Management of J-pouch Complications

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KEYWORDS

• Ileal pouch • IPAA • J-pouch • Ulcerative colitis • Anastomotic leak • Pelvic sepsis • Acute complications • Chronic complications

KEY POINTS

- Identifying complications after a restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) is paramount for successful treatment and optimal pouch function.
- Complications after IPAA can be acute or chronic and range from inflammatory (pouchitis, malignancy), structural (pouch twists, retained rectum, strictures, adhesions), and functional (pelvic floor pathology, sexual dysfunction).
- Septic complications and postoperative pelvic sepsis are the primary reasons for pouch failure.
- Patients can have salvage operations with pouch augmentation or redo pouch surgery in high-volume centers.

INTRODUCTION

A restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) is the standard of care for patients with ulcerative colitis (UC) familial adenomatous polyposis, and select patients with Crohn's disease (CD). A fecal reservoir made from the terminal ileum anastomosed to the anal transitional zone (ATZ) was first introduced in 1978 by Parks and Nicolls[1] and has revolutionized the management colorectal pathologies. An IPAA operation, usually performed in multiple stages, involves resection of the diseased colon and rectum allowing establishment of bowel continuity without the need for permanent fecal diversion.[2] While this has notably pivoted patients' quality of life (QOL) and is quoted with a success rate of approximately 95%, there have been well-documented complications that threaten pouch function and other complications that can lead to pouch failure. The severity and chronicity of

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these complications can lead to ongoing medical management for inflammatory conditions of the pouch, endoscopic and local procedures, permanent fecal diversion with/without pouch excision, pouch augmentation, or redo pouch salvage surgery.[3] Some patients may be candidates for a Kock pouch, which is an abdominal reservoir intermittently drained by a catheter through a small opening in the abdominal wall, however that is outside the scope of this article.[4]

In this study, the authors discuss common acute complications, such as bowel obstructions, anastomotic leaks, pelvic sepsis, pouch strictures, chronic complications, like Crohn's like disease of the pouch (CLDP), chronic pouchitis, and/or cuffitis, sinus and fistula tract formation, malignancy, and outlet obstructions of the pouch. Lastly, they focus on the specific workup for patients experiencing signs and symptoms of pouch failure and their treatment options.

ACUTE COMPLICATIONS

Anastomotic/Pelvic Sepsis

Post-IPAA complications are categorized into acute and chronic, with subsets of these etiologies being due to infection, inflammation, structural changes, and functional sequela, some of which predispose patients for pouch failure. Many times, acute complications can lead to chronic complications as well, for example, an acute pelvic septic complication from an anastomotic leak can also result in a chronic inflammatory pelvic collection that manifests as perianal fistulas and is subsequently mischaracterized as perianal CD. Of patients who experience pelvic sepsis after IPAA creation, the vast majority, approximately 75%, are associated with an anastomotic leak.[5] Studies range in reporting the frequency of anastomotic leaks, but the generally accepted range of leaks is 5% to 15% and typically occurs at locations of relative-ischemia and/or anastomotic tension.[5,6] The most common, which contributes to over 50% of all anastomotic leaks, occurs at the ileal-anal anastomosis, followed by a pouch-body or tip of the J leaks in decreasing frequencies.[5,7] Patients with an acute anastomotic leak develop acute postoperative pelvic sepsis and present with a wide range of symptoms including fevers, tachycardia, abdominal and/or pelvic pain, and possible feculent or purulent discharge into their abdomen.[8,9] However, other postoperative complications can also have similar presentations making it paramount to correctly identify the etiology for proper management. There has been utility in using gastrografin enemas, a form of fluoroscopic imaging used to assess the anatomy and integrity of the IPAA, which can help identify whether the presenting symptoms are due to an actual anastomotic leak, as opposed to a pelvic abscess.[10] Pelvic abscesses can often be managed with percutaneous drainage, antibiotics, and monitoring. However, anastomotic leaks require more extensive intervention and typically result in fecal diversion if the patient is not diverted at the time the leak is identified. Additionally, these patients may require serial examinations under anesthesia, and a number of endoscopic procedures, historically with serially downsizing mushroom catheters, placed in the presacral cavity over the course of many months. More recently, there has been a trend to using an endoscopic vacuum-assisted closure, known as an endo-sponge to decrease the healing interval from months to weeks. In this technique, a sponge is placed in the presacral cavity and continuous negative pressure is applied until the cavity begins to granulate and reduces in size.[11] Afterward, depending on the patient's clinical status, a reoperation can be performed to repair the pouch if the defect is not sizable or the sinus can be incorporated into the pouch body by an open or endoscopic sinusotomy.[12] Alternatively, some patients may have to go directly to a redo pouch, or the pouch can be excised and an end ileostomy created.

Bowel Obstruction

Similarly, patients can develop symptoms such as anorexia, obstipation, nausea, vomiting, and abdominal distention raising concern for small bowel obstruction (SBO) in the acute postoperative setting, but they are also at high risk for developing these symptoms as a late complication as well. This is likely due to adhesive disease from the multistaged IPAA. It has been documented between 13% and 35% reported rate in SBO after IPAA.[13] In a 2 staged or 3 staged procedure, closure of the ileostomy site is also a nidus for adhesive disease with some studies showing 7.6% rate of SBO after ileostomy takes down.[14]

Typically, IPAA is constructed as a 3 staged procedure, which involves an initial total abdominal colectomy with creation of an end ileostomy, followed by the completion proctectomy, IPAA creation with a diverting loop ileostomy, and lastly ileostomy reversal. This allows for mesenteric lengthening and protects the pouch with proximal diversion. A 2 staged approach has a first stage consisting of a total proctocolectomy, with IPAA creation, and diverting loop ileostomy followed by ileostomy closure. A 2 staged approached protects the healing pouch with a stoma but does not allow for mesenteric lengthening. Lastly, a modified 2 staged approach allows for mesenteric lengthening with an initial total abdominal colectomy and end ileostomy but does not protect the pouch with a stoma as the second stage is a completion proctectomy with ileal-pouch creation. With a 3-staged, 2-staged, or modified 2-staged approach requiring an ileostomy, there is a higher risk of high output fluid loss with resulting electrolyte abnormalities, possible skin irritation if stoma appliance is not appropriately sized, stomal prolapse, and can also be, as mentioned before, a site for an SBO whether it be by a parastomal hernia, or obstruction from luminal contents.[15]

CHRONIC COMPLICATIONS OF THE POUCH

Pouchitis and Cuffitis

Pouchitis is the most common complication after IPAA, occurring in approximately 40% to 50% of patients (**Fig. 1**).[16–18] The true incidence of pouchitis after IPAA is difficult to determine due to the variable indications for IPAA and differences in diagnostic criteria for pouchitis and follow-up.[19] Pouchitis is characterized by inflammation of the pouch, and although poorly understood, it can exist even without a mechanical cause

