An Update on the Evaluation and Management of Childhood Constipation

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Overview

Constipation is considered to be a common digestive problem in childhood. It is estimated to affect 5-30% of children, accounting for 3% of visits to primary care and 25% of referrals to pediatric gastroenterologists.[1,2] Along with the bowel problems, behavioral issues are found in more than a third of children with constipation.[1] Thus, it is responsible for deteriorating the quality of life of children; furthermore, it incurs huge costs to healthcare services as children suffering from constipation are often seen in emergency or admission wards of hospitals.[3]

Functional constipation is regarded to be the most common type in children accounting for 90-95% cases.[1] Although constipation may be characterized by infrequent motions, passage of hard stools and difficulty or pain during defecation, several specific criteria have been proposed by numerous well-known bodies to define this problem in children.[1,4] The Northern American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) defines constipation as a delay or difficulty in defecation persisting for two or more weeks.[5] The Paris Consensus on Childhood Constipation Terminology (PaCCT) group criteria[6] and the Rome IV criteria[7] for defining constipation in children are shown in Table 1.

In clinical practice, it is useful distinguish between to patients with relatively recent-onset symptoms of constipation (eg, symptoms for several months or more). This categorization helps to predict constipation (eg, symptoms present for fewer than eight weeks) and those with persistent or frequently recurrent the necessary intensity and duration of treatment.

Risk factors and etiopathogenesis

Numerous etiological and risk factors responsible for causing pediatric constipation have been identified (Table 2).[4] Although the exact pathophysiology remains unclear, it is thought to be highly influenced by these factors. Among these factors, the child's withholding behavior is considered to be the commonest mechanism for the development of functional constipation which is often seen after a negative experience such as a hard, painful, and/or frightening bowel movement. As a result of withholding, water from the fecal mass is absorbed by the rectal mucosa,

Table 1: Definitions of constipation in children

Paris Consensus on Childhood Constipation Terminology (PaCCT) group criteria
At least 2 of the following symptoms in the past 8 weeks: • Defecation frequency less than 3 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 • Painful defecation
Rome IV criteria
2 or more of the following symptoms seen at least once per week for a minimum of 1 month with insufficient criteria for a diagnosis of irritable bowel syndrome: • ≤2 defecations in the toilet per week in a child of a developmental age of at least 4 years • ≥1 fecal incontinence episode per week • History of retentive posturing or excessive volitional stool retention • History of painful or hard bowel movements • Presence of a large rectal fecal mass • History of large stools which can obstruct the toilet These symptoms could not be fully explained by any another medical condition following adequate evaluation.

Adapted from: 1. Benninga M, Candy DC, Catto-Smith AG, Clayden G, Loening-Baucke V, Di Lorenzo C, Nurko S, Staiano A. The Paris Consensus on Childhood Constipation Terminology (PACCT) Group. *J Pediatr Gastroenterol Nutr*. 2005;40(3):273-5. **2.** Hyams JS, Di Lorenzo C, Saps M, Shulman RJ, Staiano A, van Tilburg M. Childhood Functional Gastrointestinal Disorders: Child/Adolescent. *Gastroenterology.* 2016;150:1456-1468.

Table 2: Etiological and risk factors contributing to constipation in children

Risk factors	• Low fiber diet • Psychological stress • Cow's milk protein allergy • Familial predisposition • Prematurity • Living in urban areas
Intestinal causes	• Hirschsprung disease • Anorectal malformations • Neuronal intestinal dysplasia
Metabolic/ endocrine causes	• Hypothyroidism • Diabetes mellitus • Hypercalcemia • Hypokalemia • Vitamin D intoxication
Drugs	• Opioids • Anticholinergics • Antidepressants
Other causes	• Anorexia nervosa • Sexual abuse • Scleroderma • Cystic fibrosis

Adapted from: Rajindrajith S, Devanarayana NM. Constipation in children: novel insight into epidemiology, pathophysiology and management. *J Neurogastroenterol Motil*. 2011;17(1):35–47.

thereby making the stools further harder and larger with time, which ultimately results in difficulty while defecating. Moreover, the chronic stool retention can lead to distension of the rectum which causes overflow fecal incontinence, loss of rectal sensation, and involuntary loss of the normal urge to defecate. Furthermore, increased accumulation of fecal mass in the rectum can also lead to other bowel-associated symptoms.[1,7,8]

