The initial outcomes of laparoscopic surgery for the hiatal hernia repair: a tertiary center study

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ABSTRACT

Background: The surgical approach to hiatal hernia has changed with the advent of laparoscopic techniques. We sought to evaluate the short-term outcomes of laparoscopic hiatal hernia repair.

Methods: We conducted a cross-sectional study with a retrospective approach of patients receiving laparoscopic hiatal hernia repair from January 2018 to June 2023 at People’s Hospital 115.

Results: In 25 patients included in this study, the male-to-female ratio was 2:1, with a mean age of 46. The types of hiatal hernia included type I (n = 2), III (n = 16), and IV (n = 7). The most common symptoms were epigastric pain (44%), dysphagia (16%), heartburn (25%), vomiting (76%), chest pain (32%), and shortness of breath (20%). Nissen fundoplication was also performed in 19 cases (76%). The median operative time was 130 min, and the median hospital stay was 3 days. No case was converted to open surgery, and minor or major complications occurred in 3 patients (12%).

Conclusion: Laparoscopic repair for hiatal hernia is feasible and safe. The short-term outcomes included early return daily activities, and most patients experienced good to excellent functional and symptomatic results and quality-of-life improvement.

Keywords: hiatal hernia, laparoscopic repair, paraesophageal hernia.


INTRODUCTION

The hiatal hernia or paraesophageal hernia is defined as the protrusion of abdominal structure into the thoracic cavity through the hiatus opening of the diaphragm. The structure of the diaphragm consists of a small opening for the passing of the esophagus before conjunct to the stomach called the gastroesophageal junction. The lower esophageal sphincter (LES) compromised the stomach and pushed into the chest through that opening. This condition can cause the stomach contents and acid to back up into the esophagus, contributing to gastroesophageal reflux disease (GERD). Early in the last century, people attempted to classify the paraesophageal hernia into 4 types following the pathology of hernia. Type I hernia is sliding hernia, which is the most common (greater than 95%); type II hernia is pure paraesophageal hernia; type III hernia is a combination of type I and II hernia with the herniation of both the fundus and gastroesophageal. Type IV hernia refers to any structure other than the stomach herniating through the hiatus (small bowel, colon, omentum, peritoneum, or spleen). The small hernias are usually asymptomatic and can be handled by medicines; meanwhile, the large ones can cause the symptoms and often require surgical repair.

The hiatal hernia is an acquired condition common in an elderly and overweight population. Congenital diaphragmatic hernia and traumatic diaphragmatic hernia are uncommon and only detected when there are complications. The treatment of hiatal hernia is mainly surgical management, formerly open surgery with the long incision following transabdominal or transthoracic approaches (Belsey’s surgical technique proposed in the 1950s). Currently, along with the significant development of laparoscopic surgery, symptomatic hiatal hernias can be managed totally by a laparoscopic approach that is considered a “gold-standard” treatment. Laparoscopic surgery for hiatal hernia repair proved its efficacy and safety with a remarkably lower morbidity rate, shorter hospital stays, and a lower recurrence rate compared to the open approach.

In this paper, we conducted retrospective studies of the initial outcomes in 25 patients who suffered the laparoscopic approach to repair the symptomatic hiatal hernias in People’s Hospital 115 to evaluate the feasibility and safety of this surgery.

METHODS

Materials
This study is a cross-sectional study with a retrospective approach. We used the total population sampling, which included 25 patients diagnosed with hiatal hernias who received transabdominal laparoscopic hernioplasty at People’s Hospital 115, Ho Chi Minh City, Vietnam, between 2018 and 2023. The inclusion criteria: the patients presented with symptomatic hernias (reflux or obstructive symptoms), and they had the desire and agreement for surgical repair. The patients with flaccid diaphragm and acute traumatic diaphragmatic hernias...
requiring emergency surgery, along with general conditions that were surgical contraindications, were excluded.

We performed routine preoperative tests (e.g., clinical examination and standard laboratory tests). Additionally, the patients also underwent gastroesophageal endoscopy and chest and abdominal computed tomography with radiopaque preoperatively. Barium esophagography was rarely conducted. Postoperatively, the patients were comprehensively evaluated and discharged if they had no symptoms with an oral soft diet.

