

Surgical Treatment of Inflammatory Bowel Disease

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INTRODUCTION

During the course of Inflammatory Bowel Disease (**IBD**), surgery may be needed. Approximately 20% of patients with Ulcerative Colitis (**UC**) will require surgery, whereas up to 80% of Crohn's Disease (**CD**) patients will undergo an operation during their lifetime [1].

For UC patients requiring surgery, total is the operation of choice as it provides a permanent cure and Ileoanal Pouch Anastomosis (**IPAA**) has replaced the classic permanent ileostomy as the procedure of choice to accompany a proctocolectomy.

For CD, surgery is not a definitive cure. Therefore, intestinal resection is indicated for patients who are refractory to the therapy or who are intolerant to medical treatments. In addition, patients that show severe complications of the disease will require surgery for obstruction, recurrent sub-obstructions, abdominal abscesses, perforation, massive bleeding or even cancer. The most common surgical procedure is ileo-cecal resection and primary reconstruction, which is indicated in patients with CD of distal ileum and/or ileo-colon [2].

Surgery is certainly not the cure for CD, but is a viable therapeutic option and, given the potential advantages of the minimally invasive surgery, it shouldn't be always put at the top of the pyramid of treatment. In selected subgroups of patients, early surgery is correlated with a more favorable surgical outcome and a laparoscopic ileo-cecal resection together with a fast track recovery protocol [3].

INDICATIONS FOR SURGERY IN UC

Indications for emergency surgery: Patients with ulcerative colitis who develop one or more life-threatening complications require immediate surgery. These complications include colonic perforation, life-threatening gastrointestinal hemorrhage, and toxic megacolon.

Colonic perforation: Patients with ulcerative colitis who develop colonic perforation require colectomy, although this complication is rare.

Life-threatening gastrointestinal hemorrhage: Massive colorectal hemorrhage occurs in a small percent of patients with ulcerative colitis at some time during their disease course, which necessitates immediate surgery.

Toxic megacolon. Is a potentially lethal complication of ulcerative colitis (or other forms of colitis) that is characterized by total or segmental nonobstructive colonic dilatation plus systemic toxicity. Patients with ulcerative colitis who present with toxic megacolon require emergency surgery.

Indication for urgent surgery. Patients who have ulcerative colitis may develop acute fulminant colitis characterized by more than 10 stools per day, continuous bleeding, abdominal pain, distension, and acute, severe toxic symptoms including fever and anorexia. Patients with acute fulminant colitis require urgent surgery (ie, during the same hospital admission) if they fail medical therapy [4].

Acute fulminant colitis refractory to medical treatment .The initial treatment for acute fulminant colitis is intravenous glucocorticoids. Patients who fail glucocorticoid therapy are typically treated with infliximab or another anti-TNF agent [5].

For patients whose acute fulminant colitis is refractory to both glucocorticoids and infliximab, urgent surgery is indicated [6-8].

An estimated 15 to 50 percent of patients hospitalized for ulcerative colitis undergo surgery during the same admission [9].

CHOOSING A SURGICAL OPTION

Emergency or urgent surgery. For emergency or urgent indications, a total abdominal colectomy with end ileostomy is typically performed.

The rectum is not resected but left as a defunctionalized Hartmann's pouch with or without a mucus fistula. In patients who develop significant rectal bleeding after total abdominal colectomy, completion proctectomy with an ultralow Hartmann's pouch or transanal suturing of the bleeding rectal ulcers can be performed to achieve hemostasis [10].

Elective surgery. For patients who undergo elective surgery for ulcerative colitis, four options are available. Most patients undergo a restorative proctocolectomy with ileal pouch anal anastomosis (RPC-IPAA). Patients with poor sphincter function, patients who are medically ill, young women, and those with indeterminate colitis may benefit from an alternate procedure.

Patients with poor anal sphincter function. Because RPC-IPAA predisposes to fecal incontinence, patients who have preexisting poor anal sphincter function (determined by either digital rectal examination or anal manometry) should not undergo IPAA. Instead, they should undergo a total proctocolectomy with end ileostomy if they accept a permanent stoma, or a Total Abdominal Colectomy with Ileorectal Anastomosis (**TAC-IRA**) if they do not desire a permanent stoma.

Patients who are medically ill. For patients who are medically ill (eg, older patients, significant comorbid disease, concurrent rectal cancer), a proctocolectomy with end ileostomy is the best surgical option. Compared with an RPC-IPAA, a proctocolectomy with end ileostomy can be completed with shorter operative time and fewer potential complications (such as pouch failure or fecal incontinence) [11].

