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Clinical assessment, conservative management, specialized diagnostic testing, and quality of life for fecal incontinence: Update on research and practice recommendations

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ABSTRACT

Aims: To summarize recent evidence and practice recommendations from a literature review of the clinical assessment, conservative management, specialized diagnostic testing, and quality of life related to fecal incontinence.

Methods: Medline, PUBMED, CINAHL, and EMBASE literature databases were searched from 2016 to the end of 2020 for English language publications. Study abstracts and relevant full-text articles were retrieved and reviewed. Reference lists from articles were examined for additional studies. Recommendations for practice were made following procedures of the International Continence Society and International Consultation on Incontinence.

Results: New evidence was identified for the following topics related to FI assessment and conservative interventions: clinical assessment, patient education, diet, dietary fiber, and fluid modifications, anti-motility medications, weight loss and physical activity, PFMT, trans-anal irrigation, biofeedback, and specialized diagnostic testing as well as effects of FI on quality of life. Recommendations for practice were reviewed and updated as appropriate based on the new evidence.

Conclusions: Research examining FI assessment and conservative interventions continues to grow. Some topics in this area are understudied or in need of studies with strong, randomized, controlled designs. The results of this review serve as a summary of the state of the science and can direct future research directions.

Contents

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1. Introduction

Conservative management of fecal incontinence (FI), the leakage of feces from the rectum, can be a long-term process as there is no cure. FI adversely impacts numerous aspects of quality of life including emotional and psychological well-being, social relationships, participation in public activities, and work. More than half of patients will have a positive response to conservative therapies [1,2]. Reduction of the severity of symptoms of FI can improve quality of life and be satisfactory to many individuals [3,4]. The conservative approach to manage FI includes a clinical assessment, a management plan that considers a patient's goals for improvement, ongoing support for patient self-management, and periodic followup by a knowledgeable clinician [5]. Initial conservative interventions include lifestyle modifications, medications, rectal emptying including trans-anal irrigation, and pelvic floor muscle therapy. Secondary interventions that can be added or used in place of initial strategies when they are insufficient are behavioral therapies such as biofeedback, and electrical stimulation. Exceptions to trialing conservative management are conditions that require timely surgical intervention (e.g., recto-vaginal fistula) or other treatments (e.g., cancer) [5,6]. For some persons including those who do not experience improvement with conservative management, specialized diagnostic testing will assist in determining the need for tertiary interventions such as surgery [5].

The purpose of this paper is to summarize the background, current research evidence, and practice recommendations regarding the clinical assessment, conservative management, specialized diagnostic testing, and quality of life related to FI that were reviewed in chapter 19 of the 7th edition of *Incontinence* [5]. While absorbent products are often used along with these conservative interventions, they were included in a separate review because their purpose is to contain fecal leakage rather than reduce it [7]. Evidence was obtained from a search and review of the literature and graded following procedures of the International Continence Society and International Consultation on Incontinence [5].

2. Methods

Medline, PUBMED, CINAHL, and EMBASE literature databases were searched from 2016 to the end of 2020 for English language publications. Search strategies were developed for specific topics and a reference librarian assisted for topics with a historically limited body of evidence, e.g., lifestyle modifications. Searches included variations in terms and spellings used in different countries and a wide range of research designs. Duplicate citations were removed and abstracts and relevant full-text articles were retrieved and reviewed. Reference lists from articles were examined for additional studies. Inter-library loans were used to obtain copies of pertinent articles as needed. It is noted that some studies reported on anal incontinence as an outcome, which includes the leakage of flatus or mucus as well as feces, and that quality of life information is from qualitative research primarily. Recommendations for practice from the 6th International Consultation on Incontinence [8] were re-evaluated using the information obtained from studies in this review and were updated as appropriate.

3. Results

3.1. Clinical assessment

An initial, comprehensive clinical assessment of FI is essential for successful management. The clinical assessment includes a focused health history and physical examination, review of diet, medications (prescribed and over-the-counter), and dietary supplements or complementary therapies used, and discussion of the impact of FI on quality of life and self-management strategies that seem helpful. The ultimate aims of a focused history and examination are to identify factors or conditions that are modifiable through treatment and to characterize symptoms so that changes can be monitored. There are approximately 20 scales for quantifying the severity of anal incontinence (AI) symptoms. Most have been employed in research, and only a few are commonly used in practice.