Surgical techniques
The patient's posture was supine, with an elevated head and wide legs. The screen was on the left side towards the patient's head. The surgeon stood between the patient's legs, the assistant surgeon was on the patient's left side, and the camera holder stood on the opposite side of the assistant (Figure 1A). Four to five trocars were used, and the positions of the trocars were illustrated in Figure 1B. The surgeons revealed the surgical field by removing the bowel and suturing, pulling the liver aside, and then evaluating the hernias. Utilizing an ultrasound scalpel to open the gastroplenic omentum and cutting the short gastric artery branches aimed to mobilize the gastric fundus. After that, the esophagus was dissected from the right pillar of the diaphragm, and the esophagus was pulled down to continue dissecting, taking the entire abdominal esophagus to the right position. Carrying out cruroplasty by suturing to recover the esophageal hiatus opening with prolene 1.0 or using V-lock thread without threading, controlling the stitches so that the suture does not narrow the hiatus opening will cause postoperative choking complications (in cases where the diaphragm is weak, we strengthen it with mesh). Performing anti-reflux technique according to Nissen fundoplication.

Data collection and analysis
The recorded variables included age, gender, type of hiatal hernia, symptoms, imaging studies, time of surgery, surgical techniques, and postoperative outcomes: time of passing gas, time of hospital stay, complications, and time of recovery of daily activities. The data were analyzed using IBM-SPSS software version 20.0. The continuous data were presented as mean ± standard deviation or median and range. The qualitative data were described as the frequencies and percentages. Statistical significance was recorded with the value of \( p < 0.05 \).

RESULTS
From January 2018 to June 2023, 25 cases received laparoscopic hernioplasty in our center. The median age was 46 ± 5.6 (21 – 83). The male and female ratio was 2:1 (68% vs. 32%). Regarding the clinical symptoms, the most common symptoms were nausea and vomiting (76%), epigastric pain (44%), and chest pain (32%). In the imaging studies, chest radiograms revealed 13 patients with 4 cases of right-sided air bubbles and 9 with left-sided gastric bubbles. The hernia components were mainly the stomach (100%) and the spleen (24%). We performed gastroscopy in all 25 cases and detected hernia through endoscopic in 19 cases; the rate was 76%. The types of hernia: Type III accounted for...
the highest percentage (64%), followed by 28% type IV hernias (Table 1).

The surgical techniques: 19 patients received cruroplasty (76%) and Nissen fundoplication (76%), and only 6 patients received Collis gastroplasty and synthetic mesh reinforcement (24% for each) (Table 2).

The median surgical time was 130 minutes (80 - 240 minutes). Anti-reflux by Nissen fundoplication in 19 cases (76%) and 6 cases with graft enhancement (24%). The mean time to return bowel movements was 1.9 days (1 day - 3 days). The patient can return to exercise to perform daily activities in 2.4 days (2 - 3 days). The average postoperative hospital stay was 3 days (Table 2).

There were no cases of complications during surgery (0%) and no cases of death after surgery (0%). There were 3 cases with early complications after surgery: prolonged vomiting after surgery (12%), all 3 cases resolved after medical treatment 2 weeks after surgery.

DISCUSSION

In this study, there are more men with hiatal hernias than women. The male/female ratio was 2:1, equivalent to Leeder et al. (2003) and Boushey et al. (2008) (2.5:1 and 1.9:1, respectively). The median age was 46. Hiatal hernias are usually found in people over 40 years old. According to the anatomy, the abdominal esophagus is surrounded by two diaphragm pillars and covered by the peritoneum and diaphragmatic membrane. The diaphragmatic membrane surrounds the abdominal esophagus and secures it to the diaphragm. In elderly patients, especially female patients, the diaphragmatic esophageal membrane is easily weakened due to aging, the esophageal hiatal orifice is widened, and the cardiac tends to herniate into the thorax. The frequency of the disease increases with age. Only 10% of patients diagnosed with hiatal hernia were under 40 years old; meanwhile, 70% of patients were over 70 years old.

Most patients with hiatal hernias have multiple clinical symptoms combined. According to Boushey et al., the most common symptom of hiatal hernia was epigastric pain, with a rate of 56%, followed by swallowing symptoms (40%), heartburn (31%), and vomiting (28%). In our study, the most common symptoms were vomiting and nausea (76%), epigastric pain (44%), chest pain (32%), dyspnea (20%), heartburn (25%), and dysphagia (16%). Digestive symptoms are prominent and overlap with other conditions. In Vietnam, patients with these symptoms often self-treat; only when the conditions worsen with the respiratory symptoms do they arrive at the hospital.

