

Functional Constipation in Children

Prasanth K.S.

*DNB (Pediatrics) DCH DM (Gastroenterology), Consultant Pediatric Gastroenterologist, SAT Hospital & Assistant Professor, Dept. of Gastroenterology, Govt. Medical College, Thiruvananthapuram, Kerala, PIN - 695011
E mail ID – drprasanthks01@gmail.com*

Abstract

Currently, the knowledge and awareness among paediatricians in India regarding diagnosis and treatment strategies of chronic constipation are far from satisfactory, creating barriers to optimal disease management. Recently the Indian Society of Paediatric Gastroenterology, Hepatology and Nutrition (ISPGHAN) have proposed guidelines on constipation for use in Indian children. Constipation is a common problem among children; the commonest

cause is functional (95 %). An elaborate history and meticulous physical examination to exclude red flags is the key to make a diagnosis of functional constipation. Management consists of disimpaction, followed by maintenance therapy with osmotic laxative, dietary modification and toilet training. Stimulant laxatives should be reserved only for rescue therapy. A regular follow-up with slow tapering of laxative is essential for successful treatment outcome.

Introduction

A normal pattern of stool evacuation is thought to be a sign of good health in children of all ages. Especially during the initial years of life, parents pay keen attention to the frequency and the characteristics of their children's defecation. Any deviation from what is thought by any family member to be normal for children may trigger an appointment with the paediatrician. Various studies from across the globe have shown that approximately 3% of general paediatric outpatient visits and 25% of paediatric gastroenterology consultations are related to a perceived defecation disorder.

Chronic constipation is a source of anxiety for parents who worry that a serious disease may be causing the symptom and is a real challenge for the paediatrician to understand and to treat it in a convincingly effective manner. The chronic nature of constipation and common misconceptions about the symptoms and pathophysiology of constipation can lead to frustrating experiences for patients and families. Beyond the neonatal period, the most common cause of constipation is functional and only a small minority of children have an organic cause for constipation.

A recent study concluded that 25% of children with functional constipation continued to experience symptoms at adult age, suggesting that referral to specialized clinics at an early stage for children who are unresponsive to first-line treatment may help improve outcomes. This warrants a meticulous and evidence based approach to manage a child or an adolescent with constipation.

Definitions

Defining constipation remains a challenge because stooling patterns are highly variable in childhood. Generally, infants have an average of three to four stools per day and a toddler may have two to three stools per day. By the age of 4 years, children have a pattern and frequency of bowel movements that are similar to those of adults.

A delay or difficulty in defecation sufficient to cause significant distress to the patient is defined as constipation. When the duration of constipation is less than 4 week, it is labelled as acute constipation and when the duration is more, it is labelled as chronic constipation.

Recently the Indian Society of Paediatric Gastroenterology Hepatology and Nutrition (ISPGHAN) have proposed a definition for chronic constipation for application in Indian children (Box 1)

Box 1 : ISPGHAN definition of chronic constipation

Duration of more than 4 weeks for all ages; and Presence of more than 2 of the following: (a) defecation frequency less than 2 times per week, (b) faecal incontinence more than 1 times per week after the acquisition of toileting skills, (c) history of excessive stool retention, (d) history of painful or hard bowel movements, (e) presence of a large mass in the rectum or on per abdomen examination, (f) history of large-diameter stools that may obstruct the toilet (*This may not be elicitable for majority of Indian children who do not use the Western type of toilet*).

Faecal incontinence is defined as passage of stools in the undergarment. Fecal incontinence is classified as: (a) constipation-associated fecal incontinence and (b) non-retentive fecal incontinence: diagnosed only if there is no constipation and normal anal sphincter tone, and symptoms last for more than 2 months in a child with a developmental age of more than or equal to 4 years.

Refractory constipation: constipation not responding to optimal conventional treatment for at least 3 months, despite good

compliance. These patients should be referred to a pediatric gastroenterologist for evaluation.

