Fecal Incontinence and Defecatory Disorders in Patients With Ileal Pouch–Anal Anastomosis

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Abstract: Functional anorectal disorders are common in patients with ileal pouch–anal anastomosis (IPAA) and often have a debilitating impact on quality of life. The diagnosis of functional anorectal disorders, including fecal incontinence (FI) and defecatory disorders, requires a combination of clinical symptoms and functional testing. Symptoms are generally underdiagnosed and underreported. Commonly utilized tests include anorectal manometry, balloon expulsion test, defecography, electromyography, and pouchoscopy. The treatment for FI begins with lifestyle modifications and medications. Sacral nerve stimulation and tibial nerve stimulation have been trialed on patients with IPAA and FI, resulting in improvement in symptoms. Biofeedback therapy has also been used in patients with FI but is more commonly utilized in defecatory disorders. Early diagnosis of functional anorectal disorders is important because a response to treatment may significantly improve a patient's quality of life. To date, there is limited literature describing the diagnosis and treatment of functional anorectal disorders in patients with IPAA. This article focuses on the clinical presentation, diagnosis, and treatment of FI and defecatory disorders in patients with IPAA.

Keywords
Defecatory disorder, fecal incontinence, ileal pouch–anal anastomosis, inflammatory bowel disease

Ileal pouch–anal anastomosis (IPAA) has become the surgery of choice for patients with refractory inflammatory bowel disease (IBD), including patients with ulcerative colitis and selected patients with Crohn's disease (CD). Most patients experience satisfactory functional results, with an early complication rate of 26% to 33% and a late complication rate of 29% to 63%.[1,2] Common complications include anastomotic leak, bleeding, infection, fistula, prolapse, stricture, incontinence, obstruction, and pouchitis, with a pouch failure rate ranging from 3% to 15%.[3] The leading causes of pouch complications, including anastomotic leaks, abscesses, strictures, and pouchitis, have been discussed in detail in the literature. However, there is limited literature on functional anorectal disorders such as defecatory disorders and fecal incontinence (FI) in patients with IPAA, which are the focus of this article. FI is defined as the

involuntary loss of liquid or solid stool. Uncontrolled FI can lead to pouch failure.[3] Defecatory disorders have been referred to previously as dyssynergia or dyssynergic defecation.[4] Under the current Rome IV criteria for functional gastrointestinal disorders, defecatory (or defecation) disorder is the preferred, more generalized diagnostic term under which dyssynergia or dyssynergic defecation is a subset that refers to paradoxical contraction of the pelvic floor during attempts at defecation. These functional anorectal disorders are closely related to the functional results and quality of life of the patient with IPAA. The aim of this article is to review the clinical presentation, diagnosis, and treatment of FI and defecatory disorders in patients with IPAA.

Clinical Presentation of Functional Anorectal Disorders in Patients With Ileal Pouch–Anal Anastomosis

After IPAA, patients have a median expected bowel frequency of 6 bowel movements per day.[2,5] Most patients have at least 1 nocturnal bowel movement and occasional minor leakage.[6] Educating patients preoperatively regarding normal pouch function and expectations is key. Patients should be counseled regarding potential normal age-related changes to anal sphincter function and how such changes may impact future pouch function.

Patients should be asked to clarify if they have daytime, nocturnal, or daytime and nocturnal incontinence. Incontinence may also be classified by severity (occasional spotting with 1-2 leaks/week, minor leakage with 3-7 leaks/week, and major leakage with >7 leaks/week) or type (passive or urge).[2]

Patients with defecatory disorders present mostly with symptoms of incomplete evacuation: increased bowel frequency, tenesmus, straining, and constipation. Constipation is the most common diagnosis to prompt anorectal testing.[7] Coexisting difficulty with urination should raise concerns regarding pelvic floor dysfunction.

A thorough medication and supplement review is also crucial, as symptoms may be attributed to medications such as narcotics, anticholinergics, or antibiotics.[8] Over-the-counter soluble fiber supplements increase bulk and stool consistency and may increase the sensation of tenesmus and urgency in patients with poor pouch compliance. Magnesium in supplements can worsen FI.