A focused health history includes systemic comorbidities (e.g., diabetes mellitus, irritable bowel syndrome, and stroke) and local factors (e.g., surgery or obstetrical or other trauma to the anal sphincter or nerves of the pelvic floor, and pelvic radiation) potentially associated with an etiology of FI. The history taker asks about the patient's bowel elimination pattern, characteristics/symptoms of FI (such as frequency, consistency, amount and timing of fecal leakage). Inquiring about leakage that is passive or associated with flatus, urgency, or limitations in mobility, toileting and cognition will identify subtypes of FI and direct therapy. This information is optimally obtained using a prospective bowel diary [9–11]. A diet record reported during the same time as a bowel diary can be helpful in identifying foods or fluids that trigger FI. Other questions in a focused history assess the co-presence of urine leakage as well as medications and dietary supplements that may have side effects that worsen FI.

The focused physical exam [10–12] consists of inspection and palpation of the perianal area for scars or absence of the perineal body from previous surgery, obstetric injury or other trauma; perianal disease such as prolapsing hemorrhoids, fistula, or anal warts; and signs of perineal irritant contact dermatitis due to fecal leakage (redness, skin loss, or rash). Inspection should also include assessment of underclothing for soiling and staining by feces. A digital rectal exam is performed to assess rectal contents, any masses, and the function, quality, and possible defects of the internal and external rectal sphincters and puborectalis muscle including voluntary and involuntary (e.g., during cough or Valsalva maneuver) squeeze pressure.

Recent evidence

Recent evidence supports earlier observations [8] that clinicians who are experienced in conducting a digital rectal examination can reliably assess resting and squeeze strength of the anal sphincter [13]. A new electronic bowel diary used on a mobile phone was acceptable and even preferred by some women over a one on paper [14]. FI data reported on the electronic and paper diaries had a good correlation [14]. Following this review, an ICS task force published a consensus paper about standard questions to use on a bowel diary for assessing FI, which have been lacking [15]. Two new AI severity scales were identified: the

Accidental Bowel Leakage Evaluation [16], which has 18 questions, and the Rapid Assessment Fecal Incontinence Score (RAFIS) [17] that asks about the type of leakage, frequency severity, and impact on lifestyle.

4. Initial conservative management

4.1. Patient education

Educating the patient (and a family caregiver as appropriate) about their FI condition, treatment plan, and recommended self-management activities is a fundamental component of conservative management of FI [5]. Patient teaching can be conducted in-person or remotely by video on a computer or mobile phone. Supplemental information can be provided via hard copy or online modules. The most effective approaches for educating patients about FI and its management have yet to be identified. Patient education can include practical tips for self-management and coping. These tips include providing information about foods that commonly exacerbate FI symptoms to avoid, developing a regular schedule of daily activities to try and achieve a regular bowel elimination pattern, how to locate toilets in public areas ahead of time, and types of absorbent products [18–23].

Recent evidence

Results of a four-arm randomized controlled trial (RCT) in which the group receiving a patient education pamphlet and oral placebo showed no significant difference in FI improvement compared to the other interventions which included an anti-motility medication or biofeedback with and without patient education [24]. An evaluation of information about FI on the internet and social media showed that an abundance of information is available making it difficult to sort through and assess. The quality of information identified varied by the search term. For example, searching "fecal incontinence" resulted in higher quality information than "accidental bowel leakage" [25,26]. However, past studies have shown that many patients are unfamiliar with the term fecal incontinence [20,27,28]. Patients and their caregivers often rely on their healthcare providers for accurate information [20,29].

No studies evaluating the method of delivery or content of patient education about FI were identified.

4.2. Lifestyle modifications

Lifestyle modifications are part of the initial conservative management of many chronic health conditions including FI. Lifestyle modifications that have been investigated to lessen FI include diet and fluid modification, dietary fiber supplementation or a high fiber diet, a diet low in fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs), achieving a regular bowel habit or pattern, weight loss, and physical activity.

