

Laparoscopic Management of Hiatus Hernia

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ABSTRACT

Introduction: Hiatus hernia is axial type of hernia occurring at the esophageal opening of diaphragm. Large hiatal hernias have increased risk for severe complications that can include gastric strangulation, bleeding, and perforation. This study presents our technique and results of laparoscopic management of hiatus hernia.

Materials and methods: This study was done retrospectively on 42 patients from data over a period of last 10 years (April 2010–March 2020) in a tertiary care hospital.

Results: Total number of patients included in our study were 42. The range of age and the mean age of patients were 22–60 years and 38.36 (SD 8.018), respectively. Heartburn (32, 76.19%) was the most common symptom. Nissen's fundoplication was our primary choice performed in 37 (88.1%) patients. Few of our patients were comorbid and frail to whom Toupet's repair (4, 9.52%) and gastropexy (1, 2.3%) were performed, optimum to their conditions. Out of 42, mesh was placed in 17 (40.48%) patients including all the type IV and few of the type III patients. The mean operative time, mean blood loss, and hospital stay were 126.90 (SD 12.781 minutes), 62.14 (SD 17.605 mL), and 4.60 (SD 1.127 days), respectively. Two patients were converted to open procedure. Recurrence occurred in three (7.1%) patients of type III hernia in whom only fundoplication was done without mesh placement.

Conclusion: This study concluded that laparoscopic management of hiatus hernia is a feasible and safe option, with a very low morbidity and mortality rate.

Keywords: Esophagogastroduodenoscopy, Gastroesophageal junction, Gastroesophageal reflux disease, Hiatus hernia.

World Journal of Laparoscopic Surgery (2021): 10.5005/jp-journals-10033-1474

INTRODUCTION

Hiatus hernia is axial type of hernia occurring at the esophageal opening of diaphragm. It is classified into four types according to the anatomic characteristics.¹ Type I hernia being the most common is also known as sliding hiatal hernia. Characteristic feature of this type of hernia is the migration of gastroesophageal junction (GEJ) into the posterior mediastinum. Type II, or true paraesophageal hernia, is characterized by herniation of the gastric fundus into the mediastinum alongside the esophagus, with the GEJ remaining in an intra-abdominal position. Type III hernias, also called mixed hernias, involve herniation of the stomach with the GEJ into the mediastinum. Type IV hernias are rare and are characterized by an intrathoracic stomach along with associated viscera such as the spleen, colon, small bowel, or pancreas. Large hiatal hernias representing 5–10% of all hiatal hernias.² Various symptoms occur in patients with hiatus hernia namely obstructive symptoms (chest pain, vomiting, postprandial), respiratory symptoms (asthma, cough, dyspnea), or gastroesophageal reflux disease (GERD). Large hiatal hernias have increased risk for severe complications that can include gastric strangulation, bleeding, and perforation.^{3,4} In Istanbul, Nissen, in 1937, performed first fundoplication to prevent the gastroesophageal reflux. In it, Nissen performed a transpleural cardia resection and protected the anastomosis within a gastric fold.

Since the 1950s, the repair of hiatal hernias has been performed traditionally via open laparotomy or thoracotomy.⁵ The first laparoscopic hiatal hernia repair was done by Cuschieri et al.⁶ in 1992. The first fundoplication without resection was performed in 1955 and reported in 1956.⁷ Various modifications were introduced into the technique commenced by the coworker of Nissen and Rossetti. The total wrap commonly performed nowadays was

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How to cite this article: Attri MR, Mir IN, Kumar IA. Laparoscopic Management of Hiatus Hernia. *World J Lap Surg* 2021;14(3):208–211.

