

Outcomes after Laparoscopic Gastropexy as an Alternative for Paraesophageal Hernia Repair

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ABSTRACT

Background: Outcomes after laparoscopic gastropexy (LG), performed as an alternative to formal paraesophageal hernia (PEH) repair in patients with giant PEH, have been rarely studied. This manuscript evaluates complications and long-term quality-of-life after LG.

Methods: An IRB-approved protocol was used to identify patients who underwent LG to alleviate symptoms of acute or chronic gastric obstruction secondary to a paraesophageal hernia. Postoperative outcomes and quality-of-life data were retrospectively collected via chart review and prospectively via phone interview.

Results: Twenty-six patients underwent LG, with a median age of 76 (52 – 91). Median follow-up was 28 (3 to 55) months. Gastropexy was the chosen intervention due to comorbid conditions (23, 88%), gastric inflammation (2, 8%), or intraoperative instability (1, 4%). Nine (35%) suffered postoperative complications, and 2 (8%) required reoperation. At the time of follow-up, 7 (27%) had died, 3 (11%) could not be reached. Sixteen (62%) completed the follow-up survey. Fourteen (88%) reported symptom resolution. Ten (62%) still required antireflux medication. Median Gastroesophageal Reflux Disease-Health Related Quality of Life score was 4.5 (0 to 19). Fourteen (88%) denied current dietary restrictions. All reported satisfaction with the operation.

Conclusion: Laparoscopic PEH repair remains the standard of care for the management of giant PEH. However, a subcategory of patients with high operative risk could be candidates for a shorter operative intervention. As our

data infers, LG is a reasonable alternative in this patient population. While the continued use of antisecretory medications is sometimes required, LG restores the ability to tolerate full meals without restrictions and results in excellent patient satisfaction.

Key Words: Gastropexy, Hiatal Hernia, Paraesophageal Hernia, Outcomes, Quality-of-life.

Introduction

First described in the early 1990s, laparoscopic reduction of paraesophageal hernias (PEH), including crural repair and fundoplication, has become the gold standard in the treatment of this condition.^{1,2} Society of Gastrointestinal and Endoscopic Surgery (SAGES) guidelines recommend repair of all symptomatic PEHs, particularly in the setting of volvulus and/or obstructive symptoms.³ This procedure remains technically challenging and is fraught with complications. It typically lasts several hours, and is almost exclusively performed in high-volume, tertiary referral centers.⁴ Patients with higher operative risk may benefit from a less extensive and more expeditious operative intervention.

Laparoscopic gastropexy (LG), in which the stomach is secured to the anterior abdominal wall to minimize recurrent retraction into the mediastinum, is an accepted alternative procedure for formal PEH repair.⁵⁻⁷ This surgical technique is generally considered in patients who present with poor functional status or multiple comorbidities, as LG can be performed expeditiously and in a minimally invasive fashion.

Long-term outcomes after LG in this relatively rare situation are unknown. Additionally, long-term quality-of-life is rarely evaluated. This study aimed to evaluate outcomes and long-term quality-of-life after LG as a salvage procedure for formal PEH repair.

METHODS

Under an IRB-approved protocol, patients who underwent LG to address a PEH at a tertiary referral center between January 2014 and December 2018 were retrospectively identified. Patient demographics and characteristics were obtained via retrospective chart review. Pre-existing medical conditions, including congestive

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heart failure, coronary artery disease, chronic obstructive pulmonary disease (COPD), dementia, and diabetes mellitus, were gathered. Patient comorbidities were further utilized to retrospectively calculate the Charlson Comorbidity Index (CCI) for each patient. This validated index is a weighted scoring system that combines age and the presence of 19 chronic comorbidities to estimate the overall 10-year mortality.⁸ It provides an objective measure of a patient's baseline clinical condition.

Operative reports for each patient were reviewed to obtain data regarding operative details and intra-operative decision-making. All LGs were performed laparoscopically by a minimally invasive surgeon. To lessen operative time, minimal mediastinal dissection was performed. The abdominal contents were reduced back into the abdominal cavity to the greatest extent possible. Five sutures of 0-Ethibond were used to secure the anterior wall of the stomach along the greater curvature from the midbody of the stomach to the antrum. In addition, two more sutures

were placed on the posterior wall of the cardia of the stomach, along the greater curvature, and anchored to the diaphragm above the spleen to prevent posterior gastric wall herniation into the mediastinum.

