



# Controversies in the Ileoanal Pouch

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Restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) has become the preferred operation for most patients with ulcerative colitis and selected patients with familial polyposis or other cancer syndromes. Quality of life is often improved in patients suffering from ulcerative colitis and maintained in patients with neoplastic disease, without the need for a permanent stoma. The durability of the pelvic pouch has become well established over the past four decades, but pouch failure rates of at least 5–10% continue to be reported, highlighting the need for continued improvement both in patient selection as well technical aspects of this complex surgical procedure. In this review, we highlight four of the ongoing controversies in pelvic pouch surgery: the role of mucosectomy as opposed to stapled IPAA; pouch surgery in the setting of Crohn's disease; management of the failing pouch; and the efficacy of “bottom-up” mobilization of the rectum, as opposed to the standard top-down approach, in the era of minimally invasive surgery.

## Mucosectomy vs Stapled IPAA

The rationale of mucosectomy during IPAA is the complete elimination of the mucosa affected by ulcerative colitis, one of the fundamental tenets of the procedure's original description.<sup>1</sup> However, stapled IPAA has progressively supplanted mucosectomy with hand-sewn IPAA because of its decreased technical difficulty, but especially because of improved functional results. In a meta-analysis of 4183 patients, stapled IPAA was associated with a significant reduction in the incidence of nocturnal seepage and pad usage and significantly increased resting and squeeze pressures for those patients tested with anorectal manometry. Furthermore, stapled IPAA was not associated with a statistically significant increase in the incidence of dysplasia in the residual columnar epithelium in the anal transitional zone (ATZ). There were no differences between the two techniques in postoperative complications, overall number of bowel movements, and usage of antidiarrheal medications.<sup>2</sup>

Contemporary indications for mucosectomy include patients undergoing redo IPAA, inflammatory bowel disease (IBD)-associated dysplasia, and IBD-associated cancer. With respect to dysplasia, the traditional view that mucosectomy is necessary because of the risk of metachronous dysplasia in the retained anorectal cuff has come under further scrutiny in an era where dysplasia is often able to be visually identified and treated endoscopically. While IBD-associated dysplasia guidelines do not specifically address the issue of mucosectomy versus stapled anastomosis, it seems intuitive that if the entire colon can be preserved and safely surveilled in many patients harboring dysplastic lesions, the same would hold true for the mucosa in the ATZ. Even before the advent of high-resolution endoscopic techniques, the necessity of mucosectomy when performing total proctocolectomy and ileal pouch-anal anastomosis for IBD-associated colorectal dysplasia had been questioned. When assessing 348 patients with low-grade dysplasia undergoing proctocolectomy between 1984 in 2007, a 3% rate of invasive adenocarcinoma was observed in the surgical specimen, but none of the 41 patients with preoperative

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colonic dysplasia undergoing hand-sewn ileal pouch-anal anastomosis had dysplasia or cancer identified in their mucosectomy specimen.<sup>3</sup>

The data on postoperative surveillance of stapled ileal pouch-anal anastomosis is also favorable with respect to the incidence and outcomes for ATZ dysplasia and cancer. In a study of 532 patients with stapled IPAA constructed between 1986 and 1992, the 15-year estimated dysplasia rate was 3.4% during a median follow-up of 13.4 years. ATZ dysplasia was significantly associated with IBD-associated dysplasia identified on preoperative colonoscopy and/or in the surgical specimen. There were no cases of cancer detected in the ATZ in this study population. A total of 9 patients were found to have metachronous dysplasia identified in their ATZ during postoperative surveillance. Three of them were treated with transanal mucosectomy and pouch advancement for high-grade dysplasia. One obese patient with high-grade dysplasia was successfully treated with a partial mucosectomy and subsequent ATZ follow-up failed to identify persistent or recurrent dysplasia. The remaining 5 patients with low-grade dysplasia underwent multiple sequential biopsies, and in all of them, dysplasia became progressively undetectable. All of the patients continued surveillance without recurrent ATZ dysplasia.<sup>4</sup> Another retrospective analysis of 3203 patients undergoing IPAA for IBD identified 11 patients (0.36%) who developed carcinoma of the ileal pouch or ATZ. Six out of 11 patients with ATZ-related cancer had undergone a mucosectomy, which was not protective for the development of either perianastomotic or ileal pouch cancer.<sup>5</sup>

