The American Society of Colon and Rectal Surgeons Clinical Practice Guidelines for the Evaluation and Management of Chronic Constipation

Karim Alavi, M.D., M.P.H.[1] • Amy J. Thorsen, M.D.[2] • Sandy H. Fang, M.D.[3]
Pamela L. Burgess, M.D.[4] • Gino Trevisani, M.D.[5] • Amy L. Lightner, M.D.[6]
Daniel L. Feingold, M.D.[7] • Ian M. Paquette, M.D.[8]

On behalf of the Clinical Practice Guidelines Committee of the American Society of Colon and Rectal Surgeons
1 Division of Colon and Rectal Surgery, UMass Memorial Medical Center, Worcester, Massachusetts
2 Division of Colon and Rectal Surgery, Department of Surgery, University of Minnesota, Minneapolis, Minnesota
3 Division of Gastrointestinal and General Surgery, Department of Surgery, Oregon Health and Sciences University, Portland, Oregon
4 Colon and Rectal Surgery, M Health Fairview Southdale Hospital, Minneapolis, Minnesota
5 Colon and Rectal Surgery, University of Vermont Medical Center, Burlington, Vermont
6 Department of Surgery, Scripps Clinic Medical Group, La Jolla, California
7 Division of Colon and Rectal Surgery, Department of Surgery, Rutgers University, New Brunswick, New Jersey
8 Department of Surgery Section of Colon and Rectal Surgery, University of Cincinnati, Cincinnati, Ohio

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

The American Society of Colon and Rectal Surgeons (ASCRS) is dedicated to ensuring high-quality patient care by advancing the science, prevention, and management of disorders and diseases of the colon, rectum, and anus. The Clinical Practice Guidelines Committee is composed of society members who are chosen because they have demonstrated expertise in the specialty of colon and rectal surgery. This committee was created to lead international efforts in defining quality care for conditions related to the colon, rectum, and anus and develop clinical practice guidelines based on the best available evidence. Although not proscriptive, these guidelines provide information based on which decisions can be made and do not dictate a specific form of treatment. These guidelines are intended for use by all practitioners, health care workers, and patients who desire information on the management of the conditions addressed by the topics covered in these guidelines. These guidelines should not be deemed inclusive of all proper methods of care nor exclusive of methods of care reasonably directed toward obtaining the same results. The ultimate judgment regarding the propriety of any specific procedure must be made by the physician considering all the circumstances presented by the individual patient.

STATEMENT OF THE PROBLEM

Constipation is one of the most common GI disorders seen in ambulatory medicine clinics and is a common reason for referral to a colorectal surgeon.[1] Constipation has a worldwide prevalence of 15% and is more frequently diagnosed in North America and Europe compared with Asia, likely because of differences in diet, culture, and environment.[2] Risk factors for constipation include age greater than 65 years, female sex, inactivity, low socioeconomic status, low-fiber diet, and non-White race.[3]

Constipation is characterized by dysfunctional colonic motility and/or outlet dysfunction. Primary constipation can be classified into 3 subtypes: constipation with normal transit, constipation with delayed transit time, and outlet dysfunction constipation. Constipation with normal transit time and irritable bowel syndrome with associated constipation (IBS-C) comprise a group of functional bowel disorders with several overlapping symptoms. The distinguishing symptom of IBS-C is the presence of abdominal

CME Earn continuing medical education (CME) credit online at cme.lww.com. This activity has been approved for AMA PRA category 1 credit.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text, and links to the digital files are provided in the HTML and PDF versions of this article on the journal's website (www.dcrjournal.com).

Funding/Support: None reported.

Financial Disclosure: None reported.

Correspondence: Ian M. Paquette, M.D., Colon and Rectal Surgery, University of Cincinnati College of Medicine Surgery, 2123 Auburn Ave No. 524, Cincinnati, OH 45219. E-mail: ian.m.paquette@gmail.com

Dis Colon Rectum 2024; 67: 1244–1257
DOI: 10.1097/DCR.0000000000003430
© The ASCRS 2024

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

pain more than once per week that resolves with flatulence or a bowel movement.[4] Based on the Rome IV criteria, functional constipation (or normal transit constipation) is characterized by the presence of 2 or more of the following: fewer than 3 spontaneous defecations per week or for more than 25% of defecations: straining, lumpy, or hard stools; incomplete evacuation; sensation of anorectal blockage; or requiring manual maneuvers to assist with defecation. To meet these criteria, symptoms cannot be associated with diarrhea and must be present for 3 to 6 months before the diagnosis.[5] The cause of secondary constipation is multifactorial and can include factors such as diet, medications, metabolic or neurological disorders, and psychosocial issues. The complex cause and variable severity of constipation symptoms mandate an individualized approach to evaluation and treatment. Given the range of specialties that manage constipation, a collaborative approach is often warranted to achieve optimal patient outcomes.

METHODOLOGY

These guidelines were based on the previous ASCRS "Clinical Practice Guidelines for the Management of Constipation," which was published in 2016.[6] A comprehensive search was conducted in MEDLINE (Ovid), Cochrane Library (Wiley), and Scopus (Elsevier) for English-language studies including human subjects published between January 1, 2014, and February 1, 2024. The search strategy was developed in conjunction with a health sciences research librarian, and it used a combination of subject headings and keywords to identify primary literature on constipation, including chronic or idiopathic constipation, obstructed defecation, slow transit, surgery, rectocele, rectal intussusception, pelvic dyssynergia, anismus, paradoxical puborectalis, megacolon, and megarectum. Retrieved publications were limited to the English language and adult patients (see Appendix 1 at http://links.lww.com/DCR/C363 for the full search strategy). The initial search generated 4195 eligible studies, and after removing 1315 duplicates, 2880 studies were screened for initial inclusion. Abstracts were screened for relevance (details included in Fig. 1), leaving 332 studies that underwent full-text review by 5 coauthors, with all conflicts resolved by the first author. After a full-text review, 198 studies were excluded; 134 studies were included in the final article (Fig. 1). Abstract and full-text screening was performed using Covidence systematic review software.[7]

CERTAINTY OF EVIDENCE

The final grade of recommendation and level of evidence for each statement were determined using the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) system. The certainty of evidence reflects the extent of our confidence in the estimates of effect. Evidence from randomized controlled trials (RCTs) start with high certainty, and evidence derived from observational studies start with low certainty. For each outcome, the evidence is graded as high, moderate, low, or very low (Table 1). The evidence can be rated down for risk of bias, inconsistency, indirectness, imprecision, and publication bias. The certainty of evidence originating from observational studies can be rated up when there is a large magnitude of effect or dose–response relationship. As per GRADE methodology, recommendations are labeled as "strong" or "conditional." Current recommendations are stated in Table 2. When agreement regarding the evidence base or treatment guideline was incomplete, the consensus from the committee chair, vice chair, and 2 assigned reviewers determined the outcome. Recommendations formulated by the subcommittee were reviewed by the entire Clinical Practice Guidelines Committee. The submission was then approved by the ASCRS Executive Council and peer-reviewed in *Diseases of the Colon & Rectum*. In general, each ASCRS Clinical Practice Guideline is updated approximately every 5 years. No funding was received to prepare this guideline, and the authors have declared no competing interests related to this material. This guideline conforms to the Appraisal of Guidelines for Research and Evaluation checklist.

Initial Evaluation and Treatment of Constipation

1. A directed history and physical examination should be performed in patients presenting with constipation. Strength of recommendation: strong based on low-quality evidence.

Although constipation in and of itself is a benign condition, a history and physical examination can help ensure that a serious or even life-threatening disease is not the underlying cause of symptoms related to constipation. Patients with constipation who also report rectal bleeding, change in caliber of stools, blood in the stool, weight loss, anemia, or a family history of colorectal cancer should be evaluated endoscopically for an endoluminal neoplastic process.[1,8] A directed history may elucidate modifiable behavioral factors, such as diet, dehydration, or immobility, as well as medications that may be contributing to constipation.[1] Opioids, antidepressants, anticholinergics, calcium channel blockers, and calcium supplements are commonly associated with constipation and may need to be stopped or adjusted for symptomatic relief. Patients may also have an associated or undiagnosed psychiatric, neurological, or endocrine disorder that may require treatment to help address constipation symptoms.[9] Patients should be questioned regarding coexisting pelvic floor conditions, such as dyspareunia,

