# Inflammatory Bowel Disease

# 13

Kelli B. Ishihara, John Mayo, and Suzanne Gillern

A patient with inflammatory bowel disease (IBD) can be a very intimidating consult for the general surgeon. Although there have been significant advances in medical management, ulcerative colitis (UC) and Crohn's disease (CD) often still present with acute and emergent surgical issues. Surgical intervention is generally reserved for failed medical therapy or complications of the disease. IBD patients should ideally be admitted and managed on a Medicine Service with care directed by a multidisciplinary team of specialists to include a gastroenterologist.

## Medical Management of Inflammatory Bowel Disease (IBD)

With a multitude of medications available, there are many nuances involved in the care of IBD patients, and therefore the medical management of these patients should be directed by a gastroenterologist. However, it is important for the surgeon to understand a few basic principles of medical management. The medical treatment for acute flares of IBD is aimed at reducing inflammation and inducing remission of the disease. For CD, the inflamed tissue can be anywhere along the gastrointestinal tract but most commonly is found in the terminal ileum and cecum [1]. The inflammation in UC begins in the rectum and advances proximally [2].

In the acute setting, systemic steroids are the first treatment. Systemic steroids have been shown to induce remission in up to 92% of patients, but are not as effective at maintenance of remission and are rife with side effects when used long term [1, 3]. Corticosteroids will usually result in improvement of symptoms within 48–72 hours [4]. If this does not occur, or sometimes concurrently, patients will also get treated with a biologic agent. The anti-TNF agents are the most common biologics used in the acute setting and include infliximab (Remicade®, Inflectra®, Renflexis™), adalimumab (Humira®), and certolizumab pegol (Cimzia®). Newer biologic agents are the integrin-receptor antagonists, to include natalizumab (Tysabri®) and vedolizumab (Entyvio®), with their role in an acutely ill patient still being studied. The addition of the biologic medications should lead to improvement in symptoms within 5–7 days. If clinical improvement is not seen at this point, surgery is often indicated.

K. B. Ishihara · J. Mayo · S. Gillern (✉)
Department of Surgery, Tripler Army Medical Center, Honolulu, HI, USA
e-mail: Suzanne.m.gillern.mil@mail.mil



R. Lim (ed.), *Multidisciplinary Approaches to Common Surgical Problems*,
https://doi.org/10.1007/978-3-030-12823-4_13

The following topics discussed in this chapter are the possible presentations of IBD that may lead to urgent or emergent surgery.

## Acute Colitis

Either UC or CD can cause colitis, and the treatment strategies are similar for both. The management of colitis depends on its severity. Mild and moderate colitis is usually defined as less than ten bowel movements per day with no systemic symptoms. The term severe colitis is used to describe ≥6 bloody bowel movements (BMs) combined with at least one sign of systemic toxicity, such as anemia, elevated erythrocyte sedimentation rate (ESR), fever, or tachycardia. The term fulminant colitis is used when there are >10 bloody BMs daily along with signs of systemic toxicity, a transfusion requirement, abdominal tenderness and distention, and imaging that shows colonic dilation [5]. Finally, toxic megacolon is defined as focal or diffuse colonic dilation, greater than 6 cm, with severe systemic toxicity, and usually represents impending perforation [6]. Surgery in the context of colitis is warranted with toxic megacolon, imminent or existing perforation, or if there is ongoing or worsening of colonic dilation, peritonitis, and/or systemic toxicity [7, 8].

For severe and fulminant colitis, a short trial of medical management is recommended, but clinical improvement should begin within 2–3 days of starting glucocorticoids or 5–7 days within initiating biologics [1, 2]. It is also necessary to rule out other infectious etiologies for colitis, such as *Clostridium difficile* or *Cytomegalovirus*. In addition, the use of medications that slow intestinal transit, such as narcotics and antidiarrheal agents, may lead to progression of colitis to toxic megacolon and should be abandoned [7, 8].

