Surgical management of ulcerative colitis

AUTHOR: Phillip R Fleshner, MD, FACS
SECTION EDITOR: Martin Weiser, MD
DEPUTY EDITOR: Wenliang Chen, MD, PhD

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INTRODUCTION

Ulcerative colitis is a chronic disease of the colon and rectum characterized by relapsing and remitting episodes of inflammation. Although ulcerative colitis is primarily treated medically, surgery may be required in patients who become refractory to medical therapy or develop severe complications [1,2].

This topic will review the surgical management of patients with ulcerative colitis. Medical management of ulcerative colitis is discussed separately. (See "Management of the hospitalized adult patient with severe ulcerative colitis" and "Clinical manifestations, diagnosis, and prognosis of ulcerative colitis in adults" and "Medical management of low-risk adult patients with mild to moderate ulcerative colitis" and "Management of moderate to severe ulcerative colitis in adults" and "Overview of dosing and monitoring of biologic agents and small molecules for treating ulcerative colitis in adults".)

INDICATIONS FOR SURGERY

Indications for emergency surgery — Patients with ulcerative colitis who develop one or more life-threatening complications require immediate surgery [3]. These complications include colonic perforation, life-threatening gastrointestinal hemorrhage, and toxic megacolon. (See "Clinical manifestations, diagnosis, and prognosis of ulcerative colitis in adults", section on 'Disease severity'.)

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 percentage of patients with ulcerative colitis at some time during their disease course, which necessitates immediate surgery [3].

Toxic megacolon — 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. (See "Toxic megacolon".)

Indications 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 [4]. Patients with acute fulminant colitis require urgent surgery (ie, during the same hospital admission) if they fail medical therapy.

Acute fulminant colitis refractory to medical treatment — The initial treatment for acute fulminant colitis is intravenous glucocorticoids. Patients who fail glucocorticoid therapy are treated with a biologic agent, typically infliximab [5]. Other biologic therapies have not been shown to be effective in acute severe ulcerative colitis, although off-label use of high-dose tofacitinib suggests potential efficacy in this setting [6]. (See "Management of the hospitalized adult patient with severe ulcerative colitis", section on 'Complications'.)

For patients whose acute fulminant colitis is refractory to both glucocorticoids and infliximab, urgent surgery is indicated [7-9]. In the past, 15 to 50 percent of patients hospitalized for ulcerative colitis undergo surgery during the same admission [10,11]. With improved medical treatment, however, that number is decreasing, as an example, from 5 percent in 2007 to 2.7 percent in 2016 [12].

Indications for elective surgery — Chronic ulcerative colitis can be treated with total proctocolectomy or long-term medical therapy. The choice of treatment should be individualized based upon patient characteristics and preferences as well as available resources [13]. The development of continence-preserving procedures such as the ileal pouch-anal anastomosis has made surgery a more attractive option for patients to consider [1,7-9,14]. It is estimated that approximately 20 to 30 percent of patients with advanced ulcerative colitis will eventually require a surgical resection [4,15,16].

Extraintestinal manifestations are common in patients with ulcerative colitis, but their responses to surgical management of ulcerative colitis are variable [1,17,18]. Thus, extraintestinal manifestations of ulcerative colitis are **not** considered to be independent indications for surgery. (See "Clinical manifestations, diagnosis, and prognosis of ulcerative colitis in adults", section on 'Extraintestinal manifestations'.)

Patients with persistent symptoms — Surgery may be offered to patients who either have persistent symptoms of ulcerative colitis despite best medical management or those who cannot tolerate continued medical therapy due to side effects.

Patients with increased cancer risk — Patients with dysplastic/adenomatous polyps and/or long-standing ulcerative colitis are at an increased risk of developing colorectal cancer. Surgery that removes the entire colon and rectum can significantly reduce that risk.

Patients with dysplastic or adenomatous colorectal polyps — The estimated cancer risks in patients with ulcerative colitis who have a polyp with low-grade dysplasia, a polyp with high-grade dysplasia, and dysplasia within a lesion are approximately 10 to 30 percent, 30 to 40 percent, and 80 percent, respectively [19,20]. In inflammatory bowel disease patients, high-grade dysplasia has been associated with an increased risk of colorectal cancer at the time of colectomy [21]. The recommended surveillance method and schedule for patients with long-standing ulcerative colitis are discussed in another topic. (See "Surveillance and management of dysplasia in patients with inflammatory bowel disease".)