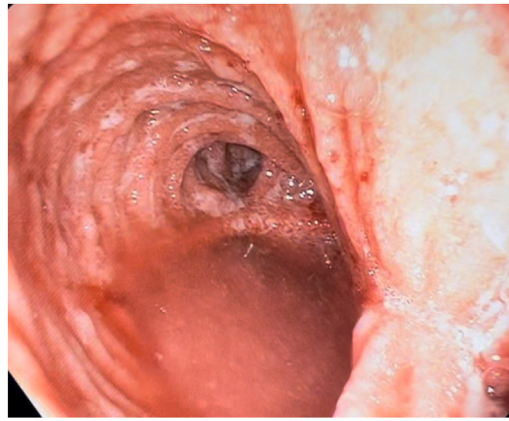

Fig. 1. A pouchoscopy where a patient has chronic pouchitis and a mild pouch twist with a mid-pouch stricture.

such as stricture or abscess and is often confused for possible CD in many refractory cases.[20] The etiology of pouchitis is multifactorial, involving dysbiosis and altered microbiome of the pouch, fecal stasis and the resultant changes in the small bowel mucosa of the pouch, genetic predisposition, and host immunity all playing a role.[21,22] Recurrent colitis at the rectal cuff may also play a role. The underlying pathology also predicts whether a patient will suffer from pouchitis after IPAA—almost no patients who undergo IPAA for polyposis syndromes develop pouchitis, while patients with UC experience pouchitis at a significantly higher rate, up to 72% at 10 years.[23] Patients with extraintestinal manifestations of UC are also more likely to develop pouchitis.[24]

Patients often experience nonspecific symptoms such as increased frequency of loose, watery, or bloody stools; urgency or incontinence; and abdominal cramping or pelvic pain.[7,25] These symptoms are sometimes accompanied by systemic symptoms such as malaise, weight loss, or fever, or extraintestinal manifestations such as arthralgias.[26,27] The time frame can be variable, with some patients having a single acute episode lasting less than 4 weeks, while the majority of patients having a relapsing course.[7,21] A minority of the patients with relapsing pouchitis will develop constant symptoms refractory to medical management or recalcitrant pouchitis and is known as chronic pouchitis.[28,29] These patients are often tried on the same biologic medicines they received prior to their IPAA to treat the pouchitis that carries an additional psychological effect to the patient who thought they would be finished with chronic medication usage, but despite proper treatment, the patient may eventually require excision of the pouch.

The diagnosis is made with endoscopy, with the pouch mucosa demonstrating signs of inflammation such as erythema, friability, exudates, ulcers, granulations, or erosion, and confirmed with histology. Endoscopy and biopsy must be performed as it is important to rule out other potential causes of the patient's symptoms such as infection (*Clostridiodes difficile* or cytomegalovirus), CD, cuffitis, primary sclerosing cholangitis (PSC), nonsteroidal anti-inflammatory drugs (NSAIDs), or a mechanical complication of the pouch such as anastomotic stricture, pouch ischemia, or fistula. Endoscopy can also aid in quantifying pouch inflammation through commonly used indices such as the pouch disease activity index (PDAI).[30] PDAI uses a series of criteria based on clinical signs and symptoms as well as endoscopic findings and histology to assign a score and determine the presence of active disease to guide treatment options.

The mainstay of treatment of pouchitis is antibiotics, with either ciprofloxacin or metronidazole being first-line agents.[31] Patients undergo a 2 week treatment course with either metronidazole 250 to 500 mg 3 times a day or ciprofloxacin 500 mg twice a day.[32] Ciprofloxacin has been found to have higher rates of remission based on PDAI.[33] Many patients will experience significant improvement in symptoms within a few days of antibiotic treatment. Probiotics have shown little to no benefit on either the prevention or prophylaxis of pouchitis.[19,34] Of those successfully treated with antibiotics, about 60% will have recurrent symptoms.[28] If episodes are infrequent, these patients may continue to be treated with antibiotic therapy, possibly cycling different antibiotics or using combination therapy with 2 or more antibiotics. There are some early data showing that antibiotics may be useful in the prophylaxis of pouchitis, but this is not the currently recommended practice and the adverse effects of chronic antibiotic therapy should be weighed against the potential minimal benefit of pouchitis prophylaxis.[35]

Approximately 5% to 19% of patients develop chronic pouchitis after IPAA, with a portion of those patients developing medically refractory disease and pouch failure

necessitating pouch excision.[36] Chronic pouchitis can be antibiotic dependent or antibiotic refractory, and the treatment is largely divided into induction and maintenance phases. For chronic antibiotic-dependent pouchitis, the patient may require multiple course of combination antibiotics or chronic suppressive antibiotic therapy depending on the frequency of recurrent symptoms. Long-term use of metronidazole has been shown to be associated with peripheral neuropathy so other agents are generally preferred for chronic suppressive therapy.[37] For chronic antibiotic-refractory pouchitis (CARP), induction therapy will often include steroids or mesalamine with the latter being used for maintenance therapy as well. There is a role for budesonide both as an induction and maintenance agent.[38] Biologics (antitumor necrosis factor and anti-interleukin 12/23) are sometimes used for patients with insufficient response to the earlier agents.[39–41] Finally, if the pouchitis is refractory to all medical management, patients may require further surgery with a diverting ileostomy, pouch revision, or pouch excision.

Cuffitis is inflammation of the pouch limited to the rectal cuff, usually treated locally with topical steroids or 5-aminosalicylic acid in enema or suppository form. Cuffitis may sometimes require mucosectomy or redo IPAA.[42]

Obstruction of Pouch

Obstruction of the pouch due can occur either at the pouch inlet leading to afferent limb syndrome, or at the outlet from a pouch twist, anastomotic stricture or obstructive defecation (**Fig. 2**). Strictures can occur due to operative technique, anatomy such as sharp angulation, a mesenteric twist causing a structural obstruction, or surrounding inflammation. Inlet strictures are likely to occur as a result of inflammatory or fibrotic causes, with the former requiring medical therapy (thiopurines or biologics) and the latter requiring endoscopic dilation.[25] An outlet stricture at the pouch-anal anastomosis is often the result of prior episodes of pelvic sepsis in the setting of an anastomotic leak or tension on the anastomosis causing an ischemic stricture, a pouch twist, or prolapse of the pouch.[7] Chronic pouchitis or cuffitis may also contribute to the condition. Unique to a handsewn S-pouch is efferent limb syndrome, where the exit conduit is longer than 2 cm or elongates overtime and leads to kinking of the bowel between the pouch and the anal canal, causing an outlet obstruction.[3]

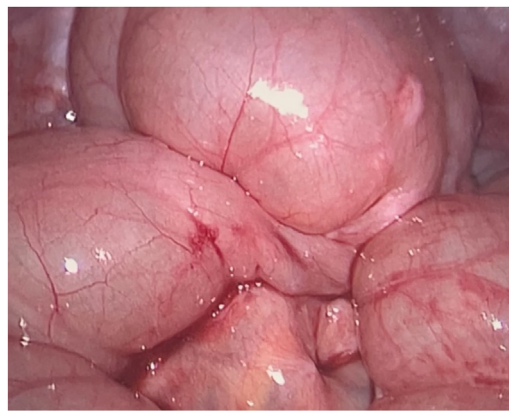

Fig. 2. A "thoughtful ileostomy" of a patient with afferent limb syndrome. The small bowel is adherent between the pouch and the sacrum resulting in a chronic partial bowel obstruction.