Pathogenesis

Faecal continence is maintained by involuntary muscles, internal anal sphincter and voluntary muscle contractions in perineum. The external anal sphincter is under voluntary control. The urge to defecate is triggered when stool comes in lower rectum. If a child doesn't want to defecate, he or she tightens the external anal sphincter and squeezes the gluteal muscle pushing feces higher in the rectal vault and reduce the urge to defecate. In response to the urge, they refuse to sit on the toilet, rise on their toes, cross their legs, scream and turn red. These actions are termed as withholding manoeuvre which parents mistake as an attempt to defecate. The longer that faeces remain in the rectum, the harder it becomes due to continued absorption of water. Passage of a hard or large stool may cause a painful anal fissure. The cycle of avoiding bowel movements because of a fear of painful defecation may progress to stool retention and infrequent bowel movements, a condition that is termed functional constipation. With prolonged duration of constipation, liquid stool from the proximal colon may percolate around hard retained stool and pass per rectum involuntarily called as fecal incontinence. If left untreated, chronic constipation can lead to other significant clinical issues, such as enuresis, frequent urinary tract infections and urinary symptoms, rectal prolapse, pelvic dyssynergia and rectal bleeding.

Causes of chronic constipation

Functional constipation is the commonest cause (90%), which is constipation not due to organic or anatomical cause or intake of medication.

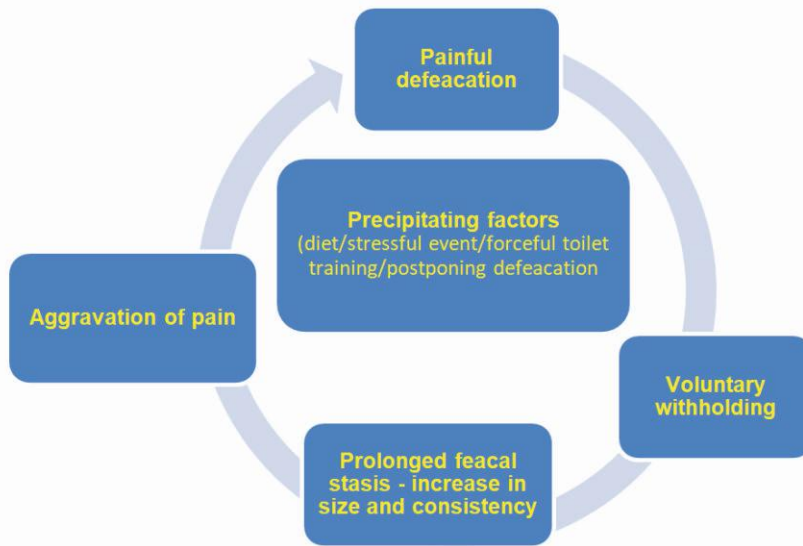


Figure 1 – Pathogenesis of functional constipation

Surgical	Medical
<p>Local anal pathology – anal fissure Hirschsprung's disease(HD) Spina bifida Tethered cord Meningomyelocele Anterior displaced anus</p>	<p>Drugs – anticholinergics, anticonvulsants, antacids Mental retardation, hypotonia Hypothyroidism Hypercalcemia, hypokalemia</p>

Table 1 – Causes of chronic constipation

Approach to constipation

The clinical history should include a description of stool frequency and quality, associated symptoms such as abdominal pain and rectal bleeding, growth pattern, continence and toilet training, presence or absence of withholding behavior, and symptom onset and duration.

It is important to enquire about dietary habits of the child. Consumption of excess of milk, juices and or other drinks, junk foods and bakery products may lead to constipation. In the modern era children largely depend on low fiber diet and this becomes important factor for onset of constipation. Less consumption of cereals,

pulses, vegetables and fruits can result into constipation.

Delayed passage of meconium should raise suspicion for HD. Thin, ribbon like stools also may suggest HD compared to the large bulky stools that often are found with functional constipation.

Faecal incontinence should be directly assessed in terms of frequency and quality because it may be concurrent with constipation due to leakage of liquid stool around a firm rectal stool mass. Symptoms of overflow incontinence typically are small-volume liquid stools, often passed in the afternoon or during activities and sometimes unrecognized or

ignored by the child. Specific questions, including family history, should be directed toward exclusion of diagnoses other than functional constipation.

Standardized measures such as the modified Bristol stool chart (figure 2) allow for a common language and description of stools.