The optimal approach for patients with IBD-associated colorectal cancer remains unclear. Many surgeons view a stapled IPAA for IBD-related adenocarcinoma of the colon or upper rectum as acceptable. Whether mucosectomy is always necessary in the specific setting of low rectal cancer is more problematic. A retrospective analysis was performed assessing 41 patients with rectal cancer complicating ulcerative colitis. Among a variety of operations performed, 11 out of 41 patients underwent IPAA, 6 of whom received a stapled anastomosis while 5 underwent mucosectomy and hand-sewn anastomosis. The specific type of surgery performed was not associated with either overall survival or recurrence rates. With the limitation of small numbers and the inherent heterogeneity of the study population, this analysis did not reveal any adverse consequences associated with the performance of IPAA (either stapled or with mucosectomy) in this select group of patients with rectal cancer complicating ulcerative colitis.<sup>6</sup>

To sum up, stapled IPAA has better functional results than mucosectomy with hand-sewn anastomosis and appears preferable in the majority of patients. A stapled IPAA is also safe for most patients with colorectal dysplasia and colon cancer. In case of preoperative dysplasia in the ATZ,

mucosectomy should be performed. While the data in the setting of rectal cancer remain inconclusive, there is no evidence indicating that stapled IPAA is contraindicated.

## IPAA for Crohn's Disease

As surgeons have gained considerable experience in performing this operation, both patients and surgeons alike have wondered if and when this sphincter-saving option can be used in the setting of Crohn's disease. One of the first papers published on this topic reported that 25 of 362 pelvic pouches performed ostensibly for ulcerative colitis were actually found to have Crohn's disease postoperatively on histopathological examination. At a mean follow-up of 38 months, 16 patients had functioning pouches, 8 had either pouch excision or a stoma, and one had died.<sup>7</sup> Early reports like this pushed surgeons to consider when a patient with Crohn's disease should be considered for a pelvic pouch.<sup>8</sup>

When thinking about this subject, patients need to be subdivided into three groups. The *intentional* group is known to have Crohn's disease preoperatively. The *incidental* group has a clinical presentation that is consistent with ulcerative colitis but the postoperative pathology is consistent with Crohn's disease. The third or *delayed* group has their diagnosis changed to Crohn's disease after developing endoscopic and/or clinical symptoms most consistent with Crohn's disease. In this context, one study assessed outcomes on 204 patients with a pelvic pouch and Crohn's disease.<sup>9</sup> Twenty were done intentionally, 97 incidentally, and 87 had a delayed diagnosis of Crohn's disease. At 10 years, 71% of all patients had a functioning pelvic pouch. If patients were divided between delayed diagnoses vs intentional/incidental, the pouch retention rate was significantly less for those with a delayed diagnosis versus the other groups. On multivariate analysis, delayed diagnosis of Crohn's disease, postoperative pouch-vaginal fistula, and abdominal/pelvic sepsis were significantly associated with pouch loss.

How does pouch function and survival of the pouch compare with patients that have ulcerative colitis? A large study compared patients at 1, 5, and 10 years. There were 1300 ulcerative colitis, 28 indeterminate colitis, 71 Crohn's disease, and 98 familial polyposis patients evaluable at 10 years. The function was essentially the same in all groups when considering quality of life, overall health, and happiness with the current medical situation.<sup>10</sup> Therefore, it appears that a patient with a pelvic pouch and Crohn's disease, when highly selected, can expect a similar quality of life to those with a pelvic pouch and ulcerative colitis. An extensive literature review of patients with a pelvic pouch grouped them into intentional and de novo diagnosis of Crohn's disease.<sup>11</sup> They reported that selected patients with no preoperative anal or small bowel disease have reasonable

outcomes and a failure rate of 15%. Prior to biologic therapy, patients with a de novo diagnosis of Crohn's disease had a pouch failure rate of 89%; this was reduced to 33% with biologic therapy.

When patients diagnosed with ulcerative colitis suffer with a failing pouch related to technical complications, redo pelvic pouch surgery is typically offered to “save” the pelvic pouch. If the patient has Crohn's disease, should we offer the same surgery? The long-term outcomes of patients with known Crohn's disease who had primary pelvic pouch surgery without complications ( $n=253$ ) have been compared to those having a redo pelvic pouch and known Crohn's disease ( $n=52$ ).<sup>12</sup> There was no difference in quality of life, dietary and social restrictions, or number of daily bowel movements. Eighty-seven percent of patients with a primary pouch and 78% of those with redo pouches would undergo the surgery again.

IPAA does appear to have a role in carefully selected patients with Crohn's disease. There should be no small bowel or perianal disease. The patient should be highly motivated and informed consent based on shared decision-making. When the diagnosis of Crohn's disease is unexpectedly made in a J pouch, referral to a tertiary care center expert in the management of pelvic pouch complications should be considered.

## Management of the Failing Pouch

Although most patients enjoy a good quality of life after IPAA, this is certainly not the case in all pouch patients. Careful assessment and timely intervention is often needed, as a function over the short, intermediate, and long term can be affected by a variety of mechanical problems or disease processes. Pouch capacity and construction, integrity of the pouch-anastomosis, structure and coordination of the pouch outlet/pelvic floor, and small bowel mucosal integrity influence functional results, patient symptoms, and overall satisfaction.