When emergent surgery is indicated, the procedure of choice is a total abdominal colectomy with end ileostomy and Hartmann closure or mucus fistula, regardless of the segments of bowel that are involved [7, 8]. The goal of surgery is to rescue the patient from life-threatening toxicity by removing as much of the diseased colon in the safest, most efficient way. The rectum should be left in place and pelvic dissection avoided in this setting [9]. The distal point of transection should be on the distal sigmoid colon at or near the level of the inferior mesenteric artery. Not only does this reduce the operative time and potential complications of the surgery but also allows for a technically easier restorative operation. There is a risk of staple line leak from the Hartmann pouch due to inflammation. The surgeon should consider placing the end of the rectosigmoid stump in the extrafascial superficial tissue or place pelvic and transanal drains to mitigate this risk [7–9].

Restorative procedures are usually completed 4–6 months after colectomy, once inflammation has subsided, nutrition is optimized, and immunologic medications are reduced or stopped [9]. For UC, a second stage operation is required and may include a completion proctectomy with an ileal pouch anal anastomosis (IPAA) and diverting loop ileostomy or a completion proctectomy with an end ileostomy. If an IPAA is performed, the loop ileostomy is later reversed as the third stage operation. IPAA should not be used in patients with CD as the pouch can become involved with the disease and lead to additional complications. As long as there is no inflammation of the rectum, an ileal-rectal anastomosis may be performed for CD patients, but if proctitis is present, the patient will likely need to keep the end ileostomy [7, 9].

## Acute Hemorrhage

Acute lower gastrointestinal hemorrhage is a very rare complication of both UC and CD. The bleeding from IBD is most often caused by inflammation and can often be successfully treated with medical management [10]. IBD patients with significant hemorrhage should immediately undergo resuscitation and diagnostic imaging with CT angiography. Stable patients may be treated by endoscopic or interventional radiologic techniques [7, 8]. Operative intervention should be limited to those patients that are clinically unstable. In the case of both Crohn's colitis and UC, it is recommended that a total abdominal colectomy be performed with end ileostomy [7, 8].

## Obstruction

IBD can cause bowel obstruction primarily from strictures but also secondarily from adhesive disease, malignancy, fistulae, and abscesses. Intestinal strictures in IBD can arise from inflammation, fibrosis, or a previous anastomosis. Evaluation begins with a CT scan with oral and intravenous contrast, which is useful to also identify abscess, fistula, perforation, or other complications of IBD. CT or MR enterography are also often used, as they both have a high sensitivity and specificity for identifying an obstruction from active inflammation or fibrostenosis [7]. Barium small bowel follow-through and capsule endoscopy are other modalities used for evaluating small bowel strictures and obstruction, but these provide more limited information and are not often used in the acute setting [11].

Medical management again is the first line of treatment and well preferred over surgical intervention. The patient should undergo nasogastric tube placement for decompression, fluid resuscitation, and a trial of IV corticosteroids. In the setting of inflammation, the obstruction will usually resolve with steroid treatment, and surgery can be avoided [12]. Endoscopic management with balloon dilation may be considered for fibrotic strictures when they are located in an accessible segment of bowel. The best results for endoscopic treatment are strictures in an isolated short segment (<5 cm) with no signs of active inflammation or associated abscess, fistula, or perforation [7]. Endoscopic dilation is the preferred treatment for anastomotic strictures, with over 80% success rate [13].