Bristol Stool Chart








Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on its surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges (passed easily)
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. Entirely Liquid

Figure 2 – Bristol Stool Chart

Physical examination should explore both the severity of constipation and potential causes. Ideally, a growth chart contains data spanning the onset of constipation to determine current parameters as well as past growth velocity.

External anal inspection can assess for anal atresia and displacement and may identify anal fissures, skin tags, or external haemorrhoids. It may also be useful to assess sphincter tone visually or identify faecal material around the anus or in the underwear. In addition, examining the back for sacral dimples or spinal deformities and assessing lower extremity motor tone, strength, and deep-tendon

reflexes can indicate whether additional assessment for neurologic pathology is indicated.

Digital rectal examination (DRE) is important in specific circumstances but is not always necessary to diagnose functional constipation. Palpation of a firm or large rectal stool mass on rectal examination often confirms clinical suspicions, abnormalities in sphincter tone may indicate anal stenosis, and an empty rectal vault with expulsion of stool on finger withdrawal is a classic but infrequently seen finding in HD.

Laboratory evaluation is not warranted for constipation unless warning signs are present or other aspects of the history or physical examination suggest systemic disease.

Constipation rarely is the sole presenting symptom of hypothyroidism, electrolyte abnormalities, lead toxicity, or celiac disease, and routine screening for these diseases is not recommended. Routine allergy testing is also not recommended in evaluation of constipation, and cow milk protein restriction in young children for a limited time to assess the clinical response remains controversial.

A plain abdominal radiograph may help to visualize the amount of retained stool. Barium enema is suggested but not required when constipation is accompanied by “red flag” symptoms. It provides information about the

Box 2 : Alarm signs and symptoms in constipation

- Constipation starting extremely early in life (<1 mo)
- Passage of meconium >48 h
- Failure to thrive
- Absence of withholding maneuvers
- Bladder dysfunction
- Empty rectal ampulla on digital rectal examination
- Abnormal neurological findings

calibre of the rectum and colon and may be useful if obstruction in the colon is suspected.

Further diagnostic tests when the clinician suspects HD depend on patient characteristics (age, health status) and test availability. Full-thickness rectal biopsy remains the gold standard for diagnosis and is performed under anaesthesia. Aganglionosis or hypertrophied nerves on rectal biopsy haematoxylin and eosin staining can indicate HD.

Anorectal manometry uses a small rectal balloon and anorectal pressure sensors to determine the presence or absence of the recto anal inhibitory reflex (RAIR -relaxation of the internal anal sphincter in response to rectal distension). Anorectal manometry may also have a role in determining rectal sensation threshold and the presence of anorectal dyssynergia, potentially directing therapy, including the addition of physiotherapy or biofeedback.

Spinal imaging, including magnetic resonance imaging, should be considered in the child with constipation and other neurologic signs or symptoms, including lower motor dysfunction, lower urinary tract symptoms, and lumbosacral spinal abnormalities.

Management

Most children with functional constipation with or without faecal incontinence benefit from a precise, well organized treatment plan. The treatment is comprehensive and has four phases:

1. Education
2. Disimpaction or clean out of stools
3. Prevention of re-accumulation of stools
4. Withdrawal of treatment

Education

Education and reassurance constitute the primary component in the management of functional constipation and faecal incontinence and should continue throughout all stages of management. Developmentally appropriate discussion of the anatomy and physiology of the lower gastrointestinal tract and defecation is

important and visual diagrams can aid in this education. Parents need to be educated that faecal incontinence is often involuntary and the result of overflow from constipation, or altered function of the rectum and pelvic floor as well as learned withholding behaviours in some children. Counselling can be provided to parents to help them establish a positive and supportive attitude toward their child during treatment.

Disimpaction or cleanout

Removal of impacted fecal matter decompresses the rectum, allows for the normal passage of stool, and prevents liquid stool from leaking around the fecal mass. Among the approaches to disimpaction are high-dose oral laxatives, enemas, manual disimpaction, or admission to the hospital for nasogastric administration of a bowel cleansing agent. High-dose oral laxatives and enemas are equally efficacious, but the preferred method for evacuation of faecal impaction is via the oral route.

