



INFLAMMATORY BOWEL DISEASE



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Ulcerative Colitis: Surgical Perspective

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Abstract

Ulcerative Colitis (UC) is an inflammatory disease resulting from an interaction between genetic and environmental factors and observed predominantly in developed countries. However incidence in developing countries is also on the rise, possibly as a result of more westernisation. UC is characterized by mucosal inflammation of the rectum and to a variable extent the colon in a continuous fashion. Patients generally present with manifestations of the disease including abdominal pain, diarrhoea, rectal bleeding, and weight loss in the second or third decade of life. The patient's management is influenced by the extent of inflammation; with medical management being started as first line of treatment for mild to moderate disease while as surgery is reserved for advanced and complicated disease. The aim of this chapter is to highlight the indications for surgery, principles of surgical decision-making, operative techniques with associated complications and a few special considerations.

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Indications for Surgery

Nearly 25 -30 % of patients with UC will need a surgical intervention in their lifetime, with up to 10 % of patients requiring surgery within the first year of diagnosis due to a variety of elective and emergent causes [1]. Surgical indications should be a joint decision between medical gastroenterologist and a surgeon. The timing of surgery depends on the indication and severity of disease. At present the threshold for elective surgery is too high and it is important to consider surgery an alternative to medical therapy, rather than representing failed management [2]. Elective indications for surgery include failure of medical management, complications or side effects associated with medications, dysplasia or invasive cancer, extraintestinal manifestations, and growth retardation in children and adolescents. Patients with active disease despite optimization of maintenance therapy are often in better general health than patients with fulminant colitis, but may undergo surgery in order to avoid corticosteroid dependency.

Failure of medical management is the most common indication for surgery. The key challenge in acute colitis remains early identification of patients who are not good responders to steroid or alternate salvage therapy and require colectomy. Sev-

eral clinical indices have proven to perform well in predicting patients who will require salvage therapy within 3-5 days of admission. In a prospective study, Travis et al [3] from Oxford suggested that a stool frequency of >8/day or 3-8/day and C-reactive Protein (CRP) >45 mg/dL on the third day of corticosteroid therapy should be sufficient for initiating rescue therapy. Similar to the Oxford criteria several other including the Swedish Index, the Scottish Index and the PUCAI Index for pediatric patients (Table 1) are based on stool frequency, blood in stools, CRP, and colonic dilatation. These indices are based on the consistent observation that the likelihood of responding to corticosteroids is inversely related to the disease severity. Radiological criteria can also be used. Presence of >5.5 cm colonic dilatation or presence of mucosal islands predict need for surgery in 75% of the patients [4]. A study by Saha et al suggested that performing colectomy early (<7 days) in patients with steroid-refractory acute severe UC could improve operative outcomes [5].

Colonic dysplasia is a precursor to adenocarcinoma and occurs in patients with UC. Many physicians use surveillance colonoscopy for monitoring patients with UC and determining the need for colectomy. This involves scheduled annual or bi-annual colonoscopy with multiple random biopsies. However,



surveillance colonoscopy must be undertaken with caution, because even low-grade dysplasia is associated with synchronous adenocarcinoma in as many as 42% of cases, and as many as 84% of neoplasms in persons with UC are missed at random biopsy. Furthermore, 1% of colon cancers in patients with UC have no foci of preexisting dysplasia. Even in patients in whom the disease is medically controlled, the optimal time for colectomy may be 7-10 years after the onset of disease, to prevent colon cancer [6].

Earlier studies reported very high incidence (25%) of adenocarcinoma in patients with UC after 20 years of disease [7]. However, as a result of improved medical therapy the risk of cancer is believed to be only 2.5% at 20 years, 7.6% at 30 years, and 10.8% at 40 years [8].

Backwash ileitis is an independent marker for the presence of dysplasia, as is age older than 45 years and the presence of disease for more than 10 years. Therefore, the patient with UC must be made aware of the significant risk of colon cancer, and surgical intervention in non acute cases must be encouraged after 10 years of disease.

