Thirty-Day Outcomes of Paraesophageal Hernia Repair Using the NSQIP Database: Should Laparoscopy Be the Standard of Care?

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BACKGROUND: Although surgical repair is universally recognized as the gold standard for treatment of paraesophageal hernia (PEH), the optimal surgical approach is still the subject of debate. To determine which surgical technique is safest, we compared the outcomes of laparoscopic (lap), open transabdominal (TA), and open transthoracic (TT) PEH repair using the NSQIP database.

STUDY DESIGN: From 2005 to 2011, we identified 8,186 patients who underwent a PEH repair (78.4% lap, 19.2% TA, 2.4% TT). Primary outcome measured was 30-day mortality. Secondary outcomes included hospital length of stay, and NSQIP-measured postoperative complications. Multivariable analyses were performed to compare the odds of each outcome across procedure type (lap, TA, and TT) while adjusting for other factors.

RESULTS: Transabdominal patients had the highest 30-day mortality rate (2.6%), compared with 0.5% in the lap patients ($p < 0.001$) and 1.5% in TT patients. Mean length of stay was statistically significantly longer for TA and TT patients (7.8 days and 6.5 days, respectively) compared with lap patients (3.3 days). After adjusting for age, American Society of Anesthesiologists score, emergency cases, functional status, and steroid use, TA patients were nearly 3 times as likely as lap patients to experience 30-day mortality (odds ratio [OR], 2.97; 95% CI, 1.69 to 5.20; $p < 0.001$). Moreover, TA and TT patients had significantly increased odds of overall (OR 2.12; 95% CI 1.79 to 2.51; $p < 0.001$; OR 2.73; 95% CI 1.88 to 3.96; $p < 0.001$; respectively) and serious morbidity (OR 1.90; 95% CI 1.53 to 2.37, $p < 0.001$; OR 2.49; 95% CI 1.54 to 4.00; $p < 0.001$; respectively).

CONCLUSIONS: In the absence of published data indicating improved long-term outcomes after open TA or TT approach, our findings support the use of laparoscopy, whenever technically feasible, because it yields improved short-term outcomes. (J Am Coll Surg 2014;219:229–236. © 2014 by the American College of Surgeons)

Hiatal hernias are one of the most common benign conditions of the foregut and affect mostly late-middle–aged and older individuals. Estimates of the prevalence of hiatal hernias in the population range from 10% to 50%, and, given the progressive aging of the American population, these numbers can be expected to increase in the future.[1] Paraesophageal hernias (PEH) represent a subtype of this disease and account for 5% of all hiatal hernias.[2] The clinical presentation of affected patients is heterogeneous; symptoms can be nonspecific, leading to misinterpretation or poor recognition of the disease, and some patients can be nearly or completely asymptomatic.[3,4] When symptoms are present, patients typically present with gastroesophageal reflux disease or intermittent obstructive complaints (early satiety, bloating, chest pain, dysphagia). Less frequently, patients present with nonobstructive manifestations of the disease (anemia due to chronic blood loss from the inflamed mucosa within the herniated stomach, or shortness of breath caused by lung or heart compression).[5,6] Although the natural history of PEH is generally

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Abbreviations and Acronyms

ACS = American College of Surgeons
ASA = American Society of Anesthesiologists
Lap = laparoscopic
NIS = Nationwide Inpatient Sample
OR = odds ratio
PEH = paraesophageal hernia
TA = (open) transabdominal
TT = (open) transthoracic

benign, it is worth noting that PEH can occasionally result in potentially life-threatening complications such as acute gastric obstruction and ischemia/necrosis.[7]

Although the role of medical therapy is well established for managing symptoms, surgical repair continues to be the only definitive treatment for PEH. In the past, the presence of a large hernia defect was considered, in and of itself, to be an indication for surgical repair; however, a recent analytic decision model demonstrated that the risk of developing acute symptoms requiring emergency surgery decreases significantly with patient age.[8] This evidence has led to adoption of a more conservative strategy in elderly and asymptomatic patients, reserving surgical treatment mainly for symptomatic hernias.[9]

Accepted surgical approaches to PEH repair include thoracotomy, laparotomy, and more recently, laparoscopy. Although each approach has its particular advantages, there have, as yet, been no randomized controlled trials to demonstrate superiority of one technique over the others. Consequently, the choice of the approach still depends largely on individual surgeon's preference and skills. Introduced in 1992, laparoscopic PEH repair has gained increasing popularity, in large measure due to such benefits as quick recovery, short length of stay, and low mortality, morbidity, and postoperative pain.[10,11]

In this study, we performed a retrospective analysis using the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database to compare short-term outcomes after PEH repair by the different surgical approaches. In the absence of randomized controlled trials, the use of a large surgery-oriented dataset provides a valuable overview of the outcomes of different surgical approaches; this study attempts to assess if surgical technique affects the short-term outcomes of PEH repair.

METHODS

Data

This retrospective study was performed using the ACS NSQIP database from 2005 to 2011. The NSQIP is a nationally validated, risk adjusted, outcomes-based program, and it is used to measure and improve the quality of surgical care. This program uses a prospective systematic data collection on 135 preoperative and intraoperative variables, as well as 30-day postoperative morbidity and mortality. Details of ACS NSQIP are described elsewhere.[12,13] This study protocol was granted exempt status by the institutional review board of the Johns Hopkins University School of Medicine.

Study population

The study population was limited to adults 18 years of age or older who underwent a surgical procedure for PEH repair between January 2005 and December 2011. In order to minimize inclusion of patients with simple sliding hiatal hernias, when we generated our initial cohort, we included only patients with a primary diagnosis of PEH (ICD-9 code of 553.3 or 552.3) in addition to having a primary Current Procedural Terminology (CPT) code indicating PEH repair. Three treatment groups were identified based on surgical approach. The first group included patients who underwent a laparoscopic PEH repair. The specific codes for laparoscopic PEH repair with and without mesh (43281 and 43282) were introduced in 2010; before this, patients were identified using CPT codes of 43280, 43281, or 43282. The second group underwent an open transabdominal (TA) PEH repair, identified by CPT codes 39502, 39599, 43324, 43332, or 43333. The third group consisted of patients who underwent a transthoracic (TT) PEH repair, defined by CPT codes of 39520, 43334, 43335, 43336, or 43337. We reviewed our initial TA group (n = 1,923) by manually performing a detailed examination of individual patient records. Patients were then reassigned to the laparoscopic (lap) group based on the presence of accessory CPT codes indicating a concurrent laparoscopic procedure (43280, 43289, 43653, 43659, 44180, 47562, 47563, 49329, 49320, or 49659) (Table 1).[14] As a result, 352 patients were reassigned to the lap group. Patients were then further stratified into 2 groups; laparoscopic vs open TA and laparoscopic vs open TT treatments for comparison.

Patient baseline demographics and clinical characteristics were compared. Patient demographics included age, sex, and race (white, black, or other). Clinical characteristics consisted of body mass index (BMI) (underweight/normal, overweight, and obese), American Society of Anesthesiologists (ASA) classification of patient physical condition, functional health status before surgery (independent, or partially/totally dependent), and preoperative comorbidities such as diabetes mellitus (with oral agents or insulin), smoking status (within 1 year before the operation), alcohol consumption (of more than 2 drinks per day), dyspnea, hypertension requiring medication, steroid