Ministry of Higher Education

and Scientific Research

University of Diyala

College of Medicine

A Review Article in:

Pediatric Constipation

Submitted to the Council of the College of Medicine, Diyala University, In Partial Fulfillment of Requirements for the Bachelor Degree in medicine and general surgery.

Submitted by

Wael Ghadhban Abdul-Hadi

Supervised by

Prof. Dr. Mehdi Shemkhi Jabr

2021 **2022**

Abstract

Constipation is a delay or difficulty in defecation, present for two weeks or more, and sufficient to cause significant distress to the patient. The majority of children with constipation have functional constipation, accounting for 95% of cases. The peak incidence of constipation occurs between 2 and 4 years of age. several factors may contribute to constipation, such as lower parental educational level, increased body weight, reduced physical activity, a low fiber diet, positive family history and psychological factors. The pathophysiology of constipation in children is multifactorial and remains incompletely understood. Signs and symptoms may vary according to the age of the child. Infants may present with clinical features, such as straining, turning red in face and crying. Toddlers may present with passing painful and hard stool that may be associated with bleeding per rectum. Dietary changes are often advised in children with constipation. In this article we will discuss the pediatric constipation and the management.

Introduction

A normal bowel pattern is thought to be a sign of good health. In the general population. Constipation is one of the ten most frequent problems that a general pediatrician deals with, accounting for 25% of referrals to pediatric gastroenterologists worldwide (1).

The North American Society of Gastroenterology, Hepatology, and Nutrition (NASPGHAN) define constipation as "a delay or difficulty in defecation, present for two weeks or more, and sufficient to cause significant distress to the patient" (2). The Paris Consensus on Childhood Constipation Terminology (PACCT) defines constipation as "a period of 8 weeks with at least two of the following symptoms: defecation frequency less than three times per week, fecal incontinence frequency greater than once per week, passage of large stools that clog the toilet, palpable abdominal or rectal fecal mass, stool withholding behavior, or painful defecation (3).

Constipation affects 0.7-29.6% of children worldwide, according to a systematic review (median 12 percent). The prevalence was 10-20% in the United States and the United Kingdom, and 20-30% in Australia, South Africa, and China. Constipation might afflict just one child in a family, but it can also impact multiple family members from one or more generations. (4).

Etiology

The majority of children with constipation, 95 percent of the time, have functional constipation. Constipation is most common between the ages of two and four, when toilet training begins. Constipation may be caused by a variety of causes, including lower parental educational levels, increased body weight, decreased physical activity, a low fiber diet,

favorable family history, and psychological issues, according to available data. It generally refers to fecal retention, which occurs when a youngster tries to prevent an uncomfortable feces. However, an organic cause of constipation, such as neuromuscular illnesses, medicine side effects, food allergies, celiac disease, and so on, affects only 5% of children (5). As shown in table 1.

Idiopathic				
Functional constipation				
Developmental disorders (behavioral disorders, ADHD, Autism)				
Occasional constipation (forced toilet training, phobia, sexual abuse, exaggerated parental interventions)				
Psychological (eg. depression)				
Lazy colon				
Genetic predisposition				
Environmental (organochlorine insecticides or heavy metals)				
Dietary (low dietary fluid and fiber intake, malnutrition)				
Organic				
Neuromuscular disorders	Anatomical lesions	Systemic diseases	Drugs	Other
Congenital megacolon	Congenital or acquired	Cystic fibrosis	Ferrum	Cow's milk allergy
Intestinal neuronal dysplasia	rectosigmoid stenosis	Connective tissue	Diuretics	Celiac disease
Vertebral lesions	Ectopic anus	disorders	Codeine/	
Embedded filament	Congenital colon	Diabetes Mellitus	Narcotics	
Neurofibromatosis	defects	Diabetes Insipidus	Antidepressants	
Cerebral palsy	Gastroschisis	Hyperthyroidism	Aluminium	
Botulism		Hypokaliemia	antacids	
		Hypothyroidism	Lead	
		Down syndrome	poisoning/	
		Pelvic tumors	Vitamin D	
		MEN 2B Syndrome		