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

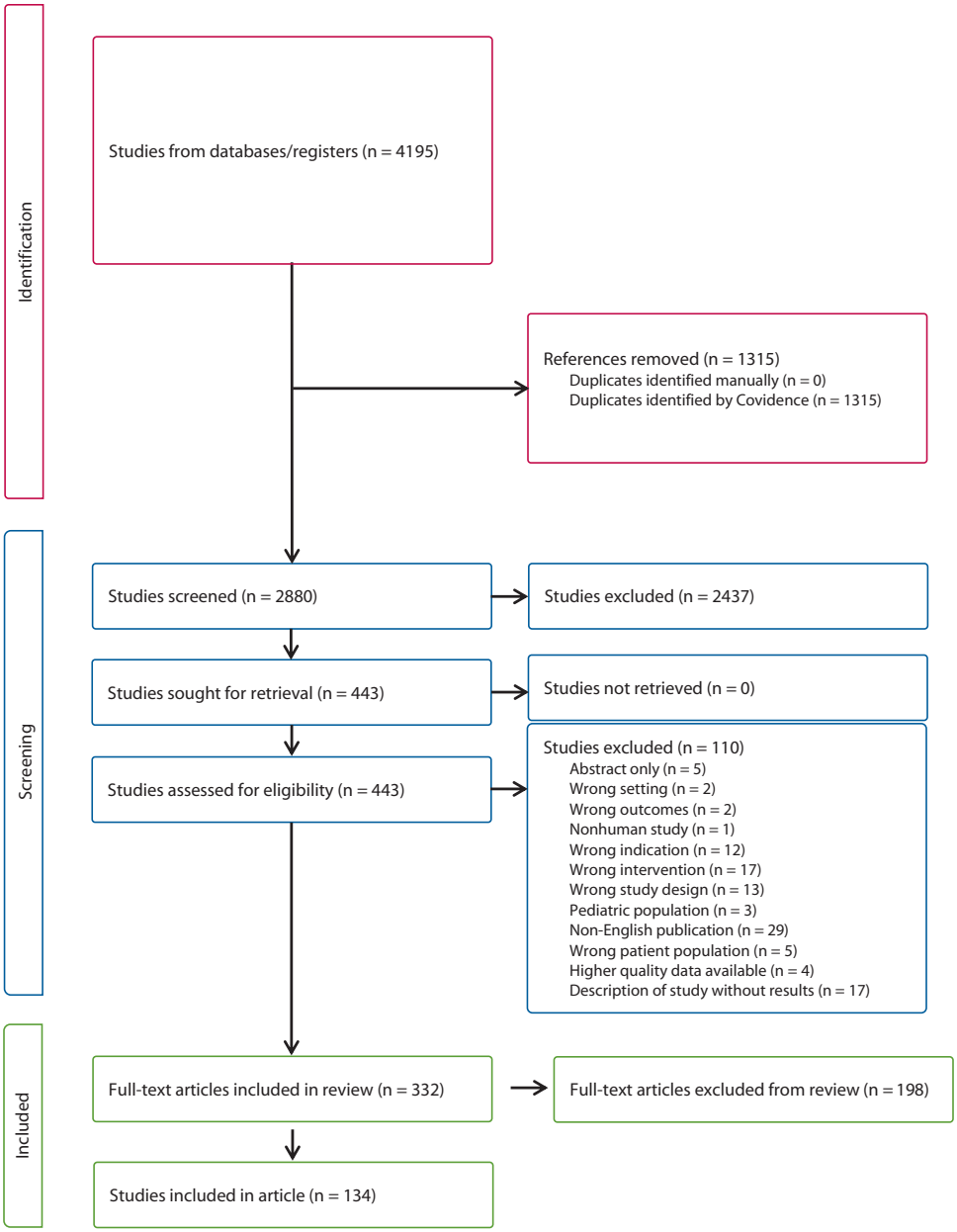

FIGURE 1. Preferred Reporting for Systematic Reviews and Meta-analyses literature search flow chart of studies on the management of constipation.

urinary symptoms, and any obstetric history, including number of pregnancies, history of hysterectomy, injuries, and repairs.[10] Consideration should be given for inquiring about a history of sexual assault or the presence of an eating disorder in both male and female patients.[11] Finally, a careful assessment of symptoms and frequency and consistency of bowel movements (BMs) may help distinguish among constipation subtypes. Patients with infrequent, hard stools may be more likely to have colonic inertia, whereas those with incomplete evacuation and straining may be more likely to have pelvic floor dysfunction, and the presence of abdominal pain may indicate IBS. However, the history alone may be inadequate to clearly establish a diagnosis because many patients will have symptoms associated with more than 1 subtype.

The physical examination is directed at the abdominal and anorectal components. Generally, the abdomen is nontender but may be remarkable for distention or discomfort on palpation. Special attention should be paid to the presence of palpable abdominal masses, which may contribute to constipation because of extrinsic compression. External anorectal inspection should include specific attention to the presence of distorted anatomy or a bulky lesion, such as a neoplasm. Digital rectal examination can reveal the presence of anal hypertonia, paradoxical puborectalis contraction, rectocele, anorectal mass, stricture, or fecal

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

TABLE 1. Interpretation of strong and conditional recommendations using the GRADE approach

Evaluation	*Description*
Recommendation	
Strong	Most individuals should receive the intervention. Formal decision aids are not likely to be needed to help individuals make decisions consistent with their values and preferences.
Conditional	Different choices will be appropriate for individual patients consistent with their values and preferences. Use shared decision-making. Decision aids may be useful in helping patients make decisions consistent with their individual risks, values, and preferences.
GRADE certainty rankings	
High	The authors are confident that the true effect is similar to the estimated effect.
Moderate	The authors believe that the true effect is probably close to the estimated effect.
Low	The true effect might be markedly different from the estimated effect.
Very low	The true effect is probably markedly different from the estimated effect.

GRADE = Grading of Recommendations, Assessments, Development, and Evaluation.

TABLE 2. Summary and strength of GRADE recommendations

No.	*Summary*	*Recommendation strength*	*GRADE quality of evidence*
1	A directed history and physical examination should be performed in patients presenting with constipation	Strong	Low
2	Objective measures assessing the nature, severity, and impact of constipation on quality of life can be useful when evaluating patients with constipation	Conditional	Low
3	The initial management of patients with symptomatic constipation involves dietary modifications and ensuring adequate fluid intake and fiber supplementation	Strong	Low
4	Osmotic laxatives are an appropriate firstline medical therapy to manage chronic constipation. Stimulant laxatives, such as bisacodyl, can be considered for rescue therapy or as second-line therapy, if needed	Strong	Moderate
5	Patients who fail to improve with dietary changes, fiber therapy, and osmotic laxatives should be evaluated for outlet dysfunction. Anorectal physiology testing or dynamic imaging by fluoroscopic defecography, MRI defecography, or dynamic ultrasound may help identify functional or structural causes related to an evacuation disorder	Conditional	Low
6	Colonic motility and transit should be measured before surgical intervention is considered	Strong	Low
7	Biofeedback therapy is considered a firstline treatment for patients with symptomatic pelvic floor dyssynergia	Strong	Moderate
8	Injecting botulinum toxin into the puborectalis and external sphincter muscle may be considered in patients with outlet dysfunction constipation related to nonrelaxing puborectalis muscle	Conditional	Low
9	Patients with significant outlet dysfunction from a rectocele may be considered for surgical repair after addressing any concomitant functional causes, such as nonrelaxing puborectalis muscle	Conditional	Moderate
10	STARR is not recommended for the repair of a rectocele or internal rectal intussusception because of the high complication rates associated with this procedure	Strong	Moderate
11	Repair of rectal intussusception may be considered in patients with severe obstructed defecation in whom nonoperative treatments were unsuccessful	Conditional	Low
12	Patients with isolated refractory colonic slow-transit constipation may benefit from total abdominal colectomy with ileorectal anastomosis	Conditional	Low
13	Fecal diversion may be considered in patients with intractable constipation refractory to other treatment options	Conditional	Low

GRADE = Grading of Recommendations, Assessments, Development, and Evaluation; STARR = stapled transanal rectal resection.

impaction. A Valsalva maneuver may help determine the degree of pelvic descent or the presence of puborectalis dysfunction. Anoscopy or rigid proctoscopy may also be helpful to evaluate internal hemorrhoids, proctitis, or masses. Any causes for constipation identified during the history and physical should be evaluated and alternative causes ruled out.

The diagnostic workup for patients with constipation should address other potential causes, such as colorectal cancer or endocrine disorders. Laboratory testing can identify hypothyroidism, hyperparathyroidism, or diabetes mellitus but is nonspecific for constipation.[12] Imaging studies such as CT scans can demonstrate colonic dilation or fecal loading but are

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

unlikely to demonstrate an anatomic abnormality or obstruction unless patients report symptoms that are suspicious of these findings.[12]

A meta-analysis of 8 cross-sectional studies investigating constipation as an indication for colonoscopy found that constipation alone, as a presenting symptom, was not associated with an increased risk of colorectal cancer.[13] However, a retrospective study of 985 patients in South Africa who underwent colonoscopy as part of their evaluation for constipation reported a polyp detection rate of 9.7%, and 9 patients (6.3%) were diagnosed with colorectal cancer, consistent with prior studies.[14] In general, a colonoscopy should be recommended if patients meet guideline criteria for general screening or if patients present with concerning symptoms, such as hematochezia, weight loss, or change in bowel habits; have a strong family history of colorectal cancer; or have anemia and warrant further investigation.[1,15]

2. Objective measures assessing the nature, severity, and impact of constipation on quality of life can be useful when evaluating patients with constipation. Strength of recommendation: conditional recommendation based on low-quality evidence.

