Surgical Management of Ulcerative Colitis

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KEYWORDS

• Ulcerative colitis • Total abdominal colectomy • Proctocolectomy
• Ileal pouch anal anastomosis • Pouchitis

KEY POINTS

- Multidisciplinary care and management of ulcerative colitis (UC) patients is a key in outcomes. Early surgical consultation is crucial in the management of patients with moderate to severe colitis. Surgical referral remains a cornerstone in the treatment of multifocal and high-grade dysplasia in the setting of UC.
- Preoperative assessment and nutritional status of the patients is a key characteristic to take into consideration and can determine the staging of surgery.
- Ileal pouch-anal anastomosis is the standard surgery for medically refractory disease, cancer, and/or dysplasia. One, 2, or 3-stage surgery may be chosen and tailored to multiple baseline patients' characteristics including preoperative nutritional status, steroid, and biologics use, and intraoperative findings and factors.
- Post-surgical long-term functional outcomes including bowel, sexual, and urinary function, as well as fertility preservation, are key considerations and should be considered and discussed preoperatively with patients, as well as monitored closely postoperatively.

Video content accompanies this article at http://www.surgical.theclinics.com.

INTRODUCTION

The surgical management of Ulcerative Colitis (UC) has made great strides over the years from early attempts of diversion with appendicostomy, cecostomy, and ileostomy that ultimately led to limited success. The introduction of the total proctocolectomy (TPC) versus subtotal colectomy with end ileostomy, and less frequently the subtotal colectomy with ileo-rectal anastomosis, in the 1950s was a significant breakthrough in operative management of UC as these surgeries offered patients an opportunity for a cure. Adjunctive medical therapy with steroids also began to emerge around this period.

Continence-preserving operations started to emerge in the 1980s with the ileal pouch-anal anastomosis (IPAA) and remain a mainstay option for surgical therapy

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Surg Clin N Am 105 (2025) 289–299
https://doi.org/10.1016/j.suc.2024.09.003 surgical.theclinics.com

to this day.[1] In the interim years, the pre-operative planning, intra-operative techniques, and post-operative care have continued to be refined to optimize outcomes for function and to minimize morbidity/mortality for patients with UC.

NATURE OF THE PROBLEM

Approximately 30% of patients with UC will undergo surgery in their lifetime. In most patients, surgery is recommended and scheduled electively, while 10% require emergent surgery. The decision pathway for operative planning begins with whether the patient presents in an elective versus emergent setting, as well as patients' individual characteristics.

Elective Cases

Surgery may be offered to patients who have persistent symptoms despite best medical management therapy (medically refractory colitis). Furthermore, those who cannot tolerate the side effects of medical therapy may be good candidates for surgical intervention. Certain extra-intestinal UC symptoms may improve with surgery in certain patients, but these results are variable.[2] Another indication includes growth retardation in children.

Medically refractory disease and its associated complications make up approximately 70% of the overall surgical cohort. Since the United States Food and Drug Administration approval of infliximab for moderate to severe UC in 2005, several biologics have become available options for patients with medically refractory colitis. Medical decision-making has become more complex, and patients are frequently treated with multiple biologics before proceeding to surgery. Shared decision-making may be facilitated through early surgical referral and consultation prior to exhaustion to all medical options. It is indeed the responsibility of the physicians to provide patients with realistic expectations relating to their disease treatment and status to allow patients to make the appropriate and timely decisions when surgery is inevitable.

Colorectal cancer (CRC), high-grade dysplasia, or multifocal low-grade dysplasia are additional indications for surgery. Patients with UC are at increased risk for developing CRC and are recommended to receive screening, starting 8 y after their date of diagnosis or at the standard age of 45, depending on which criteria is met sooner.[3] Patients with a young age at diagnosis, pancolitis, moderate to severe UC, family history of CRC, and presence of primary sclerosing cholangitis are at higher risk of CRC. Traditionally, all patients with UC with low-grade and high-grade dysplasia discovered on screening colonoscopy were offered a total colectomy with possible proctocolectomy due to the concern for synchronous and/or metachronous lesions. This has since changed with the SCENIC Guidelines published in 2015, which offers guidance on screening for CRC in patients with inflammatory bowel disease, as well as for the management of dysplasia that is discovered on surveillance colonoscopy. Ultimately, the authors recommended that patients with endoscopically resectable polypoid and nonpolypoid dysplasia that is completely removed should be offered continued surveillance over surgical intervention. However, if there is a concern for multifocal disease or high-grade dysplasia, then colectomy should be considered.[4]

Elective surgical options include TPC with an end of continent ileostomy; IPAA; or total abdominal colectomy with an ileorectal anastomosis. The choice of the procedure is individualized based on clinical and patient factors.

