Chapter 12
Acute Complications of Inflammatory Bowel Disease

Kenneth Bogenberger, Robert Conrad, and Suzanne Gillern

Inflammatory bowel disease (IBD) poses a challenging problem for the general surgeon. Despite advances in medical management, ulcerative colitis (UC) and Crohn's disease (CD) often present with acute and emergent surgical issues. Surgical intervention is generally reserved for failed medical therapy or complications of the disease. The complications that may require urgent surgical intervention include hemorrhage, acute severe colitis, perforation, obstruction, abscess, and fistula disease.

Medical Management

If at all possible, IBD patients should be admitted to the medicine service and a gastroenterologist consulted. Except for the few surgical emergencies described in this chapter, CD and UC should be treated medically until they become

K. Bogenberger · R. Conrad
General Surgery, Tripler Army Medical Center, Honolulu, HI, USA

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

D. Renton et al. (eds.), *The SAGES Manual of Acute Care Surgery*, https://doi.org/10.1007/978-3-030-21959-8_12

refractory to such treatment. It is best to approach these complicated patients with a multidisciplinary team of specialists.

That being said, there are a few basic principles of medical management of both CD and UC that are important to understand. In the acute setting, corticosteroids and biologic therapy will be the first line of treatment. Corticosteroids induce remission in reported rates of between 67% and 92% [1, 2]. Typically, the starting dose is 60 mg methylprednisolone or an equivalent, followed by a slow taper down [3]. The downside of corticosteroids is there are significant side effects and they fail to maintain remission [4]. Corticosteroids will usually result in improvement of symptoms within 48–72 hours [3]. If this does not occur, or sometimes concurrently, patients will also get treated with a biologic agent. The most commonly used agents are infliximab (Remicade®, Inflectra®, Renflexis™), adalimumab (Humira®), and certolizumab pegol (Cimzia®), all of which are anti-TNF agents. Natalizumab (Tysabri®) and vedolizumab (Entyvio®) are integrin receptor antagonist and the newest biologic medications that may be used on IBD patients to induce remission. 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 [3].

Preoperative Considerations

When dealing with complications of IBD and faced with urgent or emergent surgery, there are several important factors to consider when developing the operative plan. Many IBD patients are chronically malnourished from insufficient dietary intake, malabsorption, systemic inflammation, and the side effects of medications [5]. One critical reason to avoid emergent surgery in this patient population, if possible, is to allow time to optimize their nutrition with the goal of decreasing postoperative morbidity [6]. 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 as well [7, 8].

IBD patients are at a two- to threefold greater risk of suffering from venous thromboembolism. Patients with IBD undergoing surgery should therefore receive both mechanical and pharmacologic prophylaxis perioperatively [6].

Another factor to consider is that many of these patients will present to the surgeon already on immunosuppressive therapy. The use of steroids can lead to adrenal insufficiency (AI), which is critical to consider at the time of operation. Although there are no widely agreed upon patterns of steroid use that absolutely cause AI, patients who receive greater than 15 mg of prednisone or an equivalent dose daily for more than 3 weeks are likely to suffer from AI and should therefore be treated appropriately at the time of anesthesia induction [6].

There are many individual factors that should be considered when determining if diversion will be required in an operation for IBD. One of these critical factors is the patient's nutritional status as its importance was previously highlighted. In addition, although the impact of high-dose glucocorticoids and other immunomodulators such as the anti-TNF agents in the setting of sepsis or anastomotic leaks has yet to be universally agreed upon in the literature, they still likely play some role in the development of anastomotic leaks and need to be considered [6]. There are intra-operative factors that should also be evaluated to include the patient's hemodynamic stability, degree of abdominal contamination, and amount of bowel edema. Ultimately, the decision to perform diversion in IBD cases should be made on an individual basis for each patient, taking into account all of these factors as well as the surgeon's judgment [9].

