

Clinical Science

Delayed repair of obstructing ventral hernias is associated with higher mortality and morbidity



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Abstract

BACKGROUND: Patients presenting with ventral hernia-related obstruction are commonly managed with emergent ventral hernia repair (VHR). Selected patients with resolution of obstruction may be managed in a delayed manner. This study sought to assess the effect of delay on VHR outcomes.

METHODS: The American College of Surgeons' National Surgical Quality Improvement Program database from 2005 to 2011 was queried using diagnosis codes for ventral hernia with obstruction. Those who underwent repair over 24 hours after admission were classified as delayed repair. Preoperative comorbid conditions, American Society of Anesthesiology (ASA) scores, and 30-day outcomes were evaluated.

RESULTS: We identified 16,881 patients with a mean age of 58 ± 15 years and body mass index of 36 ± 10 . Delayed repair occurred in 27.7% of the patients. After controlling for comorbidities and ASA score, delayed VHR was independently associated with mortality (odds ratio [OR] 1.9, 95% confidence interval [CI] 1.41 to 2.48, $P < .001$), morbidity (OR 1.4, 95% CI 1.24 to 1.50, $P < .001$), surgical site infection (OR 1.2, 95% CI 1.03 to 1.35, $P = .016$), and concurrent bowel resection (OR 1.2, 95% CI 1.03 to 1.34, $P = .016$).

CONCLUSIONS: VHR for obstructed patients is frequently performed over 24 hours after admission. After adjusting for comorbid conditions and ASA score, delayed VHR is independently associated with worse outcomes. Prompt repair after appropriate resuscitation should be the management of choice.

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Drs Megan Sippey and Konstantinos Spaniolas had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Ventral hernias are common in the United States, with 2.3 million inpatient abdominal hernia repairs performed between 2001 and 2010 according to the National Center for Health Statistics, National Hospital Discharge Survey data.¹ Despite increasing rates of diagnosis and repair, ventral hernias remain one of the leading causes of small bowel obstructions, behind only adhesive disease and malignancy.^{2,3} Patients presenting with ventral hernia-related obstruction are commonly managed with emergent ventral hernia repair (VHR), and the number of emergent repairs has increased over the past decade from 16.0 per every 100,000 person-years in 2001 to 19.2 in 2010.¹ However, emergent operations in the general population (orthopedic, gastrointestinal, hernia, etc) are associated with a higher risk of morbidity, mortality, length of stay, and associated resource utilization.⁴⁻⁹ Furthermore, in patients undergoing VHR, the risk of morbidity and mortality in the emergent setting is 26.0% and 14.3% ($P < .001$) vs 11.3% and .7% ($P = .002$), respectively, with elective repair.¹⁰

Selected patients with resolution of obstruction may potentially be managed in a delayed manner. The dictum “the sun should never rise nor set on a small bowel obstruction” has substantially changed over the past decades, with nonoperative management being successful in up to 73% of cases involving adhesive obstructions.¹¹⁻¹³ However, for patients requiring operative intervention, current literature suggests that worsened outcomes when time from onset of symptoms to presentation and surgical consultation are increased.^{14,15} Unfortunately, the majority of subjects in these studies presented with inguinal and femoral hernias, making results potentially less applicable to patients with ventral hernias. The aim of this study was to assess the association between timing of operation and 30-day surgical outcomes in patients undergoing VHR for obstruction.

Patients and Methods

The American College of Surgeons' National Surgical Quality Improvement Program (ACS NSQIP) database was used for this study. This is a national database with data entered by trained clinical abstractors. It includes preoperative risk factors, laboratory values, intraoperative variables, and 30-day postoperative morbidity and mortality data. The ACS NSQIP administration periodically audits the data to ensure high reliability. Current Procedural Terminology (CPT) codes were used to identify patients who underwent VHR between 2005 and 2011. This included open (codes 49560, 49561, 49565, 49566, 49570, 49572, 49585, 49587, and 49590) and laparoscopic VHR (codes 49652, 49653, 49654, 49655, 49656, and 49657). Current Procedural Terminology codes were used to identify patients who required bowel resection or creation of an enterostomy. Patients undergoing VHR for obstruction were identified using the 9th revision of the International Classification of Diseases codes (552.1, 552.2, 552.20, 552.21, and 552.8).

Baseline demographics included age, sex, body mass index (BMI), American Society of Anesthesiology class (ASA), and presence of comorbid disease. Comorbidities were grouped into anatomic systems based on previous published analyses using ACS NSQIP data.¹⁶⁻¹⁸

Those who underwent repair over 24 hours after admission were classified as delayed repair. The primary outcomes assessed were mortality, serious morbidity, and overall morbidity. Complications were defined as serious based on previous studies and included postoperative cardiac arrest requiring cardiopulmonary resuscitation, myocardial infarction, bleeding requiring transfusion, cerebrovascular accident, coma lasting for more than 24 hours, pulmonary embolism, ventilator dependence for more than 24 hours, organ space infection, wound dehiscence, progressive or acute renal failure, and sepsis or septic shock.¹⁶ Overall morbidity included events listed above as well as urinary tract infection, deep venous thrombosis, unplanned reintubation, pneumonia, peripheral nerve injury, and superficial or deep surgical site infection (SSI). SSI, concurrent bowel resection, and enterostomy creation were also assessed as secondary outcomes. Subgroup analysis for emergent cases was performed. Cases were classified as emergent if the surgeon or anesthesiologist reports the case as such and the procedure performed as soon as possible but no longer than 12 hours after the patient had been admitted or after the onset of related symptoms.

Approval for this study was obtained through ACS NSQIP administration and the East Carolina University Institutional Review Board. Data analysis was performed using SPSS (IBM, Somers, NY) for Windows version 20. Univariate analysis was performed to assess the effect of delay on mortality and morbidity using chi-square for nominal and ordinal variables with frequencies reported. Two-tailed independent samples *t* test was used for continuous variables with mean and standard deviation reported. Multivariate logistic regressions were performed with mortality, overall morbidity, serious morbidity, SSI, bowel resection, and enterostomy creation as the dependent variable. All variables with a *P* value less than .1 on univariate analysis were entered into the logistic regression models. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported when applicable. A *P* value less than .05 was considered statistically significant. Subgroup analysis of cases classified as emergent was performed. The ACS NSQIP and the hospitals participating in the ACS NSQIP are the source of the data used herein; they have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors.

Results

We identified 16,881 patients who underwent VHR for obstruction: 6,329 (37.5%) were male, mean age was 58 (± 15) years, and mean BMI was 36 (± 10). Repair was delayed for more than 24 hours in 4,684 (27.7%) patients.

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