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Technical tips for reoperative pouch surgery

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ABSTRACT

The ileoanal pouch is the cornerstone of intestinal reconstruction after proctocolectomy in patients with ulcerative colitis, familial adenomatous polyposis, and selected other diseases of the colorectum. With successful surgery, patients avoid a conventional lifelong ileostomy and maintain a satisfying quality of life with acceptable bowel function. Complications during surgery or convalescence, however, can result in ileoanal pouch failure and lead to an unacceptably poor quality of life. Although pouch excision has been (and is still) an option for patients with pouch failure, modern advances have allowed for corrective surgical measures to be applied in circumstances of pouch failure in order to restore good function of the pouch and as an alternative to pouch excision with permanent ileostomy. Selecting patients suitable for the ileoanal pouch revision and properly performing the technical aspects of the surgery are two challenging feats that have a direct impact on outcomes and quality of life in this population. This section will focus on strategies to evaluate and select the correct patient for the ileoanal pouch revision, and how to surgically optimize a patient that has been selected as an appropriate candidate. Additionally, proper surgical technique of ileal pouch revision/reconstruction will be discussed.

Introduction

Restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) is a desirable surgical option for patients who must undergo removal of the colorectum but wish to avoid permanent conventional ileostomy.[1,2] In the majority of cases, patients experience an excellent quality of life as a result of a durable ileal pouch and are spared the need for a lifelong conventional ileostomy.[3] Over the years, IPAA surgery has incorporated modern technical approaches while maintaining good pouch function and survival in patients who are treated in high-volume IPAA centers.[4]

When surgery is successful, patients enjoy desirable bowel habits and achieve a high quality of life.[3] However, a minority of unfortunate patients experience poor pouch function and quality of life/health as a result of surgical complications or poor healing. These are often challenging for the clinician to identify and manage, and sometimes even more difficult to resolve.[5]

The decision to offer revisional or corrective IPAA surgery (as opposed to pouch excision or diversion) to a particular patient, as well as the subsequent perioperative strategies for doing so, is a challenging endeavor with lasting consequences. The focus of this chapter is to provide a structured approach to evaluating a patient for reoperative IPAA surgery with emphasis on patient selection and determining surgical strategy. In addition, techniques of corrective IPAA surgery will be described and discussed.

Preoperative evaluation

Determining candidacy for corrective IPAA surgery

Establishing patient goals

The foremost critical step in assessing a patient for reoperative IPAA surgery is determining the patient's personal goals and level of interest in/desire to undergo revisionary pouch surgery. It is an intense endeavor that requires multiple operations performed over 12–18 months or more, and the surgeon must ensure that the patient has a clear understanding of the level of commitment necessary to achieve successful completion of reoperative IPAA surgery. A patient initially showing interest in IPAA revision may prefer pouch excision with conventional ileostomy after learning of the time and effort necessary for pouch salvage. Conversely, a patient may initially agree to pouch excision/conventional ileostomy thinking that this was the only option, but favor pouch revision if he/she is a candidate for such. It is the strong opinion of the authors that a patient with IPAA dysfunction should always be given an option for evaluation in a center specializing in IPAA disorders so that the patient understands all surgical options and can make an educated, individualized decision. It cannot be emphasized enough that a patient who is accepting of IPAA

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excision with conventional ileostomy and does not have a distinct desire for pouch salvage should never be convinced to pursue IPAA revision surgery.

Assessment of the dysfunctional IPAA

A patient experiencing poor IPAA function should undergo a comprehensive, standardized assessment without the influence or consideration of any pre-evaluation diagnoses that may exist. Determining the etiology of pouch dysfunction can be quite challenging, and patients with poor pouch function may be incorrectly and empirically labeled as 'pouchitis' even when the actual cause of pouch dysfunction may be something completely different, such as chronic pelvic sepsis or Crohn's disease. Pelvic sepsis occurs in nearly 25% of patients undergoing IPAA, and is typically due to disruption of the pouch-anal anastomosis or, less frequently, a tip of the J-pouch leak.[6] Approximately 30% of these patients will experience pouch failure, and represents the most common cause of IPAA failure (Fig. 1).[7,8] Correct diagnosis of pouch dysfunction is crucial as treatment options are at times vastly different for each complication.[9] This is particularly illustrated in patients initially diagnosed with Crohn's disease of the pelvic pouch. A study of patients diagnosed with Crohn's-related pouch failure underwent a more thorough evaluation by a multi-disciplinary IPAA team and over 3/4 were determined to have a pouch failure etiology other than Crohn's disease. A majority of these patients completed successful reoperative pouch surgery by addressing their actual cause of pouch failure, with a pouch retention rate of nearly 85%.[9]

