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Geriatric fecal incontinence

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Fecal incontinence is defined as the involuntary passage of stools through the anus. Fecal and urinary incontinence together constitute the second most common cause of institutionalization [1]. Fecal incontinence is common, affecting 3% to 21% of community-dwelling elderly individuals over age 65 [1–3]. In the institutionalized elderly population, the prevalence is more than 50% [4]. Incontinence may occur even in healthy people during an acute event, such as diarrhea, when the volume of stool overwhelms the rectal reservoir. When fecal incontinence occurs, it is emotionally and socially devastating, resulting in silent suffering, anxiety, fear of embarrassment, and isolation [5–7]. Patients underreport fecal incontinence unless prompted. This places the onus on the physician to ask about anorectal problems and to direct patients toward effective treatment options.

Prevalence

In the general population, the reported prevalence of fecal incontinence is 2.2% in those who are elderly [8]. In individuals over age 65 who were studied, the frequency of fecal incontinence increased from 3.7% to 27%. In younger persons, fecal incontinence occurs more commonly in women than in men, but this differential narrows with advancing age (Table 1). The prevalence of fecal incontinence is highest in nursing homes, with more than 50% of long-term care residents affected by chronic fecal incontinence [4]. In hospitalized settings, fecal incontinence is found in 20% to 32% of patients in geriatric wards and in 56% of patients in geriatric psychiatry wards [9,10]. Eighty percent of patients hospitalized because of dementia also experience fecal incontinence [10,12]. Double incontinence (ie, fecal incontinence and urinary incontinence) occurs 12 times

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Table 1
Prevalence of fecal incontinence

Author (ref)	Setting	Location	Prevalence, general population (%)	Prevalence, age > 65 y (%)	Gender distribution, age > 65–70 y	Gender distribution, overall
Campbell [2]	Community	New Zealand		3.1	M > F	
Faltin [39]	Community	Switzerland	4.4[a]			
Giebel [45]	Community	Germany	5			
Kok [3]	Community	Netherlands	2.3	4.2 – 16.9		
Nakanishi [14]	Community	Japan		8.7 M; 6.6 F	M > F	
Nelson [8]	Community	Wisconsin	2.2			M < F
Resnick [102]	Community	Boston		17		
Roberts [103]	Community	Minnesota	8.4 M; 13.1 F	17 M; 27 F[b]	M = F	M < F
Talley [104]	Community	Minnesota		3.7	M > F	
Chassagne [5]	Long-term care	France		58		
Nelson [1]	Long-term care	Wisconsin		47	M = F	
Peet [101]	Long-term care	England		20.8		

Abbreviations: F, female; M, male.

[a] Only women studied.

[b] Age greater than 50 years.

more often than fecal incontinence alone, and 50% to 70% of patients who have urinary incontinence also suffer from fecal incontinence [8,11].

Importance

In long-term care, fecal incontinence affects the affected residents and their caregivers. It is a poor marker of overall health and is associated with increased mortality in the nursing homes and those who live at home [4,14]. Incontinent nursing home residents experience more urinary tract infections and pressure ulcers [13]. The total health care costs attributable to fecal incontinence are difficult to determine, because few studies examine health care costs for fecal incontinence alone. The nursing home–related costs for incontinence were $3.26 billion in 1987; the yearly cost of adult diapers alone is $400 million and there are additional health expenditures in excess of $9,000 per patient year [13,15,16].

Anatomy and physiology of the anal canal and rectum and changes associated with aging

To better understand the clinical presentation, evaluation, and treatment options for fecal incontinence, the anatomy and physiology of the anal canal and rectum are reviewed briefly, as are changes that occur with aging.

The rectum is a tubular structure, 12 to 15 cm in length. The dentate line separates the anal canal into an upper mucosal lining and lower cutaneous segment. Anal cushions are columns connected at their bases just above the dentate line and there are 8 to 12 rectal columns (anal cushions). The high-pressure zone is formed by a combination of muscles (internal anal, external anal, and puborectalis) and anal cushions surrounding the anal canal.

The internal anal sphincter emanates from the distal inner circular muscle layer of the rectum. It consists of a 2 to 3 mm thick circular band of muscle and is contracted tonically at rest, preventing the involuntary loss of stool and gas.

The resting tone of the internal anal sphincter contributes from 50% to 85% of the resting tone of the sphincter, with the external anal sphincter contributing 25% to 30% and the remaining 15% coming from the anal cushions [17,18,26]. In response to rectal distention, the internal anal sphincter tone increases initially, followed by decreased tone constituting the rectoanal inhibitory response [17].