A review of surgical history is essential. Patients who underwent a stapled IPAA have been shown to have lower rates of daytime and nocturnal incontinence than patients who underwent a hand-sewn anastomosis.[5,9] In addition, a review of obstetric history in women needs to be conducted, as long-term complications may occur. For example, risk of sphincter injury was significantly worse in patients with IPAA who underwent vaginal delivery than in those patients who underwent cesarean section.[10]

The perianal area should be physically examined. If the patient can tolerate examination in the provider's office, a digital rectal examination is usually conducted to palpate for anastomotic stricture and to screen for a defecatory disorder.[11,12] Patients are examined in the left lateral position with hips flexed to 90 degrees. The evaluation consists of 3 steps. First, the provider inspects the anus and surrounding tissue for skin excoriation, skin tags, anal fissures, scars, or hemorrhoids. Second, the provider tests for perineal sensation and the anocutaneous reflex by stroking the skin around the anus with a cotton swab. Third, the provider evaluates for anastomotic strictures, sphincter tone, and paradoxical contractions on digital rectal examination. The resting and squeezing sphincter tone may be categorized as normal, weak, or increased. The patient should push and bear down as if to defecate so that the provider may determine the presence of paradoxical contractions. The provider should also note the abdominal push effort, ability to relax the anal sphincter, and degree of perineal descent with bearing down.[12]

Diagnosis

Pouchoscopy

Pouchoscopy is often the first and primary tool of investigation in patients presenting with functional anorectal disorders. Pathology such as pouchitis, pouch prolapse, and strictures can be visualized endoscopically. Retained soft or solid stool is a sign of poor emptying, either from strictures or defecatory disorder. Dilation of anastomotic strictures typically can improve symptoms of incomplete evacuation. However, a normal pouchoscopy does not rule out a defecatory disorder.

Anorectal, or Ano-Pouch, Manometry

Anorectal, or ano-pouch, manometry in patients with IPAA is the most frequently performed first-line assessment of anorectal function.[7] Using the manometry catheter, the provider is able to detect motor abnormalities of sphincter function and anorectal coordination. Prior to completing the manometry, the provider should ensure that no anastomotic stricture will impede passage of the manometry catheter.

Anorectal manometry has been used for preoperative assessment of anorectal function for patients planning for IPAA, especially in patients with questionable continence.[13] In patients with incontinence, surgeons may consider continent ileostomies such as the Kock pouch. For patients with borderline or questionable continence, stapled anastomoses have been noted to lead to less

seepage and incontinence than hand-sewn anastomoses. Therefore, stapled anastomoses may be preferred. If the patient has severe incontinence, the creation of an IPAA is contraindicated.[13]

Anorectal manometry investigates the involuntary function (resting pressure of the internal anal sphincter), voluntary function (squeeze pressure of the external anal sphincter), rectoanal reflex coordination during rectal distension, and rectoanal coordination during simulated defecation (push). Abnormal manometry has been shown to be an independent predictor of pouch failure.[14]

Although anorectal manometry is the best-established technology to assess anal sphincter pressure and recto-pouch coordination during simulated defecation, the interpretation of normal values may vary based on a patient's prior surgical history or disease state.[15,16] No normal values for anorectal manometry in patients with IPAA have been validated. However, a recent study of 14 asymptomatic patients with IPAA suggests proposed parameters, including mean anal resting pressure (mean ± standard deviation) of 72 ± 16 mm Hg, maximum anal squeeze pressure of 247 ± 69 mm Hg, and pouch-anal gradient during defecation of -27 ± 37 mm Hg.[17] Rectoanal inhibitory reflex has also been reported absent in approximately 53% of patients with IPAA, which can contribute to the inability to distinguish among gas, liquid, and solid stool and contribute to soiling.[18]

Balloon Expulsion Test

The balloon expulsion test (BET) is a first-line screening tool to assess the ability to evacuate. In patients without IPAA, the BET is consistent with, but not diagnostic of, a defecatory disorder if the patient is unable to expel the balloon within 60 seconds in the left lateral or seated position.[19]

In a small cohort of patients with IPAA, failure of the BET was significantly higher in patients with functional pouch disorders than in patients with structural disease (60% vs 20%; P=.043).[7] In this study, 20% of patients with structural disorders (including pouchitis, CD of the pouch, cuffitis, and surgery-associated complications) also failed the BET. At New York University, if a patient with IPAA has an anastomotic stricture at the ileal-anal anastomosis, the BET is not attempted because the test is considered less reliable.

Defecography

Two forms of defecography exist: barium radiograph and magnetic resonance (MR). Defecography is an established clinical tool for diagnosing evacuation disorders and is often the next step in evaluation after the results of manometry and the BET are inconclusive.[20] Barium or MR defecography showing greater than 50% retained contrast is often used in diagnostic criteria for dyssynergic defecation when the results of the manometry and the BET are inconsistent.[21] Barium defecography availability may be limited by provider expertise.

