ETIOLOGY AND CLINICAL SPECTRUM OF CONSTIPATION IN INDIAN CHILDREN

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ABSTRACT

Objective: *To analyze the etiology, clinical spectrum and outcome of constipation in children.*
Setting: *Tertiary care teaching hospital.*
Design: *Retrospective chart review.*
Participants: *Consecutive children with constipation from 2011 to 2012*
Inclusion criteria*: Functional constipation was designated when there was no objective evidence of any causative pathologic condition while the rest were termed as organic constipation.*
Intervention: *Lactulose was started after disimpaction with polyethyleneglycol in functional constipationcases.*
Outcome measures: *Clinical and etiological profile, management, and follow-up data.*
Results: *137 children (boys, 90); 117 (85%), had functional constipation while the remaining 15% had an associated organic disorder. Hirschsprung's disease accounted for 6% of all patients. Children in organic group more commonly had delayed passage of meconium (50.0% vs 1.7%), symptoms since first month of life (40.0% vs 1.7 %), and abdominal distension (50% vs 5%) as compared to functional group, while fecal impaction was less common (69% vs 20%). Besides fecal impaction, straining (35%), withholding behaviour (27.4%), and fecal incontinence (30.8%) were other main clinical characteristics of the functional group. In the functional group, 'successful outcome' to laxatives was obtained in 95% of patients while 10% needed rescue disimpaction.*
Conclusions: *Functional constipation is the most common cause of constipation in Indian children. Historyof delayed passage of meconium, presence of abdominal distension, and absence of fecal impaction point toan organic pathology.*

Key words: *Child, Constipation, Etiology, Hirschsprung disease, India, Management.*

INTRODUCTION

Childhood constipation is a common problem that has been difficult to define because it may comprise of diverse symptoms from delay or difficulty in defecation, sufficient to cause significant distress to symptoms of fecal incontinence, displaying of retentive posturing and withholding behavior, painful defecation, to passing of stools so large that they may obstruct the toilet (1-3). In asystematic review on epidemiology of functional constipation, the prevalence of childhood constipation in general population varied widely from 0.7% to 29.6% (median 10.4%)(4). It accounts for 3% of visits to general pediatric clinics and as many as 30% of visits to pediatric gastroenterologists (5-7). Although clinical profile of such children is well documented from the West (5,6,8-16), the same has not been described from the developing world. Pediatricians of this subcontinent believe that functional constipation is uncommon in developing countries as diet of this part of the world is rich in fiber. Hence, many cases of constipation are

subjected to detailed investigations to rule out Hirschsprung's Disease (HD). As there is no published study on constipation in children from India, we studied etiology, clinical profile and long-term outcome ofthis disorder.

METHODS

Consecutive children with constipation, who presented to the Pediatric Gastroenterology services at Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India between January 2001 and December 2006, were included in this study. Their complete case records were reviewed in detail for an evaluation of their presenting complaints, associated symptoms, age at presentation, duration of constipation, and an analysis was done of their full clinical and etiological profile.

Constipation was defined as a delay or difficulty in defecation sufficient to cause significant distress (1). Patients were considered having functional or idiopathic constipation (FC) if there was no objective evidence of a pathologic condition. Fecal impaction was defined as a hard mass in the lower abdomen identified during physical examination, a dilated rectum filled with a large amount of stool found during rectal examination, or excessive stool in the colon identified by abdominal radiography. Digital rectal examination was done in all children on the first visit. Functional fecal incontinence was defined as the involuntary loss of any amount of feces once a week or more after attainment of toilet skills. Secondary or organic causes of constipation were assessed in appropriate clinical settings with appropriate investigations. A confirmatory diagnosis of Hirschsprung's disease (HD) was made only after rectal /colonic biopsy showed the absence of ganglion cells.

Spinal abnormalities in suspected cases were confirmed with magnetic resonance imaging (MRI) ofthe spine. Barium enema, anorectal manometry and rectal biopsy were done only in suspected casesof Hirschsprung disease.