Postoperative outcomes were gathered via chart review and phone survey (**Table 1**). Quality-of-life was assessed via phone survey utilizing the Gastroesophageal Health-Related Quality-of-Life questionnaire (GERD-HRQL), which is an 11-question interview that evaluates the effect of GERD symptoms on quality-of-life.⁹ It is scored from 0 (completely asymptomatic) to 50 (incapacitating symptoms). Because many patients with this disease process present with symptoms of gastric outlet obstruction due to volvulus rather than GERD symptoms, patients were also evaluated for symptom improvement, dietary restrictions, ability to tolerate meals, current medication use, and subsequent hospitalizations.

Data were compared using Student's T Test and Fisher's Exact Test, where appropriate. R[®] statistical software was used for calculations.

Table 1.
Gastropexy Follow-up Questionnaire

1. What were your preoperative symptoms?	(Free response)					
2. Have your symptoms improved since the operation?	Not at all	Somewhat	Greatly	Symptoms entirely gone		
3. Are you able to tolerate full meals?	Yes	No				
4. Do you have any dietary restrictions?	Yes	No				
5. Have you been hospitalized since your operation? Why?	Yes	No				
6. Do you take medications for heartburn? What kind?	Yes	No	(Free response)			
7. GERD-HRQL*						
How bad is your heartburn?	0	1	2	3	4	5
Heartburn when lying down?	0	1	2	3	4	5
Heartburn when standing up?	0	1	2	3	4	5
Heartburn after meals?	0	1	2	3	4	5
Does heartburn change your diet?	0	1	2	3	4	5
Does heartburn wake you from sleep?	0	1	2	3	4	5
Do you have difficulty swallowing?	0	1	2	3	4	5
DO you have pain with swallowing?	0	1	2	3	4	5
Do you have bloating or gassy feelings?	0	1	2	3	4	5
If you take medication, does this affect your daily life?	0	1	2	3	4	5
How satisfied are you with your present condition?	Satisfied	Neutral	Dissatisfied			

GERD-HRQL, gastroesophageal reflux disease health-related quality-of-life.

*Scale: 0, No symptoms; 1, Symptoms noticeable but not bothersome; 2, Symptoms noticeable and bothersome, but not every day; 3, Symptoms bothersome every day; 4, Symptoms affect daily activities; 5, Symptoms are incapacitating, unable to do daily activities.

RESULTS

A total of 26 patients underwent LG at our tertiary referral center over the study period of 4 years (Table 2). The majority (65%) were female and of more advanced age (median 75.5 [52 to 83]). All patients were an American Society of Anesthesiology class three (58%) or four (42%). The median preoperative predicted CCI 10-year survival was 53% (0% to 96%). One-fourth of the patients presented with a recurrent paraesophageal hernia.

Indications for surgery included volvulus, chest pain and severe dysphagia. The decision to perform laparoscopic gastropexy was at the discretion of the surgeon. The most common reason was the presence of significant patient comorbidities that severely limited functional status and the likelihood of recovery after an extensive operation, including significant cardiac pathology, COPD, diabetes mellitus, and/or dementia (88%). Other reasons included extensive crural inflammation compromising suture placement (8%) and intra-operative patient instability (4%). Anterior crural re-approximation was achieved in 15% of the cohort, in patients who had a type II PEH. Relaxing incisions on the diaphragm to facilitate crural apposition were not attempted, in order to minimize operative time.

Median follow-up was 28 (3 to 55) months (Table 3). Postoperative complications occurred in 35% of patients and included pneumothorax, postoperative anemia requiring transfusion, urinary tract infection, pneumonia, and inability to wean nasal cannula. Two patients (8%) required re-operation after initial discharge, one for a recurrent volvulus and one for an ischemic gastric perforation.