Acute Hemorrhage

Acute lower gastrointestinal hemorrhage is a very rare complication of both UC and CD, occurring in 1–4% of patients [10, 11]. The bleeding from IBD is most often caused by inflammation and thus can often be successfully treated with corticosteroids and biologic therapy [10]. IBD patients with

significant hemorrhage should immediately undergo resuscitation and diagnostic imaging. Stable patients may be treated by endoscopic or interventional radiologic techniques [9]. Operative exploration 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 colectomy be performed in this setting. [9, 12]

Acute Severe Colitis

Acute severe colitis is not very common, occurring in approximately 5–8% of patients with UC and only 4–6% for CD [13, 14]. In both UC and CD, clinical evidence of acute severe colitis, noted by impending or actual perforation, are indications for urgent surgical intervention. Acute severe colitis is defined as greater than six bloody stools per day with signs of systemic toxicity, to include fever (>37.8 °C), tachycardia (>90), anemia (<10.5 g/dL), and elevated erythrocyte sedimentation rate (ESR >30 mm/h) [15]. Fulminant or toxic colitis is defined by the presence of systemic toxicity, greater than ten bloody stools per day, a transfusion requirement, colonic dilation on imaging, and abdominal distention and tenderness [15]. When the transverse colon is dilated >5.5–6 cm and the patient has associated signs of systemic toxicity, the diagnosis is toxic megacolon [16]. Patients with toxic colitis are at an especially high risk of perforation, and surgery is required 20–30% of the time [17]. Mortality in the setting of toxic colitis and IBD dramatically rises if perforation occurs, increasing from 2–8% up to 27–40% [18, 19]. For this reason, if there is concern for toxic colitis, early surgical intervention is preferred.

When initially consulted on the acute severe colitis patient, other causes of the colitis must be ruled out, specifically *Clostridium difficile* and cytomegalovirus. This may be done by performing both stool studies and endoscopic biopsy [20]. Initial management should include admission to a monitored setting, resuscitation, and early administration of maximal

medical therapy. The use of antibiotics and nasogastric decompression may be considered but they have not been shown to consistently improve outcomes in severe colitis. Narcotics and antidiarrheal medications should be avoided [9, 12]. Imaging, preferably a computed tomography (CT) scan of the abdomen and pelvis with IV and oral contrast should be performed to evaluate for increasing dilation, evidence of pneumatosis, or free air, all of which are ominous signs. If the patient clinically deteriorates or does not medically improve after 5–7 days of corticosteroids and biologic agents, surgery is indicated [9, 12].

Whereas the goal of elective surgery is to remove all diseased colon, the goal in urgent/emergent surgery for IBD is to rescue the patient from life-threatening systemic toxicity by removing most of the inflamed intestine in the most efficient and safe manner that avoids a difficult pelvic dissection. Restorative procedures are not recommended in this operative setting for both UC and CD patients [21]. The preferred surgery is a total abdominal colectomy with end ileostomy [9, 12]. The distal extent of resection should be the sigmoid colon at or near the level of the inferior mesenteric artery as this will allow easier anatomic dissection for likely subsequent restorative operations. Due to the remaining inflammation of the distal bowel being left behind and the risk of perforation of this distal staple line, the surgeon should consider extrafascial closure of the closed rectosigmoid stump or abdominal drains with transanal drainage of the distal stump to decrease the risk of pelvic sepsis [9, 12, 21]. Restorative procedures can be considered 4–6 months later, based on the overall health status of the patient [21].

Bowel Obstruction

Bowel obstruction is a relatively common complication of IBD, being much more common in CD as it accounts for approximately 20% of the operations performed on these patients [22]. UC, unlike CD, is not a transmural process, with

inflammation generally confined to the mucosa. The presence of obstruction in patients with previously diagnosed UC should prompt an evaluation to look for the etiology of the obstruction. 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 is indicated in these patients [12].