Objective measures that assess the severity of constipation and its impact on quality of life may help direct the course of treatment and whether to pursue further diagnostic studies.[16] Although the Rome criteria are often used to identify constipation and its subtypes, these do not assess disease severity.[17–20] Several instruments have been developed to assess constipation specifically. These include the Constipation Assessment Scale,[21] the Constipation Scoring System,[8,22] the Patient Assessment of Constipation Symptom Questionnaire,[23,24] the Knowles-Eccersley-Scott Symptom Score,[25] the Garrigues Questionnaire,[26] the Chinese Constipation Questionnaire,[27] and the Constipation Severity Instrument.[28] Other available instruments assess comprehensive bowel function, including fecal incontinence, or address only 1 aspect of constipation, such as obstructed defecation. The primary aim of these instruments is to develop a consistent means of categorizing the baseline severity of the disease and to follow the response to treatment over time. The Pelvic Floor Disorders Consortium, composed of colorectal surgeons, urologists, urogynecologists, pelvic floor therapists, and gastroenterologists, recommended using the Patient Assessment of Constipation Symptom Questionnaire and the Constipation Severity Instrument when assessing patients presenting with constipation.[29]

3. The initial management of patients with symptomatic constipation involves dietary modifications and ensuring adequate fluid intake and fiber supplementation. Strength of recommendation: strong based on low-quality evidence.

Dietary modification and increasing water and fiber consumption are considered firstline treatments in the management of constipation and are typically recommended before investigations of pelvic floor function and colonic motility are performed.[30–32] Fortifying a diet by increasing the intake of food items high in fiber offers a strategy that is considered a gentler alternative to using laxatives and enemas.[33–37] A randomized trial of 72 patients reported that ingesting a combination of soluble and insoluble fiber resulted in similar increased bowel motility but was better tolerated than using psyllium alone.[38] Daily dietary fiber supplementation with oat bran has been shown to allow discontinuation of laxatives in 59% to 80% of elderly patients with chronic idiopathic constipation and is well tolerated.[34] Similarly, a moderate increase in dietary fiber intake increases bowel frequency and fecal bulk and has been shown to be a safe and convenient alternative to laxatives in patients with chronic idiopathic constipation, even in the setting of pelvic outlet obstruction.[33,35,39,40] However, 80% of patients with slow colonic transit and 63% of patients with constipation because of outlet obstruction may not respond adequately to increased dietary fiber, whereas 85% of patients without an underlying pathological finding may see symptomatic improvement.[41] A systematic review of the efficacy of soluble and insoluble fiber supplementation in the management of chronic idiopathic constipation identified 6 RCTs comparing fiber with placebo or no therapy in adult patients with chronic idiopathic constipation.[42] A formal meta-analysis was not undertaken in this study because of concerns related to methodology issues across the studies. Compared with placebo, soluble fiber led to improvements in global constipation symptoms (86.5% vs 47.4%, $p < 0.001$), straining (55.6% vs 28.6%, $p = 0.003$), pain on defecation, stool consistency, and mean number of stools per week (3.8 stools per week after therapy compared with 2.9 stools per week at baseline), as well as a reduction in the number of days between stools. A meta-analysis reported that fiber supplementation was beneficial in patients with mild to moderate chronic constipation and IBS-C. The majority of the studies included in this analysis were underpowered, with less than 50 patients per arm, and included predominantly elderly and female patients, and there was variability in the type and duration of fiber administered among the studies.[43] A RCT of female patients (n = 54) randomly assigned to psyllium husk or placebo for 4 weeks reported improvement in straining (55.2% vs 8.0% $p < 0.001$), less than 3 BMs per week (86.2% vs 20%, $p < 0.001$), stool consistency (62.1% vs 32%, $p = 0.027$), and pain with BMs (58.6% vs 28.0%, $p = 0.024$), and less feeling of incomplete defecation (65.5% vs 16.0%, $p < 0.001$) related to fiber use. Interestingly, this study also reported a significant change in gut microbiota in samples taken after 4 weeks of fiber therapy; in the fiber supplementation group, the gut microbiota was consistent with patients without constipation.[44]

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

4. Osmotic laxatives are an appropriate firstline medical therapy to manage chronic constipation. Stimulant laxatives, such as bisacodyl, can be considered for rescue therapy or as a second-line therapy, if needed. Strength of recommendation: strong based on moderate-quality evidence.

Osmotic agents used in the treatment of constipation include polyethylene glycol (PEG)–based solutions and magnesium salt–based products. Osmotic laxatives are generally preferred over stimulants, such as senna or bisacodyl, given the short-term and long-term efficacy and safety with PEG-based treatment.[15,45] A meta-analysis of 10 RCTs comparing PEG with lactulose demonstrated the superiority of PEG in terms of improving stool frequency and consistency, relieving abdominal pain, and reducing the use of other laxatives.[46] Magnesium salt laxatives such as magnesium sulfate also have been shown to improve stool frequency and consistency compared with placebo[47] and have safety profiles comparable to PEG[48,49] solutions.

The stimulants sodium picosulfate and bisacodyl are prodrugs that are hydrolyzed by colonic bacteria and intestinal and colonic brush border enzymes, respectively, into the active metabolite (bis-(*p*-hydroxyphenyl)-pyridyl-2-methane), which has antiabsorptive, secretory, and prokinetic effects. A meta-analysis evaluating drug therapies for chronic idiopathic constipation demonstrated superior efficacy for sodium picosulfate and bisacodyl at achieving complete spontaneous BMs at 4 weeks compared to prescription motility agents and secretagogues; the most frequent side effect was abdominal pain. The prokinetic agent prucalopride appeared to be superior at 12 weeks.[50] Studies with longer treatment duration are necessary to establish the efficacy and safety of these agents as maintenance therapy for patients with chronic idiopathic constipation. There is a lack of RCTs documenting the safety and efficacy of anthraquinone stimulant laxatives, which include the popular over-the-counter ingredients senna, cascara, and aloe, in treating chronic constipation.[51]

Treatment of Defecatory Disorders

5. Patients who fail to improve with dietary changes, fiber therapy, and osmotic laxatives should be evaluated for outlet dysfunction. Anorectal physiology testing or dynamic imaging by fluoroscopic defecography, MRI defecography, or dynamic ultrasound may help identify functional or structural causes related to an evacuation disorder. Strength of recommendation: conditional based on low-quality evidence.

Evacuation disorder or outlet dysfunction are accepted terms used to describe a patient's inability to satisfactorily expel stool. Evacuation disorders may be caused by structural and/or functional phenomena[52] and are the most common cause of medically refractory chronic constipation; hence, further evaluation is indicated after failure of first-line therapies.[53]

The balloon expulsion test (BET) is a widely used, easily performed direct test of evacuation. BET assesses the time a patient requires to expel a 50 mL water-filled balloon; a prolonged or failed expulsion suggests impaired evacuation. Although BET has good test reproducibility, is highly specific, and can predict response to biofeedback therapy, the test has a low sensitivity of 50% and does not delineate the underlying cause of an evacuation disorder.[12,54,55]

Anorectal manometry and sensation testing are indirect tests that can clarify functional causes of defecation disorders. Rectal and anal pressures are recorded during rest and with the squeeze and push maneuvers. High-resolution anal manometry allows for both quantitative and qualitative functional assessment with the aid of color plots. Balloon sensation testing evaluates the rectoanal inhibitory reflex, which is absent in Hirschsprung disease, as well as rectal hypersensitivity or hyposensitivity. These data, along with the BET, are used by the London protocol classification of defecatory dysfunction: 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. The London protocol classification was developed to standardize the language and testing protocol in the evaluation of patients with anorectal dysfunction.[56]

Defecography, which is the only direct test of evacuation, evaluates anatomical and functional causes of defecation disorders.[52] Using fluoroscopy or MRI, contrast paste is placed into the rectum as a stool surrogate, and images are acquired as the patient evacuates the contrast. Physical barriers to expulsion, such as rectocele, enterocele, or intussusception, can be illustrated, as well as the coordination of the pelvic floor musculature during evacuation.[52,57] A systematic review of 63 studies providing data on outcomes of 7519 barium defecographies and 668 MR defecographies in patients with chronic constipation demonstrated pathological high-grade (Oxford III and IV) intussusception in 23.7% of patients and large (>4 cm) rectoceles in 15.9% of patients. Enterocele descent was observed in 16.8% and perineal descent was observed in 44.4% of patients.[52] Although MRI, performed in the supine position, permits excellent assessment of all pelvic floor compartments and the surrounding musculature,[58] fluoroscopic defecography, performed in the seated position, is considered the evacuation examination with the most construct validity.[55] Dynamic ultrasound, including both transperineal and echodefecography (transrectal technique with rectal gel contrast), can identify paradoxical pelvic floor contraction with Valsalva as well as prolapse of pelvic floor structures, but its use is limited by operator availability and expertise.[59,60]

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

6. Colonic motility and transit should be measured before surgical intervention is considered. Strength of recommendation: strong based on low-quality evidence.