Children with FC were treated with a well-defined treatment plan intended to clear fecal retention, prevent future retention, and promote regular bowel habits. Polyethylene glycol (PEG) was used for disimpaction at a dose of 20ml/kg/hour (reconstituted solution of PEG) for 4 hours and repeated on successive days (up to 3 days), if required. Children younger than 5 years, who were unlikely to drink a large volume, were admitted for nasogastric infusion of PEG at a dose of 25 mL/kg/hour (maximum 1000 mL/hour) till disimpaction was complete. Successful disimpaction was defined as passage of clear fluid of nearly same colour and consistency as being used for disimpaction (PEG fluid) per rectum and it was reconfirmed with a digital rectal examination in those who required rescue disimpaction. After disimpaction, patients were started on long-term lactulose (dose 1-2 mL/kg/day) to achieve daily defecation. The dose of lactulose was adjusted to achieve the goal of one to two soft stools per day without any discomfort. Parents were also given information about toilet training and high fibre diet. Parents were educated about the normal defecation process, the importance of dietary fibre and approach to toilet training by making their child to have several defecation trials daily, especially after each meal. After the child had achieved regular bowel habitson a particular dose of laxatives, he was maintained on that dose for 3 to 6 months and then gradually tapered off.

After the initial evaluation patients were followed up after one month and then every 3-monthly. On follow up, laxative dose was adjusted as per response and rescue disimpaction was done if therewas a recurrence of fecal impaction.

The clinical outcome was assessed only after 3 months of laxative therapy. Those who had a lesser duration of laxative therapy were excluded from the study. 'Successful outcome' was defined as a period of at least 4 weeks with 3 or more bowel movements per week, without pain during defecation and 2 or fewer soiling episodes per month with complete resolution of all associated symptoms as retentive posturing, pain abdomen, and bleeding per rectum(13).

Statistical analysis: SPSS statistical package (version 13. Chicago, IL, USA) was used. Results were expressed as mean with standard deviation or median with range, as required. Categorical data were tested with Fisher's exact test and continuous data with independent sample t-test. P <0.05 was considered significant.

RESULTS

During the study period, a total of 137 children with constipation were managed. Their mean (SD) age was 59.2 (42.1) months (range, 8 months to 14 years) and 90 of them were boys. The etiological spectrum of constipation is shown in ***Table* I**. The majority, 117 (85%), had functional constipation (FC) while the remaining 20 (15%) had an associated organic disorder. Hirschsprung disease accounted for 6% of all cases of constipation and 40% of organic cases (***Table* II)**. All patients with HD had history of delayed passage of meconium. Delayed passage of meconium, and presence of abdominal distension were significantly more common in organic group while fecal impaction was more common in the functional group.

TABLE I

Etiology of Constipation in the Study subjects (n=137)

Etiology	**Number(%)**
Functional	117 (85.4)
Motility related organic causes	
Hirschsprung's disease	8 (5.8)
Visceral myopathy	1 (0.7)
Congenital anomalies	
Anorectal malformation (anal stenosis)	1 (0.7)
Spinal cord abnormalities*	4 (2.9)
Neurologic disorders	
Disorders with mental retardation†	3 (2.2)
Spinal Muscular atrophy (SMA) type 2	1 (0.7)
Celiac disease	2 (1.5)

* *Meningomyelocele (operated) 3, Myelomalacia 1; †Cerebral palsy 3.*

TABLE II

Comparison of Clinical Features between Children with Functional and Organic Constipation

	Functional (n=117)	**Organic (n=20)**
M:F	76:41	14:6
Age (mo)Mean (SD)	60.8 (42.25)	50.3 (41.2)
Duration of symptoms (mo)	25.3 (28.45)	33.0 (33.7)
Delayed passage of meconium*	2 (1.7%)	10 (50%)
Bowel action/ wk, mean (SD)	2.8 (1.8)	2.8 (2.4)
Straining	41 (35%)	4 (20%)
Painful defecation	24 (20.5%)	1 (5%)
Witholding	32 (27.4%)	2 (10%)
Fecal incontinence	36 (30.8%)	4 (20%)
Rectal bleeding	29 (24.8%)	2 (10%)
Pain abdomen	22 (18.8%)	4 (20%)
Fecal impaction*	81 (69.2%)	4 (20%)
Abdominal distention*	6 (5.1%)	10 (50%)