Diet and fluid intake

Avoiding or restricting the intake of foods or fluids that worsen FI severity periodically or permanently is a common lifestyle modification, with more women than men engaging in this strategy [30,31]. Foods identified as worsening FI, from several observational studies with different types of patient samples, include certain vegetables especially those increasing flatus (such as cabbage, broccoli, onions, and garlic), fruits (such as strawberries and apricots), fatty/greasy or spicy foods (spare ribs, peppery ethnic foods), foods and fluids containing caffeine (such as coffee and chocolate), and dairy products (ice cream, cream, cheese) [31–33]. Supplementation with psyllium fiber has been shown to decrease the frequency and overall severity of FI in randomized clinical trials [34–36]. Mechanisms underlying the effects of dietary fiber were formation of a gel of undigested fiber and fecal water in feces and increased water-holding capacity of undigested fecal solids [34,36–38]. Examples of FODMAPs are sorbitol, fructose, and lactose [39]. Foods containing FODMAPS may be poorly digested or absorbed increasing the volume of liquid and gas in the intestines, which could worsen FI.

Weight loss can reduce urinary incontinence (UI) [40]; hence, weight loss has been investigated as a strategy to reduce FI. However, associations between FI and weight loss, from dieting programs [41–44] or after bariatric surgery [8], have been mixed. Physical activity is a risk for stress UI in women [45] yet a sedentary lifestyle is associated with UI in older adults [46,47]. The association of physical activity and FI is an area of investigation.

Recent evidence

Two observational studies reported differences in diet or fluid intake between those with and without FI. Japanese women with FI had higher intakes of wheat products, fruits, and dietary fiber snacks and lower intake of rice compared to women without FI who completed a national survey about diet [48]. Women with FI in the US had lesser water intake and greater carbonated beverage intake compared to women without FI. There were no significant differences in caffeine, alcohol, juice, or milk intake between the groups [49].

A study of older (mean age = 73 years) female nurses in the US reported that higher dietary fiber intake was associated with a lower risk of FI. Women with dietary fiber intake in the highest quintile (25 g/d) had a significant decrease in risk of FI of 18% compared to fiber intake in the lowest quintile (13.5 g/d) (HR = 0.82, 95% CI (0.76–0.89)) [50]. Consuming a supplement of methylcellulose fiber (500 mg every 8 h) along with dietary advice for 6 weeks was associated with lower AI severity (per St. Mark's score) and firmer stool consistency compared to baseline [51]. The fiber supplement had no effect on defecation urgency. A retrospective review of health records of women with FI showed that a low FODMAP diet was associated with a reduction in FI symptoms in 64.6% (42/65) of patients [52].

Weight loss and physical activity

The association between FI and weight loss, either from dieting or after bariatric surgery, has been inconclusive, and recent studies have not provided definitive evidence to recommend this lifestyle change except for general health reasons. One large observational study of >50,000 female nurses showed no significant association between body mass index (BMI) and FI after examining the development of FI at two time points two years apart [53]. On the other hand, two studies comparing FI in obese patients awaiting bariatric surgery with case-matched non-obese control patients showed a higher percentage of obese patients with FI [54,55]. In one of the studies, 21% of obese patients had FI versus 7.7% of controls ($p = .01$) [54].

Regarding weight loss after bariatric surgery, two studies examining AI in obese patients before and 12–15 months after bariatric surgery showed no significant difference in AI despite an average weight loss of approximately 10 kg [56,57]. In one of the studies, the median AI score (per the Vaizey scale) was 4 (IQR 4–4)) both before and after surgery ($p = 0.1$), and the prevalence of AI actually increased from 12.8% preoperatively to 24.4% postoperatively (24.4%) [57]. Two meta-analysis of the effects of bariatric surgery (one of 11 studies and the other of 9 studies) concluded that there was no significant decrease in AI despite postoperative weight loss [58,59].

There was one study about the risk FI among four levels of physical activity in a large cohort of female nurses [53]. A modest reduction (25%) in the risk of FI was seen with increased physical activity. The hazard ratio (95% CI) for FI in the group with the highest level of activity was 0.86 (0.80–0.93), and in the group with the lowest level of physical activity, it was 0.75 (0.70–0.81).

