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Consensus statement AIGO/SICCR diagnosis and treatment of chronic constipation and obstructed defecation (Part Ⅱ: Treatment)

Antonio Bove, Massimo Bellini, Edda Battaglia, Renato Bocchini, Dario Gambaccini, Vincenzo Bove, Filippo Pucciani, Donato Francesco Altomare, Giuseppe Dodi, Guido Sciaudone, Ezio Falletto, Vittorio Piloni

Antonio Bove, Vincenzo Bove, Gastroenterology and Endoscopy Unit, Department of Gastroenterology, AORN "A. Cardarelli", 80131 Naples, Italy
Massimo Bellini, Dario Gambaccini, Gastrointestinal Unit, Department of Gastroenterology, University of Pisa, 56100 Pisa, Italy
Edda Battaglia, Gastroenterology and Endoscopy Unit, Cardinal Massaja Hospital, 14100 Asti, Italy
Renato Bocchini, Gastroenterology Unit, M. Bufalini Hospital, 47023 Cesena, Italy
Filippo Pucciani, Department of Medical and Surgical Critical Care, University of Florence, 50141 Florence, Italy
Donato Francesco Altomare, Department of Emergency and Organ Transplantation, University of Bari, 70124 Bari, Italy
Giuseppe Dodi, Department of Oncological and Surgical Sciences, University of Padua, 35126 Padua, Italy
Guido Sciaudone, Division of General and Geriatric Surgery, Second University of Naples, 80131 Naples, Italy
Ezio Falletto, Sixth Division of University Surgery, Department of General Surgery, San Giovanni Battista Hospital, 10126 Turin, Italy
Vittorio Piloni, Diagnostic Imaging Centre "N. Aliotta", Villa Silvia - Senigallia, I-60100 Ancona, Italy
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Correspondence to: Antonio Bove, MD, Gastroenterology and Endoscopy Unit, Department of Gastroenterology, AORN "A. Cardarelli", Via Cardarelli, 9, 80131 Naples, Italy. 3392982380@fastwebnet.it
Telephone: +39-81-7474034 Fax: +39-81-7474034
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Abstract

The second part of the Consensus Statement of the Italian Association of Hospital Gastroenterologists and Italian Society of Colo-Rectal Surgery reports on the treatment of chronic constipation and obstructed defecation. There is no evidence that increasing fluid intake and physical activity can relieve the symptoms of chronic constipation. Patients with normal-transit constipation should increase their fibre intake through their diet or with commercial fibre. Osmotic laxatives may be effective in patients who do not respond to fibre supplements. Stimulant laxatives should be reserved for patients who do not respond to osmotic laxatives. Controlled trials have shown that serotoninergic enterokinetic agents, such as prucalopride, and prosecretory agents, such as lubiprostone, are effective in the treatment of patients with chronic constipation. Surgery is sometimes necessary. Total colectomy with ileorectostomy may be considered in patients with slow-transit constipation and inertia coli who are resistant to medical therapy and who do not have defecatory disorders, generalised motility disorders or psychological disorders. Randomised controlled trials have established the efficacy of rehabilitative treatment in dys-synergic defecation. Many surgical procedures may be used to treat obstructed defecation in patients with acquired anatomical defects, but none is considered to be the gold standard. Surgery should be reserved for selected patients with an impaired quality of life. Obstructed defecation is often associated with pelvic organ prolapse. Surgery with the placement of prostheses is replacing fascial surgery in the treatment of pelvic organ prolapse, but the efficacy and safety of such procedures have not yet been established.

Key words: Laxatives; Prokinetics; Biofeedback; Pelvic floor rehabilitation; Outlet obstruction; Stapled transanal rectal resection; Delorme operation; Colectomy; Pelvic organ prolapse; Mesh

Peer reviewer: Timothy R Koch, MD, FACG, Professor of Medicine, Gastroenterology, Washington Hospital Center, Georgetown University School of Medicine, POB North, Suite 3400, 106 Irving Street, NW, Washington, DC 20010, United States

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MEDICAL AND REHABILITATIVE TREATMENT

Behavioural modification is considered to be the first-line treatment in patients with symptomatic chronic constipation. If the behavioural modification proves unsuccessful, various pharmacological approaches are available.

Behavioural modification

Recommendations for lifestyle changes in patients with chronic constipation are based on the widespread belief that constipation is associated with low physical activity, reluctance to defecate whenever the need is felt, and poor fluid intake.

Can behavioural changes help the patient with chronic constipation?

Physical exercise: Epidemiological studies report that constipation is more frequent in subjects with a sedentary lifestyle[1]. Physical activity can increase colonic transit time[2] and reduce other symptoms of constipation in elderly subjects[3]. Trials evaluating the effect of exercise in constipated patients are lacking. Increased physical activity is often recommended for patients with chronic constipation, but there is no evidence that constipation can be improved by increased physical activity.

Defecation habits: Patients with chronic constipation are often instructed to defecate when the need is felt and to try to defecate at the same time every day, ideally upon awakening and after meals, when the colonic motor activity is highest. This recommendation is based on the observation that many people with normal colonic activity routinely defecate at the same time each day[4]. Trials evaluating this recommendation in constipated patients are also lacking.

Increased fluid intake: It is generally believed that increased fluid intake improves constipation. In one trial, healthy volunteers were given increasing amounts of liquids, up to 2 L/d. The volume of urine increased, but the stool frequency did not[5]. This finding is not surprising because the absorption capacity of the small intestine is 7-10 L/d. Trials evaluating the effect of increased liquid intake in constipated patients are lacking, and there is no evidence that constipation can be improved by increasing oral fluid intake, unless the patient is dehydrated[6]. Suggestions for behavioural changes are not usually helpful. These recommendations are supported by Level V evidence, Grade C recommendation.

PHARMACOLOGICAL THERAPY

Various drugs are available to treat chronic constipation (Table 1). Laxatives generally can resolve the symptoms of constipation, but few rigorous studies on their effectiveness have been conducted[7]. Placebo-controlled trials conducted over a sufficient period of time are needed to demonstrate the actual efficacy of an agent. Many trials have been of short duration (4 wk), which limits the validity of their conclusions because cognitive studies have shown that half of all patients become dissatisfied with their therapy over time[8]. Furthermore, the results of different studies are not always comparable; the definition of constipation may not be sufficiently specific, and the therapeutic end-point may simply be stool frequency, without taking other symptoms into account.

The resolution of constipation-related symptoms is an important therapeutic target because constipation is a complex condition, with hard stool, straining, incomplete evacuation, bloating, and abdominal discomfort. Infrequent bowel movements are not always present, and infrequent bowel movements are certainly not the most unpleasant[8] symptom of constipation. Additionally, investigators have only recently begun to address the important problem of quality of life in patients with constipation, which has been shown to worsen as constipation-related symptoms increase[9-11].

Defining constipation remains difficult[12]. Patients and physicians often have different feelings and opinions on the matter; patients use the word "constipation" to mean the annoying symptoms related to defecation, but physicians use this term to describe infrequent bowel movements[13,14]. Constipation has two different but overlapping pathophysiological characteristics: delayed transit and evacuation disorders. The Roma Ⅲ criteria[15,16] were developed by an international panel of experts and have been applied in several clinical trials of laxatives. These criteria have also been adopted in this consensus statement and are useful in clinical practice and for clinical research.

