

Emergent Paraesophageal Hernia Repair: Comparative Outcomes of Minimally Invasive and Open Approaches in a Propensity Score Matched ACS-NSQIP Cohort

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Introduction

Paraesophageal hernias (PEH) represent approximately 5–10% of all hiatal hernias and may lead to serious complications including gastric volvulus, obstruction, strangulation, or ischemia when presenting emergently. Compared with elective repair, emergent PEH operations are associated with significantly higher morbidity and mortality due to delayed presentation, physiologic instability, and increased operative complexity.

Minimally invasive surgery (MIS) has become the preferred approach for elective PEH repair because multiple studies have demonstrated decreased postoperative morbidity, shorter length of stay, and improved recovery compared with open surgery. However, evidence evaluating MIS approaches in the emergent setting remains limited, and the comparative outcomes of laparoscopic versus robotic techniques for emergent PEH repair have not been well defined.

Objective

To compare perioperative outcomes of minimally invasive and open approaches for emergent paraesophageal hernia repair and to evaluate differences between laparoscopic and robotic techniques using a national surgical quality database.

Methods

Data Source: Data were obtained from the ACS-NSQIP Participant Use File (PUF) for 2022–2023, the first datasets specifying minimally invasive approach as laparoscopic or robotic. Paraesophageal hernia (PEH) repairs were identified using CPT codes 43281 and 43282. Relevant demographic, perioperative, and 30-day postoperative variables were extracted.

Study Population: Adult patients aged 18–90 years undergoing emergent paraesophageal hernia repair were included. Patients with missing robotic use, conversion to open data, or perioperative variables were excluded, as were those undergoing concomitant procedures.

Study Design: This retrospective cohort study compared operative approaches for emergent PEH repair. Patients were stratified into minimally invasive surgery (MIS) and open repair, with MIS further classified as laparoscopic or robotic-assisted. To reduce confounding, 1:1 propensity score matching was performed using covariates including age, sex, BMI, ASA class, functional status, diabetes, hypertension, chronic heart failure, bleeding disorders, smoking status, COPD, ventilator dependence, steroid use, preoperative RBC transfusion, and mesh utilization.

Outcomes: The primary outcome was 30-day major morbidity. Secondary outcomes included operative time, hospital length of stay (LOS), postoperative sepsis, RBC transfusion within 72 hours, superficial surgical site infection, readmission, and return to the operating room.

Results

A total of 513 emergent paraesophageal hernia repairs were identified. MIS was performed in 434 cases (85%) and open repair in 79 (15%). Among MIS cases, 289 (67%) were laparoscopic and 145 (33%) robotic-assisted.

After 1:1 propensity matching, 77 MIS cases were matched with 77 open repairs, and 139 laparoscopic cases with 139 robotic cases.

Compared with open repair, MIS was associated with shorter median LOS (5 vs 6 days; $p = 0.035$) with no differences in sepsis, SSI, readmission, or return to OR. Compared with laparoscopy, robotic repair had longer operative time (166 vs 133 min; $p < 0.001$) but lower transfusion (0% vs 5%; $p = 0.014$) and sepsis rates (0% vs 5%; $p = 0.014$), with no differences in LOS, SSI, readmission, or return to OR.

Table 1. Perioperative Outcomes Following Emergent PEH Repair

	MIS (N=77)	Open (N=77)	p-value	Lap (N=139)	Robotic (N=139)	p-value
Operative Time, Median (IQR)	132	119	0.34	133	166	<0.001
LOS	5 (3 – 9)	6 (5 – 9)	0.035	5 (3 – 9)	5 (2 – 7)	0.48
RBC Transfusion within 72 Hours of Surgery Start, % (n)	2.6% (2)	6.5% (5)	0.44	5.0% (7)	0% (0)	0.014
Sepsis, % (n)	2.6% (2)	2.6% (2)	>0.99	5.0% (7)	0% (0)	0.014
Superficial Surgical Site Infection, % (n)	1.3% (1)	5.2% (4)	0.37	1.4% (2)	0% (0)	0.50
Readmission, % (n)	7.8% (6)	9.1% (7)	0.77	7.9% (11)	7.9% (11)	>0.99
Return to OR, % (n)	5.2% (4)	1.3% (1)	0.37	4.3% (6)	3.6% (5)	0.76

Abbreviations: MIS = minimally invasive surgery; LOS = length of stay; RBC = red blood cell; OR = operating room.

Key Findings

- MIS was associated with shorter hospital length of stay compared with open repair (5 vs 6 days; $p = 0.035$).
- No differences in postoperative sepsis, SSI, readmission, or return to OR between MIS and open repair.
- Robotic repair had longer operative time than laparoscopic repair (166 vs 133 min; $p < 0.001$).
- Robotic repair demonstrated lower transfusion and sepsis rates (0% vs 5%; $p = 0.014$).

Discussion

Minimally invasive techniques are the preferred approach for elective paraesophageal hernia repair due to improved recovery and lower morbidity compared with open surgery. In this national cohort analysis, minimally invasive repair for emergent PEH was associated with a shorter hospital length of stay compared with open repair while demonstrating similar rates of postoperative complications, including sepsis, surgical site infection, readmission, and return to the operating room. These findings support the feasibility of minimally invasive approaches even in emergent presentations.

Within the minimally invasive cohort, robotic repair demonstrated longer operative time but lower rates of transfusion and sepsis compared with laparoscopic repair. The enhanced visualization and instrument articulation provided by robotic platforms may facilitate safer mediastinal dissection and hiatal reconstruction in complex cases. Together, these findings suggest that minimally invasive approaches, including robotic techniques, may provide safe and effective management of emergent paraesophageal hernia repair.

Conclusions

Minimally invasive repair was associated with shorter hospital length of stay compared with open surgery for emergent PEH repair, while demonstrating similar rates of postoperative complications, including sepsis, surgical site infection, readmission, and return to the operating room. Within minimally invasive approaches, robotic-assisted repair demonstrated longer operative time but lower rates of postoperative transfusion and sepsis compared with laparoscopic repair. These findings suggest that MIS approaches, including robotic techniques, can be safely applied in the emergent setting while maintaining favorable perioperative outcomes. When feasible, minimally invasive repair should be considered for the management of emergent paraesophageal hernias.

References:

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