Changes with aging

The thickness of the internal anal sphincter increases with age, from 2.4 to 2.7 mm in individuals under age 55 to 2.8 to 3.4 mm in those older than 55 [19–22]. Although the functional significance of this change is unclear, it is hypothesized that the increased thickness of the internal anal sphincter is a compensatory change for the maintenance of continence [19]. This hypothesis is

difficult to demonstrate, as the age-related changes in anal sphincter pressures are quite modest in healthy individuals who have no changes described in resting anal sphincter pressure [23,24]. Others demonstrate increased connective tissue, or sclerosis, of the internal anal sphincter with aging, which may represent a more likely explanation for the sonographic findings [25].

The external anal sphincter is an elliptic cylinder of striated muscle surrounding the inner smooth muscle and terminating distal to the internal anal sphincter. Along with the puborectalis, the external anal sphincter provides voluntary control of continence in response to various stimuli, such as the increased intra-abdominal pressure that occurs with coughing, rectal distention, and anal dilatation [27]. Voluntary sphincter contractions are limited to at most a few minutes, because of the development of muscle fatigue [28]. Voluntary anal sphincter pressures are lower in women than in men [29]. There is loss of skeletal muscle causing significant thinning of the external anal sphincter that occurs with aging, possibly contributing to this reduction in pressure [19].

The levator ani muscles comprise the major component of the pelvic floor, and consist of three striated muscles: iliococcygeus, pubococcygeous, and puborectalis. The puborectalis muscle plays the largest role in continence and forms a U-shaped loop of striated muscle slinging around the posterior aspect of the external anal sphincter, pulling the anal canal forward, creating the anorectal angle. The puborectalis and resultant anorectal angle aid in the maintenance of continence. As this angle becomes more acute with a voluntary sphincter contraction, it provides an anatomic obstruction to the distal movement of stool retained above the angle [30].

Defecation physiology

Sensory- and motor-mediated mechanisms of the anorectum interact to maintain continence and control the process of defecation. The desire to defecate usually is preceded by high amplitude propagated contractions in the more proximal colon, resulting in the movement of feces into the rectum, followed by relaxation of the distal colon/rectum and internal anal sphincter and contraction of the external anal sphincter until the socially appropriate time for defecation is reached (in the cognitively and neurologically intact individual) [31]. The sensory receptors in the anal canal determine the nature of luminal contents, that is, if the contents are solid, liquid, or gas [32]. When voluntary defecation is desired, intra-abdominal pressure rises from the abdominal wall contraction. The muscles of the pelvic floor (external anal sphincter, puborectalis, and other muscles of the levator ani) relax. This is identifiable on physical examination during inspection of the perineum, with a descent of 2 to 3 cm of the perineum, and on digital rectal examination, with relaxation of the puborectalis, which can be palpated posteriorly during rectal examination. Relaxation of the puborectalis results in straightening of the anorectal angle, providing a straightened conduit for stool movement. The anal canal relaxes with the increased rectal pressure, resulting in the evacuation of stool. Clinically, these events can be assessed during defecation

Table 2
Risk factors for fecal incontinence

Prior history of urinary incontinence
Presence of neurologic disease
Presence of psychiatric disease
Poor mobility
Age greater than 70 years
Dementia

See references [8,34].

proctography. Continence is maintained through the combined action of several muscles: the external and internal anal sphincters and the puborectalis muscle. Determinants of continence include resting anal tone, resistance to opening at the anus, rectal compliance, normal anorectal sensation, and the consistency of stools [33]. Impairment in any of these mechanisms may result in fecal incontinence.

Causes of fecal incontinence

A variety of medical conditions and risk factors are associated with fecal incontinence in the elderly population (Tables 2 and 3). Impaired neurologic control can result either from disruption of spinal reflex arc or from central inhibition of or problems with autonomic control. The continence mechanism can be overwhelmed by diarrhea, colitis, laxative, radiation, or poor access to toileting facilities, especially in older persons who rely on a walker because of unstable gait, advanced arthritis, or hemiparesis. Advanced dementia and delirium also can result in fecal incontinence. Possibly the most common predisposing condition to fecal incontinence is fecal impaction. It is reported in up to 42% of elderly patients admitted to geriatric units [34]. These patients often have chronic constipation and receive large doses of laxatives resulting in incontinence from leakage around the large fecal impaction [35]. The problem is compounded by the presence of decreased rectal sensation, allowing the progressive accumulation of stool in the rectum [36]. Fecal incontinence in diabetes mellitus occurs from autonomic neuropathy and is worse in the presence