Medications

Loperamide [35,60,61] and cholestyramine [62,63] are common medications used to manage FI. Loperamide is a synthetic mu-opioid receptor agonist that slows gut transit, increases fluid reabsorption and reduces secretion, and increases anal sphincter tone and resting anal pressure [64]. Cholestyramine is an anion exchange resin and bile acid sequestrant; it exchanges its chloride anions with anionic bile acids present in the gastrointestinal tract [65]. A common side effect of loperamide and cholestyramine is constipation. Loperamide overdose

can be cardiotoxic, and cholestyramine overdose can result in bowel obstruction [64,65].

Loperamide is widely used, and its effects on FI have been examined with and without other conservative interventions [35,60,61]. In some studies, there was no significant difference in FI in the group taking loperamide compared to dietary fiber supplements [35,61]. In one study, taking loperamide along with a low dose psyllium supplement (2 teaspoons/d) and dietary advice resulted in no difference/additional benefit of the psyllium supplement compared to loperamide, dietary advice, and a placebo supplement [60]. Cholestyramine taken along with performing biofeedback reduced FI more than biofeedback alone [62].

Recent evidence

There were three analyses of loperamide from data of one RCT by Jelovsek et al. [66] using a 2 × 2 factorial design comparing four interventions for FI. The interventions were receiving an educational pamphlet and oral placebo (considered the control group), biofeedback exercises assisted by ano-rectal manometry (BF) and oral placebo, loperamide, BF and educational pamphlet, or BF and loperamide. Because all groups improved and there was no significant difference in FI among them, investigators concluded there was no benefit of combining loperamide with biofeedback or education compared to using the therapies alone. Another analysis showed there was no significant difference in the side effect of constipation among the intervention groups. Thirdly, being overweight and having a higher baseline severity of FI improved the clinical response to loperamide.

There were no recent studies examining the effects of cholestyramine on FI.

Rectal emptying and trans-anal irrigation

Emptying the rectum of feces in between bowel movements aims to remove rectal contents and reduce the risk of leakage. Techniques to empty the rectum are using trans-anal (i.e., retrograde) irrigation systems, small enemas, suppositories, laxatives, and digital rectal stimulation and manual evacuation.

Trans-anal irrigation (TAI) has been the technique with the most recent research. TAI involves installation of water through the anus using a catheter or cone-shaped adapter to rinse the rectum of its contents after which the patient defecates or the fluid drains into the toilet. Typically the patient performs the procedure while sitting on the toilet. Quasi-experimental and observational studies have reported decrease in FI after TAI [8,15]. Patients with neurogenic or passive FI had initially used TAI, but those with FI due to other causes or who do not respond to initial conservative therapies also use it. Development of smaller systems and addition of pumps for instilling the irrigation fluid has increased the convenience of TAI.

Recent evidence

Of two recent studies about TAI, one examined its efficacy and the other adherence to the procedure [67,68]. In a study of 216 patients with AI or constipation who had not responded to other conservative therapies, there was decrease in AI severity after use of TAI for 12 months. AI severity per the Wexner score decreased from 12.4 at baseline to 10.2 at the one year follow-up ($p < 0.001$) and per the St. Marks score it decreased from 14.9 at baseline to 12.7 at followup ($p < 0.001$). Quality of life and general satisfaction with bowel function also increased [67]. Adherence to TAI for one year by patients with FI or constipation was 43% (48/108), and among those with AI it was 54.5%. The main reasons for discontinuing TAI were lack of its efficacy (41% of patients) and time spent performing the procedure (23%). Other reasons included technical problems such as catheter expulsion or leaking of instilled water, pain during irrigation, anal bleeding, and developing an anal fissure.

There were no studies evaluating the use of small enemas, suppositories, laxatives, or manual evacuation/stimulation for emptying the rectum.

Pelvic floor muscle therapy

Pelvic floor muscle therapy (PFMT) uses a set of exercises in which voluntary pelvic floor and anal sphincter muscles are contracted, held, and relaxed with the aim of improving muscle strength, tone, endurance, and coordination to increase control over fecal leakage. PFMT can be done with and without clinical supervision or BF. PFMT had been recommended as a secondary conservative intervention due to the mixed results of its effectiveness for FI [8], but recent evidence and a low risk of complications has supported its use as an initial intervention.