J, S, or W pouch configurations are associated with similar capacity over the long term when constructed properly.<sup>13</sup> Stapled ileal pouch-anal anastomosis reduces sphincter stretch and minimizes the nocturnal seepage that is more commonly associated with a hand-sewn anastomosis.<sup>14</sup> Technical considerations such as creating an adequately sized, well-vascularized pouch, avoidance of twisting the pouch when it is delivered into the pelvis, minimizing tension on the anastomosis, and avoiding inadvertent injury to surrounding structures such as the vagina help preserve pouch function and retention. Similarly, leaving unduly long segments of the native rectum may create problems from ongoing inflammatory bowel disease. A leak from the anastomosis or pouch often leads to chronic pelvic sepsis that

may lead to pouch dysfunction and eventual failure. Emptying of the pouch might be impaired by anastomotic stricture, an S pouch constructed with a long efferent limb and pouch prolapse, or functional problems with the pelvic floor causing obstructive defecation. Poor sphincter integrity due to previous trauma, excessive stretch at surgery, or subsequent childbirth injury predispose to incontinence. With regard to the state of the small bowel and the pouch itself, inflammatory conditions such as pouchitis, cuffitis, and Crohn's disease may affect function and pouch retention.

Disorders of the ileal pouch have been classified as surgical/mechanical, inflammatory/infectious, functional, neoplastic, and systemic/metabolic.<sup>15</sup> Clinical evaluation of any patient with a pouch with suboptimal function starts with a careful preoperative, perioperative, and postoperative history. Imaging with a contrast enema, CT or MR enterography, MRI of the pelvis, and MR or standard defecography are often helpful. Anorectal manometry may be used to evaluate the pelvic floor and sphincter function.

Pouchitis in most patients is antibiotic responsive and is readily managed by a 2-week course of oral antibiotics, usually ciprofloxacin or metronidazole. However, some patients need antibiotics long term (antibiotic dependent) or require usual IBD medications such as biologics (antibiotic refractory). Patients with postoperative complications such as leak often develop a chronic presacral cavity or sinus, which may be managed endoscopically or surgically. Cuffitis is usually managed with topical agents such as mesalamine, although surgical treatment might be needed for a long anorectal cuff.

Crohn's disease may manifest or develop after pouch construction and affect the pouch, proximal small bowel, or the perineum leading to inflammation, strictures, and internal or external fistulae. Medical treatment is needed for inflammatory manifestations. Fibrostenotic and penetrating disease of the afferent limb/pouch inlet, pouch itself, or perineum can sometimes be managed successfully with a combination of endoscopic or surgical interventions combined with medical therapy. An array of surgical options such as small bowel resection, strictureplasty, takedown of internal fistulae, pouch-vaginal fistula repair, or seton placement may be indicated.

A chronic leak or sinus from the pouch or pouch-anal anastomosis is often associated with pelvic sepsis, which impairs pouch function and reservoir capacity. Defunctioning the pouch with a loop ileostomy, redo pouch surgery, or pouch excision may be needed. A leak from the tip of the J limb is often subtle in its presentation and may be challenging to diagnose. Pouch-perineal and pouch-vaginal fistulae are typically difficult to manage. After control of sepsis with drainage and/or seton placement, local repairs with vaginal or pouch advancement, fibrin glue or plug, or tissue interposition can be attempted in the appropriate setting. A redo pouch with pouch revision might ultimately be needed but

is also associated with a high recurrence rate. Pouch defunction and excision are the best options in some circumstances. Outlet problems such as anastomotic stricture, long efferent limb, and prolapse can often be managed with non-surgical treatment such as diet, medication, enemas, and/or endoscopic therapy. Surgery might be needed to revise or pexy the pouch depending on the specific circumstances.

Many structural problems ultimately require major reconstructive surgery if the pouch is to be salvaged. This typically consists of an abdominoperineal approach with pouch-anal disconnection, pouch repair/revision versus the creation of a new pouch, and then a hand-sewn pouch-anal anastomosis. Redo IPAA can be associated with acceptable function, quality of life, and durability when performed in carefully selected patients at centers experienced in the technique.<sup>16</sup> A continent ileostomy may be a good option in patients who do not desire or are not suitable candidates for a redo pouch. The J pouch can often be converted to a K pouch and is associated with good function and patient satisfaction.<sup>17</sup>

### Bottom-Up Versus Top-Down?

Restorative proctocolectomy with Ileal pouch-anal anastomosis has traditionally been performed top-down through an open incision. Recent advances in minimally invasive surgery (MIS) have driven increasing interest in performing the technically challenging IPAA operation laparoscopically or through a hybrid approach using a Pfannenstiel incision to facilitate the proctectomy. Short-term advantages of MIS-IPAA include reduced pain with shorter hospital stay and long-term benefits include improved cosmesis, reduced incisional hernias, decrease in adhesive disease, and improved female fertility.<sup>18</sup> However, minimally invasive top-down access to the low pelvis remains a challenge even for the most skilled of surgeons.