Current recommendations suggest the use of polyethylene glycol solution (PEG 3350) at doses of 1 to 1.5 g/kg per day for 3 consecutive days (up to 6 consecutive days if necessary) to achieve disimpaction. If PEG 3350 is unavailable, once-daily sodium phosphate, saline, or mineral oil enemas for 3 consecutive days are acceptable. Suppositories may be used in combination with high-dose oral laxatives to help promote evacuation of the fecal impaction.

Manual disimpaction is rarely necessary and generally not advised except in cases of severe impaction and obstipation. If manual disimpaction is required, general anesthesia should be used to decrease the trauma associated with this procedure.

Prevention of reaccumulation of stools

a. Dietary modification

Encourage breastfeeding during early infancy and cereal supplementation should be started after 4 months of life.

Diets rich in high fiber are bran based cereals, pulses, fruits, vegetables etc. The

dietary recommendation for children older than 2 years of age is to consume an amount of dietary fiber equivalent to age in years plus 5grams/day.

b. Maintenance therapy with laxatives

Laxatives used for maintenance therapy should be individualized for each patient. In practice, laxative doses should be titrated to

Medication	Age	Dose
Slow oral disimpaction PEG 3350 without electrolytes (for 3 days) PEG 3350 with electrolytes (for 6 days) Milk of magnesia (for 7 days) Liquid paraffin (for 7 days) Lactulose or sorbitol (7 days)	2 to 4 yrs old 5 to 11yrs old	1.5gm/kg/day 52gm/day 78gm/day 2ml/kg twice/day 3ml/kg twice/day 2ml/kg twice/day
Rapid rectal disimpaction Glycerin suppositories Phosphate enema	Infants & toddlers < 1 year > 1 years	60ml 60ml/kg body weight upto 135ml twice daily

Table 2 – Suggested medications for faecal disimpaction

Dietary fibres are non-starch polysaccharides – can be water soluble like oat bran, barley, nuts, seeds, beans, lentils, peas and some fruits like pomegranate, apple, plantain, strawberry, guava, pear, peach, amla and water insoluble like wheat bran, vegetables like bitter gourd, beetroot, carrot, radish, cucumber and whole grains.

The dietary fibres contribute to increase bulk of stools by virtue of fermentation and bacterial overgrowth and mechanical water holding effect which lead onto faster colonic transit and lesser colonic absorption.

The dietary fiber content in flours can be increased by not sieving and by the addition of ragi/jowar/mung flour, til or flaxseeds powder, grinded dried skin of orange/musambi powder. Milk can be enriched with dietary fibres by adding dry fruit powder, corn flakes, wheat flakes or mussel.

Intake of plenty of fluids is encouraged. Excess of drinks in the form of milk, sugar, chocolates juices and cold drinks to be avoided. Bakery foods like biscuits, breads and junk foods like chips, kurkure, maggi, burgers and pizza to be discouraged.

achieve at least one or two bowel movements every day that are loose enough to ensure complete daily emptying of the lower bowel and to prevent faecal incontinence and abdominal pain.

Osmotic laxatives increase the osmotic load within the lumen of the intestine, allowing for fluid retention. The retained fluid is incorporated into the stool and distends the colon, promoting peristalsis. Children may experience bloating, but these laxatives are generally safe; the most common adverse effect is diarrhoea. The two main osmotic laxatives are polyethylene glycol (PEG) and lactulose/lactitol. Based on the literature, and the experience of the group, the ISPGHAN recommendations are: (i) PEG is the first line of therapy and is more effective as compared to lactulose/lactitol. However in children <1 year of age, the only drug recommended is lactulose/lactitol. (ii) In case of nonresponse or intolerance due to non-palatability to PEG, the second line of treatment is lactulose/lactitol which is safe for all ages. (iii) Two osmotic agents like PEG and lactulose/lactitol should not be given simultaneously. Combinations therapy with two classes of laxatives is not