Table 3
Etiology of fecal incontinence

Fecal impaction
Loss of normal continence mechanism
Local neuronal damage (eg, pudendal nerve)
Impaired neurologic control
Anorectal trauma/sphincter disruption
Problems overwhelming normal continence mechanism
Psychologic and behavioral problems
Severe depression
Dementia
Cerebrovascular disease
Neoplasm (rare)

of diabetic diarrhea [37]. Pelvic neuropathy may result from prolonged straining and birth trauma, causing anal sphincter disruption [38].

Evaluation of fecal incontinence

The goals in evaluating fecal incontinence include establishing the severity of incontinence, understanding the pathophysiology, and directing the patient to appropriate therapy. This is accomplished through history, physical examination, and investigations targeted at determining the etiology of fecal incontinence (outlined in Table 4).

History

Patients who have fecal incontinence usually do not volunteer information about incontinence unless asked by the physician [6]. This information is elicited best through direct questioning regarding bowel habit and continence. This is important especially in patients who have chronic diarrhea, fecal urgency, constipation, diabetes mellitus, urinary incontinence, recurrent urinary tract infections, or neuromuscular disease. It is helpful to identify when the symptoms first occurred and under what circumstances (eg, after surgery, stroke, or radiation). Noting the timing of incontinence compared with periods of continence, bowel movement frequency, stool consistency, stool volume, nocturnal symptoms, and the relationship to certain foods or meals may point toward underlying etiology. Determine if the patient has an awareness of the sensation of the passage of stool or gas, fullness in the rectum, or warning symptoms, such as abdominal cramps

Table 4
Evaluation of fecal incontinence

History
Chronic medical condition, such as diabetes, cerebrovascular accidents, cord compression, dementia, and depression or immobility
Obstetric injury at young age
Surgeries in the anorectal area—hemorrhoidectomy, sphincterotomy, fistulectomy, colon resection, and dilatation
Radiation to the prostate or cervix for carcinoma
Review of medications
Physical examination
Supplemented by Saint Louis University Mental Status examination or Mini–Mental State Examanination and geriatric depression scale
Neurologic examination
Rectal examination
Diagnostic tests
Plain abdominal radiograph
Sigmoidoscopy/colonoscopy
Anorectal manometry
Electromyography
Anal ultrasound or MRI

and urgency. Inquire about the home environment, which may reveal barriers to bathroom facilities.

In the evaluation of fecal incontinence, several components of the neurologic history deserve attention. A cerebrovascular accident may limit the patient's physical ability to use the toileting facility. The new onset of fecal incontinence also may herald the presence of cord compression, especially when associated with other neurologic symptoms. Chronic medical conditions, such as diabetes, may be a cause of neuropathy, contributing to incontinence. A good history of surgeries (such as anal surgery, including hemorrhoidectomy; anal fissure repair; and anal dilatation, which may disrupt the anal sphincter muscles, resulting in impaired continence [40]) is important. Patients who have total internal sphincterotomy have a 40% risk of fecal incontinence, whereas partial sphincterotomy carries a risk of 8% to 15% [41,42].

A thorough review of prescriptions, over-the-counter medicine, and supplements may reveal an underlying cause of altered bowel habit. Medicines causing diarrhea include magnesium-containing antacids and poorly absorbed sugars, such as sorbitol and mannitol (used in dietetic products). Sorbitol also is frequently used as a base in elixirs (eg, theophyline elixir). The intentional or inadvertent use of cathartics may contribute to diarrhea and incontinence.

Physical examination

The physical examination helps identify the pathophysiology of fecal incontinence and can guide the ordering of appropriate tests for further evaluation [43]. The neurologic examination includes assessment of general patient mobility, motor strength, and sensory testing. Stroking the skin lateral to the anal canal and observing the contraction elicit the anal wink. Absence of this reflex suggests significant neural damage. Anal gaping can be seen when the buttocks are parted in patients who have paraplegia [44]. Inspect the perineum for dermatitis, hemorrhoids, fistula, surgical scars, skin tags, rectal prolapse, soiling, and ballooning of the perineum (suggesting weakness of the pelvic floor). Inspect the anal area and perform a digital rectal examination. The positive predictive value of digital examination in experienced hands is 67% for detecting decreased anal tone compared with anal manometry. In patients who have lesions of the spinal cord or cauda equina, the sphincter tone may be normal, but when pressure is applied to any part of the anorectal ring, the phenomena of gaping can be seen. Findings in the normal elderly patient typically reveal lower anal canal pressures [46].