A complete history should be obtained including a full review of the patient's symptoms, treatments that have been attempted prior to the surgical evaluation, and response to each treatment. Operative reports should be obtained and reviewed, with specifics of surgery and convalescence noted. Any indication of technical difficulty must be thoroughly explored, as a technical complication of the initial pouch surgery may be easily missed and symptoms mistaken for pouchitis. One should pay particular attention to the condition of the patient at the time of pouch creation and the use of covering ileostomy as large doses of immunosuppression negatively affect pouch healing and anastomotic complications may result in occult sinus tracts or chronic anastomotic leaks with symptoms mimicking pouchitis. Gastrografin enema and pelvic MRI are then performed to reveal or rule out anastomotic complications, fistulae, sinuses or chronic leaks that may be the source of symptoms. Exam under anesthesia with pouchoscopy (see below) performed in a multi-disciplinary setting are also critical in completing the assessment of a dysfunctional pouch. Recent advancements in the understanding of pouch function and dysfunction have introduced the concepts of twisting of the ileal pouch, pouch wall prolapse, and 180 or 360° rotation of the pouch that may affect function and can be apparent on endoscopic exam.[10–12]

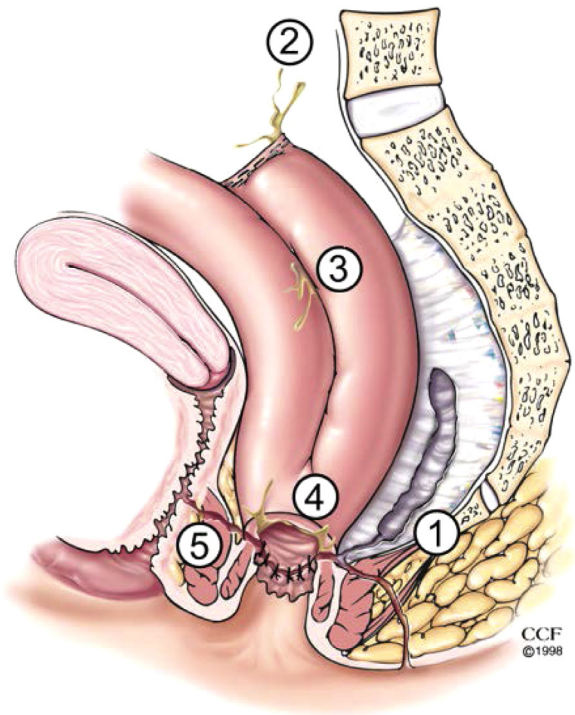

Fig. 1. The many etiologies of IPAA-related pelvic sepsis.

The surgeon must then assess the patient's health status and quality of life during the initial patient encounter, even if the etiology of pouch dysfunction is still unclear. Patients are often referred to the surgeon after years of medical treatments that have left the patient malnourished, decompensated, and mentally exhausted. These individuals may benefit from surgical intervention such as fecal diversion offered sooner rather than later. Performing fecal diversion early in the assessment, allows the patient to regain his/her health while undergoing the evaluation. This can be done with a minimally invasive approach in many cases, even if the index operations were performed in an open fashion. The surgeon does not manipulate the pouch in any way during fecal diversion, but is able to obtain more information with regard to etiology of dysfunction, such as seeing changes of Crohn's disease or rotation of the small bowel mesentery that might be contributing to pouch failure. Early fecal diversion also allows the patient to make a final decision about whether or not to undergo pouch revision when he/she feels well and is in a better emotional state of mind to make such an important and life-changing decision.