The treatment of anastomotic strictures consists of endoscopic or manual dilation, which is often successful but must be repeated serially in efforts to avoid a formal redo pouch operation.[43] Some patients may be able to self-intubate using flexible catheters to alleviate their symptoms but must be educated on how to safely and comfortably do so.[43,44] Some patients may need a redo pouch procedure to correct ongoing strictures when less-invasive modalities have failed.

Fistula

Fistulae after pouch creation can occur, with pouch-vagina fistulae being the most common and occurring in 7% to 10% of women who undergo IPAA creation.[45] Other fistulous complications include pouch-perineal, pouch-vesical, or pouch-cutaneous fistulae. Pouch-related fistulae are one of the most important determinants of pouch failure, with recurrent fistulas being the reason for pouch excision in up to 20% of patients.[46,47] Fistulae occurring shortly after surgery (early fistulae, within 6–12 months of surgery) are usually due to pelvic sepsis from leak or abscess or from technical errors, while fistulae occurring late (>6–12 months after surgery) should raise suspicion for CD.[25,48,49] Rarely, there may be malignancy in the pouch leading to fistula as well.

The diagnosis of pouch fistula is made by history and physical, with imaging as needed. Contrast enema can help to delineate the anatomy of both the fistulous tract and surrounding structures. Treatment focuses initially on symptom control with diversion, drainage of associated collections with seton placement, and antibiotics as needed. The fistula may eventually require endoscopic intervention with endoclip or endo-sponge, or other local anorectal procedures before a definitive surgical repair is attempted.[50]

Crohn's like Disease of the Pouch

CLDP after IPAA presents unique diagnostic and therapeutic challenges. Approximately 10% to 15% of patients undergoing IPAA for presumed ulcerative colitis or indeterminate colitis will develop pouchitis with a CD-like phenotype.[7,51,52] In recent years, clinicians have started to distinguish between "CD of the pouch", in which there is an unequivocal diagnosis of preoperative CD, and pouchitis with "CD-like features," seen in patients with a preoperative diagnosis of UC or indeterminant colitis who subsequently develop a phenotypic CD-like pouch inflammation.[52] For the purpose of this review, we will use these terms interchangeably, focusing on individuals without a preoperative diagnosis of CD.

CD of the pouch can be difficult to distinguish between other post-IPAA complications, such as postoperative septic complications and other etiologies of pouchitis.[7] Risk factors, such as a family history of CD, active smoking, and serologic findings of immunoglobulin A (IgA) antibodies to Saccharomyces cerevisiae or antibodies to CBir1 flagellin, have been implicated in CD of the pouch and can help clinicians identify higher risk individuals.[53–56] On examination, patients may present with new perianal or vaginal fistulas, as well as ulcerations and atypical fissures of the anal canal. The International Ileal Pouch Consortium established a set of diagnostic criteria for CD of the pouch, combining clinical, endoscopic, histologic, and imaging findings.[52] Findings of prepouch ileitis, late development of fistulas or abscess (6–12 months after ileostomy takedown), segmental or skip lesions, or strictures in the pouch or small intestine are suggestive of CD. Tissue demonstrating non-necrotizing granulomas on histopathology is pathognomonic for CD.[51,57]

CD of the pouch can be further classified into 3 phenotypes: inflammatory, fibrostenotic, and fistulizing. The inflammatory phenotype is associated with long segments of

discrete/segmental inflammation of the afferent limb, ileitis or pouchitis refractory to antibiotic therapy, medically refractory cuffitis, and perianal or upper gastrointestinal involvement. Patients with a preoperative history or family history of CD are more likely to exhibit this phenotype.[52,58] Fibrostenotic phenotypes are accompanied by ulcerated strictures. These strictures can be differentiated from other causes of post-IPAA strictures, including surgery-induced ischemia and NSAID use, by their anatomic location. The fibrostenotic phenotype typically involves the distal small intestine or pouch inlet, whereas surgery-induced ischemia is typically associated with strictures at the pouch-anal anastomosis.[59] Similarly, the anatomic location of a fistula can help determine whether it is from the fistulizing phenotype of CD of the pouch versus other etiologies. Typical fistulizing phenotype is associated with fistulas of the anal canal. Additionally, if a patient develops de novo fistula more than 6 months after ileostomy takedown in the absence of postoperative infectious complications, then a diagnosis of CLDP should be considered.[59]

Treatment of CLDP is similar to that for patients with CD without IPAA and depends on the severity and quality of presentation. Medical management with both antitumor necrosis factor (TNF)-α and non-TNF-targeted biologics has demonstrated efficacy. In one meta-analysis including 313 patients treated with either infliximab or adalimumab for inflammatory pouch conditions, 8 week and 12 month clinical remission rates were 50% and 52%, respectively. This study also found that patients with CD-like pouchitis had higher short-term clinical remission rates compared to patients with refractory pouchitis of other etiologies.[60] For patients with fibrostenotic phenotype, endoscopic balloon dilation has been shown as effective and safe in experienced hands. Similarly, endoscopic stricturotomy may be utilized in select cases.[52,61] Similarly, patient's with shallow, short, pouch-to-pouch fistulas due to fistulizing phenotype of CD of the pouch may be favorable candidates for endoscopic fistulotomy.[62] In some instances, surgical intervention and revision may be warranted for patients with CD of the pouch. Patient's with fibrostenotic phenotype may require strictureplasty, surgical resection and anastomosis, or bowel bypass to effectively treat strictures when repeat endoscopic therapy fails. Patient's with fistulizing phenotypes who develop perianal fistulas and abscess may require long-term antibiotic therapy as well as surgical or interventional radiologic drainage. Fecal diversion may ultimately be required after failed medical and local surgical approaches. Due to high frequency of disease recurrence and pouch failure, surgical redo of the pelvic pouch is not usually recommended for patients with CD-like pouchitis.[63]

Dysplasia/Malignancy Post-Ileal Pouch-Anal Anastomosis

Dysplasia and malignancies are rare after IPAA but can develop in the ileal pouch, the anal transition zone, or in the retained rectal mucosa.[7] Overall risk of neoplasia has been reported between 1.3% to 2.0% at 10 years and 4.2% to 6.9% at 20 years following IPAA.[64,65] The rates of carcinoma post-IPAA are even lower, with one systematic review demonstrating a pooled cumulative incidence of pouch-related adenocarcinoma after IPAA to be 0.19% (95% confidence interval [CI], 0.18%–0.20%), and 0.33% (95% CI 0.31%–0.34%) at 10 and 20 years post-IPAA, respectively.[66] A personal history of colorectal neoplasia (colorectal cancer [CRC]), PSC, and chronic pouchitis is associated with increased risk of neoplasia of the pouch.[52,65,66] The pathogenesis of J-pouch neoplasia, specifically adenocarcinoma, is thought to originate from residual rectal cuff mucosa, most often occurring along the transition zone. However, mucosectomy at time of IPAA does not seem to decrease risk of developing carcinoma post-IPAA. This can partially be explained by findings that up to 20% of patients receiving mucosectomy retain residual microscopic islets of rectal mucosa.[64,66,67]

