Original Research Article

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Study of laparoscopic repair of hiatus hernia

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ABSTRACT

Background: Traditionally, repair of giant PEH has been performed through an open laparotomy or thoracotomy. This population of patients is often elderly, with comorbidities, which has led to concern over surgical referral. With the advent of laparoscopy, giant PEHs are now being approached with minimally invasive techniques. Less invasive procedures may decrease the amount of postoperative pain and the perioperative complication rate and shorten recovery time. Recently, a few series have reported that laparoscopic repair of PEH is technically feasible, effective, and safe. Thus, once paraoesophageal hernia is identified current thinking is that it should be surgically treated regardless of symptoms.

Methods: Prospective study of patients diagnosed with hiatus hernia on endoscopy and barium swallow was conducted from October 2010 to November 2013. All patients with consent were operated with standard laparoscopic Nissens fundoplication and some require crural repair and studied during the course.

Results: 22 cases with haitus hernia type I 8 (36.41%), type II 7 (31.8%) and type III 7 (31.8%), 68.18% having heart burn, 54.55% regurgitation, dysphagia 36.36% and chest pain 31.82% were treated and observed preoperative, intraoperative and postoperative. Most cases 15 (68.18%) were between 61-70 years age group with 13 (59.09%) males and 9 (40.91%) females. 9.9% had asthma, 13.64% DM and 36.36% systemic HT out of 22 cases. Mean blood loss was 29.09 ml, mean operative time was 181.27±8.80 minutes, mean hospital stay was 3.68 days with 4.55% intraoperative complication, 4.55% postop complication rate having mean VAS on post op day 1 was 6.31 and on day 7 it was 0.52.

Keywords: Hiatus hernia, Nissons fundoplication Paraesophageal hernia

INTRODUCTION

All HHS are characterized by a portion if not all of the stomach protruding through an enlarged esophageal hiatus into the chest. HHs are thought to be caused by the combined forces of age, stress (negative intrathoracic pressure and positive intra-abdominal pressure), and degenerative processes on the diaphragm. Although hiatus hernia had been occasionally noted as a congenital anomaly or a consequence of abdominal trauma in the preradiographic literature, the prevalence of this condition was not appreciated until the evolution of imaging technology. With the maturation of imaging

technology, especially barium contrast radiography, it became reasonably easy to detect hiatus hernia antemortem. Akerlund reported that hiatal hernia was found in 2.3% of all upper gastrointestinal x-ray studies. With the improvement of radiographic techniques and a more systematic approach to their detection, more hernias were identified, such that by 1955 the reported incidence was 15%. When provocative maneuvers were employed to accentuate herniation during fluoroscopy, the frequency increased more dramatically; of 955 patients subject to abdominal compression during an upper gastrointestinal x-ray series, hiatus hernia was diagnosed in 55%. Coincident with this evolution in imaging, the

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clinical understanding of reflux disease also evolved. The term reflux esophagitis was introduced in 1946 by Allison, thereby acknowledging that irritant gastric juices were refluxed from the stomach to the esophagus. Since then, there has been considerable controversy regarding the relationship between esophagitis, heartburn, hiatal hernia, and the physiology of the lower esophagus.

Gastroesophageal reflux disease (GERD) affects millions of Americans: up to 11% of the U.S. population reports daily symptoms of heartburn.⁵ One of the common associations Of GERD is the presence of a hiatal hernia. The Incidence of hiatal hernia in the general population is approximately 5 per 1,000, but 95% of these are small, sliding type I hernias that are rarely associated with serious complications.⁶ The remaining 5% can be classified as giant Paraesophageal hernias (PEH) and are associated with significant complications.⁷ Without surgical intervention, giant (PEH) are associated With progression of symptoms in up to 45% of patients.8 In a classic report of nonsurgical observation of a group of minimally symptomatic patients with giant PEH, 26% died of catastrophic complications including torsion, gangrene, perforation, and massive hemorrhage.9 In the subset of patients who develop gastric volvulus, the death rate can be as high as 100%. 10-11 Given the significant complications that can occur, giant PEH should be electively repaired. When repair is performed electively, the death rate is less than 1% to 2% in most series. 10-13

Traditionally, repair of giant PEH has been performed through an open laparotomy or thoracotomy. This population of patients is often elderly, with comorbidities, which has led to concern over surgical referral. With the advent of laparoscopy, giant PEHs are now being approached with minimally invasive techniques. Less invasive procedures may decrease the amount of postoperative pain and the perioperative complication rate and shorten recovery time. Recently, a few series have reported that laparoscopic repair of PEH is technically feasible, effective, and safe. 14-17 Most of these reports did not give the details of the size of the hernia, which can greatly affect the technical difficulty of the repair.