Bulking laxatives

Bulking laxatives consist of fibre. These agents must be ingested with sufficient amounts of water to increase the weight of the faeces. Their action begins within 12 to 72 h, but their effectiveness should be assessed after a period of some weeks. There are two types of fibre: in-

Table 1 Classes of drugs used to treat chronic constipation

Type of medication	Drugs
Laxatives	
Bulking (insoluble and soluble fibres)	Bran, methylcellulose, psyllium
Osmotic	Lactulose, sorbitol, magnesium hydroxide, magnesium salts, polyethylene glycol
Stimulant	Anthraquinone derivatives: senna, aloe, cascara
	Diphenylmethane derivatives: bisacodyl, sodium picosulfate
Softening	Liquid paraffin (vaseline oil), docusate, glycerine
Serotoninergic enterokinetic agents	Tegaserod, prucalopride, renzapride
Prosecretory agents	Lubiprostone, linaclotide
Gastrointestinal μ-opioid antagonists	Methylnaltrexone, alvimopan
Probiotics	Bifidobacterium, lactobacillus
Colchicine	

soluble and soluble. Insoluble fibre consists of bran containing cellulose, hemicellulose and lignin. Galattomannan, pectin, gum and mucilage are types of soluble fibre that can be found in fruits and in some vegetables. Most types of soluble fibre are completely fermented in the colon, except psyllium, which is only partially fermented. Fermentation increases the production of short-chain fats and gas; therefore, one side effect of bulking laxatives is bloating.

What evidence is there for the effectiveness of added fibre intake?

Current guidelines recommend the use of fibre in both dietary and supplement form for the first-line treatment of chronic constipation[17], but a recent review showed that there is little evidence to support this approach[18].

Trials of insoluble fibre

There have been only two well-conducted placebo-controlled trials of insoluble fibre[18]; the first used bran and the second used rye bread. The first trial was a crossover study that enrolled 24 patients. In this study, the effectiveness of bran was documented only if the placebo was given before the bran[19]. The second trial studied 29 patients and compared a diet rich in rye bread to a diet containing low-fibre bread. The bowel movement frequency and difficulty in defecation significantly improved with a diet rich in rye bread[20].

In a randomised trial, 117 constipated patients were treated with bran plus water: one group was told to drink water as desired, whereas the other group was instructed to consume 2 L of water per day. The ingestion of bran plus 2 L of water increased the stool frequency ($P < 0.001$) and reduced the use of rescue laxatives[21]. Fibre supplementation may lead to the increased use of enemas and suppositories[22]. The data regarding insoluble fibre are conflicting[18]. Treating constipation with bran is supported by Level Ⅲ evidence, Grade C recommendation.

Trial of soluble fibre

Placebo-controlled trials of psyllium: Psyllium fibre is partially soluble and is the most studied type of fibre. Three placebo-controlled trials on the efficacy of psyllium have been published[23-25]. Two found that psyllium was superior to a placebo in increasing the frequency of defecation ($P < 0.05$) and improving the consistency of the stool ($P < 0.05$)[23,24]. Ashraf *et al*[23] conducted a well-designed study, but it only lasted 8 wk and only enrolled 22 patients. The third study reported no significant difference between psyllium and a placebo[25].

Studies comparing psyllium with other laxatives: One trial reported no difference in the stool frequency between a regimen of senna plus psyllium and psyllium alone[26]. A study comparing psyllium and laxatives (lactulose, bisacodyl, docusate, senna and magnesium salts) found that psyllium was more effective in increasing the stool frequency and improving the stool's consistency[27]. The use of psyllium is supported by Level Ⅱ evidence, Grade B recommendation.

Osmotic laxatives

Osmotic laxatives attract water into the colon by osmosis. Sugar-based laxatives and polyethylene glycol (PEG) are effective after 24 to 48 h. Magnesium hydroxide and magnesium salts are effective after 6-8 h.

How effective are osmotic laxatives?

Placebo-controlled trials of lactulose: Three trials have shown the effectiveness of lactulose[28-30] in increasing the stool frequency ($P < 0.05$). These trials may be biased, however, because of the number of patients enrolled and their age; furthermore, the sex distribution and treatment duration were not specified. The side effects of lactulose include bloating, nausea and abdominal cramps.

Trials of lactulose *vs* other laxatives: Several trials have compared lactulose with other laxatives. Lactulose was shown to be less effective than PEG[31,32]. Psyllium plus senna was shown to be more effective than lactulose, but this combination can cause incontinence[33-35]. No difference was found between lactulose and psyllium[36] or lactulose and sorbitol[37], but nausea was reported more frequently in patients treated with lactulose ($P < 0.05$)[37]. The recommendation regarding sorbitol could not be graded because of insufficient data; the trial only enrolled men, and the randomisation procedure was not described[37]. The use of lactulose is supported by Level Ⅱ evidence, Grade B recommendation.

Magnesium hydroxide and magnesium salts: There is only one study in the literature that compares magnesium hydroxide to bulking laxatives[38]. Published in 1987 and focusing on elderly patients, this study has various drawbacks. However, in patients receiving magnesium hydroxide, the stool frequency was higher ($P < 0.001$), and the use of rescue laxatives was lower ($P < 0.01$).

The possible risk of hypermagnesemia with these agents must be mentioned[38]. Hypermagnesemia was not reported in this study but can occur in patients suffering from renal disease[39].

No clinical trials using magnesium salts (Epsom salts, English salt) have been published in the last 40 years. The use of magnesium hydroxide is supported by Level V evidence, Grade C recommendation.

Placebo-controlled trial of PEG: PEG is an organic polymer that is not degraded by the intestinal flora. The effectiveness of PEG has been documented in numerous trials[40-44]. PEG increased the stool frequency ($P < 0.01$) while improving the stool consistency[40,41,43] and reducing other symptoms of constipation[41,43]. Iso-osmotic or hypo-osmotic solutions of PEG consistently improved the frequency of bowel movements compared with the frequency before treatment ($P < 0.001$)[45]. PEG was well tolerated, and side effects (abdominal cramps, flatulence, nausea) were rare.

Trials of PEG *vs* other laxatives: PEG is more effective than lactulose[31,32] in increasing the stool frequency and improving the stool's consistency. In patients treated with PEG, there are also lower rates of rescue medication use and flatulence. One trial showed that PEG was more effective than Tegaserod[46]. PEG is a pillar in the treatment of chronic idiopathic constipation because of its high efficacy. There is evidence that PEG provides significant benefits compared with placebos and other laxatives. Furthermore, retrospective studies show that PEG remains effective for up two years of treatment[46,47]. The use of PEG is supported by Level I evidence, Grade A recommendation.

Stimulant laxatives

Stimulant laxatives are not absorbed and have a prokinetic effect in the colon; they stimulate the production of secretions and reduce the absorption of water and electrolytes. Stimulant laxatives begin to take effect 6 to 12 h after administration. Bisacodyl and sodium picosulfate (SPS) are prodrugs[48].

How effective are the stimulant laxatives?

Placebo-controlled trial of stimulant laxatives: Although stimulant laxatives have been used for many years to treat patients with constipation and are often used as rescue medications in clinical trials of other laxatives, only recently have placebo-controlled trials of stimulant laxatives been conducted. SPS[49] and oral bisacodyl[50] increase the stool frequency ($P < 0.0001$) while improving the stool consistency and decreasing the symptoms of constipation and the use of rescue medications ($P < 0.01$). These drugs are well tolerated and appear to generally improve the patient's quality of life.

Comparison of stimulant laxatives and other laxatives

Senna plus a bulk laxative[33,34] is more effective than lactulose ($P < 0.05$) but less effective than psyllium alone[26]. The faeces are softer with lactulose than with stimulant laxatives ($P < 0.001$)[51].

Adverse effects of stimulant laxatives include abdominal cramps and diarrhoea. Experimental studies have shown that stimulant laxatives do not damage the colonic epithelium[52]. Hepatotoxicity has been reported with some products; anthraquinone derivatives can cause melanosis of the colon.

