

Early Detection and Aggressive Management Is a Key to Success in Management of Childhood Constipation

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Abstract

Introduction: Functional constipation is an emerging problem in childhood of Indian subcontinent. If diagnosed early and managed aggressively along with lifestyle modification the success rate of disease treatment improves.

Objectives:

- To assess whether the pain abdomen is the early feature of constipation
- To determine the relationship between good follow ups and the outcome
- To determine the minimum duration of laxative therapy in management of constipation

Materials and Methods: A retrospective analytical study of 150 children with constipation. Various parameters were considered namely demographic

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details, eating habits, clinical examination, abdominal radiographs and abdominal ultrasonography. Patients were divided into two groups based on the symptoms at the presentation. The first comparison was between constipation group vs pain abdomen group. Second comparison was between the patients with good follow-ups and bad follow-ups. The finally the duration of laxative therapy was assessed. Data was entered into Microsoft Excel and analysed using SPSS version 25. The categorical variables are presented using frequency and percentages. Chi square tests were used for statistical analysis. $p < 0.05$ is considered as significant value for interpretation of results.

Results: All the 150 patients were treated for constipation 70% showed improvement. Eighty percent of pain abdomen group patients also showed improvement in their symptoms suggesting that they might be the subset of larger constipation group. 97.1% patient with good follow-up followed the dietary advice. The study reveals that there is an association between following dietary advice and final improvement. 70.5% who followed dietary advice had good outcome irrespective of the use of regular laxatives. Most of the patients (78 %) showed the improvement with 3- 6 months of laxative therapy.

Keywords

- Childhood constipation
- Functional constipation
- Nonspecific pain abdomen

Conclusion: Pain abdomen with stool stasis must be considered as early feature of constipation. Patients with better follow and good dietary habits have significant improvement. Aggressive therapy with two laxatives for 3-6 months can increase the success.

Introduction

The worldwide prevalence of childhood constipation varies between 0.7% and 29.6%.¹ Constipation is not an infrequent problem in the Indian subcontinent, in

contrast to what was previously assumed. Various articles suggest that the constipation prevalence is rising due to changing lifestyle. An early diagnose of

constipation and aggressive management along with the life style modifications can increase the success rate of the disease treatment.² The organic causes of constipation are not more than 5%, majority of the cause of constipation beyond the neonatal period is functional in nature, also known as idiopathic constipation.³ Childhood functional constipation is often regarded as a trivial symptom that would gradually disappear, but it is not true. Various studies show that overall success rate in constipation treatment is 50-60% at the end of 1 year of intensive therapy and goes up to 68% by 5 years. Among them 80% of the children treated early in the course of disease recovered completely compared to 32 % of patient where initiation of the treatment was delayed.⁴ Effective treatment within 3 months of symptoms leads to better outcome. The common cause of intractable constipation is inadequately treated constipation and irregular follow-ups. If not taken care of effectively one third of the children continue this problem to adolescence.⁵

Materials and Methods

This is a retrospective analytical study, in which 150 patients aged between 2 and 14 years who presented to pediatric surgery out-patient department (OPD) since June 2017 till May 2020 with various symptoms strongly suspicious of constipation were reviewed. These patients were followed up for a minimum of 1 year before making a conclusion. Follow-up parameters were recorded to assess the outcome such as: age and

gender of the child, duration of symptoms, different modes of presentation, compliance to the treatment in terms of following the dietary advice and duration of treatment, grading of stool retention in abdominal radiograph, nature and quantity of consumption of junk food, consumption of quantity of fluid per day, final outcome of the treatment. The following patients were included in the study

- A) Patients presenting with the clinical feature suggestive of constipation based on ROME-3 criteria and were classified as “constipation group”
- B) Children who presented with non-specific abdominal pain as the only symptom along with stool retention, identified by clinical examination or abdominal radiographs not matching the ROME -3 criterion were classified as “pain abdomen group”

Following patients were excluded from the study.