Toxic dilatation (or toxic megacolon) is defined as total or segmental non-obstructive dilatation of the colon more than 5.5 cm with accompanying systemic toxicity. Although its true incidence has not been reported, approximately 5% of admitted patients with acute, severe colitis will have toxic dilatation [8]. Risk factors include hypokalemia, hypomagnesaemia, bowel preparation, and the use of anti-diarrhoeal therapy [9]. Surgery is usually the preferred therapeutic option in patients with toxic megacolon, which is a life threatening event. However, a 24-48 hour trial of conservative treatment in form of bowel rest, broad spectrum antibiotics and rectal tube, may be cautiously attempted in non-severe cases at specialized centres, only under intense monitoring [9]. Colonic perforation occurs in the setting of toxic megacolon and is an indication for urgent surgery. Perforation is the most serious complication of acute severe colitis and is often associated with inappropriate total colonoscopy or toxic dilatation where colectomy has been inappropriately delayed. It carries a mortality of up to 50% [8]. Signs and symptoms may be masked by corticosteroids and a high index of suspicion is needed in patients on medical management. Urgent subtotal colectomy with ileostomy is needed in patients once diagnosis is confirmed by X-rays or CT scan.

Massive haemorrhage is a very rare indication for urgent colectomy in ulcerative colitis. Improvements in medical management of ulcerative colitis and an early aggressive surgical approach have reduced the incidence of life threatening complications like toxic megacolon, perforation and haemorrhage.

Contraindications for Surgery

The only absolute contraindication for surgical treatment of UC is anal sphincter dysfunction. Pre existing incontinence due to neurologic impairment or other causes makes reservoir construction unnecessary and makes ileoanal pull-through inadvisable.

Other contraindications include suspected Crohn disease. The diagnosis of UC must be certain before an ileal pouch reservoir is created in a patient with Inflammatory Bowel Disease (IBD). The need for pelvic irradiation is also a contraindication to pelvic reservoir construction. For example, if rectal cancer is found at the time of exploration, end ileostomy should be performed in anticipation of postoperative pelvic irradiation.

Radiation leads to pouch fibrosis and noncompliance, with resultant loss of reservoir function.

Surgical procedures

Brooke Ileostomy

In 1952, Professor Bryan Brooke described his technique for everting an ileostomy in order to minimize skin excoriation [11,12], the Brooke ileostomy remains the preferred approach for patients who are not candidates for restoration of intestinal continuity [Figure 2].

Continent Ileostomy

There have been several modifications of the original description of the continent ileostomy popularized by Nils Kock in 1969 [13]. Creation of a continent ileostomy, or Kock pouch, requires an elaborate operation that involves the building of an ileal pouch with an internal valve to prevent and control the flow of enteric contents into the ostomy bag. With improvements in our understanding of inflammatory bowel disease and surgical technique, there are few patients today for whom the Kock pouch is an appropriate alternative to Total Proctocolectomy [TPC] [Figure 3] with Ileal Pouch Anal Anastomosis [IPAA] anastomosis following proctocolectomy. Specifically, this operation should be offered in specialized centers to patients with UC and a locally advanced low rectal cancer that will need adjuvant therapy postoperatively; patients who already have a Brooke ileostomy after proctocolectomy and wish to improve their quality of life; patients who are not candidates for an IPAA because of poor sphincter function; patients who prefer a continent ileostomy to an IPAA as a personal choice; and lastly, patients who have failed an IPAA but prefer a continence-preserving procedure to a Brooke ileostomy [14,15] [Figure 4]. Contraindications to this procedure include Crohn's disease, obesity, critically ill patients, and the psychologically unfit patients because of the inability to intubate. This procedure has also been performed in the pediatric population with satisfactory results [14-16].