Some physicians fear that the prolonged use of stimulant laxatives can induce dependency. The classical concept of dependency to a drug is characterised by specific features such as lack of control over intake, compulsive use and craving for the drug. The addiction to drugs usually occurs via the activation of dopaminergic systems after passage through the blood-brain barrier. Stimulant laxatives are not absorbed and do not pass the blood-brain barrier, so there is no pharmacologic basis for dependency. Moreover, the existence of "rebound constipation" after the laxatives are stopped has not been definitively established[6]. However, many constipated patients require a constant intake of laxatives to achieve normal (or what they believe to be "normal") bowel movements. Additionally, the abuse of laxatives has been reported in some patients; these cases of laxative misuse are often the result of psychological/psychiatric problems[53]. The use of SPS and bisacodyl is supported by Level I evidence, Grade B recommendation. It is not possible to provide graded recommendations for the other stimulant laxatives because placebo-controlled trials are lacking.

Softening laxatives

Softening laxatives make the stool softer by forming an emulsion of the faeces with lipids and water. Olive oil and sweet almond oil can function as softeners if their intake exceeds the absorptive capacity of the small intestine.

What evidence is there for the effectiveness of softening laxatives?

Docusate: Docusate is an anionic detergent that mixes aqueous and fatty components, thereby softening the stool; it may be administered orally or rectally through enemas or micro-enemas. When administered per rectum, docusate acts within 30 min.

Placebo-controlled trial of docusate: Two trials testing orally administered docusate yielded conflicting results. In the first trial, there was no difference in the stool frequency[54], but in the other study, a significant difference in stool frequency was observed ($P < 0.01$)[55].

Comparison of docusate with other laxatives: Psyllium was more effective than docusate for stool softening ($P < 0.04$)[56]. Therapy with docusate is supported by Level V evidence, Grade C recommendation.

Liquid paraffin (vaseline oil): Liquid paraffin is taken

orally and begins to take effect 6-12 h after administration. It acts by reducing the absorption of water and electrolytes. Its chronic use can damage the mucosal epithelium and lead to malabsorption of fat-soluble vitamins; aspiration can cause lipoid pneumonia. We did not find any randomised clinical trials in the literature on this product.

Glycerine: Glycerine, used as a suppository and mixed into enemas, is classified as a softening laxative, but its mechanism of action is unclear. It is assumed that, applied locally, glycerine produces tissue dehydration and irritation that in turn stimulate contractions of the rectum and defecation.

Serotoninergic enterokinetic agents

Serotonin (5-HT) is a critical component in the regulation of gut motility, visceral sensitivity, and intestinal secretion. Serotonin acts mainly on the 5-HT3 and 5-HT4 receptors expressed by enteric nervous system interneurones. Stimulation of the 5-HT4 receptor is responsible for excitatory effects such as the peristaltic reflex.

The 5-HT4 receptor agonists belong to several different classes of drugs. Cisapride is a substituted benzamide that acts as a partial 5-HT4 receptor agonist. Renzapride is a benzamide hydrochloride that is a full agonist of the 5-HT4 receptor, an antagonist of the 5-HT3 receptor, and a weak partial antagonist of the 5-HT2b receptor. Tegaserod is an aminoguanidineindole that is a 5-HT4/5-HT1 receptor partial agonist and a 5-HT2 receptor antagonist. It also has been shown to inhibit dopamine and noradrenaline transporters. Prucalopride is a dihydrobenzofurancarboxamide that is a selective 5-HT4 receptor agonist.

What evidence is there for the effectiveness of these drugs?

Placebo-controlled trials of serotoninergic enterokinetic agents: A recent systematic review of available controlled trials[57] showed that cisapride was more effective than a placebo in improving the gastrointestinal transit time. However, there was no evidence that cisapride use resulted in a global improvement of constipation-related symptoms compared to the placebo. It was concluded that cisapride use had no clear benefit and that the use of this drug could not be justified because of its cardiotoxic side effects. Indeed, in 2000, cisapride was withdrawn from the market because it had been associated with rare dose-dependent cardiac events, including lengthening of the QT interval, syncope, and ventricular arrhythmia in patients with predisposing conditions. These effects may be caused by the interaction of cisapride with the cardiac hER potassium channel. Although cisapride was withdrawn from the market, it can still be purchased online.

In a placebo-controlled trial, renzapride[58] was only marginally superior to a placebo in reducing the symptoms of constipation and did not improve the quality of life. This drug can cause ischemic colitis.

Large studies of tegaserod[59-61] and prucalopride[62-65] have been conducted that enrolled over 2500 and 2000 patients, respectively. Both drugs improved the stool frequency ($P < 0.001$), improved stool consistency, decreased the need for rescue medications, and reduced the symptoms of constipation. Tegaserod was previously approved in the United States but was not approved in Europe, except in Switzerland. It was withdrawn from the market in March 2007 because of an increased risk of cardiovascular adverse events (including myocardial infarction, unstable angina, and stroke) and is now only available for emergency use. The cardiovascular side effects may be related to vasoconstriction mediated by 5-HT1B receptors in the vascular wall[66].

Drugs with a higher selectivity for 5-HT4 receptors (e.g., prucalopride) may be able to minimise the incidence of cardiac side effects. In a small trial of patients with chronic noncancer pain suffering from opioid-induced constipation, prucalopride was found to be effective and safe[67]. The European Medicines Agency (EMA) approved the use of prucalopride in July 2009. The use of prucalopride is supported by Level I evidence, Grade A recommendation.

Prosecretory agents

Prosecretory agents stimulate the secretion of fluid into the intestinal lumen by activating intestinal chloride channels (lubiprostone) or the guanylate-cyclase receptors of enterocytes (linaclotide).

What evidence is there for the effectiveness of the prosecretory agents?

Placebo-controlled trials using lubiprostone: Two trials[68,69] showed that lubiprostone significantly increased the stool frequency, improved the stool consistency and reduced straining. Nausea was reported as a side effect. The Food and Drug Administration approved the use of lubiprostone for the treatment of adult patients with chronic idiopathic constipation in 2006. The EMA has not yet approved its use in Europe. The use of lubiprostone is supported by Level I evidence, Grade B recommendation.

Linaclotide: This drug has been reported to be effective in irritable bowel syndrome (IBS)[70]. In patients with chronic constipation[71,72], linaclotide significantly increased the stool frequency, improved the stool consistency and reduced straining. The health-related quality of life improved. Diarrhoea can be a side effect. The drug is currently being tested in a phase Ⅱ study.

Gastrointestinal μ-opioid receptor antagonists

Constipation is a side effect of opioid treatment that results from interference with the gastrointestinal μ-opioid receptors. Methylnaltrexone and alvimopan can increase the intestinal motility in patients taking opioid medications ($P < 0.001$) without neutralising the analgesic effect

of opioids[73-75].

One trial showed these drugs to be ineffective in patients with constipation-predominant IBS[76]. It therefore appears that gastrointestinal μ-opioid receptor antagonists are only effective against opioid-induced constipation. Level I evidence, Grade A recommendation regarding the ineffectiveness of this drug in patients with functional constipation.

Probiotics

Probiotics are orally administered living microorganisms that can reach and colonise the bowel. They are mainly prescribed to reduce the bloating and abdominal pain that accompany IBS.

How effective are probiotics in the treatment of chronic constipation?

Milk fermented with *Bifidobacterium lactis* reduced the symptoms of IBS but not constipation in 41 female IBS patients[77]. In women with "self-reported" constipation, probiotics reduced the severity of constipation (P = 0.003)[78]. *Bifidobacterium animalis* increased the stool frequency ($P < 0.01$) and improved the stool consistency in both healthy and constipated women[79]. A study involving 28 subjects reported that *Lactobacillus rhamnosus* + *Propiobacterium freudenreichii* improved the stool frequency but did not decrease the consumption of laxatives[80].