Young women. Open RPC-IPAA has been associated with infertility in females due to pelvic adhesion formation. Thus, for young women who desire to preserve fecundity, some authorities perform TAC-IRA initially and delay the completion proctectomy with ileal pouch reconstruction until the patient no longer desires future pregnancy.

Other authorities perform RPC-IPAA laparoscopically and place intraoperative adhesion barriers around the ovaries and fallopian tube in an attempt to reduce pelvic adhesion and preserve fertility [12].

SURGICAL OPTIONS. Four types of surgical procedures are commonly performed in the treatment of ulcerative colitis. Although all four procedures include resection of the entire colon with or without the rectum, only two procedures include a gastrointestinal reconstruction. The other two procedures leave a permanent end ileostomy (Table 1).

Table 1: Choice of Operation For Ulcerative Colitis.

OPERATION	ADVANTAGES	DISADVANTAGES
Rectal mucosectomy with ileal pouch-anal canal anastomosis	Complete excision of large intestinal disease. Transanal defecation and fecal continence preserved no ileostomy	Two operations required. At risk for pouchitis Nocturnal fecal spotting present.
Stapled, ileal pouch-distal rectal canal anastomosis	Ttransanal defecation and fecal continence preserved. No ileostomy Easier technically	At risk for pouchitis and cancer from residual rectal mucosa
Continent ileostomy	Complete excision of large intestinal disease. Fecal continence preserved No external appliance	Stoma present Intubatio of pouch required At risk for pouchitis and need for valve revision
Brooke ileostmy	Complete excision of large intestinal disease One operation	Stoma present, risk of parastomal hernia Incontinence for feces Need of external appliance
Ileorectal anastomosis	Transanal defecation and fecal continence preserved. No ileostomy	Diseased rectum remains to produce symptoms, require treatment and predispose to cancer.

All four procedures can be performed with an open or a minimally invasive technique (ie, laparoscopic, single-port [13-15], or robotic. Pedraza R. et al, conducted a study using Restorative Proctocolectomy (**RP**) with Ileal Pouch-Anal Anastomosis (**IPAA**) is the surgical procedure of choice for Chronic Ulcerative Colitis (**CUC**). Robotic-Assisted Laparoscopic Surgery (**RALS**) has been shown to have its greatest merits in colorectal procedures involving the pelvis, to evaluate the safety and feasibility of RP with IPAA using an innovative robotic technique. A total of five consecutive patients underwent RALS RP with IPAA between August 2008 and February 2010. Patient demographics, intraoperative parameters, and postoperative outcomes were tabulated and assessed. Surgery was indicated for medically intractable CUC in three patients (60%), CUC-related dysplasia in one patient (20%) and CUC-related adenocarcinoma in one patient (20%). An ileal pouch-anal anastomosis was successful in all five cases. The mean operative time was 330 min and estimated blood loss was 200 cc. There were no intraoperative complications or conversions. The mean length of hospital stay was 5.6 days and no patients developed major postoperative complications. RALS is an innovative technique offering technical and visual advantages to the colorectal surgeon and can be offered for those who are seeking restorative proctocolectomy for chronic ulcerative colitis [16].

Compared with open surgery, minimally invasive surgery offers short-term benefits (eg, less surgical site infection, less adhesion formation, better cosmesis, and decreased length of stay, but similar long-term outcomes (eg, recurrence rate, pouch function).

Restorative proctocolectomy with ileal pouch-anal anastomosis. Restorative Proctocolectomy with Ileal Pouch-Anal Anastomosis (**RPC-IPAA**) removes the entire colon and rectum while preserving the anal sphincter, often resulting in excellent bowel function and fecal continence. The pouch serves as an internal pelvic reservoir for intestinal contents.

Staged approach to IPAA: Following the proctocolectomy, an Ileal Pouch-Anal Anastomosis (**IPAA**) can be performed in stages as follows:

One-stage IPAA. An ileal pouch is made and anastomosed to the anus. The operation is completed in a single stage.

Two-stage IPAA. The same ileal pouch anal anastomosis is made, but is protected by a loop ileostomy from the fecal stream. The loop ileostomy is subsequently reversed in a second operation. Although there is no evidence that a loop ileostomy protects against serious complications such as anastomotic leak [17-18], many surgeons still routinely perform IPAA in two stages.

Three-stage IPAA. The first stage of a three-staged IPAA is a total abdominal colectomy and ileostomy. This is followed by a completion proctectomy with an IPAA and loop ileostomy as the second stage operation. Finally, the loop ileostomy is reversed as the third stage.

Anastomotic technique. The IPAA can be hand-sewn or stapled.

