



# Constipation

*P. Poitras, M. Bouin, C. Faure, and M. Dapoigny*

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## 15.1 Definition

Constipation, in the medical community, is often identified as a condition where the daily stools are low in number (the “normal” daily frequency being estimated as  $1 \pm 3$  bowel movements/day) and/or weight (the “normal” weight of stools being approximately 200 g/day).

For the patients, constipation often relates to a feeling of an inadequate and/or unsatisfying evacuation of stools that are rare (not as frequent as they expect), usually of small volume and hard texture, and difficult to evacuate (with straining, etc.).

Rome IV classification of functional GI disorders recognizes that a patient is constipated if he/she presents at least two of the following items:

1. Straining during more than 1/4 of defecations
2. Lumpy or hard stools more than 1/4 of defecations
3. Sensation of incomplete evacuation more than 1/4 of defecations
4. Sensation of anorectal obstruction/blockage more than 1/4 of defecations
5. Manual maneuvers to facilitate more than 1/4 of defecations
6. Fewer than three bowel movements per week

Normal defecation is a vague concept. Most “normal” people report a frequency varying from one stool every 3 days to three stools per day. However, some people can tolerate a bowel movement once a week easily, while others report constipation with two or three bowel movements per day. The patient often associates various digestive symptoms (e.g., abdominal pain, bloating, flatulence, nausea, etc.) and even extradigestive symptoms (headache, fatigue, etc.) with constipation.

Constipation, in popular belief, is often perceived as a harmful phenomenon that may lead to the accumulation of toxins that are not evacuated and impair the health condition. However, there is no scientific evidence to support this concept in the general population.

## 15.2 Pathophysiology

Constipation involves the distal digestive organs, i.e., the colon and the anorectum. Stools are formed imperceptibly and involuntarily in the colon (► Chap. 4) and are expelled during a voluntary action involving the anorectal motility (► Chap. 7).

**Colon transit** The colon transit lasts, normally, 1–3 days. A rapid transit compromises the liquid absorption and

leads to liquid frequent stools, whereas a slow transit will allow more time for the absorption process and cause dry, hard, and rare stools. Any condition slowing down the colon transit (e.g., opiate drugs, colonic inertia) will result in constipation.

**Colon absorption** The colon works to complete the nutrient and fluid absorption done upstream in the small bowel by reabsorbing daily more than 1 liter of water and electrolytes that have escaped the intestinal absorption.

Stools (about 200 g/day), normally, contain 75% water and 20% of non-absorbable matter such as dietary fibers. The colon thus absorbs nearly 90% of the liquids that are entering it in order to concentrate and solidify the colonic content into a feces material to be excreted in a way that is physiologically and socially useful and acceptable.

An impaired colon absorption will result in stools of increased quantity and decreased consistency (diarrhea), while an enhanced absorption will result in stools of reduced quantity and firmer consistency (constipation). Colon absorption may be increased by slow colon transit (e.g., opiate use, hypothyroidism) and, probably, in large colonic surfaces (e.g., dolichocolon).

**Anorectal sensory perception** Propelled by colon contractions, the colonic material will reach the rectum. The rectal distention will send a signal to the brain and will be perceived as a need to defecate. Failure to perceive this signal (e.g., in patients with spinal cord injury, brain lesions, or megarectum) may cause prolonged stagnation of colonic contents, leading to an increased fluid reabsorption and constipation.

**Anorectal motility** When distended by stools, the rectal walls first relax and accommodate, while the individual can voluntarily contract the anal sphincter to contain the fecal material until defecation is possible.

To defecate, abdomino-diaphragmatic wall (voluntary) contractions will increase the intra-abdominal pressure and push forward the intestinal content, while the puborectalis muscle relaxes to open the anorectal angle, and the anal sphincters open to allow the passage of stools. Any perturbation in these coordinate actions (e.g., insufficient abdomino-diaphragmatic contraction, obstruction (by rectocele, non-opened sphincters, etc.) to stool passage) may cause constipation.

The expulsion of stools, therefore, is linked to the transit of the colonic contents and to the defecatory action. The anorectum allows this evacuation that is regulated by autonomic physiological events, controlled by

voluntary movements and dependent upon sociocultural needs and obligations (accessibility to the toilet, etc.).