Emergent Cases

Patients with UC can become acutely ill and require urgent or emergent surgery. Acute fulminant colitis that is unresponsive to medical treatment, specifically intravenous (IV)

glucocorticoids and/or biologics, often require urgent surgery. Patients with acute fulminant colitis may present with signs of systemic toxicity, such as fever, tachycardia, anemia secondary to bleeding, elevated inflammatory markers in addition to frequent (≥10) bloody bowel movements per day with abdominal pain, or distension.

Alternatively, UC patients can also manifest potentially lethal complications such as toxic megacolon. Symptoms usually include abdominal pain, bloody diarrhea, laboratory derangements, and systemic inflammatory symptoms. Imaging with plain films and/or abdominopelvic computed tomography scans can assist with differentiating perforation from toxic megacolon. Concomitant infectious etiologies, most importantly from Clostridioides difficile or Cytomegalovirus, must be ruled out.

In the emergent setting, the preferred surgical approach is a total colectomy with end ileostomy. The rectum, even if diseased, can generally be left as a Hartmann's stump. When there are concerns about the integrity of the suture line of the stump, the rectum can be brought to the skin as a mucous fistula or subcutaneous rectal stump to minimize complications of stump blow out. The authors also recommend transanal drainage of the rectal stump with Malecot catheter to prevent this complication. The primary goal when performing an urgent colectomy is to avoid a pelvic dissection that may hinder future restoration of intestinal continuity and increase the risk of bleeding complications or autonomic nerve injury both in current of future surgeries. Removal of the diseased colon is generally sufficient to allow the patient to come off immunosuppressive medications and improve their overall nutritional status. The surgeon can consider further continence-sparing procedures (completion proctectomy with IPAA) in the elective setting once the patient has improved clinically from an inflammatory perspective.[5]

PRE-OPERATIVE/PRE-PROCEDURE PLANNING

- Early discussion of expectations of milestones and discharge criteria (enhanced recovery after surgery [ERAS])[6]
- If the patient presents acutely ill, optimize as able by correcting anemia/coagulopathy, volume status, and nutrition.
- Consider incorporating ESPEN guidelines for optimizing nutrition in the preoperative setting.[7]
- Consider early involvement of multidisciplinary team including gastroenterology, nutritionists, occupational/physical therapy, and case management.
- Consider pre-habilitation before elective procedures in patients with multiple comorbidities or significant deconditioning (ERAS).[6]
- Involve a stoma therapist for pre-operative stoma marking for ileostomy.
- Continue tumor necrosis factor (TNF) inhibitors preoperatively—the PUCCINI trial in 2022 demonstrated no increase in postoperative complications with preoperative anti-TNF exposure.[8] Engage with patient's gastroenterologist to discuss weaning steroids if able and consider stress-dose steroids preoperatively for patients on long-term glucocorticoids.
- Mechanical (ie, with polyethylene glycol) with antibiotic preparation prior to surgery (ie, with neomycin/metronidazole).[6]
- Initiate a multimodal, opioid-sparing pain regimen before induction of anesthesia (ERAS). For open procedures, consider thoracic epidural analgesia (ERAS).[6]
- Discuss with anesthesiology team to minimize excess fluid administration or volume overload and consider antiemetic prophylaxis (ERAS).[6]

- Evaluation of integrity of anal sphincter mechanism must be assessed—assess preoperative fecal incontinence.
- TPC and IPAA could be performed via minimal invasive surgery (MIS) or technique (MIS - Laparoscopic and/or Robotic) versus open. In elective setting, MIS approach is preferred and offers short-term benefits such as reduced complications and shorter hospital-stay.
- Foley placement indicated preoperatively. Authors usually leave foley until POD 2 after proctectomy.
- Orogastric tube is inserted to decompress the stomach.
- Modified lithotomy positioning. (Fig. 1)
- Port placement (Fig. 2): A 12 mm trocar in the right lower quadrant, 2 5 mm trocars in the right upper quadrant 1 of which was subxiphoid. A periumbilical 5 mm trocar for the camera and a 5 mm port in the left midclavicular and 1 left lateral. These are all placed under direct vision.

