

North Pacific Surgical Association: Best Resident Paper

The impact of delaying elective resection of diverticulitis on laparoscopic conversion rate

The Colorectal Writing Group for the SCOAP-CERTAIN Collaborative¹**KEYWORDS:**

Diverticulitis;
Laparoscopy;
Elective;
Colectomy;
Conversion;
Complication

Abstract

BACKGROUND: Guideline-concordant delay in elective laparoscopic colectomy for diverticulitis may result in repeated bouts of inflammation. We aimed to determine whether conversion rates from elective laparoscopic colectomy are higher after multiple episodes of diverticulitis.

METHODS: Prospective cohort study evaluating laparoscopic colectomy conversion rates for diverticulitis from 42 hospitals was conducted.

RESULTS: Between 2010 and 2013, 1,790 laparoscopic colectomies for diverticulitis (mean age 57.8 ± 13; 47% male) resulted in 295 (16.5%) conversions. Conversion occurred more frequently in nonelective operations ($P < .001$) and with fistula indications ($P = .012$). Conversion rates decreased with surgeon case volume ($P = .028$). Elective colectomy exclusively for episode-based indications ($n = 784$) had a conversion rate of 12.9%. Increasing episodes of diverticulitis were not associated with higher conversion rates, even among surgeons with similar experience levels.

CONCLUSIONS: Conversion from laparoscopic colectomy for diverticulitis did not increase after multiple episodes of diverticulitis. Delaying elective resection appears to not prevent patients from the benefits of laparoscopy. © 2015 Elsevier Inc. All rights reserved.

Acute diverticulitis is one of the most common indications for hospitalization related to the gastrointestinal tract in the United States, where it is estimated that it will result in an estimated 300,000 admissions, 1.5 million days/year of inpatient care, and upwards of \$1.8

billion in healthcare costs in 2014.^{1,2} Although diverticulitis is one of the leading indications for emergency colectomy and colostomy,^{3,4} most colectomies for diverticulitis are performed electively to prevent recurrence or progression of disease.

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Laparoscopic colectomy for the management of diverticular disease was more widely adopted after publication of initial studies in colorectal cancer in the early 2000s,^{5,6} and contemporary evidence supports lower morbidity, shorter hospitalization, and higher patient satisfaction with the laparoscopic approach to diverticulitis.⁴ Accordingly, most modern professional guidelines, including the 2014 update from the American Society of Colon and Rectal Surgeons (ASCRS),¹ recommend a laparoscopic approach to colectomy for diverticulitis.

However, given an increasingly recognized disconnect between episodes of diverticulitis and disease progression and recurrence,⁴ the timing of elective colectomy has become less clear. The classic surgical dogma of operating after 2 episodes, maintained as recently as the 2000 ASCRS guidelines,⁷ or delay operating until 3 or more episodes of diverticulitis as per the 2006 guidelines⁸ have given way to recommendations to avoid episode-based surgery altogether and consider each patient's need for elective colectomy on a case-by-case basis.¹

Whether this delay in operating until after multiple episodes of diverticulitis, potentially increasing inflammation and scarring, has impacted the ability to complete operations laparoscopically remains to be determined. More so than laparoscopy for malignancy, laparoscopy for diverticulitis entails technical challenges of inflammation and adhesions, and failed laparoscopy rates are as high as 20%.^{9,10} Conversion to an open operation negates the benefits of a laparoscopic approach, and there is growing interest in factors associated with failed laparoscopy for diverticulitis. In Washington State, where nearly half of all colon operations are performed laparoscopically,¹¹ we sought to describe the factors associated with conversion and the impact of delayed elective colectomy on conversion from laparoscopy.

Methods

This study was exempted from human subjects review by the University of Washington Human Subject Review Committee. The Comparative Effectiveness Research Translation Network provided research and analytic support to the Surgical Care and Outcomes Assessment Program (SCOAP).¹²

Data sources and definitions

The primary cohort was defined by consecutive patients who underwent laparoscopic colon resection for diverticulitis between January 1, 2010 and December 31, 2013 in 42 Washington State hospitals that participated in SCOAP. Sociodemographic, clinical, and operative details were extracted from inpatient medical records by trained chart abstractors at each clinical site. SCOAP metrics and data dictionary are available via a secure page at www.SCOAP.org. A modified Charlson comorbidity index for each patient was calculated.¹³

The SCOAP data collection platform for diverticulitis has been previously described,¹¹ and includes indications

for the operation such as number of prior episodes of diverticulitis; chronic complications including gastrointestinal bleeding, stricture, and fistula; and an 'other' category to capture additional indications. Surgical approach was derived from the operative report and operating room logs looking for specific identification of open, laparoscopic, laparoscopic/hand-assisted, and laparoscopic/robotic-assisted surgical approaches. As in our prior definitions, the latter 3 categories were considered laparoscopic procedures on an intention to treat basis.¹⁴ Conversion was defined through operative reports indicating that opening the abdomen was necessary to complete the procedure. Operations included were right/transverse hemicolectomy, left hemicolectomy, low anterior resection (including sigmoidectomy), and total abdominal colectomy. Because of a recognized association between laparoscopic procedural volume and conversion rates,¹⁵ we describe the relationship between conversion rates and surgical volume. Overall rates of procedures and conversions at the surgeon level were acquired using a de-identified code unique to each surgeon in the database (n = 198 surgeons).

The main outcome of interest for this study was the rate of conversion from laparoscopy. In addition, we describe rates of in-hospital complications and composite adverse events (CAE). In-hospital complications include SCOAP's standard measures of cardiac, pulmonary, renal, infectious, or other complications requiring nonoperative intervention. CAE included any of these with the addition of reoperative interventions and in-hospital deaths.¹⁴

The quality of indications data improved dramatically at SCOAP hospitals contemporaneous to a statewide benchmarking and educational initiative.¹¹ To minimize bias from chronic complication indications and missing data, we defined a subgroup a priori to include only those patients who underwent elective laparoscopic colectomy for an episode-based indication and had non-missing data.

Statistical analysis

Patient characteristics, operative indications, and outcomes were summarized using frequency distributions for categorical variables, and mean (standard deviation) for continuous variables. We stratified our description by conversion from laparoscopy. Categorical variables were compared using Pearson chi-square statistic. Continuous variables were compared using the Student *t* test. Linear and logistic regression models were used to evaluate the association of case volume (clustered at surgeon level) and prior episode number, respectively, on conversion from laparoscopy, adjusting for patient, clinical, and operative characteristics identified as statistically significant ($P < .05$) on univariate evaluation or identified as clinically important in previous studies. A *P* value of less than .05 was considered statistically significant. All analysis was performed using STATA version 13 (STATA Corp, College Station, TX).

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