As shown in **Table 15.1**, constipation can be caused by several phenomena:

- Lack of fiber or calorie intake reduces the solid fecal material (and high-fiber diet is a logical step in the treatment of constipation). Fasting is an obvious cause of absent stools (no ingesta, no excreta!).
- An obstruction in the distal colon or anorectal region can interfere with the stool transit and evacuation. The obstruction may be due to a lesion (a malignant or inflammatory stricture, etc.) or to a functional disorder (anorectal dyssynergia, rectocele, etc.).
- A slow colon transit, due to a disease (e.g., hypothyroidism) or medication (e.g., opioids), results in an exaggerated absorption of colonic fluids and therefore reduces the fecal bolus.
- An impaired defecation, caused either by an unperceived need to evacuate (e.g., spinal cord injury, quadriplegia, or idiopathic), by an obstruction (prolapse, anorectal dyssynergia, etc.), or by a voluntary repression of defecation (e.g., due to a “difficult” access to the toilet, anal pain, encopresis, etc.), increases the colon transit time, therefore reducing the fecal bolus.
- Idiopathic: often left without any causal explanation, chronic constipation is then declared as idiopathic (70% of cases). Since the transit time is normal in this case, one could hypothesize that the colon has, here, an enhanced reabsorption capacity.

**Acute vs. chronic constipation** Constipation can be acute and is then most often related to a brief and reversible condition such as a temporary fasting, the use of medications that slow down the colon transit (e.g., opiate analgesics), or acute psychosocial conditions (stress, travel, etc.). Chronic constipation is most often idiopathic. It may be part of the irritable bowel syndrome (IBS-C) if accompanied by abdominal pain (see ► Chap. 4).

**Proximal versus distal constipation** The paradigm of constipation must consider not only the functions of colon transit and absorption but also the anorectal defecation process. The anorectal defecation is a voluntary gesture and can be compromised by an obstruction (e.g., Hirschsprung’s disease, anorectal dyssynergia, rectocele, etc.) but also by psychosocial conditions (e.g., discomfort to defecate while travelling, at the office, etc.). These two phenomena (colon and anorectum motility) are linked: restrained defecation leads to slowdown of the colon transit.

**Table 15.1** Constipation: most common causes

General mechanism	Diagnostic tests
<b>(A) Deficient dietary intake</b>	
General (fasting)	
Fiber	
<b>(B) Obstruction</b>	
Lesional	Endoscopic or X-ray imaging
Cancer	
Inflammatory stricture	
Functional	Anorectal manometry, defecography
Hirschsprung	
Anorectal dyssynergia	
Dyschezia (anal lesions, rectocele, prolapse)	
Voluntary repression	
<b>(C) Slow transit</b>	
Diseases	
Hypothyroidism	Blood tests
Metabolic disorders (Ca <sup>+</sup> , K <sup>+</sup> , Mg <sup>+</sup> )	
Neurological conditions (diabetes, MS, Parkinson)	Neuro exams
Colonic inertia	Marker transit
Medications	
Opioids	
Anticholinergics (including TCAs, SSRIs)	
Calcium antagonists	
5HT-3 antagonists	
Iron, calcium, and aluminum supplements	
<b>(D) Impaired rectal sensitivity</b>	
Megarectum	Imaging
Rectal hyposensitivity	Rectal manometry, barostat
Neurological disorder	
Central	Imaging [MRI]
Peripheral (spinal cord, quadriplegia, etc.)	Imaging (fMRI, EMG)
<b>(E) Idiopathic</b>	
Functional constipation	
IBS-C	

### 15.3 Investigation

The investigation of constipation is based on the history and physical examination.

Favoring factors [such as low fiber intake, certain drugs (opiates, etc.), psychosocial conditions, stress, etc.] should be identified.

Alarm symptoms (recent onset, older age, rectal bleeding, anemia, impairment of the general health condition, abnormal physical exam) are indications for a medical investigation (mostly to rule out colon cancer).

A defecation disorder may be suspected in the presence of exaggerated straining, sensation of incomplete evacuation, sensation of anal blockage, or digital maneuvers (e.g., vaginal or perineal pressure) to facilitate stool expulsion.

Constipation is most often a condition that affects the quality of life of patients but is medically benign (i.e., without repercussions on the patient physical health). It is most often idiopathic, and, after an adequate questionnaire and medical examination, it can be managed by a stepwise treatment as described below. Biological investigation will not be necessary in all cases. Who, why, and how to investigate are described in

Table 15.2.