PROCEDURAL APPROACH

Operative Approach

Total proctocolectomy with ileal pouch-anal anastomosis

In 1978, Parks and Nichols described the IPAA, which has since become the standard operation in patients desiring restoration of intestinal continuity and may be performed in 1, 2, or 3 stages. In this operation, a near complete proctocolectomy is performed, and an ileal pouch is either stapled or hand-sewn to the anal canal. When patients are considered appropriate candidates for upfront restorative proctocolectomy with IPAA, single-stage or two-stage IPAA may be considered. A staged IPAA is a far more common and prudent approach. Creation of a diverting ileostomy at the time of IPAA prevents catastrophic pelvic septic complications in the event of anastomotic leak. This can be reversed in 2 to 3 mo post index TPC.

2 Stage (laparoscopic/robotic vs open)
Stage 1: Total proctocolectomy with IPAA with diverting loop ileostomy
Stage 2: Reversal of loop ileostomy
Modified 2 Stage (laparoscopic/robotic vs open)
Stage 1: Subtotal colectomy with end ileostomy
Stage 2: IPAA

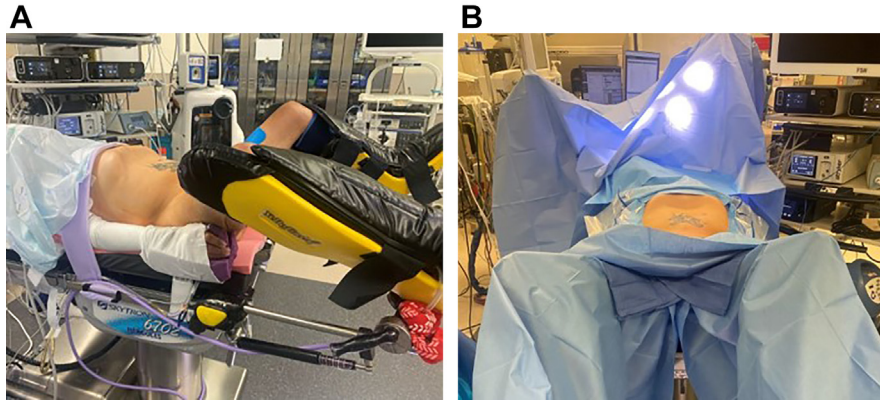

Fig. 1. Modified lithotomy position intraoperative photograph. (*A*) Undraped lateral view (*B*) Draped view.

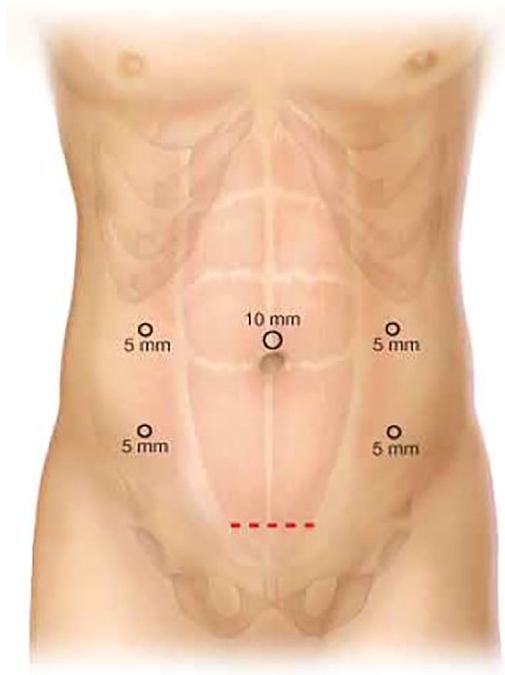

Fig. 2. Port placement – dotted line Pfannenstiel incision/extraction point.