Compared with other tests of evacuatory function, defecography provides a more comprehensive evaluation of the defecatory process (including pelvic floor function and emptying capability) and structure and function of the anorectum. During defecation, the anorectal angle and perineal descent are measured. Excessive straining, internal intussusception, solitary rectal ulcers, rectoceles, and rectal prolapse can be identified on defecography. MR defecography may also detect multicompartmental (anterior, middle, posterior) pathology.[22]

Limited data have been published regarding the efficacy of defecography in diagnosing IPAA functional anorectal disorders.[22-24] Defecography has not been routinely used in the evaluation of IPAA disorders[24] but has contributed to the diagnosis of floppy pouch complex.[25] In a small study comparing patients with normal and poor pouch function, there was no significant difference in the descent of the pelvic floor during Valsalva maneuver or emptying.[24]

Electromyography

Pelvic floor electromyography (EMG) enables mapping of the external anal sphincter to identify sphincter defects, determination of striated muscle function, and evaluation of denervation-reinnervation potentials.[26] EMG may be utilized to investigate symptoms of FI that could be secondary to nerve injury from pelvic surgery. Prior studies have demonstrated that the findings of motor unit action potential activity, fiber density, and jitter through recording of EMG activity have all been shown to be altered in patients with FI in comparison with controls.[22,27,28] EMG has also been used to detect paradoxical contraction or impaired sphincter relaxation in patients with defecatory disorders,[19] including patients with IPAA.[29]

Treatment of Fecal Incontinence

Patients with IPAA, with or without pouchitis, have loose or watery stool owing to the lack of a colon. Thus, the risk of FI is increased. In a study conducted with 1009 patients who underwent IPAA, daytime incontinence was reported in 18% of patients and nighttime incontinence in 29% of patients.[2]

Lifestyle Modifications

Lifestyle modifications are associated with improvements in fecal continence in patients with IPAA. Dietary modifications may include reducing common triggers of diarrhea, including lactose, fructose, and gluten, as well

Table 1. Summary of Studies With Patients With IPAA Undergoing Treatment for Fecal Incontinence

Study	Type	Patients	Diagnosis	Treatment	Response
Hwang et al[47]	Retrospective	14 post-surgical (5 IPAA)	Manometry, pudendal nerve terminal motor latency, EMG	EMG-based biofeedback therapy	Decrease in bowel frequency (6 to 3) Decrease in incontinence episodes (2 to 1)
Khera et al[44]	Prospective	40 IBD (4 IPAA)	Symptomatic diagnosis	Gut-directed behavioral treatment, including pelvic floor muscle training	Moderate or substantial improvement reported in 62% overall
Seifarth et al[34]	Retrospective	23 IPAA	Symptomatic diagnosis	Sacral nerve stimulation	16 (70%)
Segal et al[46]	Retrospective	26 IPAA	Symptomatic diagnosis	Biofeedback therapy	20 (77%)
Khera et al[45]	Prospective	34 IBD (3 IPAA)	Symptomatic diagnosis (both incontinence and constipation)	Pelvic floor behavioral treatment	21 (62%)
Mege et al[38]	Retrospective	16 IPAA	Symptomatic diagnosis	Sacral nerve stimulation	12 (75%)
Lebas et al[39]	Prospective	4 IPAA	Symptomatic diagnosis	Sacral nerve stimulation	3 (75%)
Vitton et al[40]	Prospective	12 IBD (5 IPAA)	Symptomatic diagnosis, Wexner score	Transcutaneous tibial nerve stimulation	IBD: 5 (42%) IPAA: 1 (20%)

EMG, electromyography; IBD, inflammatory bowel disease; IPAA, ileal pouch–anal anastomosis.

as fermentable oligosaccharides, disaccharides, monosaccharides, and polyols.[20] Ingestion of carbohydrates such as breads, starches, and pasta may thicken the consistency of stool. However, these dietary modifications are expert opinion, as no dietary trials have been conducted exclusively on patients with IPAA with FI. For patients with nocturnal FI, it is recommended to limit fluids and food ingestion several hours prior to bedtime.