Clinical presentations

The clinical manifestations of children with constipation may vary depending on the child's age. In infants with constipation, there is infrequent passage of a large fecal bolus which is usually accompanied by crying, screaming and local discomfort which gets resolved after evacuation while in toddlers, constipation is characterized by the passage of painful and hard stool which may be associated with rectal bleeding that develops secondary to a small tear in the anal canal, thereby resulting in further withholding.[1,9]

In a school-going child, further accumulation of stools in rectum cause megarectum development resulting in loss of rectal sensation and urge for defecation. Soiling may be seen in these children which poses as a major social problem affecting both the child and the family. In addition, these children may be subjected to social withdrawal and introversion as they have the fear of being ridiculed by peers.[1,9]

Additional clinical manifestations seen in children with constipation include enuresis and urinary tract infections attributed to pressure created by stool masses on the urinary tract; abdominal distention; and the feeling of incomplete disimpaction leading to nausea, loss of appetite and abdominal pain.[1]

Figure 1: Bristol stool scale for the determination of stool consistency

Type 1 - Separate hard lumps, like nuts

Type 2 - Sausage-like but lumpy

Type 3 - Like a sausage but with cracks in the surface

Type 4 - Like a sausage or a snake, smooth and soft

Type 5 - Soft blobs with clear-cut edges

Type 6 - Fluffy pieces with ragged edges, a mushy stool

Type 7 - Watery, no solid pieces

Adapted from: Ferrante G, La Grutta S. The Burden of Pediatric Asthma. *Front Pediatr.* 2018;6:186.

Diagnostic evaluation

Evaluation of childhood constipation primarily comprises of a thorough medical history and physical examination. The medical history should contain information on factors such as frequency and consistency of stools, abdominal pain, fecal incontinence, withholding behavior, dietary history, vomiting, and weight loss. The Bristol stool scale may be used to define the stool consistency (Figure 1). In addition, information regarding a child's bowel habits may be recorded in a daily bowel diary. Furthermore, history regarding coexistence of abdominal pain, dietary history, changes in appetite, presence of nausea and/or vomiting, and other accompanying symptoms is essential. Alarm symptoms suggestive of an organic cause should be noted (Box 1).[8,10]

Physical examination should include abdominal examination, inspection of the perianal region, examination of the lumbosacral region, and neurological examination. Abdominal examination allows the detection of a palpable fecal mass while in perianal inspection, the presence of anatomic abnormalities, perianal feces, fissures, scars, and erythema is evaluated. The presence of fissures may indicate hard and/or large stools. Laboratory and radiological investigations are usually not required in the routine diagnostic workup of functional constipation unless otherwise alarm symptoms are evident.[8] A diagnostic algorithm for evaluating pediatric constipation is demonstrated in figure 2.[1]

Evaluation of the presence of fecal impaction is an important step in the management of constipation in children. The presence of fecal impaction may be determined by abdominal examination or digital rectal examination. No imaging studies are essential if the rectal examination reveals fecal impaction. However, abdominal radiography may be considered if rectal examination is not possible or it is traumatic for the child. Plain-film abdominal radiographs showing fecal impaction have been demonstrated to be highly predictive of the finding of fecal impaction on digital rectal examination.[11] The criteria for diagnosis of fecal impaction by digital examination include the following:

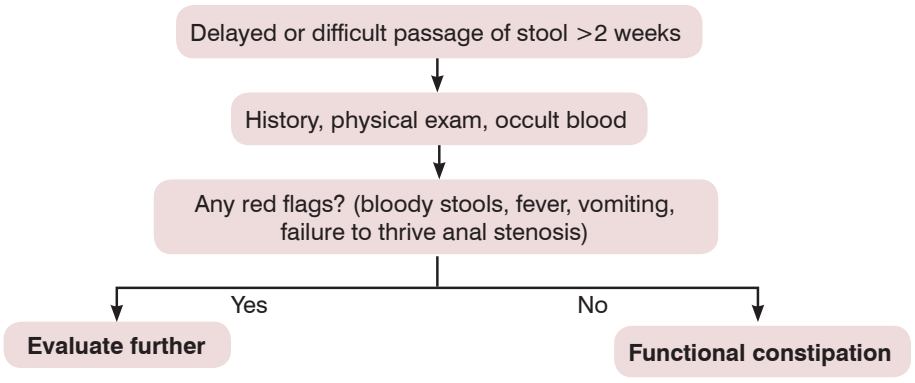
- Children with intractable constipation
- Presence of alarm signs or symptoms
- If only 1 of the Rome IV criteria is present and the diagnosis of functional constipation is uncertain.[12]

