CLINICAL PRACTICE

Fecal Incontinence in Adults

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This Journal *feature begins with a case vignette highlighting a common clinical problem. Evidence supporting various strategies is then presented, followed by a review of formal guidelines, when they exist. The article ends with the author's clinical recommendations.*

A 53-year-old otherwise healthy woman presents with a 2-year history of intermittent fecal incontinence. Because of embarrassment, she has curtailed her social and professional activities. Physical activity often precipitates an episode, and she wears absorbent pads. She has occasional urinary incontinence when she coughs or sneezes. There is no history of gastrointestinal or rectal surgery and no neurologic symptoms. Physical examination reveals no perianal deformity or rectal prolapse. The tone of the anal canal is adequate, whereas contractions of the anal sphincter muscle and the puborectalis muscle are weak. On the patient's bearing down, there is no rectal prolapse, and the perineal descent is approximately 2 cm. How should she be evaluated and treated?

THE CLINICAL PROBLEM

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Fecal incontinence is a devastating nonfatal illness, resulting in considerable embarrassment and anxiety in those who have it. It affects 2 to 17% of people living in the community and almost half of all nursing home residents.[1] Many affected persons do not voluntarily report fecal incontinence to their physicians and must be asked about it directly.[2]

The prevalence of fecal incontinence is increased among women, the elderly, persons with poor health status or physical limitations, and those residing in nursing homes.[2] Other risk factors associated with fecal incontinence in adults include rectal radiation therapy (e.g., for prostate cancer), pregnancy, injury to the sphincter or nerve damage associated with vaginal delivery, anorectal surgical procedures (e.g., sphincterotomy for anal fissures), diarrhea alone or in association with the irritable bowel syndrome, and fecal impaction. Neurologic conditions (e.g., stroke, multiple sclerosis, spinal cord injury, and Parkinson's disease) and diabetes are also risk factors.

Continence relies on the appropriate functioning of the puborectalis muscle and the internal and external anal sphincter muscles, which encircle the anal canal (Fig. 1). Factors such as stool consistency, rectal and colonic storage capacity, perception of rectal sensation, and cognitive and behavioral functioning also play important roles. An abnormality in any of these factors may result in fecal incontinence.

STRATEGIES AND EVIDENCE

EVALUATION

A detailed history should be taken to assess the frequency, severity, and nature of the incontinence and the effect of incontinence on the quality of the patient's life, including an assessment of the patient's ability to leave the house for work and social activities. Patients are particularly anxious about the unpredictability of episodes of fecal incontinence and often alter their social and professional activities to avoid embar-