CD, in contrast to UC, is characterized histologically by transmural inflammation of the bowel and may present phenotypically in a fibrostenotic obstructing pattern or a penetrating fistulous pattern [23, 24]. When facing a Crohn's patient with obstructive symptoms, the most important thing to do is establish the source of obstruction. Symptoms may be a result of active inflammation, fibrotic stricture, or an anastomotic stricture. Although much more rare, patients may also present with obstruction secondary to adhesive disease from prior surgery, malignancy, or foreign bodies such as capsules or plant material. Any patient who presents with obstruction with either known or suspected Crohn's disease should have a thorough workup to include imaging and laboratory data. CT should be performed with IV and oral contrast. Consideration should also be given to obtaining CT or MRI enterography, as they both have a high sensitivity and specificity for identifying an obstruction from active inflammation or fibrostenosis [9].

CD patients with evidence of small bowel obstruction should be managed with nasogastric tube placement, 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 [25]. If the stricture is not responsive to steroid therapy or appears to be at the site of previous anastomosis, endoscopic evaluation, if anatomically feasible, is recommended [9]. Surgery is usually indicated if a fibrotic stricture is seen at the time of endoscopy. However, if the stricture is present at an anastomotic site, endoscopic dilation is the preferred treatment option, with over 80% success rate reported [26].

Once the decision has been made to proceed to the operating room, the primary tenet of surgery in this setting is to

minimize the amount of bowel resected as recurrence rates are high and the patient may need future procedures. As many as 45% of patients require additional resections within 10 years [27]. With this in mind, patients should undergo a limited resection with gross negative margins of disease of approximately 2 cm. Recurrence rates do not increase with presence of microscopic CD at the margins [28]. One technique to determine healthy bowel 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]. When performing the bowel resection, it is important to be aware that the mesentery is likely very thick in the diseased area and may require suture ligation.

Stricturoplasty is a surgical option but should be reserved for patients who have non-inflamed strictures, diffuse involvement of the small bowel, short bowel syndrome, impending short bowel syndrome, or disease that recurs very rapidly [9]. Stricturoplasty 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 [30, 31]. The most commonly performed stricturoplasty is the Heineke-Mikulicz, which is performed by making a longitudinal incision on the antimesenteric side of the bowel followed by closure of the enterotomy transversely. This method is best utilized for strictures less than 10 cm. Other types of stricturoplasty include the Finney and Michelassi, or longitudinal isoperistaltic stricturoplasty, which are utilized for longer strictures [32].

Perforation

Perforation in the setting of active CD is a rare but potentially devastating indication for surgery that occurs in 1–3% of Crohn's patients [33]. 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.

Immediate surgery is indicated when perforation is discovered. Perforations are usually solitary and most commonly occur in the ileum if severe colitis is not present [33]. Resection of the perforated segment is typically performed with primary anastomosis [34]. Diversion is indicated in the presence of hemodynamic instability, edematous bowel, technical challenges of the case as well as the aforementioned patient factors [9].

Colonic perforations can occur but are more commonly seen in the setting of UC and toxic colitis [35]. 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 [12].

Intra-abdominal Abscess

Intra-abdominal abscesses are not uncommon in the setting of CD and are often the result of perforation that is contained by the surrounding structures. Initial management in the setting of a hemodynamically stable patient consists of broad-spectrum antibiotics covering gram-positive, gram-negative, and anaerobic flora [36]. For larger abscesses (>3 cm), the treatment strategy of choice is parenteral antibiotics in addition to percutaneous drainage of the abscess performed by interventional radiology in order to avoid a potentially more morbid emergency surgery [37, 38]. It has been reported that up to 78% of the time, percutaneous drainage is successful in achieving resolution of the abscess and avoidance of urgent surgery [39]. 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 [38, 40]. If emergent surgery is required, a resection is preferred over operative drainage alone [9].