If medical and/or endoscopic treatments fail to relieve symptoms, surgical resection of the stricture is recommended. The primary goal of surgery in this setting is to minimize the amount of bowel removed because recurrence rates are high and as many as 45% of patients require additional resections within 10 years [14]. Strictureplasty is a surgical option but should be reserved for patients who have fibrotic strictures with no evidence of inflammation and associated abscess or fistula, diffuse involvement of the small bowel, short bowel syndrome, impending short bowel syndrome, or disease that recurs very rapidly [7]. Strictureplasty allows for maximal preservation of bowel length while achieving the primary goal of relieving the obstruction; however, it can lead to bacterial overgrowth and potential for malignant degeneration [15, 16]. The most commonly performed strictureplasty is the Heineke-Mikulicz. This is performed by making a longitudinal incision on the antimesenteric side of the bowel followed by closure of the enterotomy transversely and is best utilized for strictures less than 10 cm in length. Other types of strictureplasty include the Finney and Michelassi, or longitudinal isoperistaltic strictureplasty, which are utilized for longer strictures [17]. Proximal CD-related strictures of the stomach and duodenum that are not responsive to medical therapy or endoscopic dilation may require proximal bypass procedures rather than resection or stricturoplasty.

In the case of colonic strictures for either UC or CD, the site should be thoroughly biopsied endoscopically given the increased risk for colon cancer. A colonic stricture in the setting of UC harbors a malignancy approximately 25% of the time, regardless of negative biopsy results, and therefore an oncologic resection with total abdominal colectomy is indicated in these patients [8].

## Perforation

Although infrequent, patients with Crohn's disease may present with perforation of the small or large bowel. The most common etiologies are an obstruction or toxic colitis. The presenting symptoms may be masked in the setting of immunomodulatory therapy, particularly high-dose steroids. A high clinical suspicion should be maintained in any patient with an active Crohn's flare who clinically deteriorates. Resuscitation and emergent surgery are indicated when perforation is identified. The procedure of choice for small bowel perforation is resection of the diseased segment with primary anastomosis to bowel that does not clinically appear inflamed [18]. Primary closure of the perforation is not recommended as studies show this technique results in high failure rate and increased mortality, with rates of up to 41% in one case series [7, 18].

In the instance of CD- or UC-related colonic perforation, resuscitation and immediate surgery are again recommended. If a colonic perforation occurs at the cecum due to distal stricture or at the site of necrosis in the setting of toxic colitis, it is recommended to perform a total abdominal colectomy and end ileostomy [8]. In both small and large bowel perforation cases, if the patient is unstable and unfit to undergo an anastomosis at the time of the index operation, the surgeon should obtain source control, and the patient may be left in discontinuity until conditions are more optimal to restore continuity.

## Abdominal Abscess

Intra-abdominal abscess formation is common in CD patients and usually occurs secondary to a perforation or a penetrating ulcer. The management of this issue is complex and requires a multidisciplinary approach involving gastroenterology, surgery, and interventional radiology. Initial management in the setting of a hemodynamically stable patient consists of fluid resuscitation, drainage, broad-spectrum antibiotics with bowel rest, and the consideration of parenteral nutrition [19]. For larger abscesses (>3 cm) that are amenable, the treatment strategy of choice is parenteral antibiotics in addition to percutaneous drainage of the abscess performed by interventional radiology [20, 21]. Percutaneous drainage is successful in achieving resolution of the abscess up to 78% of the time and allows for avoidance of urgent surgery [22]. Although nearly 30% of patients who undergo percutaneous drainage require surgery within a year, it serves as a bridge to definitive surgery resulting in decreased operative complications [21, 23]. If emergent surgery is required, a resection is preferred over operative drainage alone [7].

## Enteric Fistula

Patients with CD often develop fistulas. The most common CD-related fistula is enterocolonic (29%), followed by enterosigmoid (17–26%) and enteroenteric (18–24%). Enterocutaneous fistulas occur in about 6–16% of patients [24]. Fistulas to other organs, such as the bladder, vagina, or stomach, may also develop.

Most fistulas do not require urgent or emergent surgical intervention. The first step in management is to determine if sepsis is present. If the patient is septic, he or she should be appropriately resuscitated and parenteral antibiotics initiated. A CT scan should be performed to look for uncontrolled source of sepsis, such as an associated abscess, in which case a percutaneous drain should be considered as described above. If the patient continues to be septic, operative intervention is required with resection of the diseased bowel [7].