Source of support: Nil

Conflict of interest: None

introduced by Donahue and Bombeck in 1977 and validated by DeMeester in 1986. In this technique, full mobilization of the GEJ and posterior fundus with division of the upper short gastric vessels and a crural repair is done. The length of the wrap has been reduced over these years to the current 2.0 cm, and another modification made was ensuring a loose, "floppy" fundoplication.^{8,9}

The morbidity with the open approach was mostly associated with the wound. With the extension of laparoscopy to other procedures other than cholecystectomy, the morbidity of the procedures was avoided to a large extent; faster recovery and earlier return to normal function were achieved.¹⁰ This study presents our technique and results of laparoscopic management of hiatus hernia, performed by a single surgeon, in last 10 years.

MATERIALS AND METHODS

A retrospective cohort study of 42 patients operated laparoscopically was done. We analyzed retrospectively the data recorded from patients who underwent laparoscopic

repair for hiatal hernia, by a single surgeon, over a period of 10 years between April 2010 and March 2020 in Government Medical College, Srinagar. All patients were first examined by Department of Gastroenterology. The patients were worked up *vis-à-vis* symptomatic evaluation, barium meal, and esophagogastroduodenoscopy (EGD). Patients who had hiatus hernia grade II, III, and IV were included in the study. Patients were optimized for surgery and were kept fasting for 8 hours prior to the procedure. All patients underwent antibiotic prophylaxis and prophylaxis for deep vein thrombosis.

Exclusion Criteria

- Medically unfit patients.
- Patients with previous gastroesophageal surgery.
- Type I hiatus hernia.
- Esophageal motility disorders.

Operative Technique

Procedure was started under general anesthesia; urinary catheterization for monitoring and Ryle's tube for stomach decompression were placed. Pneumoperitoneum (12–15 mm Hg) was created by Veress needle, and patient was placed in a reverse Trendelenburg position. Five trocars are inserted into the peritoneal cavity at the epigastrium, the right subcostal area, the left subcostal area, above the umbilicus on the middle abdominal line, and at 4–5 cm lateral to the midline in the left upper quadrant. Surgeon stands in-between the legs (French position); primary and secondary assistants on either side of patient. Procedure was started with liver retraction and commencement of lesser omentum division keeping GEJ under traction. Phrenoesophageal membrane was then dissected starting from anterior aspect of hiatal opening resulting in mobilization of esophagus and visualization of crura taking care of the two vagi. Mediastinal dissection of esophagus was done for lengthening of intraabdominal esophagus and reduction of hernia. Gastric fundus was then mobilized for the wrap by dissection of short gastric vessels, sometimes gastrosplenic ligament also. Esophageal hiatus was then narrowed down by suturing the crura with nonabsorbable sutures under a large 50–60 Fr bougie. About 2 cm anti reflux wrap was then made by grasping posterior aspect of gastric fundus with a blunt forceps placed posteriorly to the esophagus and calibrating with a large 50–60 Fr bougie. In cases where total fundoplication was not feasible, a partial posterior fundoplication was performed. In type IV and few of type III hiatal hernia, U-shaped mesh [mixed mesh polypropylene + polytetrafluoroethylene (PTFE)] was placed around the hiatus and fixed with the tacks. No drains were placed, and procedure was completed by closing the port sites.

Postoperative care was taken for the prevention of postoperative nausea and vomiting. Barium radiography was done on second postoperative day. Orals were started on postoperative day 2. Patients were discharged once tolerating orals.

Follow-up

Patients were followed up at 1 month, 6 months, and then annually. The follow-up included routine general examination, barium radiography, and EGD.

Statistical Analysis

The recorded data were compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0. Continuous variables were summarized as mean \pm SD, and categorical variables were expressed as frequencies and

percentages. Chi-square or Fisher's exact test, whichever appropriate, was applied for categorical data. A *p*-value of less than 0.05 was considered statistically significant.

RESULTS

A total number of patients included in our study were 42 after fulfilling the inclusion and exclusion criteria. Our study included 24 (57.14%) female and 18 (42.86%) male patients. The range of age was 22 to 60 years and the mean age of patients was 38.36 (SD 8.018). The study was conducted over 14 (33.33%), 18 (42.86%), and 10 (23.81%) patients of type II, III, and IV hiatal hernia, respectively, as shown in Table 1.