**Table 15.2** Biological investigation of constipation

Who to investigate	Why	How
Infant/child	R/O Hirschsprung	Anorectal manometry
Alarm signs	R/O colon lesion	Colonoscopy, X-ray imaging
Recent onset		
Rectal bleeding		
Impaired health condition		
Dyschezia symptoms	R/O rectocele, prolapse, dyssynergia	Anorectal manometry, defecography
Straining		
Digital maneuvers		
Severe symptoms	R/O colonic inertia	Marker transit (X-ray)

### 15.4 Treatment

The management of constipation is based on the following general principles:

- Reassurance and education: constipation is not harmful to the individual's physical health, and it has no real biological consequences (however, the impact on the patient's quality of life should not be minimized).
- The general treatment, according to the author's experience, should look for regular bowel movements and avoid extreme situations where the colon will be alternately overfilled with fecal residues in the absence of (effective) treatment or empty after taking too much laxatives.
- Optimizing defecation: synchronize the need to defecate and the defecation. The function of defecation is a voluntary act based on complex biological mechanisms (described in ► Chap. 7) but also governed by psychosocial conditions and conventions. The colonic motility, usually increased after meals, is "awakened" when waking up in the morning, which explains why a morning defecation is present in many people. Defecation cannot ignore the voluntary gesture (abdomino-diaphragmatic contraction with

anal sphincter relaxation) which can be easily repressed (leading to slowdown of the colon transit), and unfavorable situations (embarrassment in a non-personal environment such as the office, cleanliness of public toilets, hectic pace of life, etc.) should be avoided to ensure satisfying stool evacuation.

- The therapeutic strategy may be progressive or stepwise as described in Fig. 15.1.

**Education** Patients often fear that constipation will have adverse effects on their health, leading to nonspecific symptoms such as migraine, fatigue, etc., or that it may induce serious complications, such as cancer. However, they should be reassured that there is no evidence to suggest that constipation should be treated to control systemic or future complications.

**Lifestyle habits** In subjects with insufficient fiber intake, diet adjustments can help. However, as a general treatment, many studies have shown that supplement dietary fibers will increase stool volume but will have no beneficial effects on the symptoms of constipation. Bloating, especially associated with insoluble fibers (bran, etc.) and fermentable foods (cabbage, onion, legumes), is a common consequence of an excessive fiber diet.