More commonly, in the non-septic patient, initial medical management of fistulas focuses on optimizing nutrition, hydration, and correction of electrolyte imbalances. Patients can become malnourished from a fistula if the output remains high, or large segments of bowel are bypassed. If the patient is asymptomatic, surgery is not indicated. Once the symptomatic patient is medically optimized, surgery is recommended with resection of the diseased portion of bowel. The non-diseased portion of bowel or other involved organs such as the vagina or bladder may be closed primarily [7].

## Intraoperative Considerations

There are many challenges a surgeon faces when operating on an IBD patient. One of the biggest questions pondered intraoperatively is whether a proximal diversion is needed. Ultimately, there is no single all-encompassing answer as each patient should be considered individually. However, there are several factors that should contribute to this decision. The patient's nutritional status, and specifically serum albumin of less than 3.5 g/dL, has been shown to be a preoperative risk factor for anastomotic leak in elective colon surgery, and this data has been replicated for IBD patients [25, 26]. The dosage and chronicity of immunosuppressive medications is also critical to consider. The impact of high-dose glu-

cocorticoids and other immunomodulators such as the anti-TNF agents on septic complications and anastomotic leaks has yet to be universally agreed upon in the literature [27]. Nonetheless, it is generally accepted that they likely play some role in increasing the risk of postoperative complications and therefore must be considered when operating on these patients. The intraoperative considerations that must be factored into the decision to perform a diversion include the patient's hemodynamic stability, the amount of intra-abdominal contamination present at the time of surgery, the extent of disease burden, and the extent of bowel wall edema [7].

The extent of small bowel resection has been well studied. It has been shown that patients should undergo a limited resection with gross negative margins of disease of approximately 2 cm. Fortunately, recurrence rates do not increase with presence of microscopic CD at the margins [28]. One technique to determine healthy bowel intraoperatively is to use the thumb and index finger to palpate the mesenteric border of the bowel. A healthy target for resection will be where the thumb and index finger can be felt with minimal thickening and the bowel edges are soft [29]. Another important intraoperative consideration is to note if the mesentery associated with the diseased bowel is very thick or if it tears or bleeds easily. This is not be the portion of bowel to create an anastomosis.

There has also been debate about how to create the small bowel anastomosis with IBD. Multiple studies have demonstrated that a stapled anastomosis has lower morbidity, recurrence rates, and anastomotic leak rates than a hand-sewn one [30–32]. However, some still advocate for hand-sewn anastomosis when thickened, edematous bowel must be used [33]. Recent data demonstrate a lower rate of anastomotic stricture with a hand-sewn Kono-S-type column-supported anastomosis [34].

The role of laparoscopy in treatment of IBD has also been well argued. Initially, surgeons may have been discouraged from utilizing laparoscopic approaches in patients with CD due to the potential for less than ideal surgical conditions and concerns regarding poor tissue quality. However, recent studies have shown that there may be benefits to the laparoscopic approach, such as earlier return of bowel function and shorter length of hospital stay, with similar rates of disease recurrence and significantly lower overall morbidity [35–37]. Even in the emergent setting of acute severe colitis and toxic megacolon, studies support that laparoscopic colectomy is safe and effective in experienced hands with appropriate patient selection [8, 35, 36]. In addition, the current data suggest that laparoscopy may allow for shorter time interval between each surgery of the three-stage surgical approach to UC [38].

## Conclusion

IBD is a complicated disease process that is best managed initially by medial therapy directed by a multidisciplinary team of gastroenterologist and medical doctors. However, there are times when complications occur and need the urgent attention of the general surgeon. Though medical management resolves the complications of IBD the majority of the time, acute decompensation during the period of medical management and observation can still occur. If the decompensation is due to a perforation or abscess formation, then surgery- or radiology-guided drainage is necessary. In cases involving the small bowel, every effort should be made to preserve as much small bowel as possible and individual consideration given to the creation of a diverting ileostomy. For patients with colonic emergencies, an abdominal colectomy with end ileostomy is the treatment of choice. Laparoscopy can be safe and beneficial in IBD patients and should be considered, even in the emergent setting.