Total abdominal colectomy with ileorectal anastomosis

Until the 1950s, total proctocolectomy with end ileostomy was the only available approach for UC patients failing medical management. In the 1940s reports of subtotal colectomy with ileorectal Anastomosis (IRA) as an alternative to total proctocolectomy in selected patients were first published. Prior to the description of IPAA, this procedure quickly became a valid alternative to total proctocolectomy in highly selected patients with minimal rectal inflammation and adequate rectal compliance to avoid a permanent stoma [17,18]. Advantages included lack of a permanent stoma, performance of a one-stage, less invasive operation, and avoiding pelvic dissection with its associated risk of sexual dysfunction [19]. Total Abdominal Colectomy with Ileorectal Anastomosis (TAC-IRA) is now generally reserved for patients with limited rectal involvement, good rectal compliance, and no dysplasia or cancer. Adequate rectal compliance and normal anal sphincter function are critical for good long-term results. This can be initially assessed by digital rectal examination, but is more accurately characterized by rigid/flexible proctoscopy and anal manometry. Patients with poor sphincter function, severe rectal disease, and a non-distensible rectum should not be offered an IRA. TAC-IRA may be done via a minimally invasive or open approach depending on the nature and severity of disease, previous surgical history, comorbidities, and surgeon experience.

Total Proctocolectomy with End Ileostomy

Proctocolectomy with Brooke ileostomy was the standard of care for the treatment of ulcerative colitis until the early 1980s when Utsonomiya popularized the IPAA [20]. By removing all diseased epithelium, a proctocolectomy cures patient disease, eradicates the associated risk of malignancy, and eliminates the need for costly medications and time-consuming lifelong follow-up. The disadvantages of this operation include the presence of a permanent ileostomy, the potential for nerve injury during pelvic dissection, and the risk of perineal wound healing problems. A proctocolectomy with an end ileostomy [Figure 5] is indicated in patients who are not candidates for an IPAA or a Kock pouch. The operation may also be indicated if other medical problems make a more complex, longer operation too risky [21,22]. Finally a total proctocolectomy should be considered in patients who desire a single operation for cure or whose work and other daily activities make an ostomy appliance easier to manage than frequent bowel movements. There are no absolute contraindications to this procedure. However, in the emergent setting, it is advisable to stage the procedure with an initial abdominal colectomy. This strategy avoids the morbidity associated with rectal dissection, which can be potentially difficult and time-consuming in an unstable patient. This procedure can be performed through a laparotomy incision, single incision, hand or laparoscopic assisted, or totally laparoscopically as the authors have previously described [23].

Restorative proctocolectomy with Ileal Pouch anal anastomosis

Restorative proctocolectomy with IPAA is now the gold standard in the surgical management of UC. Before proceeding with an IPAA, fecal continence should be fully evaluated particularly in patients presenting preoperatively with impaired function. The Pouch anal anastomosis can be performed with the use of a circular stapler or hand sewn. Multiparous women, particularly after multiple vaginal deliveries with episiotomies or lacerations, should be asked about their continence function. While it is important to note that continence significantly worsens in all patients during a flare, with multiple bloody and liquid bowel movements, the report of incontinence should be further discussed and investigated. A digital rectal examination performed by the operating surgeon often provides enough information to decide if evaluation by manometry and a rigid probe 3-D endoanal ultrasound should be entertained. Although advanced age was once considered a relative contraindication to IPAA, this has been reevaluated in the setting of optimized surgical and medical management and minimally invasive approaches [24,25]. Also morbid obesity is considered to be a relative contraindication to immediate IPAA [26] [Figure 6,7,8].

These surgeries are technically demanding and should be performed in high volume centre or colorectal units. These surgeries can be performed laparoscopically in centres performing advanced laparoscopic surgery with excellent results. Our colorectal division at Sher-i-Kashmir Institute is also performing these demanding surgeries laparoscopically with excellent results.

Surgical considerations

Choice of pouch

The creation of an IPAA involves total proctocolectomy, with folding of the distal ileum into a J, S, or W formation to create a fecal reservoir. The anastomosis to the anus preserves conti-

nence function involving the internal and external anal sphincters. The S and W configurations have been associated with a failure rate as high as 66% and a need for revision; however, the J configuration is associated with a need for revision in only 1-2% of cases [27].

