

Minimally Invasive Surgery for Complicated Crohn's Disease – Early Experience

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Abstract:

Background: The surgical and medical management of inflammatory bowel disease (IBD) has significantly evolved over the course of the last two decades. The evidence has been accumulating in favor of a minimally invasive approach to ileocolic Crohn's disease (CD), especially when the disease is complicated by an abscess, a phlegmon, or fistulizing disease. The aim of this study is to present our primary experience with three cases of complicated ileocolic CD treated with a minimally invasive approach.

Materials and Methods: From March 2018 until May 2019 in our unit three consecutive patients with ileocolic Crohn's disease complicated by a paracolic abscess, a phlegmon, or a fistula underwent minimally invasive ileocaecal resection. Data recorded included demographic information, body mass index (BMI), estimated blood loss (EBL), length of surgery, rate of conversion to open surgery, length of hospital stay, and rate of complications.

Results: A total of three patients were identified. Complications from Crohn's disease included one patient who developed a paracolic abscess that required drainage upon admission, one patient who developed a phlegmon, and one patient who developed an entero-enteric fistula. Mean age of the study population was 24 years, with a mean BMI of 22.3 ± 3.2 and a mean ASA score of 2.75 ± 0.25 . Two (66.6%) of the patients were immunosuppressed with high-dose steroids. Mean operative time was 180 ± 46 min, with a median EBL of 80 ml. Two (66.6%) patients required diversion with a loop ileostomy, there were no conversions to laparotomy. Median time to flatus was 1.6 day. All patients tolerated a diet on the day of surgery, with a median length of stay of 4 days. There were no deaths and no complications related to bleeding, organ injury, surgical site infections, or anastomotic leaks.

Conclusion: Minimally invasive surgery for complicated ileocolic Crohn's disease can be performed safely, with short lengths of hospital stay and with a low rate of complications. A multicenter study would be beneficial to validate these findings.

Key Words: Complicated ileocolic Crohn's disease - Minimally invasive approach - Ileocaecal resection.

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I. Introduction

The surgical and medical management of inflammatory bowel disease (IBD) has significantly developed over the course of the last two decades [1]. As a member of this family Crohn's disease (CD) represents a challenging chronic inflammatory disorder, which is associated with an incidence of up to 20.2 per 100,000 in Europe and Northern America [2, 3]. The Montreal and Vienna classification systems subdivide disease behavior into either penetrating or stricturing or non-penetrating, non-stricturing phenotypes [4]. Penetrating CD (PCD), described by acute perforation, chronic fistula or abscess formation, as a distinct aggressive type, which influences time period to reoperation [5]. Recently, some reports showed that penetrating disease, even though treated by modern immunosuppressive medication, is still associated with a more difficult course of disease [6].

Minimally invasive surgery is the treatment of choice for nonpenetrating CD (NPCD) with well-proven benefits, such as less postoperative pain, less surgical trauma, earlier bowel function and shorter hospital stay when compared to open surgery [7, 8]. However, many factors make procedure for Crohn's disease challenging. Abscesses and inflammatory tumor masses can complicate the operative field and procedure, precluding dissection in known tissue planes. They also may theoretically increase infectious complications. In addition, the thickened and shortened mesentery of Crohn's disease often makes laparoscopic vascular dissection difficult. Additionally, penetrating disease and preoperative immunosuppressive therapy increased the likelihood of conversion to open surgery [9]. Notably, current guidelines do not recommend minimally invasive resection as first-line treatment or even limit laparoscopic techniques in penetrated CD due to insufficient data [10, 11].

However, recent studies have been accumulating in favor of a minimally invasive approach to ileocolic Crohn's disease (CD), especially when the disease is complicated by an abscess, a phlegmon, or fistulizing disease [12-14].

Aim: Hereby, we present our primary experience and initial outcomes of minimally invasive resection for three cases of penetrating CD with ileocolic localization.

II. Materials and methods

From October 2017 until November 2018 in our unit three consecutive patients with penetrating Crohn's disease with ileocolic localization complicated by a paracolic abscess, a phlegmon, or a fistula underwent minimally invasive ileocaecal resection. Data recorded included demographic information, the American Society of Anesthesiologists (ASA), body mass index (BMI), length of surgery, rate of conversion to open surgery, estimated blood loss (EBL), length of hospital stay, and rate of complications.