At follow-up, 7 (27%) patients were deceased. Causes of death included pulmonary fibrosis, congestive heart failure, and recurrent pneumothorax leading to withdrawal of care in 1 patient, with the remaining causes of death unknown. Three (11%) patients were lost to follow-up. Sixteen (62%) patients completed follow-up interview. Median GERD-HRQL score was 40.5 (0 to 19). Most (62%) patients reported continued use of an antacid medication. All reported at least some improvement in symptoms, with 88% reporting major improvement or complete resolution. Most patients (88%) reported no dietary restrictions. All reported satisfaction with their present health condition.

DISCUSSION

Laparoscopic gastropexy is considered a salvage procedure when formal PEH repair cannot safely be performed.

	Median (Range), n (%)
n	26
Gender	
Male	9 (35%)
Female	17 (65%)
Age	76 (52 – 91)
BMI	29 (19 – 40)
ASA classification	
III	15 (58%)
IV	11 (42%)
CHF/CAD	11 (42%)
COPD	21 (81%)
Diabetes mellitus	6 (23%)
Dementia	9 (35%)
CCI (predicted 10-year survival)	53% (0% – 96%)
Reason for gastropexy	
Comorbidities	23 (88%)
Gastric inflammation	2 (8%)
Intraoperative instability	1 (4%)
Crural re-approximation achieved	4 (15%)

ASA, American Society of Anesthesiology; CHF, congestive heart failure; CAD, coronary artery disease; COPD, chronic obstructive pulmonary disease; CCI, Charlson Comorbidity Index.

This study evaluates long-term outcomes after LG in this setting, with a median follow-up of greater than 2 years. The findings suggest that pre-operative symptoms are almost always resolved at long-term follow-up. Most patients can tolerate full meals without restrictions and report excellent satisfaction. Patients do report continued use of antisecretory medications. This is an expected finding, given the persistent dissociation of the lower esophageal sphincter and the diaphragmatic crura, which is a major component of esophagogastric junction pressure.¹⁰

Guidelines recommend repair of symptomatic PEH.³ Symptoms may be chronic in nature, relating to gastroesophageal reflux and/or obstruction, or they may be acute (occurring within a 48-hour period), relating to volvulus, bleeding, strangulation, or perforation. Typical chronic symptoms include intermittent chest pain, epigastric discomfort, early satiety and abdominal fullness following meals, shortness of breath, nausea, vomiting, dysphagia, and anemia. Typical acute symptoms including

Table 3.
Patient Outcomes

	Median (Range), n (%)
Follow-up length (months)	28 (3 – 55)
Postoperative complications	9 (35%)
Pneumothorax	1 (4%)
Required transfusion	1 (4%)
Urinary tract infection	3 (12%)
Pneumonia	2 (8%)
Pulmonary embolism	1 (4%)
Inability to wean nasal cannula	3 (12%)
Required reoperation	2 (8%)
For volvulus	1 (50%)
For ischemic gastric perforation	1 (50%)
Patient status	
Completed follow-up interview	16 (62%)
Deceased	7 (27%)
Lost to follow-up	3 (11%)
Time from operation to death (months)	14 (3 – 35)
Cause of death	
Recurrent pneumothorax	1 (14%)
Pulmonary fibrosis	1 (14%)
Congestive heart failure exacerbation	1 (14%)
Unknown	4 (58%)
Interview responses (n = 16)	
GERD-HRQL score	4.5 (0 – 19)
Requiring medication	
None	6 (38%)
H2 blocker	1 (6%)
Proton pump inhibitor	9 (56%)
Self-reported symptom improvement	
No improvement	0 (0%)
Somewhat improved	2 (12%)
Major improvement/complete resolution	14 (88%)
Dietary habits	
Dietary restrictions due to symptoms	2 (12%)
No dietary restrictions	14 (88%)

Table 3.
Continued

	Median (Range), n (%)
Satisfaction with present condition	
Satisfied	16 (100%)
Neutral	0 (0%)
Dissatisfied	0 (0%)
GERD-HRQL, gastroesophageal reflux disease health-related quality-of-life.	