There are currently no uniformly accepted guidelines for post-IPAA surveillance of neoplasia. Both the British Society of Gastroenterology (BSG) and European Crohn's and Colitis Foundation (ECCO) agree that annual pouch surveillance should be considered in high-risk patients (ie, those with severe and chronic pouchitis, PSC, or a history of neoplasia at the time of pouch surgery).[68,69] For patients without these risk factors, BSG suggests 5 year surveillance, whereas ECCO does not recommend routine surveillance in this "low risk" population. Most recently, the International Ileal Pouch Consortium released consensus guidelines suggesting annual surveillance pouchoscopy in patients with a prior diagnosis of neoplasia. They also suggest surveillance pouchoscopy every 1 to 3 years for patients with risk factors including PSC, chronic pouchitis, chronic cuffitis, CLDP, duration of UC 8 years or more, or a family history of CRC in a first-degree relative. They also recommend surveillance pouchoscopy every 3 years for patients without these risk factors.[57,70]

If dysplasia is identified on surveillance, endoscopic interventions should be employed to eradicate diseased areas, and surveillance intervals should be shortened to every 3 to 6 months. Surgery, along with neoadjuvant and adjuvant chemotherapy, is the mainstay of treatment for those who develop carcinoma of the pouch. Depending on the extent of disease, surgery consists of abdominoperineal excision of the pouch or exenteration of the pelvis. Surgery is often complicated by adhesions and disease extension, requiring urinary and/or pelvic floor and soft tissue reconstruction.[66]

Functional Complications of the Pouch

An understanding of appropriate pouch physiology and function is vital to adequately appreciate ways in which dysfunction can occur. A pouch does not function in the same capacity as the colon and rectum; it is composed of small bowel, is straight rather than tortuous, and has a different muscular anatomy than the large bowel, thus preventing the generation of high intraluminal pressure.[71] Melvin and colleagues[72] defined "ideal" pouch function as 6 or less bowel movements per day, with no nighttime bowel movements and no incontinence.[71] More recently, Quinn and colleagues[73] defined normal pouch function as "self-reported healthy pouch function," making an important point that not all pouches function the same, and ultimately, patient health and satisfaction are the most important outcomes to consider when managing a patient post-IPAA.

Following this patient-centered approach, several studies have identified specific symptoms, including incomplete emptying, severity of urgency, number of bowel movements per day, major incontinence, and use of antidiarrheal medications to correlate with patients' QOL.[71,74,75] Recently, a consortium, known as Patient-Reported Outcomes After Pouch Surgery (PROPS), went on to define "ileoanal pouch syndrome" as a patient experiencing one functional symptom along with one consequence. The 7 symptoms PROPS identified were fecal incontinence, soiling, urgency, clustering/fragmentation, uncomfortable perianal symptoms, and nocturnal symptoms. The 7 consequences they identified were pad usage, toilet awareness, dietary and medical adjustments, alterations in sleep and energy, negative impact on intimacy, changes in social roles, and negative mental, emotional, and psychological changes.[74,75] In practice, a vast majority of post-IPAA patients will meet the criteria for a diagnosis of ileoanal pouch syndrome on early follow-up, calling into question the practical value of such a system. However, the symptoms and consequences identified serve as good starting points to help clinicians and patients work together to achieve optimal outcomes and improve QOL.

Ileoanal pouch syndrome should be considered a diagnosis of exclusion. When a patient presents with ongoing pouch or pelvic symptoms, a thorough history and

physical examination should be completed. Surgical notes and immediate postoperative complications should be queried. Often, endoscopic and radiographic examinations will be required to rule out structural or inflammatory pathologies.[3] Along with a thorough history and physical, endoscopic and radiographic examinations may be necessary to rule out structural or inflammatory etiologies. Once a diagnosis is made, initial treatments should be geared toward a patient's symptoms, including dietary changes, biofeedback exercises, and medications. Often, the root cause of pouch dysfunction can be traced to ineffective pouch emptying, an innate characteristic of the pouch. A chronically full pouch can lead to frequent stooling, incontinence, pelvic pain, and bacterial overgrowth. Early adaptations, such as spending more time on the toilet, keeping stool soft, and avoiding fibrous foods, can help avoid serious problems down the line.[71] Rarely, patients may require surgical revision of the pouch or even permanent diversion if symptoms remain debilitating despite other, noninvasive measures.

Sexual Dysfunction and Fertility

The effect of IPAA on sexual dysfunction and fertility is important for clinicians and patients to understand. In general, male sexual function and fertility seem to remain similar to those treated medically for UC.[76] In fact, several studies suggest that fertility may be slightly improved in male individuals after IPAA when compared with male patients being treated medically for UC.[77] The effect of IPAA on female sexual dysfunction is less understood. Several studies have suggested that up to 50% of women report symptoms of sexual dysfunction after IPAA, with one study finding 5% of female individuals who underwent pediatric IPAA reporting severely restricted sexual function and 30% reporting dyspareunia.[78] It is difficult to determine whether these symptoms are related to IPAA or the underlying diagnosis of inflammatory bowel disease, as one prospective case-control study demonstrated no difference in sexual dysfunction between female individuals undergoing IPAA versus those who had medically managed UC.[76,79] In a survey of 90 women who underwent IPAA, 55% to 80% of respondents perceived no change or improved performance in sexual function after IPAA.[80]

With IPAA often being performed in adolescent and young adult populations, it is imperative that all patients undergoing IPAA receive appropriate counseling about potential sexual dysfunction and fertility complications before and after surgery. Fertility and fecundity are reviewed in detail in another section.

WORKUP OF POUCH FAILURE AND REDO POUCH SURGERY SUCCESS

Most patients have a successful restorative proctocolectomy with IPAA; however, a minority of patients will have signs of pouch failure, defined as the need for pouch excision or permanent diversion.[81–84] Many patients do not want to live with a permanent ileostomy and wish to proceed with a redo pouch or pouch augmentation despite the considerable risks. A redo pouch is a full abdominopelvic mobilization of the ileal pouch with bowel transection at the level of the ATZ and creation of a new anal-anastomosis by means of repairing the pouch or creating a new pouch. The best example of this would be the correction of chronic obstruction from a structural complication like a pouch twist, which needs to be untwisted and reattached to the anal canal in the proper orientation (**Fig. 3**). A pouch augmentation is when 1 or more elements of an ileal pouch can be corrected without a full pouch mobilization. An example of pouch augmentation would be repairing a chronic leak from the tip of the J by oversewing the leak after debridement, or correcting afferent limb syndrome by mobilizing the bowel from behind the pouch. Some cases of cuffitis can