Reasons for failure with S and W pouches include dilation of the reservoir, leading to stasis, and elongation of the spout at the anal anastomosis, leading to stenosis [28]. These technical points are all but alleviated with the current technique of J pouch construction. Transanal defecation is restored in 88% of children with J pouches, whereas 32% of those with S pouches and 32% of those undergoing straight ileoanal pull-through procedures require revision [29].

Although most surgeons do not use the S pouch as the first option (because of its pouchitis rate), the spout created in its construction provides an additional 3-5 cm in length to the entire ileal reservoir, as compared with the length of a J pouch.

The choice of pouch size and type involves a balance between increasing reservoir function to decrease stool frequency and the risk of developing pouchitis. All reservoirs have a tendency to enlarge over time. Consequently, most surgeons have opted for a smaller initial reservoir that depends on reservoir enlargement to gradually decrease stooling frequency while avoiding pouchitis.

Timing of surgery

One of the major preoperative concern in UC is the timing of surgery. Surgery in emergency settings should be avoided if possible, but not delayed when absolutely indicated. A staged procedure (2 or 3 stage) should usually be performed. Initially to alleviate the major symptoms of the disease, including bleeding, impending perforation and pain, emergency total colectomy with end ileostomy is performed should be performed. It also helps to wean off the patient from steroids.

Managing distal rectal stump

At a subsequent sitting, an IPAA is created, with the removal of remaining rectum. During emergency surgery the rectum should be left in place, to prevent disrupting the pelvic tissue planes, with the aim of making the subsequent pelvic dissection safer. Some critical aspects need to be considered when performing such procedure. Distal resection of rectum should be avoided, because such an approach will impose difficulties at subsequent proctectomy, with a probable increase in the risk of pelvic nerve injury. The alternatives are to divide the rectum more proximally at the level of the promontory [i.e. at the rectosigmoid junction], or to leave the distal part of the sigmoid colon in situ. This allows the bowel to be anchored to the anterior abdominal wall, which facilitates its subsequent identification and dissection or its relocation through the abdominal fascia, either closed in the subcutaneous fat or brought forward as a mucous fistula. The latter option is considered to be safe, as no closed bowel is left within the abdomen. However, a mucous fistula results in an extra stoma for the patient, which may not be easily managed [30].

Closing the stump and leaving it within the subcutaneous fat is also a safe approach, although the skin should be allowed to heal through secondary intention in order to avoid wound infection [31].

There are no studies yet on the risk of subsequent inflammation or bleeding after leaving different lengths of rectum

or recto-sigmoid colon in situ. When the rectum is transected within the abdominal cavity at the promontory level, it is advisable to perform transanal rectal drainage for a few days to prevent a 'blowout' of the rectal stump following mucous retention. During the intervening period patient will regain general health, normalise nutrition, and have the time to consider carefully the options of an IPAA or of a permanent ileostomy. Also a preliminary subtotal colectomy allows the clarification of the pathology, definitively excluding Crohn's disease. If the patient has mild disease or disease in remission, total proctocolectomy with the creation of an IPAA may be performed as the initial definitive procedure.

Site of coloanal anastomosis

A common complication when using a stapling technique to perform an ileo-anal anastomosis is leaving a remnant of anorectal mucosa above the dentate line. This can be a cause of persistent inflammation ['cuffitis'], with pouch dysfunction and a risk of dysplasia or, very rarely, cancer [32,33]. When well performed, the low-stapled anastomosis seems to have better outcomes, particularly with regard to soiling, faecal leakage, and social restriction [34,35].

European Crohn's and Colitis Organisation [ECCO] consensus guideline recommends that the maximum length of anorectal mucosa between the dentate line and the anastomosis should not exceed 2 cm when performing pouch surgery [36].