Recent evidence

There were two RCTs evaluating supervised PFMT [69,70]. In one study, a PFMT group received PFMT supervised by a physiotherapist, and an attention control group received massage of the neck and back. The PFMT program consisted of 3 sets of 10 pelvic floor muscle contractions sustained for up to 10 s and 2 sets of 3 contractions sustained for up to 30 s and progressed on an individual basis. Both treatments were given in six sessions over 16 weeks and included other conservative therapies that were not identified. The supervised PFMT group had a larger mean reduction of the Vaizey scale score of AI severity (−1.83 points; 95% CI, −3.57 to −0.08; $p = .04$) compared with the control group [69]. The PFMT group had a five-fold higher odds of self-reported improvement in AI symptoms, using the subjective Patient Global Impression of Improvement Scale. However, frequency of AI did not decrease.

In the second study of women with obstetrical anal sphincter injury, the intervention group received 6 months of individual PFMT led by a physiotherapist and the control group received written information on PFMT [70]. AI severity measured by St. Mark's score before and after the interventions was significantly reduced in both groups (PFMT group = 5.4 (3.6) before vs 3.3 (3.5) after, and control group = 5.0 (3.2) before vs 4.2 (3.4) after (mean (sd)), and there was no significant difference between the two groups. However, the investigators considered only the reduction of 2.1 points in the PFMT group as clinically significant.

In a RCT, women with urinary and fecal incontinence received combination conservative therapy or were wait-listed [71]. Combination therapy included PFMT (relaxation, contraction, endurance, and coordination components), dietary changes to optimize stool consistency, and patient education about optimal defecatory position over three sessions of two hours each. FI decreased in 55% of the combination therapy group compared to 27% in the wait-listed group ($p < .005$).

5. Secondary conservative interventions

5.1. Behavioral therapies

Behavioral therapies, biofeedback and electrical stimulation, are secondary interventions for FI due to the lack of robust evidence from RCTs of their efficacy. Biofeedback uses electronic or mechanical devices to augment and increase patient awareness of intrinsic sensory information. Biofeedback is used to inform patients how well they are contracting and relaxing their pelvic floor muscles during PFMT, recognize sensations associated with the movement of stool into the rectum, improve coordination of the contraction of pelvic floor muscles in response to rectal distention, or develop resistance to high defecation urgency. Biofeedback is used alone or in conjuction with PFMT, other conservative therapies, electrical stimulation or after surgery. Electrical stimulation provides electrical current of various intensities to muscles or nerves involved in defecation and continence using electrodes or probes. The basis of electrical stimulation is to enhance contraction of pelvic floor or sphincter muscles or increase sprouting of nerve synapses peripherally or the size of the receptive fields for nerves in the brain [72].

Recent evidence

In the RCT by Jelovsek et al. [66] described above, there was no significant difference in AI outcomes among groups receiving biofeedback, loperamide or patient education. In another RCT, patients who had surgical repair of trauma after childbirth performed biofeedback for 3 months before and 6 months after surgery, only for 6 months after surgery, or not at all [73]. The severity of AI measured by the Wexner score significantly decreased after surgery only in the group not receiving biofeedback. There was no difference in preoperative and postoperative anorectal manometry measures among the groups.

In comparing different regimens of biofeedback therapy without a control group, one study compared 4 biofeedback regimens (with varying face-to-face and telephone contacts) in addition to standardized counseling and education, dietary modification, and anti-diarrheal medications [74]. There were no differences in AI among the groups. All groups had significant improvements in AI measured by St Mark's score. Another study showed no significance difference in AI and anal sphincter squeeze pressures between patients randomly assigned to biofeedback therapy training at home or in the office [69]. Both groups improved.

No new studies evaluating the effects of electrical stimulation on FI were identified.

6. Quality of life and environmental resources

Living with FI negatively impacts multiple aspects of quality of life including personal and social relationships, interactions with healthcare clinicians, time and planning, bodily symptoms, self-esteem, and body image, sexuality, and diet and eating patterns. Some patients develop self-management routines and alter their food preparation and eating patterns to increase their sense of self-control and coping and lessen FI symptoms, while others lower expectations in resignation to the problem. Women describe making tradeoffs of restricting intake of aggravating foods versus periodically enjoying foods and dealing with the consequences of FI. Women have reported the importance of receiving empathy and emotional support from healthcare providers when discussing their FI [8]. Lack of such support discourages further help-seeking and confidence in their healthcare provider.