Diagnostic tests

Particularly in the elderly population, the first priority is to exclude fecal impaction; several tests are available [47]. In the absence of stool in the rectal vault, a higher impaction may be present. In the patient at risk, a plain abdominal radiograph is required to exclude high impaction. Using flexible sigmoidoscopy, examine the colorectal mucosa for evidence of colitis, neoplasia, inflammatory

bowel disease, colonic and rectal ischemia, laxative abuse, and other structural abnormalities. Patients who have a history of colorectal neoplasia, a positive family history of colon cancer, or iron deficiency anemia should undergo colonoscopy. Anorectal manometry provides comprehensive information regarding anorectal function, as it quantifies anal sphincter tone and assesses anorectal sensory responses, the rectoanal inhibitory reflex, and rectal compliance [48]. Anorectal manometry either gives new information or confirms a suspected diagnosis in patients who have fecal incontinence [49]. A lower rectal compliance may indicate fecal incontinence from increased stress on the continence mechanism as the stool is received in the rectum (ie, a stiff rectum does not accommodate the stool bolus, resulting in overflow) [50]. Electromyography

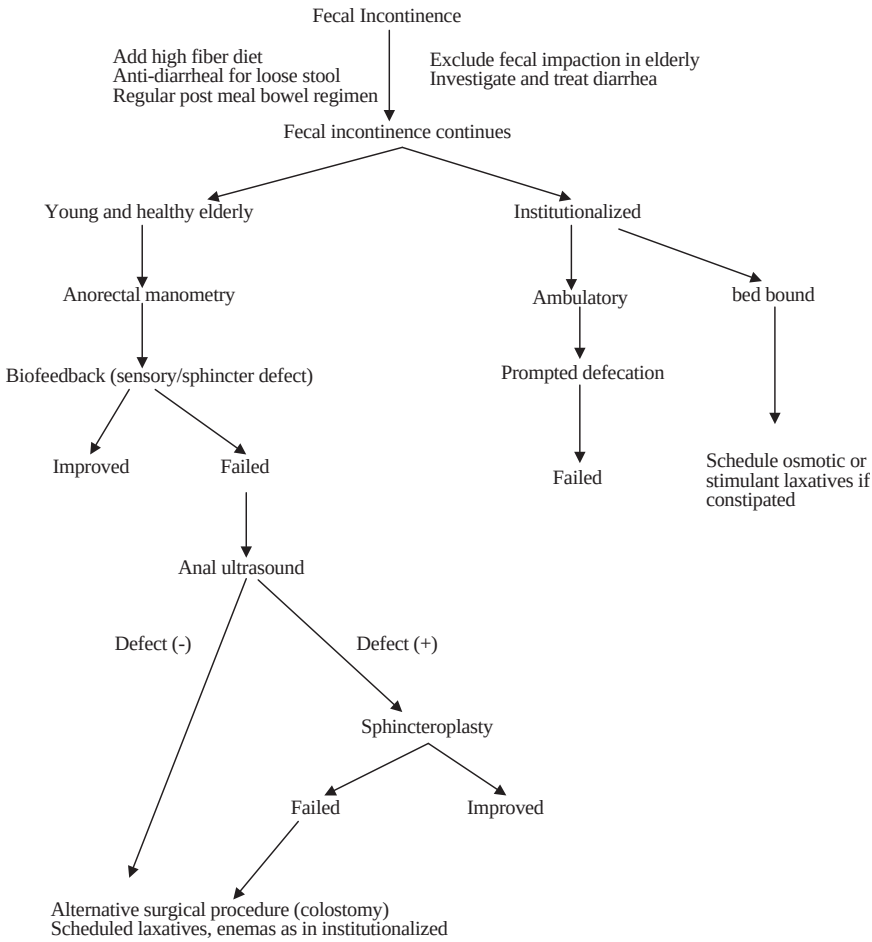

Fig. 1. Algorithm for the evaluation and treatment of fecal incontinence. (*From* Tariq SH, Prather CM, Morely JE. Fecal incontinence in the elderly patient. Am J Med 2003;115:217–26; with permission.)

measures the neuromuscular integrity between the distal portion of pudendal nerve and the anal sphincter muscle [51]. The use of electromyography in routine use of fecal incontinence is controversial but correlates well with anorectal manometry [47,52]. For sphincter defects, identification anal ultrasound or MRI can be used [53–56], although MRI provides higher spatial resolution and better contrast for lesion characterization [56]. Not all patients require each test. An algorithm outlining one possible management strategy is shown in Fig. 1 [98].