-In patients who have dysplasia or carcinoma at the anal transitional zone, we perform a transanal mucosectomy to remove all rectal mucosa, followed by a hand-sewn anastomosis.

-In patients who have no dysplasia or carcinoma at the anal transitional zone, we perform a stapled anastomosis, which preserves the anal transitional zone mucosa in a small rectal cuff. The anal transitional zone has a rich sensory innervation, which may be involved in discriminating feces and gas. Thus, preservation of the anal transitional zone mucosa may help maintain anal sensation and better continence, especially at night [19].

Total abdominal colectomy with ileorectal anastomosis. A Total Abdominal Colectomy with Ileorectal Anastomosis (**TAC-IRA**) removes the entire colon and connects the distal small bowel to the rectum. The rectum serves as the native pelvic reservoir for intestinal contents. As a result, TAC-IRA can produce normal bowel function and fecal continence.

Potential candidates for the TAC-IRA procedure include:

-Patients who are not suitable for an IPAA but who refuse an ileostomy, or who have medical conditions for which an ileostomy is contraindicated (eg, portal hypertension or ascites).

-Young women who desire preservation of their fecundity.

-Patients with indeterminate colitis, in whom Crohn disease cannot be excluded.

-Patients with ulcerative colitis and advanced colonic malignancy (who have a limited life expectancy).

Patients who choose to have a TAC-IRA need to have intensive endoscopic surveillance of the rectum and are often maintained on medical therapy. At 10 years, approximately 20 percent of patients will have required a completion proctectomy for either proctitis or rectal dysplasia/cancer.

Total abdominal colectomy with end ileostomy. A total abdominal colectomy with end ileostomy removes the entire colon but leaves behind a defunctionalized rectum as a Hartmann's

pouch. It is a simple procedure that can be performed quickly, and is favored in emergency or urgent situations.

Total proctocolectomy with end ileostomy. A total proctocolectomy with end ileostomy removes the entire colon and rectum without reestablishing gastrointestinal continuity. The end ileostomy is permanent and can be constructed in a continent (Kock) or incontinent (Brooke) fashion. A total proctocolectomy with permanent ileostomy is curative for ulcerative colitis, and can be performed laparoscopically as a “scarless” or “incisionless” procedure [18,20].

Preventing Postoperative Recurrence

For patients who smoke, cessation significantly reduces postoperative relapse. Additional medical therapy should be considered for at least 18 months after surgery, especially if disease has frequently relapsed prior to surgery, or after surgery for fistulating disease, or after a second operation.

All smokers should be strongly advised to stop with help offered to achieve this.

Mesalazine (>2 g/day) lowers postoperative recurrence in small bowel disease, but is ineffective after colonic resection.

Azathioprine 1.5–2.5 mg/kg/day or mercaptopurine 0.75–1.5 mg/kg/day may be used for preventing post-operative recurrence and may be better than mesalazine

Metronidazole (20 mg/kg/day for 3 months) effectively delays recurrence after ileocolic resection for up to 18 months, but potential side effects include peripheral neuropathy [21].

INDICATIONS FOR SURGICAL RESECTION IN CROHN DISEASE

Operative management is reserved for patients who develop complications or have disease refractory to medical therapy and can alleviate symptoms, address serious complications, improve quality of life, and, in some settings, be lifesaving [22]. As many as one-half of patients with Crohn disease require at least one surgical procedure during the course of their disease and, if diagnosed and medically treated early in the course of disease, the need for surgical intervention within the first two years of diagnosis has decreased in some settings [23].

A bowel resection is performed when segments are actively or subacutely inflamed or perforated, or when there is an abscess or fistula to an adjacent organ.

The major indications for surgical management include [24].

- Fibrotic stricture with obstruction
- Medically intractable fistula
- Perforation
- Abscess formation
- Hemorrhage
- Cancer
- Failure to respond to medical therapy

OPERATIVE MANAGEMENT

Conservative resection. The surgical resection of diseased bowel should be conservative, resecting only the sections causing symptomatic complications, such as obstruction, bleeding, or perforation. Gross inspection, rather than histopathology, is utilized to determine extent of resection and the disease-free margins, since microscopic disease at the margins is not associated with an increased rate of recurrence [25].

The type of anastomosis (eg, side-to-side, side-to-end) is debated. It is difficult to conclude that one type of anastomosis is superior to another based on the currently available data. Some surgeons perform a side-to-side anastomosis after ileocolonic resection because its large width may impede the development of symptomatic recurrence. A metaanalysis of eight comparative studies found that a side-to-side anastomosis was associated with fewer anastomotic leaks and postoperative complications, a shorter hospital stay, and lower peri-anastomotic recurrence rates compared with end-to-end anastomosis [26].