- A) Patients who had organic causes of constipation; diagnosed initially or Later in the course of management, eg. Hirschsprungs disease and anorectal malformation.
- B) Mentally retarded individuals
- C) The patients with incomplete medical records and irregular follow-ups.

These patients were assessed with thorough clinical examinations (including digital rectal examination), abdominal radiographs and ultrasonography. All were treated for constipation, as the stool stasis was demonstrated in them.

Blethyn's classification was used to grade stool retention in abdominal radiograph, namely:⁶

Grade 0- Normal study, minimal stool noted in rectum and cecum

Grade 1- Minimal stool scattered in the region of the colon other than normal areas

Grade 2- Significant amount of stool loaded in all the segments of colon allowing gas in between.

Grade 3- Assigned when whole of the colon is filled with stool with dilated colon and impacted stool in rectum.

Patient information was collected about the stool pattern and frequency based on Bristol stool charting and Rome -3 criteria. The parents (preferably the mother) were counselled for 35-34 minutes regarding the dietary advice and other management.

The patients who had impacted stools as seen in abdominal radiograph were admitted for rectal wash with 20ml/kg of normal saline (NS) 2-3 time a day. Non responders were offered bowel cleansing using NS, 30ml/kg/hour for 3-4 hours administered per orally or through nasogastric tube.⁴

Patients who were less severely affected were subjected to laxative therapy. Two laxatives were used; polyethylene glycol and liquid paraffin.

Patients were called for review on 15th, 30th and 90th days for titration of the dose.

The decision on tapering the laxative therapy was considered after 3 months of therapy, if there was a significant improvement. In the absence of improvement, the laxative therapy would be continued.

The patients were divided into different groups. Initially comparisons were made based on the symptoms at presentation- Constipation group vs. pain abdomen group to estimate whether pain abdomen group was a subset of constipation group.

Another comparison grouping was to see the relationship between the follow up and compliance for the dietary advice.

Patients were divided into good follow-up and bad follow-up groups. If the patients visited to our OPD at regular interval as advised, they were considered to have good follow-ups. Their compliance for the diet was assessed in these patients. Assessment of final improvement was also made in these patients.

Third comparison was made between patients taking laxatives for at least 3 months as advised and the other group being the one who had discontinued laxatives before three months (against the medical advice) to know the minimum period of laxative therapy. The final outcome was assessed in both these groups.

Statistical analysis

Data was entered into Microsoft Excel and analysed using SPSS version 25. The categorical variables are presented using frequency and percentages. Chi square tests were used for statistical analysis. $p < 0.05$ was considered as significant value for interpretation of results.

Results

Out of 150 patients, 94 patients were diagnosed with constipation based on the Rome 3 criteria. Fifty-six patients were mostly referred to us for exclusive abdominal pain with occasional other

nonspecific symptoms. Seventy-five percent of the patients belonged to the age

group of 2-10 years. The profile of the patient are noted in **Table 1**.

Table 1: Distribution of study participants (n=150) according to different study variables

SI No	Variables	Classification	N=150	%
1	Age (in years)	2-5	57	38.0
		6-10	56	37.3
		11-14	37	24.7
2	Gender	Male	96	64
3	Constipation (As per ROME -III criteria)		94	62.6
4	Patient presenting with exclusive pain abdomen		56	37.3
5	Hard stools as presenting complaints		68	45.3
6	Foul smelling stool		18	12
7	Abdominal distension		56	37.3
8	Encopresis		10	6.6
9	Stool with holding manoeuvre		27	18
10	Bleeding per rectum		26	17.3
11	Genital handling		8	5.3
12	Rectal mucosal prolapse		3	2
13	Vomiting as the only presenting symptoms		4	2.6
14	Pain abdomen (Overlapping with other symptoms)		132	88
		Central or generalized pain abdomen	91/132	68.9
		Right iliac fossa	14/132	10.6
		Hypochondrium	2/132	1.5
		Left iliac fossa	12/132	9
		Flank on either side or both	10/132	7
		Epigastric pain	4/132	3
15	Urinary symptoms		45	14.8
		Day time Incontinence	14/45	31.1
		Increased frequency of passing urine	18/45	40
		Enuresis	3/45	6
		LUTS	6/45	13.3
		Documented UTI	4/45	8
16	Abdominal radiograph	Blethyn's classification		
		0	2/128	1.5
		1	37/128	28.9
		2	43/128	33.5
		3	46/128	35.9
17	Loaded rectum	Yes	114	76
18	Referred to us as appendicitis	None of them were operated on first visit	8	5.3

