

# Surgical treatment of constipation

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## Abstract

Constipation is a common symptom in clinical practice. Definition of constipation includes abnormal bowel frequency, difficulty during defecation and abnormal stool consistency. There are many classifications of constipation based on constipation etiology (constipation in healthy people caused by life style, constipation as a symptom of digestive tract diseases, secondary constipation in the course of systemic disorders or associated with drugs) and/or constipation mechanisms (functional, mechanical). The numerous disorders leading to constipation make often diagnostic management difficult and complicated. Treatment of constipation includes dietary and behavioral approaches, pharmacologic therapy and in selected patient surgical treatment. Surgical treatment is recommended in young patients with severe slow transit constipation refractory to conservative treatment. Confirmation of indication to surgical treatment requires studies of colonic and anorectal function (colonic transit studies, anorectal manometry, studies of defecation). Preferred surgical technique is colectomy with ileorectal anastomosis. Authors reported good results and patient satisfaction in 50-100 percent of cases. Postoperative complications include intestinal obstruction, abdominal pain, flatulence, diarrhea.

**Key words:** constipation, surgical treatment.

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## Definition

Diagnostic criteria for constipation include:

- abnormal stool form (at least 25 percent lumpy or hard stools),
- abnormal stool passage (at least 25 percent defecations with straining and feeling of incomplete evacuation, manual maneuvers to facilitate more than 25 percent defecations) and/or
- abnormal stool frequency (less than 3 bowel movements per week) [1].

Severe constipation is diagnosed when there are 4 or less bowel movements per month.

## Epidemiology

Constipation is one of the most common complaints in Western countries. Epidemiological studies in North America reported frequency of constipation from 1.9 to 27.2 percent (most from 12 to 19 percent) of adults. Approximately 63 million people in North America suffer from this symptom. There is females predominance among constipated patients (female to male ratio – 2.2 : 1). The prevalence of constipation increases with age [2]. In the study of 10000 adults in the USA prevalence of constipation was 14.7 percent with 45 percent of individuals having the symptom for 5 years or more [3].

## Etiology

As there is a great number of disorders causing constipation there are also numerous classifications of constipation. They usually based on constipation etiology or constipation mechanism. Different criteria are used to precise categorization of constipation, but it is still difficult to find one classification including all constipation types. For example Hirschprung's disease may be categorize to congenital disorders and simultaneously to the group of constipation secondary to peripheral neurogenic disorders as well as to the group of constipation with large bowel dilatation.

**Table 1. Classification of constipation (according to Rocha Miranda JA, Wexner SD: Surgical treatment of constipation [in]: Shackelford's surgery of the alimentary tract. Zuidema GD, Yeo CJ. W.B. Saunders Company, Philadelphia 2002, 431-445 [9])**

<b>Congenital</b>	<b>Extraintestinal</b>	<b>Metabolic and endocrine</b>
Hirschprung's disease	Pharmacologic	Amyloidosis
<b>Acquired</b>	Analgesics	Diabetes
Chagas' disease	Anesthetics	Hypercalcemia
<b>Mechanical</b>	Anticholinergics	Hyperparathyroidism
Obstructive	Anticonvulsant	Hypokalemia
Neoplasia	Antidepressants	Hypopituitarism
Adhesions	Antiparkinsonian agents	Hypothyroidism
Hernia	Antacids	Pheochromocytoma
Volvulus	Barium sulfate	Porphyria
Endometriosis	Diuretics	Pregnancy
Severe sigmoid diverticulitis	Ganglionic blockers	Scleroderma
Anal stenosis	Iron	Uremia
<b>Functional</b>	Hypotensives	<b>Neurogenic</b>
Inadequate fiber intake	Laxative abuse	Peripheral
Irritable bowel syndrome	Metallic intoxication	Autonomic neuropathy
<b>Idiopathic</b>	(arsenic, lead, phosphorus)	von Recklinhausen's disease
<b>Colonic</b>	Monoamine oxidase inhibitors	Multiple endocrine neoplasia IIb
Inertia	Opiates	<b>Spinal</b>
Dolichocolon	Paralytic agents	Cauda equina tumor
<b>Pelvic</b>	Parasympatholytics	Iatrogenic
Intussusception/rectal prolapse	Phenothiazines	Meningocele
Rectocele	Psychotherapeutics	Multiple sclerosis
Sigmoidocele		Paraplegia
Descending perineum		Resection of nervi cringens
Paradoxical puborectalis contraction		Shy-Drager syndrome
Perineal hernia		Tabes dorsalis
		Trauma
		<b>Central</b>
		Parkinson's disease
		Stroke
		Tumors

### Constipation in healthy people

In healthy people constipation occurs occasionally as a result of diet, traveling or emotional factors. Chronic constipation may be caused by: low – fiber diet (recommended amount of dietary fiber is 20-35 g per day), intake of products increasing tendency to constipation (tea, cacao), low consumption of fluids, low level of physical activity. All of this factors led to impairment of large intestine transit.