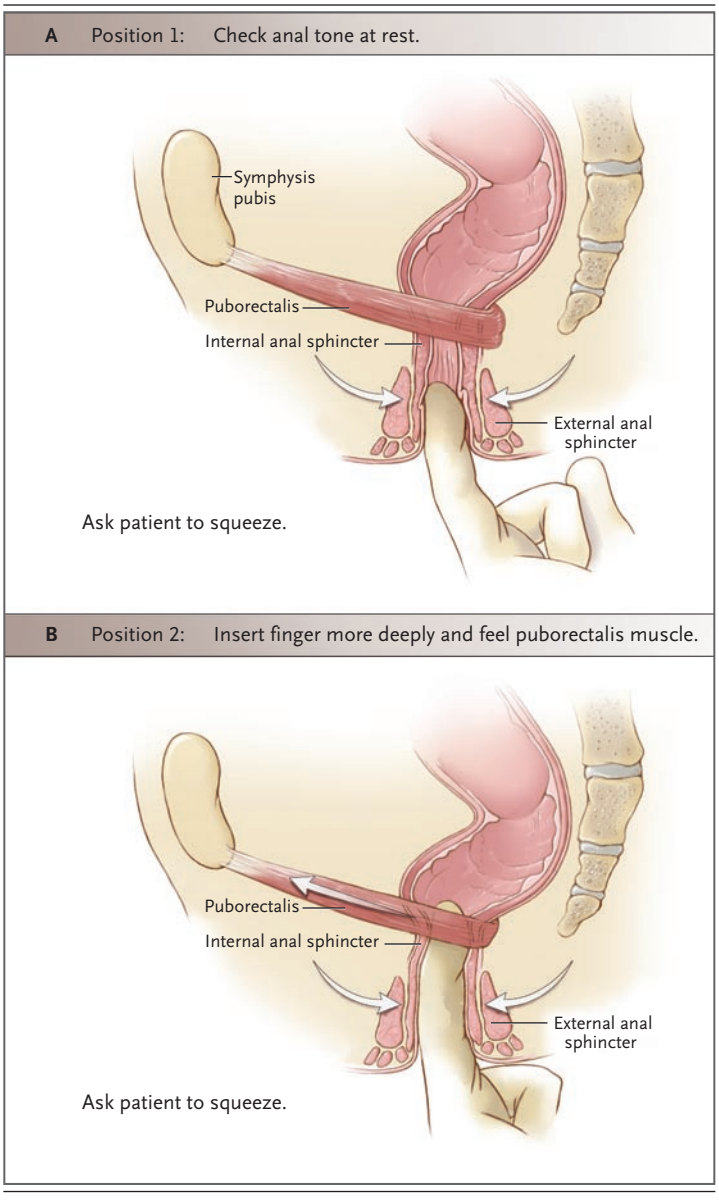

Figure 1. Relevant Anatomy of the Anorectum and Digital Examination of the Anorectum of an Adult with Fecal Incontinence.

The rectum serves as both a storage area and a conduit from the colon to the anal canal. The anal canal is defined proximally by the levator ani muscles and includes the puborectalis muscle, which creates the anorectal angle. Two sphincters encircle the anal canal, the internal anal sphincter, which is a continuation of the circular smooth muscle of the rectum, and the external anal sphincter, which consists of striated muscle innervated by the pudendal nerves arising from sacral nerves S2, S3, and S4. Extrinsic innervation of the internal anal sphincter is by the sympathetic and parasympathetic autonomic nerves. The initial examination assesses the resting tone of the anal canal, derived primarily from the internal anal sphincter (70%) with contributions from the external anal sphincter (30%) (Panel A). When the patient is asked to squeeze, the strength and duration of the contraction of the external anal sphincter may be assessed (curved arrows). To assess the puborectalis muscle, the examining finger is advanced and oriented posteriorly (Panel B). When the patient is asked to squeeze, the contraction of the puborectalis muscle is felt as an anterior and upward tug as the muscle shortens (arrow). Simultaneously, the external anal sphincter contracts to increase the pressure in the anal canal.

rassment. An emphasis on only the frequency and type of episodes will result in underestimation of the often profound effect of this disorder on the quality of life. Although a number of incontinence scales have been developed, none are routinely used in practice.[3,4]

Physical examination should include perianal inspection, digital rectal examination, and a focused examination of the perineum. The assessment of the perineum and the digital anorectal exam are best performed while the patient is in the left lateral or prone position.[5,6] The inspection may reveal prolapsed hemorrhoids, a patulous anus (indicative of denervation), anal deformity, or dermatitis resulting from frequent soiling. Excessive perineal descent (≥3 cm) or rectal prolapse may be identified by asking the patient to strain as if to defecate (optimally in the squatting position). Perineal sensation is determined by lightly touching the perianal skin with a cotton-tipped stick; the anocutaneous reflex (a brief contraction of the external anal sphincter when the perianal skin is lightly stroked) indicates the presence of intact sensory and motor innervation.

The digital rectal examination has been dismissed by some as inaccurate for assessing anal sphincter tone and strength.[4] As with any such test, accuracy depends on the skill of the examiner. When performed by an experienced and knowledgeable examiner, the following features can be assessed or identified: anal-canal tone, contraction of the external anal sphincter, contraction of the puborectalis muscle, fecal impaction or mass, and disruptions of the anal sphincter. In one study, the positive predictive value of digital examinations performed by experienced clinicians to identify low resting pressure and squeeze pressure was 67% and 81%, respectively.[7] Figure 1 depicts a proper digital rectal examination in a patient with fecal incontinence.