Finally, it is important to emphasize again the importance of having an honest and straightforward discussion with the patient to determine and agree upon goals and expectations for surgery prior to embarking on revision of the IPAA.

Multidisciplinary approach to diagnosis

When a patient presents with IPAA dysfunction and the etiology of such is in question, the authors often use a multidisciplinary approach to evaluate the IPAA. After preoperative evaluation with history, physical, and radiographic testing as outlined above, an evaluation with an anoperineal exam under anesthesia with pouchoscopy is performed as a team by a colorectal surgeon and gastroenterologist. The anoperineum, pouch-anal anastomosis, pouch body, and afferent limb (complete to the ileostomy closure site) are examined with members of both specialties in the operating room, offering both perspectives of expertise. Any clinical signs of pouchitis, pouch rotation, or any other IPAA complications are noted (anastomotic sinus or fistula, stricture, pouch prolapse, Crohn's disease, etc.), many of which may cause similar symptoms. Biopsies are obtained for pathologic review. At the completion of the exam, the findings along with a patient-centered treatment strategy are discussed with the patient and his/her support team. This multidisciplinary team approach is ideal for the patient as he/she is presented an immediate plan for treatment, including endoscopic treatments, surgical treatments, or a combination of both. Surgical revision is offered on a case-by-case basis, as patient selection is crucial to success particularly in these patients to maximize success and longevity of the redo IPAA. Again, a patient who is a candidate for IPAA but does not have a desire for such and is accepting of a permanent ileostomy should never be convinced otherwise.

A patient who is offered surgical revision, but who is unsure of whether or not to pursue this endeavor, may be offered a staged approach in which a diverting loop ileostomy is performed as a next step. This allows the patient to regain his/her overall physical and psychological health and to make a decision about the fate of pouch in a more appropriate state of mind.

Preoperative considerations

There are a number of common issues that play a particularly important role in the care of a patient preparing to undergo reoperative pouch surgery.

Nutritional optimization

As discussed above, many patients who are being evaluated for pelvic pouch revision are often in a state of poor health, with particularly low nutritional robustness. Patients should undergo a comprehensive nutritional assessment and evaluation of surgical fitness, with acquisition of nutritional laboratory studies and review of their ability to heal from surgery. A staged approach to revisional IPAA surgery allows patients to first undergo diverting ileostomy as a first step that serves as a means to regain their health and nutrition as well as to let the pouch rest prior to undergoing IPAA revision. This is particularly important in the setting of chronic pelvic sepsis. Patients who exhibit severe malnutrition may benefit from preoperative parenteral nutrition prior to surgery.[13] Performing fecal diversion as an initial step, however, almost always allows the patient to regain a good measure of health and nutrition without the need for parenteral support.

Thromboembolic issues

Patients with IBD who are undergoing surgical revision of the ileal pouch must be counseled about risk factors for developing venous thromboembolism (VTE), as they commonly have many risk factors for this compared to other surgical patients, particularly those without IBD.[14] They should be maintained on anticoagulant thromboprophylaxis during hospitalization for revisional surgeries and monitored closely for bleeding issues, although risk for major bleeding compared to those who do not receive VTE prophylaxis is not significantly different.[15] Aggressive ambulation and use of sequential compression devices should be a mandatory part of recovery after these surgeries. Long-term use of anticoagulant thromboprophylaxis in the transition to home after surgery is debated but commonly utilized in high-volume IBD centers to reduce morbidity in this population with multiple risk factors.[16]

Enterostomal care and preparation

In nearly every case, patients undergoing corrective IPAA surgery will maintain an ileostomy in place for nearly 12 months or more. It is imperative that an experienced enterostomal therapist (ET) be included as a vital member of the multi-disciplinary IPAA team for perioperative education and stoma site marking. An ET should meet with the patient early in the process to establish a relationship with patient and family and to reorient them to life with an ostomy (as many have had an ileostomy in the past). Frequently, patients report negative experiences with a prior ileostomy that dictate their decision-making regarding whether or not to accept a permanent or temporary ileostomy to regain health. An experienced ET can help identify and correct reasons that the prior experiences were negative and help to achieve an ideal ostomate experience for the future, as many of these are related to poor stoma siting or incorrect pouching systems.[17] ETs partner with clinicians to prepare patients for an ostomy prior to surgery, help maintain the ostomy during convalescence, and provide support as patients integrate back into normal life after surgery with their ostomy to achieve a high quality of life.