### Constipation secondary to the systemic diseases and drugs

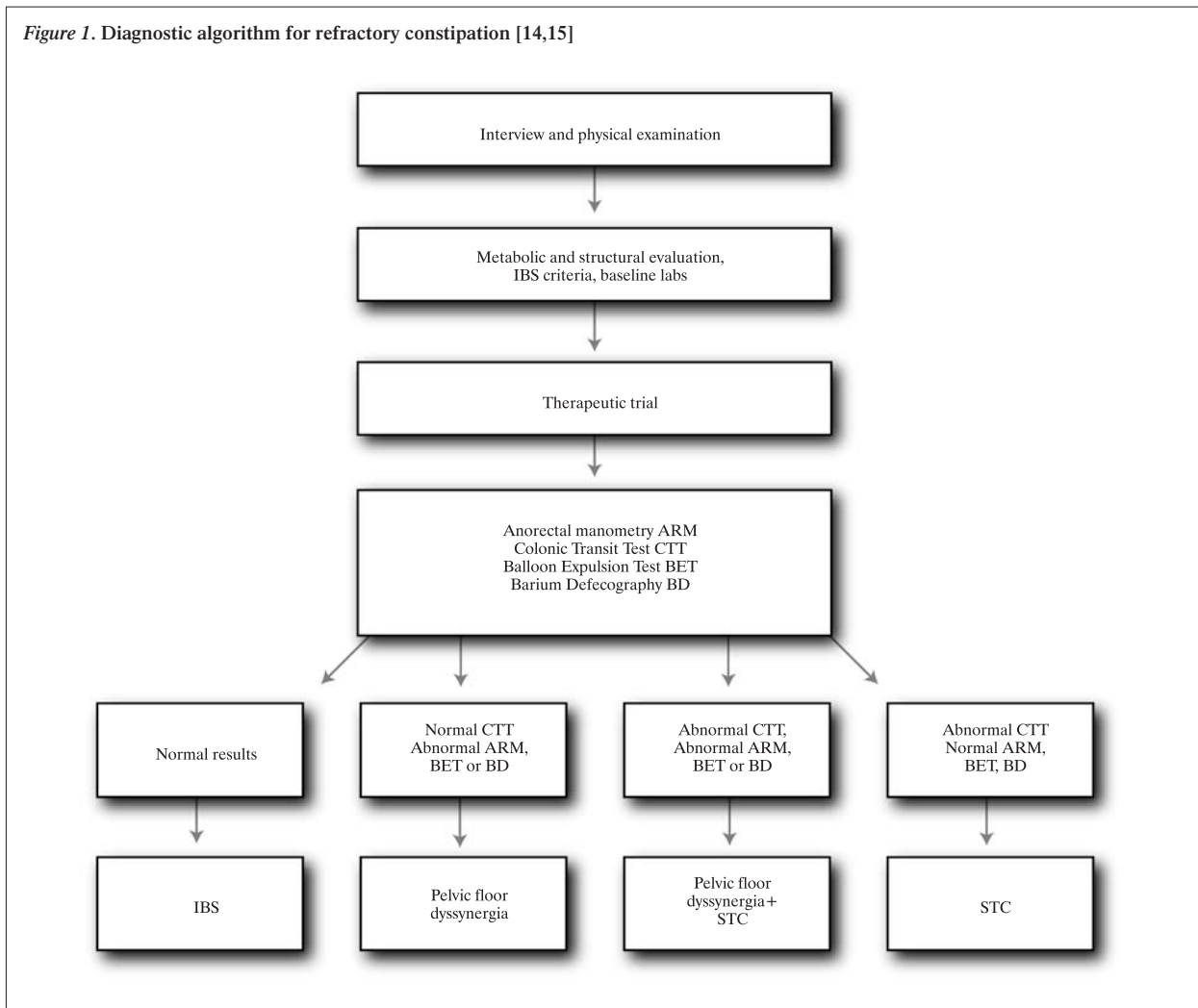
Constipation is associated with numerous disorders affecting colonic motility: metabolic and endocrine disorders (the most common are diabetes mellitus and hypothyroidism), neurogenic disorders (peripheral, central, spinal), muscle disorders. Neurogenic, peripheral disorders include congenital (Hirschprung's disease) or acquired (Chagas' disease) disorders of the enteric nervous system. It must be remembered that every chronic disease may be a cause of constipation because of

impairment of physical activity, especially in bedridden patients, change in diet and concomitant medications. Drugs which can produce or exaggerate constipation are shown in *Tab. 1.*

