention of adverse events and improvement or elimination of reflux.

Technique of laparoscopic Fundoplication

The camera port is planned at 20 cm below xiphisternum, pneumoperitoneum is created by closed technique after that one

working port of 12 mm trocar at left mid clavicular line at level of camera port and one 5 mm port at right MCL for surgeons left hand taking care of falciform ligament. Nathanson's retractor is placed to retract left lobe of liver and care is taken to not cause any liver tear especially at attachment of falciform. This may need release in between the procedure in case liver appears congested. Assistant ports-one at left MAL at level of umbilicus is placed.

Operative steps -45° scope can visualize this part better due to better angle and length although 30° scope can also be used. With help of harmonic short gastric vessels at gastric fundus are taken & starting of left crus dissection from esophagus, PEM and hernia sac is done, also gastric fundus is dissected from retroperitoneal a vascular attachment. After this a retrogastric window is created.

On right pars-flaccida of lesser omentum, dissection of right crus from esophagus, gastric cardia and hernia sac is done, preserving hepatic branch of LGA & vagus. Both anterior and posterior vagus are visualised but neither dissected nor transected. Hernia sac is excised, lower most esophagus is dissected from PEM and mediastinal tissues up to 5 cm and GEJ is placed well in abdomen so as to ensure that it remains in abdomen throughout procedure without any tension. In case this doesn't occur, esophageal lengthening procedure may be needed.

After this gastric fundus just below the fat pad of stomach is taken towards right of esophagus via the window which was created initially at left side. Wrap of 360 is checked for tension free reach up to anterior esophagus without causing tightening or twisting the GEJ.

Now crural closure is done with nonabsorbable suture Ethibond 2-0 so as to keep loose space for up to 2 cm around esophagus. 360° wrap is fashioned (it is optional to use bougie 42 French in order to avoid tightening of GEJ) and fundus is fixed to each other with 3 silk sutures and also one stitch to fix it to hiatus is placed to prevent migration in mediastinum (this is optional). Middle stitch is be fixed to esophageal wall also to prevent wrap dislodgement (this is optional). After completion look for ant bleed from short esophageal vessels and retracted liver surface.

Partial Fundoplication

270° Total fundoplication has stood test of time. All operative steps are same in total or partial fundoplication except the degree and position of wrap. Here after gastric fundus mobilization, fundus tested to reach on both sides of esophagus leaving front right 90° area without wrap, it is fixed by 3 stitches on each side with silk 2-0. No bougie is needed for calibration as there is no encircling of GEJ in this procedure.

Total vs Partial Fundoplication

In a randomized clinical trial including 456 patients, partial and total fundoplication were equally effective in reducing esophageal acid exposure after 3 years, while mechanical adverse effects were more common after total fundoplication. Although PF and TF could be recommended for treatment of gastroesophageal reflux disease, PF might be superior by having similar acid reflux while inducing less dysphagia especially to solid food

after up of 12-24 months [3]. In our experience in 45 hiatus hernia operation done over 5 years, toupet's fundoplication have given great results and only 2/45 patients had postoperative pain and dysphagia issues, out of 2 one had documented hiatal hernia recurrence which was managed with medications. Other patient had no documented GERD issues despite many postoperative investigations. One of the largest meta-analyses, conducted by Andreou et al and including 29 RCTs, concluded that TF has a better outcome than NF, especially relating to postoperative dysphagia [4].

Rodrigo F. Ramos et al al studied 17 RCTs comparing various fundoplication and their results showed that partial fundoplication resulted in a less incidence of obstructive effects compared with the total fundoplication. There was a significant difference in post-operative dysphagia in favor of the partial fundoplication [5]. A very recently published systematic review and meta-analysis of 26 RCTs and 17 cohort studies by McKinley et al.25 tried to answer effectiveness of total vs partial fundoplication in GERD patients. They found no significant differences in early major complications in postoperative reflux assessment by PH manometry.

Similar results were obtained by Baigrie et al.1. They randomized 163 GERD patients, regardless of esophageal motility, to total (84 patients) or to partial anterior 180° (79 patients). They found no significant differences in heartburn. Patients after partial fundoplication had significantly less dysphagia. A slightly lower risk of long-term (more than 5 years) dysphagia was reported in patients undergoing partial fundoplication; however, the difference was not statistically significant [6].

Complex Hiatus Hernia

Complex hernia is described as hernias which are large and recurrent, have undergone previous surgical repair. Failure of surgical repair can be due to various causes for example -Persistently raised intraabdominal pressure, defect more than 5 cm, weak crural tissues and under tension suture of diaphragmatic tissue, prosthesis fixation issues and prosthesis migration in chest.

These are extremely difficult to repair due to presence of previous surgical repair, previous mesh which gets densely adhered to diaphragm and proximity of GEJ which may need repair and has tendency to leak in case of failed repair. These cases must be taken by experienced surgeon and surgery should be performed carefully in order to avoid opening of esophagus and GEJ [7]. One approach can be use of vascularised tissue flap from posterior rectus sheath based on falciform ligament, to repair of hiatus in complex hernia.

Technical Factors

Repair Of Hiatus Hernia

Tissue repaired in hiatus hernia is muscle compared to inguinal or ventral hernia where fascia is repaired, this tissue is under abdominal pressure and mobile due to diaphragmatic movements. These are the basic reasons this hernia can recur.

Side Effects and Complications of Surgery

Hiatus hernia is referred alarmingly for urgent by medical practitioners, mainly 1-2% of all hiatus hernia with GERD get

operated. When performed adequately floppy fundoplication helps reducing GERD and intrathoracic heaviness significantly. Few rare well known side effects / sequelae of these operations are gas bloating, failure to burp, dysphagia of varying degrees and postprandial heaviness. Various measures have been suggested to reduce these side effects namely -choosing partial fundoplication (90°/270°) instead of 360° floppy fundoplication, excision of hernia sac, placement of GEJ intrabdominally without tension, reasonable hiatal closure and Intraoperative use of functional luminal imaging (FLIP) to ensure, length of narrowing (LON) 2.5-4.5 cm. Longer LON gives better relief from dysphagia but increases gas bloat [8].

Slipped Nissen's or Twisted Wrap

Fundoplication operation needs thorough knowledge about anatomy of gastric fundus and GEJ, if wrap is done using gastric cardia or body instead of gastric fundus wrap can slip down and create twist at GEJ. In both cases recurrent GERD or dysphagia or postprandial discomfort can be there. It needs redo operations when the diagnosis is confirmed in imaging [9].

Wrap Migration / Recurrent Hiatus Hernia

Sometimes the esophageal length is less and short esophagus is present, hiatus size is large and tissues are weak, in those cases hiatal stitches may fail to contain wrap and GEJ intra-abdominally and wrap can migrate in chest and create postprandial discomfort, dysphagia or gastric necrosis. Imaging mainly contrast CECT abdomen and UGIE can diagnose and re-operative surgery may be needed.

Recurrent Gerd

This can be result of all above mentioned surgical complications and also quoted in literature due to partial wraps [10].

But in many analytical articles on RCTs comparing partial with complete wrap, significant difference in occurrence of postoperative GERD has not been found. Other postoperative complications can be injury of lower esophagus, injury to stomach fundus needing repair, bleed from short gastric vessels. liver etc which needs to be managed according to clinical picture of the patient.

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