Placebo-controlled trials of probiotics in chronic idiopathic constipation are lacking. Probiotics can be considered for use in conjunction with other drugs in the treatment of chronic constipation. The use of probiotics to treat chronic constipation is supported by Level V evidence, Grade C recommendation.

Colchicine

Colchicine is effective in the treatment of a variety of inflammatory syndromes. In two controlled trials that enrolled a total of 72 patients, colchicine increased the stool frequency and reduced the consumption of laxatives[81,82]. The use of colchicine is supported by Level Ⅲ evidence, Grade C recommendation.

Procedures to empty the rectum and sigmoid colon

There is no controlled randomised trial in the literature addressing the chronic use of suppositories or enemas, which are commonly used for relief from occasional constipation and to empty the rectum in bedridden patients or those with impacted faeces.

Suppositories act by making the stool softer and by generating a foreign body stimulus that leads to the defecation reflex. The precise mechanism of action of transanal irrigation is unknown. Its efficacy may be related to a wash-out effect, and large volumes of liquid generate mass movements[83]. Irrigation volumes of less than 100 mL do not produce distension of the rectum. Without evacuation, the liquid and its solutes are absorbed from the rectum.

Hyperphosphatemia has been reported as a serious adverse event following the misuse of sodium phosphate enemas. A trial recently showed that transient mild hyperphosphatemia following the use of sodium phosphate enemas correlates with retention time but not with dose[84].

Transanal irrigation of the colon, with or without a rectal balloon catheter (Peristeen®), is a useful approach in patients with neurogenic bowel dysfunction secondary to spinal injury[85].

What is the evidence confirming the effectiveness of transanal irrigation in chronic constipation?

Based on the rate of colonic emptying, transanal irrigation appears to be more effective in patients with spinal cord damage than in those with chronic constipation[85].

Retrospective studies report the benefits of transanal irrigation for constipated patients. In one study of 16 patients, symptoms were reduced in 19% of patients suffering from constipation or obstructed defecation[86]. In another study of 37 patients, with a mean observation period of 4.5 years and a maximum observation period of 13 years, transanal irrigation was beneficial in 45% of patients with defecation disturbances[87]. Cazemier *et al*[88] consulted the database of enterostomal therapists for 12 patients for constipation and reported that after a mean observation period of 8.5 years, 42% of patients routinely used transanal irrigation, and 60% were satisfied with this method.

In patients with obstructed defecation, Gosselink *et al*[87] and Gardiner *et al*[89] reported, with colonic irrigation, an effectiveness of 65% and 57%, respectively. Recently, Christensen *et al*[90] presented the results of a long-term study on Peristeen® and reported positive effects in 31% of patients with slow transit constipation, in 43% of patients with obstructed defecation, and in no patients with indeterminate constipation. Retrograde irrigation for the treatment of chronic constipation is supported by Level V evidence, Grade C recommendation. Table 2 summarises the levels of evidence and the recommendation grade for various drugs.

At what point and on what grounds should we judge a treatment to be ineffective?

Generally accepted criteria to define the response to medical therapy have not yet been developed. To date, every clinical trial has defined its own endpoints in terms of the response to therapy.

A medical treatment should be considered unsatisfactory when a patient with good compliance does not report an appreciable improvement in the symptoms and quality of life after at least 4 wk of treatment at the full dose. To assess the therapeutic response, patients should be encouraged to keep a daily diary of their symptoms[91].

REHABILITATIVE TREATMENT

Dys-synergic defecation can be effectively treated by rehabilitative treatment (RT). Protocols vary among dif-

Table 2 Levels of evidence and grades of recommendation of medical treatment in chronic constipation

	Level of evidence	Grade of recommendation
Life style		
Physical exercise	V	C
Toilet training	V	C
Increased fluid intake	V	C
Bulking laxatives		
Insoluble fibre	III	C
Soluble fibre: Psyllium	II	B
Osmotic laxatives		
Lactulose	II	B
Sorbitol	V	C
Magnesium hydroxide/magnesium salts	V	C
Polyethylene glycol	I	A
Stimulant laxatives		
Sodium picosulfate, bisacodyl	I	B
Senna, aloe, cascara	V	C
Softening laxatives		
Docusate	V	C
Serotoninergic enterokinetics		
Tegaserod	I	A[1]
Prucalopride	I	A
Prosecretory agents		
Lubiprostone	I	B[2]
Linaclotide	I	B[3]
Gastrointestinal μ-opioid antagonists		
Methylnaltrexone	I (no effect)	A (not used)
Alvimopan	I (no effect)	A (not used)[2]
Probiotics	V	C
Colchicine	III	C
Procedures to empty the rectum-sigma		
Peristeen®	V	C

[1]Food and Drug Administration prescribing restrictions; [2]Not approved in Europe; [3]Phase II study. Adapted from: American College of Gastroenterology Chronic Constipation Task Force[184]; and Rao[249].

ferent centres, but all RT programs aim to improve defecation-related behaviour and restore a normal pattern of defecation with both instruments and educational devices.

Electrostimulation, kinesitherapy, biofeedback and volumetric rehabilitation can be used in various combinations to correct the dys-synergic behaviour of abdominal, rectal, and anal sphincter muscles and to improve rectal sensory perception.

RT requires a highly trained therapist and is time-consuming both for the therapist and the patient. Patients must therefore be strongly motivated.

When should RT be prescribed for obstructed defecation?

Functional obstructed defecation is the main indication for RT. Biofeedback is the treatment of choice for patients affected by pelvic floor dys-synergia. Three randomised controlled trials[92-94] have shown a success rate of approximately 70%[76] and a long-term success rate of approximately 50%[94]. Level I evidence, Grade A recommendation.

RT is also an effective therapy for organic diseases such as descending perineum syndrome, rectocele, recto-anal intussusception, rectal mucosal prolapse, rectal solitary ulcer syndrome not related to rectal prolapse, and second-degree sigmoidocele[95,96]. Level IV evidence, Grade C recommendation.

What is the recommended RT for obstructed defecation?

There are no universally accepted recommendations for RT, and there are no specific criteria to evaluate the efficacy of this intervention. The methods used such as biofeedback, kinesitherapy, electrostimulation and volumetric rehabilitation can differ greatly, resulting in a considerable variation in rehabilitation programmes among centres[97]. For this reason, the results of different studies may not be comparable[98-100].

Biofeedback is a technique based on the use of instruments to provide an information loop whose aim is to achieve operant conditioning[101]. Information on a physiological function (such as muscle contraction/relaxation) is translated into a visual or audio signal. When the execution of a muscle movement is correct, a signal is activated. Thus, erroneous functioning can be immediately corrected and the subject is conditioned to perform the correct contraction or relaxation movement. Some authors have studied the use of biofeedback combined with kinesitherapy for the pelvic and perineal muscles. The aim of the therapy in this setting is to teach the patient the correct sequence of contraction and relaxation of the striated muscles that is required for defecation[102-105]. It must be noted that these rehabilitative techniques have not been codified, they vary widely from one country to another, and they are supported by only one randomised trial[98]. Level II evidence, Grade B recommendation.

RT may be useful for improving rectal sensation when anorectal manovolumetry demonstrates rectal hyposensitivity in patients with obstructed defecation[106]. Such RT may be performed through biofeedback ("sensory retraining")[107] or volumetric rehabilitation using an inflated balloon or water enemas of decreasing volume and a probe to monitor muscle movement[108]. Neither biofeedback nor volumetric rehabilitation is supported by randomised controlled trials. Level IV evidence, Grade C recommendation.