Recent evidence

Women who developed FI following obstetric anal sphincter injury (OASI) described numerous feelings that have been reported in earlier studies including feeling unclean, isolated/alone, guilty or embarrassed, and diminished confidence and dignity. They kept FI a secret, had employment concerns, and feared being incontinent during sexual intercourse. This study also revealed that developing FI caused some women to feel a failure as a mother [75].

Community-living women with FI described 12 barriers to seeking care for FI that had three overarching themes: (1) the internalized self in relation to FI (e.g., embarrassment, denial), (2) perceptions about FI and its treatment (e.g., lack of knowledge about FI and its treatment and fear of an unwanted diagnosis), and (3) interaction with the health care system (e.g., negative experiences with providers and inconvenient access to care) [76]. A group of patients with FI and health care providers identified reasons that encouraged patients to seek treatment for FI: the negative impact on quality of life, activities, personal hygiene, work productivity, and psychological well-being, opportunity and motivation to participate in new treatments, and satisfaction with available treatment options [29]. In a study of older (aged 65+ years) women with FI [32], the participants' responses supported earlier reports [31,33] of modifying their diet and food preparation as an approach to lessen FI. They also tried to balance between restricting intake of and eating desired foods that worsened FI.

Knowing the location of public toilets is a self-management and coping strategy of persons with FI facilitating activity outside the home. Two studies using geographic information system methods mapped the location, distribution, and density of public toilets in open spaces in major international and US cities [77,78]. These results call attention to the positive role that environmental resources and urban planning can have in promoting FI self-management and quality of life, and they encourage patient education about this practical coping tip.

7. Specialized diagnostic testing

Specialized diagnostic testing is indicated when initial conservative management of FI fails to improve symptoms sufficiently or as a workup for possible surgery. Specialized diagnostic testing for FI utilizes anorectal function tests, endoanal ultrasonography, defecography, or magnetic resonance imaging.

7.1. Anorectal function tests

Anorectal function tests (AFTs) include anorectal manometry (ARM), the rectal sensory test (RST) and the balloon expulsion test (BET). These tests are typically used to evaluate rectoanal sensorimotor function, functional anorectal pain, preoperative anorectal function in patients with incontinence or evacuatory pain symptoms. Investigation may also be performed following obstetric anal sphincter injury or preoperatively when planning surgery that may impact the continence mechanism (e.g. sphincter repair, fistulectomy, rectopexy) [79]. High-resolution and high-definition ARM are now available, which can capture data simultaneously from the entire length of the anal canal and distal rectum [80,81]. In general, assessments should be performed with catheters that incorporate sensors spaced <5 mm apart, measure circumferential (versus unidirectional pressure) and record over a length of at least 6 cm, [81–83].

7.2. Endoanal ultrasound

Endoanal ultrasound (EAUS) or three-dimensional (3D) EAUS is used during the evaluation of anal sphincter injury, anal fistulae, and rectal prolapse and at times following their surgical treatments and in use of intersphincteric bulking agents or implants. EAUS is the gold standard investigation to identify anal sphincter injury recommended by the International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report [84]. EAUS can differentiate between intact anal sphincters and sphincter lesions (defects, scarring, thinning, thickening, and atrophy) due to vaginal delivery or anal surgery (e.g., fistula surgery, hemorrhoidectomy, or sphincterotomy) [84,85]. 3D-EAUS is also accepted for sphincter evaluation in FI. 3D-EAUS enables measurement of length, thickness, and the area of sphincter defect in the sagittal and coronal planes in addition to the volume of sphincter damage [86].