3 Stage (laparoscopic/robotic vs open)
Stage 1: Subtotal colectomy with end ileostomy
Stage 2: IPAA with diverting loop ileostomy
Stage 3: Reversal of loop ileostomy

We will describe a MIS laparoscopic-assisted approach. After creation of pneumoperitoneum, the small bowel is evaluated for Crohn's disease and the abdomen explored for any evidence of bowel perforation. Abdominal colectomy is performed in a standard fashion, with close to bowel mesenteric dissection unless dysplasia/cancer is present in which case high ligation of vessels/oncologic resection is performed. Bipolar coagulator device is used for most of the dissection. Care is taken to avoid injury to the duodenum, stomach, small bowel loops, spleen, bladder, pancreas gallbladder, and bilateral ureters. Colectomy is performed from right to left in medial to lateral fashion. Our dissection starts by elevating the cecum, the ileocolic pedicle is visualized. The pedicle is dissected after all the retroperitoneal structures are protected, specifically the duodenum, which is visualized and posteriorized. The ileocolic pedicle is then isolated and divided in between clips and bipolar device. We then proceed cephalad by continuing our medial dissection and pushing all the retroperitoneum structures posteriorly (Video 1). The omentum at the mid-transverse colon is dissected and the lesser sac entered. The dissection is continued laterally all the way down toward the cecum. Then the lateral attachments of the right colon are taken down and the medial plane met. Middle colic dissection is performed in a medial and lateral fashion. Middle colics are isolated, clipped, and divided.

Then left colectomy is performed starting at the inferior mesenteric vein (IMV) lateral to the ligament of Treitz. The IMV is isolated and divided after the retroperitoneal

structures had been posteriorized. Then, the splenic flexure is mobilized in a medial to lateral fashion. Dissection of the mesentery anterior to the pancreas is performed and the rest of the mesentery of the colon is divided (Video 2). The flexure is taken down in its entirety from medial to lateral and then lateral to medial approach by dividing the omentum, entering lesser sac. The splenocolic ligament is divided. We then continue our medial dissection of the left colon by posteriorizing the retroperitoneal structures. The ureter and gonadal vessels are visualized. They were protected and followed into the pelvis and cephalad as well. Once we have created a medial to lateral plane, and confirmed the location of the ureter, the Inferior Mesenteric Artery (IMA) is visualized as it branches into the left colic and the superior hemorrhoidal.

The IMA is then isolated, clipped, and divided making sure that the ureter was free posteriorly.

Once the entire colon is mobilized and if there is adequate pouch reach and the patient's clinical condition is conductive for IPAA, rectal dissection is carried down to the pelvic floor. Laparoscopic, sharp total mesorectal dissection is begun circumferentially to the level of anal ring. The hypogastric nerves are identified and preserved (Video 3). This portion can be assisted by robotic platform, alternatively, can be performed via Pfannenstiel incision in open fashion to facilitate dissection. Posterior dissection is carried down first in the relatively bloodless total mesorectal excision plane. Anterior dissection is carried close to the rectum preserving the recto prostatic fascia in men and rectovaginal septum in women, and the lateral stalks are divided close to the rectum to minimize injury to autonomic nerves in the setting of benign disease. The rectum is then transected with a stapler. Hemostasis is confirmed in the pelvis. Then, the ileum mesentery is divided first with a bipolar energy device. The staple line is grasped with a locking grasper. A Pfannenstiel incision is made with a knife 2 cm cephalad to the pubic symphysis. The anterior rectus sheath is opened transversely and elevated off the rectus muscles superiorly and inferiorly. The rectus muscles are split in the midline and an extra small wound retractor/protector is inserted. The colon/rectum is pulled up easily through the wound retractor. If a staged procedure, the specimen is brought out via the ileostomy site (usually through a 12 mm port site).