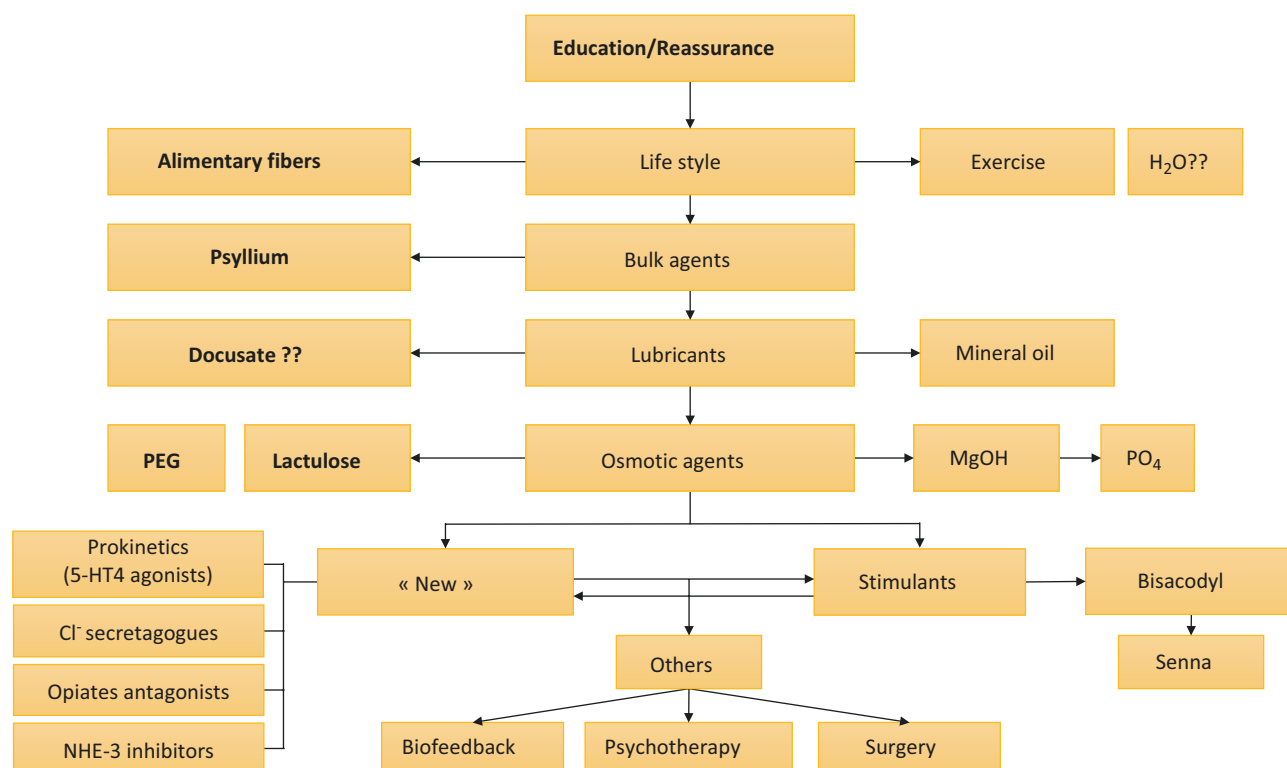


Fig. 15.1 Constipation: progressive step-up therapy

Physical exercise can improve constipation (intense exercise, such as marathon running, can even cause diarrhea!). It is also recognized that bed rest or immobilization in the hospitalized or bedridden patient is a cause of constipation (fecal rectal impaction is feared in these patients).

Increased water intake has no impact on the fecal bolus and constipation since these ingested fluids will be absorbed in the small bowel before reaching the colon and will therefore only influence the urine volume.

**Bulking agents** Bulk agents such as psyllium (Metamucil<sup>®</sup>, etc.) are effective in the treatment of constipation both to increase the fecal bolus and to decrease the symptoms related to constipation.

**Lubricants (emollients)** Docusate (Colace<sup>®</sup>) is widely used in clinical practice. It has the advantage of being easy to use (small, tasteless tablet) and has no significant side effects, but its effectiveness has been denied in all the studies available in the literature.

Mineral oil is used in children, but not much in adults. Malabsorption of fat-soluble vitamins (although this has been denied) and bronchial aspiration complicated by lipoid pneumonia are feared. To avoid this risk of bronchial aspiration, it should not be given to patients with swallowing disorders (and risks of a false route) or

taken before bedtime (because of the supine position, which favors gastric reflux and possible bronchial aspiration).

**Osmotic agents** Osmotic agents (unabsorbed substances holding water into the small bowel or colon lumen) come in several forms. Polyethylene glycol 3350 solutions (Lax-A-Day<sup>®</sup>, MiraLAX<sup>®</sup>, RestoraLAX<sup>®</sup>, 17 g 1–2 times per day) are useful for normalizing stool frequency and consistency. PEG solutions with additional salts (Colyte<sup>®</sup>, PegLyte<sup>®</sup>, Klean Prep<sup>®</sup>, etc.) were developed for colonoscopy preparation (4 L ingested in 4 h for colon irrigation cleansing); they can also be used (250–500 mL daily) for the treatment of chronic constipation, but their taste is often not appreciated.

Lactulose is a non-absorbed sugar that improves stool frequency and consistency. However, the gas production from the sugars metabolized by the colonic bacteria is a source of bloating that is often uncomfortable for the patient.

Magnesium solutions (milk of magnesia) are well known clinically for their laxative effect. However, magnesium overload is to be feared in subjects with renal insufficiency.

Phosphate and/or sulfate solutions (e.g., Pico-Salax<sup>®</sup>, Fleet Phospho-Soda<sup>®</sup>) are powerful laxatives used mainly in acute conditions, such as preparations for

colonoscopy. There is little data on their chronic use in smaller quantities for the management of constipation.

**Stimulant laxatives** Stimulant (or irritant) laxatives have long been banned by medical authorities. However, bisacodyl appears to be effective and safe. Senna and its derivatives (natural products such as herbal teas, malva, etc.) have been used since centuries by constipated patients all over the world.

Senna (anthraquinone) derivatives are well known to induce a black coloration of the colon (an asymptomatic condition known as melanosis coli; see ► Chap. 4). They were also suspected to induce the “laxative (or cathartic) colon,” a condition associated with laxative abuse and characterized by an atonic, often aganglionic, colon and progressively refractory to any laxative treatment. However, we now recognize the colonic inertia syndrome linked to a lack of colon neural ganglions and characterized by severe constipation requiring the use of powerful laxatives, such as senna; it is therefore possible that the colonic motor abnormality (cathartic colon) that has been attributed to senna abuse was, in fact, not a consequence of the high-dose laxative treatment, but was rather its cause!