Patients with long-standing disease — Although the risk of developing colon or rectal cancer is low during the first 8 to 10 years after a diagnosis of ulcerative colitis is made, the risk increases steadily by 0.5 to 1 percent per year after the first 10 years [22]. Thus, for patients who do not have colorectal polyps but have had ulcerative colitis for over 10 years, surgery can also reduce the risk of colorectal cancer.

CHOOSING A SURGICAL OPTION

Emergency or urgent surgery — For emergency or urgent indications, a total abdominal colectomy with end ileostomy is typically performed. (See 'Indications for emergency surgery' above and 'Indications for urgent surgery' above and 'Total abdominal colectomy with end ileostomy' below.)

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 [23].

After the patient is stabilized, a completion proctectomy with reconstruction can be performed at a later time [24]. In a series of 50 patients who underwent urgent surgery for ulcerative colitis, a staged approach with a minimally invasive total abdominal colectomy followed by a minimally invasive completion proctectomy with ileal pouch-anal anastomosis resulted in no mortality and only one anastomotic leak [25]. (See 'Staged approach to IPAA' below.)

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) [26,27]. Patients with poor sphincter function, patients who are medically ill, young women, and those with indeterminate colitis may benefit from an alternate procedure. (See 'Surgical options' below.)

Typical patients — RPC-IPAA is the procedure of choice for most patients undergoing elective surgery for ulcerative colitis. RPC-IPAA allows patients with ulcerative colitis to live a near-normal life with a preserved body image and no need for a permanent stoma. (See 'Restorative proctocolectomy with ileal pouch-anal anastomosis' below.)

Special patient groups — RPC-IPAA is either **not** performed or performed **selectively** in these special patient groups. Alternate procedures are suggested as follows.

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. (See 'Total proctocolectomy with end ileostomy' below and 'Total abdominal colectomy with ileorectal anastomosis' below.)

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). (See 'Total proctocolectomy with end ileostomy' below.)

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. (See 'Total abdominal colectomy with ileorectal anastomosis' below.)

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 [28]. In one study of over 500 women, fertility was reduced after both open and laparoscopic IPAA (61 percent laparoscopic versus 63 percent open), but the time to pregnancy was shorter after laparoscopic IPAA (3.5 versus 9 months) [29]. (See 'Sexual dysfunction' below.)

Patients with indeterminate colitis — In approximately 10 to 15 percent of patients with inflammatory bowel disease, the distinction between Crohn disease and ulcerative colitis cannot be made; such patients are referred to as having indeterminate colitis. The distinction may be particularly difficult to make in patients with fulminant colitis [30]. (See "Clinical manifestations, diagnosis, and prognosis of Crohn disease in adults", section on 'Differential diagnosis'.)

Indeterminate colitis resembles ulcerative colitis more than it does Crohn disease, although there may be an increased risk of perineal complications and pouch failure associated with indeterminate colitis [31,32]. Thus, many surgeons treat patients with indeterminate colitis using the same procedures (eg, RPC-IPAA) as those used to treat ulcerative colitis [1,33]. When treated with RPC-IPAA, patients with indeterminate colitis achieved good functional results and low failure rates that were comparable to those achieved in patients with ulcerative colitis [34,35]. An increased pouch failure rate was observed in patients whose diagnosis was later revised from indeterminate colitis to Crohn disease [31,36]. (See 'Restorative proctocolectomy with ileal pouch-anal anastomosis' below.)

Other authorities prefer to treat indeterminate colitis patients who do not have significant rectal disease with a TAC-IRA procedure instead of RPC-IPAA [37]. They fear that indeterminate colitis may progress to Crohn disease, which is associated with a high risk (about 50 percent) of pouch failure, requiring pouch excision and permanent ileostomy. (See 'Total abdominal colectomy with ileorectal anastomosis' below.)

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 and figure 1).