Table 1. Causes of functional and organic constipation

Idiopathic constipation must be distinguished from Hirschsprung's illness. Hirschsprung's disease is a condition of colonic motility caused by segmental colonic aganglionosis. It is thought to be responsible for 20 to 25% of all occurrences of newborn intestinal obstruction9. It can cause severe enterocolitis, which includes fever, diarrhea, and acute prostration, and can be fatal if not diagnosed early. During the first few weeks of life, the majority of affected newborns have problems defecating. Abdominal

distention, unwillingness to feed, and bilious vomiting are some of the other indications and symptoms of the illness. If the diagnosis is not made early in life, the older infant or kid may experience prolonged abdominal distention, repeated fecal impaction, and failure to thrive (6).

Alarm signs symptoms and physical findings that distinguish organic constipation from functional constipation include : Constipation starting extremely early in life (<1 month), Abdominal distention, Passage of meconium >48 hours, Ribbon stools, Blood in the stools in the absence of anal fissures, Failure to thrive, Fever, Bilious vomiting, Occult blood in the stool, Extreme fear during anal inspection, Lack of lumbosacral curve, Pilonidal dimple covered by tuft hair, Midline pigmentary abnormalities of the lower spine, Sacral dimple, Sacral agenesis, Anteriorly displaced anus, Perianal fistula, Perianal scars, Abnormal position of anus/ Patulus anus/ Flat buttocks, Abnormal thyroid gland, and tight, empty rectum in the presence of palpable abdominal fecal, mass (7).

Pathophysiology of constipation

Constipation in children has a complex etiology that is still poorly understood. Constipation is caused by a recognized organic problem, such as anorectal malformations, Hirschsprung disease, neurological abnormalities, or an endocrine or metabolic disorder, in a small percentage of people. There is no evident organic cause for constipation in more than 90% of children who present with it; hence it is diagnosed as functional constipation. The rectal mucosa absorbs water from the fecal bulk as a result of the withholding, and the held stools become increasingly difficult to empty. This causes a vicious cycle of stool retention, in which the rectum becomes increasingly bloated, culminating in overflow fecal incontinence, loss of rectal feeling, and, eventually, loss of the natural urge to defecate. (8).

The rectum is an important part of the defecation process. Some children with chronic constipation have been observed to have greater rectal compliance, decreased rectal feeling, or both. As a result, aberrant rectal wall characteristics and/or sensory dysfunction could potentially cause evacuation issues (9). Because constipation commonly begins in the first months of life and many patients have a favorable family history of constipation, genetic predisposition may play a role in the development of juvenile constipation. A systematic analysis published in 2011 concluded that genetic variables play a role in childhood constipation, however mutations in genes linked to constipation have yet to be discovered. Presence of a clinical syndrome should be investigated in familial cases of childhood constipation because a number of syndromes are associated with chronic constipation (10).

Functional constipation's pathophysiology is still unknown, but it is thought to be multifaceted. Withholding behavior, which usually occurs after an unpleasant experience, such as a hard, painful, and/or frightening bowel movement, is an essential etiological element, especially in young children. Fecal impaction, or the presence of a big fecal mass in the rectum or abdomen, can result from stool-withholding behavior. Furthermore, fecal impaction frequently results in overflow fecal incontinence, which is the unintentional loss of soft stools that pass through an obstructing fecal mass (11). Major life experiences, as well as psychosocial factors, may have a role in the pathophysiology of FC. Furthermore, behavioral disorders like autism spectrum disorders and attention deficit hyperactivity disorder are linked to an increased incidence of constipation in children. (12).

Clinical features

Signs and symptoms differ depending on the child's age. Infants may display clinical signs such as squeezing, getting red in the face, and wailing. Toddlers may have painful, hard feces that is coupled with bleeding per rectum, which is caused by a minor rip in the anal canal, resulting in increased withholding. Fecal incontinence was shown to be more prevalent in school-aged children than in pre-school and teenage children. Nearly 40% of the youngsters who were constipated had abdominal pain. Girls and older children were more likely to experience abdominal pain. The most prevalent physical discovery was a fecal mass in the rectum, with constipated boys having greater rates (22).

