Clinical Science

Contemporary management of anastomotic leak after colon surgery: assessing the need for reoperation

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KEYWORDS:
Anastomotic leakage;
Colonic anastomosis;
Reoperation

Abstract

   BACKGROUND: We sought to investigate contemporary management of anastomosis leakage (AL) after colonic anastomosis.

   METHODS: The American College of Surgeons National Surgical Quality Improvement Program database 2012 to 2013 was used to identify patients with AL. Multivariate regression analysis was performed to find predictors of the need for surgical intervention in management of AL.

   RESULTS: A total of 32,280 patients underwent colon resection surgery with 1,240 (3.8%) developing AL. Overall, 43.9% of patients with AL did not require reoperation. Colorectal anastomosis had significantly higher risk of AL compared with ileocolonic anastomosis (adjusted odds ratio [AOR], 1.20; $P = .04$). However, the rate of need for reoperation was higher for AL in colocolonic anastomosis compared with ileocolonic anastomosis (AOR, 1.48; $P = .04$). White blood cell count (AOR, 1.07; $P < .01$), the presence of intra-abdominal infection with leakage (AOR, 1.47; $P = .01$), and protective stoma (AOR, .43, $P = .02$) were associated with reoperation after AL.

   CONCLUSIONS: Nonoperative treatment is possible in almost half of the patients with colonic AL. The anatomic location of the anastomosis impacts the risk of AL. Severity of leakage, the presence of a stoma, and general condition of patients determine the need for reoperation.

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   Although there is a wide variance in the rate of anastomosis leakage (AL) because of more than 40 definitions of AL in literature, the rate is typically reported between 3.5% and 6% after colorectal operations.[1–5]

However, AL is one of the main factors of mortality of colorectal patients and mortality of patients with the complication has been reported to be as high as 25% to 30%.[2,6] Also, AL significantly increases the risk of local tumor

recurrence in colorectal cancer surgery because of the stimulation of locally shed cancer cells by cytokines released during inflammation.[1,7,8] In the long-term quality of life can be significantly impaired, especially after rectal anastomosis leaks because of fibrosis and anastomotic stricture.[9–11] It is important to recognize high-risk patients and the best treatment strategies of AL to decrease mortality and morbidity of such patients.

It is proposed that reduction in the anastomosis region tissue oxygenation due to ligation and resultant ischemia is the main factor that affects AL.[6] Consequences of AL depend on the clinical severity of the complication, which may vary from a subclinical leak which can be detected merely on contrast radiology to generalized peritonitis.[1,6] Management usually depends on the severity as well as the experience and the view of the operating surgeon.[2] Traditionally, AL was managed with resection of the anastomosis and creation of a stoma.[2] Alternative treatments include over sewing the anastomosis with or without protective stoma, medical treatment with or without drainage of perianastomotic abscess, and creating a stoma alone.[2,6] However, there is no specific guideline in treatment of AL.

Although there are limited data, successful treatment of AL without reoperation has been reported in 50% of cases.[6] However, factors affecting the management of AL need more investigation. Considering the relatively low incidence of AL in colorectal surgery, randomized control trials and even defining treatment strategies to manage AL requires large and lengthy multicenter experiences. In addition, there are difficulties in design regarding homogeneous groups of patients to compare regarding treatment of AL. So, although randomized control trials are ideal, they will likely be limited to specific populations and specific types of anastomoses (eg, low anterior resections), therefore, national retrospective studies using reliable databases are more accessible and practical for evaluating the treatments of anastomotic leakage. Using American College of Surgeons' National Surgical Quality Improvement Program (ACS NSQIP) database, this study aims to investigate contemporary treatment of AL in patients who underwent colon resections and investigate factors affecting the need for reoperation and mortality of patients with AL.

Methods

We conducted a retrospective cohort study using national participant user files and colectomy target files of the ACS NSQIP database during 2012 to 2013. ACS NSQIP is a nationwide outcome-based database which was collected from medical records and provides preoperative to 30-day postoperative information of surgical patients based on clinical data in the United States.[12] ACS NSQIP database includes more than 150 patient variables using standardized definitions created by the ACS.[12] NSQIP database is exempt to obtain informed consent from individual patients and is covered within the hospitals' patient consent forms. Approval

for the use of the NSQIP patient-level data in this study was obtained from the institutional review board of the University of California, Irvine Medical Center, and NSQIP.

We analyzed the available data on adult patients who underwent partial colon resection with anastomosis during 2012 to 2013 in the US. Using the current procedural terminology (CPT) codes, patients were classified into 4 groups of partial colectomy with colocolonic anastomosis (CCA; 44,140 with 44,204), partial colectomy with colorectal anastomosis (CRA; 44,145 with 44,207), partial colectomy with ileocolonic anastomosis (ICA; 44,160 with 44,205), and partial colectomy with colocolonic or ICA with a protective stoma (44,141), and partial colectomy with CRA with a protective stoma (44,146 and 44,208). Patients who underwent total colectomy were excluded from the study because the CPT code for total colectomy does not indicate which patients had protective ileostomy. Patients diagnosis was defined based on the *International Classification of Diseases, 9th Revision, Clinical Modifications* codes of 153, 153.0 to 154.0, 154.1, 230.3, and 230.4 for colorectal cancer, 211.3 and 211.4 for benign tumors, 562.1, 562.10 to 562.13 for diverticular disease, 564.7 and 564.00 to 564.09 for constipation, 555, 555.0 to 555.9 for Crohn's disease, 569.1 for rectal prolapse, 557, 557.0 to 557.9 for vascular insufficiency of intestine, and 556, 556.0 to 556.9 for ulcerative colitis. AL was defined as a leak of endoluminal contents through an anastomosis. This could include air, fluid, gastrointestinal contents, or contrast material. Also, the presence of an infection and/or abscess thought to be related to an anastomosis, even if the leak cannot be definitively identified as visualized during an operation, or by contrast extravasation, was considered an anastomotic leak if so indicated by the surgeon.

Patient data on baseline patient demographics, comorbidities, operative details, and postoperative complications were extracted from the database. Definitions for NSQIP collected data points according to ACS definition are online available in the NSQIP user guide.[13] The primary end points investigated were rate and management of AL. Patients were identified for AL complication. Risk-adjusted analysis was performed to report independent predictors of need for reoperation in patients with AL.

Statistical analysis

The SPSS software statistical package version 22 (SPSS Inc., Chicago, IL) was used to perform statistical analysis. The main analyses of the study were multivariate statistical analysis using logistic regression and multivariate linear regressions. Bivariate logistic regression was used for binary outcomes such as mortality and need for reoperation for patients with AL. Linear multivariate regression was used for linear outcomes such as hospitalization length. To eliminate confounding variables and report independent associations between perioperative factors and AL