	based on USG report			
19	Dietary compliance	Following diet as prescribed	95	63
20	Follow up	Coming for regular follow up	68	45.3
21	Laxative therapy	Duration		
		<3months	62	41
		3-6 months	76	50.6
22	Need for enema	>6months	12	8
		Yes	63	42
23	Need for gut irrigation	Yes	18	12
24	Final overall outcome	Improvement noted in	105	70

USG of abdomen of forty-five patients in pain abdomen group showed mesenteric lymphadenitis in 26, sub-acute appendicitis in 8, intussusception in 4, ileal thickening in 1, 4 patients had cholelithiasis and 16 had upper tract stones. These patients had significant stool retention in abdominal radiograph (Blethyn's grade type 2 and 3) and loaded rectum in 66% each respectively. Only 3 patients required appendicectomy, one needed cholecystectomy and four required surgical intervention for urinary calculi later in the follow-up.

Comparison was done between the

constipation group and pain abdomen groups **Table 2**, which showed that the majority of children in age group 11-14 years complained of pain (64.9%) and majority of the children in age group 2-5years presented with constipation (78.9%). The study also found that stool retention in the rectum was a predominant feature noted in constipation group (82.9%). Both groups were comparable in terms of gender, need for enema and findings in the abdominal X-ray. There was a significant improvement in the pain abdomen group after they were treated for constipation.

Table 2: Comparison between the constipation group and pain abdomen group.

Characteristics		Constipation		Chi square value	p value
		Presenting as constipation (%)	Presenting as pain (%)		
Age group (In years)	2-5	45 (78.9)	12(21.1)	18.508	<0.001*
	6-10	36(64.3)	20(35.7)		
	11-14	13(35.1)	24(64.9)		

Sex	Female	35(64.8)	19(35.2)	0.166	0.683
	Male	59(61.5)	37(38.5)		
loaded colon	No	16(44.4)	20(55.6)	6.723	0.010*
	yes	78(68.4)	36(31.6)		
Enema	No	50(57.5)	37(42.5)	2.39	0.122
	Yes	44(69.8)	19(30.2)		
X ray #	1	20(54.1)	17(45.9)	0.693	0.707
	2	25(58.1)	18(41.9)		
	3	29(63.0)	17(37.0)		
Improvement	No	34(75.6)	11(24.4)	4.565	0.033*
	Yes	60(57.1)	45(42.9)		

*p value <0.05 is considered statistically significant

Xray#: No records were found for 22 patients and 2 records were found to be normal

The final improvement and regular follow-up attitude of patient's guardian were compared with the dietary compliance of the patients to look for any correlation between them in **Table 3**.

Study shows that 97.1% of patients with good follow-up followed the dietary advice whereas only 35.36% of patients

among bad follow-up group were complaint to the dietary advice. The study reveals that there is an association between following dietary advice and final improvement. Among the patients who followed the diet, 70.5% had good outcome irrespective of the duration of therapy.

Table 3: Association of following dietary advice with follow up and final improvement

Characteristics		Following dietary advice		Chi square value	p value
		No	Yes		
Follow-up	Poor Follow-up	53(35.3)	29(19.3)	60.925#	<0.001*
	Good Follow-up	2(1.3)	66(44.0)		
Final improvement	No	24(16.0)	21(14)	7.69	0.006*
	Yes	31(20.7)	74(49.3)		

*p value <0.05 is considered statistically significant

Fisher's Exact test is used

Note: total %'S are reported

The **Table 4** shows the impact of duration of therapy on the outcome of constipation.

