Fundoplication vs. Gastric Fixation for the Management of Emergency Hiatal Hernia Repairs: A Retrospective Cohort Study

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INTRODUCTION

- Hiatal hernias are a common occurrence in the Western world, occurring when contents from the abdominal cavity protrude through the esophageal hiatus in the diaphragm[1].
- Surgical intervention is employed for emergent cases of hiatal hernias when deemed necessary. Repair procedures typically involve reducing the hernia and repairing the hiatal defect[2].
- To diminish the likelihood of recurrence, stabilize the gastroesophageal junction, and alleviate symptoms, additional surgical measures are often employed[3].
- The choice between a hiatal hernia repair with fundoplication or simply gastric fixation to the anterior abdominal wall remains a topic of debate.

OBJECTIVE

- Our primary study objective was to compare the 30-day complication rate between fundoplication and gastric fixation following hiatal hernia repair in the emergency setting.
- Our secondary objective was to evaluate the 30-day readmission, reoperation and mortality rates.

METHODS

- A retrospective cohort study using the National Surgery Quality Improvement Program (NSQIP) database from 2011-2021 was conducted[4].
- The study population was determined using ICD9/10 codes describing diaphragmatic hernia without obstruction or gangrene, with obstruction, and with gangrene.
- Elective cases were excluded.
- CPT codes were used to group fundoplication procedures and gastric fixation procedures.
- The primary outcome was the 30-day complication rate. Secondary outcomes included 30-day readmission, reoperation and mortality rates.
- A multivariable logistic regression analysis was used to adjust for clinically relevant confounding variables

RESULTS

Table 1 Baseline patient characteristics

Characteristic	Fundoplication (n = 971)	Gastric Fixation (n = 346)	p-value
Demographics			
Male sex	357 (36.77)	119 (34.39)	0.430
BMI > 30	310 (31.93)	100 (28.90)	0.297
Smoker	86 (8.86)	19 (5.49)	0.047*
Non-independent functional status	68 (7.00)	51 (14.73)	<0.001*
Comorbidities			
ASA > 3	700 (72.09)	299 (86.67)	<0.001*
Congestive heart failure	20 (2.06)	10 (2.89)	0.374
Diabetes	35 (3.60)	13 (3.76)	0.897
Hypertension	521 (53.66)	236 (68.21)	<0.001*
Steroid use	59 (6.08)	22 (6.36)	0.851
Chronic obstructive pulmonary disease	60 (6.18)	31 (8.96)	0.080
Bleeding disorder	81 (8.34)	37 (10.69)	0.189
Disseminated cancer	12 (1.24)	2 (0.58)	0.306
Ascites	1 (0.10)	0 (0.00)	0.550

*Significance based on *p*-value <0.05. *BMI* Body Mass Index. *ASA* American Society of Anesthesiologists.

Table 2 Summary of outcomes

30-day Outcomes	Fundoplication (n = 971)	Gastric Fixation (n = 346)	p-value
Morbidity (≥1 complications)	203 (20.91)	125 (36.13)	<0.001*
Morbidity (≥2 complications)	81 (8.34)	72 (20.81)	<0.001*
Superficial Incisional SSI	12 (1.24)	13 (3.76)	0.003*
Deep Incisional SSI	1 (0.10)	3 (0.87)	0.027*
Organ space SSI	33 (3.40)	18 (5.20)	0.135
Pneumonia	62 (6.39)	57 (16.47)	<0.001*
Unplanned reintubation	33 (3.40)	21 (6.07)	0.0315*
Pulmonary embolism	12 (1.24)	6 (1.73)	0.493
Postoperative dialysis	10 (1.03)	7 (2.02)	0.160
Cerebrovascular accident	1 (0.10)	3 (0.87)	0.027*
Cardiac arrest requiring CPR	9 (0.93)	11 (3.18)	0.003*
Myocardial infarction	14 (1.44)	3 (0.87)	0.416
Deep vein thrombosis	14 (1.44)	7 (2.02)	0.458
Sepsis	32 (3.30)	23 (6.65)	0.007*
Septic shock	34 (3.50)	36 (10.40)	<0.001*
Urinary Tract Infection	20 (2.06)	20 (5.78)	0.001*
Readmission	105 (10.91)	45 (10.91)	0.287
Reoperation	67 (6.90)	37 (10.69)	0.025*
Mortality	37 (3.81)	27 (7.80)	0.003*