### Constipation in the course of organic and functional digestive tract diseases

Constipation is usually a symptom of digestive tract disorders. Organic disorders cause constipation in mechanical way (obstruction). Mechanical impairment in colonic transit may be caused by: colorectal cancer, diverticular disease, intraperitoneal adhesions etc. Functional bowel disorders are diagnosed basing on Rome II criteria and excluding other condition with similar clinical presentation. According to Rome II criteria constipation is a symptom of irritable bowel syndrome (IBS) and functional constipation<sup>1</sup>. Colorectal motility disorders presenting with constipation include: slow-transit constipation (STC, colonic inertia), pelvic floor dysfunction and combination syndromes. STC typically affects young women, with the onset of symptoms below age 25 in most cases. Etiopathogenesis of

Figure 1. Diagnostic algorithm for refractory constipation [14,15]



STC is not clear. Wedel et al. [4] reported that the colonic motor dysfunction in STC is associated with quantitative alterations of the enteric nervous system (oligoneuronal hypoganglionosis), which can not be detected by submucosal biopsy because they primarily affect myenteric plexus and external submucous plexus. Pelvic floor dyssynergia (anismus) is described as inappropriate contraction or failure to relax the pelvic floor during the attempt to defecate. Behavioral treatment of this disorder (biofeedback) is reported to be successful in 80 percent of cases [5]. Idiopathic megarectum and megacolon are defined as dilatation of the rectum and/or colon without demonstrable organic disease [6,7]. Other condition with large bowel dilatation and constipation is intestinal pseudo-obstruction. Mann et al. [8] found out that constipation occurred in 40 percent of patients with intestinal pseudo-obstruction. Classification of constipation is shown in Tab. 1.

### Diagnostic strategies

In the evaluation of the patient presenting with constipation history of complaint and physical examination are mandatory. The aim of the other studies is exclusion of anatomic (colonoscopy, barium enema) and extracolonic causes of

constipation. The next step is 6-month period of conservative approach: dietary modification, physical exercises, behavioral and pharmacologic treatment. After failure of such management referral for colonic and anorectal physiologic testing should be considered (Fig. 1).

### Colonic and anorectal testing techniques

Evaluation of colonic and anorectal function includes several tests: colonic transit time, anorectal manometry, defecography, EMG and pudendal nerve terminal latency (PNTML), balloon proctography, perineometry, scintigraphic study of rectal evacuation. Results of colorectal function tests allow to categorize the constipation to 4 groups: 1. colonic inertia with/without megacolon, with/without gut dysmotility syndrome, 2. pelvic floor dysfunction with anatomical abnormalities (Hirschprung's disease, perineal descent, rectocele, sigmoidocele, intussusception, rectal prolapse) or without anatomical abnormalities (paradoxical puborectal contraction, levator spasm, anismus, rectal pain), 3. combined syndrome, 4. normal transit constipation [10].

Colonic transit study involves ingestion of radiopaque markers and measurement of their transit by abdominal

radiographs. Overall colonic transit time and segmental transit times can be calculated. Study is conducted until at least 80% of markers have passed or during a defined period of time (6-8 days). In the Metcalf's method markers are ingested on three consecutive days and on day 4 and day 7 their distribution is assessed by an abdominal plain film [11]. To determine localization of the markers in the left, right and rectosigmoid colon bony landmarks are used. Colonic transit time can be also determined by the radioisotopes. This test confirms patients subjective complaint of constipation and/or decreased bowel frequency and is useful for confirmation of slow transit and identification of the colonic regions with delays in transit.

Defecography (evacuation proctography) is radiological contrast study evaluating process of defecation using fluoroscopic techniques. This method is helpful in patients with suspected pelvic floor dyssynergia (inappropriate contraction of the puborectalis muscle), enterocele and anterior rectocele. Defecography supports the symptom of inability to defecate.