Paraoesophageal hernia represents a potentially catastrophic condition that warrants immediate attention in all affected patients and urgent intervention in symptomatic individuals. Patients deemed to be good surgical risks should be offered surgical correction before complications occur because emergent surgery in the setting of incarceration has a high mortality. However, the choice of operative approach is controversial. Patients with severe comorbidity may benefit from a less invasive technique that focuses on reduction of the hernia and prevention of gastric volvulus. Thus, paraoesophageal hernia is identified current thinking is that it should be surgically treated regardless of symptoms.

METHODS

This Prospective study was conducted at the Department of General Surgery IGGMC, Nagpur. After initial evaluation patients were given options regarding treatment modality. Study was conducted in between October 2010 to November 2013.

Inclusion criteria

All symptomatic and diagnosed patients of Hiatus hernia willing to give consent were studied.

Exclusion criteria

Complicated hiatal hernias and patients unfit for general anaesthesia.

Operative procedure

Laparoscopic Nissen's Fundoplication.

Symptom grading according to scoring systems

Dysphagia was graded on a 5-point symptom scoring scale from 0-4 according to symptom scoring of modified Mellow and Pinkas scale. Regurgitation and heartburn scoring was graded on a 4-point scoring system according to modified symptom scoring of DeMeester.

Esophageal Manometry and 24-hour pH monitoring were not done, because of non-availability of it in our institute.

Preoperative preparation

After establishment of the diagnosis of Hiatus hernia and symptom scoring, the patient was prepared for laparoscopic procedure. An informed written consent was taken. Patients were put on nil by mouth for 6-8 hours before surgery, on liquid diet 48 hours before surgery intravenous fluid supplements and peri-operative antibiotics were administered routinely.

Operative technique

Rapid-sequence anaesthesia was used to minimize risks of aspiration. The surgery included three parts: reduction of hernial content, crural repair and nissens fundoplication.

Patient was put in a semi lithotomy position in steep reverse trendelenburg position approximately 30 degrees. Then after creating pneumoperitoneum a five-port access established.

- 10 mm/12 mm telescope port 3cm to the left and above umbilicus.
- 5 mm port below and to the right of xiphoid process.

- 10mm/12mm port 4 cm to the right and above umbilicus.
- 5 mm port midway between xiphoid and umbilicus to the right of linea alba.
- 5 mm port at the lower edge of the subcostal region.
- A 30-degree scope is placed through the supraumbilical port.
- The left lobe of the liver is retracted up by a blunttipped instrument inserted through the subxiphoid trocar.
- The stomach is retracted caudally through the left anterior axillary port.
- Reduction of hernia is achieved by a "walking" technique using grasping forceps.
- Gastrohepatic ligament divided, and the right crus is identified along with its peritoneal attachment near caudate lobe.
- The left crus identified after lifting gastroesophageal junction.
- Posterior vagus running across the median ligament is preserved.
- Phrenoesophagial ligament opened in anterior aspect and extended circumferentially.
- A retro-esophageal window is created by alternate right and left-handed instrument.
- The lower end of esophagus is mobilized from the mediastinum to obtain 3-5 cm of intraabdominal esophagus.
- Fundus mobilized by dividing short gastric vessels
- Gastrocolic ligament cut to enter in lesser sac.
- The hiatus is reconstructed by approximating with interrupted nonabsorbable sutures starting from the median arcuate ligament, just anterior to the aorta.
- Placement of the all sutures posterior to esophagus might lead to tenting of esophagus. In order to avoid this problem, further narrowing of the hiatus can be done by approximating the crura anterior to esophagus.
- The adequacy of the hiatal opening can be assessed by relaxing the traction on sling. The esophagus just fills the hiatus on release of traction on sling.
- The peritoneum on right crus and subdiaphragmatic fascia should include in the stitches during crural approximation, in order to prevent disruption of the crura.

- Limb adjusted to form complete wrap, fundus is wrapped over the entire circumference of the esophagus in 360 degree and 5 mm blunt instrument is introduced between wrap and esophagus to confirm that it is floppy.
- The wrap is fixed to the crura with non-absorbable suture to prevent migration wrap in mediastinum.