The recurrence rate is lower in patients with Crohn's colitis who undergo a total colectomy and ileostomy compared with those with disease involving other segments of the digestive tract. Such patients have only a 10 percent recurrence rate in the small intestine at 10 years. Total proctocolectomy in properly selected patients is associated with low morbidity, a decreased risk of recurrence, and a long interval to recurrence.

Laparoscopic versus open approach. Laparoscopic approaches have been used increasingly for properly-selected patients, even in those with recurrent disease. They have the potential of decreasing morbidity, speeding recovery, and reducing costs, while decreasing the incidence of small bowel obstruction and incisional hernias [27].

Strictureplasty. Strictureplasty can relieve obstruction, and can be performed with or without a synchronous small bowel resection. Strictureplasty involves creation of a longitudinal incision through the narrowed area while closing transversely, which widens the lumen. Strictureplasty is particularly well-suited for patients who have short, localized areas of chronic stenosis, and who are at increased risk for short bowel syndrome due to previous intestinal resection, and is our preferred approach for managing strictures [28-29].

Strictureplasty has been associated with excellent results, including relief of obstruction, the ability to withdraw steroids, and improvement in symptoms. The risk of fistula or recurrent stricture formation is low and comparable to resection. Whether preservation of diseased bowel increases the long-term risk of malignancy is unknown, although case reports have documented adenocarcinoma arising from sites of previous strictureplasty [28].

Balloon dilatation. Another method to dilate intestinal strictures is with a hydrostatic balloon. Experience is relatively limited compared with strictureplasty or resection, and the long-term efficacy and safety are therefore less well-established. Although balloon dilatation may be useful

in situations in which it is desirable to postpone surgery (eg, patients maintained on infliximab who develop high-grade strictures, it is associated with a 2 to 3 percent risk of perforation which substantially increases morbidity, and a lower long-term efficacy; hence, strictureplasty is our preferred approach [29,30].

Intra-abdominal abscess and perforation. The conventional approach to intra-abdominal pyogenic complications has been initial surgical drainage followed by resection of the diseased segment of bowel. However, the introduction of interventional procedures, new immunosuppressive agents, and laparoscopy has altered the surgical approach. CT- or ultrasound-guided percutaneous drainage is safe and successful in approximately 70 percent of patients. The benefits of preoperative drainage include time to improve the patient's nutritional status, convert the operative field into a noninfected area, and decrease use of steroids. An established abscess should preferentially be drained nonoperatively using a percutaneous approach if possible [31]. A transgluteal or transabdominal percutaneous approach to drainage can be performed depending on the location of the abscess. The procedure may need to be repeated to completely drain the abscess.

If percutaneous drainage is unsuccessful, surgical drainage should be performed. The timing of surgery following percutaneous abscess drainage, when clinically indicated, is after clinical resolution of sepsis. Controversy exists regarding the need for subsequent operation after adequate abscess drainage as intractable disease or recurrent abscess occurs in at least 30 percent of these patients within a year.

Fistulas. After resection and anastomosis of the diseased segment, fistulas to adjacent organs (such as the stomach, duodenum, bladder, vagina, and sigmoid colon) can be closed by suturing the site of entrance. Resection of the adjacent segment is necessary only when it is primarily involved with Crohn disease. Bypasses should be avoided because persistent disease in the bypassed segment can lead to abscess formation, bleeding, perforation, bacterial overgrowth, and malignancy.

Colorectal disease. Several alternatives are available for patients requiring elective surgery for control of symptoms from Crohn disease involving the colon and/or ano-rectum, ranging from temporary diverting ileostomy to resection of segments of diseased colon or even the entire colon and rectum. Although controversial, it appears that the conservative principles applied to disease involving the small intestine should also be applied to the surgical management of Crohn's colitis [32].

The indications for surgery for patients with Crohn's disease were obstruction and stenosis and the most frequent procedure employed was the right hemicolectomy, patients with this procedure have a high morbidity rate, primarily anastomotic stenosis without a difference between manual suture or mechanical suture. Patients treated preoperatively with steroids are more prone postoperative complications [33].

Recurrence: The postoperative recurrence rate for patients undergoing a resection and anastomosis is overall high with endoscopic recurrence approaching 80 percent at one year, while the clinical recurrence rate is 10 to 15 percent per year. A number of medical options are available that may reduce the risk of recurrence. A relatively aggressive approach should be considered in patients with diffuse and distal Crohn's colitis.

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