Medication	Age	Dose
<u>For long term treatment (years)</u>		
PEG 3350 without electrolytes	>1 month	0.4 to 0.8gm/kg/day
Lactulose or sorbitol	>1 month	1-3ml/kg/day in 2 doses
Milk of magnesia	>1 month	1-3ml/kg/day in 2 doses
Liquid paraffin	>12 months	1-3ml/kg/day in 2 doses
Isabgol		Age in years + 5 = gm/day Titrate upto 20gm/day
<u>For short term treatment (months)</u>		
Senna syrup/tablets	1-5 years	5ml(1 tab) with breakfast,max 15ml/day
	5-10years	2 tablets with breakfast,maximum 3 tablets/day
Glycerin enemas	>10yrs	20-30ml/day (1/2 glycerin and ½ normal saline
Bisacodyl suppository	> 10yrs	10mg daily

Table 3 – Suggested medications and dosages for maintenance therapy of constipation

recommended for children.

Stimulant laxatives such as bisacodyl or senna irritate smooth muscle of the colon and stimulate the myenteric plexus to produce peristaltic activity within the colon. Children may experience abdominal cramping with the peristaltic activity. The abdominal cramping is self-limited and can be reduced by decreasing the dose. Although stimulant laxatives are safe, no studies have assessed dependency with chronic daily use. Stimulant laxatives can generally be reserved for intermittent use and rescue therapy.

Liquid paraffin may ease the passage of stool by lubricating the intestine and decreasing water absorption. A common complaint with use of liquid paraffin is leaking of the oil from the rectum, which can be unpleasant. Palatability of mineral oil is also a challenge for many children. Oral mineral oil is contraindicated in children younger than age 1 year or with known or suspected aspiration.

c. Behaviour modification

This component should be started at the time of bowel disimpaction or cleanout and continue throughout maintenance treatment. An important part of the standard medical-behavioural treatment of constipation is

improving toilet sitting behaviour. However, stool withholding and toileting refusal behaviours may interfere with progress toward toilet sitting goals and sometimes must be addressed before implementing a toilet sitting plan.

Stool withholding and toileting refusal are believed to be related to the history of difficult-to-pass or even painful bowel movements and are often conceptualized as an anxiety or phobia about passing bowel movements, especially into the toilet. The initial focus of stool withholding management should be to ensure soft and easy to-pass bowel movements so that the child can gain comfort in passing a bowel movement on a daily basis. In early stages of treatment, bowel movements in a pull-up or diaper may need to be reinforced for the child to gain confidence and voluntarily relax the pelvic floor to achieve a bowel movement.

Toilet refusal behaviour should also be treated with interventions that gradually desensitize children toward toileting. Desensitization to the toilet may include rewarded trips to the bathroom to look at the toilet, stand by the toilet, sit on a closed lid fully clothed, and eventually sit on the toilet with open lid and pants down. Once the child is having bowel movements comfortably in the diaper or a pull-up and able to sit on the toilet

without significant anxiety, parents can use a shaping procedure to encourage bowel movements closer to the toilet and eventually into the toilet. Reward systems or incentives are used to encourage children to take a next step toward successful toileting behaviour.

Once the child is comfortable and compliant with sitting on the toilet, the overall goal is to improve daily toileting habits and routines. Scheduled toilet sits can occur 20 to 30 minutes after meals to take advantage of the gastrocolic reflex. The time on the toilet should be unrushed and positive. It may include special activities that are only available while on the toilet (special books, toys). Parents can also be counselled to provide modelling and coaching during toilet sitting, which includes the parents showing the child when they sit on the toilet and that they are pushing to help get bowel movements out in the toilet. Toilet sits should generally last 5 minutes, but some children need to gradually work their way up to longer sits if there is initial resistance.

Scheduled, rewarded toilet sits should include small step stools to assist the children in getting on the toilet and to use as leverage for their feet. A wider stepstool or potty stool may allow the child to spread out the feet and knees for better posture to allow successful defecation and for them to feel more comfortable and balanced on the toilet. Once children are having more productive bowel movements in the toilet and soiling has stopped for a 1 month, the number of daily toilet sits can be reduced. As treatment progresses, children can start to earn incentives/rewards for independently going to the toilet when they feel the urge to have a bowel movement rather than strictly relying on the schedule.