Anorectal manometry provides information about anal canal pressure and anal sphincter responses. Procedure includes a number of specific tests: resting anal pressure, anal canal squeeze pressure, rectoanal inhibitory reflex, anal pressure in response to a cough, anal canal pressure in response to defecatory maneuvers, compliance of the rectum in response to balloon distension, sensory thresholds in response to balloon distension. Anal manometry confirms the diagnosis of pelvic floor dysfunction and is also useful in diagnosis of Hirschprung's disease. Authors emphasize that clinical value of anorectal manometric tests is limited by the relative absence of standardization of test protocols and normative data from a large number of healthy individuals [12]. Balloon expulsion test estimates motor function and coordination. This procedure confirms the symptom of inability to defecate. Balloon distension test evaluates rectal sensation detecting the threshold for: rectal sensory (the first detectable sensation), the sensation of urgency to defecate and the sensation of pain (maximum tolerable volume). The procedure is used in differential diagnosis between functional and neurological causes of constipation [13].

### **Treatment of constipation**

Treatment of constipation includes:

- life style modification (adequate intake of dietary fiber and fluids, regular physical activity),
- behavioral approaches (habit training, biofeedback),
- pharmacologic treatment (bulk-forming laxatives, emollient laxatives, hyperosmolar laxatives, salina laxatives, stimulant laxatives, anthraquinones),
- surgical treatment [16].

### **Surgical treatment of slow-transit constipation**

Surgical treatment is indicated in selected patients with constipation. Excluding patients with constipation as a symptom of organic disease of digestive tract in which surgery is a treatment of choice (colorectal cancer, complicated diverticular disease etc.) surgery is used in Hirschprung's disease, slow-transit constipation, rectocele, enterocele, rectal intussusception and prolapse.

Surgery as a method of treatment for refractory constipation was first described by Sir William Arbuthnot-Lane in 1908. He reported 20 percent mortality rate and 64 percent success rate in the group of 39 patients.

Currently, the most widely accepted operative technique for STC is colectomy with an ileorectal anastomosis. Other procedures used in surgical treatment of STC involve: colectomy with ileosigmoid anastomosis, segmental resection of the colon with colo-colonic or colorectal anastomosis.

According to Lahr et al. [17] operative treatment of constipation may be considered when this symptom meets several criteria, including: "1) the severity must warrant the surgical risks, 2) medical and psychological causes have been ruled out, 3) medical therapy has failed, and 4) diagnostic studies show correctable anatomic or physiologic abnormalities". Lahr et al. reported outcome of operative treatment for constipation in the group of 196 patients. 44 percent of patients underwent pelvic hiatal hernia repair (sigmoid resection, rectopexy and patch sacral colpopexy), 27 percent underwent total abdominal colectomy and ileorectal anastomosis for colonic inertia and 29 percent had surgery for both colonic inertia and pelvic hiatal hernia. Relief of symptoms was reported by 90 percent of patients. Complications occurred in 6.1 percent of patients and included: small bowel obstruction, anastomotic leak, ureteral stenosis, patch erosion.

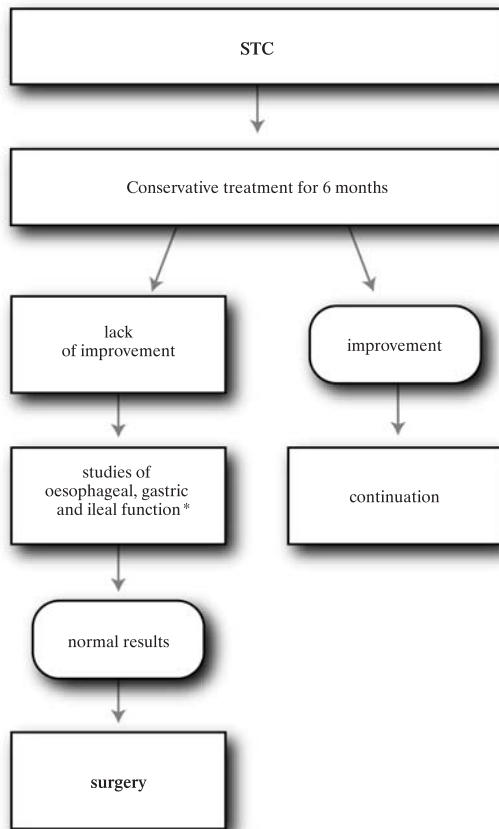
Upper gastrointestinal motility disorders are often recognized in patients with STC and may be an important predictive factor for postoperative morbidity (intestinal obstruction). Patients with oesophageal, gastric and small-bowel motor abnormalities have 50 percent chance of recurrent symptoms or other abdominal complaints after operation [18].

Piccirillo et al. [19] presented the results of prospective assessment of total abdominal colectomy and ileorectal anastomosis in the group of 54 patients with STC. 94 percent of patients had satisfactory improvement in bowel habit with a mean frequency of spontaneous bowel movements of 3.7 per day (range 1-10) after a mean follow-up of 27 months. Small bowel obstruction appeared in 9 percent of patients. Authors suggested that high success rate in the study is probably due to the strict patient selection with exclusion of paradoxical puborectalis muscle contraction and Hirschprung's disease.