Role of the multi-disciplinary IPAA specialty team

Care for patients undergoing restorative pouch surgery requires a comprehensive team approach, and this is best delivered by a multidisciplinary team working closely to satisfy every need of the patient. The best outcomes are shown when a patient-centered plan is created by a team of IPAA specialists with experience in IPAA failure, including, but not limited to gastroenterologists, colorectal surgeons, pathologists, radiologists, rheumatologists, dermatologists, ETs, GI specialty nurses, and nutritionists. The team should be involved in patient care early in the evaluation process so that relationships are established with patient and family members and decisions regarding medical and surgical options are made in a less time-sensitive environment. Ideally, the team meets regularly in a group setting to allow for free face-to-face discussion and debate about each patient's file in order to create an individualized treatment plan for that patient. The final decision regarding timing and candidacy for surgery must be individualized and consider the patient's desires and goals for surgery in addition to clinical status and pathology of pouch failure. Ideally, the multidisciplinary team approach is less like a relay team, and more like a cycling 'peloton', with varying levels of support from each discipline in each step of the process.

Shared patient experiences

Shared patient experiences passed from patients who have previously undergone revisional pouch surgery to those considering this surgery are very effective in preparing a patient for life during and after reoperative pelvic pouch surgery. Although an IPAA specialty care team can provide endless information about the expected perioperative course, those who have personally experienced the process share a unique perspective to those embarking on the process, and can offer a personalized support and acknowledgement of apprehension in a way that those without personal experience cannot offer. It is helpful to have a database of current redo IPAA patients agreeable to sharing their experiences, both positive and negative, with others considering the operation. Interestingly, both groups of patients have anecdotally given this interaction very positive feedback, and many patients who meet in this manner maintain strong relationships over many years.

Operative technique of revisional ileoanal pouch surgery

Step 1: the 'thoughtful' ileostomy

Surgical correction of a dysfunctional IPAA begins with creation of a diverting loop ileostomy to rest the ileal pouch. This important step serves multiple functions. First, this almost always allows the patient to regain health and improve quality of life, regardless of etiology of pouch failure. IPAA failure patients commonly present with intolerance of food, pelvic pain, perineal excoriation and bowel frequency that promotes malnutrition and impairs sleep and normal social interaction. Second, pelvic sepsis is cleared or improved, with the addition of anoperineal drainage of sepsis, if present. These measures increase the likelihood of successful pelvic dissection during the next operation with hopes of salvaging the pelvic pouch rather than having to make a new one using additional bowel. Resting the pelvic pouch at least 6 months before IPAA revision permits the patient to regain physical, mental and emotional strength that is mandatory for success for the upcoming pouch revision surgery.

This first step may be performed open or in a laparoscopic fashion, even if the index operations were done with an open approach. The abdomen is carefully explored to gain more insight into pathology of pouch failure, with close attention given to the rotation of the small bowel mesentery, existing signs of Crohns disease, and position of the pouch and afferent limb. It is important to emphasize that pelvic dissection should *not* be performed during this step, as this may make eventual pouch revision more difficult, risk injury to the pouch/pelvic structures, and slow recovery in an already decompensated patient. The enterotomy made to create a new loop ileostomy is ideally made at a location in the small bowel that would reach caudally to the anus to be part of a new pouch-anal anastomosis should a new ileal pouch be required for correction. This method of anticipating needs for future operations creates a 'thoughtful' ileostomy (Fig. 2).