7.3. Defecography

Defecography under fluoroscopy is the radiological assessment of the voluntary rectal evacuation of semi-solid contrast material, providing information on static and dynamic anorectal structure and function. Defecography can be useful in the diagnosis and management of FI by measuring perineal descent and the anorectal angle, and leakage of contrast material and diagnosing rectal intussusception and rectocele. Defecography was not included as a diagnostic examination for FI in the guidelines of the American Society of Colon and Rectal Surgeons in 2015 [9] or of the American College of Gastroenterology in 2014 [10]. However, it was incorporated into the algorithm of surgery for FI by the 6th International Consultation on Incontinence in 2017 [87] due to the increase in its use in diagnosing rectal intussusception and complicated rectocele since the advent of laparoscopic ventral rectopexy [88–90] and is now part of the American College of Gastroenterology's 2021 guidelines [91].

7.4. Magnetic resonance imaging

Magnetic resonance defecography (MRD), also termed dynamic MRI, is a non-ionizing radiation technique that can also provide information about anorectal structure and function. Its advantages over conventional fluoroscopic defecography are avoidance of radiation exposure and ability to evaluate other pelvic organs (e.g., vagina, uterus, bladder) [92–94]. Its disadvantages are that it is usually performed in the supine position and its expense.

Anal (or static) MRI provides detailed information of the anal sphincters and pelvic floor anatomy [95,96]. It can be used to detect injuries of internal and external anal sphincters. Anal MRI has higher accuracy in identifying atrophy of the external sphincter compared with EAUS [97,98]. Experience with MRI for FI is less than EAUS because of its availability and few radiologists in this field. Thus, the role of MRI for the assessment of FI is limited in clinical practice and behind EAUS for the evaluation of anal sphincter integrity [99,100]. It is particularly useful in special situations where anorectal anatomy is complex or malformed [101].

7.5. Recent evidence

AFTs

ARM, RST, and the BET should be performed as a group of complimentary investigations [79]. If resources allow, fluoroscopic defecography or MRD defecography can substitute for the BET. Recommendations for the performance and interpretation of AFTs were developed by the International Anorectal Physiology Working Group in 2019 [102]. The resultant London Classification is a diagnostic algorithm that uses the combined findings of AFTs to describe and attribute the likely impact of the results on symptoms. The classification is divided into four parts: (1) disorders of the rectoanal inhibitory reflex, (2) disorders of anal tone and contractility, (3) disorders of rectoanal coordination, and (4) disorders of rectal sensation [102]. Studies suggest that high resolution ARM measurements may improve diagnosis compared to conventional ones [82,103], but specific high resolution ARM metrics have not yet been incorporated into the recommended analysis methods.

EAUS

EAUS allows a significantly better detection of symptomatic OASI compared to clinical examination alone [104]. 3D-EAUS remains the most accurate diagnostic imaging modality for diagnosis and classification of sphincter defects after childbirth [105]. 3D-EAUS can detect small sphincter defects that otherwise would have gone unnoticed, as approximately one-third of patients with OASI are asymptomatic [105]. Imaging has a crucial role in the management of OASIs. In a study by Faltin et al. [106], when primary repair was performed after EAUS assessment, it was associated with a reduction in severe FI. EAUS also has a role in the evaluation of persistent sphincter defects after repair and in the decision of mode of birthing subsequent pregnancies [107]. Ultrasound assessment can also be useful in the selection of patients who might benefit from rehabilitation.

3D-EAUS accurately and reproducibly assessed the type and height of anal fistulae, reducing the potential risk of FI and recurrence associated with the surgical treatment [108]. EAUS has a role in grading anal sphincter integrity in rectal prolapse preoperatively and in predicting improvement in FI after surgical repair [109]. 3D-EAUS is useful before and after post intersphincteric bulking agents or implants to treat FI. The use of 3D-EAUS prior to these procedures is recommended for patient selection and to exclude conditions that may negatively affect outcomes. Postoperatively, 3D-EAUS has been used to demonstrate the normal localization or displacement of the prosthesis [110–112]. Meta-regression revealed that implants intact on EAUS postoperatively were predictive of greater improvement in FI [110].

