The American Journal of Surgery (2014) 208, 749-755

The American Journal of Surgery®

Clinical Science

Organ space infection following ileocolectomy for Crohn's disease: a National Surgical Quality Improvement Project study

Matthew Z. Wilson, M.D., M.S.[a], Tara M. Connelly, M.B., B.Ch., M.Sc.[a], Christopher S. Hollenbeak, Ph.D.[a,b], Evangelos Messaris, M.D., Ph.D.[a,*]

[a]*Division of Colon and Rectal Surgery, Department of Surgery and* [b]*Department of Public Health Sciences, The Pennsylvania State University, College of Medicine, 500 University Drive, Hershey, PA 17033, USA*

KEYWORDS:
Crohn's disease;
Ileocolectomy;
Organ space infection;
Abscess;
Anastomotic complication

Abstract

BACKGROUND: Organ space infection (OSI) rates post ileocolectomy for Crohn's disease are relatively high. The aim of this study was to determine which factors predispose to OSI in this patient cohort.

METHODS: Data for 2,618 Crohn's patients undergoing ileocolectomy between 2005 and 2011 were obtained from the American College of Surgeons National Surgical Quality Improvement Project database. Primary outcome was an OSI within 30 days of discharge. Univariate analysis using chi-square and Student *t* tests and a logistic multivariate analysis were performed.

RESULTS: Preoperative weight loss (odds ratio [OR] 2.11, $P = .002$), extended operating time (OR 1.57, $P = .016$), open procedures (OR 1.47, $P = .043$), and contaminated/dirty wounds (OR 1.95, $P = .008$) conferred an increased risk for OSI on multivariate analysis. Rates of stoma creation and steroid use were not significantly different between the groups.

CONCLUSIONS: Weight loss is a preoperative, potentially modifiable variable associated with OSI in Crohn's patients undergoing ileocolectomy and OSI-associated operative factors which may be noted to identify high-risk patients include extended operating time and open procedures.

Crohn's disease (CD) is a chronic relapsing–remitting immune-mediated disease of the gastrointestinal tract, which is characterized by inflammation, strictures, abscesses, and/or fistuli. Although the disease can manifest along the length of the tract and extraintestinally, the most common disease distribution is the junction between the small and large bowel—the ileocolic region.[1] Because of the nature of the disease, surgery is commonly required by CD patients with up to 80% of patients with ileocolic disease undergoing at least one ileocolectomy within 10 years of diagnosis.[2]

CD patients are at a relatively higher risk for deep organ space infection (OSI) when compared with other patients undergoing abdominal surgery. Rates of postoperative intra-abdominal abscesses resulting from anastomotic leaks post bowel resection for CD varies from 4% to 50% based on resection type and the presence or absence of a number

There was no sponsorship from industry or other outside support for this project.

* Corresponding author. Tel.: +1-717-531-5164; fax: +1-717-531-0646.

E-mail address: emessaris@hmc.psu.edu

Manuscript received March 24, 2014; revised manuscript April 7, 2014

0002-9610/$ - see front matter © 2014 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.amjsurg.2014.04.010

of risk factors. Such risk factors vary between studies.[3–5] However, poor tissue quality, malnutrition secondary to the disease process and corticosteroid use (which is relatively common in the CD patient cohort) have all been attributed to the development of postoperative infection.[6–8]

Previous studies on the risk of OSI in CD have been limited by several factors. Generally, these studies have had small patient numbers and have focused on overall complications with a lack of data specific to space infections. Additionally, results are often confounded by the inclusion of a variety of resection types. Because of such limitations and conflicting study results, there exists a lack of clarity on which risk factors are associated with infection. Therefore, the aim of this study was to use a nationwide database to identify perioperative variables associated with the development of OSI in the largest cohort of CD patients undergoing ileocolectomy studied to date.

Methods

Data

Data from the National Surgical Quality Improvement Project (NSQIP) during the 2005 to 2010 time period were queried to identify patients with CD undergoing either open or laparoscopic ileocolectomy. Common Procedural Terminology (CPT) identifiers included 44160 (open partial colectomy) and 44205 (laparoscopic partial colectomy). Patients undergoing other colon or rectal procedures were excluded. Institutional review board approval was waived as the NSQIP database is an open, deidentified database.

Covariates recorded included age, sex, body mass index (BMI) category (underweight <20, normal 20 to 25, overweight 25 to 30, and obese >30+), tobacco use, insulin-dependent diabetes, bleeding disorder, preoperative steroid therapy (defined as "the regular administration of oral or parenteral corticosteroid medications in the 30 days before surgery. Patients who receive a short course <10 days in this time period are excluded"), preoperative weight loss (defined as >10% of total body weight within the 6-month interval immediately preceding the surgery), preoperative systemic inflammatory response syndrome (SIRS), operative duration, extended operative time (defined as >75th percentile of the procedure-specific operating time), case status (emergent vs elective), procedure type (open vs laparoscopic), wound classification (clean, clean/contaminated, contaminated, and dirty/infected), stoma creation (when listed as a secondary procedure), and American Society of Anesthesiologists (ASA) classification.

Postoperative organ space surgical site infection (OSI) within 30 days post discharge from the admission for ileocolectomy was recorded. OSI is defined by NSQIP as "an infection that occurs within 30 days after the operation and the infection appears to be related to the operation and the infection involves any part of the anatomy, other than the incision and at least one of the following: Purulent drainage from a drain that is placed through a stab wound into the organ/space, organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space, an abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation or by histopathologic or radiologic examination."

Statistical analysis

Summary statistical analysis was performed by stratifying patients according to the presence or absence of the development of an OSI within 30 days of ileocolectomy. Comparisons involving patient covariates were made using Student *t* tests for continuous variables and chi-square tests for categorical variables. A multivariate regression analysis was then performed using all known OSI-associated variables. The following covariates were included in this analysis: BMI category, diabetes, current use of smoking tobacco, preoperative steroid therapy, preoperative weight loss, ASA classification, extended operative time, open procedure, preoperative SIRS, emergent procedure, and wound classification. Multivariate analyses controlled for comorbidities by utilizing binary indicators for each condition. Logistic regression was used to model the risk of OSI and the risk in Crohn's patients undergoing ileocolectomy while controlling for patient characteristics and comorbidities. All analyses were performed using STATA version 12 (Stata Corp, College Station, TX) and statistical significance was defined as a P value less than .05.

Results

Patient characteristics are presented in Table 1. A total of 2,618 patients were identified. The cohort consisted of 53% women. One thousand and one patients were taking steroids. No statistically significant difference was found in the basic demographic parameters of age, sex, BMI, or history of diabetes between those who developed an OSI versus those who did not. Baseline health status as represented by ASA also did not differ between the 2 groups.

The OSI rate was 5.7% (149 patients). On univariate analysis, smoking ($P = .041$) and preoperative weight loss ($P < .0001$) were significantly higher in the OSI group (Table 2). As expected, OSI rates were higher in those who had undergone more complex procedures as evidenced by an open versus laparoscopic approach ($P = .002$), extended operative times ($P = .0005$), and contaminated and dirty/infected wound classification ($P = .005$). Stoma rates were nonsignificantly higher in the OSI group (6.7% vs 3.6% in the non-OSI group, $P = .056$). On the other hand, preoperative steroid therapy did not affect outcomes.

Table 3 shows the results of logistic regression analysis of factors associated with OSI. Preoperative weight loss (OR [odds ratio] 2.11, $P = .002$), extended procedure-specific operating time (OR 1.64, $P = .016$), open procedures (OR 1.47, $P = .043$), and dirty/infected wounds (OR 1.95, $P =$