The patient is allowed to recover for at least 6 months or more to regain health. The next step is not planned or undertaken until the patient achieves good health, regardless of how long this takes. It is

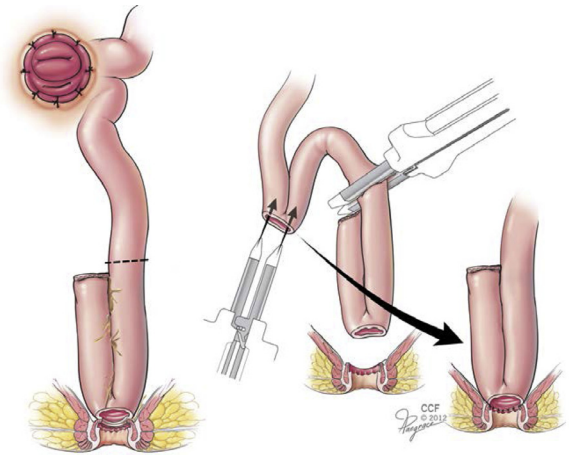

Fig. 2. The 'thoughtful' ileostomy is created with the possible need for neo-IPAA in mind.

the opinion of the authors that these patients are significantly more decompensated than they physically appear in the clinic, and they are often very slow to recover after ileostomy creation even though this would not typically be considered an operation with difficult recovery in an otherwise healthy patient. Patience is key during recovery, and the high likelihood of a prolonged hospital stay and convalescence at home should be emphasized when perioperative goals and expectations are discussed with patients, family, and hospital administrators.

Step 2: revision of the ileoanal pouch

The patient is readied for surgery with a final discussion reiterating the goals and expectations of surgery among patient, family and surgeon. He/she is ideally positioned in a modified lithotomy Lloyd-Davies position with arms tucked to the side to allow for unconstrained surgeon movement on either side of the operating table. Positioning the arms out to the side severely limits surgeon comfort and positioning for deep pelvic dissection and should be avoided. The abdominal location previously marked by ET for an ideal stoma site is noted and identified. A padded support is placed under the hips to lift the buttocks slightly off of the operating table for optimal access of the perianum during the transanal approach. Ureteral stents are strongly recommended for this operation, as pelvic tissue planes are often obliterated, making identification of ureters (or recognition of injury during dissection) nearly impossible without them. Preoperative arranging of able and willing urologic, gynecologic and vascular surgery consultants is helpful in the case of inadvertent injury in difficult dissection planes.

The abdomen is entered in a midline fashion, followed by careful lysis of adhesions, if necessary, to identify normal anatomy. The surgeon should never hesitate to make a generous incision for adequate exposure of the entire abdomen. Lysis of adhesions should be performed to liberate distal small bowel, particularly to identify the cut edge of the small bowel mesentery so that it can be followed from the duodenum to the pelvis to ensure that it is oriented appropriately and not rotated. The loop ileostomy should be taken down from the abdominal wall, even if salvage of the existing pouch is pursued, to allow for more efficient packing of the bowel in the upper abdomen to facilitate exposure of the pelvis. Tissue quality, signs of Crohn's disease, and remaining length of small bowel should be noted and documented. Preparation for pelvic dissection is initiated. The authors prefer use of a wound protector device along with a Balfour retractor to expose the abdomen and pack the proximal bowel carefully in the upper abdomen. Extra-long instruments and lighted pelvic retractors should be readily available and put into use. A foot-controlled electrocautery device is also preferred as it allows for reach into the deep pelvis without impairing dexterity of the operating hand.

The pelvic pouch is carefully mobilized from pelvic attachments and adhesions with every effort made to avoid injury to the pouch, as it commonly can be salvaged and reused. This allows for preservation of remaining small bowel length. Mobilization is often an arduous task and is best approached with slow and methodical sharp dissection with long Metzenbaum or Harrington scissors, often beginning posteriorly between the pouch mesentery and the presacral fascia, or following the edge of the small bowel mesentery into the pelvis. Again, lighted pelvic retractors such as the Fazio retractor (ESI Instruments, Rochester, NY) are critical in achieving the best exposure possible so that tissue planes can be identified. Commonly, these planes have been obliterated by fibrosis as a result of pelvic sepsis, and placement of ureteral stents (as discussed above) is imperative here. Residual mesenteric tissue, either colonic mesentery or mesorectum left in place during the index IPAA operation, should be removed. Extra tissue at the sacral promontory requires additional length of small bowel mesentery to obtain adequate reach into the deep pelvis, causing the pouch mesentery to travel 'up and over' the remnant tissue to reach the distal pelvis, creating tension in some cases. In addition to the 'reach' issues, remnant tissue in the distal pelvis can act as a 'collar' around the pouch outlet and cause outlet obstruction and pouch dysfunction.