Table 4: Association of final improvement and duration of treatment

Duration of treatment(in months)	Final improvement		Chi square value	p value
	No	Yes		
≤3	28(45.2)	34(54.8)	11.568	0.001*
>3	17(19.3)	71(80.7)		

*p value <0.05 is considered statistically significant

Patient who had laxative therapy for more than three months had 80.7% improvement in their symptoms. Majority of these patients had good follow-ups, were complaint to the medication and dietary advice. Patients who had discontinued the treatment before 3 months noted initial improvement in 54.8% patients, without long-term follow-ups. Seventeen of our patients (19%) didn't respond to our treatment despite regular follow-ups and laxative therapy. Among them 4 patients didn't follow the given dietary advice well. Nine patients recovered with 1 year of laxative therapy but had waxing and waning symptoms hence were not considered cured. Six patients who were not relieved of symptoms, 2 were laxative dependant with more than 18 months of therapy. Three patients were subjected for barium enema which were normal. All the three children, subjected for nuclear scintigraphy had normal colon transit time with obstructive

pattern at the rectum. Among the seventy-one patients were relieved of their symptoms after good follow up and more than 3 months of laxative therapy **Table 4** seven patient required laxative therapy ranging from 8 months to 2 years.

Discussion

Constipation is perceived differently by the patients, parents and by treating physicians. There were many criteria for diagnosis such as Lova system, Loening-Baucke criteria, etc. used in the past as it was not well defined. In 2006, Paris consensus led by concerned specialists, developed new diagnostic criteria which is now popular, known as ROME-3 consensus.⁷ The North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) have further modified the criteria by lowering the

duration of symptoms, to avoid unnecessary delay in diagnosis of constipation.⁷ The above-mentioned criteria is still considered restrictive by some of the authors as these are formulated based on the western standards. Bowel movement and frequency of defecation are highly influenced by geographical situation, staple diet of the communities and diverse living conditions. For instance, average stool frequency in Indian subcontinent is 7 times a week. Colon transit time (CTT) is faster in Asians (16.6 hours). The upper limit of CTT is 31.8 hours in Indian population compared to European study which is 63 hours.⁸ Encopresis is seen in up to 75-90% and are more common in the boys in western literatures.^{9, 10} It was not common in our study but was limited to 10 patients (6.6%), among which six patients were male and two patients were younger than 4 years. These factors suggest that the disease pattern and severity is different in the Asians.

Patients or parents often complain about pain in the abdomen as a presenting symptom noted in up to 33% -55% of the cases in one of the studies.¹¹ About 123 (82%) patients presented with abdominal pain in our series. Fifty-six among them presented with exclusive pain without any other symptoms. These patients had significant stool retention in abdominal radiograph (Blethyn's grade type 2 and 3) and loaded rectum in 66%. Mesenteric lymph nodes in abdominal ultrasonography were noted in 47%. We thus suggest that a triad of nonspecific abdominal pain, essentially normal USG

abdomen with mesenteric lymphadenitis and features suggestive of stool retention in abdominal radiograph is indicative of constipation and would avoid unnecessary delay in the initiating treatment for constipation **Figure 1**. Other vague symptoms are noted in the **Table 1**. Most of the patients are treated for nonspecific symptoms with recurrence of pain agonising the patient's family. The patient may present with urinary incontinence and frequent urinary tract infection and rectal bleed.¹² In our study 14.3% and 17.3% of patients presented with bladder and bowel symptoms respectively. The other rare symptoms, with which patient may present is recurrent vomiting and upper abdominal distension. This could be attributed to reversal of gastrocolic reflux, where the individual develops gastric paresis due to filled rectum^{13,14} We too had 4 patients (3 male and 1 female) who presented without any symptoms other than vomiting who had been thoroughly worked up for the cause. Significant stool retention was the only positive findings in imaging studies. All of them had shown improvement after bowel cleansing therapy and continuing laxative therapy. The precipitating factor for the disease might be low socioeconomic status, over-crowding, inadequate hydration, non-availability of toilets, intercurrent illness and dietary practices in the communities.⁵ Eight of our patients were staying in hostels who presented with recurrent symptoms to us. They couldn't follow the medical and dietary advices, who later lost to the follow-ups. Three adolescences; one male and two females, with the constipation had