Next the ileal reservoir is created. The terminal ileum is aligned in a J configuration, and the pouch constructed with stapling device. Both limbs of the J should measure approximately 15 to 25 cm in length (pouch needs to reach to pelvis) (**Fig. 3**A–C). Outside the abdomen, during construction, the apex of the pouch must reach beyond the symphysis pubis to accomplish a tension-free IPAA. Selective division of the mesenteric vessels to the apex of the proposed reservoir will allow for more length. Superficial incision of the anterior and posterior aspects of the small bowel mesentery along the course of the superior mesenteric artery up to the duodenum is 2 additional lengthening maneuvers to take into consideration if needed. An ileal pouch is created by folding the ileum on itself, making a common enterotomy and firing a linear stapler as many times as needed to achieve sufficient pouch size—usually 2 to 3 (**Fig. 4**A). Staple line is verified to be hemostatic. A circular stapler anvil is placed within the enterotomy and secured with a purse string suture (**Fig. 4**B, C).The ileal reservoir is returned to the abdomen.

We then re-insufflate the abdomen and perform a tension-free end-to-end ileo-anal anastomosis. Caution is taking to avoid twisting of mesentery by ensuring the cut edge of the mesentery is on the right side of patient and the bowel on the left side. The flexible sigmoidoscope is then used to evaluate the anastomosis and the pouch integrity and a leak test is performed. A pelvic drain is usually placed through the lateral left port.

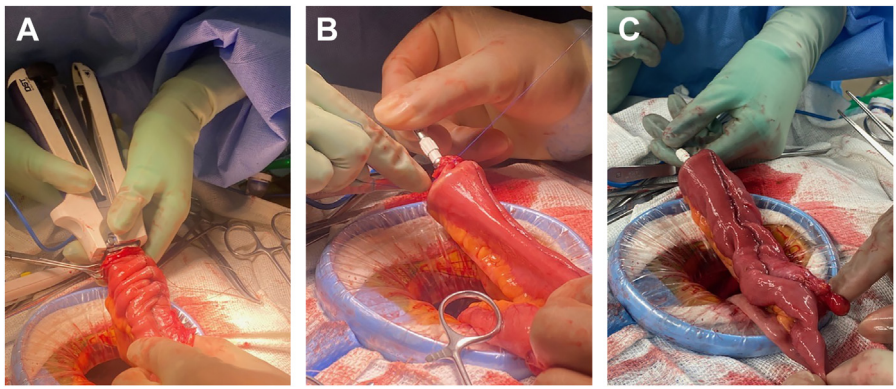

Fig. 3. Ileal reservoir is created. (*A*) Creation of J pouch. (*B*) Anvil placement. (*C*) J pouch 15 to 25 cm length.

Alternatively, distal mucosal stripping may be performed with a hand-sewn ileal pouch anal anastomosis. The use of a circular retractor facilitates exposure. Mucosectomy is performed and the excised mucosa and remaining proximal rectum removed, leaving a short cuff of denuded rectal muscle distally just above dentate line. The pouch is then pulled into the pelvis and the anastomosis carried out between the apex of the pouch and the dentate line, suturing full thickness of the pouch wall to the internal sphincter and anal mucosa. Then a site on the terminal ileum is selected for ileostomy. A pre-marked circular skin pedicle is removed from the right lower quadrant. Dissection is carried down through the deeper tissues and the rectus muscle split in the midline. The loop of ileum is pulled up into the field and secured with a red rubber catheter. Then the fascia of the Pfannenstiel is closed in running fashion. All the incisions are irrigated and closed. Finally, the ileum is opened transversely and a loop ileostomy was matured in a Brooke fashion. The red rubber catheter is removed during this process and an ileostomy appliance applied.

Ileorectal anastomosis

Proponents of IRA report advantages including the lower technical demand compared with IPAA, the ability to perform a single-staged operation, and elimination of a pelvic