Enteric Fistulas

Fistulas in CD are fairly common and are responsible for up to 24% of surgeries performed on Crohn's patients [22, 41]. Enteroenteric fistulas are the most common fistulas that form in CD and the most common location is the terminal ileum [42]. Other types of fistulas include enterocutaneous fistulas and fistulas to other intra-abdominal organs such as the colon, bladder, stomach, or vagina.

Most fistulas do not require urgent or emergent surgical management. 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. If the patient continues to be septic, operative intervention is required with resection of the diseased bowel [9].

In a patient without sepsis there is no urgent need for surgical intervention. Symptoms of fistula are malabsorption, diarrhea, and recurrent infections. If the patient is asymptomatic, which often occurs if only a short loop of bowel is bypassed by an enteroenteric fistula, no treatment is needed. If surgery is warranted due to symptoms, the patient should be medically optimized. The principle of surgery is to remove the diseased portion of bowel and the non-diseased bowel can be closed primarily. Other organs that may be involved such as the bladder or vagina may be closed primarily or left to heal by secondary intention [9].

Role of Laparoscopy in Acute Management of IBD

Laparoscopy is a safe option for the treatment of IBD. It has been found to be equivalent to open surgery in the well-chosen patient and setting [43]. A recent meta-analysis compared laparoscopic and open surgery in the treatment of CD

and found the laparoscopic group had longer operative times, but faster recovery of bowel function and shorter hospital stay. In addition, the overall morbidity was lower in the laparoscopic group [44]. 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 [12, 45, 46]. The current data suggest that laparoscopy may allow for shorter time interval between each surgery of the three-stage surgical approach to UC [47].

Conclusion

IBD is a complicated disease process that is best treated initially with medical therapy with the assistance of medical specialist. At times, the clinicians can wait up to 7 days to see if medical management, biologic agents in particular, will be effective. However, in some circumstances, to include life-threatening hemorrhage, acute severe colitis, free perforation, or septic patients with intra-abdominal abscess or fistula, surgery may be emergently indicated. In cases involving the small bowel, every effort should be made to remove as little bowel as possible and individual consideration given to determine if diversion is required. For patients with colonic emergencies, an abdominal colectomy with end ileostomy is recommended. Laparoscopy can be safe and beneficial in IBD patients and should be considered in the emergency setting.

References

1. Modigliani R, Mary J-Y, Simon J-F, et al. Clinical, biological, and endoscopic picture of attacks of Crohn's disease. Gastroenterology. 1990;98(4):811–8.
2. Turner D, Walsh CM, Steinhart AH, Griffiths AM. Response to corticosteroids in severe ulcerative colitis: a systematic review of the literature and a meta-regression. Clin Gastroenterol Hepatol. 2007;5(1):103–10.

3. Burger D, Travis S. Conventional medical management of inflammatory bowel disease. Gastroenterology. 2011;140(6):1827–1837.e2.
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. Razack R, Seidner DL. Nutrition in inflammatory bowel disease. Curr Opin Gastroenterol. 2007;23(4):400–5.
6. Sharma A, Chinn BT. Preoperative optimization of crohn disease. Clin Colon Rectal Surg. 2013;26(2):75–9.
7. Suding P. Definitive risk factors for anastomotic leaks in elective open colorectal resection. Arch Surg. 2008;143(9):907.
8. Telem DA. Risk factors for anastomotic leak following colorectal surgery. Arch Surg. 2010;145(4):371.
9. 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.
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. Robert JR, Sachar DB, Greenstein AJ. Severe gastrointestinal hemorrhage in Crohn's disease. Ann Surg. 1991;213(3):207–11.
12. 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.
13. Strong SA. Management of acute colitis and toxic megacolon. Clin Colon Rectal Surg. 2010;23(4):274–84.
14. Grieco MB, Bordan DL, Geiss AC, Beil AR Jr. Toxic megacolon complicating Crohn's colitis. Ann Surg. 1980;191(1):75–80.
15. Hanauer SB. Inflammatory bowel disease. N Engl J Med. 1996;334(13):841–8.
16. Jones JH, Chapman M. Definition of megacolon in colitis. Gut. 1969;10(7):562–4.
17. Present DH. Toxic megacolon. Med Clin North Am. 1993;77(5):1129–48.
18. Sheth SG, Thomas LaMont J. Toxic megacolon. Lancet. 1998;351(9101):509–13.
19. Heppell J, Farkouh E, Dubé S, Péloquin A, Morgan S, Bernard D. Toxic megacolon. An analysis of 70 cases. Dis Colon Rectum. 1986;29(12):789–92.
20. Lewis JD. The utility of biomarkers in the diagnosis and therapy of inflammatory bowel disease. Gastroenterology. 2011;140(6):1817–1826.e2.