Post-operative care

Patient kept NBM for 1 day. Oral allowed on postoperative day 1. Drain kept if required. Postoperative pain recorded on VAS on postoperative day one and postoperative day seven.

Initially patients were asked to attain OPD weekly for 3-4 weeks. Post OP symptoms grading done after 3 months and 6 months. Follow up upper GI endoscopy done after 3 months and 6 months. Barium swallow done after 3 months.

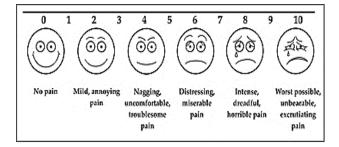


Figure 1: Visual analog scale.

RESULTS

A total of 22 patients of Hiatus Hernia were diagnosed and underwent laparoscopic repair with 8 (36.4%), 7 (31.8%) and 7 (31.8%) patients were of Type I, Type II and Type III Hiatus Hernia respectively. In our study on laparoscopic repair of hiatus hernia it is found that hiatus hernia is more common in males i.e. (59.9%), females were (40.91%) with youngest case included was 28 years and oldest one was 78 years old. The incidence of disease was more common between age group 61- 70 years and lowest between age group 31-40 years.

Table 1: Age ar	ıd gender wise	distribution of	f patients of hiatus hernia.

Age group (years)	Male	Female	Total	Percentage (%)
21-30	0 (0.00%)	1 (4.55%)	1	4.55
31-40	0 (0.00%)	0 (0.00%)	0	0.00
41-50	1 (4.55%)	0 (0.00%)	1	4.55
51-60	0 (0.00%)	2 (9.09%)	2	9.09
61-70	9 (40.91%)	6 (27.27%)	15	68.18
71-80	3 (13.64%)	0 (0.00%)	3	13.64
Total	13 (59.09%)	9 (40.91%)	22	100.00

A significant change in grades of heart burn pre-operative and post-operative was noted. There were 2 (9.10%) and 7 (31.80%) cases in grade 3 and grade 2 heart burn before surgery. Following surgery there were 0% cases in both

grade 2 and 3 after 3 months. After 6 months, there was 1 (4.50%) case in grade 1, all other patients were completely alleviated of their preoperative heart burn.

Table 2: Heart burn grade preoperatively, at 3 months and 6-month post operatively in laparoscopic repaired patients of hiatus hernia.

Duration	Grade 0	Grade 1	Grade 2	Grade 3
Pre-op	7 (31.8%)	6 (27.3%)	7 (31.8%)	2 (9.1%)
3 months	17 (77.3%)	5 (22.7%)	0 (0.00%)	0 (0.00%)
6 months	21 (95.5%)	1 (4.5%)	0 (0.00%)	0 (0.00%)
x2-value	120.00			

p-value: p <0.0001, significant

Regurgitation was seen in 9 (40.9%), 2 (9.1%) and 1 (4.5%) patients in grade 1, grade 2 and grade 3 respectively. After surgery at the end of 3 month 19 (86.4%) had no symptoms of regurgitation and 3 (13.6%) patient had regurgitation of grade 1. At the end of 6 months 22 (100%) patients had no regurgitation.

Table 3: Regurgitation grades preoperatively, at 3 months and 6 months postoperative in laparoscopic repaired patients of hiatus hernia.

Duration	Grade 0	Grade 1	Grade 2	Grade 3
Preop	10 (45.5%)	9 (40.9%)	2 (9.1%)	1 (4.5%)
3 months	19 (86.4%)	3 (13.6%)	0 (0.00%)	0 (0.00%)
6 months	22 (100%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
א2-value	94.87			

p-value: p <0.0001, Significant

Preoperatively 5 (22.7%) patients had grade 2 and 3 (13.6%) patients had grade 1 dysphagia. After 3 months of postoperative there was only 1 patient had grade 1 dysphagia and after 6 months of postoperatively there were 0% patients had dysphagia.

Table 4: Dysphagia grading preoperatively, at 3 months and 6 months of post-operative in laparoscopic repaired patients of hiatus hernia.