Heartburn (32, 76.19%) was the most common symptom followed by regurgitation (27, 64.29%) and epigastric pain (25, 59.52%). Some patients also complaint of pulmonary symptoms with chest pain (16, 38.1%) as most common symptom followed by breathing difficulty (14, 33.33%). Two (4.76%) of the procedures were converted to open repair owing to the nonavailability of bariatric instruments as the patients were obese (BMI >30) and dissection became difficult with the available instruments. Posterior crurography was done in all the patients. Nissen's fundoplication was our primary choice performed in 37 (88.1%) patients. Few of our patients were comorbid and frail to whom Toupet's repair (4, 9.52%) and gastropexy (1, 2.3%) were performed, optimum to their conditions. Out of 42, mesh was placed in 17 (40.48%) patients including all the type IV and few of the type III patients as shown in Table 2.

The mean operative time was 126.90 (SD 12.781 minutes), with operative duration decreasing with each procedure performed. The mean blood loss and hospital stay were 62.14 (SD 17.605 mL) and 4.60 (SD 1.127 days), respectively, as shown in Table 3.

Table 1: Patient profile

Total	42 (100%)
Gender	
Female	24 (57.14%)
Male	18 (42.86%)
Type of hernia	
II	14 (33.33%)
III	18 (42.86%)
IV	10 (23.81%)
Mean Age	38.36 \pm 8.018 (22–60) years

Table 2: Symptomatology and procedure

Variable	Type	Frequency
Total		42 (100%)
Symptoms	Heartburn	32 (76.19%)
	Epigastric pain	25 (59.52%)
	Regurgitation	27 (64.29%)
	Chest pain	16 (38.1%)
	Breathing difficulty	14 (33.33%)
	Palpitation	18 (42.86%)
Type of plication	Nissen's	37 (88.1%)
	Toupet's	4 (9.52%)
	Gastropexy	1 (2.38%)
Crural closure	Suture repair	25 (59.52%)
	Mesh repair	17 (40.48%)

Table 3: Intraoperative parameters

Mesh	Blood loss	Operative time	Hospital stay
No	60.00 SD 14.142 mL	122.00 SD 10.00 minutes	4.20 SD 0.816 days
Yes	65.29 SD 21.828 mL	134.12 SD 13.257 minutes	5.18 SD 1.286 days
Total	62.14 SD 17.605 mL	126.90 SD 12.781 minutes	4.60 SD 1.127 days

Table 4: Complications

Complications	Mesh		Total
	No	Yes	
Diarrhea	1 (2.4%)	0 (0.0%)	1 (2.4%)
Dysphagia	4 (9.5%)	6 (14.3%)	10 (23.8%)
Gas bloat	4 (9.5%)	6 (14.3%)	10 (23.8%)
Pulmonary complication	1 (2.4%)	2 (4.8%)	3 (7.1%)
Total	10 (23.8%)	14 (33.33%)	24 (57.14%)

In 24 (57.14%) patients, minor, manageable complications were observed in intra- and postoperative follow-up of 2 years. Dysphagia and gas bloat being the most common, and each was observed in 10 (23.8%) patients. Pulmonary complication was observed in three (7.1%) patients owing to the mediastinal dissection. Out of three, pneumothorax was detected in one (2.4%) of the patients, which was managed by putting chest tube and thereafter patient was managed conservatively. Complication profile of the patients is shown in Table 4.

There was no mortality in 30 days postoperatively. This procedure was satisfactory (defined as symptom relief and with no hiatus hernia in postoperative barium meal) in 39 (92.9%) patients. Recurrence occurred in three (7.1%) patients of type III hernia in whom only fundoplication was done without mesh placement. These patients were re explored, and mesh was placed after crural repair. They had an uneventful postoperative period.