Parents may note that the child resists the urge to defecate. Patients may also present with retentive fecal soiling secondary to withholding that can be mistaken as diarrhea and will force parents to seek medical care. Other manifestations include abdominal pain, distention, and feeling of incomplete disimpaction causing nausea and decreasing appetite. Some patients also present with enuresis and urinary tract infections, because stool masses press on the urinary tract and block normal urinary flow (13).

Management of constipation

A thorough history and physical exam are usually adequate in determining whether additional evaluation is necessary or whether the patient should be referred. Routine lab tests are not indicated in evaluating functional constipation; however, tests to consider on differential include: thyroid function, serum calcium, potassium, lead, celiac panel, and sweat test. A complete history of elimination patterns should include a description of the stool, including frequency, consistency، and caliber. A positive history of stool withholding supports a diagnosis of functional

constipation. Toilet training experiences should be considered, and patients should be asked about fecal soiling, withholding behaviors, and associated symptoms, which may include nausea, vomiting, appetite change, and weight loss. The history should also include bleeding associated with stooling. The diet history should be reviewed and should include prior evaluation or treatment, home remedies, complementary and alternative therapies, or cultural-specific therapies (14).

Plain radiographs of the abdomen may be necessary to establish fecal impaction in a child who refuses rectal examination, and in the obese child when abdominal and rectal examinations are suboptimal to assist fecal load. Barium enitalica on unprepared colon, rectal biopsy, and anorectal manometry study are performed in case of suspicion of Hirschsprung's disease. Anorectal manometry is also helpful to identify functional abnormalities in some children with chronic idiopathic constipation, including an increased rectal sensory threshold, decreased rectal contractility on attitalicpted defecation and paradoxical contraction of the external anal sphincter and puborectalis muscles, during attitalicpts at defecation (15).