At this point in time, the pathologic cause of the patients IPAA failure will dictate next steps. Since the most common indication for pouch revision surgery is chronic pelvic sepsis due to pouch-anal anastomotic dehiscence, the following discussion will address steps to correct and redo a pelvic pouch in this setting.

The pouch is fully mobilized to the anorectal ring. If the pouch-anal anastomosis is still in tact, it is helpful to leave this in place as a guide for trans-anal dissection that begins with an anal canal mucosectomy (Fig. 3). Anal effacement sutures are placed at the anal verge to better expose the anal canal. This is less costly but as equally effective as commercially available disposable anal retractors (Lone Star retractor, Cooper Surgical, Trumbull, CT). The mucosectomy begins at the dentate line and is performed using electrocautery, continuing circumferentially and cephalad to meet the pelvic dissection, and the ileal pouch is detached and removed from the pelvis.

The critical step for success in reoperative pouch surgery for pelvic sepsis is debridement of the distal pelvis after removal of the pouch. Chronic inflammation due to long-standing sepsis forms thick layers of fibrosis that coats the distal pelvis and complicates identification of anatomy. This thick rind must be excised (Fig. 4). If it remains in place, even with a newly created healthy pouch/pouch-anal anastomosis in the pelvis, sepsis will likely recur and the patient will suffer from many of the same issues. Slow oozing of blood from raw surfaces is common

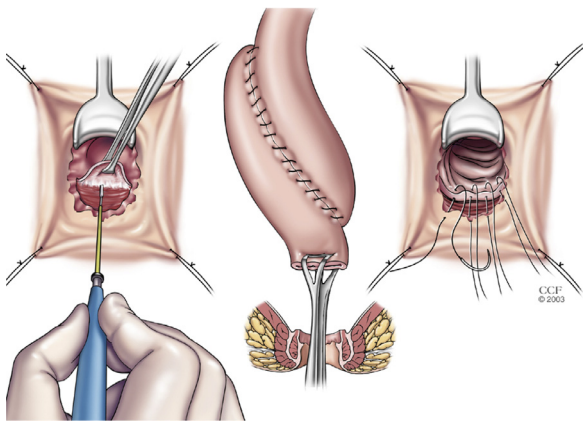

Fig. 3. Anal canal mucosectomy is performed, beginning at the dentate line. Preparation is made for a hand-sewn pouch-anal anastomosis.

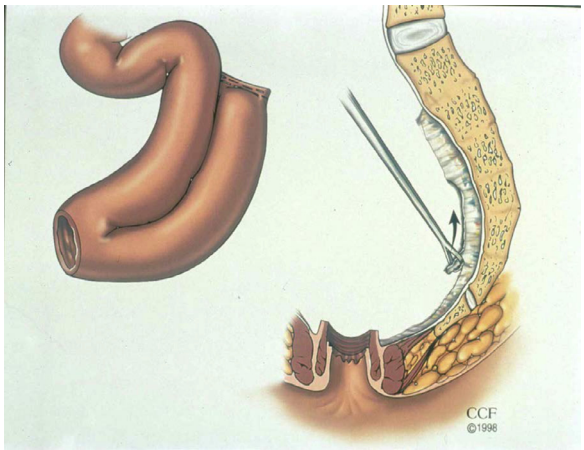

Fig. 4. The thick chronic fibrotic 'rind' is excised from the pelvis prior to creation of neo-pouch-anal anastomosis. This is a critical step to avoid recurrence of pelvic sepsis.

after this maneuver and best dealt with by tightly packing the pelvis while the remainder of the abdominal work is complete.