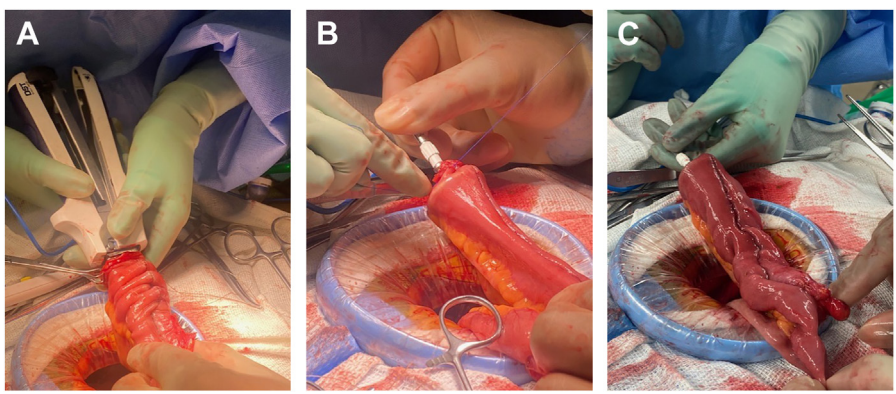

Fig. 4. Ileal pouch creation. (*A*) An ileal pouch is created by folding the ileum on itself, making a common enterotomy and firing 3 loads of the stapler. (*B*) An EEA circular stapler anvil is placed within the enterotomy and secured with a purse string suture. (*C*) Final ileal pouch.

dissection with the potential associated complications. Technical aspects are similar to the colectomy portion of IPAA. The ileocolic pedicle and the superior rectal arteries are preserved. The ileum is transected flush with the cecum and the rectum transected at the rectosigmoid junction. A circular stapler is used to provide a wider lumen and minimize stenosis. The specimen is removed via ileostomy site. After ileal transection, the anvil is placed inside and brought out via the antimesenteric side of the ileum and secured in purse string fashion. The enterotomy is closed with another fire of a linear stapler. The bowel is then delivered back to the abdomen and the anastomosis created in side-to-end fashion and integrity/leak test is performed with flexible sigmoidoscopy.

Several studies have shown safety of IRA for UC with overall complications ranging from 24% to 30%. Long-term failure rate, as well as development of dysplasia or cancer in the retained rectum are important factors to consider (specially in patients that have dysplasia/cancer in the colon). Another important factor to take into consideration is the functional capacity of the rectum as chronic UC may impede compliance of the rectum.

Continent ileostomy

A continent ileostomy could be a viable alternative in patients who have failed Brooke ileostomy or those who are candidates for IPAA but cannot have a pouch due to rectal cancer, poor anal sphincter function, or patient preference. Suspicion of Crohn's disease contraindicates this approach. Obesity and age over 40 y are associated with increased risk of pouch dysfunction and represent relative contraindications.

Technique: After mobilization of the existing ileostomy from the abdominal wall, the reservoir is created by using the terminal 40 to 50 cm of the ileum to create an aperistaltic reservoir as initially described by Kock. The outlet is constructed from the distal 3 to 5 cm of this segment, the nipple valve is created from the next 18 cm of bowel, and the remaining 30 cm is used for the pouch itself. Peritonectomy is performed overlying the mesentery supplying the nipple valve on both sides. The pouch is oriented in the form of an S, and a posterior row of sutures is placed between each limb and an enterotomy made along the S-shape. A second posterior row of sutures is created to re-approximate the cut edges. The valve is then created with 3 firings of a linear, noncutting stapler. A 2-layer closure of the anterior portion of the pouch is then performed. A circumferential row of interrupted sutures are placed between the outlet and the pouch to help maintain the position of the nipple valve. The end of the ileum is then brought through the abdominal wall. The ostomy is sutured flush with the skin and the pouch anchored to the posterior rectus sheath. Gravity drainage should be allowed in the immediate postoperative period. Intubation of the pouch is recommended 3 times a day.

Special considerations. Obese patients: Obese patients are at risk for short-term perioperative complications such as wound complications (ie, surgical site infections), stoma complications, and pelvic sepsis.[9] Relative contraindication for IPAA and continent ileostomy creation due to mechanical difficulty in creating the pouch.

Two-stage versus 3-stage total proctocolectomy with IPAA: Oftentimes the decision between a 2-stage versus 3-stage procedure will depend on surgeon preference, gastroenterology input, and patient preference/baseline status.

Rectal mucosectomy: The IPAA can be constructed with a double-staple technique without rectal mucosectomy or with a handsewn anastomosis after a trans-anal mucosectomy. The rectal cuff that is left behind after the stapled procedure may lead to persistence of disease or recurrence of dysplasia.[10]

Fertility/Pregnancy: Historically, open proctocolectomy with IPAA has been associated with fertility issues in females due to the subsequent development of pelvic adhesions.[11]

Consider laparoscopic techniques and potentially use of adhesion barriers to minimize adhesions or consider an ileorectal anastomosis until completion of childbearing with continued rectal surveillance for dysplasia with subsequent completion proctectomy and J-pouch construction.