Stimulant laxatives should not be used as a first-line treatment, but neither should they be banned from the therapeutic arsenal for constipated patients.

**New drugs** Various medications have been developed recently for the treatment of constipation. These drugs offer the advantages of having a better elucidated mode of action than the classic laxatives that have been empirically used for centuries and a therapeutic efficacy which has been validated by modern scientific investigations. However, many of them require a systemic route of action (with possible systemic side effects) and, as new drugs, have a long-term safety profile that is still poorly known. Their cost is also a limiting factor, and their place in the therapeutic arsenal (e.g., to be used before or after stimulant laxatives?) is still a matter of debate.

Prokinetics, such as 5-HT<sub>4</sub> agonists, are known to be effective in the treatment of constipation and bloating since the earlier studies with tegaserod (now withdrawn from the market because of cardiovascular side effects). Prucalopride (suggested dose for treatment of chronic constipation, 2 mg die) is a 5-HT<sub>4</sub> agonist marketed in Canada in 2012.

Chloride secretion activators act on the small bowel enterocyte to induce Cl<sup>-</sup> and (secondary) H<sub>2</sub>O secretion

(and a secondary motility response). Lubiprostone, acting on the chloride channel 2, has been available in the USA since 2009. Misoprostol, a synthetic prostaglandin used for the treatment of peptic ulcers, is known to have a laxative effect; given its prostaglandin nature like lubiprostone, a similar mode of action is presumed. Linaclotide, a guanylin agonist activating cyclic GMP and Cl<sup>-</sup> secretion from the enterocyte, is available in Canada since 2014 (plecanatide is also now available).

A sodium-hydrogen NHE-3 exchanger inhibitor, tenapanor, is available since 2019 to treat constipated IBS patients.

Peripheral opioid receptor antagonists such as methylnaltrexone, naloxegol, or alvimopan (available in the USA) may have a prokinetic effect by blocking the peripheral motor inhibition of opioids such as morphine, codeine, etc. [or even of endogenous opiates (endorphins)]. They are used in opioid users to block the drug-induced constipation.

**Specific treatments for specific patients** Biofeedback is used mainly in cases of anorectal dyssynergia where, during the defecation thrust, the patient contracts its external anal sphincter (rather than relaxing it), thus impeding the stool passage. Biofeedback therapy can correct this behavioral motor disorder.

Psychotherapy can improve certain conditions associated with constipation or irritable bowel syndrome. Anecdotally, it has also been found effective in some cases of colonic inertia or pelvic dyssynergia.

Surgery can be useful in certain selected cases. Defecation disorders linked to a rectocele, an intussusception, or a prolapse can be corrected by surgery. Some patients with a colonic inertia syndrome, with exclusive colonic involvement and without a generalized intestinal pseudo-obstruction disorder, can be improved after colectomy (and, most often, an ileorectal anastomosis).

## 15.5 Miscellaneous

Glycerin suppositories are used to stimulate the defecation in individuals with rectal hyposensitivity (e.g., spinal cord injury). Rectal enemas are useful in acute conditions (acute constipation, preparation for colonic examinations); they can also be used chronically in selected patients (neurological constipation, severe constipation, etc.).

## 15.6 Constipation in Children

### Some guidelines for children:

- In full-term children, the first bowel movement occurs within the first 36 hours of life.
- At 4 years of age, a “normal” child has between three bowel movements/day and three bowel movements/week.
- Over 4 years of age, 97% of children have 0.5–3 stools daily.

### Definition of constipation:

- In infants: breastfed, <2 stools/day; on cow’s milk or “varied” diet, <3 stools per week.
- In older children: <2 stools per week.

Hirschsprung’s disease can sometimes be difficult to distinguish from functional constipation (see [Table 15.3](#)).

**Table 15.3** Functional constipation vs. Hirschsprung’s disease in infants

	Hirschsprung	Functional constipation
Age of onset	<2 months	>1 year
Meconium	Delayed >24 hours	Normal
Encopresis/ incontinence	Absent	Possible
Growth	Delayed	Normal
Abdominal pain	Rare	Frequent
Stool volume	Small	Large
Retention behavior	Absent	Present
Abdomen	Distended	Not distended
Rectal examination	Empty rectum	Stool