* *P values <0.001.*

One of the two children with celiac disease who presented with constipation had even undergone rectal biopsy elsewhere to rule out HD. The child with visceral myopathy had two laparotomies (elsewhere) for suspected intestinal obstruction. Laparotomy revealed numerous diverticulae. A full-thickness ileal biopsy, taken during laparotomy, showed features of visceral myopathy and antroduodenal manometry showed no spontaneous MMC (migratory motor complex) up to three hours and small amplitude MMC after octreotide. His lactulose hydrogen breath test was suggestiveof small bowel bacterial overgrowth.

Half of the children with functional constipation had their onset of symptoms by 18 months of age. There were only 2 patients under 12 months of age in the functional group (both at 11 months of age). Clinical parameters were compared between children who presented by 5 years of age (n=77) and those who presented later (n=40). Children <5 years of age had a significantly shorter mean duration of symptoms (15.9 ± 11.4 *vs* 43.9 ± 40.8 months, P<0.001) and more commonly displayedwith-holding behaviour (35.1% *vs* 12.5%, P<0.01) while pain abdomen was significantly more common in children who presented to us after 5 years (10.4% *vs* 35.0%, P<0.01). More than 84% of children having withholding behavior were either 5 years or below in age. There was no significant difference between these two groups in respect to delayed passage of meconium, mean bowel action/week, straining, painful defecation, fecal incontinence, rectal bleeding, fecal impaction and abdominal distension. Twenty-nine patients (24.8%) had history of bleeding per-rectum, 6 had documented fissure, 2 had unrelated pathology (rectal polyp), whereas rest 21 did nothave any active lesion.

On comparing patients with and without fecal incontinence (in the functional group), it was seen that fecal incontinence was more commonly seen in boys than in girls but the difference was not statistically significant. All other variables (as in table II) were comparable between the two groups, except the mean frequency of bowel movement, which was significantly less in the patients with fecal incontinence (2.1 ± 1.3 *vs* 3.3 ± 1.9, $P<0.01$). Pain abdomen as a symptom was more commonin girls (29.3%) than in boys (13.2%) ($P < 0.05$) and while painful defecation was also more common in girls, it did not reach a level of significance.

Of the initial 117 patients with FC, 24 were lost to follow-up and another 17 had incomplete follow-up of less than 3 months. Thus response to therapy could be assessed in only 76 patients who had a mean follow-up duration of 15.0 ± 16.7 months. Overall, 'successful outcome' was obtained in 72/76 (95%). Only 4 patients failed to achieve this outcome on laxatives, including one who did not show good response to second disimpaction and later got lost to follow-up. Fourteen (18.4%) patients had recurrence of symptoms on follow up and 8 (10.5%) of them required rescue disimpaction after a median duration of 5.5 months (range 1.5-17 months) of the first disimpaction.As a maintenance therapy, lactulose was changed to PEG in 14 children, 11 due to recurrence of symptoms while on lactulose and 3 due to side effects of lactulose (bloating and abdominal distension). It is also noteworthy that seven of the eight patients (87.5%) who needed rescue disimpaction had history of fecal incontinence in comparison to 21 of 68 patients (31.0%) not needing rescue disimpaction, the difference being significant ($P <0.003$).

DISCUSSION

This is the first study from India documenting the frequent occurrence of constipation among Indian children, with functional constipation being responsible for the majority of the cases. Studiesfrom the West have shown that only around 5%-10% of children with constipation are due to organic causes (7, 17). A recently published study on constipation in children (2 years of age), done in primary general pediatric clinic, found organic causes to be responsible only in 1.6% of the patients(12). Majority of our children with consti-pation belonged to functional group, but around 15% had an associated organic disorder responsible for it. Our study reiterates that history of delayed passage of meconium, presence of abdominal distension and absence of fecal impaction arepointers to an organic pathology.