Is RT the first therapeutic option?

Biofeedback, either alone or in combination with other rehabilitative techniques[102,103], is generally attempted only after pharmacological therapy has failed[95]. After drugs, however, rehabilitation is the treatment of choice in patients affected by obstructed defecation because there are no side effects. Even if RT fails, it will not have a deleterious effect on the patient's condition, and its results will not affect future decisions regarding therapy, including surgery[106,108,109].

Is RT more effective than drug therapy?

One randomised trial showed that biofeedback was su-

perior to laxatives in improving defecation in patients affected by pelvic floor dys-synergia[97]. It should be noted that the laxative dosage was not high in the control group, but the finding remains that rehabilitation reduced the need for laxatives. Level I evidence, Grade B recommendation.

What factors may influence the efficacy of RT?

There is no general agreement as to what factors may predict or influence the outcome of RT[93,105,110]. In one study, no correlation was found between specific conditions (rectocele, ano-rectal intussusception, descending perineum and sigmoidocele) and the efficacy of biofeedback in patients with dys-synergic defecation[111]. Level Ⅳ evidence, Grade B recommendation. In a more recent study, harder stools, shorter duration of laxative use, higher rectal pressure while straining and prolonged balloon expulsion independently predicted a positive outcome for RT[112]. Level Ⅲ evidence, Grade C recommendation.

Nevertheless, significant anatomic damage, severe psychiatric or neurological disease, poor patient compliance, and poor patient–physiotherapist interactions could pose major obstacles to the success of RT[97,113]. Level Ⅲ evidence, Grade C recommendation.

Does surgery make RT superfluous?

No, the experience suggests that RT, even if it does not achieve satisfactory function, can improve pelvic floor muscle tone and coordination and can contribute significantly to a positive outcome in ano-rectal surgery[114]. Level V evidence, Grade C recommendation.

How should patients who do not respond to RT be managed?

It is not clear how non-responsive patients should be managed because a validated, universally accepted set of criteria regarding the response to RT has not yet been developed. If the clinical grounds for prescribing RT were appropriate (presence of dys-synergic defecation and/or inadequate propulsive forces) and no negative predictive factors are present, the failure of a patient to respond to RT should raise the suspicion of significant organic damage (e.g., a rectocele or rectal intussusception) and lead to the evaluation of surgical options[115]. In fact, in patients with a rectocele and/or ano-rectal intussusception, one of the prerequisites for surgery to correct obstructed defecation is the failure to respond to RT[115]. Level Ⅱ evidence, Grade C recommendation.

In one report on a small number of patients, sacral neuromodulation was found to be effective[116]. Level Ⅳ evidence, Grade C recommendation.

Should RT be prescribed before or after ano-rectal surgery?

Although it is difficult to discriminate between patients who will derive some benefit from RT and those who instead will require surgery, the generally accepted procedure is to begin with RT[117] and, if this proves ineffective, to then consider surgery[115]. Level Ⅱ evidence, Grade B recommendation.

There are no clear guidelines to help the clinician decide between the approaches of "rehabilitation-surgery" and "rehabilitation-surgery-rehabilitation". RT should certainly be prescribed if the outcome of ano-rectal surgery is unsatisfactory[117]. In cases involving large rectoceles, anal fissures or severe anatomical anorectal changes, where it is unlikely that RT will have any direct effect, rehabilitative therapy should be prescribed after surgery[118]. Level V evidence, Grade C recommendation.

Concerning the efficacy of RT following surgery, only a handful of reports on patients who underwent RT for obstructed defecation after ano-rectal surgery have been published, each involving a different protocol. RT has been successful in treating persistent symptoms of obstructed defecation after stapled trans-anal rectal resection (STARR)[119,120], hemorrhoidectomy, and surgery for mucosal rectal prolapse[121]. Level V evidence, Grade C recommendation.

What are the medium- and long-term effects of RT?

Lasting improvement has been observed in patients with dys-synergic defecation (confirmed clinically and by manometry) up to 2 years after RT[92,122-124]. Level I evidence, Grade B recommendation.

SURGICAL TREATMENT FOR SLOW-TRANSIT CONSTIPATION

Colectomy

What are the conditions and selection criteria for colectomy?: There are no randomised trials focusing on the selection of constipated patients for surgery. The most commonly described selection criteria for segmental, subtotal or total colectomy are (Level V evidence, Grade C recommendation): (1) ≤ 2 weekly defecations[125-131]; (2) duration of symptoms (mean 5-17 years)[130,132]; (3) the presence of symptoms such as abdominal bloating or pain, nausea, and vomiting that have a significant impact on the patient's quality of life[110,113,130,132,117]; (4) failure of behavioural, dietetic, pharmacological and RTs to improve the symptoms[109-114,133]; (5) radiological evidence of slow-transit constipation[130,131,133-138]; (6) exclusion of organic or functional pelvic floor disorders (obstructed defecation, Hirschsprung's disease) based on defecography and ano-rectal manometry[131,136-138]; (7) exclusion of upper gastrointestinal tract dysmotility based on functional (manometric, scintigraphic) examinations, if dyspeptic symptoms are present[137,139-141]; and (8) normal results of psychological evaluation (patients with psychological disorders tend to show poor results after surgery for constipation)[136,142-145].

Total or subtotal colectomy with ileorectal anastomosis

What are the levels of evidence and grades of recommendation for this procedure?: No randomised or controlled studies have been published on this proce-

dure. Level V evidence, Grade C recommendation.

What is the success or satisfaction rate following surgery?: Definitive conclusions regarding the effectiveness of surgery cannot be drawn. The methods used to assess the outcome of surgery and patient satisfaction vary greatly. Among 39 published studies, 6 did not define the criteria used, in 17 the assessment was based solely on patient feedback, and in 8 the conclusions were based on the results of post-operative functional tests. Only in 8 studies was the success of surgery determined from functional results and the patient's evaluation. The data collection methods also differ between the studies; they were not defined in 15 of the 39 studies reviewed, whereas a questionnaire was used in 15 studies; only in 9 studies was a post-operative interview conducted. The overall rate of success or satisfaction documented in 39 studies involving 1423 patients was 86% (39%-100%)[125,129,130,133,136,146-149].

What are the post-operative morbidity and mortality rates?: The overall post-operative morbidity in 25 series was 20% (2%-71%)[125,129,130,134,149], and the mortality documented in 26 studies was 2.6% (0%-15%)[125,130,134,146].

Post-operative complications

What is the incidence of small bowel obstruction, diarrhoea, faecal incontinence and abdominal pain, and what is the re-operation rate?: The complication rates were (mean and range): (1) small bowel obstruction, evaluated in 26 series with 913 patients: 18% (2%-71%)[125,129,130,134,146]; (2) chronic diarrhoea, in 19 series with 843 patients: 14% (0%-46%)[130,136,146,148]; (3) faecal incontinence, in 21 series with 913 patients: 15% (0%-52%)[125,129,130,136,146,148]; (4) abdominal pain, in 19 series with 839 patients: 35% (0%-90%)[125,129,130,136,143,146,148]; and (5) re-operation rate, evaluated in 5 studies with 965 patients: 14% (0%-50%)[125,130,134,149].

What are the functional results after surgery, in terms of daily bowel movement rates and recurrent constipation?: In 26 studies[125,129,130,133,146,148] involving 1047 patients and with a mean follow-up period of 44.8 (12-180) mo, the rate of bowel movements reported by the patients was 2.8 times per day, whereas recurrent constipation was reported by 9% (0%-33%) of 683 patients in 17 series[129,130,136].