DISCUSSION

Laparoscopic surgery provides the advantages of a minimally invasive approach, which consist of shorter hospital stays, faster time of recovery, reduced postoperative pain, and reduced pulmonary complications.^{11,12}

The standard surgical technique include stomach reposition, crural repair, and antireflux procedure. Hernia sac dissection and complete detachment from the mediastinal pleura are mandatory. After doing so, it is possible to return the stomach and GEJ to its usual infradiaphragmatic position in a tension-free manner.¹³ At the completion of hiatal dissection, the intraabdominal esophagus should measure at least 2–3 cm in length to decrease the chance of recurrence. The goals of the surgery as described by Stein and DeMeester should be construction of a short, loose 360-degree fundoplication.¹⁴ In our series, we performed a total of 25 (59.52%) posterior cruroraphies. In the cases of large hiatal defect and friable crura, the crura repair should be reinforced. Some authors suggest routine use of pledgets to lessen the pressure on the suture line.¹⁵ Some authors recommend the use of a synthetic mesh in patients with the hiatal defect larger than 8 cm in cruralseparation.¹⁶ In 17 (40.48%) cases with the hiatal defect larger than 8 cm, we reinforced the primary crural repair with an only application of “U”-shaped synthetic mesh fixed by tacks.¹⁷ Zaman and Lidor have found a decrease in recurrence after laparoscopic paraesophageal

hernia repair and mesh reinforcement, with similar results in both synthetic and biologic mesh.¹⁸ Zhang et al., Huddy et al., and Tam et al. have found a reduced rate of hernia recurrence after mesh reinforcement compared to primary suture repair at short-term follow-up (up to 12 months).^{19–21} Recent studies have indicated that the fundoplication is the necessary step in all hiatal hernia repairs due to the incompetent lower esophageal sphincter and extensive hiatal dissection, which may also potentiate reflux.²⁵

In our series, we performed a total of 37 (88.1%) 360° Nissen floppy fundoplications. In four (9.52%) patients, we performed partial posterior fundoplication according to Toupet. One patient (2.38%) underwent gastropexy. The conversion rate to open procedure was 4.8% (two patients), mainly because of technical difficulties in very obese patients. The average length of hospitalization was 4.6 (SD 1.12 days). The 30-day death rate was zero. Similar results were obtained in other series.^{22,13}

Although chances of recurrence are more with PTFE mesh, but with least adhesions, vice versa holds true for polypropylene mesh. In our study, mixed mesh was used to have least adhesions and recurrences. Our study showed recurrence rate of 7.1%, and all the recurrences occurred in the type III hernia in which mesh was not used similar to the study done by Morino et al. in which the recurrences decreased by using a mixed mesh.²³ In hiatal hernia, Nissen fundoplication is a time-proven procedure with various modifications. In a 1,340 case series, 1,248 (93.1%) patients had satisfactory outcome over a period of 5 years.²⁴ Out of 42 patients in our study, 39 (92.9%) patients had satisfactory results. Multiple studies have reported that complications occur rarely after mesh fixation.²⁵

Dysphagia is the most common complaint in first week after Nissen fundoplication.²⁶ Although resolving spontaneously, endoscopic dilatation is required in patients who had persistent dysphagia over the long term. In a 50 case series, three (6%) patients were operated with repeat laparoscopic surgery for dysphagia.²⁷ Some studies have reported the rate of dysphagia in excess of 13% after mesh placement.²⁸ In the study done by Soricelli et al., the recurrence rate dropped from 1.8% with the tension-free technique to 1.1% with the use of cruroplasty and mesh placement.²⁹ In our technique, U-shaped mesh was used to decrease the dysphagia rate. Our study showed dysphagia in 10 (23.8%) patients (mesh: 6, 14.3%; nonmesh: 4, 9.5%) who were managed conservatively without any surgical intervention for dysphagia.

CONCLUSION

This study concluded that laparoscopic management of hiatus hernia is a feasible and safe option, with a very low morbidity and mortality rate. The patient satisfaction rate was excellent, and postoperative complications were minimum and manageable.

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