In general, acute flares of IBD that result in an obstruction or colitis should be treated by steroids, and consideration given to adding a biologic agents. The surgical team should exercise strict vigilance because if symptoms worsen or the patient decompensates, a perforation may be occurring. Initial symptoms of worsening may be masked by the steroids or biologic agents. As such, urgent surgical intervention is indicated for a suspected perforation or if the patient clinically worsens.

## References


1. Scott FI, Osterman MT. Medical management of crohn disease. Clin Colon Rectal Surg. 2013;26(2):67–74.
2. Mahadevan U. Medical treatment of ulcerative colitis. Clin Colon Rectal Surg. 2004;17(1):7–19.
3. Chan WPW, Mourad F, Leong RW. Crohn's disease associated strictures. J Gastroenterol Hepatol. 2018;33(5):998–1008.
4. Munkholm P, Langholz E, Davidsen M, Binder V. Frequency of glucocorticoid resistance and dependency in Crohn's disease. Gut. 1994;35(3):360–2.
5. Hanauer SB. Inflammatory bowel disease. N Engl J Med. 1996;334(13):841–8.
6. Jones JH, Chapman M. Definition of megacolon in colitis. Gut. 1969;10(7):562–4.
7. Strong S, Steele SR, Boutrous M, et al. Clinical practice guideline for the surgical management of Crohn's disease. Dis Colon Rectum. 2015;58(11):1021–36.
8. Ross H, Steele SR, Varma M, et al. Practice parameters for the surgical treatment of ulcerative colitis. Dis Colon Rectum. 2014;57(1):5–22.
9. Martin S, Vogel J. Restorative procedures in colonic Crohn disease. Clin Colon Rectal Surg. 2013;26(02):100–5.
10. Kim K-J, Han BJ, Yang S-K, et al. Risk factors and outcome of acute severe lower gastrointestinal bleeding in Crohn's disease. Dig Liver Dis. 2012;44(9):723–8.
11. Fakhoury M, Negrulj R, Mooranian A, Al-Salami H. Inflammatory bowel disease: clinical aspects and treatments. J Inflamm Res. 2014;7:113–20.
12. Lichtenstein GR, Hanauer SB, Sandborn WJ, Practice Parameters Committee of American College of Gastroenterology. Management of Crohn's disease in adults. Am J Gastroenterol. 2009;104(2):465–483; quiz 464, 484.
13. Ajlouni Y, Iser JH, Gibson PR. Endoscopic balloon dilatation of intestinal strictures in Crohn's disease: safe alternative to surgery. J Gastroenterol Hepatol. 2007;22(4):486–90.
14. Fornaro R, Caratto E, Caratto M, et al. Postoperative recurrence in Crohn's disease. Critical analysis of potential risk factors. An update. Surgeon. 2015;13(6):330–47.
15. Drenick EJ, Ament ME, Finegold SM, Corrodi P, Passaro E. Bypass enteropathy. Intestinal and systemic manifestations following small-bowel bypass. JAMA. 1976;236(3):269–72.
16. Hawker PC, Gyde SN, Thompson H, Allan RN. Adenocarcinoma of the small intestine complicating Crohn's disease. Gut. 1982;23(3):188–93.
17. Yamamoto T, Fazio VW, Tekkis PP. Safety and efficacy of strictureplasty for Crohn's disease: a systematic review and meta-analysis. Dis Colon Rectum. 2007;50(11):1968–86.
18. Greenstein AJ, Mann D, Sachar DB, Aufses AH Jr. Free perforation in Crohn's disease: I. A survey of 99 cases. Am J Gastroenterol. 1985;80(9):682–9.
19. Graham E, Rao K, Cinti S. Medical versus interventional treatment of intra-abdominal abscess in patients with Crohn disease. Infect Dis (Auckl). 2017;10:117991611770173.