Diagnostic Testing

After fecal impaction with overflow, decreased rectal storage capacity, and neurologic causes have been ruled out (Table 1), and when there is diagnostic uncertainty after the history taking and physical examination, tests to assess anorectal structure and function may be useful (Table 2). Anorectal manometry is helpful to assess anal-sphincter tone and strength as well as the perception of rectal sensation.[5,6,8,9] When a potentially reparable anal-sphincter disruption is a consideration, anal sonography is useful to assess the structural integrity of the sphincters.[6,8,9] When a sphincter tear is discovered, assessment of the external anal sphincter and the puborectalis muscle with electromyography (EMG) is warranted to rule out concurrent denervation (which clinical experience suggests may reduce the chances of surgical success). These tests are best performed at tertiary care centers by experienced practitioners.

The value of measurement of pudendal-nerve terminal motor latencies (a measurement of conduction time through the terminal portion of the pudendal nerve to the external anal sphincter) and of barium proctography[5,6,8,9] is more controversial. Dynamic pelvic magnetic resonance imaging (MRI) may provide information about the pelvic-floor anatomy and function,[5] but pelvic MRI is costly and not widely available at present, and its precise role in the assessment of anorectal structure and function has not been established.

MANAGEMENT

Fecal incontinence after the age of 4 years should never be considered normal or age-appropriate. Management of the disorder should be tailored to the specific cause when possible, but typically a variety of strategies are used. These include modification of stool consistency and delivery of stool to the anorectum, behavioral interventions, and surgery to correct abnormal continence mechanisms. There are few randomized, controlled tri-

Table 1. Some Causes of Fecal Incontinence.

Cause	Example	Suggestive Findings
Overflow	Childhood encopresis; diarrhea in institutionalized, elderly, or psychotic patients	Constipation or withholding behavior; use of constipating medications; dementia; psychosis; impaction found on digital exam; "overloaded colon" on abdominal radiography
Reduced storage capacity	Inflammatory bowel disease, radiation therapy, or proctectomy	History of colitis or proctitis; radiation therapy for prostate cancer; rectal surgery; frequent, urgent small stools; normal anal sphincters and puborectalis muscle
Weakness of internal anal sphincter	Anal sphincterotomy, systemic sclerosis	Incontinence of small amounts of liquids or mucus; no sensation of stool loss; rectal seepage only Decreased resting tone, with normal squeeze pressure and contraction of the puborectalis muscle
Weakness of external anal sphincter only	Vaginal delivery with sphincter defect; pudendal neuropathy	Vaginal delivery with prolonged labor, use of forceps, known tear with or without repair; urge incontinence; weak squeeze pressure with normal contraction of the puborectalis muscle; possible anterior external sphincter defect
Weakness of puborectalis muscle	Spinal cord lesion, peripheral neuropathy, "high" tear after vaginal delivery	Weak contraction of the puborectalis muscle with weak or absent squeeze pressure; decreased perianal sensation with gaping of the anus (spinal cord lesion); urinary incontinence (spinal cord lesion)
Decreased perception of rectal sensation	Spinal cord lesion, diabetes, multiple sclerosis, megarectum	Weak contraction of the puborectalis muscle with weak or absent squeeze pressure; decreased perianal sensation with gaping of the anus (spinal cord lesion); urinary incontinence (spinal cord lesion); nocturnal incontinence; capacious rectum with overflow (megarectum only); decreased perianal sensation with gaping of the anus (spinal cord lesion only); urinary incontinence

als, and management of fecal incontinence is guided by expert opinion, clinical experience, and case series. Referral to a specialist is not necessary in all cases, but it is warranted when conservative measures fail or when there may be a surgically correctable lesion.