vomiting or retching, sharp chest pain, and respiratory distress.^{6, 11}

The standard surgical technique utilized in formal PEH repair includes circumferential hiatal dissection with hernia sac excision. Subsequent mobilization of the esophagus and reduction into the abdominal cavity returns the gastroesophageal junction (GEJ) to its correct anatomic position. Coupled with crural repair, this recreates the native anatomy of the distal esophagus. An antireflux procedure in the form of a complete or partial fundoplication is usually included.¹¹ Operative time is often several hours, and formal repair is increasingly exclusive to urban settings with minimally invasive foregut surgeons.⁴

In contrast, there is no standardized method of gastric fixation to the abdominal wall when performing a LG. Our technique involves laparoscopic suture fixation of both the anterior and posterior greater curvature to the abdominal wall at multiple points. Other suggested methods include laparoscopic distal antral suture gastropexy, percutaneous gastrostomy tube fixation, or a combination of the two.¹²⁻¹⁵ A single point of fixation, as in placement of a gastrostomy tube, is insufficient, given the anatomy of the stomach and the nature of herniation into the mediastinum. We advocate multiple points of fixation to address this risk.

When the operative time of formal PEH repair has a higher likelihood of resulting in significant morbidity or mortality, LG is a viable alternative.^{6, 16} A limited number of prior studies evaluate long-term results after LG in this setting. Yates, et al. evaluated outcomes after three months in the setting of LG performed in high operative risk patients with gastric volvulus.⁷ This retrospective study evaluated eleven patients and found all to be free of obstructive symptoms caused by gastric volvulus at follow-up. A large, prospective, multicenter study by Daigle, et al. evaluated patients after laparoscopic anterior gastropexy for repair of PEH.¹⁷ While they reported a recurrence

rate of 17%, 70% of their 101 patients reported being free of reflux symptoms at a mean of 100.8 months follow-up. While these studies assess symptom improvement after LG, the follow-up intervals are short. Additionally, they do not assess quality-of-life outcomes.

Because pre-operative GERD-HQRL was lacking in our cohort, we compared outcome measures from similar studies addressing formal repair of giant PEH. Stringham, et al. evaluated quality-of-life outcomes utilizing the GERD-HRQL in patients who underwent formal PEH repair in the setting of giant PEH.¹⁸ Median GERD-HRQL score was seven at 1-year follow-up and patient satisfaction rate was 71%. Similarly, Louie, et al. reported a mean GERD-HRQL score of four at a mean follow-up of 10.3 years in patients over age 70 undergoing formal PEH repair.¹⁹ The similarity of these results to those found in this study suggest that performing LG for large PEH results in outcomes that are comparable to those after formal repair.

In our patient population, greater than one-third suffered a postoperative complication and nearly one-fourth were deceased at 2-year follow-up. This underscores the high-risk nature of operating on this patient population and reinforces our belief that performing a gastropexy in these patients, rather than an extensive formal PEH repair, is prudent. However, for patients who do survive beyond the short-term, our study indicates that they can expect good quality-of-life that is comparable to patients undergoing formal repair. This method of intervention can be particularly useful for general surgeons with limited experience in advanced foregut laparoscopy, who are likely to encounter these patients in the acute setting.

This study should be interpreted in light of several limitations. It is inherently limited by its partially retrospective design, as well as its small population size and even smaller response rate of only 62%. While this potentially limits broad generalization of our findings, a substantial population size is difficult to achieve in the study of this procedure, as its necessity is somewhat rare (a total of 158 formal PEH repairs were successfully performed at our institution over the same time period). Additionally, the fact that one quarter of the patient population was deceased at the time of follow-up reinforces the wisdom of performing a LG, in lieu of a formal PEH repair, in this particularly comorbid patient population. An additional limiting factor is that pre-operative GERD-HRQL scores are not available for comparison, which limits our ability to evaluate the change in quality-of-life conferred by the operation. Utilizing comparative studies that evaluate GERD-HRQL scores after formal PEH repair mitigate this limitation.

CONCLUSION

Formal repair of paraesophageal hernias with an antireflux procedure is not always feasible when patients present with extensive comorbidities or with prohibitive anatomy. Laparoscopic gastropexy results in good long-term quality-of-life, making it a reasonable alternative for patients not amenable to formal repair. Larger studies are needed to confirm these findings.

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