Evaluating colonic transit can elucidate the underlying cause of constipation. The transit time of radiopaque markers through the colon remains the most common motility testing modality[61] given the wide availability, low cost, and ease of use.[12,62–65] Although previous studies suggested that the distribution of markers in the rectosigmoid colon is suggestive of pelvic floor dyssynergia, a multicenter study suggested the contrary and recommended pelvic floor assessment with digital rectal examination and BET to definitively confirm pelvic floor dyssynergia.[66]

Other techniques to evaluate colonic transit include radionuclide scintigraphy and the wireless pH-pressure capsule. These studies correlate well with the transit of radiopaque markers in the evaluation of colonic transit[67,68] and appear to be most useful when additional information on gastric emptying or small-bowel transit is needed.[1] An advantage of scintigraphy over radiopaque markers is that scintigraphy requires avoiding motility agents for only 24 to 48 hours compared with 5 to 7 days for radiopaque marker studies.[64] Colonic manometry is offered in only a few centers and is more widely used in the evaluation of constipation in pediatric patients.

7. Biofeedback therapy is considered a firstline treatment for patients with symptomatic pelvic floor dyssynergia. Strength of recommendation: strong based on moderate-quality evidence.

Biofeedback is a firstline treatment for dysfunctional neuromuscular rectoanal coordination of the pelvic floor and can improve rectal sensitivity and compliance. After completing initial training, periodic reinforcement is needed to sustain the efficacy of biofeedback over time. The success of pelvic floor physical therapy relies on the motivation and participation of the patient in an individualized biofeedback plan tailored to a patient's needs.[69] A systematic review of 7 RCTs including 413 patients demonstrated that electromyography biofeedback was superior to non-electromyography biofeedback at improving pelvic floor dysfunction (OR 6.74; 95% CI, 2.91–15.58; $p < 0.001$).[70] A systematic review reported that dyssynergic defecation is underrecognized and that biofeedback is the most efficacious and safe treatment available for this condition.[71] A Cochrane Review that included 17 randomized trials with 911 patients demonstrated that biofeedback was successful in 80% of patients (43/54) with pelvic floor dysfunction compared to only a 22% success rate in patients treated with laxatives and dietary and lifestyle modifications (relative risk 3.65; 95% CI, 2.17–6.13). There were mixed results comparing biofeedback to surgical procedures such as partial division of the puborectalis and stapled transanal rectal resection (STARR), as well as to botulinum toxin (BTX) type A (BTX-A).[72] The authors cautioned that most of the studies were limited because of small sample sizes, variability in biofeedback treatment techniques, and inconsistencies in the definition of pelvic dyssynergia. A retrospective study of 116 consecutive patients evaluated the short-term outcomes of biofeedback combined with diet modifications in patients with obstructive defecation secondary to anismus and reported that 59% of patients had a satisfactory response (decrease in constipation score of more than 50%).[73] The coexistence of IBS does not appear to impact the success rate of biofeedback for patients with constipation.[74]

8. Injecting BTX into the puborectalis and external sphincter muscle may be considered in patients with outlet dysfunction constipation related to nonrelaxing puborectalis muscle. Strength of recommendation: conditional based on low-quality evidence.

Injecting BTX into a nonrelaxing puborectalis has shown variable success in improving symptoms of obstructed defecation syndrome (ODS) with a nonrelaxing puborectalis muscle. The symptomatic relief is typically temporary, with a decrease in efficacy within 3 months postinjection.[71] In an observational cohort study, 31 selected patients with nonrelaxing puborectalis muscles who were unresponsive to biofeedback underwent an injection of 100 units of BTX-A into the puborectalis and external sphincter muscles with subsequent biofeedback training 2 weeks after BTX-A injection. Twenty-three patients (74.2%) who had failed the BET before the BTX-A injection were able to successfully expel the balloon after the BTX-A injection. The constipation symptom questionnaire showed an improvement from 14.3 ± 2.49 to 6.4 ± 3.20. The addition of biofeedback training after BTX-A injection presumably allowed for the durability of results. This study was limited by its small sample size, selection bias, and overall study design.[75] A systematic review of 11 studies, including 3 RCTs and involving 248 patients evaluating the role of BTX-A injection (transanal approach with varied doses) as a treatment option for pelvic floor dyssynergia, found that symptomatic improvement ranged between 29.2% and 100%.[76]

9. Patients with significant outlet dysfunction from a rectocele may be considered for surgical repair after addressing any concomitant functional causes, such as nonrelaxing puborectalis muscle. Strength of recommendation: conditional based on moderate-quality evidence.

Thirty to seventy percent of patients with rectoceles report symptoms of obstructed defecation, including difficulty evacuating stool from the rectum, sensing a blockage, increased straining on defecation, fecal incontinence, and the need for vaginal digitation (ie, splinting) to evacuate bowel contents.[77–79] Imaging, such as defecography, may demonstrate that the rectocele does not spontaneously

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

empty. In general, surgical repair should be considered only after addressing coexisting functional causes of ODS, such as pelvic organ prolapse (enterocele or sigmoidocele) and pelvic floor dysfunction.[77,78,80] It is important to recognize that many patients will be found to have incidental rectoceles during workup. The surgeon needs to use their experience to decide whether a repair is indicated on the basis of the previously listed factors.

Several approaches for rectocele repair have been described, including transanal, transvaginal, transperineal, and abdominal, with or without the interposition of mesh.[77–79,81–93] There is little evidence to guide the decision of which technique to choose. Studies on the best surgical approach for rectocele are limited by small sample size, selection bias, short follow-up intervals, generalizability, and a lack of a unified definition for success. In general, success rates are variable and range from 50% to 100%.[94]

A RCT evaluated the outcomes of transperineal repair (TPR; n = 32) versus transvaginal repair (TVR; n = 32) of rectoceles in 64 patients with ODS. The TVR cohort had a shorter length of hospital stay (2.1 TVR vs 2.4 TPR, $p = 0.03$), a greater decrease in constipation score (6.4 ± 1.4 TPR vs 4.9 ± 1.3 TVR at 6 months, $p < 0.0001$; 7.2 ± 1.4 TPR vs 5.4 ± 1.6 TVR at 12 months, $p < 0.0001$), and a significant improvement in sexual-related quality of life at 6 and 12 months after surgery.[77] A systematic review including RCTs and prospective and retrospective comparative and single-group studies compared the transvaginal approach to the transanal approach and found the transvaginal approach was associated with greater improvement in anatomic outcomes and obstructive defecation symptoms and had a lower chance of rectal injury but had a higher incidence of dyspareunia.[95]

A systematic review evaluating the long-term outcomes of patients who underwent transperineal versus transanal rectocele repairs concluded that transperineal rectocele repair was associated with better symptomatic improvement in fecal incontinence and constipation and had complication rates similar to the transanal rectocele repairs.[93] Transvaginal and transperineal approaches may be augmented with synthetic or biologic mesh, albeit at an increased risk for mesh erosion, infection, migration, and pain. In fact, the Food and Drug Administration has identified serious safety and efficacy concerns over the use of mesh for the TVR of rectocele.

10. STARR is not recommended for the repair of a rectocele or internal rectal intussusception because of the high complication rates associated with this procedure. Strength of recommendation: strong based on moderate-quality evidence.

A systematic review examining postoperative outcomes of STARR performed for rectocele or rectal intussusception was notable for significant postoperative morbidity, including bleeding, infection, pain, fecal urgency, and incontinence.[96] A prospective observational cohort study evaluated 262 women with rectoceles who underwent STARR for ODS and reported that 23% experienced postoperative complications, including rectovaginal fistula, rectal diverticulum, total rectal obliteration, anastomotic leak, recurrence of rectocele, staple line bleeding, and urinary retention and urgency.[82] A retrospective cohort study of 450 patients who underwent STARR for ODS reported postoperative urinary retention (7.8%), rectal bleeding (2.9%), pelvic hematoma (1.1%), pelvic sepsis (1.3%), fecal urgency (27.8%), and staple line dehiscence (4.2%). The relatively high rate of complications was attributed to surgeons' early learning curve.[97] Other studies have reported similar complication rates after STARR ranging between 10% and 78%.[80,90,92,98–107]

11. Repair of rectal intussusception may be considered in patients with severe obstructed defecation in whom nonoperative treatments were unsuccessful. Strength of recommendation: conditional based on low-quality evidence.

During evacuation, rectal intussusception or occult rectal prolapse is a telescoping of the proximal rectal wall into the distal rectum. Several approaches to treat outlet obstruction attributed to rectal intussusception have been described, including rectopexy, Delorme, STARR, and ventral mesh rectopexy. Although surgery may restore normal rectal anatomy, patients may not see improvement in function or may even experience worse function after surgery.[108,109] In general, studies regarding the operative management of intussusception and ODS are limited by their small sample size and their lack of direct comparisons between different procedures and long-term functional outcomes data.