Medications and Supplements

Medications are first-line treatments for FI. Antidiarrheal agents such as loperamide and diphenoxylate-atropine have been used in the treatment of FI in patients who have IPAA.[30-32] Patients with daytime incontinence are encouraged to take scheduled antidiarrheals such as loperamide or diphenoxylate-atropine 30 minutes before meals. For patients with nocturnal incontinence, taking antidiarrheals before bedtime is recommended. In a randomized, double-blind, crossover trial of 16 patients with IPAA, loperamide significantly increased resting anal sphincter pressure in patients with IPAA by 20%.[30] Fiber supplements such as psyllium have traditionally been used as stool-bulking agents to reduce watery stools, but caution should be employed in patients with IPAA with reduced pouch compliance, as bulking agents may exacerbate fecal urgency.

Sacral Nerve Stimulation

Sacral (S2-S4) parasympathetic nerves innervate and regulate activities of the descending colon and rectum, urinary bladder, and genital organs. The pudendal nerve innervates the external anal sphincter and controls the sensory and motor function of the external anal sphincter.

Sacral nerve stimulation (SNS) is an established therapy for FI in the general population. Its application in patients with IBD and patients with IPAA has been mentioned in multiple previous review articles and smaller studies (Table 1).[8,33-35] SNS has shown encouraging results with a promising response rate in patients with CD[36] and refractory ulcerative colitis proctitis.[37] The use of SNS in patients with IPAA was explored in a study by Seifarth and colleagues, which included 23 patients.[34] Within the median follow-up of 6.5 years, improvement of continence was demonstrated in 70% of patients. Other smaller studies showed a similar improvement in approximately 75% of patients.[38,39]

Tibial Nerve Stimulation

The tibial nerve is a mixed nerve containing sensory, motor, and autonomic fibers. It emerges from L4 to S3, innervating the colorectum, bladder, and pelvic floor. There are 2 types of tibial nerve stimulation: percutaneous tibial nerve stimulation using a fine-needle electrode, and

Table 2. Summary of Studies With Patients With IPAA Undergoing Treatment for Defecatory Disorders

Study	Type	Patients	Diagnosis	Treatment	Response
Quinn et al[19]	Retrospective	38 IPAA	Anorectal manometry, BET, barium or MR defecography, external anal sphincter EMG	Biofeedback therapy (22 patients)	15/22 (68%)
Hull et al[29]	Retrospective	13 IPAA	EMG	Biofeedback therapy (12 patients)	9/12 (75%)
Khera et al[44]	Prospective	40 IBD (4 IPAA); 18 with constipation (hard stools, straining, or incomplete evacuation)	Symptomatic diagnosis	Gut-directed behavioral treatment, including pelvic floor muscle training	15/18 (83%)
Stellingwerf et al[23]	Retrospective	87 IPAA; 16 with non-mechanical defecatory difficulty	Defecating pouchogram	Biofeedback therapy (16 patients)	7/16 (44%)

BET, balloon expulsion test; EMG, electromyography; IBD, inflammatory bowel disease; IPAA, ileal pouch–anal anastomosis; MR, magnetic resonance.

transcutaneous tibial nerve stimulation (TTNS) using an adhesive electrode.

Only 1 small study explored TTNS to treat FI in patients with IBD (7 patients with CD, 2 patients with indeterminate colitis, and 3 patients with ulcerative colitis) (Table 1).[40] Although TTNS did not objectively improve FI as measured by the Wexner score for FI, 5 patients (41.6%) demonstrated a significant improvement in symptoms and quality of life after 3 months of TTNS.

Biofeedback Therapy

Owing to its efficacy in patients with FI,[41,42] biofeedback therapy is recommended by international neurogastroenterology and motility societies for the treatment of FI.[43] As with all physical therapy, patient willingness and motivation to complete therapy sessions are required.

Biofeedback therapy for FI aims to gradually strengthen coordination and isolation of pelvic floor musculature, promote an improved sensation of small volumes of stool with contraction of the pelvic floor muscles in response (sensory training), and improve management of urgency (urge resistance training).[43] During biofeedback exercises, the patient is taught to isolate the anal sphincter and puborectalis muscles and is provided visual and verbal feedback regarding changes in manometric pressure tracings. During urge resistance training, patients are taught relaxation techniques to respond to the sensation of urgency elicited by the gradual inflation of a balloon in the pouch. Sensory training aims to improve impaired pouch sensation and anal sphincter response to urges. The use of pelvic floor exercise was described in patients with IBD with a response rate of approximately 60%.[44,45] In a single-center study of 26 patients with IPAA with FI, 77% of patients noted improvement in FI after biofeedback sessions (Table 1).[46] Another small study investigating the use of EMG-based biofeedback therapy showed a decrease in bowel frequency and incontinence episodes.[47]