Defecography

The Pelvic Floor Consortium of the American Society of Colon and Rectal Surgeons and other five societies published "Consensus Definition and Interpretation Templates for Fluoroscopic Imaging of Defaecatory Pelvic Floor Disorders" [113]. There were two studies (one for sacral nerve stimulation [114], and the other for laparoscopic ventral rectopexy [89] that reported that preoperative defecography predicted the outcomes of surgery for FI. A meta-analysis showed that MRD had a lower detection rate than fluoroscopic defecography for rectocele and rectoanal intussusception [115]. A structured template for reporting the results of MRD was recommended by the Society of Abdominal Radiology Pelvic Floor Dysfunction Disease Focused Panel [116].

MRI

A consensus report was published by the International Urogynecological Association (IUGA) and the International Continence Society (ICS) to standardize terminology for female anorectal dysfunction [95]. This report included terminology of MRI for anal sphincters and the pelvic floor. A consensus on MRI protocols was reported by the pelvic floor-imaging working group of the European Society of Urogenital Radiology (ESUR) and the European Society of Gastrointestinal and Abdominal Radiology (ESGAR) [117]. It contains recommendations to standardize indications, patient preparation, sequences acquisition, interpretation and reporting of MRI for diagnosis and grading pelvic floor disorders.

8. Summary and conclusions

Recent studies regarding the assessment and conservative management of FI and related quality of life were reviewed. New evidence was identified for topics related to clinical assessment of FI, patient education, diet, dietary fiber, and fluid modifications, anti-motility medications, weight loss and physical activity, PFMT, trans-anal irrigation, biofeedback and specialized diagnostic testing as well as effects of FI on quality of life. Results of recent qualitative studies are consistent with previous findings about the embarrassment, negative impact of FI on quality of life, daily activities, mental health, use of diet and eating pattern modifications as a self-management strategy and need for better patient literacy about FI and its management. Studies revealed the interference of FI on the maternal role and raised awareness of the role of environmental resources (i.e., public toilets) in promoting FI self-management.

Table 1 summarizes the current recommendations for practice, which were updated as appropriate based on this new evidence, and lists the grade of recommendation [118]. The intervention of dietary fiber supplementation has an A grade recommendation, i.e., supported by RCTs. PFMT is now recommended as an initial intervention for FI. Evidence for weight loss is mixed; hence no conclusive recommendation is possible. A RCT trial showed improvement in FI after taking an anti-motility medication, performing biofeedback, and receiving patient education without any significant difference among the interventions. Biofeedback supervised by a physiotherapist shows some promise for good outcomes. There have been advances in specialized testing for diagnosing causes of FI that are suitable for surgical repair. While some topics related to assessment, diagnosis and conservative interventions are in need of additional evidence and studies with strong designs, such as randomized, controlled trials, this review shows that the evidence base for assessing, diagnosing and managing FI continues to grow. The results of this review summarize the state of the science and reveal future research needs.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: DZ Bliss is on the editorial board of Continence. EV Carrington has received honoraria for teaching and education from Laborie.

Table 1
Practice recommendations for assessment and conservative management of fecal incontinence.

Clinical Assessment

- Focused history (Grade of Recommendation* = C)
  - Bowel elimination pattern and FI episodes/characteristics using a bowel diary
  - Modifiable risk factors
  - Diet and fluid intake and association with FI
  - Medications, supplements, complementary therapies
  - Toileting ability, mobility, cognition limitations
  - Impact on quality of life
- Focused Physical Exam (C)
  - Inspection of perineal area
  - Palpation of perineal area
  - Digital rectal exam

Initial Conservative Interventions

- Education of patient and/or caregiver as part of self-management support (B/C*)
  - Normal bowel function and elimination and FI alterations
  - Response to foods and fluids, and eating patterns
  - Practical tips (locating toilets, developing regular bowel elimination habits, absorbent products, skin care) and coping skills
- Diet and fluid modifications (B/C)
- Dietary fiber intake/supplementation (A)
- Medications (B)
- Pelvic floor muscle training (B)
- Rectal emptying (C) and trans-anal irrigation (B)
- Emotional support including empathy (C)

Secondary Conservative Interventions

- Biofeedback (A/B)
- Electrical stimulation (B/C)

Specialized Diagnostic Testing

- Anorectal function tests (B/C)
- Endoanal ultrasound (B/C)

Possible other tests

- Defecaography (B/C)
- Magnetic resonance imaging (C)

*Grades of Recommendation as described in *Incontinence* 7th ed. [118].

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