Two patients whose Crohn's disease was complicated by a phlegmon and paracolic abscess were admitted through the emergency department for the treatment of intra-abdominal sepsis. Initially these patients were with total parenteral nutrition and kept on bowel rest, broad-spectrum parenteral antibiotics to treat infection, and high-dose hydrocortisone [15, 16]. Upon admission, each patient underwent a contrast-enhanced CT scan of the pelvis and abdomen. The patient with paracolic abscess was drained by an interventional radiologist within 24 h of admission. A second CT scan was obtained 48 h before minimally invasive surgery to ensure the absence of any undrained abscess. Each patient was provided with a mechanical bowel preparation the day before procedure, and if the patient had not undergone colonoscopy before operation, a diagnostic colonoscopy was performed.

All surgeries were performed by a single, experienced colorectal surgeon, who are specialized in the treatment of CD. Two patients required diversion with a loop ileostomy, the decision to divert the patient was made at the time of surgery, with a diverting loop ileostomy constructed in those patients whose tissue integrity was felt to warrant protection of their ileocolic anastomosis or who had significant residual infection.

In modified lithotomy positioning each patient underwent surgery, using by standard laparoscopic equipment, which consisted of a 5-mm laparoscopic Babcock, a 10-mm/ 30° camera, and a 45-cm length EnSeal device (Ethicon Endosurgery, Cincinnati, OH). Posterior approach was used for resection to mobilizing the ascending colon [Fig. 1-3], elevating the inflammatory mass of ascending colon and terminal ileum away from the duodenum and ureter and extending this initial dissection from the pelvic inlet as far cephalad as the liver and as far medially as the duodenum [Fig. 4].

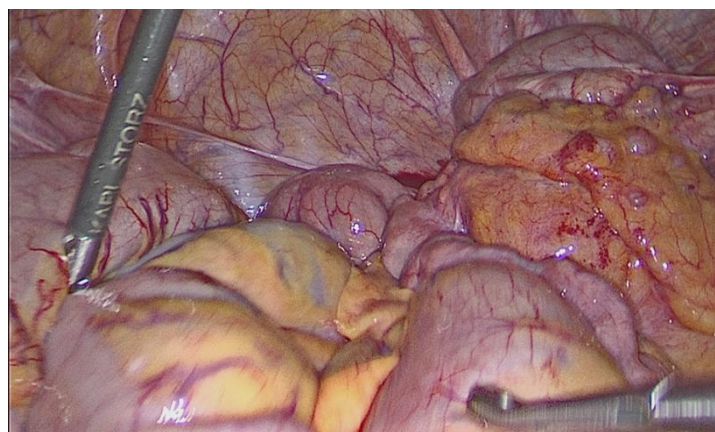


Figure no 1. PCD phenotype with ileo-ileal fistula - Initial view.

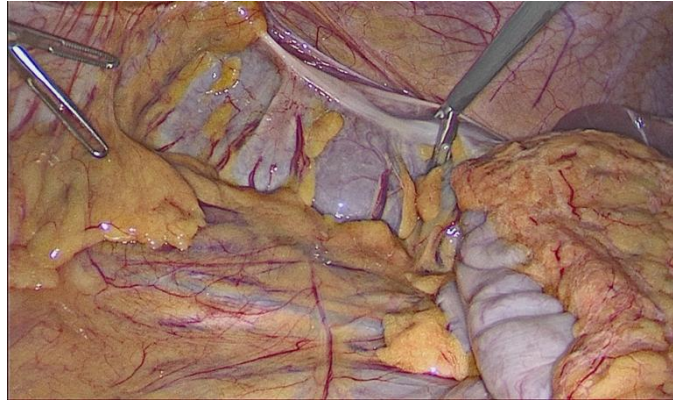


Figure no 2. Mobilizing the ascending colon.



Figure no 3. Mobilizing the ascending colon (posterior approach).

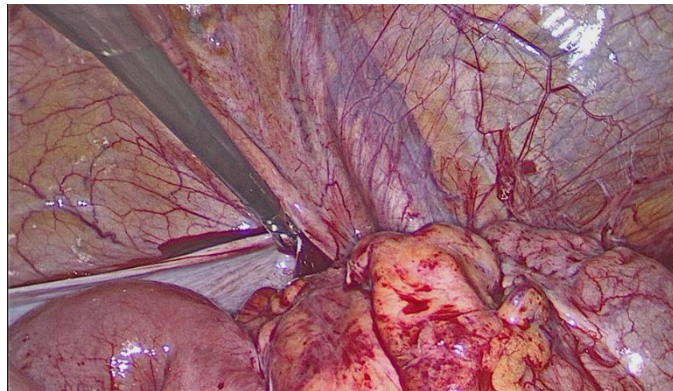


Figure no 4. Extending dissection from the pelvic inlet in cephalad direction.