General Measures

Incontinence pads protect the skin and prevent the soiling of clothing and bedding; polymers are used to conduct moisture away from the skin.[6,10] Randomized trials indicate that disposable products are superior to nondisposable products in providing skin protection.[10] Although not rigorously studied, barrier creams such as zinc oxide and menthol lotion (Calmoseptine) may prevent skin irritation. Topical antifungal agents are useful for perianal fungal infections.[6]

Medical and Pharmacologic Treatments

In patients with overflow incontinence associated with fecal impaction, disimpaction and colon cleansing with large-volume warm-water enemas or oral polyethylene glycol with electrolyte solutions provide immediate relief.[11,12] Such patients require an ongoing program of bowel management to prevent recurrence. Such programs involve regularly scheduled defecation with the assistance of laxatives such as magnesium salts or polyethylene glycol or stimulant laxatives as rescue therapy if defecation does not occur spontaneously within 3 days.[11] Short-term (3 to 6 months) success rates of 60 to 80% have been reported in case series, but ongoing vigilance is required because of the high rates of recurrence.

When fecal incontinence is associated with decreased colonic and rectal storage capacity or with chronic diarrhea, treatment is directed toward reversing the underlying causes or, if this is not an option, modifying the volume, consistency, and delivery of stool[11] (Table 3). Although trials of modified dietary intake of fiber are lacking, clinical experience suggests that in some patients, reducing the intake of dietary fiber has benefit when combined with the administration of antidiarrheal drugs, which slow colonic transit and decrease intestinal fluid secretion. Of the antidiarrheal agents, loperamide (Imodium, Ortho–McNeil) is preferred because it has no effects on the central nervous system, has been shown in a randomized, controlled trial[13] in patients with fecal incontinence to be more effective than diphenoxylate–atropine (Lomotil, Searle), and may increase internal anal sphincter tone.[5,13-15] Adequate dosing and the timing of administration are important (2 to 4 mg administered 45 minutes before meals or before social occasions) to avoid accidents outside the home. In patients with diarrhea associated with the irritable bowel syndrome, tricyclic agents[16] may also help to alleviate diarrhea by means of their anticholinergic properties. Continence is more easily established for solid than for liquid stools and gas, especially when there is adequate puborectalis muscle function. Alosetron (Lotronex, GlaxoSmithKline) is a 5-hydroxytryptamine type 3 antagonist that has been approved by the Food and Drug Administration for women with the irritable bowel syndrome and diarrhea[17]; because the drug reduces urgency and the frequency of liquid stool, it may improve fecal incontinence caused by other conditions, although this hypothesis has not been formally tested. Because of cost considerations, as well as reports of ischemic colitis, the use of alosetron should be considered only after treatment with other antidiarrheal medications has failed.

Patients with internal anal sphincter abnormalities that cause decreased tone in the anal canal characteristically also have fecal soiling with normal bowel habits. Clinical experience suggests that an anal plug constructed of cotton balls may be an inexpensive approach to restore the passive barrier function and may also serve as an absorbent, although this approach has not been formally studied.

Table 2. Diagnostic Tests for Fecal Incontinence in Adults.

To evaluate anorectal structure and function
Anorectal examination
Pelvic MRI*
Barium defecography†
To evaluate anorectal structure only
Anal sonography†
To evaluate anorectal function only
Anorectal manometry‡
EMG of puborectalis and external anal sphincter muscles§
Pudendal-nerve terminal motor latency¶

* Pelvic magnetic resonance imaging (MRI) is not widely available.
† This test is used when surgery is contemplated but pelvic MRI is not available.
‡ This test is most useful when an experienced examiner is not available or when findings on the history taking and physical examination are uncertain.
§ Electromyography (EMG) is used when surgery is contemplated and an external anal sphincter defect is detected.
¶ This test is used when surgery is contemplated and EMG expertise is not available.

