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Review

Surgical Treatment in Inflammatory Bowel Disease

Tugce Eskazan, Ibrahim Hatemi

Division of Gastroenterology, Department of Internal Medicine, Cerrahpasa Faculty of Medicine, Istanbul University-Cerrahpasa, Istanbul, Türkiye

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Corresponding author: Ibrahim Hatemi, e-mail: ihatemi@yahoo.com

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Abstract

In inflammatory bowel disease (IBD), surgery plays a crucial role in disease management, particularly when active disease cannot be controlled by medical therapy or when complications arise, especially in Crohn's disease (CD).In ulcerative colitis, surgery is indicated for cases of acute severe colitis and chronic, treatment-refractory disease. Restorative proctocolectomy and rectal-sparing surgery are the preferred approaches in certain patient groups. In CD, surgery is typically performed either alone or in combination with medical therapy in the presence of strictures, fistulae, or penetrating disease.The timing of surgery and the performance of elective procedures under optimal conditions are critical to effective surgical management. During the perioperative period, patients should be optimized through measures such as nutritional support, while ongoing treatments (e.g., corticosteroids and anti-TNF therapies) should be carefully assessed. Elective surgeries are associated with fewer postoperative complications and higher success rates.Surgical options may include procedures like stricturoplasty and endoscopic balloon dilation for localized disease, as well as resection or diversion stoma for more severe cases.Although advancements in medical therapies have reduced surgical rates, the management of IBD still requires an individualized approach that integrates both medical and surgical strategies. A multidisciplinary treatment plan is essential to achieve optimal outcomes, particularly in complex cases involving perianal disease or fistulae.
Keywords: Crohn's disease, surgery, ulcerative colitis

INTRODUCTION

The need for surgical treatment in inflammatory bowel disease (IBD) is closely associated with the duration of the disease. A meta-analysis revealed that in Crohn's disease (CD), the surgery rate is 16% within the first year, increasing to 45% by the 10th year. For ulcerative colitis (UC), these rates are reported as 4.9% and 15.6%, respectively.[1]

In CD, effective medical treatment administered before complications arise can reduce the likelihood of surgery. In UC, effective medical therapy can delay colectomy and, in some cases of acute severe UC, may even prevent the need for surgery. However, while some meta-analyses suggest that early biological therapy (within three years of diagnosis) reduces the need for surgery in CD, the opposite trend is observed in UC.[2,3] This discrepancy may be because UC patients who require biological therapy often have a more severe clinical course.

Surgical treatment for UC is typically necessary in two primary situations:

1. Acute severe UC
2. Chronic active refractory colitis that does not respond to medical treatment

Colectomy may be required in 10–20% of cases after the first attack and in 30–40% of patients with chronic disease.[4] The recommended surgical procedure is restorative total proctocolectomy with ileal pouch-anal anastomosis. In selected cases, a rectum-sparing colectomy may also be considered.[5] In rare instances, a permanent end ileostomy may be the most appropriate treatment option. The decision to proceed with surgery should be made by a multidisciplinary team, taking into account factors such as the patient's age, preferences, and fertility considerations for women.

There are various approaches to proctocolectomy, which can be restorative or non-restorative. Restorative proctocolectomy may be performed in one, two, or three stages. The details of the surgical technique and the most suitable approach for the patient should be carefully discussed between the surgeon and the gastroenterologist. Patients should be thoroughly informed about the rationale for selecting a particular surgical method.

ACUTE SEVERE COLITIS

The treatment of acute severe colitis will not be detailed here, as it has been covered in another section. The primary treatment involves intravenous corticosteroids, with patients requiring hospitalization and close monitoring. It is essential that the surgical team is informed of the patient's condition. For patients who do not respond to steroid treatment by day three, intravenous infliximab or cyclosporine should be considered. The ECCO guidelines do not provide specific recommendations regarding the dosage and frequency of infliximab in this context, and various sequential rescue therapy regimens have been attempted.

UC REFRACTORY TO MEDICAL TREATMENT

Surgical intervention may be necessary for patients with UC who fail to respond to medical treatment. The timing of surgery is as critical as the decision itself since delays may prevent the procedure from being performed under optimal conditions. Prolonged use of immunosuppressive therapy increases the risk of infection, while extended periods of inflammation without adequate nutritional support can lead to cachexia. This condition weakens the patient's immune system, making them more susceptible to infections and raising the likelihood of postoperative complications. These risks are particularly significant for steroid-dependent patients.