Hirschsprung's disease, the most important organic cause of constipation is reported in 3% of constipated children referred to the gastro-enterologist(18) and it accounted for 6% of the constipated children presenting to us. The possibility of HD should be considered when there is a history of delayed passage of meconium, poor growth, significant abdominal distension, and an empty rectal vault in spite of palpable abdominal fecal matter (1,7,19,20). All 8 children with Hirsch-sprung's disease in our study had significant abdominal distension and had a history of delayed passage of meconium. None had rectal fecal impaction, or withholding behaviour or fecal incontinence, which are hallmarks of functional constipation (20).

Two children in our study had celiac disease and presented with constipation rather than diarrhea. This association of celiac disease and constipation has also been reported previously (21, 22). It is

imperative to suspect celiac disease in any case of constipation who has failure to thrive, anemia, alternating diarrhea and constipation, or have abdominal distension with bloating and flatulence along with constipation(1,2).

One of the commonly seen clinical characteristic in functional constipation is withholding behaviour and is reported in 50-60% cases of functional constipation (1,3,13-16,20). Only 27% of our patients exhibited this type of retentive posturing similar to 31.2% reported in a similar retrospective study (12). This low frequency in our study could be due to poor data retrieval or retrospective design or it could be due to misinterpretation of symptoms. As symptoms being noted verbatim, if the parents were not able to differentiate between the concept of retentive posturing and what they perceived as straining (reported in 35% of our cases but not reported by others), it is likely that many cases with withholding maneuvers have been misinterpreted by the parents as attempts at straining for defecation(1,13).

Many children with FC have associated fecal incontinence and the prevalence ranges from 18-89%, but on an average it is 40%-60% (12-14, 16). In our study, 31% of children had associated history of fecal incontinence. The mean frequency of bowel movement was significantly less in the patients with fecal incontinence than in those without fecal incontinence. Most of the patients who needed rescue disimpaction on follow up had history of fecal incontinence, pointing to the fact that children with fecal incontinence are a subset of constipation with more severe symptoms and may need rescue disimpaction on follow-up (11). Others have also found fecal incontinence to be a negative prognostic factor for a successful outcome of therapy (9, 23). All our patients were started on the treatment programme as outlined above and 'successful outcome' was obtained in the majority of cases, with meagre 5% not responding adequately to laxatives mainly due to non-compliance to dose and non-cooperation with toilet training. Similar response rates have been previously documen-ted (13). It is important to note that mere laxative therapy does not guarantee cure in functional constipation. Dietary advice (reduction of milk intake and increase in high fibre containing solid food intake) and toilet training play an important role in the successful outcome of medical therapy. With regular follow up we ensured compliance to high fibre diet and regular toilettraining and that is responsible for the good response noted by us.

A subset of patients with constipation may be refractory to usual medical therapy of laxative, diet and toilet training and one of the reasons is motility disorder. As per the motility pattern three main types of functional constipation have been described; normal colonic transit constipation, slow transit constipation and functional outlet obstruction (24). The prokinetic drugs like tegaserod (not yet approved for use in children) is useful in slow transit constipation and biofeedback helps in functional outlet obstruction cases.

In view of retrospective nature of our study the main limitation is that almost 35% of children with functional constipation either was lost to follow up or had incomplete information. Hence, the efficacy of therapy could not be assessed properly.

To summarize, functional constipation is the most common form of constipation presenting in children in India as in the West, though up to 15% of patients may have an organic cause in whom history of delayed passage of meconium, presence of abdominal distension, and absence of fecal

impaction in rectum point to an organic pathology. Patients with fecal incontinence along with constipation are a subset with more severe disease. We hope this study will increase the awareness about functional constipation in India and pediatricians/pediatric surgeons will stop investigating allcases of constipation for Hirschsprung disease.

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