All four procedures can be performed with an open or a minimally invasive technique (ie, laparoscopic, single-port [38-40], or robotic [41]). Compared with open surgery, minimally invasive surgery offers short-term benefits (eg, less surgical site infection [42], less adhesion formation [43,44], better cosmesis [45], and decreased length of stay [42]) but similar long-term outcomes (eg, recurrence rate, pouch function) [46-48]. Thus, the choice of surgical approach should be made based upon patient preference and surgeon expertise.

A new minimally invasive technique, transanal ileal pouch-anal anastomosis (Ta-IPAA), has also been introduced. Although both short-term surgical outcomes [49] and long-term functional outcomes [50] appear favorable compared with transabdominal minimally invasive techniques, more robust data with increased surgical experience are eagerly awaited. The principles of Ta-IPAA are similar to those of transanal total mesorectal excision (TaTME) used in rectal cancer surgery. (See "Radical resection of rectal cancer", section on 'Transanal TME'.)

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 (figure 1). 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. (See 'Anastomotic technique' below.)

- **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 [51], many surgeons still routinely perform IPAA in two stages.

  The ileostomy is typically reversed between two and four months after it is created, but the exact timing has not been standardized. A trial of early (7 to 12 days) versus late (after 8 weeks) ileostomy reversal was terminated early due to higher complication rates (70 versus 17 percent) and more severe complications (30 versus 0 percent) in the early reversal group [52].

- **Three-stage IPAA** – The first stage of a three-stage 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.

Three-stage IPAA was routinely performed in patients treated with anti-tumor-necrosis-factor (anti-TNF) agents (eg, infliximab) due to concerns about infection [24,53]. However, contemporary studies and a meta-analysis found no advantage to the three-stage IPAA in such patients [54-56].

Patients should be advised that a permanent ileostomy will be required if an IPAA is not technically possible. In a large series of 1789 patients undergoing proctocolectomy, IPAA was attempted but abandoned intraoperatively in 4.1 percent [57]. An ileostomy may also be required if the pouch fails postoperatively due to anastomotic complications, infection, fistulization, development of Crohn disease, disease recurrence, or poor function.

Anastomotic technique — The IPAA can be hand-sewn or stapled. (See "Restorative proctocolectomy with ileal pouch-anal anastomosis: Laparoscopic approach".)

- 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 [58].

The best data comparing the two anastomotic techniques came from a nonrandomized prospective study of 3382 patients undergoing IPAA. Compared with a stapled anastomosis, a hand-sewn anastomosis was associated with a higher frequency of anastomotic stricture, septic complications, bowel obstruction, and pouch failure. Patients who had the hand-sewn anastomosis reported more incontinence, seepage, and pad usage as well as dietary, social, and work restrictions [59].

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.

A TAC-IRA is performed **infrequently** in patients with ulcerative colitis because it does not excise the diseased rectum and therefore leaves patients at risk for persistence of inflammatory symptoms and future malignancy. A retrospective analysis of 86 patients who underwent the TAC-IRA procedure found that the rectum was eventually resected in 46 patients (53 percent) for rectal dysplasia (17 percent), rectal cancer (8 percent), and refractory proctitis (28 percent) [60]. The risk of cancer development in the residual rectum has been reported to be 6 percent at 20 years and 15 percent at 30 years. This risk is significant considering that most patients with ulcerative colitis are young.

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). It is important to note that such patients should have minimal rectal disease to be considered for a TAC-IRA. (See 'Patients with poor anal sphincter function' above.)
- Young women who desire preservation of their fecundity. (See 'Young women' above.)
- Patients with indeterminate colitis, in whom Crohn disease cannot be excluded. (See 'Patients with indeterminate colitis' above.)
- 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. (See 'Emergency or urgent surgery' above.)

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 [61,62].

A total proctocolectomy with end ileostomy is primarily performed in patients who readily accept a permanent stoma or those who cannot tolerate an IPAA because of comorbidities. (See 'Patients with poor anal sphincter function' above and 'Patients who are medically ill' above.)

PERIOPERATIVE CONSIDERATIONS

Routine preoperative care — The following measures are carried out routinely in all patients undergoing surgery for ulcerative colitis.

