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Incidence, reasons, and risk factors for readmission after surgery for benign distal esophageal disease

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Background. Our aim was to ascertain the incidence of, reasons for, and risk factors associated with hospital readmission after an operation for benign distal esophageal disease.

Methods. Using the American College of Surgeons National Surgical Quality Improvement Program database (2012–2014), patients with a primary diagnosis of gastroesophageal reflux disease, paraesophageal hiatal hernia, or achalasia who underwent fundoplication, paraesophageal hernia repair, or Heller myotomy were identified. The primary outcome was hospital readmission. Multivariable logistic regression analysis was used to identify risk factors associated with hospital readmission.

Results. Of the 14,478 patients included in this study, 801 (5.5%) were readmitted at a median of 11 days (interquartile range 6–17) postprocedure. Intolerance of oral intake (21.8%), respiratory complications (11.6%), abdominal pain (6.0%), and venous thromboembolic events (4.7%) were some of the most common reasons for readmission. Open operative approach (odds ratio 1.34, 95% confidence interval 1.05–1.71), chronic steroid use (odds ratio 1.48, 95% confidence interval 1.10–2.00), emergency admission (odds ratio 1.50, 95% confidence interval 1.01–2.21), and predischarge complication (odds ratio 1.91, 95% confidence interval 1.42–2.59) were associated most strongly with hospital readmission.

Conclusion. Implementing standardized perioperative strategies, such as nutritional counseling, early ambulation, intensive pulmonary toilet, and deep vein thrombosis prophylaxis, may help decrease the number of preventable readmissions and enhance the overall quality of care in this patient population. (Surgery 2016;160:599-606.)

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IN THE UNITED STATES, gastroesophageal reflux disease affects approximately 20% of the population and can require operative intervention when secondary to hiatal hernia, refractory to medical management, or when diagnosed in patients who do not wish to be on an indefinite duration of medical therapy, or who are noncompliant with medications.^{1,2} Paraesophageal hernias (PEH) are less common, accounting for 5% of all hiatal hernias, but they can require surgery in symptomatic cases, when quality of life is affected, or less frequently when patients develop potentially life-threatening complications, including gastric obstruction and necrosis.³ As

both gastroesophageal reflux disease and PEH affect primarily middle-aged and elderly patients, the prevalence of these conditions is expected to increase with our aging population and increasing life expectancy. Although a rare condition affecting <1% of the population, achalasia is a progressive disorder that, without operative or endoscopic intervention, often leads to end-stage disease.⁴

In patients requiring operation for these benign distal esophageal diseases, hospital readmission is a concern, because it is associated with increased morbidity and poor patient satisfaction.⁵ In an effort to improve patient outcomes and decrease overall health care spending, the Centers for Medicare and Medicaid Services (CMS) enacted the Hospital Readmissions Reduction Program (HRRP) in October of 2012. The HRRP decreases CMS payments to hospitals with readmission rates beyond the risk-adjusted national average for hospital readmission within 30 days of discharge. While the initial concentration of this metric was on readmissions after the index hospitalizations for medical conditions (congestive heart failure, myocardial infarction, and pneumonia), in 2014, CMS began including certain surgical patient readmissions in the calculated readmission rates of hospitals. Additionally, all operative patient readmissions are included in the publicly reported, hospital-wide readmissions statistics that are used as a hospital quality indicator.

Although the intention of HRRP is to improve patient outcomes and thereby to decrease health care expenditure, data pertaining to readmission after surgery is lacking robustness. Up until the past few years, most research on readmission has aimed to characterize readmission in medical patients. Because operative patients, unlike medical patients, are admitted for a specific invasive procedure with inherent risk of complications, assuming the approaches applied to improve medical patient outcomes will be successful in operative patients is insufficient.

Even between operative procedures, there is great variation in the rates of and reasons for readmission, as demonstrated in recent publications using multi-institutional databases.^{6,7} For example, Merkow et al⁶ found that in bariatric operation patients the primary reason for readmission was ileus or obstruction (24.5%), and the unplanned readmission rate was 5.2%, whereas in patients undergoing colectomy or prostatectomy, the primary reason for readmission was surgical site infection (SSI) (25.8%), and the unplanned readmission rate was 10.9%. Due to the unique perioperative characteristics of each procedure

type, it is imperative that research to improve readmission rates and other outcome metrics be tailored to operative type.

While several recent studies using multi-institutional databases have looked at reasons for and factors associated with readmission after specific operative procedures,⁶⁻⁹ none to our knowledge have evaluated readmission in benign distal esophageal disease operations. The aim of this study was to ascertain the incidence of, reasons for, and factors associated with early hospital readmission after an operation for benign distal esophageal disease. The knowledge obtained from this and similar well-designed studies will allow for improved policies to identify at-risk patients and decrease readmission rates and adverse operative outcomes.

METHODS

Data source. This study was a retrospective analysis using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database from 2012 through 2014, as the *timing* and *reason for readmission* variables were not included until 2012. The ACS-NSQIP database comprises risk-adjusted data on patients undergoing an operation at participant hospitals with the intention of aiding in the development of outcomes-based initiatives to improve operative quality of care. Data are collected prospectively by certified Surgical Clinical Reviewers and include >150 variables pertaining to preoperative risk factors, intraoperative case details, and 30-day postoperative morbidity and mortality.¹⁰ Specifics of ACS-NSQIP are described elsewhere.^{11,12} This study was reviewed and approved by the Institutional Review Board of the Johns Hopkins University School of Medicine.

Study population. Patients ≥ 18 years of age who underwent fundoplication (defined as Current Procedural Terminology [CPT] codes: 43280, 43327, 43328), PEH repair (CPT codes: 43281, 43282, 43332, 43333, 43334, 43335, 43336, 43337), or Heller myotomy (CPT codes: 43279, 43330, 43331) and had a corresponding diagnosis of benign distal esophageal disease (defined as International Classification of Diseases, 9th revision [ICD-9] codes: 553.3, 552.3, 530.10, 530.11, 530.19, 530.20, 530.81, or 530.0) were included. Patients were excluded if they were not discharged within 30 days of the operation, died during initial hospitalization, or were transferred to another acute care hospital, because these patients were not at risk of being readmitted.¹³

Because ACS-NSQIP data are collected for only the 30-day period after operation, readmission is

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