The Delorme procedure is a mucosal proctectomy that excises the redundant mucosa proximal to the dentate and plicates the underlying muscularis. A single-institution experience of 100 patients who underwent a Delorme procedure for internal intussusception and ODS reported improved Cleveland Clinic Constipation Scores and ODS scores at 6 months compared to baseline (18.9 to 5 and 18.5 to 5, respectively; $p < 0.0001$).[110] The recurrence rate was 6%, with an excellent overall safety profile consistent with previous studies.[111]

Early studies suggested that ventral rectopexy, when performed for the treatment of rectal intussusception, is associated with improvement in constipation in 80% to 95% of patients with minimal new-onset constipation and a 5% recurrence rate.[112,113] In a retrospective series of 40 patients who underwent ventral mesh rectopexy without sigmoid resection in the setting of rectal intussusception with a mean follow-up of 38 months, 65% of patients reported being "cured" on a self-assessment questionnaire and another 33% reported being "improved," and most patients reported significant improvement in symptoms

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

of fecal incontinence.[113] Another retrospective study of 51 patients assessed the long-term functional outcomes and quality of life after ventral mesh rectopexy for rectoanal intussusception and/or rectocele at a median follow-up of 60 months. There were no mesh-related complications, and constipation and fecal incontinence scores improved after 1 year and remained significantly reduced at 7 years.[89]

12. Patients with isolated refractory colonic slow-transit constipation may benefit from total abdominal colectomy with ileorectal anastomosis. Strength of recommendation: conditional based on low-quality evidence.

Although segmental colectomy for the treatment of slow-transit constipation can have a failure rate as high as 100%,[114] total abdominal colectomy with ileorectal anastomosis (TAC-IRA) is associated with clinical improvement in 50% to 100% of patients.[115–117] Morbidity after TAC-IRA may include anastomotic leak, bowel obstruction, and prolonged postoperative ileus.[115,117–119] Although constipation generally improves after TAC-IRA for slow-transit constipation, patients may experience diarrhea, abdominal pain, fecal incontinence, or recurrent constipation. In a retrospective series of 42 patients with slow-transit constipation who underwent TAC-IRA with a 15-year follow-up, 50% of patients had less than 4 BMs per day (mostly Bristol stool 6), and 21% experienced severe incontinence. Overall patient satisfaction was high; however, 8 patients (19%) eventually underwent a permanent ileostomy.[120] Other symptoms experienced by patients after TAC-IRA included abdominal pain, bloating, need for BM assistance, incontinence to gas or liquid stool, and lower quality-of-life score (Medical Outcomes Study Short Form-36) compared with the general population.[121] A survey of 75 patients after TAC-IRA reported diarrhea in 46% of patients and lower GI quality-of-life scores associated with abdominal pain, diarrhea, and incontinence. Regardless of these outcomes, more than 90% of patients reported that they would undergo TAC-IRA again to treat their constipation.[122]

An alternative operation for the treatment of slow-transit constipation has been described. The Jinling procedure is a subtotal colectomy with side-to-side cecorectal anastomosis. This procedure can theoretically relieve slow-transit constipation with potentially less risk of diarrhea because of the preservation of the ileocecal valve. In a retrospective review of 117 patients who underwent the Jinling procedure, there was a significant reduction in the Cleveland Clinic Florida constipation scores observed at 1 month that was maintained at 48 months, as well as significant improvements in postoperative GI quality of life and high satisfaction rates, but there was no direct comparison to TAC-IRA.[123] Similarly, retrospective data on this procedure appear to show good immediate postoperative outcomes, good postoperative function with a mean of 4.8 ± 7.5 BMs daily, and improved satisfaction, with 78% of patients stating that they would undergo this surgical procedure again.[124–128] A retrospective comparison of cecorectal anastomosis versus ileosigmoid anastomosis demonstrated that cecorectal anastomosis was more often associated with persistent constipation and lower patient satisfaction (73% vs 93%).[129] The efficacy of these procedures compared with TAC-IRA remains unclear. Studies have failed to demonstrate significant differences in the median number of BMs per day, quality of life, or incidence of postoperative complications.[130,131]

13. Fecal diversion may be considered in patients with intractable constipation refractory to other treatment options. Strength of recommendation: conditional based on low-quality evidence.

Patients who have failed other available treatment options may be considered for a permanent ostomy as a last resort. The majority of available evidence has described the use of an ileostomy in this setting.[132–134] A retrospective analysis of 24 patients with constipation reported that an ileostomy was successful in alleviating constipation in 96% of patients.[133] Successful relief of constipation must be weighed against the risk of chronic complications, such as dehydration, parastomal herniation, and stomal retraction. Another series of 38 patients with stoma-related complications were followed and asked whether they regretted the intervention. With a median follow-up of 34 months (range, 7–74), 49% of patients had no regret and 27% of patients had minimal regret about the decision for a stoma. Fifty-five percent of patients had additional procedures related to the stoma, some undergoing up to 5 operations.[135]

There is less evidence to support the use of diverting colostomy in the setting of constipation. One series of 8 patients with refractory constipation with chronic colon or rectal dilation treated with diverting sigmoid colostomy reported that 100% of patients with rectosigmoid dilation improved (n = 6), whereas the 2 patients with pancolonic dilation did not benefit from a colostomy.[134] The psychosocial and health-related quality of life of individuals undergoing ostomy surgery for severe, chronic constipation was evaluated in 1 series of 24 patients. Study outcomes were evaluated retrospectively using clinical notes and prospectively via administration of the City of Hope Ostomy quality-of-life questionnaire, the Medical Outcomes Study Short Form-36, the Hospital Anxiety and Depression tool, and a specially designed ostomy-specific questionnaire. Of the 58.3% of patients who responded to the postal questionnaires, representing 14 patients (13 women, median age = 47.5 years; interquartile range, 23–70 years), more than 70% were satisfied (median follow-up = 17 months; interquartile range, 0.16–8 years) with their quality of life despite a reoperation rate of 20%.[136]

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

ACKNOWLEDGMENTS

The committee thanks Becky Baltich Nelson for conducting the systematic literature review for this project.

REFERENCES

1. Bharucha AE, Lacy BE. Mechanisms, evaluation, and management of chronic constipation. *Gastroenterology*. 2020;158:1232–1249.e3.
2. Włodarczyk J, Waśniewska A, Fichna J, Dziki A, Dziki L, Włodarczyk M. Current overview on clinical management of chronic constipation. *J Clin Med*. 2021;10:10.
3. Milosavljevic T, Popovic DD, Mijac DD, Milovanovic T, Krstic S, Krstic MN. Chronic constipation: gastroenterohepatologist's approach. *Dig Dis*. 2022;40:175–180.
4. Mearin F, Ciriza C, Mínguez M, et al. Clinical Practice Guideline: irritable bowel syndrome with constipation and functional constipation in the adult. *Rev Esp Enferm Dig*. 2016;108:332–363.
5. Drossman DA. Functional gastrointestinal disorders: what's new for Rome IV? *Lancet Gastroenterol Hepatol*. 2016;1:6–8.
6. Paquette IM, Varma M, Ternent C, et al. The American Society of Colon and Rectal Surgeons' clinical practice guideline for the evaluation and management of constipation. *Dis Colon Rectum*. 2016;59:479–492.
7. Covidence. *Covidence Systematic Review Software*. Melbourne, Australia: Veritas Health Innovation; 2022.
8. Brandt LJ, Prather CM, Quigley EM, Schiller LR, Schoenfeld P, Talley NJ. Systematic review on the management of chronic constipation in North America. *Am J Gastroenterol*. 2005;100(Suppl 1):S5–S21.
9. Rao SS, Tuteja AK, Vellema T, Kempf J, Stessman M. Dyssynergic defecation: demographics, symptoms, stool patterns, and quality of life. *J Clin Gastroenterol*. 2004;38:680–685.
10. Ortega MV, Kim Y, Hung K, et al. Women with chronic constipation have more bothersome urogenital symptoms. *Tech Coloproctol*. 2022;26:29–34.
11. Wofford SA, Verne GN. Approach to patients with refractory constipation. *Curr Gastroenterol Rep*. 2000;2:389–394.
12. Rao SS, Ozturk R, Laine L. Clinical utility of diagnostic tests for constipation in adults: a systematic review. *Am J Gastroenterol*. 2005;100:1605–1615.
13. Power AM, Talley NJ, Ford AC. Association between constipation and colorectal cancer: systematic review and meta-analysis of observational studies. *Am J Gastroenterol*. 2013;108:894–903; quiz 904.
14. Mjoli M, Govindasamy V, Madiba TE. What is the diagnostic yield of colonoscopy in patients with a referral diagnosis of constipation in South Africa? *S Afr J Surg*. 2017;55:14–18.
15. Bharucha AE, Pemberton JH, Locke GR, III. American Gastroenterological Association technical review on constipation. *Gastroenterology*. 2013;144:218–238.
16. McCrea GL, Miaskowski C, Stotts NA, Macera L, Hart SA, Varma MG. Review article: self-report measures to evaluate constipation. *Aliment Pharmacol Ther*. 2008;27:638–648.
17. Digesu GA, Panayi D, Kundi N, Tekkis P, Fernando R, Khullar V. Validity of the Rome III criteria in assessing constipation in women. *Int Urogynecol J*. 2010;21:1185–1193.
18. Xin HW, Fang XC, Zhu LM, et al. Diagnosis of functional constipation: agreement between Rome III and Rome II criteria and evaluation for the practicality. *J Dig Dis*. 2014;15:314–320.
19. Wong RK, Palsson OS, Turner MJ, et al. Inability of the Rome III criteria to distinguish functional constipation from constipation-subtype irritable bowel syndrome. *Am J Gastroenterol*. 2010;105:2228–2234.
20. Ruiz-López MC, Coss-Adame E. Quality of life in patients with different constipation subtypes based on the Rome III criteria. *Rev Gastroenterol Mex*. 2015;80:13–20.
21. McMillan SC, Williams FA. Validity and reliability of the constipation assessment scale. *Cancer Nurs*. 1989;12:183–188.
22. Agachan F, Chen T, Pfeifer J, Reissman P, Wexner SD. A constipation scoring system to simplify evaluation and management of constipated patients. *Dis Colon Rectum*. 1996;39:681–685.
23. Neri L, Conway PM, Basilisco G; Laxative Inadequate Relief Survey (LIRS) Group. Confirmatory factor analysis of the Patient Assessment of Constipation-Symptoms (PAC-SYM) among patients with chronic constipation. *Qual Life Res*. 2015;24:1597–1605.
24. Frank L, Kleinman L, Farup C, Taylor L, Miner P Jr. Psychometric validation of a constipation symptom assessment questionnaire. *Scand J Gastroenterol*. 1999;34:870–877.
25. Knowles CH, Eccersley AJ, Scott SM, Walker SM, Reeves B, Lunniss PJ. Linear discriminant analysis of symptoms in patients with chronic constipation: validation of a new scoring system (KESS). *Dis Colon Rectum*. 2000;43:1419–1426.
26. Garrigues V, Gálvez C, Ortiz V, Ponce M, Nos P, Ponce J. Prevalence of constipation: agreement among several criteria and evaluation of the diagnostic accuracy of qualifying symptoms and self-reported definition in a population-based survey in Spain. *Am J Epidemiol*. 2004;159:520–526.
27. Chan AO, Lam KF, Hui WM, et al. Validated questionnaire on diagnosis and symptom severity for functional constipation in the Chinese population. *Aliment Pharmacol Ther*. 2005;22:483–488.
28. Varma MG, Wang JY, Berian JR, Patterson TR, McCrea GL, Hart SL. The constipation severity instrument: a validated measure. *Dis Colon Rectum*. 2008;51:162–172.
29. Bordeianou LG, Anger JT, Boutros M, et al; Members of the Pelvic Floor Disorders Consortium Working Groups on Patient-Reported Outcomes. Measuring pelvic floor disorder symptoms using patient-reported instruments: proceedings of the consensus meeting of the Pelvic Floor Consortium of the American Society of Colon and Rectal Surgeons, the International Continence Society, the American Urology. *Female Pelvic Med Reconstr Surg*. 2020;26:1–15.
30. Anti M, Pignataro G, Armuzzi A, et al. Water supplementation enhances the effect of high-fiber diet on stool frequency and laxative consumption in adult patients with functional constipation. *Hepatogastroenterology*. 1998;45:727–732.
31. Ashraf W, Park F, Lof J, Quigley EM. Effects of psyllium therapy on stool characteristics, colon transit and anorectal function in chronic idiopathic constipation. *Aliment Pharmacol Ther*. 1995;9:639–647.
32. Voderholzer WA, Neuhaus DA, Klauser AG, Tzavella K, Müller-Lissner SA, Schindlbeck NE. Paradoxical sphincter contraction is rarely indicative of anismus. *Gut*. 1997;41:258–262.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