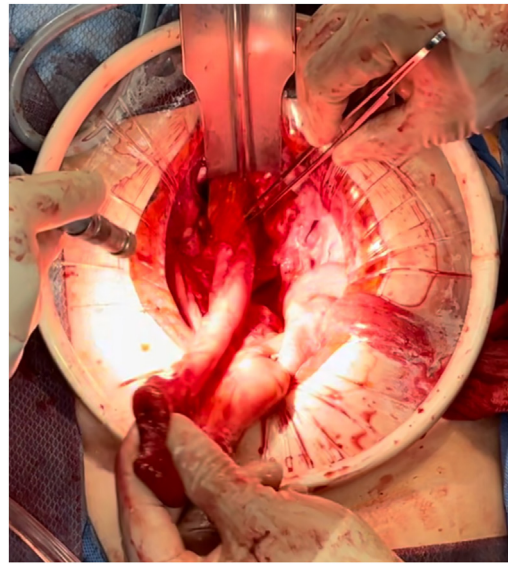

Fig. 3. Showing a patient with a pouch twist as the bowel is seen passing underneath the mesentery as it passes into the deep pelvis and is anastomosed to the anal canal.

be remedied with a pouch-advancement flap once other sources of pouch failure have been ruled out.[85] The majority of redo pouches and pouch augmentations are done in 3 steps, as typically these patients are too mentally and physically deconditioned to undergo a major operation, although some instances can be repaired with only one operation, or more likely, correcting the pathology and diverting to allow friable tissue to heal without the added complexities of an active fecal stream.[86] The first step in a 3 staged redo pouch is a "thoughtful ileostomy," where an ileostomy is created after excising any previous stapled side-to-side stapled ileostomy closure and performing a handsewn anastomosis, where the diverting stoma is 20 cm proximal to the pouch inlet.[87] The bowel between the pouch inlet and the ileostomy will be one limb (of 2) of the new J-pouch if a new pouch is needed at the next operation, ensuring that no additional bowel is resected. This procedure can be performed in nonspecialized centers if the patient cannot be transferred to a center of excellence and should be performed before there is any attempt at a pouch excision. Six months later, once the patient has regained physical strength and is mentally prepared for a major operation, the patient has their redo pouch/pouch augmentation and is left diverted with a loop ileostomy until a water-soluble contrast enema and potentially an MRI confirms appropriate healing, and lastly, the ileostomy is closed.

The results of redo pouch surgery are favorable, with over 90% of patients stating they would undergo the operation again, and they would recommend a redo pouch to another patient, despite the largest study showing patients with redo pouch have more nighttime stooling, incontinence, and pad use than patients with an index pouch.[88] The majority of patients had the indication of a redo pouch as a result of pelvic sepsis (61%), obstruction/prolapse (25%), chronic pouchitis (12%), and neoplasia in 2%. It is regarded as a safe operation with overall morbidity of 53%, anastomotic leak rate of 8%, and a pouch success rate of 80% at 7 years.[88]

The workup of a patient with pouch dysfunction is extensive as it is imperative to identify the original, progenitor complication that may have led to other symptoms.

Often these mimic symptoms related to CD, that is, perianal fistulas that are a result of an anastomotic leak and not perianal CD.[46] The most important element of the history is the patient's symptoms. Patients will often state they "never felt right" after their pouch was created, or starting after their protective ileostomy was closed.[89] Although nonspecific and subjective, this phrase is often telling and should prompt a thorough workup. The patient will be able accurately describe their symptoms and when they occur, for example, if they become bloated after eating, or they simply cannot evacuate, versus the presence and location of abdominal pain and associated symptoms. The second key element of the history is the timing of symptoms. Within the first 6 months to 1 year following pouch surgery, any complication such as recurrent pouchitis, pelvic pain, obstructive symptoms, abdominopelvic abscesses, and perianal fistulas should all be thought of as surgical, mechanical complications that will usually require a surgical correction. This is different than patients who have years of normal pouch function and then develop these symptoms, as this is usually associated with CLDP. Though such patients may eventually need surgical intervention, it is typically initially treated with anti-inflammatory medications, that is, biologic therapy, while any associated pathologies are treated concurrently, that is, antibiotics for abscesses, fistulas, and/or pouchitis.[90] Lastly, the operative reports should be reviewed in detail, specifically for mention of technical complications such as problems with bowel reach to pelvis, enterotomies, staple-misfires, air leak after the ileal-anal anastomosis, and poor visibility. The record should also be examined for postoperative events like a return to the operating room for sepsis, hemorrhage, or unexplained systemic inflammatory response syndrome despite the lack of intraoperative findings. These should all raise suspicion of a mechanical complication after surgery.[3]

On physical examination, the location of scars, evaluation for incisional hernias, evidence of enterocutaneous fistulas, and a perianal examination evaluating perianal fistulas should be performed. Most patients will need an examination under anesthesia to carefully evaluate the anal canal and pouch. Evidence of cuffitis/retained rectum, pouch compliance, pouch twist, inlet and outlet strictures, presence of efferent limb syndrome (in S-pouch patients), small bowel inflammation consistent with CD, and pouchitis should be examined, biopsied, and integrated into the treatment plan.[3] The examination under anesthesia is typically done only after a water-soluble contrast enema is reviewed looking for stricture, leak, and/or afferent limb syndrome, and an MRI is examined to check for the presence and location of a pelvic abscess, fistula tracts, pouchitis, retained rectum, and mesenteric swirling consistent with a pouch twist. Occasionally, patients may need anorectal manometry to evaluate for pelvic floor dysfunction but it is imperative to rule out other sources as some patients develop pelvic floor dysfunction as a result of chronic obstruction.[91]

After the patient has been diverted for approximately 6 months with a "thoughtful ileostomy," he/she will undergo the redo pouch operation.[87] This is performed in an open fashion; although in selected circumstances, a minimally invasive redo pouch has been successfully completed by the senior author.[92] The operation is complex and might involve any number of technical steps to correct the source of the pouch dysfunction. It is mandatory for the operating surgeon to be able to excise the pouch, create a new J-pouch, S-pouch, or H-pouch, convert from a double stapled to mucosectomy handsewn anastomosis, debride a chronic presacral inflammatory rind, and perform a technique to augment the pouch with a strictureplasty of the pouch inlet.[93,94] They also must be prepared to repair a leak from the tip of the J and any associated complications like enteroenteric and/or enterocutaneous fistulas, or a full pouch mobilization to untwist the pouch and perform a new anastomosis, or complete the proctectomy in the case of retained rectum. These complex operations are

typically performed in high-volume centers with extensive expertise in pelvic pouch operations.

SUMMARY

Most patients with a restorative proctocolectomy with IPAA do well; however, properly identifying acute and chronic complications are paramount to managing and correcting these complications to allow for optimal pouch function and avoid pouch failure. Inflammatory conditions like pouchitis may require ongoing medical therapy, but surgical intervention may be needed to correct any underlying septic complication and to repair any structural disorders. Pelvic floor and sexual dysfunction as well as neoplasia are rare but serious complications after an IPAA. Patients with signs of pouch failure may be candidates for pouch augmentation or redo pouch surgery and should be referred to high-volume centers before pouch excision is offered if the patient wishes to avoid a permanent ileostomy.