Table 3. Suggested Approaches to Treatment of Fecal Incontinence in Adults.*

Cause	Treatment
Overflow	Disimpaction Colon evacuation Periodic defecation (twice weekly) with the use of laxatives, enemas, or both, if necessary
Decreased storage capacity	Low-fiber diet Loperamide† Periodic defecation (twice weekly) with or without the use of laxatives
Isolated internal anal sphincter weakness	Loperamide† Anal cotton plug
Anal sphincter disruption	Loperamide† Surgery
Peripheral neuropathy	Sacral-nerve stimulation‡
Behavioral problems or dementia	Prompted defecation with regular use of laxatives, suppositories, or enemas (twice weekly); administration of loperamide in the presence of diarrhea or between enemas

* For fecal incontinence from all causes, general measures include skin care, the use of incontinence pads, odor control, and support from caregivers, as needed.
† The suggested dose of loperamide is 2 to 4 mg administered in the morning or twice daily, as needed, or 2 to 4 mg 45 minutes before travel to locations where toilet facilities are not readily available. There is no use of the drug on days of induced defecation.
‡ This method is not approved in the United States for fecal incontinence.

Biofeedback

In contrast to the use of exercises to strengthen the pelvic floor muscle (Kegel exercises), biofeedback has been used to improve the perception of rectal sensation and the responsiveness of the sphincter muscle to balloon distention with the use of instruments that monitor sphincter contractions.[18] Although several case series have reported the efficacy of biofeedback, these studies lacked sham controls, often had imprecise end points, and were subject to bias.[19] Randomized, controlled, blinded trials have failed to show the superiority of biofeedback to conservative measures, such as instruction on managing fecal incontinence, implementing lifestyle modifications, obtaining emotional support, and using medications and dietary changes to modify the liquidity and delivery of stool.[20] Neither was instrumental feedback superior to noninstrumental feedback, which used simple digital insertion, providing the patient only tactile feedback.[21]

Surgical Approaches

Anal sphincteroplasty is based on the repair of an anatomically disrupted anal sphincter and is best performed with the use of a technique that overlaps the two ends of the sphincter muscles.[22,23] Anal sonography to identify sphincter disruptions has replaced EMG mapping of the external anal sphincter.[5] Although overlapping sphincteroplasty is highly effective in acute sphincter disruption, its durability and effectiveness in patients with nonacute sphincter disruption are less certain.[23,24] Many reports have noted a short-term improvement in fecal continence in up to 85% of patients, but failure rates of approximately 50% have been noted after 5 years of follow-up.[22,23] In several case series, fecal continence after sphincteroplasty was maintained in only 28% of patients followed for a mean of 40 months and in only 11 to 14% of those followed for more than 69 months.[24-27]

The criteria for selecting patients who can benefit from sphincter repair remain uncertain. On the basis of case series, the clinical features that may predict treatment failure include an internal anal sphincter defect, prolonged pudendal-nerve terminal motor latency (although this finding has been inconsistent), atrophy of the external anal sphincter on pelvic MRI, and the irritable bowel syndrome. However, prospective data are lacking to confirm these findings. In view of the potential complications of surgery and the questionable durability of modest clinical improvements, a reasonable approach is to perform surgery in selected

patients only when nonsurgical measures prove unsatisfactory.

Antegrade colonic irrigation by means of an appendicostomy or cecostomy was initially developed to treat fecal incontinence in children but has also been used in adults.[28] Access to the cecum is established by externalizing the appendix or by implanting a cecostomy button surgically or by percutaneous colonoscopy (similar to placement of a gastrostomy tube) in adults and children. Large-volume enemas can be delivered into the cecum with the use of a catheter that is passed through the cecostomy stoma daily or every other day in order to empty the colon completely to prevent fecal soiling. Complications include traumatic catheterization with perforation, stomal stenosis, and infection, but these have become less frequent as the procedure has been simplified. In a recent review of studies of adults undergoing this procedure, stenosis developed in 20% of the patients, and in 14% the procedure was reversed because of leakage or abdominal pain during the administration of enemas.[28] Optimal candidates are those with neurogenic fecal incontinence or anorectal deformities.[8] Infrequently, surgery may also be performed to replace a damaged or nonfunctioning anal sphincter complex with the use of nearby muscles and the implantation of a stimulator (dynamic graciloplasty)[29] or an artificial sphincter. Improved fecal continence has been reported in more than 50% of the patients in whom the surgery is performed. However, complication rates have been as high as 42%, including infections, device malfunctions, and in the case of implantation of an artificial sphincter, explantation of the device.[23,30] Such procedures are best performed by experienced surgical teams.