Next, the pouch is inspected to determine whether it is fit for reuse, and, if so, the distal edges are gently freshened. If not, the pouch is excised and a new pouch is created, ideally using the enterotomy that had been created during loop ileostomy formation in the first operation (see above). The J pouch configuration is most commonly used unless adequate mesenteric length is not available, as creating a tension-free pouch-anal anastomosis is critical to achieve a successful redo. In the case where a J pouch will not reach without tension, an S pouch should be considered as its configuration allows for a longer reach into the pelvis as compared to the J pouch. The H pouch is a type of ileal pouch configuration that allows for pouch construction when a J pouch is technically feasible but mesenteric length is lacking (Fig. 5).[18] For construction, the most dependent portion of the proposed J pouch is opened, allowing for the afferent aspect of this enterotomy to reach 2–3 cm further than a conventional J pouch. The distal-most portion of the ileum is stapled closed, as is the distal end of the enterotomy, leaving a closed segment of ileum that remains in continuity with the afferent portion as mesentery is shared. The afferent and efferent limbs are aligned and an enterotomy is then made at a midpoint in both the afferent and efferent segments. A linear stapler is inserted through this enterotomy and fired proximally and distally to create a side-to-side isoperistaltic reservoir. The enterotomy created to allow for stapling is now closed and the distal aspect of the afferent limb, previously left open, is sewn to the anus to complete the pouch anal anastomosis after anal canal mucosectomy is performed. Data regarding use of this rare pouch configuration is very limited and reflects the uniqueness and limited use by high-volume surgeons specializing in pouch revision.[18] It is rarely required but is an option when nothing else will work, and failure rate is similar to that of other pouch configurations.

Regardless of pouch configuration, a hand-sewn pouch-anal anastomosis is fashioned, first with placing sutures at the dentate line circumferentially, then delivering the pouch into the pelvis, and finishing the anastomosis. The keys to success include no tension on the anastomosis, appropriate orientation of mesentery, and healthy bleeding of tissues, along with the prior thorough debridement of septic rind in the pelvis.

A diverting loop ileostomy is created as the final step, taking care to avoid creating tension on the small bowel mesentery leading to the new pouch. If tension is present, it is advisable to choose a site more proximal in the small bowel where the mesentery is more mobile, even if this creates a higher output ileostomy requiring routine administration of intravenous hydration until ileostomy closure is performed.

There are less common but equally relevant causes of pelvic pouch failure that require additional or unique steps for repair, such as