Future Treatment Targets for Fecal Incontinence

Noninvasive neurostimulation devices such as transcranial direct current stimulation,[48] vagus nerve stimulation,[49] repetitive magnetic stimulation,[50] and translumbosacral neuromodulation[51] have been trialed in patients with FI but without IPAA with success. There may be future therapeutic potential with these technologies in patients with IPAA.[51]

Treatment of Defecatory Disorders

As mentioned previously in this article, defecatory disorder is the preferred term for patients who fulfill either of the Rome IV criteria for constipation syndromes and have evidence of impaired evacuation on functional testing or imaging. Dyssynergic defecation is a subset of this group that specifically refers to paradoxical contraction of the pelvic floor during attempts at evacuation. The prevalence of defecatory disorders in patients with IBD and IPAA ranges from 9% to 75%.[52] This is thought to be at least partially driven by maladaptive behaviors (tightening the external anal sphincter during periods of urgency) in response to an undesirable stimulus, such as fear of FI in patients with IBD or IPAA. Of note, patients with chronic pouchitis are significantly more likely to be diagnosed with defecatory disorders.[19]

Table 3. Take-Home Points

- Anorectal disorders, including defecatory disorders and fecal incontinence (FI), are common in patients with ileal pouch–anal anastomosis (IPAA). If not optimally managed, these functional anorectal disorders may decrease the patient's functional results and quality of life.
- Preoperative screening with manometry for incontinence in high-risk patients is recommended prior to IPAA surgery.
- After a thorough history and physical examination, diagnosis of anorectal disorders in patients with IPAA includes a combination of pouchoscopy, anorectal manometry, balloon expulsion test, defecography, or electromyography.
- Treatment options for FI in patients with IPAA include lifestyle modifications, medications, sacral nerve stimulation, tibial nerve stimulation, and biofeedback therapy.
- Treatment of defecatory disorders in patients with IPAA typically involves biofeedback therapy.

Medical Therapy

For patients with an intact colon and symptoms of constipation from an underlying defecatory disorder, various medical recommendations may include laxatives, exercise, timed toileting, and increased soluble fiber. However, these recommendations do not serve well for patients with IPAA with defecatory disorders. Patients with IPAA with dyssynergia often describe exacerbated straining and incomplete evacuation when stool has been thickened by the use of soluble fiber supplements or antidiarrheal medications. Most patients with IPAA with dyssynergia prefer for the stool to remain more liquid. In some patients with IPAA with dyssynergia, the use of enemas may be helpful to achieve more complete evacuation.

Biofeedback Therapy

The aim of biofeedback therapy for dyssynergia is to improve the relaxation of anal and pelvic floor muscles during defecation.[53] Multiple randomized controlled trials in patients without IPAA have demonstrated both short-term and long-term efficacy of biofeedback therapy compared with standard therapy such as diet, exercise, and/or laxatives.[54,55]

Biofeedback therapy has been proven effective in patients with both IBD and defecatory disorders (Table 2).[56] A meta-analysis of patients with IPAA demonstrated 86% (95% CI, 67%-98%) effectiveness.[57] In other studies, the use of biofeedback therapy in patients with IPAA has a reported efficacy of 62% to 100%.[7,29,46,55,58,59] Quinn and colleagues studied 38 patients, of whom 22 completed biofeedback therapy.[19] Of those 22 patients, 23% experienced significant symptomatic improvement, 68% experienced mild-moderate improvement, and 9% experienced no improvement.

Conclusion

Functional anorectal disorders are highly prevalent in patients with IPAA, yet there are scarce data to guide diagnosis and treatment. This article outlines the clinical presentation, diagnostic tools, and possible treatment options for this patient population (Table 3). Regular screening and recognition of symptoms can prompt diagnosis and early treatment. Preoperatively, utilization of diagnostic tools, particularly anorectal manometry for patients with concern for incontinence, is key to facilitating thoughtful patient selection and counseling prior to IPAA surgery. Postoperatively, addressing functional anorectal disorders can potentially improve quality of life.

More prospective studies of patients with IPAA with functional anorectal disorders are needed. Validated manometry values for patients with IPAA would be beneficial for the diagnosis of functional anorectal disorders. More treatment options for incontinence and defecatory disorders are also needed.

Disclosures

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