*Significance based on *p*-value <0.05. *CPR* Cardiopulmonary resuscitation. *SSI* Surgical site infection.

- The number of patients who underwent fundoplication and gastric fixation were 971 (74%) and 346 (26%), respectively.
- Comparison of preoperative characteristics revealed statistically significant differences between the two groups (Table 1).
- When comparing study outcomes within 30 days, 203 (20.91%) and 125 (36.13%) patients who had undergone fundoplication and gastric fixation, respectively, had >1 serious complication (p <0.001). 81 (8.3%) and 72 (20.81%) patients had >2 serious complications within these groups (p <0.001).
- The 30-day readmission rate was comparable between the two groups (p 0.287). However, there was a statistically significant difference between the two groups with respect to reoperation (p 0.025) and mortality (p 0.003) (Table 2).
- When comparing the cohorts following adjusted analysis, fundoplication was significantly associated with a 47% decrease in odds of 30-day complications (OR 0.53, p<0.001 95% CI 0.40-0.71) and 45% decrease in odds of 30-day mortality (OR 0.55, p=0.033 95% CI 0.32-0.95).
- However, there was no significant difference with respect to 30-day readmission (OR 0.86, p=0.449 95% CI 0.59-1.27) and reoperation (OR 0.66, p=0.063 95% CI 0.42-1.02) (Table 3).

Table 3 Multivariable regression analysis of 30-day outcomes.

30-day Outcomes	Adjusted OR	95% CI	p-value
Serious complications	0.532	0.401-0.706	<0.001*
Readmission	0.861	0.585-1.268	0.449
Reoperation	0.656	0.421-1.023	0.063
Mortality	0.553	0.321-0.953	0.033*

*Significance based on *p*-value <0.05. *OR* Odds ratio, *CI* Confidence Interval.

DISCUSSION

- Our study findings show that fundoplication following hiatal hernia repair in the emergency setting has a lower 30-day complications rate compared to gastric fixation procedures.
- The decreased morbidity following a fundoplication procedure was also demonstrated following adjustment for relevant characteristics.
- It is possible that gastric fixation is commonly done during more complex, emergent presentations of hiatal hernias as it is a technically easier operation.
- This may result in worse outcomes as the patient may be presenting in extremis.
- It is also possible that gastric fixation procedures were more likely performed by surgeons not trained in advanced foregut surgery. Some guidelines suggest performing gastric fixation procedures as a way of damage control or as a salvage procedure in these situations.
- However, our results show that there can still be complications associated with it and even if people regard it as a conservative option, it may still result in complications.

LIMITATIONS

- The analysis did not incorporate the surgeon's level of experience and expertise, variables that can significantly influence the choice of procedure and subsequent outcomes.
- The NSQIP database did not capture all pertinent patient-specific variables, such as hernia size, potentially introducing confounding factors. Although we attempted to address this by incorporating all available variables into a regression analysis, the possibility of unaccounted confounders persists.
- Moreover, the temporal scope of the NSQIP database is limited to short-term 30-day outcomes, leaving the post-30-day return of symptoms and complications unknown.

CONCLUSION

- Patients with hiatal hernias that underwent emergent repair with hiatal hernia repair with fundoplication had a significantly lower 30-day complication and mortality rates compared to those who underwent gastric fixation procedures only.
- Hiatal hernia repair with fundoplication appears to be a safe and feasible approach to manage hiatal hernias in the emergency setting.

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