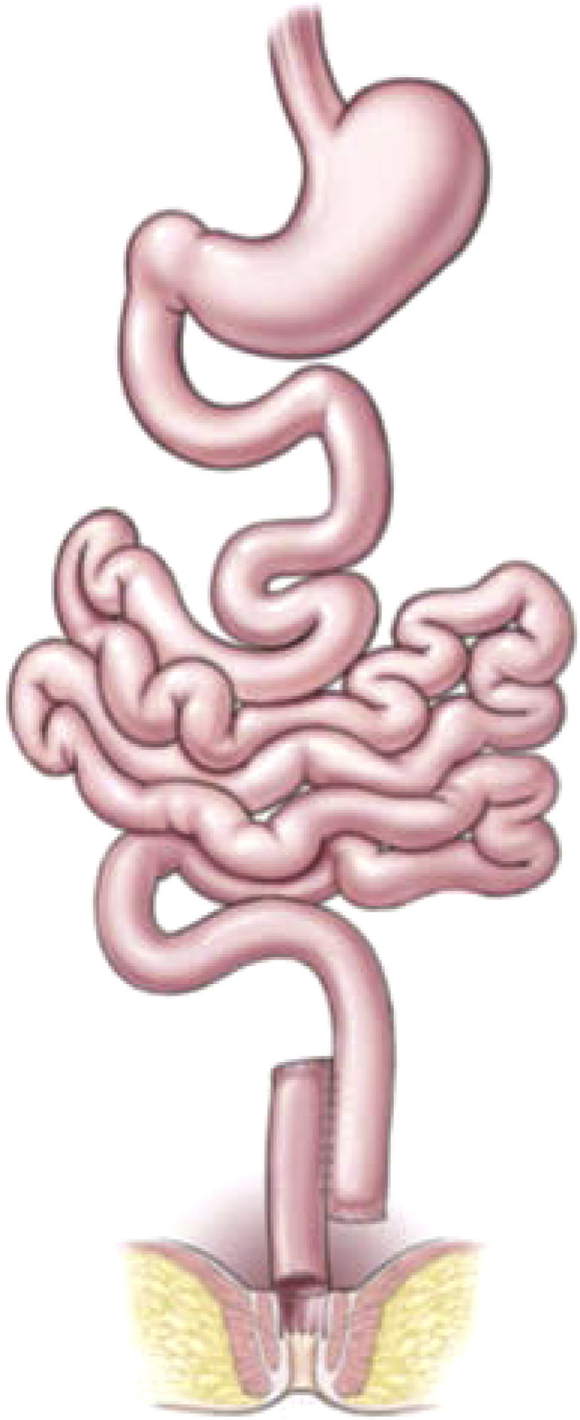

Fig. 5. H pouch constructed from ileum.

afferent limb stricture, elongated efferent limb, or inappropriate pouch mesenteric rotation. Surgical approach must be tailored to the presumed etiology of dysfunction, but both the surgeon and patient must always be prepared for the need for complete redo of the IPAA in case the pouch is damaged or new pathology is identified, regardless of initial surgical plan.

Step 3: restoring continuity and adjusting to life with redo IPAA

The diverting ileostomy is closed 3–6 months later, after recovery is complete, and after a distal contrast study shows appropriate distention of the new pouch and a patent anastomosis without leak or

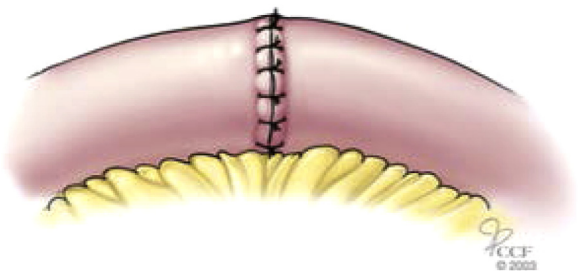

Fig. 6. A hand-sewn end-to-end ileostomy closure after corrective IPAA is favored.

sinus tract. Flexible pouchoscopy and MRI pelvis are also commonly employed if there is a suspicion for residual sepsis or as dictated by symptoms. Not uncommonly, there is a cicatrix that forms at the pouch-anal anastomosis due to disuse that is easily dilated at the time of ileostomy closure. The authors prefer a directed anal exam with use of a tonsil clamp to dilate the soft narrowing instead of a blind digital dilation, which can result in creation of a false passage.

It is recommended that a hand-sewn ileostomy closure be performed to maintain normal anatomy of the bowel leading into the pouch (Fig. 6). The closure site in this configuration is most useful if pouch revision is required in the future, and prevents the possibility of dilation and bacterial overgrowth at the stapled closure site, which anecdotally has been thought to contribute to abdominal bloating in patients after redo IPAA.

Finally, the reoperative IPAA experience does not end when intestinal continuity is restored. The multidisciplinary team must guide the patient through the 'getting to know my revised IPAA', a process that lasts months to years. Studies are reassuring that function after redo IPAA can be largely equivalent to that after de novo IPAA, but patients may experience more nighttime leakage after reoperative IPAA, and need guidance and reassurance while they are learning about life with the new pelvic pouch.[19,20] A combination of dietary modification, proper toileting habits, bowel stoppers, and pelvic floor therapy can improve function, and applications such as use of sacral nerve stimulators in these patients are being considered.

Conclusion

Development of the technique of reoperative ileal pouch surgery to redo or revise poorly functioning pelvic pouches has allowed for many patients to realize a high-quality, stoma- and disease-free living not previously achievable. Success of surgery is inherent upon choosing the proper, motivated patient after a comprehensive IPAA evaluation, and performing surgical steps with deliberate technical precision is fundamental.

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