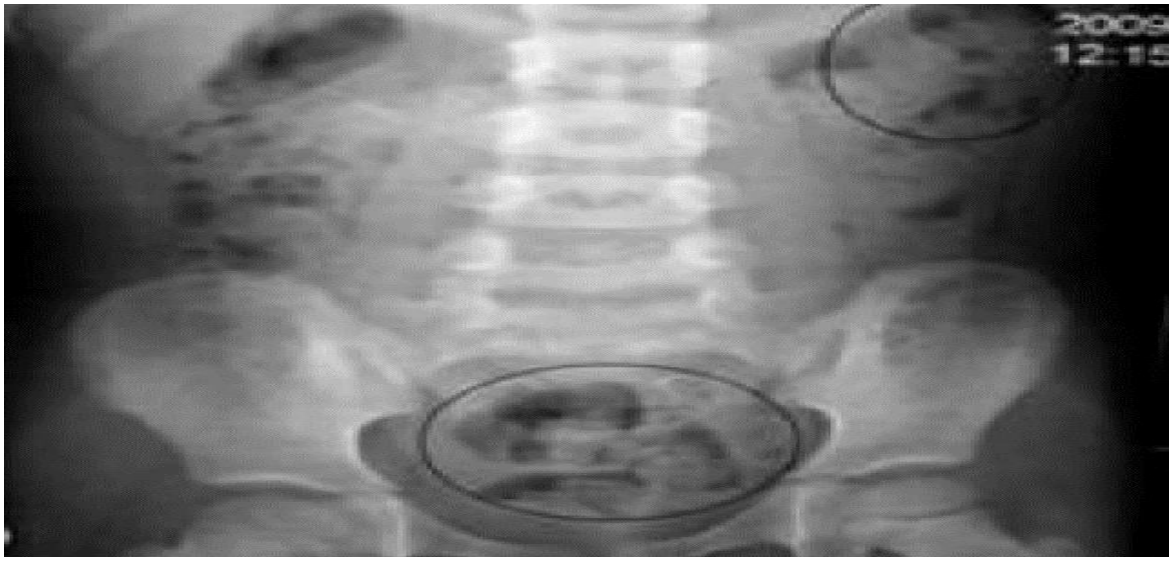

Figure 1. Fecal impaction in rectum

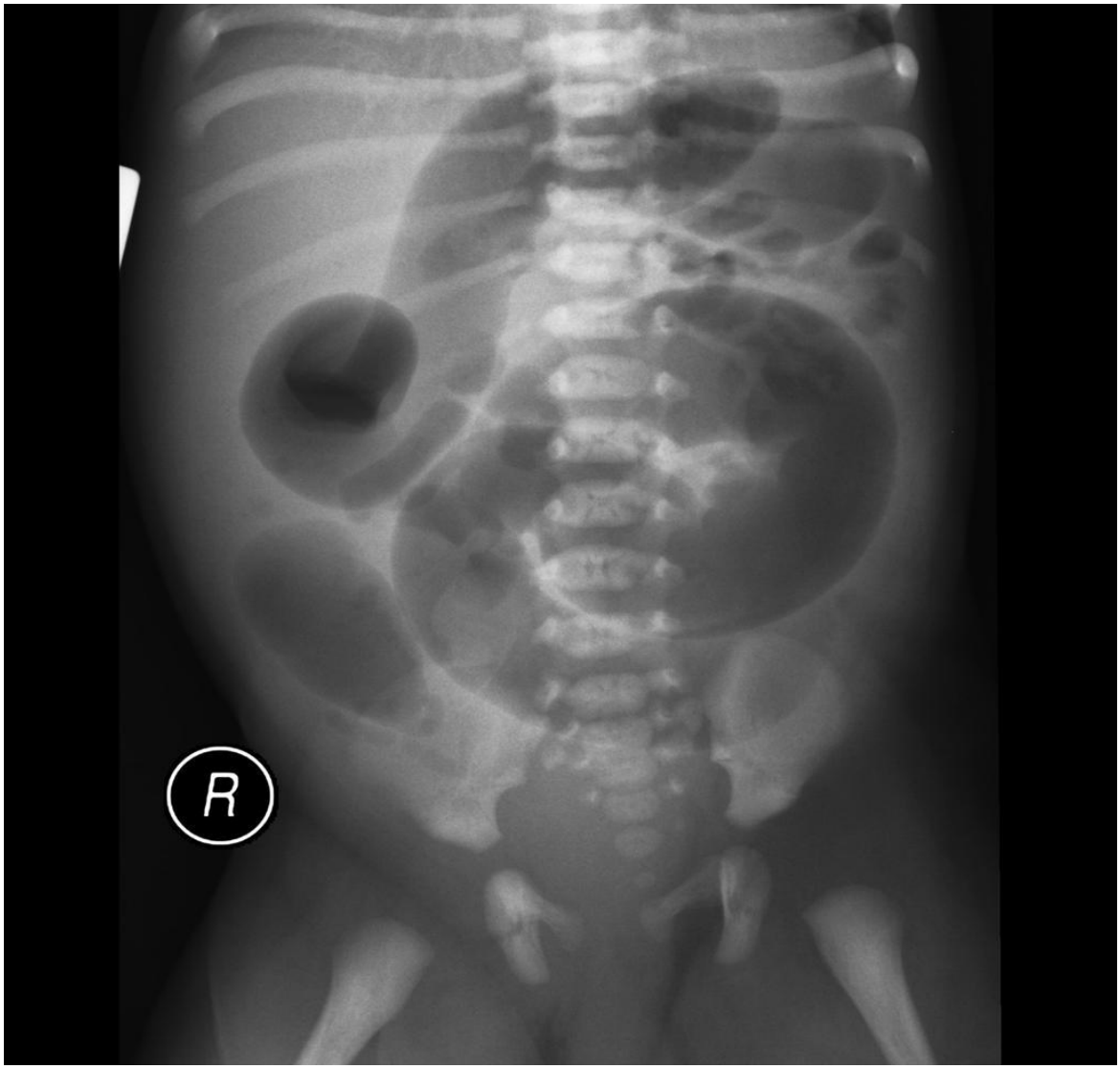

Figure 2. hirschsprung disease

DDX of constipation

Nonorganic

- Developmental: cognitive handicaps, attention-deficit disorder, attention-deficit hyperactivity disorder
- Situational: coercive toilet training, toilet phobia، school bathroom avoidance, excessive parental interventions, sexual abuse, depression
- Constitutional: colonic inertia, genetic predisposition