RECOVERY/REHABILITATION

ERAS protocols have been developed to incorporate preoperative, intraoperative, and postoperative components. The American Society of Colon and Rectal Surgeons and the Society of American Gastrointestinal and Endoscopic Surgeons released an updated guideline in 2017 from which the postoperative recommendations included the following:

A. Patient Mobilization
   a. Encourage early and progressive patient mobilization to reduce length-of-stay.
B. Prevention of Ileus
   a. Start a regular diet immediately after *elective* colorectal surgery.
   b. Sham feeding (ie, with sugar free gum for $\geq$10 min up to 3–4 times a day) can lead to improved gastrointestinal recovery and decreased length-of-stay.
C. Postoperative Fluid Management
   a. Discontinue IV fluids early in the postoperative period.
D. Urinary Catheters
   a. Remove urinary catheters within 48 h of lower rectal resections.

MANAGEMENT/OUTCOMES

IPAA remains an excellent surgical option for the management of UC as it provides patient preservation of fecal continence and the avoidance of a permanent stoma.

Complications of IPAA:

Anastomotic Stricture

Reported incidence is varied between 5% and 40%. Strictures often respond well to mechanical dilation but can also be treated with stricturoplasty or pouch revision.[12]

Pelvic Sepsis

Approximately 6% risk in current literature. The presence of pelvic sepsis has been shown to increase the risk for pouch failure.[13]

Pouch Failure

Pouch failure, which has been defined as excision of a pouch or the continuation of an unreversed stoma is described to occur at about 6%.[14]

Fecal Incontinence

Fecal incontinence can be a very distressing and impactful symptom for patients postoperatively. Rates of nighttime incontinence have been cited as being higher than daytime incontinence. Encourage lifestyle modifications and consider adding antidiarrheal agents. Sacral nerve stimulators may also play a role in management of symptoms.[15]

Pouchitis

Pouchitis occurs due to mucosal inflammation of the ileal pouch and can present with a spectrum of symptoms that can be acute or chronic. Laboratories, stools studies, and endoscopy evaluation with biopsies should all be obtained.

First-line treatment includes oral antibiotics. Some patients may require maintenance therapy for frequent pouchitis.[16]

Pouch Dysplasia

It can occur within the retained rectal mucosa, anal transitional zone, or the ileal pouch, although this risk is very low.[17]

Sexual Dysfunction

Sexual dysfunction after IPAA has been observed more frequently in patients who undergo re-do pelvic surgery.[18]

Female Infertility

As discussed previously, open IPAA procedures have been associated with higher infertility rates due to pelvic adhesions.

CLINICS CARE POINTS

- Operations for emergent/urgent presentations of UC focus on controlling the source of inflammation but care should be taken to preserve the anatomy for possible completion proctectomy with pouch construction in the future, if able. In the emergent setting, the preferred surgical approach is a total colectomy with end ileostomy.
- In the elective setting, the choice of surgical treatment for UC should involve shared decision-making with the patient and close involvement with gastroenterology to decide timing for surgery. Main indications for elective surgery are medically refractory disease, side effects of medical therapy, CRC, high-grade dysplasia or multifocal low-grade dysplasia, and growth retardation in children.
- In the elective setting a near complete proctocolectomy is performed, and an ileal pouch with either stapled or hand-sewn to the anal canal. When patients are considered appropriate candidates for upfront restorative proctocolectomy with IPAA, single-stage or 2-stage IPAA may be considered. MIS approach is preferred and offers short- and long-term benefits such as reduced minor complications and shorter hospital stay, as well as improved fertility rates. Creation of a diverting ileostomy at the time of IPAA decreases the incidence of catastrophic pelvic septic complications in the event of anastomotic leak.
- Complications of IPAA include pouchitis, anastomotic leak/pelvic sepsis, anastomotic stricture, pouch dysplasia, pouch failure, sexual dysfunction, and fecal incontinence.

DISCLOSURE

The authors have no disclosures.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at. doi:10.1016/j.suc.2024.09.003

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