How often is a permanent stoma the only solution for a patient?: The incidence of permanent stoma placement as a therapy of last resort was 5% (0%-28%) in 27 studies involving 930 patients[125,130,150].

What prognostic factors have been identified?: Preservation of the ileocaecal valve and caecum during isoperistaltic anastomosis resulted in a higher rate of persistent or recurrent constipation[145,146,150,151]. One controlled study[146] reported better results in 45 patients who underwent ileosigmoid anastomosis compared with 34 patients who underwent isoperistaltic caecorectal anastomosis (93% *vs* 73%). Level Ⅲ evidence, Grade C recommendation. (1) Negative prognostic factors described in the literature include the onset of constipation in adulthood or after pelvic or intestinal surgery[151-153]; (2) Positive prognostic factors include childhood onset and "lifelong" duration of symptoms[154,155].

Is autonomic neuropathy an indication for surgery?: A higher rate of post-operative complications (especially small bowel obstruction) and the persistence of pre-operative symptoms (abdominal pain and bloating) have been reported in patients with autonomic neuropathy[141]. Therefore, some authors consider autonomic neuropathy to be a contraindication to surgery[138]. Level V evidence, Grade C recommendation.

Can laparoscopy yield better results than surgery?: Four studies without controls and one evaluating a "hand-assisted" technique have been published, but these were primarily feasibility studies[129,134,136,156,157].

Segmental colectomy

Can segmental colectomy lead to better functioning?: It appears that if the decision to undertake segmental colectomy is based on radiologically demonstrated segmental colonic slow transit, good results can be achieved in 82%-96% of patients[136,158,159]. Without this evaluation, the failure rate is 100%[151,160]. Level V evidence, Grade C recommendation.

Subtotal colectomy with antiperistaltic caecoproctostomy (Sarli's procedure)

Can this procedure lead to better results than conventional total or subtotal colectomy?: In the literature, 3 series[126,157,161] have reported on a total of 43 patients in whom a subtotal colectomy with caecal preservation and antiperistaltic cecorectal anastomosis was performed. These were non-randomised but controlled studies, with subjects undergoing ileorectal anastomosis. Level Ⅲ evidence, Grade C recommendation. Patients reported less faecal incontinence (documented by the Wexner score), less use of anti-diarrhoeal drugs, fewer defecations per day, more consistent faeces and a better quality of life after surgery. After 4.5 years (range 2-7) of follow-up, the mean daily number of bowel movements was 2.5, and the success rate of the surgical procedure was 88% (65% in patients with ileorectal anastomosis).

Does this procedure have a lower incidence of complications?: The cumulative post-operative complication rate was 9% (in 22 patients); 2 (1%) patients experienced small bowel obstruction, but none complained of diarrhoea[126,157,161].

Malone antegrade continence enema

What patients are candidates for this procedure?: Although good results have been reported recently in

adults, Malone antegrade continence enema (MACE) is most successful in paediatric patients[162,163] or in patients with neurological diseases such as myelomeningocele, cerebral or spinal cord injuries, or Hirschsprung's disease[163-169]. The greatest improvement in the quality of life was observed in patients with concomitant faecal incontinence[168]. Level V evidence, Grade C recommendation.

What is the level of evidence and recommendation grade for this procedure?: The level of evidence and recommendation grade cannot be determined because there are no randomised or controlled studies on MACE in the literature[162-172].

What is the success or satisfaction rate with the Malone procedure?: The methods of assessing the overall success or satisfaction rate vary widely among studies. Among 7 studies, the criteria were not clearly defined in one, success/satisfaction was based on the patient's judgement in another, and in 5 the outcome was evaluated based on functional results and the patient's judgement. The data collection methods also varied; they were based on a questionnaire and interview in 4 studies, whereas an interview was conducted in only 3 studies. With a mean follow-up period of 44 (range 12-78) mo, the overall success or satisfaction rate, documented in 7 studies on 67 patients, was 74% (50%-100%)[164-166,169-172], but within 3 years, the MACE procedure was replaced by other therapies in 50%-75% of cases[165,171].

What complications have been observed?: The main complication of this procedure is stenosis of the stoma (8%-50%)[163,165,166,169-171].

Sacral nerve stimulation

What is the level of evidence and the recommendation grade for this procedure in patients with constipation?: One double-blinded, placebo-controlled crossover study in 2 patients[173] and 7 non-randomised studies[116,174-179] have been published, but 3 of these studies[173-175] probably used the same patients. One of these trials was presented only in the form of an abstract at Digestive Diseases Week in 2007[177] and for this reason was not taken into consideration in the calculation of the mean success rate. In this report by Kamm *et al*[177], the success rate of a temporary implant was 66% (n = 67), and all patients with a permanent implant continued to show good results after 12 mo of follow-up.

In a recent prospective study at five European sites, sacral nerve stimulation (SNS) was effective among patients with idiopathic slow and normal transit constipation resistant to conservative treatment. The primary end points were increased defecation frequency, decreased straining and decreased sensation of incomplete evacuation ($P < 0.001$)[179] (Level Ⅲ evidence, Grade C recommendation).

What is the mean success rate of percutaneous nerve evaluation followed, if indicated, by the insertion of a permanent pacemaker?: The overall success rate of percutaneous nerve evaluation, as documented in 4 studies involving 86 patients, was 60% (25%-75%)[174,176,177,179]. In 2 studies[116,175] involving a total of 12 patients who received permanent pacemakers, the reported success rates were 100% and 75% after a median follow-up of 11 and 8 mo, respectively. Finally, the multicentre prospective study coordinated by Kamm *et al*[179] reported that after a median of 28 mo (range 1-55), the frequency of defecations increased from a baseline of 2.3 evacuations per week to 6.6 evacuations per week.

SURGERY FOR OBSTRUCTED DEFECATION

The management of patients affected by obstructed defecation can be challenging because of the frequent association of anatomical and functional anomalies, which makes it difficult to distinguish between the causes and consequences of excessive strain[180,181]. The complexity of the syndrome and the range of available treatments make the outcome of the therapy unpredictable[182]. Surgery is usually considered for patients with reparable anatomical defects, concomitant pathologies, or symptoms that severely impact their quality of life[183].

Indications for surgery in constipation arising from obstructed defecation

Surgical treatment is indicated in cases of reparable anatomical defects, severe symptoms, symptoms leading to a poorer quality of life, or concomitant pathologies[183,184]. Level V evidence, Grade C recommendation.

What criteria are there for evaluating treatment efficacy (severity score, defecography, quality of life)?

The obstructed defecation syndrome (ODS) score is a tool designed to evaluate patients suffering from *pure* outlet obstruction without slow transit or mixed forms of constipation. The ODS provides an index of the disease severity and can be used to monitor the efficacy of therapy[182]. Level Ⅲ evidence, Grade C recommendation. Other tools, such as the Constipation Scoring System[185] and the KESS Score[186], are not specific for ODS but can be employed to study other forms of constipation; some items in these scores are not influenced by the therapy[185].

There are two approaches - abdominal (rectopexy) and trans-anal (STARR or Delorme transrectal excision) - to surgically correct internal intussusception: Which is recommended on the basis of the clinical evidence?

The results of rectopexy are uncertain. Some studies report the persistence or worsening of constipation and difficulty in emptying the rectum in approximately 50% of cases, although the prolapse is corrected in almost all patients[187]. Other studies report that resection and rec-

topexy improve the symptoms relating to intussusception and coexisting anatomical and functional pathologies of the pelvic floor, such as enterocele, solitary ulcer of the rectum, incontinence and descending perineum syndrome[188]. Level V evidence, Grade C recommendation.