- Reduced stool volume and dryness: low fiber in diet، dehydration, underfeeding, or malnutrition

Organic

- Anatomic malformations: imperforate anus, anal stenosis, anterior displaced anus, pelvic mass (sacral teratoma)
- Metabolic and gastrointestinal: hypothyroidism، hypercalcemia, hypokalemia, cystic fibrosis, diabetes mellitus, multiple endocrine neoplasia type 2 B, gluten enteropathy
- Neuropathic conditions: spinal cord abnormalities، spinal cord trauma, neurofibromatosis, static encephalopathy, tethered cord
- Intestinal nerve or muscle disorders: Hirschsprung disease, intestinal neuronal dysplasia, visceral myopathies, visceral neuropathies
- Abnormal abdominal musculature: prune belly، gastroschisis, Down syndrome
- Connective tissue disorders: scleroderma, systemic lupus erythematosus, Ehlers-Danlos syndrome
- Drugs: opioids, phenobarbital, sucralfate, antacids، antihypertensives, anticholinergics, antidepressants، sympathomimetics
- Other: heavy metal ingestion (lead), vitamin D intoxification, botulism, cow's milk protein intolerance. (13).

Treatment

The treatment of functional constipation requires parental education, behavior interventions, measures to ensure that bowel movements occur at normal intervals with good evacuation, close follow-up, and adjustment of medication and evaluation as necessary.

Dietary changes are often advised in children with constipation. An increased intake of fluids and absorbable and nonabsorbable carbohydrates (e.g., sorbitol in prune, pear, and apple juice) can help soften stools, particularly in infants. The recommended dosage of prune juice for infants is 2 oz per day. It can be diluted with 2 oz of water for palatability (16). Studies have shown that children with constipation have a lower fiber intake than other children. An increased intake of dietary fiber may improve the likelihood that a child will be able to discontinue laxative therapies. The addition of a probiotic (e.g., *Lactobacillus* GG) may be helpful in some children (17).

When fecal impaction is present, disimpaction with oral or rectal medication is required before initiation of maintenance therapy. Oral medications are less invasive but require more patient cooperation and may be slower to relieve symptoms. A number of therapies are available. The advent of polyethylene glycol–based solutions (Miralax) has changed the initial approach to constipation in children because they are effective, easy to administer, noninvasive, and well tolerated (18).

The goal of maintenance therapy is to avoid reaccumulation of stool by maintaining soft bowel movements, preferably occurring once a day. Given a robust placebo response, there is insufficient evidence to support the effectiveness of laxative therapies over placebo in the treatment of childhood constipation (19). However, most studies show that the addition of laxatives is usually necessary and more effective than behavior modification alone. Although the use of enemas has been advocated in the past, recent studies have shown that the addition of enemas to oral laxative regimens does not improve outcomes in children with severe constipation (20). Stimulant laxatives (e.g., bisacodyl [Dulcolax], sennosides) may be required in some children, although data on their use in children are

limited. The lack of liquid formulations limits the practical use of stimulant laxatives in younger children (21). In the primary care setting, stimulant laxatives should be reserved for rescue therapy when an osmotic laxative is ineffective. Patients requiring constant administration of stimulant laxatives should be evaluated further (21).

Conclusion

Constipation is a common pediatric issue that need further educating. Because of its clinical significance it need more research to identify its exact pathophysiology and treatment options