33. Dahl WJ, Whiting SJ, Healey A, Zello GA, Hildebrandt SL. Increased stool frequency occurs when finely processed pea hull fiber is added to usual foods consumed by elderly residents in long-term care. *J Am Diet Assoc*. 2003;103:1199–1202.
34. Sturtzel B, Elmadfa I. Intervention with dietary fiber to treat constipation and reduce laxative use in residents of nursing homes. *Ann Nutr Metab*. 2008;52(Suppl 1):54–56.
35. Jenkins DJ, Kendall CW, Vuksan V, et al. Effect of cocoa bran on low-density lipoprotein oxidation and fecal bulking. *Arch Intern Med*. 2000;160:2374–2379.
36. Graham DY, Moser SE, Estes MK. The effect of bran on bowel function in constipation. *Am J Gastroenterol*. 1982;77:599–603.
37. Hull C, Greco RS, Brooks DL. Alleviation of constipation in the elderly by dietary fiber supplementation. *J Am Geriatr Soc*. 1980;28:410–414.
38. Erdogan A, Rao SS, Thiruvaiyaru D, et al. Randomised clinical trial: mixed soluble/insoluble fibre vs. psyllium for chronic constipation. *Aliment Pharmacol Ther*. 2016;44:35–44.
39. Badiali D, Corazziari E, Habib FI, et al. Effect of wheat bran in treatment of chronic nonorganic constipation. A double-blind controlled trial. *Dig Dis Sci*. 1995;40:349–356.
40. Shariati A, Maceda JS, Hale DS. High-fiber diet for treatment of constipation in women with pelvic floor disorders. *Obstet Gynecol*. 2008;111:908–913.
41. Voderholzer WA, Schatke W, Mühldorfer BE, Klauser AG, Birkner B, Müller-Lissner SA. Clinical response to dietary fiber treatment of chronic constipation. *Am J Gastroenterol*. 1997;92:95–98.
42. Suares NC, Ford AC. Systematic review: the effects of fibre in the management of chronic idiopathic constipation. *Aliment Pharmacol Ther*. 2011;33:895–901.
43. Rao SS, Yu S, Fedewa A. Systematic review: dietary fibre and FODMAP-restricted diet in the management of constipation and irritable bowel syndrome. *Aliment Pharmacol Ther*. 2015;41:1256–1270.
44. Yang C, Liu S, Li H, et al. The effects of psyllium husk on gut microbiota composition and function in chronically constipated women of reproductive age using 16S rRNA gene sequencing analysis. *Aging (Albany NY)*. 2021;13:15366–15383.
45. Ford AC, Moayyedi P, Lacy BE, et al; Task Force on the Management of Functional Bowel Disorders. American College of Gastroenterology monograph on the management of irritable bowel syndrome and chronic idiopathic constipation. *Am J Gastroenterol*. 2014;109(Suppl 1):S2–26; quiz S27.
46. Lee-Robichaud H, Thomas K, Morgan J, Nelson RL. Lactulose versus polyethylene glycol for chronic constipation. *Cochrane Database Syst Rev*. 2010;(7):CD007570.
47. Mori S, Tomita T, Fujimura K, et al. A randomized double-blind placebo-controlled trial on the effect of magnesium oxide in patients with chronic constipation. *J Neurogastroenterol Motil*. 2019;25:563–575.
48. Loening-Baucke V, Pashankar DS. A randomized, prospective, comparison study of polyethylene glycol 3350 without electrolytes and milk of magnesia for children with constipation and fecal incontinence. *Pediatrics*. 2006;118:528–535.
49. Gomes PB, Duarte MA, Melo Mdo C. Comparison of the effectiveness of polyethylene glycol 4000 without electrolytes and magnesium hydroxide in the treatment of chronic functional constipation in children. *J Pediatr (Rio J)*. 2011;87:24–28.
50. Luthra P, Camilleri M, Burr NE, Quigley EMM, Black CJ, Ford AC. Efficacy of drugs in chronic idiopathic constipation: a systematic review and network meta-analysis. *Lancet Gastroenterol Hepatol*. 2019;4:831–844.
51. Sayuk GS, Waldman SA, Brenner DM. Mechanisms of action of current pharmacologic options for the treatment of chronic idiopathic constipation and irritable bowel syndrome with constipation. *Am J Gastroenterol*. 2022;117:S6–S13.
52. Grossi U, Di Tanna GL, Heinrich H, Taylor SA, Knowles CH, Scott SM. Systematic review with meta-analysis: defecography should be a first-line diagnostic modality in patients with refractory constipation. *Aliment Pharmacol Ther*. 2018;48:1186–1201.
53. Surrenti E, Rath DM, Pemberton JH, Camilleri M. Audit of constipation in a tertiary referral gastroenterology practice. *Am J Gastroenterol*. 1995;90:1471–1475.
54. Chiarioni G, Kim SM, Vantini I, Whitehead WE. Validation of the balloon evacuation test: reproducibility and agreement with findings from anorectal manometry and electromyography. *Clin Gastroenterol Hepatol*. 2014;12:2049–2054.
55. Carrington EV, Scott SM, Bharucha A, et al; International Anorectal Physiology Working Group and the International Working Group for Disorders of Gastrointestinal Motility and Function. Expert consensus document: advances in the evaluation of anorectal function. *Nat Rev Gastroenterol Hepatol*. 2018;15:309–323.
56. Carrington EV, Heinrich H, Knowles CH, et al; All members of the International Anorectal Physiology Working Group. The international anorectal physiology working group (IAPWG) recommendations: standardized testing protocol and the London classification for disorders of anorectal function. *Neurogastroenterol Motil*. 2020;32:e13679.
57. Fletcher JG, Busse RF, Riederer SJ, et al. Magnetic resonance imaging of anatomic and dynamic defects of the pelvic floor in defecatory disorders. *Am J Gastroenterol*. 2003;98:399–411.
58. Mortele KJ, Fairhurst J. Dynamic MR defecography of the posterior compartment: Indications, techniques and MRI features. *Eur J Radiol*. 2007;61:462–472.
59. Martellucci J, Naldini G. Clinical relevance of transperineal ultrasound compared with evacuation proctography for the evaluation of patients with obstructed defaecation. *Colorectal Dis*. 2011;13:1167–1172.
60. Murad-Regadas SM, Regadas Filho FS, Regadas FS, et al. Use of dynamic 3-dimensional transvaginal and transrectal ultrasonography to assess posterior pelvic floor dysfunction related to obstructed defecation. *Dis Colon Rectum*. 2014;57:228–236.
61. Corsetti M, Brown S, Chiarioni G, et al. Chronic constipation in adults: contemporary perspectives and clinical challenges. 2: Conservative, behavioural, medical and surgical treatment. *Neurogastroenterol Motil*. 2021;33:e14070.
62. Nam YS, Pikarsky AJ, Wexner SD, et al. Reproducibility of colonic transit study in patients with chronic constipation. *Dis Colon Rectum*. 2001;44:86–92.
63. Hinton JM, Lennard-Jones JE, Young AC. A new method for studying gut transit times using radioopaque markers. *Gut*. 1969;10:842–847.
64. Metcalf AM, Phillips SF, Zinsmeister AR, MacCarty RL, Beart RW, Wolff BG. Simplified assessment of segmental colonic transit. *Gastroenterology*. 1987;92:40–47.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