21. Martin S, Vogel J. Restorative procedures in colonic Crohn disease. Clin Colon Rectal Surg. 2013;26(02):100–5.
22. Hurst RD, Molinari M, Chung TP, Rubin M, Michelassi F. Prospective study of the features, indications, and surgical treatment in 513 consecutive patients affected by Crohn's disease. Surgery. 1997;122(4):661–7; discussion 667–668.
23. Schlussel AT, Steele SR, Alavi K. Current challenges in the surgical management of Crohn's disease: a systematic review. Am J Surg. 2016;212(2):345–51.
24. Ambe R, Campbell L, Cagir B. A comprehensive review of strictureplasty techniques in Crohn's disease: types, indications, comparisons, and safety. J Gastrointest Surg. 2012;16(1):209–17.
25. 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):465–83; quiz 464, 484.
26. 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.
27. Fornaro R, Caratto E, Caratto M, et al. Post-operative recurrence in Crohn's disease. Critical analysis of potential risk factors. An update. Surgeon. 2015;13(6):330–47.
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):563–71; 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. 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.
31. Hawker PC, Gyde SN, Thompson H, Allan RN. Adenocarcinoma of the small intestine complicating Crohn's disease. Gut. 1982;23(3):188–93.
32. 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.
33. Kim JW, Lee H-S, Ye BD, et al. Incidence of and risk factors for free bowel perforation in patients with Crohn's disease. Dig Dis Sci. 2017;62(6):1607–14.
34. 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.

35. Greenstein AJ, Aufses AH Jr. Differences in pathogenesis, incidence and outcome of perforation in inflammatory bowel disease. Surg Gynecol Obstet. 1985;160(1):63–9.
36. Graham E, Rao K, Cinti S. Medical versus interventional treatment of intra-abdominal abscess in patients with Crohn disease. Infect Dis: Res Treat. 2017;10:117991611770173.
37. 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.
38. 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.
39. 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.
40. 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.
41. Michelassi F, Balestracci T, Chappell R, Block GE. Primary and recurrent Crohn's disease. Experience with 1379 patients. Ann Surg. 1991;214(3):230–8; discussion 238–240.
42. Leowardi C, Heuschen G, Kienle P, Heuschen U, Schmidt J. Surgical treatment of severe inflammatory bowel diseases. Dig Dis. 2003;21(1):54–62.
43. Hoffmann M, Siebrasse D, Schlöricke E, Bouchard R, Keck T, Benecke C. Long-term outcome of laparoscopic and open surgery in patients with Crohn's disease. Open Access Surg. 2017;10:45–54.
44. Rosman AS, Melis M, Fichera A. Metaanalysis of trials comparing laparoscopic and open surgery for Crohn's disease. Surg Endosc. 2005;19(12):1549–55.
45. Kessler H, Mudter J, Hohenberger W. Recent results of laparoscopic surgery in inflammatory bowel disease. World J Gastroenterol. 2011;17(9):1116–25.
46. Aarons CB. Laparoscopic surgery for crohn disease: a brief review of the literature. Clin Colon Rectal Surg. 2013;26(2):122–7.
47. 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.