Treatment

Treatment of fecal incontinence depends on the underlying etiology and severity of the incontinence. Minor degrees of fecal incontinence can be treated conservatively, whereas patients who have severe fecal incontinence require more aggressive treatment.

Conservative therapy

Older persons who have dementia may need simply to be directed to the toilet or reminded of such use at regular intervals. Physical limitations and obstacles in the environment need to be addressed if they are contributing to incontinence, as they often can be overcome by simple measures, such as easier access to toileting facilities and assistance for those who require it with their activities of daily living.

Ambulatory older persons with fecal incontinence should be on supplemental fiber and a scheduled toileting program, especially after breakfast. If such persons are constipated for more than 2 or 3 days, regularly scheduled enemas or laxatives should be used. It is important to know the tone of the sphincter muscle; if it is low, then an enema or suppository might not be a good choice and, in such cases, osmotic laxative should be used orally. Habit training involves regular scheduled defecation and is effective particularly in patients who have overflow incontinence [57]. Prompted voiding is shown to reduce the number of incontinent bowel movements in a study [57]. Kegel exercises or sphincter training exercises alone do not work for fecal incontinence [58]. Chronic diabetic diarrhea may be associated with fecal incontinence, which is nocturnal in most cases. A trial of cholestyramine may be helpful if bile acid malabsorption is suspected. In cases where gut dysmotility is suspected, a trial of loperamide, clonidine, antibiotics, or octreotide may be used [99]. The side effects of oral clonidine should be kept in mind, such as orthostatic hypotension and mental status changes, which may limit its use. Clonidine, applied topically, may control diarrhea without hypotension and may be a good choice in elderly patients if used with caution [100]. Antidiarrheals, such as loperamide, are helpful when the stool is loose, after infectious or inflammatory causes are excluded [59]. Loperamide, codeine, or diphenoxylate with atropine reduce the stool frequency, but loperamide and codeine are more effective in reducing fecal incontinence compared with diphenoxylate. Central nervous system side effects are more common with

diphenoxylate and codeine than loperamide and generally are best avoided in older persons [60].

Biofeedback classically is described as a learning theory that incorporates operant conditioning as its theoretic basis. It is a nonsurgical, noninvasive, and relatively inexpensive outpatient method of treating fecal incontinence and was described by Engel et al [61,62]. Biofeedback results in improving the strength of external sphincter and sensation of the anorectum [58]. Biofeedback provides immediate and long-term improvement of fecal incontinence [63]. Biofeedback training helps the patient recognize small volumes of rectal distension and contract the external anal sphincter while simultaneously keeping intra-abdominal pressure low. A visual display helps the patient perform the exercises and verbal feedback helps master them. Table 5 shows the success rate, age range, and number of sessions involved in different studies. Better results are achieved in patients who are able to sense rectal sensation and contract the external anal sphincter muscle [64], are motivated, and are cognitively intact [64]. Miner et al [65] compared active sensory biofeedback with sham retraining. Active sensory biofeedback training reduced incontinent episodes from five to one per week in this study, whereas the sham group showed no change from the baseline. At 2 years' follow-up, 73% of the available studied population maintained the initial

Table 5
Success rate of biofeedback in different studies

Reference no.	Number of patients studied	Age range (mean)	Biofeedback sessions	Improvement
[64]	18	19–24	1/wk	88%
[82]	15	26–65 (39)	3 (1–7)	73%
[83]	113	25–88 (56)	3.34	71%
[84]	12	12–78	Av:1	80%
[62]	25	10–79 (48)	?	71%
[85]	28	30–74	?	75%
[86]	26	32–82 (61)	1–2/wk	64%
[87]	16	39–72 (60)	4-wk sessions	*
[88]	16	14–84	12 sessions	86%
[89]	8	35–78 (63)	3 sessions	*
[90]	116	33–85 (73)	2–11/wk	85%
[58]	25	17–76	3 sessions	73%
[58]	18	65–92 (15/3)	4.1 sessions	75%
[91]	22	15–78 (50)	2/wk	50%–100%?
[92]	30	29–85 (68)	6 sessions	67%
[93]	37	22–82	?	40%–60%
[94]	13	13–66	?	92%
[95]	50	6–97	?	72%
[96]	14	24–75	?	85%
[97]	100	14–82	?	67%

Abbreviations: F, Female; M, Male; ?, not reported.