Duration	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4
Preop	14 (63.6%)	5 (22.7%)	3 (13.6%)	0 (0%)	0 (0%)
3 months	21 (95.45%)	1 (4.55%)	0 (0%)	0 (0%)	0 (0%)
6 months	22 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
א2-value	68.73				
p-value: p<0.0001, Significant					

In this study on laparoscopic repair of hiatus hernia, mean operative time was 181.27±8.80. Post-operative day 1 pain on VAS mean score was 6.31 and on post op day 7 it was 0.52. There was significant less pain on postoperative day 7 or negligible pain, in laparoscopic surgery. Out of 22 patients who underwent laparoscopic repair of hiatus hernia 1 patient had Intraoperative complication of pneumothorax i.e. 4.55% patients had Intraoperative complication. One patient had recurrence after 3 months, who required redo surgery. 77.27% patients were discharge on postoperative day 3 and

18.18% patients were discharge on postoperative day 4. The mean hospital stay was 3.68 days which was shorter duration as compare to open surgery (thoracotomy or laparotomy approach: 9 to 10 days). On follow up transient dysphagia of grade 3 was noted in 1 case only (4.55%). Patient was able to swallow liquids only, which got relieved in few days. However, patient had dysphagia of grade 1 for more than 3 month which was completely relieved on 6 months follow up. On interrogation, it was found that 15 (68.18%) patients were resume their routine activities in 12 post-operative days, 6 (27.27%) patients

were resume their routine activity in 14 postoperative days and 1 (4.55%) patient who had required ICD insertion resumed his daily routine activity on 18 postoperative day.

DISCUSSION

Dahlberg PS et al studied, 37 patients (23 women, 14 men) between October 1997 and May 2000, underwent laparoscopic repair of a large type II (pure paraoesophageal) or type III (combined sliding and paraoesophageal) hiatal hernia with more than 50% of the stomach herniated into the chest.¹⁸ Median age was 72 years (range 52 to 92 years). Data related to patient demographics, esophageal function, operative techniques, postoperative symptomatology, and complications were analyzed. Laparoscopic hernia repair and Nissen fundoplication was possible in 35 of 37 patients (95.0%). Median hospitalization was 4 days (range 2 to 20 days). Intraoperative complications occurred in 6 patients (16.2%) and included pneumothorax in 3 patients, splenic injury in 2, and crural tear in 1. Early postoperative complications occurred in 5 patients (13.5%) and included esophageal leak in 2, severe bloating in 2, and a small bowel obstruction in 1. Two patients died within 30 days (5.4%), 1 from delayed splenic bleeding and 1 from adult respiratory distress syndrome secondary to a recurrent strangulated hiatal hernia. Follow-up was complete in 31 patients (94.0%) and ranged from 3 to 34 months (median 15 months). Twenty-seven patients (87.1%) were improved. Four patients (12.9%) required early postoperative dilatation. Recurrent paraoesophageal hiatal hernia occurred in 4 patients (12.9%). Functional results were classified as excellent in 17 patients (54.9%), good in 9 (29.0%), fair in 1 (3.2%), and poor in 4 (12.9%). They concluded that laparoscopic repair of large paraoesophageal hiatal hernias is a challenging operation associated with significant morbidity and mortality. More experience, longer follow-up, and further refinement of the operative technique is indicated before it can be recommended as the standard approach.

Andujar JJ, Papasavas PK et al studied cases of Laparoscopic repair of paraesophageal hernia (LRPEH) from 5/1996 to 8/2002. 19 Large paraoesophageal hernia (PEH) was defined by the presence of more than onethird of the stomach in the thoracic cavity. Principles of repair included reduction of the hernia, excision of the sac, approximation of the crura, and fundoplication. Preand postoperative symptoms were evaluated utilizing visual analogue scores (VAS) on a scale ranging from 0 to 10. Patients were followed with VAS and barium esophagram studies. Statistical analysis was performed using two-tailed Student's t-test. They found that total of 166 patients with a mean age of 68 years underwent LRPEH. PEH were type II (n = 43), type III (n = 104), and type IV (n = 19). Mean operative time was 160 min. Fundoplications were Nissen (127), Toupet (23), Dor (1), and Nissen-Collis (1). Fourteen patients underwent a gastropexy. One patient required early reoperation to

repair an esophageal leak. Mean hospital stay was 3.9 days. At 24 months, postoperatively there was statistically significant improvement in the mean symptom scores: heartburn from 6.8 to 0.5, regurgitation from 5.9 to 0.3, dysphagia from 4.0 to 0.5, chest pain from 3.7 to 0.3. Radiographic surveillance was obtained in 120 patients (72%) at a mean of 15 months postoperatively. Six patients (5%) had radiographic evidence of a recurrent paraoesophageal hernia (two required surgery), 24 patients (20%) had a sliding hernia (two required surgery), and four patients (3.3%) had wrap failure (all four-required surgery). Reoperation was required in 10 patients (6%); two for symptomatic recurrent PEH (1.2%), four for recurrent reflux symptoms (2.4%), and four for dysphagia (2.4%). Patients with abnormal postoperative barium esophageal studies who did not require reoperation have remained asymptomatic at a mean follow up of 14 months. They reached to the conclusion that LPEHR is a safe and effective treatment for PEH. Postoperative radiographic abnormalities, such as a small sliding hernia, are often seen. The clinical importance of these findings is questionable, since only a small percentage of patients require reoperation. True PEH recurrences are uncommon and frequently asymptomatic.