- The patient's medical condition should be optimized prior to surgery, time permitting, by correcting anemia, coagulopathy, hypovolemia, electrolyte or acid-base imbalances, and any nutritional deficiencies [63].
- If an ileostomy is planned, a stoma therapist should mark the abdominal site for the ileostomy. (See "Overview of surgical ostomy for fecal diversion", section on 'Preparation and counseling'.)
- A mechanical bowel preparation is prescribed for patients undergoing elective but not urgent or emergency procedures. (See "Overview of colon resection" and "Overview of colon resection", section on 'Bowel preparation'.)
- Prophylactic intravenous antibiotics are routinely administered prior for all procedures (see "Overview of colon resection", section on 'Intravenous antimicrobial prophylaxis'). Oral antibiotics administered after a mechanical bowel preparation may reduce surgical site infection in patients with ulcerative colitis [64].
- We do **not** stop anti-tumor-necrosis-factor (anti-TNF) agents (eg, infliximab), cyclosporine, or thiopurines prior to surgery. In one study, the serum levels of anti-TNF agents did not correlate with surgical morbidity in ulcerative colitis [65]. In another study, however, anti-TNF agent use within 90 days of surgery was associated with higher 90 day postoperative complication rates among patients who underwent ileal pouch-anal anastomosis (odds ratio 1.38; 95% CI 1.05-1.82) but not proctocolectomy or total abdominal colectomy [66]. Glucocorticoids should be continued through the perioperative period and tapered gradually after surgery [67]. There is, however, no need for stress-dose steroids in these patients [67]. (See "Glucocorticoid withdrawal" and "The management of the surgical patient taking glucocorticoids".)
- Standard venous thromboembolism (VTE) prophylaxis (ie, intermittent pneumatic compression and/or low-dose heparin) should be instituted for all patients undergoing

surgery for ulcerative colitis while they are in the hospital [68,69]. Given that patients with ulcerative colitis have a higher-than-average risk of developing VTE [70,71], extended prophylaxis after discharge is an option but needs to be individualized for each patient [72]. (See "Prevention of venous thromboembolic disease in adult nonorthopedic surgical patients".)

SURGICAL COMPLICATIONS

The overall mortality rate associated with surgical treatment of ulcerative colitis is less than 1 percent; the overall morbidity is about 30 percent [73]. Major complications include stricture, pelvic sepsis, pouch failure, fecal incontinence, pouch dysplasia or cancer development, sexual dysfunction, and female infertility.

Stricture — Anal canal stricture has been reported in up to 11 percent of patients [74]. Nonfibrotic strictures generally respond well to transanal or endoscopic dilation [75], while fibrotic strictures require reoperation.

Pelvic sepsis — A systematic review of 43 observational studies (with a total of 9317 patients) reported a pelvic sepsis rate of 9.5 percent [76]. Pelvic sepsis is associated with a greater risk of pouch failure because of surrounding pelvic fibrosis, which limits pouch compliance [77].

Pouch failure — The same systematic review found a pouch failure rate of 6.8 to 8.5 percent, depending upon the length of follow-up [76]. In another study, the pouch failure rate increased from 4 percent at 4 years to 8 percent at 15 years [78].

Fecal incontinence — In the same systematic review cited above [76], mild and severe fecal incontinence during the day was reported in 17 and 3.7 percent of patients, respectively. The corresponding rates during the night were 13.1 and 4.5 percent. Urge incontinence during the day was reported in 7.3 percent of patients.

Overall, the rate of complete bowel continence that can be achieved after ileal pouch-anal anastomosis (IPAA) varies between 53 and 76 percent depending upon studies. Those patients who are continent have, on average, six stools a day, with more than 75 percent having at least one bowel movement at night [78,79].

Pouch dysplasia/cancer — About 1 percent of patients develop dysplasia or carcinoma after surgery, which occurs in the retained rectum, anal transitional zone, or ileal pouch, depending upon the procedure performed [80-84]. Thus, regular (at least yearly) endoscopic surveillance is mandatory for early detection of dysplasia, and pouch excision may be required in cases of

carcinoma [85-87]. Recommended screening strategies for patients with ulcerative colitis are discussed elsewhere. (See "Surveillance and management of dysplasia in patients with inflammatory bowel disease", section on 'Ileal pouch anal anastomosis'.)