20. Feagins LA, Holubar SD, Kane SV, Spechler SJ. Current strategies in the management of intra-abdominal abscesses in Crohn's disease. Clin Gastroenterol Hepatol. 2011;9(10):842–50.
21. Clancy C, Boland T, Deasy J, McNamara D, Burke JP. A meta-analysis of percutaneous drainage versus surgery as the initial treatment of Crohn's disease-related intra-abdominal abscess. J Crohns Colitis. 2016;10(2):202–8.
22. Golfieri R, Cappelli A, Giampalma E, et al. CT-guided percutaneous pelvic abscess drainage in Crohn's disease. Tech Coloproctol. 2006;10(2):99–105.
23. Gutierrez A, Lee H, Sands BE. Outcome of surgical versus percutaneous drainage of abdominal and pelvic abscesses in Crohn's disease. Am J Gastroenterol. 2006;101(10):2283–9.
24. Hirten RP, Shah S, Sachar DB, Colombel J-F. The management of intestinal penetrating Crohn's disease. Inflamm Bowel Dis. 2018;24(4):752–65.
25. Suding P. Definitive risk factors for anastomotic leaks in elective open colorectal resection. Arch Surg. 2008;143(9):907.
26. Telem DA. Risk factors for anastomotic leak following colorectal surgery. Arch Surg. 2010;145(4):371.
27. Sharma A, Chinn BT. Preoperative optimization of crohn disease. Clin Colon Rectal Surg. 2013;26(2):75–9.
28. Fazio VW, Marchetti F, Church M, et al. Effect of resection margins on the recurrence of Crohn's disease in the small bowel. A randomized controlled trial. Ann Surg. 1996;224(4):563–571; discussion 571-573.
29. Chandra R, Moore JWE. The surgical options and management of intestinal Crohn's disease. Indian J Surg. 2011;73(6):432–8.
30. Muñoz-Juárez M, Yamamoto T, Wolff BG, Keighley MRB. Wide-lumen stapled anastomosis vs. conventional end-to-end anastomosis in the treatment of Crohn's disease. Dis Colon Rectum. 2001;44(1):20–5.
31. Tersigni R, Alessandroni L, Barreca M, Piovanello P, Prantera C. Does stapled functional end-to-end anastomosis affect recurrence of Crohn's disease after ileocolonic resection? Hepato-Gastroenterology. 2003;50(53):1422–5.
32. Resegotti A, Astegiano M, Farina EC, et al. Side-to-side stapled anastomosis strongly reduces anastomotic leak rates in Crohn's disease surgery. Dis Colon Rectum. 2005;48(3):464–8.
33. Gardiner KR, Dasari BVM. Operative management of small bowel Crohn's disease. Surg Clin North Am. 2007;87(3):587–610.
34. Kono T, Fichera A, Maeda K, et al. Kono-S Anastomosis for surgical prophylaxis of anastomotic recurrence in Crohn's disease: an inter-

national multicenter study. J Gastrointest Surg. 2016;20(4):783–90.
35. Aarons CB. Laparoscopic surgery for crohn disease: a brief review of the literature. Clin Colon Rectal Surg. 2013;26(2):122–7.
36. Kessler H, Mudter J, Hohenberger W. Recent results of laparoscopic surgery in inflammatory bowel disease. World J Gastroenterol. 2011;17(9):1116–25.
37. Tan JJY, Tjandra JJ. Laparoscopic surgery for Crohn's disease: a meta-analysis. Dis Colon Rectum. 2007;50(5):576–85.
38. Chung TP, Fleshman JW, Birnbaum EH, et al. Laparoscopic vs. open total abdominal colectomy for severe colitis: impact on recovery and subsequent completion restorative proctectomy. Dis Colon Rectum. 2009;52(1):4–10.