65. Cowlam S, Khan U, Mackie A, Varma JS, Yiannankou Y. Validity of segmental transit studies used in routine clinical practice, to characterize defaecatory disorder in patients with functional constipation. *Colorectal Dis*. 2008;10:818–822.
66. Staller K, Barshop K, Ananthakrishnan AN, Kuo B. Rectosigmoid localization of radiopaque markers does not correlate with prolonged balloon expulsion in chronic constipation: results from a multicenter cohort. *Am J Gastroenterol*. 2015;110:1049–1055.
67. Rao SS, Kuo B, McCallum RW, et al. Investigation of colonic and whole-gut transit with wireless motility capsule and radiopaque markers in constipation. *Clin Gastroenterol Hepatol*. 2009;7:537–544.
68. Degen LP, Phillips SF. How well does stool form reflect colonic transit? *Gut*. 1996;39:109–113.
69. Lee YY. What's new in the toolbox for constipation and fecal incontinence? *Front Med (Lausanne)*. 2014;1:5.
70. Koh CE, Young CJ, Young JM, Solomon MJ. Systematic review of randomized controlled trials of the effectiveness of biofeedback for pelvic floor dysfunction. *Br J Surg*. 2008;95:1079–1087.
71. Skardoon GR, Khera AJ, Emmanuel AV, Burgell RE. Review article: dyssynergic defaecation and biofeedback therapy in the pathophysiology and management of functional constipation. *Aliment Pharmacol Ther*. 2017;46:410–423.
72. Woodward S, Norton C, Chiarelli P. Biofeedback for treatment of chronic idiopathic constipation in adults. *Cochrane Database Syst Rev*. 2014;2014:CD008486.
73. Murad-Regadas SM, Regadas FSP, Bezerra CCR, et al. Use of biofeedback combined with diet for treatment of obstructed defecation associated with paradoxical puborectalis contraction (Anismus): predictive factors and short-term outcome. *Dis Colon Rectum*. 2016;59:115–121.
74. Ahadi T, Madjlesi F, Mahjoubi B, et al. The effect of biofeedback therapy on dyssynergic constipation in patients with or without irritable bowel syndrome. *J Res Med Sci*. 2014;19:950–955.
75. Zhang Y, Wang Z-N, He L, et al. Botulinum toxin type-A injection to treat patients with intractable anismus unresponsive to simple biofeedback training. *World J Gastroenterol*. 2014;20:12602–12607.
76. Chaichanavichkij P, Vollebregt PF, Scott SM, Knowles CH. Botulinum toxin type A for the treatment of dyssynergic defaecation in adults: a systematic review. *Colorectal Dis*. 2020;22:1832–1841.
77. Balata M, Elgendy H, Emile SH, Youssef M, Omar W, Khafagy W. Functional outcome and sexual-related quality of life after transperineal versus transvaginal repair of anterior rectocele: a randomized clinical trial. *Dis Colon Rectum*. 2020;63:527–537.
78. Gultekin FA, Kokturk F. Functional and sexual outcome of laparoscopic ventral mesh rectopexy vs transperineal mesh repair in the treatment of rectocele: a retrospective analysis. *Eur Surg*. 2021;53:231–239.
79. De Robles MS, Young CJ. Transperineal rectocele repair is ideal for patients presenting with fecal incontinence. *Ann Coloproctol*. 2022;38:376–379.
80. Hicks CW, Weinstein M, Wakamatsu M, Savitt L, Pulliam S, Bordeianou L. In patients with rectoceles and obstructed defecation syndrome, surgery should be the option of last resort. *Surgery*. 2014;155:659–667.
81. Bogaerts-Samama M, Driessen S, Jenninga E, Delemarre J, Trimbos J, Westerweel M. Outcome and medium-term functional results of anterior rectopexy for rectocele repair. *Gynecol Surg*. 2014;11:257–260.
82. Giarratano G, Toscana C, Toscana E, Shalaby M, Sileri P. Stapled transanal rectal resection for the treatment of rectocele associated with obstructed defecation syndrome: a large series of 262 consecutive patients. *Tech Coloproctol*. 2019;23:231–237.
83. Maeda K, Honda K, Koide Y, et al. Outcomes of transvaginal anterior levatorplasty with posterior colporrhaphy for symptomatic rectocele. *J Anus Rectum Colon*. 2021;5:137–143.
84. Li W, Wu Z, Ozuner G. Does rectocele repair combined with other perineal surgeries affect outcome compared to solo rectocele repair? *Gynecol Obstet Invest*. 2021;86:454–459.
85. Pagano C, Venturi M, Benegiamo G, Melada E, Vergani C. Mucopexy-Recto Anal Lifting (MuRAL) in managing obstructed defecation syndrome associated with prolapsed hemorrhoids and rectocele: preliminary results. *Ann Surg Treat Res*. 2020;98:277–282.
86. Sforza D, Belardi C, Pellicciaro M, Filingeri V. Transanal repair of rectocele with high frequency radio scalpel. *G Chir*. 2018;34:303–308.
87. Tsunoda A, Takahashi T, Kusanagi H. Transanal repair of rectocele: prospective assessment of functional outcome and quality of life. *Colorectal Dis*. 2020;22:178–186.
88. Marinkovic SP, Hughes S, Xie D, Gillen LM, Marinkovic CM. Transvaginal rectocele repair with human dermal allograft interposition and bilateral sacrospinous fixation with a minimum eight-year follow-up. *BMC Urol*. 2016;16:16.
89. Tsunoda A, Takahashi T, Matsuda S, Kusanagi H. Long-term annual functional outcome after laparoscopic ventral rectopexy for rectoanal intussusception and/or rectocele: evaluation of sustained improvement. *Tech Coloproctol*. 2021;25:1281–1289.
90. Shi Y, Yu Y, Zhang X, Li Y. Transvaginal mesh and transanal resection to treat outlet obstruction constipation caused by rectocele. *Med Sci Monit*. 2017;23:598–605.
91. Melich G, Pai A, Kwak M, et al. Transverse incision transvaginal rectocele repair combined with levatorplasty and biological graft insertion: technical details and case series outcomes. *Tech Coloproctol*. 2016;20:51–57.
92. Shafik AA, El Sibai O, Shafik IA. Rectocele repair with stapled transvaginal rectal resection. *Tech Coloproctol*. 2016;20:207–214.
93. Zimmermann EF, Hayes RS, Daniels IR, Smart NJ, Warwick AM. Transperineal rectocele repair: a systematic review. *ANZ J Surg*. 2017;87:773–779.
94. Ladd M, Tuma F. Rectocele. In: *StatPearls*. Treasure Island, FL: StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK546689/.
95. Grimes CL, Schimpf MO, Wieslander CK, et al; Society of Gynecologic Surgeons (SGS) Systematic Review Group (SRG). Surgical interventions for posterior compartment prolapse and obstructed defecation symptoms: a systematic review with clinical practice recommendations. *Int Urogynecol J*. 2019;30:1433–1454.
96. Ripamonti L, Guttadauro A, Lo Bianco G, et al. Stapled transanal rectal resection (STARR) in the treatment of obstructed defecation: a systematic review. *Front Surg*. 2022;9:790287.