More recently, the application of a “bottom-up” or transanal proctectomy with IPAA has been proposed to mitigate the technical challenges of operating deep in the pelvis. Similar to proctectomy for rectal cancer, the bottom-up approach provides the surgeon in-line access to the low pelvis where the sacrum curves anteriorly. Furthermore, the unperturbed pelvis may be a safe starting point in light of the chronic inflammatory changes or post-surgical scarring and fibrosis often encountered in staged IPAA surgery. An additional technical benefit is that the rectal transection is performed under direct vision at the chosen distance from the dentate line, eliminating the risk of a longer than intended rectal cuff which has been a problem with laparoscopic IPAA. Furthermore, a single-stapled or double purse-string anastomosis may be performed, thereby eliminating the need for multiple staple firings across the distal rectum. Transanal specimen extraction may be performed and the pouch created via the

ileostomy aperture, potentially reducing incisional complications such as infection or hernia and allows for improved cosmesis.

Whereas initial reports of the bottom-up approach for rectal cancer described concerns over urethral injury and air embolus due to pelvic pneumo-dissection, early results of bottom-up IPAA were promising. The first comparative study of 97 bottom-up and 119 top-down IPAAs reported lower postoperative morbidity with the bottom-up approach.<sup>19</sup> However, in patients with a complication, the comprehensive complication index (CCI) was not significantly different. Conversion to open surgery was lower with the bottom-up approach (5.2% vs. 23.5%) as was postoperative hospital stay (7.34 days vs. 9.08 days;  $p=0.001$ ); leak rates were similar (7.4%). Functional outcomes are also an important outcome that deserves attention. One recent study of 374 patients including 100 bottom-up IPAA operations showed better quality of life and energy-level subscores compared with top-down IPAA; however, overall quality of life scores was comparable.<sup>20</sup> There was a trend toward lower postoperative complications (33% vs 41%) and anastomotic leak rates (6% vs 13%) with bottom-up IPAA; but again, the differences were not statistically significant.

Bottom-up IPAA was recently assessed in a study of 65 consecutive cases compared to a historic open IPAA cohort of 100 patients.<sup>21</sup> While the bottom-up approach resulted in shorter mean hospital stay (4 vs. 5.6 days;  $p<0.001$ ), overall complications were higher (60% vs. 36%;  $p=0.02$ ), as were anastomotic leaks (11% vs. 2%;  $p=0.03$ ). Comparing 76 bottom-up IPAAs vs. 37 top-down IPAAs performed during the same period (2016–2020), a 1-day longer hospital stay ( $p=0.04$ ) and higher rate of complications (56% vs 38%;  $p=0.07$ ) were observed with bottom-up IPAA. There remained a non-statistically significant higher rate of anastomotic leaks (12% vs 5%) with bottom-up IPAA.

Studies assessing this technique for rectal cancer have also suggested a higher rate of anastomotic complications with a bottom-up approach. One explanation, for the higher leak rate, is that unlike a top-down proctectomy where the rectal mobilization extends beyond the level of the distal staple firing, in the bottom-up approach, the transanal proctectomy leaves the distal rectal cuff anchored to its surrounding tissues. This prevents the inflamed cuff from cinching down during the purse-string in preparation for the single-stapled anastomosis. In a technical modification to a laparoscopic IPAA, the transanal transection with a single-stapled anastomosis (TTSS) allows the top-down approach to be coupled with many of the benefits of a bottom-up IPAA.<sup>22</sup> In this approach, the laparoscopic mobilization of the rectum is performed to the anorectal junction from above. The proctectomy is then performed transanally slightly higher than the extent of rectal mobilization, allowing for better tension-free cinching and closure of the purse-string, potentially

minimizing anastomotic leaks, while preserving the benefits of the bottom-up approach (single-stapled anastomosis and tailored rectal cuff). This approach would further avoid many other potential risks of bottom-up IPAA including wrong plane surgery (risking urethral injury and autonomic nerve injury), prolonged anal stretch, and risks of pelvic pneumo-dissection (air embolus).

With the increasing demand for minimally invasive surgery, it is possible that applications such as robotic surgery or TTSS may overcome the challenges of top-down IPAA by offering improved access to the low pelvis, minimizing multiple staple firings, and allowing for a tailored rectal cuff. Surgeons can continue to work from top-down, an approach they are far more familiar and comfortable with. For now, the technical challenges of bottom-up proctectomy do not support the widespread adoption of this technique for IPAA surgery.

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