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Small Bowel Obstruction Following Restorative Proctocolectomy: Affected by a Laparoscopic Approach?

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Background. **Total proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the gold standard surgical treatment for chronic ulcerative colitis. More recently, this procedure is being performed laparoscopically assisted. Postoperatively, small bowel obstruction (SBO) is one of the more common associated complications. However, it is unknown whether the addition of a laparoscopic approach has changed this risk. This study aims to assess and compare the incidence of SBOs after both open and laparoscopic restorative proctocolectomy.**

Methods. **All subjects who underwent restorative proctocolectomy from 1998–2008 were identified from a prospective Colorectal Surgery Database. Medical records were reviewed for all cases of SBO, confirmed by a combination of clinical symptoms and radiologic evidence. Comparisons were made between laparoscopic and open approaches. The incidence of SBO was also subdivided into pre-ileostomy takedown, early post-ileostomy takedown (30 d post), and late post-ileostomy takedown (30 d to 1 y post). Several potential risk factors were also evaluated. Statistical analysis was performed utilizing Fisher's exact (for incidence) or t-tests (for means). Significance was defined as $P < 0.05$**

Results. **A total of 290 open cases and 100 laparoscopic cases were identified during this time period. The overall incidence of SBO at 1 y post-ileostomy takedown was 14% ($n = 42$) in the open group and 16% ($n = 16$) laparoscopic ($P =$ NS). In the pre-ileostomy takedown period the incidence of SBO was 7% ($n = 21$) open and 13% ($n = 13$) laparoscopic ($P =$ NS). While in the post-takedown period, the early incidence was 4% ($n = 12$) open and 1% ($n = 1$) laparoscopic and late incidence was 3% ($n = 9$) open and 2% ($n = 2$) laparoscopic ($P =$ NS). Factors associated with an increased risk of SBO include coronary artery disease, prior appendectomy and W and J pouch configurations.**

Conclusions. **The burden of postoperative small bowel obstruction after restorative proctocolectomy is not changed with a laparoscopic approach. Most cases occur in the early postoperative period, especially prior to ileostomy reversal.**

Key Words: **proctocolectomy; IPAA; ileal pouch; small bowel obstruction.**

INTRODUCTION

Ulcerative colitis is a chronic inflammatory disease affecting the colon and rectum. Surgery is necessary when chronic ulcerative colitis is not effectively controlled with medication or under conditions of massive bleeding, dysplasia, or toxic colitis [1]. While there are a few options for surgery, the most widely accepted treatment is total proctocolectomy with ileal pouch-anal anastomosis (IPAA). In most cases, a two-staged approach is utilized along with a temporary diverting loop ileostomy [2, 3]. However, in cases of toxic colitis or poor patient health status, a three-staged approach may be indicated. In any event, both approaches eventually lead to ileostomy reversal upon successful ileal pouch construction.

One of the most common postoperative complications after restorative proctocolectomy is small bowel obstruction (SBO) [1]. Various studies have determined that the incidence of SBO following restorative proctocolectomy ranges from 13% to 35% [3–6]. However, most of these have been evaluated after an open surgical approach and it is unclear what effect a laparoscopic technique may have on the incidence of SBO. A recent

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case-matched study from the Cleveland Clinic suggests that the incidence of SBO may be similar between open and laparoscopic approaches, both short- and long-term, though few others have made similar comparisons [7]. Similarly, Fraser *et al.* suggested that the incidence of SBO has not been changed by the introduction of a laparoscopic approach [8].

Though total proctocolectomy with IPAA has historically been approached in an open fashion, a number of more recent publications have demonstrated the efficacy of approaching this procedure with a laparoscopic assisted technique [9–11]. Many of these authors demonstrate short-term advantages of the laparoscopic approach including enhanced recovery and cosmetic appeal [9–13]. Recent evidence also suggests that a laparoscopic procedure may reduce the incidence of abdominal and pelvic adhesions, which are responsible for more than 75% of the small bowel obstructions following this procedure [14, 15]. It would seem that by allowing less adhesion formation *via* a laparoscopic technique, a lower incidence of SBO might result.

Therefore, the aim of this study is to determine whether the incidence of small bowel obstruction following a laparoscopic approach is different than that for the open approach. This project also aims to identify pertinent risk factors related to small bowel obstruction following both open and laparoscopic approaches.