Box 1: Alarm symptoms in a child with constipation

- Delayed passage of meconium in a term newborn (>48 hours)
- Constipation starting in the first month of life
- Family history of Hirschsprung's disease
- Ribbon stools
- Blood in stools in the absence of anal fissures
- Failure to thrive
- Bilious vomiting
- Severe abdominal distension
- Abnormal thyroid gland
- Abnormal position of the anus
- Absent anal or cremasteric reflex
- Decreased lower extremity strength/tone/reflex
- Sacral dimple
- Tuft of hair on spine
- Gluteal cleft deviation
- Anal scars

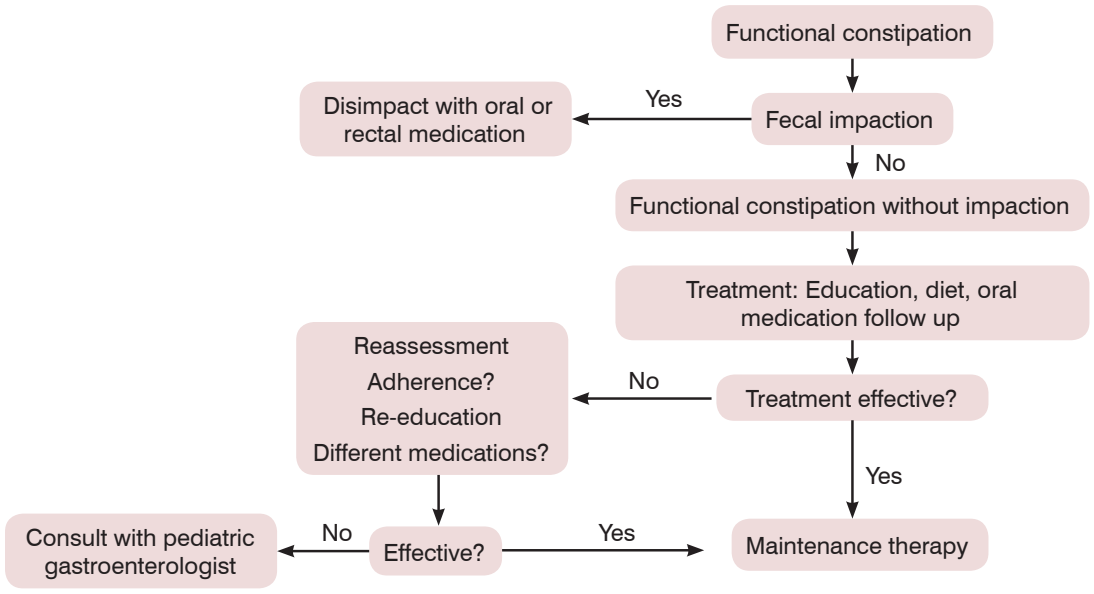
Adapted from: Hyams JS, Di Lorenzo C, Saps M, Shulman RJ, Staiano A, van Tilburg M. Childhood Functional Gastrointestinal Disorders: Child/Adolescent. *Gastroenterology.* 2016;150:1456-1468.

Figure 2: Diagnostic algorithm for the evaluation of pediatric constipation



Adapted from: Xinias I, Mavroudi A. Constipation in Childhood. An update on evaluation and management. *Hippokratia*. 2015;19(1):11-19.

Figure 3: Treatment algorithm for the management of pediatric functional constipation



Adapted from: Xinias I, Mavroudi A. Constipation in Childhood. An update on evaluation and management. *Hippokratia.* 2015;19(1):11-19.

Management approaches

Treatment of constipation in childhood is aimed at producing soft and painless stools along with prevention of rectal re-accumulation of feces.[1] However, its successful treatment requires a team approach comprising of the child, his/her family members and health care providers so that complications such as encopresis and recurrent abdominal pain can be avoided.[13] A combination of non-pharmacological and pharmacological approaches are essential in order to achieve these outcomes (Figure 3).