CLINICS CARE POINTS

- Immediate recognition of postoperative IPAA complications is crucial to proper treatment.
- Acute anastomotic leaks must be treated with antibiotics and undergo transanal drainage and fecal diversion, while a pelvic abscess without an associated leak may be treated with percutaneous drainage.
- Chronic pouch complications can stem from acute complications that mimic inflammatory conditions of the pouch.
- Corrective pouch surgery can be safely performed at high-volume centers and correct structural pouch complications.

DISCLOSURE

D.M. Schwartzberg is an advisor for Convatec International; others have nothing to disclose.

REFERENCES

1. Parks AG, Nicholls RJ. Proctocolectomy without ileostomy for ulcerative colitis. Br Med J 1978;2(6130):85–8.
2. Alsafi Z, Snell A, Segal JP. Prevalence of "pouch failure" of the ileoanal pouch in ulcerative colitis: a systematic review and meta-analysis. Int J Colorectal Dis 2022;37(2):357–64.
3. Schwartzberg DM, Kayal M, Barnes EL. The ileal pouch-anal anastomosis: identifying structural disorders. Inflamm Bowel Dis 2024;30(5):863–7.
4. Shuford R, Ashburn JH. Don't forget about the K-pouch. Clin Colon Rectal Surg 2022;35(6):499–504.
5. Guyton K, Kearney D, Holubar SD. Anastomotic leak after ileal pouch-anal anastomosis. Clin Colon Rectal Surg 2021;34(6):417–25.
6. Lian L, Kiran RP, Remzi FH, et al. Outcomes for patients developing anastomotic leak after ileal pouch-anal anastomosis: does a handsewn vs. stapled anastomosis matter? Dis Colon Rectum 2009;52(3):387–93.
7. Leinicke JA. Ileal pouch complications. Surg Clin North Am 2019;99(6):1185–96.

8. Olsen BC, Sakkestad ST, Pfeffer F, et al. Rate of anastomotic leakage after rectal anastomosis depends on the definition: pelvic abscesses are significant. Scand J Surg 2019;108(3):241–9.
9. Huang AL, Plietz M, Greenstein AJ, et al. Management of anastomotic leaks in ileal pouch anal anastomosis for ulcerative colitis. Clin Colon Rectal Surg 2022; 35(6):469–74.
10. Huang C, Remzi FH, Dane B, et al. Reporting templates for MRI and water-soluble contrast enema in patients with ileal pouch-anal anastomosis: experience from a large referral center. AJR Am J Roentgenol 2021;217(2):347–58.
11. Chandan S, Shen B, Kochhar GS. Therapeutic endoscopy in postoperative pouch complications. Clin Colon Rectal Surg 2022;35(1):78–88.
12. Ali UA, Shen B, Remzi FH, et al. The management of anastomotic pouch sinus after IPAA. Dis Colon Rectum 2012;55(5):541–8.
13. MacLean AR, Cohen Z, MacRae HM, et al. Risk of small bowel obstruction after the ileal pouch-anal anastomosis. Ann Surg 2002;235(2):200–6.
14. Mennigen R, Sewald W, Senninger N, et al. Morbidity of loop ileostomy closure after restorative proctocolectomy for ulcerative colitis and familial adenomatous polyposis: a systematic review. J Gastrointest Surg 2014;18(12):2192–200.
15. Kameyama H, Hashimoto Y, Shimada Y, et al. Small bowel obstruction after ileal pouch-anal anastomosis with a loop ileostomy in patients with ulcerative colitis. Ann Coloproctol 2018;34(2):94–100.
16. Hahnloser D, Pemberton JH, Wolff BG, et al. Results at up to 20 years after ileal pouch-anal anastomosis for chronic ulcerative colitis. Br J Surg 2007;94(3): 333–40.
17. Esckilsen S, Kochar B, Weaver KN, et al. Very early pouchitis is associated with an increased likelihood of chronic inflammatory conditions of the pouch. Dig Dis Sci 2023;68(7):3139–47.
18. Barnes EL, Karachalia Sandri A, Herfarth HH, et al. Antibiotic use in the 12 Months prior to ileal pouch-anal anastomosis increases the risk for pouchitis. Clin Gastroenterol Hepatol 2024;22(8). https://doi.org/10.1016/J.CGH.2024.03.012.
19. Gionchetti P, Rizzello F, Helwig U, et al. Prophylaxis of pouchitis onset with probiotic therapy: a double-blind, placebo-controlled trial. Gastroenterology 2003; 124(5):1202–9.
20. Pappou EP, Kiran RP. The failed J pouch. Clin Colon Rectal Surg 2016;29(2): 123–9.
21. Shen B. Acute and chronic pouchitis–pathogenesis, diagnosis and treatment. Nat Rev Gastroenterol Hepatol 2012;9(6):323–33.
22. Shen B. Pouchitis: pathophysiology and management. Nat Rev Gastroenterol Hepatol 2024;21(7). https://doi.org/10.1038/S41575-024-00920-5.
23. Barnes EL, Desai A, Hashash JG, et al. The natural history after ileal pouch-anal anastomosis for ulcerative colitis: a population-based cohort study from the United States. Am J Gastroenterol 2024. https://doi.org/10.14309/AJG.0000000000002891.
24. Maharshak N, Cohen NA, Reshef L, et al. Alterations of enteric microbiota in patients with a normal ileal pouch are predictive of pouchitis. J Crohns Colitis 2017; 11(3):314–20.
25. Deputy M, Segal J, Reza L, et al. The pouch behaving badly: management of morbidity after ileal pouch-anal anastomosis. Colorectal Dis 2021;23(5):1193–204.
26. Hata K, Okada S, Shinagawa T, et al. Meta-analysis of the association of extraintestinal manifestations with the development of pouchitis in patients with ulcerative colitis. BJS Open 2019;3(4):436–44.