Colonic resection and rectopexy can reduce intussusception in 100% of cases, restore anal muscle tone (P = 0.002), reduce the descending perineum ($P < 0.001$) and accelerate colonic transit ($P < 0.001$) with stable results over time (based on a 5-year follow-up)[188]. Level V evidence, Grade C recommendation.

Sutureless rectal mobilisation, suture rectopexy, and mesh rectopexy: Which is better?

In a multicenter randomised study of 252 patients, an actuarial analysis demonstrated a significant difference in 5-year recurrence rates between no-rectopexy and rectopexy groups (8.6% *vs* 1.5%) (log-rank, $P = 0.003$)[189]. Level V evidence, Grade C recommendation.

A ventral instead of posterior mobilisation and fixation of the mesh have recently been advocated and popularised. Excellent results have been claimed, but no randomised comparative trials have been conducted thus far[190-193]. Level V evidence, Grade C recommendation.

Laparoscopy or laparotomy for rectopexy?

Although there are no studies comparing the two different approaches, there is a tendency in the literature to perform this operation laparoscopically because of the potential of this approach to shorten hospital stays, decrease the incidence of abdominal wound complications and improve cosmesis.

A trial assessed the quality of life in ODS patients comparing STARR with biofeedback and reported that the STARR was better ($P < 0.0001$)[115]. Level II evidence, Grade C recommendation.

Which approaches to repair a rectocele (trans-anal, trans-vaginal, perineal, etc.) can be recommended on the basis of evidence based medicine?

The indications for surgery and the choice of procedure are still being debated, and a clear correlation between the correction of the anatomical problem and the improvement of symptoms has not yet been demonstrated[194]. Surgery should only be considered when conservative therapy has failed. Options include trans-vaginal posterior colporraphy and trans-rectal or trans-perineal repair[183]. In terms of an improvement in symptoms, Arnold *et al*[195] did not find any difference between the trans-anal and the trans-vaginal approaches. Level V evidence, Grade C recommendation. Even when the surgical repair has been correctly performed, 30%-72% of patients still experience difficulties in defecating[196]. Level V evidence, Grade C recommendation. Post-surgical complications include faecal incontinence and sexual dysfunction[197,198].

Is there a technique that can be considered the gold standard for the treatment of ODS?

Numerous surgical procedures using different approaches (abdominal, vaginal, trans-anal or perineal) are available for the treatment of ODS, but none has been identified as the gold standard[115]. Level II evidence, Grade B recommendation.

Can obstructed defecation resulting from rectocele/intussusception also be associated with slow-transit constipation?

Slow colonic transit is often observed in patients with a symptomatic rectocele[198,199]. The obstructed defecation in these patients does not appear to exclusively result from the rectocele (Level V evidence). Although improved rectal emptying may be observed after surgical correction, this effect is not likely to affect colonic function. It has been demonstrated that patients with poor functioning after repair of the rectocele still have a prolonged colonic transit time[200]. Furthermore, patients with a slow transit time before the operation show little improvement after surgery[198] (Level V evidence).

Can STARR be effective in the treatment of patients with ODS who fail to respond to medical and RT?

The efficacy and safety of STARR has been demonstrated in ODS patients in whom 5-10 sessions of biofeedback therapy (BF) failed[115]. Level II evidence, Grade B recommendation. This study showed a reduction of the ODS score in 81.5% of patients after STARR (one-year follow-up) compared with a reduction of 13% after BF (difference between the two groups: 48.1%, $P < 0.0001$, 95% CI: 30.1%-66.2%). This study had several drawbacks, however, including the small number of participants enrolled, a 50% dropout rate in the BF group, and the fact that a surgical approach was compared with a non-surgical one.

Can STARR improve the quality of life in patients with rectal intussusception or a rectocele?

The STARR procedure can significantly improve the quality of life in patients suffering from ODS arising from rectal intussusception or a rectocele compared with biofeedback ($P < 0.0001$)[115]. However, other options, such as pelvic floor rehabilitation or the internal Delorme procedure[201], could be considered instead to prevent any potential risk associated with the stapling procedure. Level II evidence, Grade B recommendation.

In cases of ODS arising from rectal intussusception or rectocele, can stapled trans-anal prolapsectomy with perineal levatorplasty alleviate the symptoms?

Boccasanta *et al*[202] compared the stapled trans-anal prolapsectomy with perineal levatorplasty (STAPL) and STARR procedures in a randomised trial. All of the symptoms relating to obstructed defecation improved following both procedures. After a 20-mo follow-up, the

results were still good in 76% of the STAPL patients and in 88% of the STARR patients. The authors nonetheless concluded that STARR is preferable because of the lower post-operative pain ($P < 0.001$), reduced rectal sensitivity ($P < 0.017$), absence of dyspareunia ($P < 0.018$), and a more marked reduction in the rectocele. Level I evidence, Grade B recommendation.

What procedure should be performed in cases of complete rectal prolapse?

Abdominal rectopexy with sigmoidectomy and plain rectopexy with mesh are safe and effective procedures for the treatment of complete rectal prolapse[202]. Level Ⅱ evidence, Grade B recommendation. Only one prospective randomised trial has compared abdominal rectopexy and sigmoidectomy (group Ⅰ) with rectopexy and a polyglycolic acid mesh (group Ⅱ). After correction of the prolapse, 8/11 patients in group I suffering from incontinence and 10/12 in group Ⅱ who had incontinence improved. Six months after surgery, the constipation had disappeared in 3 and 7 patients from groups I and Ⅱ, respectively, but 5 other patients from group Ⅱ required a colectomy within one year after the operation because of severe constipation[203].

Is abdominal rectopexy with sigmoidectomy associated with higher rates of morbidity than simple rectopexy in patients with complete rectal prolapse? Should this procedure be performed in cases of slow transit constipation or only in patients with dolicocolon?

Sigmoid resection with rectopexy is effective in reducing post-operative constipation arising from outlet obstruction without increasing the rate of morbidity[201]. Level Ⅱ evidence, Grade B recommendation. Rectopexy with sigmoid resection can improve the colonic transit ($P < 0.001$)[196], even in the presence of dolicocolon (Level V evidence, Grade C recommendation).

Is SNS effective for the treatment of patients with ODS constipation?

SNS may be effective in the treatment of chronic constipation when other approaches have failed[204]. In a recent prospective study at five European sites, SNS was effective in patients with idiopathic slow and normal transit constipation who failed conservative treatment. In this study, the primary end points were increased defecation frequency, decreased straining and decreased sensation of incomplete evacuation ($P < 0.001$)[179] (Level Ⅲ evidence, Grade C recommendation).

When surgery is indicated for solitary rectal ulcer syndrome, what procedure should be adopted?

Solitary rectal ulcer may be associated with paradoxical contraction of the puborectal muscle, recto-anal intussusception, rectal prolapse and descending perineum syndrome. Treatment of this condition must be conservative. Surgery can be considered for patients with full-thickness rectal prolapse or intractable haemorrhage, but the degree of continence and constipation and the risks of surgery must be carefully assessed in each individual patient, and the patient's preferences regarding treatment should be taken into account. The procedure selected must be safe and balance the risk of morbidity with an acceptable recurrence rate[183,205,206]. Level V evidence, Grade C recommendation. The surgical options include repair of the rectal prolapse with or without resection of the lesion, although the long-term results of this procedure were found to be uncertain. Anterior resection and proctocolectomy have shown satisfactory long-term results[207].

When is surgery indicated for sigmoidocele?