The ECCO 2022 guidelines emphasize that the use of prednisolone at doses greater than 20 mg for more than six weeks significantly increases the risk of postoperative complications.[4] The guidelines also note that although azathioprine and cyclosporine do not elevate the risk of postoperative complications, biologic agents may contribute to higher complication rates.[4]

Whenever possible, steroids and biologic therapy should be discontinued before surgery to reduce the risk of infection. However, in steroid-dependent patients, discontinuing biologic therapy before surgery is often not feasible, and many patients are referred for surgery while still on biologics. In such cases, the patient's condition should be carefully assessed by the surgical team, and the most appropriate surgical approach-such as a three-stage or modified two-stage procedure-should be determined.

COMPLICATIONS AND MANAGEMENT OF SURGICAL TREATMENT

The most common postoperative complication associated with the pouch is pouchitis, which can occur in up to 80% of patients during long-term follow-up. Other complications may include CD of the pouch, afferent loop ileitis, and cuffitis.

In the postoperative period following surgery for UC, the recurrence of UC in the short rectal segment left for pouch anastomosis is referred to as cuffitis. This condition is distinct from other pouch-related complications and is treated similarly to ulcerative colitis.

Pouchitis is an inflammation of the pouch mucosa, essentially a form of ileitis caused by changes in the microbiota. The primary treatment involves antibiotic therapy to modify the microbiota. Some patients may develop recurrent pouchitis, and chronic antibiotic-refractory pouchitis can occur. Pouchitis is classified as acute if it lasts less than four weeks and chronic if it persists for more than four weeks. If a patient experiences more than three episodes in a year, it is considered recurrent.

Metronidazole and ciprofloxacin are commonly used to treat pouchitis, and both have proven effective.[6] However, one randomized controlled study found that rifaximin is not more effective than placebo.[6,7] In cases of chronic antibiotic-refractory pouchitis, the pouch should be evaluated through endoscopic and radiological imaging to rule out mechanical, ischemic, and infectious causes. For chronic antibiotic-refractory pouchitis, biologic therapy may also be considered, with infliximab potentially being more effective than vedolizumab and adalimumab.[8]

Crohn's disease of the pouch is a rare condition. In patients undergoing pouch surgery for UC, complications such as fistulas and obstructions may arise postoperatively. The prevalence of CD of the pouch after pouch surgery is approximately 10%.[6] In some cases, inflammation may also develop in the afferent loop; when this occurs, it is referred to as afferent loop ileitis. Diagnosing CD of the pouch can be challenging. Radiological imaging, such as perianal MRI, should be conducted and reviewed in collaboration with the surgical team that performed the procedure. Treatment typically follows protocols for complex perianal CD. Unfortunately, some patients may require a permanent ileostomy due to recurrent complications associated with the pouch.

CD of the pouch is more commonly observed in patients diagnosed at an early age, those who undergo surgery at a young age, individuals with a family history of IBD, and smokers.[9]

MAIN POINTS

- Surgical treatment is not solely an option for managing refractory or complicated inflammatory bowel disease that does not respond to medical therapy.
- It can also be used as a first-line treatment or as part of combination therapy with biologics for certain patients.
- The timing of surgery is crucial. Delayed surgery often leads to more complex disease, increased complications, and the need for larger bowel resections.

SURGICAL TREATMENTS IN CROHN'S DISEASE

Indications for Surgical Treatment

- Complicated Crohn's disease (stenosing and penetrating disease)
- Presence of perianal disease
- Treatment-resistant patients
- Development of dysplasia and malignancy
- Conditions requiring emergency surgery

Surgery in Localized Ileocecal Disease

Surgical treatment should be considered as an alternative for patients with localized disease that is resistant to medical therapy. The goals of surgical intervention include improving quality of life, eliminating long-term uncontrolled inflammation, and reducing the risk of complications associated with prolonged steroid use or multiple immunosuppressive therapies.