Role of covering ileostomy

One of the main complications of IPAA surgery is the occurrence of a leak at the suture line of the anastomosis or pouch. This is also a complication that is most likely to compromise the clinical and functional outcomes of the operation. By defunctioning the distal anastomosis, incidence of a leak may be reduced [37]. However creation of a stoma is in itself associated with many complications, especially in obese patients.

Volume of surgeon/centre

It has been shown that institutions where a larger number of complex surgical procedures that demand sophisticated perioperative care are performed, have better outcomes [38], which is also true for pouch surgery [39]. Moreover, it is clear that high-volume institutions manage adverse events better, which leads to better pouch salvage in the face of complications [40]. Therefore, ileo-anal pouch surgery should be conducted in high-volume specialist institutions. The definition of 'high-volume' remains open for debate

Outcomes

Research suggests that after restorative proctocolectomy with IPAA, patients tend to have inferior functional outcomes and poorer long-term Health-Related Quality of Life (HRQOL) as compared with study controls [41,42]. Such results were found in a study by Andersson et al, who compared HRQOL in 105 patients with UC (and five patients with Familial Adenomatous Polyposis [FAP]), all with an intact pouch, with that of 4152 individuals from the general population [41].

In the study by Andersson et al [41], median patient follow-up time was 12 years (range, 2-22 years) after surgery. IPAA patient scores in four of six health domains on the Short Form (SF)-36 questionnaire were slightly, but significantly, lower than in members of the general population. In addition, IPAA patients had median defecation frequencies of seven bowel movements

during the day and two per night. Moreover, 40% of the patients reported the need to make lifestyle alterations because of urgency of defecation, and most of the patients experienced fecal incontinence.

In a multicenter study that included 351 respondents to a cross-sectional survey of consecutive UC patients older than 18 years who had had a colectomy within the past 10 years, 84% of respondents had better quality of life after the procedure, but 81% had problems in one or more of the following areas: depression, work productivity, restrictions in diet, body image, and sexual function [43].

Every patient who undergoes an IPAA procedure, should be counselled for possibilities of incontinence or stool seepage, increased frequency of bowel movements and possibility of sexual dysfunction. Though the procedure removes whole of the diseased organ and is technically more advanced than end ileostomy, it is not a perfect solution. In future surgical techniques and procedures may result in better postoperative functional outcomes. For dealing with the controversial issues in surgical management please refer to our review article [44].

