Small Bowel Obstruction Is a Surgical Disease: Patients with Adhesive Small Bowel Obstruction Requiring Operation Have More Cost-Effective Care When Admitted to a Surgical Service

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BACKGROUND: Adhesive small bowel obstruction (ASBO), although a potential surgical emergency, is increasingly being managed by medical hospitalists due to the likelihood these patients will not require operation. However, the value of care delivered by medical hospitalists to patients with ASBO has not been reported.

STUDY DESIGN: We hypothesized that patients admitted to the medical hospitalist service (MHS) for presumed ASBO have increased length of stay (LOS) and charges compared with patients admitted to the surgical service (SS). There were 555 consecutive admissions with presumed ASBO from 2008 to 2012; these were reviewed and grouped according to admitting service and whether an operation was performed. Group medians were compared and multivariate analysis was performed to identify variables independently associated with increased LOS, time to operation (TTO), and charges.

RESULTS: Median LOS among patients whose ASBO resolved nonoperatively was similar for those on SS and MHS (2.85 days vs 2.98 days; $p = 0.49$). In patients without nonoperative resolution of ASBO, those admitted to MHS had longer median LOS when compared with those admitted to SS (9.57 days vs 6.99 days; $p = 0.002$) and higher median charges ($38,800 vs $30,100; $p = 0.025$). Patients admitted to MHS who had an operation, had a greater median TTO than operative patients on SS (51.72 hours vs 8.4 hours; $p < 0.001$). Multivariate analysis did not identify factors independently predictive of increased LOS, TTO, or charges.

CONCLUSIONS: Adhesive small bowel obstruction patients are treated in a heterogeneous fashion in our hospital, causing disparate outcomes depending on admitting service when patients undergo operation. Admitting all suspected ASBO patients to SS has the potential to dramatically decrease LOS and reduce waste in those requiring operation, thereby reducing health care expenditures. (J Am Coll Surg 2015;221:7−13. © 2015 by the American College of Surgeons)

Adhesive small bowel obstruction (ASBO) is a common medical problem, which typically requires hospital admission. Historically, surgical services admitted patients with ASBO; however, because these obstructions often resolve with conservative measures, these patients are increasingly being admitted to medical services managed by hospital-employed hospitalists. Importantly, delays in appropriate surgical therapy for those in whom conservative management fails have been associated with increased complications and mortality.[1] Three previous studies compared the outcomes of patients with small bowel obstruction when admitted to either a medical or a surgical service.[2-4] All of these studies were of patients cared for in urban teaching hospitals with teaching services consisting of surgical and medical residents; 2 were in academic hospital settings[2,3] and 1 was in a private community teaching hospital where the staff were predominantly in private practice.[4] All studies determined that patients with ASBO who required operative intervention benefited from a shorter time to operation (TTO) and a shorter length of stay (LOS) when admitted to a surgical service. One study reported reduced complications in patients admitted to the medical service

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Abbreviations and Acronyms

ASBO = adhesive small bowel obstruction
IQR = interquartile range
LOS = length of stay
MHS = medical hospitalist service
SS = surgical service
TTO = time to operation

regardless of whether or not they underwent an operation.[4] Given this background, we sought to compare the outcomes of patients with an admission diagnosis of ASBO when admitted to a medical hospitalist (MHS) or surgical service (SS) in our urban teaching hospital. We hypothesized that patients admitted to the SS for presumed ASBO have a reduced LOS, hospital charges, and TTO when compared with patients admitted to the MHS.

METHODS

Study design and patient selection

We conducted an institutional review board-approved, retrospective cohort study of our stand-alone, urban teaching hospital discharge records for 5 years, from 2008 to 2012. We identified patients with admission, primary, or secondary diagnoses of intestinal obstruction with adhesions, intestinal obstruction not otherwise specified (NOS), and intestinal obstruction necrotizing enterocolitis (NEC, International Classification of Diseases 9th edition [ICD9], codes 560.81, 560.9, and 560.89, respectively). Initial query returned 2,437 individual patient encounters. We elected to analyze only those patient encounters with an admission diagnosis of intestinal obstruction as defined above, on an intention-to-treat basis. Elective operations and patients whose admission diagnosis was not intestinal obstruction were excluded. Patients with malignancy and inflammatory bowel disease were not excluded (Fig. 1).

All staff in our hospital are full-time employees, including surgeons, medical hospitalists, and radiologists. The radiology, medicine, and surgery services also have ACGME-accredited residency programs and had residents involved in all aspects of patient care. Information on patient demographics (age, ethnicity, insurance status, sex, and admitting service), outcomes information (LOS, TTO in those who underwent an operation, total hospital charges for the index admission including the cost of any in-hospital complications [but excluding the cost of any readmission], mortality, 30-day readmission, and overall complication rates) and information about comorbid patient conditions (diabetes mellitus, coronary artery disease, congestive heart failure, COPD, and renal failure), as well as aggregates of comorbid conditions (case mix index, Charlson comorbidity index) were gathered electronically using appropriate ICD9 codes and compiled for analysis. Information on patients who had small bowel resection for ischemia or perforation and cause of death for patients who died was collected by direct chart review.

Patient groups

Patients were grouped according to the service to which they were admitted at the start of their hospitalization and whether they underwent an operation during their stay. Hence, 4 groups were created: those admitted to the MHS who did not undergo an operation; those admitted to the MHS who had an operation; those admitted to the SS who did not have an operation; and those admitted to the SS who underwent an operation. Patients who began their hospital stay on the MHS, but underwent operation, were generally transferred to the SS for postoperative care with varying degrees of hospitalist involvement depending on patient acuity; however, no uniform policy regarding postoperative disposition exists in our institution.

Operative decision-making

Operative intervention was solely at the discretion of the attending surgeon, and there were no standard criteria for determining who should undergo operation. The reasons to operate were unable to be reliably collected from this database and were not included in analysis.

Statistical analysis

Group medians with interquartile ranges (IQR) were calculated, and groups were compared using a Kruskal-Wallis rank sum test (continuous variables) or chi-square/Fischer's exact test (discrete variables), as appropriate. Values of $p < 0.05$ were considered statistically significant. Univariate analysis for each independent variable under each outcomes variable was performed. Independent variables with a univariate $p < 0.10$ were included in the multivariate analysis. In addition, we fit the logarithm of TTO, LOS, and charges to the independent variables using standard linear regression techniques. Because of the logarithm transformation, the residuals (after fitting) were approximately normal in distribution. Multivariate analysis was performed for the outcomes variables of LOS, total hospital charges, and TTO. We adjusted the p values of the retained variables to control the false discovery rate.

RESULTS

A total of 555 consecutive patients with presumed ASBO were identified. Baseline characteristics are shown in Table 1. Patients admitted to the SS tended to be younger and had a lower age-adjusted Charlson score. Case mix index was similar between the 2 groups. Rates of renal failure were higher among patients on the MHS who