In the LIRIC study, patients unresponsive to conventional treatments were divided into two groups: one receiving laparoscopic ileocecal resection and the other undergoing infliximab treatment. 10 No significant differences were observed between these two therapeutic approaches during follow-up. Over a median follow-up period of four years, approximately one-third of the patients in the infliximab group ultimately required surgery, while about one-quarter of the patients in the surgical group required infliximab therapy.[10]

SURGICAL TREATMENTS IN THE PRESENCE OF STRICTURES

More than one-third of patients with CD develop strictures within the first ten years following diagnosis.[11] Strictures can be classified as inflammatory, fibrotic, or a combination of both. Distinguishing between inflammation and fibrosis using imaging methods is not always possible; however, identifying whether a stricture is inflammatory or fibrotic is crucial when planning treatment. Before determining a treatment plan for strictures in CD, it is essential to evaluate factors such as the presence of prestenotic dilation, the length of the affected segment, the location of the stricture, and the feasibility of endoscopic treatments. While medical therapies can be effective for inflammatory strictures,

surgical options should be prioritized for fibrotic strictures. Endoscopic treatments may be appropriate for short-segment strictures.

When planning treatment for CD, it is important to consider the risk of disease recurrence. If resection is contemplated, the patient's history of recurrent resections and the risk of developing short bowel syndrome must be carefully assessed. Preserving bowel length is critical in all cases; however, it should be noted that retaining diseased mesentery may increase the risk of recurrence. A thorough evaluation by a multidisciplinary team is essential. Preoperative factors, including the presence of intraabdominal sepsis, serum albumin levels, intraabdominal abscesses, and the patient's current medications-such as steroids and biologics-significantly affect postoperative outcomes.

Moderate prestenotic dilation has been associated with a favorable response to anti-TNF therapy, in contrast to cases without dilation or with advanced dilation. Likewise, anti-TNF therapies tend to be more effective when marked obstructive symptoms develop rapidly.[12]

In cases of acute obstruction, patients typically present with severe nausea, vomiting, abdominal pain, and the absence of gas and stool passage. Conservative treatments-such as bowel rest, nasogastric tube insertion, and hydration-should be prioritized, followed by planned surgical intervention. These measures help optimize the patient's nutritional and immunosuppressive status before elective surgery. However, if clinical or radiological signs of peritonitis, bowel ischemia, or perforation are present, emergency surgical treatment is required.

Endoscopic balloon dilation can be used alone or in combination with other treatment methods. It may prevent or delay the need for surgical resection or strictureplasty for strictures and anastomotic strictures caused by CD. Balloon dilation is particularly effective for short-segment strictures (<5 cm), isolated strictures that are easily accessible via colonoscopy, and ileocolic anastomotic strictures. In contrast, the success rate of endoscopic treatment for duodenal strictures is lower than for strictures in other regions. Ileal strictures that are endoscopically accessible are also suitable for balloon dilation, although they are associated with higher complication and recurrence rates.

The most common complications during balloon dilation include bleeding and perforation.

STRICTUREPLASTY

Endoscopic balloon dilation is a preferred method for treating small bowel strictures because it does not result in the loss of bowel length. It should be the primary choice, especially for patients who have previously undergone small bowel resections and are at risk for short bowel syndrome. This technique is particularly recommended for strictures shorter than 10 cm, in cases of multiple strictures, or when preserving bowel length is critical. However, strictureplasty is not advised in the presence of accompanying fistulas, abscesses, or premalignant/malignant lesions.

The traditional Heineke-Mikulicz strictureplasty is typically used for strictures up to 10 cm in length. Modified techniques, such as the Finney procedure, are employed for medium-length strictures ranging from 10 to 25 cm, while an enteroenterostomy (Michelassi procedure) is indicated for longer strictures.[13,14] For patients with long terminal ileal strictures exceeding 20 cm, the D'Hoore technique has been described. This is a modified side-to-side isoperistaltic strictureplasty of the terminal ileum, similar to the Michelassi technique.

Surgical morbidity is not associated with the length of the stricture. Long-term outcomes are favorable, showing that strictureplasty yields better results compared to resection.

RESECTION

Ileocolic resection is the most commonly performed surgical procedure, particularly for patients with ileal strictures. Recent studies suggest that including the mesentery in the resection may help reduce the risk of recurrence. To minimize recurrence, it is recommended to perform a mesenteric resection or use an anastomosis that excludes the mesentery, such as the Kono-S anastomosis, for terminal ileal strictures.[15,16]

In cases with multiple strictures, if there is sufficient remaining small bowel length and it is feasible to resect all affected areas, surgical resection should be preferred over multiple strictureplasties. Factors such as potential postoperative complications from complex surgeries, the risk of short bowel syndrome, and the patient's perioperative condition-including corticosteroid and immunosuppressive drug use, serum albumin levels, anemia, and nutritional status-should be carefully considered when planning appropriate management.