Sexual dysfunction — IPAA has been associated with a small risk of sexual dysfunction; the risk is greatest in patients who require reoperative pelvic surgery. Postoperative impotence and retrograde ejaculation have been observed in approximately 1.5 and 4 percent of men, respectively. Transient dyspareunia occurs in about 7 percent of women, although coital frequency and the ability to experience orgasm remain unchanged [88,89]. In 200 women who underwent IPAA <20 years of age, only 5 percent reported severely restricted sexual function [90].

Female infertility — Female fertility is significantly decreased after open IPAA [91], although successful pregnancies do occur regularly [92]. In 200 women who underwent pediatric IPAA, 73 percent of those who desired children became pregnant, and 88 percent had a successful delivery [90]. (See 'Young women' above.)

Patients who have had an IPAA procedure should not be discouraged from childbearing because of the pouch. Pregnancy and delivery are safe in patients with IPAA. Patients may experience a transient increase in stool frequency or incontinence during pregnancy, most of which resolve after delivery [93]. In the same 200 women who underwent pediatric IPAA, 32 percent reported change in pouch function that persisted after delivery [90].

It remains controversial whether vaginal or cesarean delivery is better for women with a pelvic pouch. Vaginal delivery has the potential of disrupting the anal sphincter, although the mode of delivery should be dictated primarily by obstetric considerations [94,95]. (See "Fertility, pregnancy, and nursing in inflammatory bowel disease", section on 'Mode of delivery'.)

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Ulcerative colitis in adults".)

INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5th to 6th grade reading

level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topic (see "Patient education: Colectomy (The Basics)")
- Beyond the Basics topics (see "Patient education: Ulcerative colitis (Beyond the Basics)")

SUMMARY AND RECOMMENDATIONS

- Surgical management of ulcerative colitis is required when patients fail medical therapy or when serious complications arise. (See 'Introduction' above.)
- Emergency surgery is indicated in patients with colonic perforation, life-threatening gastrointestinal hemorrhage, or toxic megacolon. Urgent surgery during the same hospital admission is indicated in patients with acute fulminant colitis that is refractory to medical therapy. A total abdominal colectomy with end ileostomy is the procedure of choice in both situations. (See 'Indications for emergency surgery' above and 'Indications for urgent surgery' above and 'Emergency or urgent surgery' above and 'Total abdominal colectomy with end ileostomy' above.)
- Elective surgery is indicated in patients with persistent symptoms despite best medical management and in those with increased cancer risk. Most patients undergo a restorative proctocolectomy with ileal pouch-anal anastomosis (RPC-IPAA). (See 'Indications for elective surgery' above and 'Typical patients' above and 'Restorative proctocolectomy with ileal pouch-anal anastomosis' above.)
- For young women who desire to preserve fecundity, surgical options include (see 'Young women' above):
  - An initial total abdominal colectomy with ileorectal anastomosis (TAC-IRA), followed by a completion proctectomy with ileal pouch reconstruction when future pregnancy is no longer desired. (See 'Total abdominal colectomy with ileorectal anastomosis' above.)

- A laparoscopic RPC-IPAA. (See "Restorative proctocolectomy with ileal pouch-anal anastomosis: Laparoscopic approach".)

- For patients with preexisting poor anal sphincter function, surgical options include (see 'Patients with poor anal sphincter function' above):
  - A total proctocolectomy with end ileostomy, if they accept a stoma. (See 'Total proctocolectomy with end ileostomy' above.)
  - A total abdominal colectomy with ileorectal anastomosis (TAC-IRA), if they do not desire a stoma. (See 'Total abdominal colectomy with ileorectal anastomosis' above.)
- 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. (See 'Patients who are medically ill' above and 'Total proctocolectomy with end ileostomy' above.)
- For patients with indeterminate colitis, surgical options include (see 'Patients with indeterminate colitis' above):
  - An RPC-IPAA. (See 'Restorative proctocolectomy with ileal pouch-anal anastomosis' above.)
  - A TAC-IRA. (See 'Total abdominal colectomy with ileorectal anastomosis' above.)
- The overall mortality rate associated with surgical treatment of ulcerative colitis is less than 1 percent; the overall morbidity is about 30 percent. Major complications include stricture, pelvic sepsis, pouch failure, fecal incontinence, pouch dysplasia/cancer development, sexual dysfunction, and female infertility. (See 'Surgical complications' above.)