Figures

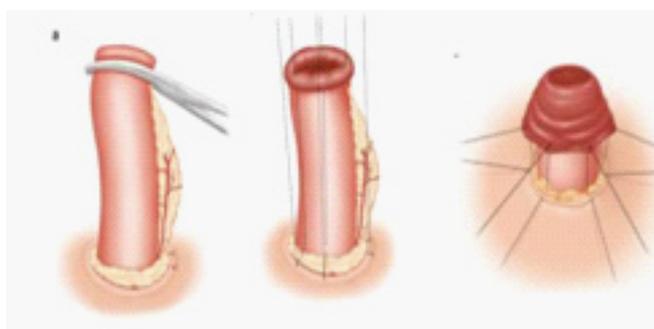


Figure 1: Brookes Ileostomy

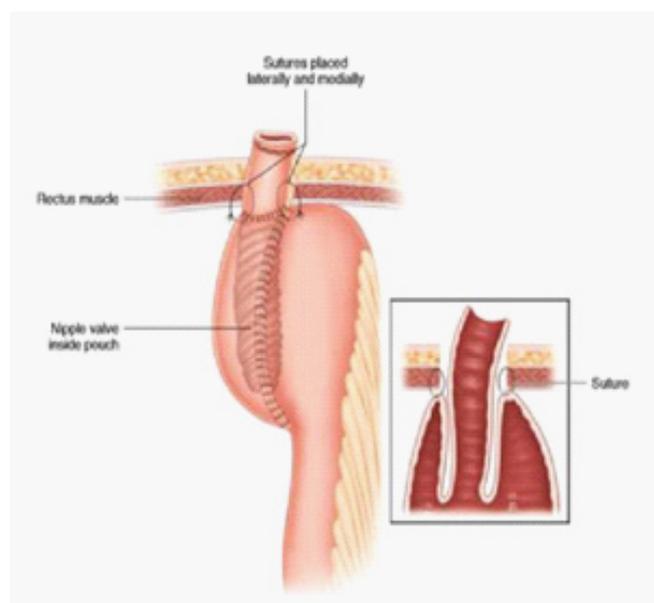


Figure 2: Kocks Ileostomy



Figure 3: Severe Pancolitis

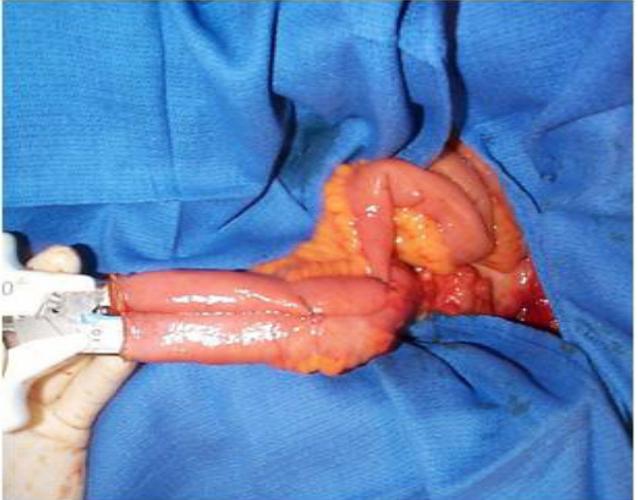


Figure 6: Stapling two loops to form a J pouch

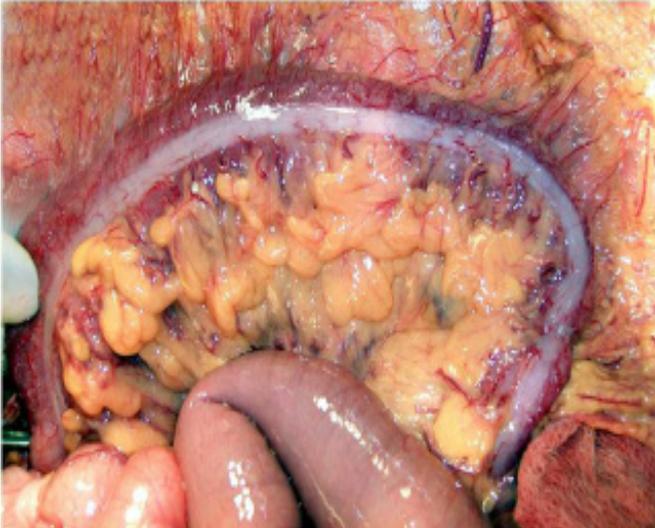


Figure 4: Fat Creeping of Mesentery



Figure 7: J pouch with anvil at distal end



Figure 5: Loop Ileostomy



Figure 8: Completed Ileal pouch Anal Anastomosis

Tables

Table 1: Prediction scores

Predictive index	Criterion	Predictive value
Oxford Criteria	Stool frequency of >8/day or 3-8/day and CRP >45 mg/L (on day 3 of intravenous corticosteroids)	Positive predictive value: 85%
Swedish criteria	CRP mg/L \times 0.14 + daily stool frequency (cut off >8 on day 3 of intravenous corticosteroids)	Sensitivity: 78%, specificity: 81%, positive predictive value: 69-72%
Scottish index	The score (0-9) includes: stool frequency, presence of colonic dilatation and albumin level (cut off >4 on day 3 of intravenous corticosteroids)	Sensitivity: 85%, specificity: 75%
Paediatric ulcerative colitis activity index (PUCAI)	The score (0-85) includes: stool frequency and consistency, presence of blood, nocturnal stools, activity level and abdominal pain	PUCAI >45 on day 3; sensitivity: 92-93%, negative predictive value: 88-94%

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