Verne et al. [20] also emphasizes the importance of preoperative patient selection with careful evaluation of gastrointestinal motility. They found out that patients with abnormal 24-h intraduodenal manometric findings reported higher mean postoperative pain scores, had longer hospitalization and higher rate of readmission to the hospital during the follow-up comparing to the patients with normal upper gastrointestinal motility. Authors concluded that subtotal colectomy has a long term benefit in patients with colonic inertia (improvement in abdominal pain and frequency of the bowel movements). They also confirmed better results in patients with colonic inertia without upper gastrointestinal dysmotility.

Glia et al. [21] studied outcome of colectomy for STC in patients with normal and abnormal antroduodenal manometry findings. Studied group consisted of 17 patients (median age 46 years) suffering from STC, who underwent subtotal colectomy.

Figure 2. Algorithm for STC



\* oesophageal manometry, antroduodenal manometry, scintigraphic study of gastric emptying, lactulose breath hydrogen test to measure orocecal transit, scintigraphic study of small bowel transit

Preoperative evaluation included whole gut transit time, anorectal manometry, antroduodenal manometry, EMG of the anal sphincter, balloon expulsion test and defecography. 56 percent of patients had abnormal antroduodenal manometry. Authors reported that overall outcome of colectomy was good or excellent in 71 percent of patients with a trend toward better outcomes in patients with normal antroduodenal manometry. At long-term follow-up (5 years) 86 percent of patients reported improvement after operative treatment despite persisted pain (43%) and bloating (50%).

Fitz Harris et al. [22] studied the relationship between functional outcomes and quality of life after subtotal colectomy for STC in the group of 75 patients. All patients were female. Authors used the Gastrointestinal Quality of Life Index (GIQLI) designed to evaluate gastrointestinal symptoms, physical, psychological, social and disease-specific issues. The maximum possible score in GIQLI is 144 (zero /worst/ and four /best/ scores for each question). 77% patients had low sigmoid anastomoses and 23 percent had rectal anastomoses. Assessing functional outcome and complications authors found out that: 5 percent of patients in studied group reported recurrent or persistent constipation, 41 percent persistent abdominal pain, 69 percent diarrhea, 45 percent incontinence. Four percent

of patients required a permanent ileostomy and 17 percent of patients underwent lysis of adhesions. Assessing the quality of life authors found out that the mean GIQLI score was  $103 \pm 22$ . Abdominal pain, diarrhea and incontinence were recognized as the symptoms with the strongest impact on GIQLI score. 93 percent of patients stated they would undergo subtotal colectomy again if given a second chance. Authors conclude that defecation frequency increased in 95 percent of patients after subtotal colectomy but a significant number of patients suffer from gastrointestinal symptoms which well correlate with the GIQLI score.

Kamm et al. [23] reported long-term efficacy of surgical treatment for constipation of 50 percent. 1/3 of patients suffered from diarrhea and 10 percent from recurrent constipation.

Bielecki and Kamiński [24] presented outcome of surgical treatment (colectomy with ileorectal anastomosis, subtotal colectomy with anastomosis of small stump of caecum with rectum) in the group of 10 patients with severe slow-transit constipation. Postoperative complications occurred in 3 patients (deep vein thrombosis, pneumonia, subileus). After a follow-up period (6-58 months) all patients were satisfied with operative treatment although most of them suffered from sporadic abdominal pain and bloating.

Some authors present laparoscopically assisted subtotal colectomy for STC as a possible alternative method to the open procedure, however the data are limited [25].

Surgery is also offered as a method of treatment of severe functional constipation in children [26] (Fig. 2).

## Conclusions

In selected patients with severe constipation surgery appears to be a valuable method of treatment. Effectiveness of surgical intervention and prevalence of postoperative complications are determined by very careful preoperative assessment of gastrointestinal function. There is a great number of gastrointestinal transit studies and anorectal testing techniques to confirm the slow-transit constipation and exclude gastrointestinal dysmotility syndrome. Before referral for surgical treatment all available methods of conservative treatment have to be used. Currently the most accepted procedure for STC is colectomy with ileorectal anastomosis with success rate of 50-100 percent. It has to be emphasized that symptoms coexisting with constipation (abdominal pain, bloating, flatulence) usually persist after operation. Selection of appropriate patients for surgical treatment through extensive studies is a condition of the satisfactory outcome.

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