MATERIALS AND METHODS

This study was designed as a retrospective analysis and was approved by the University of Wisconsin-Madison Health Sciences Institutional Review Board. All subjects with a diagnosis of ulcerative colitis who underwent total colectomy with IPAA at the University of Wisconsin from 1998 to 2008 were identified from a prospective Colorectal Surgery Database. Both the laparoscopic and open approaches were performed by four surgeons. The laparoscopic assisted approach to this procedure was introduced in 2003. This entailed a pure laparoscopic (without the use of a hand port) approach to colectomy with a small suprapubic incision utilized for proctectomy and ileal-pouch construction. Medical records (electronic or paper) were reviewed to track all cases of SBO and to identify potential associated risk factors. Follow-up time or date of last contact was also recorded.

The primary end point of this study was the incidence of small bowel obstruction. This was defined as the combination of both clinical symptoms (failure to pass flatus or stool, bloating, nausea, emesis) and radiologic evidence (abdominal X-ray or abdomen/pelvis CT scan). The small bowel obstructions were then sub-categorized into pre-ileostomy takedown, early post-ileostomy takedown (30 d post) and late post-ileostomy takedown (30 d to 1 y post takedown) (Fig. 1). The severity of the SBO was further classified based on whether it was operative or nonoperative and whether the patient had developed multiple SBOs. For those SBOs that required operation, the reason for the SBO was also recorded.

A number of patient demographic variables were analyzed, including age at initial surgery, gender, BMI, ASA score at time of initial surgery, past medical history factors, including COPD/asthma, diabetes, hypertension (HTN), coronary artery disease (CAD), prior abdominal surgery [including prior colectomy (subtotal or total), appendectomy, cholecystectomy, or gynecologic surgery], and medication use at time of initial surgery (including anti-inflammatory medications or immunomodulators).

Similarly, a number of perioperative factors were also recorded including length of initial hospital stay, time to ileostomy takedown, preoperative hemoglobin level, operative time, estimated blood loss, transfusion requirements, ileal pouch configuration, and use of an adhesion prevention barrier (Seprafilm; Genzyme, Cambridge, MA) as stated in the operative record.

Statistical Analysis

Univariate analysis was performed to detect differences between groups and identify factors correlating with risks of small bowel obstruction. P values were calculated with t-tests, Chi-Square, or Fisher's exact test where appropriate. Significance was defined as $P \leq 0.05$. Multivariable logistic regression was used to further evaluate differences between laparoscopic and open groups after adjusting for other factors.

RESULTS

Overall, there were 290 patients that underwent open restorative proctocolectomy and 100 patients that had laparoscopic assisted restorative proctocolectomy during the specified time period. A comparison of patient demographics between laparoscopic and open groups can be seen in Table 1. In addition, a comparison of perioperative variables between laparoscopic and open groups can be seen in Table 2. Mean follow-up time after takedown was 44 mo (range 0–145 mo) for the open group and 26 mo (range 1–76 mo) for the laparoscopic group.

The overall incidence of SBO with the above mean follow-up times were 22% ($n = 64$) and 21% ($n = 21$) in the open and laparoscopic groups respectively ($P =$ NS). The incidence at 1 y post-ileostomy takedown was 14% ($n = 42$) in the open group and 16% ($n = 16$) laparoscopic ($P =$ NS). In the pre-ileostomy takedown period the incidence of SBO was 7% ($n = 21$) open and 13% ($n = 13$) laparoscopic ($P =$ NS). While in the post-takedown period, the early incidence was 4% ($n = 12$) open and 1% ($n = 1$) laparoscopic, and late incidence was 3% ($n = 9$) open and 2% ($n = 2$) laparoscopic ($P =$ NS).

The incidence of SBO requiring operative intervention at one year was 7% ($n = 19$) in the open group and 6% ($n = 6$) in the laparoscopic group ($P =$ NS) (Table 3). In the pre-ileostomy takedown period the incidence of operative SBO was 7% ($n = 4$) open and 5% ($n = 5$) laparoscopic ($P =$ NS). While in the post-takedown period, the early operative incidence was 1% ($n = 3$) open and 1% ($n = 1$) laparoscopic, and late incidence was 2% ($n = 6$) open and 0% ($n = 0$) laparoscopic ($P =$ NS). The incidence of recurrent SBOs was 2% ($n = 6$) in the open group and 5% ($n = 5$) in the laparoscopic group ($P =$ NS).

Upon further evaluation of SBOs requiring operative intervention, 74% ($n = 14$) of the open cases were directly attributed to adhesions compared with 33% ($n = 2$) of the laparoscopic cases ($P =$ NS). In the pre-takedown period, the cause of operative SBO was less