The hiatal hernia was described in 1926 by Akerlund and was categorized into 4 types. Type I accounted for greater than 95% that do not require repair surgery. In our study, type III and IV comprised the majority (64% and 28%, respectively). In 1991, the first case of receiving laparoscopic hiatal repair was reported by Alfred Cuschieri. After that, the laparoscopic approach is safe and gives numerous short-term benefits compared to the traditional open approach. These advantages include a decreased hospital stay, less analgesic required, lower cardiorespiratory complications, short recovery time, good symptom control, and higher quality of life.

The mean surgical time was 130 minutes, depending on several factors, including surgical experience, type of hernia, and surgical technique. In our study, the case with the longest surgical time was 240 minutes. That was our first case; therefore, we did not have much experience, and the second longest time was 205 minutes. It was a very large type IV hernia, so the time spent dissecting the hernia sac was prolonged, and we also conducted Nissen fundoplication. Boushey et al. reported that the mean duration of surgery was 236.6 minutes, and type III hernia was also common.

Regarding laparoscopic techniques, we found that the observation and dissection of the diaphragm were quite clean and favorable compared to open surgery. Morino et al. revealed that the laparoscopic dissection was rather obvious so that it could minimize injuries to other organs. However, laparoscopic suturing for cruroplasty has several difficulties with smooth threads. The multifilament threads were recommended for utilization for laparoscopic sutures. The authors also supposed that these laparoscopic hernia procedures require the surgeon’s experience and high laparoscopic skills. With skillful surgeons, laparoscopic hernioplasty surgery was indicated not only in small hernias but also in large hernias. Among 25 patients in this study, patients who experienced the cruroplasty Nissen fundoplication was 76%, and only 24% received Collis gastroplasty and synthetic mesh reinforcement. Morino et al. found that the cases of using synthetic mesh had a lower recurrence rate than those using autologous tissue, and the cases with Nissen fundoplication had no recurrence (in this report, there was one case of esophageal perforation 3 weeks after surgery).

The anti-reflux procedure reported that the failure rates fluctuated from 25% to 35% because of incorrect construction. A large survey by Frantzides et al. revealed that using mesh for open or laparoscopic hiatal hernia repair increased the biomaterial’s recurrence rate. However, Watson et al. also reported that the recurrence rate when utilizing mesh during long-term follow-up also increased significantly because the
sustainability of the graft could decline over time. Several studies showed that the recurrence rate could peak at 40% with long-term monitoring.\(^1\)

In our study, there were no cases of intraoperative complications. There were no cases of postoperative mortality. There were only 3 cases with minor postoperative complication that was persistent vomiting after surgery, and they were stable after 2 weeks with the medicines. All our patients recovered soon after surgery. The time to return to normal activities was quite early, only 3 days. The average postoperative hospital stay was only 3 days. However, the follow-up process was interrupted, so evaluating the long-term results, especially the recurrence rate after surgery, was impossible. These are the initial results of our laparoscopic hiatal hernia repair. Hopefully, we will have more accurate assessments when the number of patients increases and the follow-up time is longer.

**CONCLUSION**

The laparoscopic approach for treating hiatal hernia was feasible and safe with the short hospital stay, early return to daily activities, and symptom improvements. However, it requires more patients and long-term assessments, especially the recurrence rate.

**AUTHOR CONTRIBUTION**

NQH contributes to providing study concepts and design, defining intellectual content, conducting data acquisition and analysis, editing and reviewing the manuscript and acting as the guarantor of this study. DKT contributes to providing study concepts and design, defining intellectual content, conducting data and statistical analysis, and preparing and reviewing the manuscript. TTH contributes to providing study concepts, defining intellectual content, searching the literature, conducting clinical studies, conducting data acquisition, data analysis and statistical analysis, and preparing and reviewing the manuscript. MDH contributes to defining intellectual content, searching the literature, conducting data acquisition and analysis, preparing, editing, and reviewing the manuscript, and acts as the guarantor of this study.

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**CONFLICT OF INTEREST**

The authors declare no conflict of interest in this work.

**ETHICAL APPROVAL**

This study has been approved by the Ethics Committee of People’s Hospital with the Ethical Clearance Certificate Number 1152769/BVND115-NCKH.

**REFERENCES**