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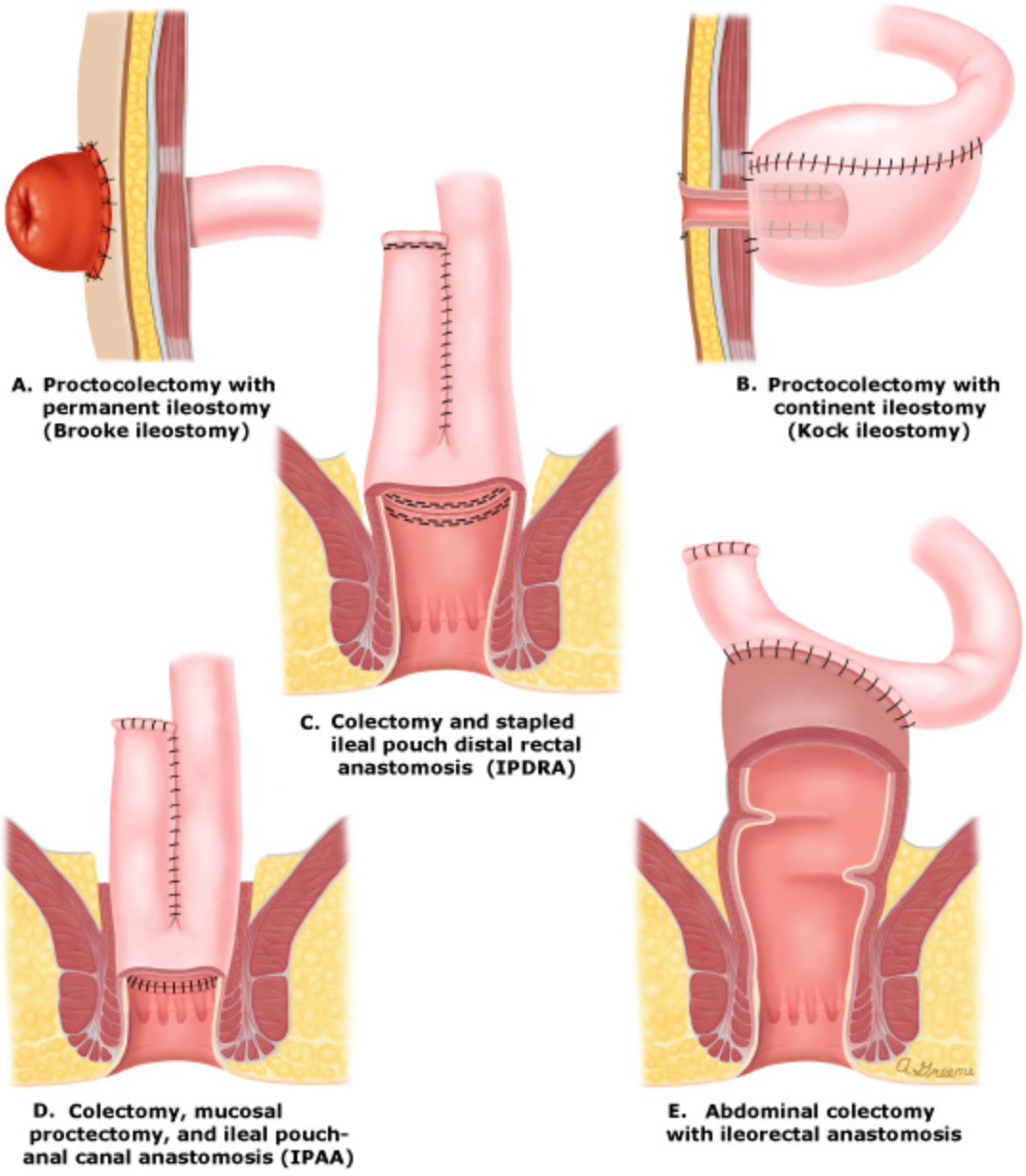
GRAPHICS

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 anastomosis	Transanal 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 Intubation of pouch required At risk for pouchitis and need for valve revision
Brooke ileostomy	Complete excision of large intestinal disease One operation	Stoma present, risk of parastomal hernia Incontinent 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

Graphic 56142 Version 1.0

Surgical options for ulcerative colitis



Graphic 52597 Version 1.0

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