In the absence of demonstrable anal sphincter defects, the efficacy of surgical approaches designed to correct abnormalities of the pelvic floor, such as anterior levatorplasty and total repair of the pelvic floor, is uncertain.[31] For severe incontinence refractory to other approaches, clinical experience suggests that a diverting colostomy may provide substantial improvement in a majority of patients,[32] although the effects on the quality of life have not been rigorously evaluated in a prospective, longitudinal study.

Stimulation of the Sacral Nerve

The use of stimulation of the sacral spinal nerve for treatment of fecal incontinence derives from its successful use in treating disorders of urinary voiding and continence.[33] The procedure involves three phases: the location of the sacral spinal nerves on percutaneous probing with a needle electrode to identify the nerve root that maximally stimulates anal sphincter contraction, temporary placement of an electrode for stimulation of the nerve root identified on testing as the most efficient, and permanent implantation of a neurostimulator for long-term therapeutic stimulation.

In the approximately 90% of patients in whom the procedure is attempted and in whom the first two phases of the therapy are successfully completed, clinical improvement of fecal incontinence has been confirmed in studies with follow-up of 24 months or less,[34-36] with full restoration of fecal continence in 37%[36] to 74%[34] of these patients. Objective physiological changes include increases in both resting pressure and squeeze pressure, increased squeeze durations, and improved perception of rectal sensation. In a multicenter trial involving 37 patients, adverse events included pain (26%), which often resolved after the stimulator was reprogrammed or repositioned; lead breakage (3%); and infection (3%).[36]

AREAS OF UNCERTAINTY

Data from randomized trials are lacking to guide the optimal approach to the diagnosis and treatment of fecal incontinence. Kegel exercises and biofeedback are often recommended, since they are without risk; biofeedback, however, is costly and time-consuming and has not been shown to be effective in randomized trials assessing its use. Effects of modification of fiber intake on fecal incontinence have also not been carefully evaluated. Randomized trials comparing surgical with nonsurgical interventions or comparing different surgical approaches are also lacking,[22] and data on surgical outcomes are derived largely from retrospective case series. It is speculated that sacral-nerve stimulation may be beneficial after anal sphincteroplasty when the results of surgery are suboptimal and include partial denervation of the puborectalis, the external anal sphincter, or both; however, data are lacking to confirm this possibility.

GUIDELINES

Practice guidelines for fecal incontinence based on expert opinion have been published by the American College of Gastroenterology (ACG).[6] For

the most part, these recommendations are similar to those contained in this review. One exception is that the ACG guidelines recommend biofeedback, but in the absence of supporting evidence from randomized clinical trials.

SUMMARY AND RECOMMENDATIONS

Careful history taking and physical examination often reveal the cause or causes of fecal incontinence in adults; further testing is warranted when there is diagnostic uncertainty. In most patients, overflow, impaired colorectal storage capacity, and isolated internal anal sphincter weakness can be identified on the basis of the history and examination. When the cause of fecal incontinence remains uncertain, such as in the case of the patient described in the vignette, the choice of testing will vary according to institutional expertise and availability, but I would proceed with anorectal manometry and anal sonography (or pelvic MRI). If an external sphincter tear is found, EMG of both the puborectalis muscle and the external anal sphincter may help guide therapeutic decisions; outcomes of surgical repair appear to be better in the absence of denervation, although long-term success rates are suboptimal even in these cases. If no surgically remedial lesion is identified, I would recommend the use of disposable incontinence pads and measures to reduce stool delivery to the rectum, including the administration of loperamide (2 to 4 mg 45 minutes before planned activities or travel) and reduced fiber intake, although this approach has not been rigorously evaluated. I would also suggest Kegel exercises to strengthen the puborectalis muscle and external anal sphincter, given their possible benefit and lack of risk, although there is also no rigorous evidence to support their benefit. Because data supporting the efficacy of sacral-nerve stimulation (which is not yet approved in the United States for fecal incontinence) are limited, this approach should be considered where it is available and for patients whose condition does not respond to conservative measures.

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