Withdrawal of treatment and follow up

Start reducing the dose of laxatives only after stool pattern has become normal. A stool diary is helpful in this regard. No abrupt stoppage of medications and ensure that faecal impaction does not recur. High fiber diet and toilet training should continue for 2 to 3 years to

avoid relapse.

A suggested follow up schedule would be initially weekly review for 2 to 3 weeks, then monthly till stooling is normal and finally bimonthly for 6 months to an year.

Successful outcome of treatment should be defined as (a) stool normalcy while on laxatives for a period of at least 4 weeks of initiation of therapy, and (b) achievement of stool normalcy for a minimum period of 6 months before tapering. Normalcy of stools should be defined as daily, not hard, nor loose watery stools, with absence of pain, straining, bleeding, posturing or incontinence.

Outcome and prognosis

Approximately 60% of children with functional constipation are symptom-free between 6 and 12 months after beginning treatment regardless of laxative use, with the remaining 40% of children still experiencing symptoms. 25% of children with functional constipation continue to experience symptoms into adulthood. Older school-age children and adolescents who have ongoing constipation and faecal incontinence are even more difficult to treat. All these points highlight the need for aggressive treatment as early as possible as well as close follow-up evaluation and adjustments to the treatment plan. Nonetheless, most children with constipation and faecal incontinence can be managed effectively by the general paediatrician.

Indications for referral to a paediatric gastroenterologist include medical red flags, trouble with disimpaction, trouble establishing maintenance therapy, and lack of improvement after 3 months of therapy. Referral to a pediatric behavioral specialist should be considered if significant conditions are interfering with treatment, such as attention-deficit/hyperactivity disorder, oppositional behaviors, anxiety or mood disorders, family conflict or parent-child conflict, or problems with adherence to recommendations.

Prevention

Prevention of colonic dysfunction have received much less attention but attending paediatrician can play a pivotal role by providing anticipatory counselling in terms of appropriate feeding practices, high fiber diet, interpretation of normal bowel habits, counselling life issues of the child and early detection of defeacatory disorders in children.

References and suggested reading

1. Jennifer M. Colombo, Matthew C. Wassom and John M. Rosen. Constipation and Encopresis in Childhood. *Pediatrics in Review* 2015; 36; 369-392
2. M.M. Tabbers, C. DiLorenzo, M.Y. Berger, C. Faure, M.W. Langendam, S. Nurko, A. Staiano, Y. Vandenplas, and M.A. Benninga. 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.
3. BR Thapa. Constipation in children. *IAP Specialty Series on Pediatric Gastroenterology* edited by Ashish Bavdekar, John Matthai, Malathi Sathiyasekaran, SK Yachha. Jaypee Brothers Medical Publisher's (P) Limited : 2nd edition 2013; p126–144.
4. Vera Loening-Baucke. Constipation and fecal incontinence from *Pediatric Gastrointestinal and Liver Disease* edited by Robert Wyllie, Jeffrey S. Hyams and Marsha Kay. Elsevier Saunders: 4th edition 2011; p127–135.
5. Ujjal Poddar. Approach to constipation in children. *Indian Pediatrics* 2016 ; 53 : 319 – 327
6. Surender Kumar Yachha, Anshu Srivastava, Neelam Mohan, Lalit Bharadia and Moinak Sen Sarma. Management of childhood functional constipation: Consensus Practice Guidelines of Indian Society of Pediatric Gastroenterology, Hepatology and Nutrition and Pediatric Gastroenterology Chapter of Indian Academy of Pediatrics. *Indian Pediatrics* 2018; 55 : 885 – 892.
7. Manu Sood, Peter Lichtlen. Unmet needs in pediatric functional constipation. *Clinical Pediatrics* 2018, 57(13) 1489–1495
8. Sujatha B, Velayutham DR, Deivamani N, Bavanandam S. Normal bowel pattern in children and dietary and other precipitating factors in functional constipation. *J Clin Diag Res.* 2015; 9: SC12-5.
9. Bongers ME, van Wijk MP, Reitsma JB, Benninga MA. Long-term prognosis for childhood constipation: clinical outcomes in adulthood. *Pediatrics.* 2010; 126: e156-62.