problem of open-air defecation due to lack of sanitary facilities who also didn't show the improvement and lost for follow-ups. Rushing to school in the morning was

noted in 31 of our patients, which may also have been precipitating factor in constipation.

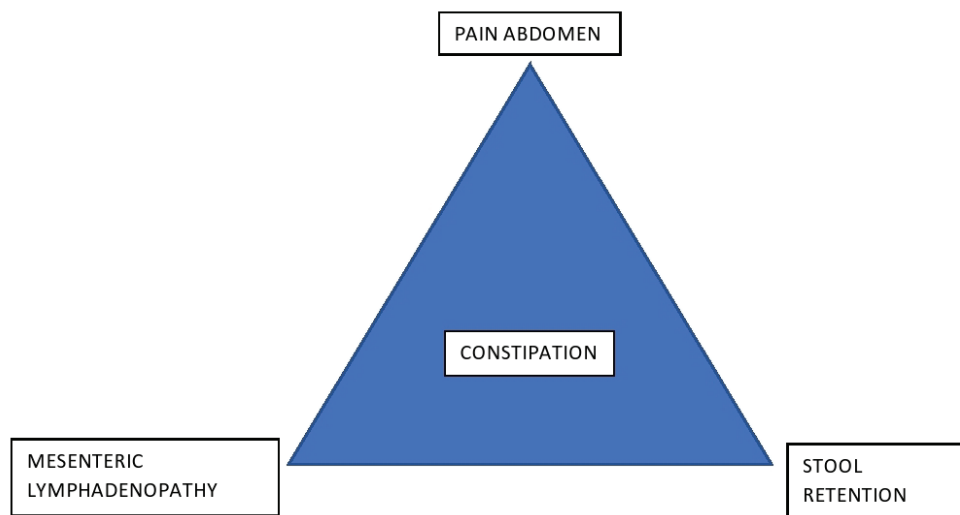


Figure 1: Triad for early detection of constipation

The prevalence of the constipation is not known in our country, but it is on rise in Asian countries as reported from Taiwan (32%), Hongkong (29.3%), Saudi Arabia (22.5%), Srilanka (15.4%) and China (12.2%).¹⁵ There are articles which suggests no difference in incidence between the genders, but we have noted that the boys presented more frequently in our study. This is similar to the findings noted by van der Plaset al.¹⁶ Three fourth of the constipation cases were noted in the age group below 10 years. Similar trends are also noted by authors in the west. In our study we found that the children less than 5 years predominantly presented with constipation and children above 10 years had predominantly pain in the abdomen Treatment of constipation starts from the disimpaction of the stools, studded in distal colon. It can be identified by either

palpating abdominal lump, by feeling hard stool in digital rectal examination or with the help of abdominal x ray. The abdominal radiograph is not considered to be a sensitive tool in assessment of constipation according to various studies as the sensitivity and specificity of the investigation was not uniform when done by other authors.¹⁷ But we are of the opinion that stool stasis can be identified in patients presenting with the subtle symptoms on radiograph. There are different grading systems designed by Leech, Barr and Blythen. Latter is by far more simplistic and is used by us in our study.⁶

Poly-ethylene glycol is unequivocally the initial laxative of choice in the management.¹⁸ Patient not responding to the above management would be treated by normal saline enemas. We use normal

saline enema for bowel cleansing when enema fails. Only one of our patients had hypokalemia after the bowel cleansing. Oral disimpaction and enemas are accepted first line of disimpaction therapy.¹⁹ Rectal disimpaction has been more successful treatment compared to more acceptable oral therapy.²⁰ We have lower tolerance in using rectal disimpaction at the first visit in case of severe stool retention. Strict dietary follow-ups in the treatment of constipation and it had important bearing in long term maintenance of bowel movement. Diet or laxative alone cannot be effective in improving the outcome, but the combined therapy can give us better results. Family education also has an important role in the achieving the success of the treatment. Our average consultation time with each patient in their each visit is 35- 45 minutes.