27. Hata K, Ishihara S, Nozawa H, et al. Pouchitis after ileal pouch-anal anastomosis in ulcerative colitis: diagnosis, management, risk factors, and incidence. Dig Endosc 2017;29(1):26–34.
28. Madiba TE, Bartolo DCC. Pouchitis following restorative proctocolectomy for ulcerative colitis: incidence and therapeutic outcome. Coll Surg Edinb 2001;46(6):334–7. Available at: https://europepmc.org/article/med/11768572. Accessed July 30, 2024.
29. Hurst RD, Chung TP, Rubin M, et al. The implications of acute pouchitis on the long-term functional results after restorative proctocolectomy. Inflamm Bowel Dis 1998;4(4):280–4.
30. Sedano R, Nguyen TM, Almradi A, et al. Disease activity indices for pouchitis: a systematic review. Inflamm Bowel Dis 2022;28(4):622–38.
31. Pardi DS, Sandborn WJ. Systematic review: the management of pouchitis. Aliment Pharmacol Ther 2006;23(8):1087–96.
32. Tome J, Raffals LE, Pardi DS. Management of acute and chronic pouchitis. Dis Colon Rectum 2022;65(S1):S69–76.
33. Shen B, Achkar JP, Lashner BA, et al. A randomized clinical trial of ciprofloxacin and metronidazole to treat acute pouchitis. Inflamm Bowel Dis 2001;7(4):301–5.
34. Bengtsson J, Adlerberth I, Östblom A, et al. Effect of probiotics (Lactobacillus plantarum 299 plus Bifidobacterium Cure21) in patients with poor ileal pouch function: a randomised controlled trial. Scand J Gastroenterol 2016;51(9):1087–92.
35. Ha CY, Bauer JJ, Lazarev M, et al. 488 early institution of tinidazole may prevent pouchitis following ileal-pouch anal anastomosis (IPAA) surgery in ulcerative colitis (UC) patients. Gastroenterology 2010;138(5):S–69.
36. Mowschenson PM, Critchlow JF, Peppercorn MA, et al. Ileoanal pouch operation: long-term outcome with or without diverting ileostomy. Arch Surg 2000;135(4):463–6.
37. Goolsby TA, Jakeman B, Gaynes RP. Clinical relevance of metronidazole and peripheral neuropathy: a systematic review of the literature. Int J Antimicrob Agents 2018;51(3):319–25.
38. Gionchetti P, Rizzello F, Poggioli G, et al. Oral budesonide in the treatment of chronic refractory pouchitis. Aliment Pharmacol Ther 2007;25(10):1231–6.
39. Ollech JE, Rubin DT, Glick L, et al. Ustekinumab is effective for the treatment of chronic antibiotic-refractory pouchitis. Dig Dis Sci 2019;64(12):3596–601.
40. Ribaldone DG, Pellicano R, Saracco GM, et al. Vedolizumab for treatment of chronic refractory pouchitis: a systematic review with pool analysis. Rev Esp Enferm Dig 2020;112(1):59–63.
41. Segal JP, Ding NS, Worley G, et al. Systematic review with meta-analysis: the management of chronic refractory pouchitis with an evidence-based treatment algorithm. Aliment Pharmacol Ther 2017;45(5):581–92.
42. Shen B. Diagnosis and management of postoperative ileal pouch disorders. Clin Colon Rectal Surg 2010;23(4):259–68.
43. Lewis WG, Kuzu A, Sagar PM, et al. Stricture at the pouch-anal anastomosis after restorative proctocolectomy. Dis Colon Rectum 1994;37(2):120–5.
44. Perry-Woodford ZL, McLaughlin SD. Ileoanal pouch dysfunction and the use of a Medena catheter following hospital discharge. Br J Community Nurs 2009;14(11):502–6.
45. Pellino G, Celentano V, Vinci D, et al. Ileoanal pouch-related fistulae: a systematic review with meta-analysis on incidence, treatment options and outcomes. Dig Liver Dis 2023;55(3):342–9.

46. Fazio VW, Tekkis PP, Remzi F, et al. Quantification of risk for pouch failure after ileal pouch anal anastomosis surgery. Ann Surg 2003;238(4):605–17.
47. Fazio VW, Ziv Y, Church JM, et al. Ileal pouch-anal anastomoses complications and function in 1005 patients. Ann Surg 1995;222(2):120–7.
48. Nisar PJ, Kiran RP, Shen B, et al. Factors associated with ileoanal pouch failure in patients developing early or late pouch-related fistula. Dis Colon Rectum 2011; 54(4):446–53.
49. Shen B, Remzi FH, Lavery IC, et al. A proposed classification of ileal pouch disorders and associated complications after restorative proctocolectomy. Clin Gastroenterol Hepatol 2008;6(2):145–58.
50. Alipouriani A, Hull T, Lipman J, et al. Diagnosis and treatment of primary ileal pouch leaks: a 27-year experience at a referral center. J Gastrointest Surg 2024;28(6): 860–6.
51. Goldstein NS, Sanford WW, Bodzin JH. Crohn's-like complications in patients with ulcerative colitis after total proctocolectomy and ileal pouch-anal anastomosis. Am J Surg Pathol 1997;21(11):1343–53.
52. Akiyama S, Dyer EC, Rubin DT. Diagnostic and management considerations for the IPAA with crohn's disease-like features. Dis Colon Rectum 2022;65:S77–84.
53. Chang SY, Pemberton JH, Larson D. Ileal pouch-anal anastomosis in patients with indeterminate colitis: long-term results. Dis Colon Rectum 2000;43(11):1487–96.
54. Shen B, Fazio V, Remzi F, et al. Risk factors for diseases of ileal pouch–anal anastomosis after restorative proctocolectomy for ulcerative colitis. Clin Gastroenterol Hepatol 2006. Available at: https://www.sciencedirect.com/science/article/pii/S1542356505009961. Accessed July 15, 2024.
55. Melmed G, Fleshner PR, Bardakcioglu O, et al. Family history and serology predict Crohn's disease after ileal pouch-anal anastomosis for ulcerative colitis. Dis Colon Rectum 2008. Available at: https://journals.lww.com/dcrjournal/abstract/2008/51010/family_history_and_serology_predict_crohn_s.17.aspx. Accessed July 15, 2024.
56. Truta B, Li DX, Mahadevan U, et al. Serologic markers associated with development of Crohn's disease after ileal pouch anal anastomosis for ulcerative colitis. Dig Dis Sci 2014;59(1):135–45.
57. Shen B, Kochhar G, Kariv R, et al. Diagnosis and classification of ileal pouch disorders: consensus guidelines from the International Ileal Pouch Consortium. Lancet Gastroenterol Hepatol 2021. Available at: https://www.thelancet.com/article/S2468-1253(21)00101-1/abstract. Accessed July 15, 2024.
58. Li Y, Wu B, Shen B. Diagnosis and differential diagnosis of crohn's disease of the ileal pouch. Curr Gastroenterol Rep 2012;14(5):406–13.
59. Lightner A, Pemberton JH, Loftus EJ. Crohn's disease of the ileoanal pouch. Inflamm Bowel Dis 2016. https://doi.org/10.1097/MIB.0000000000000712.
60. Huguet M, Pereira B, Goutte M, et al. Systematic review with meta-analysis: anti-TNF therapy in refractory pouchitis and crohn's disease-like complications of the pouch after ileal pouch-anal anastomosis following colectomy for ulcerative colitis. Inflamm Bowel Dis 2018;24(2):261–8.
61. Lan N, Wu JJ, Wu XR, et al. Endoscopic treatment of pouch inlet and afferent limb strictures: stricturotomy vs. balloon dilation. Surg Endosc 2021;35(4):1722–33.
62. Kochhar G, Endoscopy BSG. Endoscopic fistulotomy in inflammatory bowel disease (with video). Elsevier; 2018. Available at: https://www.sciencedirect.com/science/article/pii/S0016510718301822. Accessed July 15, 2024.
63. Shen B, Kochhar G, Rubin DT, et al. Treatment of pouchitis, Crohn's disease, cuffitis, and other inflammatory disorders of the pouch: consensus guidelines from the