Gangopadhyayn and Perrone JM study the impact of age and comorbidities on complications and outcomes of laparoscopic (Lap) paraesophagealhernia (PEH) repair. They collected data prospectively on all patients who underwent Lap PEH repair from January 1995 through June 2005. Pre- and postoperative variables including complications were analyzed. Patients were stratified by age (Group 1, <65 years; Group 2, 65 to 74 years; Group 3, ≥75 years) and American Society of Anesthesiology (ASA) class (1 and 2 versus 3 and 4).

Statistical analysis was performed using 1-way ANOVA, chi-square, and Fisher exact test. In this they study 171 patients underwent Lap PEH repair. Mean patient age was 65±15 years, mean ASA class 2.4±0.5, gender 72% female, and mean operating time 173±49 min. Patients in Grade 3 had a significantly higher ASA class (Grade 1, 2.3±0.6; Grade 2, 2.5±0.5; Grade 3, 2.6±0.5) and longer postoperative length of stay (LOS) compared with Grade 1 (P <0.05). Esophageal lengthening was required in 10.4% of patients in Grade 3 versus 2.6% in Grade 1 and 2.1% in Grade 2 (P = 0.079). Total complication rates were 17.1% in Grade 1, 22.4% in Grade 2, and 27.7% in Grade 3 (P = not significant [NS]). Most complications were minor; grade 2 or higher complications occurred in 10.5% of patients in Grade 1, 8.3% in Grade 2, and 8.5% in Grade 3 (P = NS). There was 1 death (Grade 2) on postoperative day 18 due to a myocardial infarction (mortality rate = 0.6%). Mean follow-up was 25.3 ± 20.6 months. Postoperative symptoms of heartburn and regurgitation were similar between groups as was antisecretory medication use. Anatomic failure of the repair occurred in 23.7% of patients with adequate follow-up: 26.7% in Grade 1, 15.4% in Grade 2, and 27.8% in Grade 3 (P = NS). Reoperation was performed in 1 of 32 (3.1%) failures. They reached on conclusion that lap PEH repair is safe in elderly and properly selected high-risk patients, although complication rates are higher than in younger patients. Most patients have a good symptomatic outcome irrespective of their age, but the anatomic recurrence rates remain a concern for all age groups.

Luketich JD et al did a retrospective review of patients undergoing nonemergency laparoscopic repair of giant paraesophageal hernia, stratified by early versus current era (January 1997-June 2003 and July 2003-June 2008).²¹ Laparoscopic repair of giant paraoesophageal hernia was performed in 662 patients (median age 70 years, range 19-92 years) with a median percentage of herniated stomach of 70% (range 30%-100%). With time, use of Collis gastroplasty decreased (86% to 53%), as did crural mesh reinforcement (17% to 12%). Current era patients were 50% more likely to have a Charlson comorbidity index score greater than 3. Thirty-day mortality was 1.7% (11/662). Mortality and complication rates were stable with time, despite increasing comorbid disease in current era. Postoperative gastroesophageal reflux disease healthrelated quality of life scores was available for 489 patients (30-month median follow-up), with good to excellent results in 90% (438/489). Radiographic recurrence (15.7%) was not associated with symptom recurrence. Reoperation occurred in 3.2% (21/662). They reach to conclusion that perioperative morbidity and mortality remain low, despite increased comorbid disease in the current era. Laparoscopic repair provided excellent patient satisfaction and symptom improvement, even with small radiographic recurrences. Reoperation rates were comparable to the best open series.

CONCLUSION

Hiatal Hernia's incidence is increasing with advances in radiology and the standard Nissens procedure shows excellent results. This study shows that laparoscopy offers a minimally invasive technique; though challenging surgeon's operative skills is usually a safe procedure for the repair of Hiatus Hernia with advantages of panoramic visualization, early recovery and faster return to normal routines. With time and practice expertise for this procedure develops, results improve and complications reduce. So we recommend routine use of this technique.

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institutional ethics committee

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