References

1. Xinias I, Mavroudi A. Constipation in Childhood. An update on evaluation and management. Hippokratia. 2015 Jan;19(1):11.
2. North American Society for Pediatric Gastroenterology HaN. Evaluation and treatment of constipation in children: summary of updated recommendations of the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. J PediatrGastroenterolNutr. 2006; 43(3): 405-7.
3. Benninga M, Candy DCA, Catto-Smith AG, Clayden G, Loening-Baucke V, Di Lorenzo C, et al. The Paris consensus on childhood constipation terminology (PACCT) group. Journal of pediatric gastroenterology and nutrition. 2005; 40(3): 273-5.
4. Mugie SM, Benninga MA, Di Lorenzo C. Epidemiology of constipation in children and adults: a systematic review. Best practice & research Clinical gastroenterology. 2011 Feb 1;25(1):3-18.
5. Tabbers MM, DiLorenzo C, Berger MY, Faure C, Langendam MW, Nurko S, et al. Evaluation and treatment of functional constipation in infants and children: evidence-based recommendations from ESPGHAN and NASPGHAN. J Pediatr Gastroenterol Nutr. 2014; 58: 258-274.
6. Hyman PE, Milla PJ, Benninga MA, Davidson GP, Fleisher DF, Taminiau J. Childhood functional gastrointestinal disorders: neonate/toddler. Gastroenterology. 2006; 130: 1519-1526.

7. Baker SS, Liptak GS, Colletti RB, Croffie JM, Di Lorenzo C, Ector W, et al. Constipation in infants and children: evaluation and treatment. A medical position statement of the North American Society for Pediatric Gastroenterology and Nutrition. J Pediatr Gastroenterol Nutr. 1999; 29: 612-626.
8. Rajindrajith S, Devanarayana NM. Constipation in children: novel insight into epidemiology, pathophysiology and management. Journal of neurogastroenterology and motility. 2011 Jan;17(1):35.
9. Scott SM, Van den Berg MM, Benninga MA. Rectal sensorimotor dysfunction in constipation. Best Practice & Research Clinical Gastroenterology. 2011 Feb 1;25(1):103-18.
10. Peeters B, Benninga MA, Hennekam RC. Childhood constipation; an overview of genetic studies and associated syndromes. Best practice & research Clinical gastroenterology. 2011 Feb 1;25(1):73-88.
11. Mugie SM, Di Lorenzo C, Benninga MA. Constipation in childhood. Nature reviews Gastroenterology & hepatology. 2011 Sep;8(9):502-11.
12. McKeown C, Hisle-Gorman E, Eide M, Gorman GH, Nylund CM. Association of constipation and fecal incontinence with attention-deficit/hyperactivity disorder. Pediatrics. 2013 Nov 1;132(5):e1210-5.
13. Petersen B. Diagnosis and management of functional constipation: a common pediatric problem. The Nurse Practitioner. 2014 Aug 16;39(8):1-6.
14. Blackmer AB, Farrington EA. Constipation in the pediatric patient: an overview and pharmacologic considerations. Journal of Pediatric Health Care. 2010 Nov 1;24(6):385-99.
15. Carmona-Sánchez R. Functional constipation. Revista de Gastroenterologia de Mexico. 2006 Aug 1;71:79-80.
16. Tabbers MM, Boluyt N, Berger MY, Benninga MA. Nonpharmacologic treatments for childhood constipation: systematic review. Pediatrics. 2011;128(4):753-761
17. Maffei HV, Vicentini AP. Prospective evaluation of dietary treatment in childhood constipation: high dietary fiber and wheat bran intake are associated with constipation amelioration. J Pediatr Gastroenterol Nutr. 2011;52(1):55-59
18. Nurko S, Youssef NN, Sabri M, Langseder A, McGowan J, Cleveland M, Di Lorenzo C. PEG3350 in the treatment of childhood constipation: a multicenter, double-blinded, placebo-controlled trial. The Journal of pediatrics. 2008 Aug 1;153(2):254-61.
19. Candy D, Belsey J. Macrogol (polyethylene glycol) laxatives in children with functional constipation and faecal impaction: a systematic review. Archives of disease in childhood. 2009 Feb 1;94(2):156-60.

20. Bongers ME, van den Berg MM, Reitsma JB, Voskuijl WP, Benninga MA. A randomized controlled trial of enemas in combination with oral laxative therapy for children with chronic constipation. Clin Gastroenterol Hepatol. 2009;7(10):1069-1074
21. Nurko S, Zimmerman LA. Evaluation and treatment of constipation in children and adolescents. American family physician. 2014 Jul 15;90(2):82-90.
22. Altamimi E. Clinical characteristics of pediatric constipation in South Jordan. Pediatric Gastroenterology, Hepatology & Nutrition. 2014 Sep 1;17(3):155-61.