This exposure was accomplished prior to mesenteric resection to avoid an inadvertent injury to the duodenum or ureter [Fig. 5]. Ligation of the ileocolic artery, were performed by using an intracorporeal technique with the EnSeal device [Fig. 6]. We constructed ileocolic anastomosis using a technique extracorporeal, in right abdomen exteriorizing the intestine through the small incision, and using linear-cutting staplers to construct a stapled, functional, end-to-end, ileocolic anastomosis. After exsufflation all incisions were closed at the skin and fascial level with interrupted absorbable sutures.

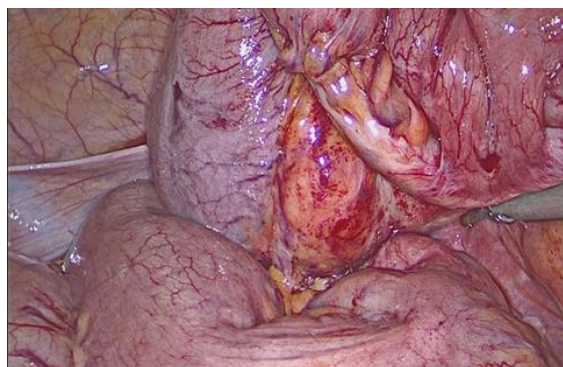


Figure no 5. Mesenteric resection.

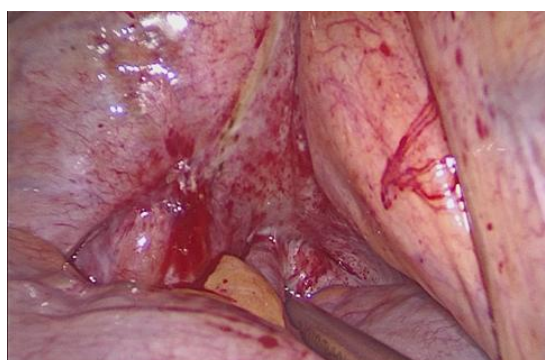


Figure no 6. Ligated and divided ileocolic artery and vein.

Postoperative care plan included the evening of surgery, the patient was provided with a low residue diet, and the patient's bladder catheter was removed within 24 h of surgery. Antibiotics were continued for 7 to 10 days after surgery as all patients were immunosuppressed and had some degree of active infection at the time of surgery. Patient-controlled analgesia (PCA) was used for postoperative pain control, and early ambulation of the patient was performed beginning the day of surgery. A prednisone therapy was stopped in two patients before surgery and after operation each patient received anti-TNF antibody. Each patient was discharged once able to tolerate a diet and once the passage of flatus had resumed.

III. Results

A total of three patients were identified. PCD cases included one patient with a paracolic abscess that required drainage upon admission, one patient with a paracolic phlegmon, and one with entero-enteric fistula. All patients underwent minimally invasive ileocaecal resection during the study period.

Table no 1: Characteristics of the study population.

INDEXES	RESULTS (n=3)
Age (years)	
Mean	24.6±4.2
Median	24
Range	20-29
Sex	
Male	2 (66.6%)
Female	1 (33.3%)
BMI (kg/m ²)	
Mean	22.3±3.2
Median	22.7
Range	18-27
ASA	
Mean	2.75±0.25
Median	3
Steroids before admission	2 (66.6%)
High-dose steroids during admission	2 (66.6%)
Previous operation	none
Type of complication from Crohn's disease	
Abscess	1 (33.3%)
Phlegmon	1 (33.3%)
Entero-enteric fistula	1 (33.3%)

Patient demographics description is provided in Table 1. Median age of the study population was 24 years, with a mean ASA score of 2.75 ± 0.25 and a mean BMI of 22.3 ± 3.2 . Two (66.6%) of the patients were immunosuppressed with high-dosage steroids.

Table no 2: Surgical characteristics.