Educating the patients and their parents regarding the prevalence, symptoms, risk factors, treatment options, and prognosis is one of the important non-pharmacological approaches. It has been reported that about 15% of children with constipation show improvement following non-accusatory education, demystification and toilet training.[4,8] In addition, dietary modifications such as increased consumption of fruits, whole grains and vegetables along with an adequate fibre and fluid intake is advised in children with constipation. Furthermore, behavioral interventions include regular toileting, use of diaries to track stooling, and reward systems for successful evacuations.[1]

Pharmacological therapies

Pharmacotherapy for constipation comprises of two steps: disimpaction for children who present with fecal impaction and maintenance therapy to prevent reaccumulation of feces. Polyethylene glycol (PEG) may be administered orally at a dose of 1-1.5g/kg/day for a period of 3-6 days or rectally administered enemas are the agents used for disimpaction. However, PEG is usually recommended as first-line therapy due to its oral route of administration.[7,8]

PEG with or without electrolytes is being effectively used even in infants and young children at reduced doses. However, further studies are warranted to demonstrate its efficacy in younger children.[14] Oral powdered PEG at a dose of 0.78 g/kg/day was found to be effective and safe in younger patients (<18 months).[15] Other oral medications for rectal disimpaction include mineral oil, senna, polyethylene glycol electrolyte solution and magnesium citrate.[11]

Likewise, several oral and rectal laxatives along with stool softening agents are available for the maintenance phase. Among those, PEG is an osmotic laxative of choice which may be given at a dose of 0.2–0.8 g/kg/day orally. Maintenance treatment is advised for at least 2 months with symptoms resolving for at least 1 month before the initiation of weaning. Evaluation of symptoms after 2 months of treatment cessation is usually advised in order to prevent relapses.[7,8] Moreover, laxatives and/or enemas may help identify children whose abdominal pain is caused by constipation when they return for a second visit with the complaint of abdominal pain.[16]

Management of abdominal pain: Role of drotaverine

Children with constipation often present with abdominal pain which is difficult to differentiate from other disorders. Evidence suggests that abdominal pain is a presenting

feature of constipation in 21% of girls and 18% of boys.[16] Non-anticholinergic antispasmodics directly acting on the intestinal smooth muscle are effective in reducing abdominal pain without exerting side-effects associated with other agents such as anticholinergics. Moreover, the functional obstruction caused by increased phasic colonic contractions in constipation may be relieved by antispasmodics.[17]

Drotaverine is an antispasmodic having a good relaxing effect on intestinal smooth muscle.[17] It is a selective inhibitor of phosphodiesterase 4, and has no anticholinergic effects. A study[18] which included children with recurrent abdominal pain had symptomatic improvement with drotaverine after 4 weeks of use. Results demonstrated significant reduction in number of pain episodes (10.3 vs. 21.6, p=0.01) with drotaverine as compared to placebo, although the exact mechanism of these benefits with drotaverine remained unclear.[18,19] Thus, drotaverine may be a part of the therapeutic regimen along with other non-pharmacological and pharmacological options in selected cases for the management of abdominal pain which may be a coexisting symptom in children with constipation.

Conclusion

Childhood constipation is a common healthcare problem worldwide. The most common type of constipation in children is functional. Several definitions of constipation in children have been proposed by numerous international organizations. Various risk factors involved in the pathophysiology of constipation have also been identified. Constipated children present with varied clinical manifestations depending on their age. Evaluation of these features along with a detailed history and physical examination is essential to accordingly initiate treatment. Management of constipation in childhood requires a multimodal approach comprising of both drug and non-drug therapies. Pharmacological treatment with laxatives consists of disimpaction, maintenance treatment, and eventually weaning off medication. PEG is the laxative of first choice for disimpaction as well as maintenance treatment. Appropriate treatment of other associated symptoms such as abdominal pain is essential. Non-anticholinergic antispasmodics such as drotaverine have been reported to be effective and well-tolerated in selective cases for children with recurrent abdominal pain. Referral to pediatric gastroenterologists for further evaluation is warranted in severe intractable cases of pediatric constipation.

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