* No improvement at 3 months.

improvement. Whitehead et al studied a geriatric population (mean age 73.3) who were treated initially for fecal impaction, but 13 patients continued to be incontinent. These patients were treated with biofeedback (two had dementia, three had significant depression, three were wheelchair dependent, one used a cane, and the others were able to walk a few steps), which improved sphincter strength and reduced incontinence episodes by more than 75%. This improvement was seen in 60% at 6 months and 42% at 1 year [58]. A critical review of biofeedback by Enck also showed improved continence in 13 of 14 studies [66]. More recently, Norton and Kamm reviewed 46 studies involving the use of biofeedback for fecal incontinence in 1364 patients (76% female). Less than 20% of these studies used randomization and most involved relatively small numbers of subjects. Improvement in continence occurred in at least one half of the patients. No specific details regarding age-related differences were noted [67]. A small pilot study and crossover trial (with randomized controls), using biofeedback for fecal incontinence in nursing homes (average age 83), showed improvement in manometric pressures, such as maximum resting pressure, squeeze pressure, and squeeze duration. There also was a decrease in the incontinent episodes in the treatment group compared with the pelvic exercises group [4].

Surgical therapy

Surgical intervention generally is considered when more conservative measures fail in patients who have severe incontinence and identifiable anatomic defects. Although surgery is recommended more commonly in younger patients, appropriately selected elderly patients, especially those who have isolated sphincter defects, fare well with surgical intervention [68].

Sphincter repair

Anterior sphincteroplasty is most successful in cases of isolated sphincter defect [69,70]. Improvement in anal function has been demonstrated by anal manometry before and after anterior sphincter repair [71]. There is a 96% improvement in anal function compared with preoperative symptoms (all women ages 22 to 75, mean age 37.8). The outcome of surgical repair is variable—some patients may continue to have incontinence and others develop new bowel problems postoperatively [70].

Neosphincter operations

Muscle transposition may be considered for severe fecal incontinence when standard therapy fails. Techniques include graciloplasty, dynamic graciloplasty, and gluteus maximus transposition. The result of graciloplasty varies significantly [72,73]. Graciloplasty provides success by tightening the anal canal, resulting in anal obstruction [72]. The result of graciloplasty is improved by electrical stimulation after the implantation of electrical electrodes and a pulse generator [74]. Electrical stimulation provides the gracilis muscle with the properties to function as a sphincter [75]. Madoff et al, in a prospective multicenter trial,

showed that 66% of patients who had graciloplasty achieved continence in a follow-up of 2 years [76]. The performance of graciloplasty specifically in the elderly population has not been reported.

Alternative therapies

Newer techniques have been developed for the treatment of fecal incontinence, but these procedures are described predominantly in younger age groups. The efficacy of these techniques is not known in older persons. In a multicenter prospective trial of 12 patients who failed conventional management for severe fecal incontinence and had an artificial anal sphincter implanted [77], a successful outcome was achieved in 75% of the patients (mean age 33). In patients who have internal sphincter dysfunction, injections of glutaraldehyde cross-linked collagen is a simple and well-tolerated procedure. In a small study of 17 patients (mean age 53), 65% of patients had symptomatic improvement, 12% had minimal improvement, and 18% had no improvement [78].

Sacral nerve stimulation for fecal incontinence is shown to improve fecal continence and improved quality of life in selected patients [79]. In a non-randomized study, the application of radiofrequency energy to the sphincter may improve continence and quality of life [80]. Finally, for severe fecal incontinence, when all other procedures fail, a diverting colostomy usually is the surgical procedure of choice [81].

Summary

Fecal incontinence is a common problem in the elderly population, particularly in nursing homes, and is one of the common reasons for nursing home placement. In addition to the inconvenience of the incontinence for the patient and caregiver, it is associated with increased mortality. Identifiable physiologic changes in the anorectal region may contribute to the development of fecal incontinence. Fecal incontinence is a disorder of men and women, with an equal or greater prevalence in men in advancing years. All patients who have fecal incontinence warrant an initial medical evaluation, including the exclusion of fecal impaction. Cognitively impaired patients benefit most from habit training. Selected elderly patients who have fecal incontinence may benefit from biofeedback and surgical intervention.

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