When surgery is required for small bowel obstruction in CD, it is essential to evaluate the bowel in detail with MR enterography before surgery, if possible. MR enterography is valuable for distinguishing between inflamed strictures (which may respond to intensified medical treatment) and fibrotic strictures. During surgical planning, maximizing bowel length preservation is critical. Surgeons should be proficient in various surgical techniques, including both traditional and non-traditional strictureplasties. Strictureplasty is not recommended for colonic strictures.

DIVERSION

In CD, diversion is commonly employed in the presence of perianal fistulas or to avoid high-risk anastomoses. It can also serve as a preventive measure against the development of obstruction, such as in cases involving a stricture in the anal canal. Diversion options include ileostomies and colostomies.[17,18]

PENETRATING CROHN'S DISEASE

Penetrating disease presents multiple indications for surgery, including intra-abdominal or retroperitoneal abscesses that fail to respond to antibiotics or percutaneous drainage, perforation, fistulas with ongoing symptoms, resistance to medical treatment, and septic conditions. Intra-abdominal abscesses require more than antibiotic therapy alone, as continuing immunosuppressive treatment in the presence of an abscess increases the risk of intra-abdominal infection. Therefore, percutaneous drainage under ultrasound and/or CT guidance along with antibiotic therapy should always be the first-line treatment for significant and accessible intra-abdominal abscesses.

The need for bowel resection should be reassessed after abscesses have been controlled with drainage and antibiotic therapy. Surgery may not always be necessary after treating localized abscesses with these measures, but studies have shown that patients who undergo resection after drainage have a lower risk of recurrence.[19] In cases of refractory disease, the presence of strictures, or enterocutaneous fistulas, surgical intervention may be required. Studies indicate that patients who have surgery after controlling the intra-abdominal abscess with drainage and antibiotics experience lower complication rates and reduced stoma requirements compared to those who undergo surgery without prior drainage.[20]

In the presence of a penetrating disease pattern in CD, emergency resection should be avoided. Postoperatively, nutrition-related issues and the use of immunosuppressive drugs can complicate healing, making surgery in these patients more challenging.

Abdominal wall abscesses, retroperitoneal abscesses, and psoas muscle abscesses are less common but more difficult to control than intra-abdominal abscesses. These patients require early surgical intervention. In cases where peritonitis develops due to an abscess, surgical treatment becomes mandatory. Ideally, surgery should be performed in a planned manner after intra-abdominal sepsis is brought under control.

SPECIAL SITUATIONS

Presence of Enterovesical and Enterovaginal Fistulas

The presence of enterovesical and enterovaginal fistulas in CD is rare, and data on their management are limited. Surgical indications include fistulas originating from the sigmoid colon, the presence of other complications of CD, obstruction, intra-abdominal abscess, ureteral obstruction, and recurrent urinary tract infections.[21]

A case series of 47 patients with enterovaginal fistulas found that antibiotics provided no lasting benefit. Thiopurines achieved a complete response in 13% of patients and a partial response in 24%, while anti-TNF therapy achieved a complete response in 17% and a partial response in 30%. In the same series, one-third of the patients underwent surgery, with a complete response observed in 22% after the first surgery and in 39% after repeated surgeries. Fistula closure was achieved in only one-third of the patients.[22]

Medical treatment alone or in combination with surgery may provide benefits for some patients in the management of enterovaginal and enterovesical fistulas. Patients should be discussed by a multidisciplinary team, and treatment should be planned according to their symptoms and current condition.

Enteroenteric Fistulas

Enteroenteric fistulas do not always present clinical symptoms, and guidelines indicate that surgery may not always be necessary for such fistulas.

Enterocutaneous Fistulas

Enterocutaneous fistulas typically occur in areas with inflamed segments in active CD and are often associated with intra-abdominal abscesses and luminal strictures. These fistulas are frequently treated surgically; however, there are cases where closure has been achieved with anti-TNF therapy. Despite anti-TNF treatment, surgery was required in 54% of patients.[23] The complexity of the fistula-such as multiple tracts, high output, or abscess development-is associated with adverse outcomes, including mortality.[24]

Immunomodulatory and biological therapies may play a role in managing low-output enterocutaneous fistulas. However, surgery is necessary for high-output and complex fistulas. All patients with enterocutaneous fistulas should be managed by a multidisciplinary team.