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

97. Guttadauro A, Chiarelli M, Maternini M, Baini M, Pecora N, Gabrielli F. Value and limits of stapled transanal rectal repair for obstructed defecation syndrome: 10 years-experience with 450 cases. *Asian J Surg*. 2018;41:573–577.
98. Borie F, Bigourdan J-M, Pissas M-H, Guillon F. Laparoscopic ventral rectopexy for the treatment of outlet obstruction associated with recto-anal intussusception and rectocele: a valid alternative to STARR procedure in patients with anal sphincter weakness. *Clin Res Hepatol Gastroenterol*. 2014;38:528–534.
99. Boccasanta P, Agradi S, Vergani C, et al. The evolution of transanal surgery for obstructed defecation syndrome: mid-term results from a randomized study comparing double TST 36 HV and Contour TRANSTAR staplers. *Am J Surg*. 2018;216:893–899.
100. Anannamcharoen S, Areerattanavet K. Short-term outcomes after anterior stapling rectotomy using a single stapler device for rectocele. *Asian Biomed*. 2015;9:133–138.
101. Petersen S, Sterzing D, Ommer A, et al. TST36 stapling for rectocele and hemorrhoidal prolapse–early results of the prospective German multicenter study. *Ger Med Sci*. 2016;14:DOC14.
102. Regadas FSP, Murad-Regadas SM, Rodrigues LV, Regadas Filho FSP, Vilarinho AS, Morano DP. Impact of TRREMS on symptoms of obstructed defecation due to rectocele: predictive factors and outcomes. *Tech Coloproctol*. 2020;24:65–73.
103. Panicucci S, Martellucci J, Menconi C, Toniolo G, Naldini G. Correlation between outcome and instrumental findings after stapled transanal rectal resection for obstructed defecation syndrome. *Surg Innov*. 2014;21:469–475.
104. Schiano di Visconte M, Nicolì F, Pasquali A, Bellio G. Clinical outcomes of stapled transanal rectal resection for obstructed defaecation syndrome at 10-year follow-up. *Colorectal Dis*. 2018;20:614–622.
105. Madbouly KM, Mohii AD. Laparoscopic ventral rectopexy versus stapled transanal rectal resection for treatment of obstructed defecation in the elderly: long-term results of a prospective randomized study. *Dis Colon Rectum*. 2019;62:47–55.
106. Lian T, Wang N. Stapled trans-anal rectal resection can improve constipation symptoms and inflammatory reaction of patients with outlet obstructive constipation. *Am J Transl Res*. 2021;13:11472–11481.
107. Naldini G, Fabiani B, Menconi C, et al. Treatment of obstructed defecation syndrome due to rectocele and rectal intussusception with a high volume stapler (TST STARR-plus). *Tech Coloproctol*. 2018;22:53–58.
108. Christiansen J, Zhu BW, Rasmussen OO, Sørensen M. Internal rectal intussusception: results of surgical repair. *Dis Colon Rectum*. 1992;35:1026–1028.
109. Murad-Regadas SM, Regadas FS, Rodrigues LV, Fernandes GO, Buchen G, Kenmoti VT. Management of patients with rectocele, multiple pelvic floor dysfunctions and obstructed defecation syndrome. *Arq Gastroenterol*. 2012;49:135–142.
110. Gallo G, Clerico G, Realis Luc A, Trompetto M. A step-by-step approach to endorectal proctopexy (ERPP): how we do it. *Tech Coloproctol*. 2021;25:879–886.
111. Ganio E, Martina S, Novelli E, et al. Internal Delorme's procedure for rectal outlet obstruction. *Colorectal Dis*. 2013;15:e144–e150.
112. Slawik S, Soulsby R, Carter H, Payne H, Dixon AR. Laparoscopic ventral rectopexy, posterior colporrhaphy and vaginal sacrocolpopexy for the treatment of recto-genital prolapse and mechanical outlet obstruction. *Colorectal Dis*. 2008;10:138–143.
113. Portier G, Kirzin S, Cabarrot P, Queralto M, Lazorthes F. The effect of abdominal ventral rectopexy on faecal incontinence and constipation in patients with internal intra-anal rectal intussusception. *Colorectal Dis*. 2011;13:914–917.
114. Knowles CH, Scott M, Lunniss PJ. Outcome of colectomy for slow transit constipation. *Ann Surg*. 1999;230:627–638.
115. Webster C, Dayton M. Results after colectomy for colonic inertia: a sixteen-year experience. *Am J Surg*. 2001;182:639–644.
116. Redmond JM, Smith GW, Barofsky I, Ratych RE, Goldsborough DC, Schuster MM. Physiological tests to predict long-term outcome of total abdominal colectomy for intractable constipation. *Am J Gastroenterol*. 1995;90:748–753.
117. Pikarsky AJ, Singh JJ, Weiss EG, Nogueras JJ, Wexner SD. Long-term follow-up of patients undergoing colectomy for colonic inertia. *Dis Colon Rectum*. 2001;44:179–183.
118. Hsiao KC, Jao SW, Wu CC, Lee TY, Lai HJ, Kang JC. Hand-assisted laparoscopic total colectomy for slow transit constipation. *Int J Colorectal Dis*. 2008;23:419–424.
119. De Marco P, Militello G, Tutino R, et al. The management of the slow transit constipation in the laparoscopic era. *G Chir*. 2018;34:297–302.
120. Patton V, Balakrishnan V, Pieri C, et al. Subtotal colectomy and ileorectal anastomosis for slow transit constipation: clinical follow-up at median of 15 years. *Tech Coloproctol*. 2020;24:173–179.
121. Thaler K, Dinnewitzer A, Oberwalder M, et al. Quality of life after colectomy for colonic inertia. *Tech Coloproctol*. 2005;9:133–137.
122. FitzHarris GP, Garcia-Aguilar J, Parker SC, et al. Quality of life after subtotal colectomy for slow-transit constipation: both quality and quantity count. *Dis Colon Rectum*. 2003;46:433–440.
123. Li N, Jiang J, Feng X, Ding W, Liu J, Li J. Long-term follow-up of the Jinling procedure for combined slow-transit constipation and obstructive defecation. *Dis Colon Rectum*. 2013;56:103–112.
124. Jiang CQ, Qian Q, Liu ZS, Bangoura G, Zheng KY, Wu YH. Subtotal colectomy with antiperistaltic cecoproctostomy for selected patients with slow transit constipation—from Chinese report. *Int J Colorectal Dis*. 2008;23:1251–1256.
125. Iannelli A, Fabiani P, Mouiel J, Gugenheim J. Laparoscopic subtotal colectomy with cecorectal anastomosis for slow-transit constipation. *Surg Endosc*. 2006;20:171–173.
126. Marchesi F, Percalli L, Pinna F, Cecchini S, Ricco' M, Roncoroni L. Laparoscopic subtotal colectomy with antiperistaltic cecorectal anastomosis: a new step in the treatment of slow-transit constipation. *Surg Endosc*. 2012;26:1528–1533.
127. Iannelli A, Piche T, Dainese R, et al. Long-term results of subtotal colectomy with cecorectal anastomosis for isolated colonic inertia. *World J Gastroenterol*. 2007;13:2590–2595.
128. Marchesi F, Sarli L, Percalli L, et al. Subtotal colectomy with antiperistaltic cecorectal anastomosis in the treatment of slow-transit constipation: long-term impact on quality of life. *World J Surg*. 2007;31:1658–1664.
129. Feng Y, Jianjiang L. Functional outcomes of two types of subtotal colectomy for slow-transit constipation: ileosigmoidal anastomosis and cecorectal anastomosis. *Am J Surg*. 2008;195:73–77.

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.

130. Gao F, Xu M, Wu W, Yang Z, Zhang X. Subtotal colectomy with cecorectal end-side anastomosis in the treatment of slow transit constipation. *Zhonghua Wei Chang Wai Ke Za Zhi*. 2014;17:680–682.
131. Xie XY, Sun KL, Chen WH, et al. Surgical outcomes of subtotal colectomy with antiperistaltic caecorectal anastomosis vs total colectomy with ileorectal anastomosis for intractable slow-transit constipation. *Gastroenterol Rep (Oxf)*. 2019;7:449–454.
132. El-Tawil AM. Reasons for creation of permanent ileostomy for the management of idiopathic chronic constipation. *J Gastroenterol Hepatol*. 2004;19:844–846.
133. Scarpa M, Barollo M, Keighley MR. Ileostomy for constipation: long-term postoperative outcome. *Colorectal Dis*. 2005;7:224–227.
134. Stabile G, Kamm MA, Hawley PR, Lennard-Jones JE. Results of stoma formation for idiopathic megarectum and megacolon. *Int J Colorectal Dis*. 1992;7:82–84.
135. Davis G, Chapple K, Brown SR. Ileostomy for chronic constipation: a good idea or just asking for more trouble? *Colorectal Dis*. 2021;23:1474–1479.
136. Iqbal F, van der Ploeg V, Adaba F, et al. Patient-reported outcome after ostomy surgery for chronic constipation. *J Wound Ostomy Continence Nurs*. 2018;45:319–325.

Downloaded from http://journals.lww.com/dcrjournal by BhDMf5ePHKav1zEoum1tQfN4a+kJLhEZgbsIHo4XMi0hCywCX1AWnYQp/IlQrHD3i3D0OdRyi7TvSFl4Cf3VC4/OAVpDDa8KKGKV0Ymy+78= on 10/03/2024

Copyright © The American Society of Colon & Rectal Surgeons, Inc. Unauthorized reproduction of this article is prohibited.