INDEXES	RESULTS (n=3)
Operative time (min)	
Mean	180±46
Median	188
Range	140-220
Estimated blood loss (mL)	
Mean	125±70
Median	80
Range	50-280
Conversion to laparotomy	None
Final incision length (cm)	
Mean	4±0.5
Median	4
Range	3.5-4.5

Table 2 provides operative details for the study group. Mean operative time was 180 ± 46 min, and a median EBL of 80 ml. The surgery for the patient with an entero-enteric fistula represented an outlier with respect to EBL (280 mL) and with respect to operative time (220 min). Two (66.6%) patients underwent a diverting loop ileostomy due to poor tissue integrity and residual intraperitoneal infection noted at the time of surgery, there were no conversions to open surgery. All patients were able to tolerate a diet the evening of surgery, and the median time to return of bowel function was 1.6 day.

Table no 3: Postoperative characteristics for complicated Crohn's disease.

INDEXES	RESULTS (n=3)
Time to tolerating regular diet (hours)	18
Range	12-24
Time to flatus (days)	
Mean	2.2±0.6
Median	1.6
Range	1-3
Postoperative length of stay (days)	
Mean	6.2±3.1
Median	4
Range	3-9
30-day readmission	0 (0%)
30-day morbidity	0 (0%)
30-day mortality	0 (0%)

There were no bowel or ureteral injuries, no strictures or anastomotic leaks, no incisional hernias, no surgical site infections, no 30-day readmissions, and no mortality. Median postoperative length of stay was 4 days [Tabl. 3]. All patients who required a diverting loop ileostomy underwent successful closure of their stoma 3 to 6 months after surgery, following a normal water-soluble contrast enema.

IV. Discussion

Surgical intervention for uncomplicated ileocolic Crohn's disease has evolved considerably during the past 15 years [17], with a more often using of minimally invasive surgery now replacing open approach for a growing number of Crohn's patients [18]. However, less data are available regarding the proper role of minimally invasive surgery for ileocolic Crohn's disease complicated by a paracolic abscess, a phlegmon, or fistulizing disease. Consequently, current guidelines accomplished those limited results about laparoscopic surgery in PCD. The European Crohn's and Colitis Organisation (ECCO) stated that in recurrent situations or complex cases, insufficient evidence exists to recommend minimally invasive surgery as technique of first choice [19]. The American Society of Colon and Rectal Surgeons (ASCR), in contrast clarifies that a laparoscopic surgery is feasible in PCD if appropriate expertise is available although this recommendation is mainly based on a study with only 40 patients presenting PCD [20-22].

Alves et al. [23] proclaimed recurrent CD episode, abscess formation, preoperative steroid use and poor nutritional status as risk factors for intra-abdominal septic complications after primary elective ileocolic resection. Kanazawa et al. [24] demonstrated that these findings were also responsible for recurrent operations. Furthermore, increased disease activity, reflecting a high level of C-reactive protein, a low level of preoperative

hemoglobin and recurrent disease were highlighted as marker for an eventful postoperative period in minimally invasive CD surgery [25, 26].

Another important aspect is deviation of planned operative approach in minimal-invasive surgery. Expert centers report in CD surgery conversion rates between 0 and 29 % [8]. Dense adhesions with large inflammatory masses related to fistulas were associated with higher conversion rate in other studies of patients with PCD [27, 28].

A recent series that compared outcomes of PCD versus NPCD after minimally invasive ileocaecal resection, noticed a longer postoperative hospital stay in the PCD group, which is concordant with other announcements [29]. Bellolio et al. analyzed 293 patients with perforating CD, which were compared to 141 non-perforating phenotypes. General morbidity was similar between two groups, but perforating phenotype was less likely to undergo laparoscopic procedure and developed more postoperative abscesses [30].

The aim of our study is to treat the majority of PCD patients by using a minimal-invasive approach; however, patients with previous penetrating disease in association with laparotomies are still often managed by open surgery. In contrast, those patients with a previous minimal invasive approach are initially attempted to be managed laparoscopically again even if a penetrating disease is expected. As a consequence, careful and profound patient selection is crucial in order to achieve best postoperative outcome.

V. Conclusion

Minimally invasive surgery for complicated ileocolic Crohn's disease can be performed safely, with a low rate of complications and with short lengths of hospital stay. A multicenter study would be beneficial to validate these findings, and finding should be taken into account in future guidelines. Notably, minimally invasive surgery remains challenging in this group of patients; thus, surgical experience and careful patient selection is essential.

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