Treatment planning should take into account both the patient's clinical symptoms and condition, along with any complications associated with the fistula. For example, surgical intervention will be required in cases of malnutrition caused by a high-output fistula or a fistula-related luminal stricture.

There is limited evidence on the role of immunosuppressive therapy in fistula closure. If a fistula is associated with active inflammation, medical treatment may provide some benefit, but it is ineffective for fistulas that develop postoperatively. In a retrospective series of 48 patients with enterocutaneous fistulas, approximately one-quarter of the fistulas developed in the postoperative period. When anti-TNF therapy was initiated in this group, one-third of the fistulas healed; however, half of these recurred within a three-year follow-up period. Additionally, one-third of the patients developed intra-abdominal abscesses during anti-TNF therapy.

SURGICAL TECHNIQUES IN THE TREATMENT OF CROHN'S DISEASE

In suitable patients, and depending on the surgeon›s experience, laparoscopic surgery should be preferred. While some studies show no differences in postoperative management between laparoscopic and open surgery, other studies indicate that laparoscopic surgery is associated with fewer postoperative complications and lower rates of incisional hernias.[25] If corticosteroids cannot be discontinued or reduced preoperatively, a temporary stoma may be considered as an option.

There are no studies directly comparing different anastomosis strategies, such as anastomosis with a protective stoma, secondary anastomosis, or stoma without anastomosis. The choice of approach should be guided by the patient›s clinical condition and the surgeon's expertise. However, it is important to note that using steroids equivalent to 20 mg or more of prednisolone for over six weeks increases the risk of postoperative infectious complications and anastomotic leaks. Primary anastomosis has been reported to be safe in patients receiving anti-TNF therapy, vedolizumab, or ustekinumab.[26]

In cases where a single segment of the colon is affected, segmental colon resection may be an option. However, when multiple segments of the colon are involved, subtotal or total colectomy is generally preferred. One meta-analysis comparing these three approaches found no differences in recurrence and complication rates.[27] However, another meta-analysis showed that complication rates were highest with segmental resection and lowest with subtotal colectomy.[28] Based on these findings, subtotal colectomy appears to be the safer procedure. It should be noted, however, that subtotal colectomy carries a higher risk of recurrence and the need for additional surgery compared to total proctocolectomy.

In patients who have previously undergone small bowel resection, segmental resection should be the preferred approach.[26]

DIVERTING STOMA

In cases of severe active disease, performing a diverting ileostomy before subtotal or total colectomy can prevent the need for emergency surgery and help optimize the perioperative period. The most common stoma-related complications include dysfunction, prolapse, hernias, and acute renal failure caused by excessive fluid loss.[29]

Risk factors for proctocolectomy include severe refractory perianal disease, the need for combination medical therapy, and a history of multiple biologic treatments. For this patient group, early colectomy with end ileostomy may be considered as an option.[26] In selected patients with refractory pancolonic involvement who have no history of perianal disease or ileal involvement, restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) may be an option. However, the potential for pouch dysfunction must always be considered.[26]

Studies comparing patients with UC who underwent total colectomy and IPAA to those with CD have found no significant differences in early complications, such as anastomotic leaks and pelvic sepsis. However, the CD group experienced significantly higher rates of anastomotic strictures, pouch dysfunction, conversion to end ileostomy, and long-term complications.[30-32]

Planning surgery for Crohn's disease is a complex process that requires individualized assessment by a multidisciplinary team. The surgeon›s expertise in the chosen surgical method is also a critical factor in determining the outcome.

SURGICAL TREATMENTS IN THE PRESENCE OF PERIANAL FISTULAS

There are no prospective studies directly comparing medical and surgical treatments for complex perianal fistulas. Current guidelines recommend a combined approach that incorporates both medical and surgical interventions to manage the fistula effectively.

SURGICAL DRAINAGE

Due to the heterogeneity of patient groups and the retrospective nature of studies, the superiority of anti-TNF therapy alone over the combination of anti-TNF therapy and surgery for perianal fistulas has not been demonstrated.

