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Effects of ascites on outcomes of colorectal surgery in congestive heart failure patients

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Abstract

BACKGROUND: There are limited data regarding the effects of ascites on outcome of patients undergoing colorectal resection. We sought to identify complications related to ascites.

METHODS: The National Surgical Quality Improvement Program database was used to evaluate congestive heart failure (CHF) patients who had ascites before colorectal resection between 2005 and 2012. Multivariate regression analysis was performed to identify affected outcomes.

RESULTS: We sampled a total of 2,178 patients who suffered CHF and underwent colorectal resection, of which 195 (9%) had preoperative ascites. The mortality rate of patients who had preoperative ascites was 46.2% compared to 25.7% for patients without ascites (adjusted odd ratio [AOR], 3.38; $P < .01$). Complications affected by ascites include ($P < .05$) ventilator dependency (AOR, 2.40), acute renal failure (AOR, 2.18), and wound disruption (AOR, 2.44; $P < .05$). There was no increase in superficial surgical site infection rate in patients with ascites (AOR, 1.01; $P = .9$).

CONCLUSIONS: The presence of ascites in CHF patients is associated with increased mortality in patients undergoing colorectal surgery. There is no correlation between ascites and surgical site infection but wound disruption increases in the presence of ascites.

Preoperative ascites as an important factor associated with high morbidity and mortality has been observed and reported previously.[1–3] In colorectal surgery, the presence of ascites is associated with a greater than 3-fold increase in mortality. Overall, mortality and morbidity of patients with ascites has been reported as high as 41% and 87%, respectively.[4–7] It is important to recognize patients with ascites and the possible complications associated with ascites before surgery in an effort to reduce the morbidity and mortality of these patients.

Respiratory acidosis, intra-abdominal infections, abdominal compartment syndrome, incisional hernia, wound dehiscence, and wound infection have been reported to be increased in patients with ascites.[1–3,6,7] Accumulation of ascites after abdominal operations despite complete drainage of ascites during surgery is typically unavoidable; therefore, preoperative medical control of ascites is usually advised.[8] Aggressive preoperative control of ascites is

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associated with decreased risks of respiratory complications as well as wound dehiscence.[9] Also, use of retention sutures to prevent evisceration and dehiscence has been recommended.[9]

Most previous studies regarding the risk of preoperative ascites are limited to cirrhotic patients with a small size of the index population and not specific for colorectal surgery patients.[6–8] A large nationwide study analyzing the complications of colorectal resectional surgery in the presence of ascites in congestive heart failure (CHF) patients undergoing colorectal surgery is lacking. Therefore, we aim to report on the incidence, complications, and outcomes of patients with ascites and CHF undergoing colorectal surgery.

Methods

This study was performed using the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database[10] from January 1, 2005 to December 31, 2012. ACS NSQIP is a nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care in the United States.[10] ACS NSQIP provides preoperative to 30-day postoperative surgical outcomes based on clinical data. We looked at patients who underwent colorectal resections with comorbidity of CHF (in 30 days before surgery) using the appropriate procedural and diagnosis codes as specified by the International Classification of Diseases, 9th Revision, Clinical Modifications then we sampled patients who had preoperative ascites. Patients who had colorectal procedures were defined based on the following Current Procedural Terminology codes: 44140 to 44160, 44204 to 44212, 45110, and 45,395. Patients who underwent colorectal surgery without colon or rectal resection, patients with disseminated cancer, and patients younger than 18 years were excluded from this study. Patients' diagnoses were defined based on the following International Classification of Diseases, 9th Revision codes: malignant neoplasm of colon and rectum (153.0 to 153.9, 154.0, 154.1, 230.3, and 230.4), benign neoplasm of colon and rectum (211.3, 211.4), diverticulosis or diverticulitis (562.10 to 562.13), acute or chronic vascular insufficiency of intestine (557.0, 557.1, and 557.9), perforation of intestine (569.83), intestinal obstruction without mention of hernia or malignancy (560.0 to 560.9), intestinal infection due to *Clostridium difficile* (008.45), peritonitis and retroperitoneal infections (with or without sepsis) (567.0 to 567.9, 038.1 to .38.9), fistula of intestine (569.81), abscess of intestine (569.5), Crohn disease (555.1, 555.2), and ulcerative colitis (556.0 to 556.9).

Preoperative factors that were analyzed include patient characteristics (age, sex, and race), and 12 comorbidity conditions, which include diabetes mellitus with oral agents or insulin, weight loss (>10% in last 6 months), history of severe chronic obstructive pulmonary disease, current smoker within 1 year, ascites, alcohol abuse (>2 drinks per day in 2 weeks before admission), hypertension requiring medication. Preoperative laboratory values that were analyzed include hyponatremia (serum sodium level <130 mmol/L), hypernatremia (serum sodium level >145 mmol/L), hypoalbuminemia (serum albumin level <3.5 g/dL), anemia (hematocrit <30%), and prerenal azotemia (serum blood urea nitrogen or creatinine ratio >20). Other factors analyzed include postsurgical complications (superficial surgical site infection [SSI], deep incisional SSI, organ space SSI, wound disruption, pneumonia, unplanned intubation, ventilator dependency >48 hours, cardiac arrest requiring cardiopulmonary resuscitation [CPR], urinary tract infection, myocardial infarction, acute renal failure [ARF], and hospitalization >40 days), pathologic conditions (colorectal cancer, diverticulosis or diverticulitis, ulcerative colitis, and benign colorectal tumor), surgical procedure (total colectomy, abdominoperineal resection of the rectum, and partial colectomy), and surgical techniques (laparoscopic vs open). The overall rate of preoperative ascites and the rate of postoperative complications by procedure type and diagnosis were examined. Risk-adjusted analysis was performed to identify independent predictors of postoperative complications after colorectal operation. Male gender, age below 70 years, Caucasian race, and benign colorectal tumor were used as reference data points for comparison in line with the literature.[11]

Statistical analysis

Statistical analysis was performed with SPSS software, version 19 (SPSS Inc., Chicago, IL). Logistic regression analysis was used to estimate the association between preoperative ascites and each outcome, including in-hospital mortality and all the considered postoperative complications. *P* values less than .05 were considered statistically significant. For each outcome, the adjusted odds ratio (AOR) with a 95% confidence interval was calculated and reported to estimate the relative risk associated with ascites. Adjustments were made for hypertension, smoke, diabetes mellitus, chronic obstructive pulmonary disease, weight loss, alcohol abuse, ascites, dialysis, surgical technique (laparoscopic vs open), admission type (emergent vs nonemergent), age, and race. Patients with missing data points were excluded from final analysis.

Results

A total of 2,178 patients with preoperative comorbidity of CHF who underwent colorectal resection from 2005 to 2012 were identified. The mean age of patients was 74 years, with a standard deviation of 12 years, and 68% of the patients were older than 70 years; most patients were Caucasian (82.7%) and male (50.4%). Most common comorbidities (excluding CHF and ascites) included hypertension (82.2%), and diabetes (35%). Demographic data of patients are reported in Table 1.