International Ileal Pouch Consortium. Lancet Gastroenterol Hepatol 2022. Available at: https://www.thelancet.com/journals/langas/article/PIIS2468-1253(21)00214-4/fulltext. Accessed July 15, 2024.
64. Kariv R, Remzi FH, Lian L, et al. Preoperative colorectal neoplasia increases risk for pouch neoplasia in patients with restorative proctocolectomy. Gastroenterology 2010;139(3):806–12.e2.
65. Derikx LAAP, Kievit W, Drenth JPH, et al. Prior colorectal neoplasia is associated with increased risk of ileoanal pouch neoplasia in patients with inflammatory bowel disease. Gastroenterology 2014;146(1):119–28.e1.
66. Selvaggi F, Pellino G, Canonico S, et al. Systematic review of cuff and pouch cancer in patients with ileal pelvic pouch for ulcerative colitis. Inflamm Bowel Dis 2014;20(7):1296–308.
67. O'Connell PR, Pemberton JH, Weiland LH, et al. Does rectal mucosa regenerate after ileonal anastomosis? Dis Colon Rectum 1987;30(1):1–5.
68. Annese V, Beaugerie L, Egan L, et al. European evidence-based consensus: inflammatory bowel disease and malignancies. Journal of Crohn's and Colitis 2015. https://doi.org/10.1093/ecco-jcc/jjv141.
69. Cairns SR, Scholefield JH, Steele RJ, et al. Guidelines for colorectal cancer screening and surveillance in moderate and high risk groups (update from 2002). Gut 2010. https://doi.org/10.1136/gut.2009.179804.
70. Barrett CM, Long MD, Grimm I, et al. Off the cuff markers: surveillance and endoscopic approaches for dysplasia after ileal pouch-anal anastomosis. Dig Dis Sci 2022;67(10):4666.
71. Church J. Functional disorders of the ileal-anal pouch: a systematic review. Dis Colon Rectum 2024;67:S36–45.
72. Melvin JC, Harms BA, Heise CP, et al. The optimal ileal pouch: physiologic parameters significantly correlate with overall pouch function. J Gastrointest Surg 2021. https://doi.org/10.1007/s11605-020-04617-3/Published.
73. Quinn KP, Busciglio IA, Burton DD, et al. Defining normal pouch function in patients with ileal pouch-anal anastomosis: a pilot study. Aliment Pharmacol Ther 2022;55(12):1560–8.
74. Brandsborg S, Nicholls R, Mortensen LS, et al. Restorative proctocolectomy for ulcerative colitis: development and validation of a new scoring system for pouch dysfunction and quality of life. Colorectal Dis 2013;15(12):e719–25.
75. Lovegrove RE, Fazio VW, Remzi FH, et al. Development of a pouch functional score following restorative proctocolectomy. Journal of British Surgery 2007;97(6):945–51.
76. Palm PH, Matos MC, Velazco CS. Complications following ileal pouch-anal anastomosis in pediatric ulcerative colitis. Semin Pediatr Surg 2024;33(2):151405.
77. Koivusalo A, Mikko AE, Ae PP, et al. Sexual functions in adulthood after restorative proctocolectomy for paediatric onset ulcerative colitis. Pediatr Surg Int 2009;25(10):881–4.
78. Potter D, Moir C, Day C, et al. Fertility and sexual function in women following pediatric ileal pouch-anal anastomosis. J Pediatr Surg 2020. Available at: https://www.sciencedirect.com/science/article/pii/S0022346819307043. Accessed July 21, 2024.
79. Cornish J, Wooding K, Tan E, et al. Study of sexual, urinary, and fecal function in females following restorative proctocolectomy. Inflamm Bowel Dis 2012;18(9):1601–7.
80. Ogilvie JW, Goetz L, Baxter NN, et al. Female sexual dysfunction after ileal pouch–anal anastomosis. Journal of British Surgery 2008;95(7):887–92.

81. Cornish J, Tan E, Teare J, et al. The effect of restorative proctocolectomy on sexual function, urinary function, fertility, pregnancy and delivery: a systematic review. Dis Colon Rectum 2007. Available at: https://journals.lww.com/dcrjournal/abstract/2007/50080/The_Effect_of_Restorative_Proctocolectomy_on.2.aspx. Accessed July 21, 2024.
82. Rajaratnam S, Eglinton T, Hider P, et al. Impact of ileal pouch-anal anastomosis on female fertility: meta-analysis and systematic review. Int J Colorectal Dis 2011;26(11):1365–74.
83. Cornish J, Tan E, Teare J, et al. TTD of the colon, 2007 undefined. The effect of restorative proctocolectomy on sexual function, urinary function, fertility, pregnancy and delivery. Dis Colon Rectum 2007. Available at: https://journals.lww.com/dcrjournal/abstract/2007/50080/The_Effect_of_Restorative_Proctocolectomy_on.2.aspx. Accessed July 21, 2024.
84. Aktaş MK, Gülmez M, Sahar AA, et al. Current status and surgical technique for restorative proctocolectomy with ileal pouch anal anastomosis. Balkan Med J 2023;40(4):236–43.
85. Ramirez RL, Fleshner P. Reoperative inflammatory bowel disease surgery. Clin Colon Rectal Surg 2006;19(4):195–206.
86. Cohen D, Silvestri C, Schwartzberg DM. Restorative pouch surgery following proctocolectomy for inflammatory bowel disease: past experience and future direction. Transl Gastroenterol Hepatol 2023;8(0). https://doi.org/10.21037/TGH-23-28/COIF.
87. Schwartzberg DM, Esen E, Remzi FH. Thoughtful ileostomy creation in patients undergoing redo IPAA. Dis Colon Rectum 2020;63(1). https://doi.org/10.1097/DCR.0000000000001535.
88. Remzi FH, Aytac E, Ashburn J, et al. Transabdominal redo ileal pouch surgery for failed restorative proctocolectomy: lessons learned over 500 patients. Ann Surg 2015;262. https://doi.org/10.1097/SLA.0000000000001386.
89. Lynn PB, Brandstetter S, Schwartzberg DM. Pelvic pouch failure: treatment options. Clin Colon Rectal Surg 2022;35(6):487–94.
90. Barnes EL, Kayal M, Schwartzberg DM. The rational use of advanced therapies for inflammatory conditions of the pouch. Inflamm Bowel Dis 2023;29(12):2007–9.
91. Kayal M, Barnes EL, Schwartzberg DM. The pouch corner: a review of functional pouch disorders. Inflamm Bowel Dis 2024. https://doi.org/10.1093/IBD/IZAE118.
92. Addison P, Abouzeid M, Schwartzberg D. Minimally invasive revisional-IPAA surgery: the future of redo pouches?. In: American society of colon & rectal surgeons, national meeting. 2022.
93. Schwartzberg D. Abdominal-IPAA failure: abdominal pathology causing symptoms of POuch failure in patients with an ileal pouch-anal anastomosis. In: Advances in IBD national meeting. 2022.
94. Aydinli HH, Peirce C, Aytac E, et al. The usefulness of the H-pouch configuration in salvage surgery for failed ileal pouches. Colorectal Dis 2017;19(8):e312–5.