In the PISA study conducted in 2021, patients with perianal fistulas were divided into three groups for one year: those who received chronic seton drainage, those who received anti-TNF therapy for six months, and those who received anti-TNF therapy plus fistuloplasty for four months. At the end of the follow-up period, the highest recurrence was observed in the seton group, while the lowest recurrence occurred in the anti-TNF plus fistuloplasty group. There was no significant difference in quality of life among the groups.[33]

In daily practice, the recommendation is to control perianal sepsis through seton drainage and administer anti-TNF therapy. Patients should undergo regular perianal examinations and be referred to general surgery for consultation.

PERIOPERATIVE OPTIMIZATION IN CROHN'S DISEASE

The need for surgery in CD remains between 20% and 30%. Postoperative complications are common, with a higher risk of complications following emergency surgeries.

Preoperative nutritional status should be monitored.[34] Severe malnutrition (BMI <18.5 kg/m² and recent weight loss of more than 10% of body weight) is associated with intra-abdominal sepsis and increased mortality. All patients scheduled for surgery should have their nutritional status and malnutrition risk assessed. Patients at risk of malnutrition should receive oral nutritional supplements. If oral supplements are not tolerated, enteral or parenteral nutrition should be considered.

The European Society for Clinical Nutrition and Metabolism (ESPEN) recommends providing nutritional support for 7–10 days preoperatively in patients with mild malnutrition undergoing major bowel surgery.[35] Elective surgery should ideally be delayed until malnutrition is treated. However, in emergencies, the type of surgery should be planned to minimize the risk of complications.

Preoperative serum albumin levels should also be checked.[35] Hypoproteinemia (albumin <30 g/L), though common in the presence of severe inflammation or malabsorption, does not fully reflect nutritional status. Hypoproteinemia is associated with an increased risk of postoperative intra-abdominal sepsis. While evidence supporting the use of intravenous albumin is weak, nutritional support is essential to improve albumin levels. However, nutritional support alone may not fully normalize low albumin levels.

Preoperative anemia (Hb <130 g/L in men and <120 g/L in women) increases the risk of postoperative intra-abdominal sepsis. Treating anemia can help reduce the risk of septic complications, including bleeding, anastomotic leaks, postoperative perforation, and pneumonia. The use of oral or intravenous iron preparations is recommended.

MEDICAL TREATMENT AND SURGERY

Patients undergoing surgery while on corticosteroid therapy are at increased risk for postoperative infectious complications and anastomotic leaks, especially those receiving high doses (40 mg of prednisolone or more). Corticosteroids should be discontinued or reduced to the lowest possible dose before elective surgery whenever feasible.

There is no evidence that the use of immunosuppressive therapy (thiopurines and methotrexate) up to the time of surgery is associated with an increased risk of postoperative complications.[36,37]

Systematic reviews and meta-analyses have shown that patients receiving anti-TNF therapy in the perioperative period have an increased risk of infectious complications, although this risk is lower than that associated with corticosteroid use.[38] The perioperative risk is influenced by other factors such as the presence of fistulas, abscesses, low albumin, anemia, and concurrent corticosteroid use, in addition to anti-TNF therapy. Some studies have also indicated that perioperative risk in Crohn's disease is linked to anti-TNF drug levels.

It is recommended to discontinue infliximab 6–8 weeks before surgery and adalimumab 4 weeks before surgery. If discontinuation is not feasible, it is advised to schedule the injections as far apart as possible prior to the operation.

TYPES OF SURGICAL TREATMENT

The type of surgery plays a crucial role in the management of perioperative treatments for patients with IBD. In patients undergoing proctocolectomy, corticosteroids can impair wound healing. The two-stage ileal pouch-anal anastomosis (IPAA) procedure carries a higher risk of complications in patients receiving anti-TNF therapy compared to the three-stage procedure.

Pouch surgery is complex, and a staged approach to pouch formation is safer for both patients on corticosteroids and those receiving anti-TNF therapy. Elective surgery is preferable for patients who can discontinue corticosteroids and anti-TNF medications prior to the procedure.

Although medical treatments, particularly biologics, are expected to reduce the need for surgery in IBD, recurrent surgical interventions may still be necessary in certain patient groups. The surgical management of these patients remains a challenging process. Surgical planning should be based on disease characteristics, including the presentation of the disease, the affected area, and severity, as well as the patient's sociodemographic factors.

The timing and type of surgery are critical in IBD. Therefore, the surgical process should always be coordinated by a multidisciplinary team

that includes specialists from gastroenterology, general surgery, and radiology, among other disciplines.

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