There is no consensus regarding the duration of laxative therapy in treatment of constipation. Many clinicians prescribe it for more than a year. When we followed the policy of two laxative approaches **Table 4**, 78% of the individuals following diet and taking laxatives for 3-6 months were relieved from the symptoms and remained so within 2 years of follow up. We recommend the constipation to be treated by two laxatives for at least 3 to 6 months with good diet and follow up. In our experience the patients having severe perianal pain and tight anal sphincter on digital examination, local application of combination of muscle relaxant and local anaesthetic agent or occasional use of systemic nonsteroidal anti-inflammatory

agents have been beneficial in 6 of our cases to break the chain of painful defecation and constipation. One of our patients had perineal abscess which didn't recur after treating constipation.

Need for elimination of cattle milk from the diet is debatable. There are literatures in support of the elimination of the cow's milk.²¹ We also advise to avoid milk in the diet.²²

Role of fibre in the diet is immense.²³ But, only administration of dietary fibres should not be relied upon in the management of childhood constipation. The fibres can reduce the flatulence and abdominal pain in patients with chronic constipation. It also reduces the fecal incontinence rate and increases overall treatment success.²⁴

Many of our patients had unhealthy diet, such as the junk food available consisting of lot of oil, food cooked using refined flour, cookies, etc. Excessive junk food consumption was noted in 47 of our patients and exclusive biscuit consumption was seen in 15 of our patients. The parents informed that the symptoms improved after stopping the consumption of such foods. Water consumption as advised in the guidelines given by American dietary recommendation, institute of medicine, was not met in 96 percent of our patients.¹⁸

In the refractory disease, various pharmacological treatment alternatives have been tried. Erythromycin showed some significant results in a group of 14 children and can be an option in constipation.²⁵ Lubiprostone, Linaclotide, and Prucalopride are other novel drugs

that have been found to be effective in constipated adults. To date, no randomized studies have been published in children.⁴ Malone antegrade enema and sigmoidectomy are also advocated in retractable constipation.²⁶ We have not used any of these medications nor performed any surgical interventions.

Hypothyroidism was evaluated in 232 patients who presented with constipation to our OPD, 3 patients had subclinical hypothyroidism and 2 had clinical feature of hypothyroidism. This is similar to the study done by William et al, where they noticed hypothyroidism in 56 patients out of the 873 patients, out of which, 9 patients had clinical hypothyroidism. NASPGHAN does not recommend routine thyroid assessment except in cases of severe and refractory constipation.²⁷

Conclusion

A total number of 150 children were followed up for management of constipation. Ninety-four (62.7%) patients presented with constipation, whereas the rest of them presented with non-specific symptoms. Children presenting with pain in the abdomen and stool stasis have to be considered as early feature of constipation

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and need early and aggressive therapy. Thyroid function test is not essential in work up of constipation, but abdominal radiograph should not be underestimated in assessment of constipation.

Laxative therapy along with dietary advice has better outcome in our study compared to either of them alone.

Aggressive therapy with two laxatives for 3-6 months can relieve symptoms in about 78% of patients provided physicians devote sufficient time for counselling for diet and regular follow ups. Bowel cleansing and enemas form an important part of aggressive management.

Ethical Consideration

This study was approved by the institutional ethical committee vide the no. SDMCDS IEC. No. 2021/Medical/Pediatric/S/05 dated 15-06-2021.

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Conflict of interests

There is no conflict of interest.

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