Surgery is indicated for symptomatic patients with third-degree sigmoidocele (below the ischiococcygeal line) or patients who require other pelvic surgery with an abdominal or vaginal approach (hysterectomy, rectal prolapse, rectocele repair). The surgery consists of sigmoid resection and rectopexy with obliteration of the Douglas pouch. Jorge *et al*[208] documented an improvement of the symptoms in 100% of patients undergoing this procedure, compared with 33% of patients who were treated conservatively, after a mean follow-up of 33 mo. Level V evidence, Grade C recommendation.

What is the best surgical treatment for megarectum with or without megacolon?

There has been considerable debate regarding the surgical treatment for megarectum. In megarectum with megacolon, colectomy and ileo-rectal anastomosis is the procedure with the best functional results and the lowest morbidity[209]. In patients who do not experience satisfactory results, total proctocolectomy and ileo-pouch-anal anastomosis is the treatment of choice to avoid permanent ileostomy[210,211] (Level V evidence). In idiopathic megarectum, proctectomy and colo-anal anastomosis with or without colonic reservoir has shown good results; defecation and faecal continence were satisfactory in 72% of patients[212,213] (Level V evidence). The Duhamel procedure is less successful for the treatment of idiopathic megarectum than for Hirschsprung's disease[214]. In idiopathic megarectum, this procedure is associated with the persistence of symptoms and often with the need for a repeat operation[215]. It has been reported that rectoplasty with vertical reduction of the rectum and sigmoid resection results in a significant improvement in the frequency of defecation, a reduced consumption of laxatives or enemas, and satisfaction with surgery in 83% of the patients[216] (Level V evidence, Grade C recommendation).

SURGERY FOR OBSTRUCTED DEFECATION WITH ASSOCIATED PELVIC DISEASES

How often is obstructed defecation associated with pelvic organ prolapse?

A posterior colpocele in pelvic organ prolapse (POP)

may be linked to anatomical conditions such as a rectocele, enterocele or sigmoidocele[217]. Of POP patients, 24%-52% complain of difficulties in defecation[218]. Straining is more common in women with prolapse (61% *vs* 4%; $P < 0.001$)[219].

Is there a correlation between POP and chronic constipation?

The literature is sparse on this point. In a study of 302 patients with urinary incontinence and/or POP, Jelovsek *et al*[220] concluded that chronic constipation plays no significant role in the etiology of the prolapse (Level Ⅳ evidence). Soligo *et al*[221] found that the prevalence of constipation was 33% (95% with obstructed defecation) in 786 women suffering from uro-gynecologic dysfunctions. A significant correlation was noted between constipation and posterior genital prolapse (Level Ⅳ evidence). Similar data have been reported by other authors[222-224].

How does the physiopathologic correlation between POP and obstructed defecation contribute to posterior colpocele and rectocele?

At present we do not know whether constipation is a symptom caused by anatomic functional defects of the pelvic floor[221], or whether it is the cause of static and dynamic changes in the pelvis. Pudendal neuropathy arising from stretching of the pudendal nerve while straining in patients with chronic constipation[225] (Level Ⅲ evidence) may explain the prolapse of the posterior wall and the overall weakening of the pelvic floor[226,227] (Level Ⅳ evidence). According to DeLancey[226], the tonic contraction of the levator ani, the perineal membrane and the endopelvic fascia provide the main support for the posterior vaginal wall. Under physiologic conditions, the levator ani has a double vector. The muscle exerts forward force (closing the vaginal walls) and then extends downward to the perineal body, supported by the perineal membrane, which anteriorly is anchored to the ischiopubic branches. This compensating balance eliminates any traction on the endopelvic fascia (corresponding to the middle third of the vagina or DeLancey level Ⅱ). Pudendal neuropathy reduces the strength of the levator ani, and the downward vector will tend to be toward the posterior vaginal wall rather than the perineal body. A weak endopelvic fascia leads to posterior vaginal wall prolapsed, which may explain both the high and low rectoceles involving the middle vagina and the perineal body, respectively.

What are the most recent anatomical and functional developments in pelvic reconstructive surgery?

Increasingly, prostheses are replacing fascial surgery in the treatment of POP. The synthetic prosthesis is set in a tension-free position and connected to structures such as the obturator membrane, the arcus tendineous of the pelvic fascia, the sacrospinous ligaments or the perineal body. The use of a synthetic mesh has resulted in a marked decrease in recurrence (from 29% in fascial reconstructions to 9% with synthetic mesh), and a significant increase in erosion from 0.7% with the re-absorbable mesh to 10.2% with the synthetic mesh[228] has been observed. Level Ⅱ evidence, Grade B recommendation. However, the efficacy and safety of the prostheses used for the posterior vaginal wall have not yet been established[228] (Level Ⅱ evidence).

Surgical treatment for rectocele has been evaluated in 4 randomised studies (Cochrane Review, 2007[229-233]. The transvaginal approach was associated with the lowest number of recurrences, the use of biologic prostheses did not reduce the recurrence rate, and there was no significant difference between trans-anal and transvaginal procedures in terms of effects on defecation. Level I evidence, Grade A recommendation.

Does obstructed defecation improve after the correction of a posterior colpocele with mesh?

Few studies have considered the effect of surgery for posterior colpocele on posterior compartment dysfunction. The improvement reported in 24%-28%[234,235] of cases in two studies was not based on an adequate scoring system (Level V evidence). The presumption that a dysfunction such as constipation can be treated simply by correcting an anatomic defect is probably incorrect. Approximately 30% of patients with obstructed defecation also complain of slow-transit constipation[236] (Level V evidence). We do not yet understand the pathophysiology of these conditions, particularly with respect to the role of the CNS and ENS. The severity of the obstructed defecation is also not correlated with the results of the pelvic organ prolapse quantification[237-239] or to the anatomic-functional data provided by defecography[222] (Level V evidence, Grade C recommendation).

What is the recommended surgical procedure for post-hysterectomy voltocele?

Voltocele affects 18.2% of women with genital prolapse after hysterectomy. In 72% of these patients, there is also an anterior (cystocele) or posterior colpocele (rectocele or enterocele)[240,241]. The incidence of enteroceles after hysterectomy is between 0.1% and 16%[242]. Voltocele is caused by damage to the supporting uterosacral and cardinal ligaments. Enterocele, a herniation of the Douglas pouch between the vagina and the rectum, is caused by damage to the perineal membrane, which supports the posterior vaginal wall and connects the ischiopubic branches to the perineal body (Level V evidence)[243,244]. The levator ani muscle is also important because it is connected to the middle of the vagina by the endopelvic fascia. Three procedures designed to prevent enterocele and posterior colpocele after hysterectomy, i.e., the Moschcowitz method, the McCall method, and simple closure of the Douglas pouch, were compared in a prospective randomised study with 3 years of follow-up, and the best results were obtained with the McCall operation[245] (Level Ⅱ evidence, Grade B recommendation).

Many techniques have been proposed to correct a

voltocele associated with an enterocele. The abdominal approach with mesh sacrocolpopexy and Douglas obliteration repairs the anatomic defect in 90% of cases[246-248]. In a Cochrane review of 22 controlled randomised studies, abdominal sacrocolpopexy appeared to be superior to the transvaginal approach (vault sacrospinous fixation), with fewer recurrences and less dyspareunia[229], but it is a longer and more painful procedure that involves a longer hospital stay and higher costs[241]. Level I evidence, Grade A recommendation. No data are available on the effects of these procedures on constipation.

APPENDIX

This paper is the second part of the consensus statement of the AIGO/SICCR regarding the diagnosis and treatment of chronic constipation and obstructed defecation. This section will focus on the treatment of this condition.

The first part of the paper was published in the *World Journal of Gastroenterology* 2012 April 14 (ISSN 1007-9327) and describes the materials and methods used to generate these recommendations. Similar to that paper, this article presents the results in a "question-and-answer" format.

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