

A retrospective cross-sectional study of nonsurgical management of childhood intussusception in a tertiary care hospital

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ABSTRACT

Objective: To describe the factors based on which nonsurgical management of acute intussusception may be undertaken.

Methodology: A retrospective cross-sectional study was conducted by collecting data of all the children admitted in the pediatric ward of the hospital with radiologically confirmed intussusception between January 2016 and December 2016 from case files. A surgical consultation had been taken, and the children with no hemodynamic instability had been treated with gut rest, intravenous fluids, and sodium phosphate enema. **Results:** Total 25 cases were studied, and nonsurgical management was successful in 88% of these cases. Statistically significant association was found between younger age ($p=0.033$), shorter duration of symptoms at presentation ($p=0.005$), early initiation of treatment ($p=0.001$) and shorter hospital stay ($p=0.002$), and successful nonsurgical management of acute intussusception. **Conclusion:** Younger age, shorter duration of symptoms, and early initiation of management are significantly associated with successful nonsurgical management of acute intussusception. With the above results, risk stratification may be proposed for predicting successful nonsurgical management of acute intussusception.

Key words: Acute intussusception, Enema, Nonsurgical management, Ultrasonography

Intussusception occurs when a portion of the alimentary tract is telescoped into an adjacent segment. It is the most common cause of intestinal obstruction between 5 months and 3 years of age and the most common cause of abdominal emergency in children younger than 2 years. Radiologic hydrostatic reduction has a success rate of 80-95%. Spontaneous reductions occur in 4-10% of the cases. Surgical reduction is indicated in the presence of refractory shock, suspected bowel necrosis, perforation, peritonitis and multiple recurrences, and ileoileal intussusception [1]. According to del-Pozo et al. ultrasonography (USG) has permitted a comprehensive understanding of anatomy and pathophysiology of intussusceptions, and nonsurgical management is possible in the most cases of intussusception [2].

Steroids have been found efficacious in preventing early relapses in acute childhood intussusception managed conservatively. Viral infections, including enteric adenovirus, can accentuate lymphatic tissue in the intestinal tract, resulting in hypertrophy of Peyer's patches in the lymphoid-rich terminal ileum, which potentially acts as a lead point for ileocolic intussusception. A role for corticosteroids in the prevention of recurrence has been proposed in light of this possible association with lymphoid hyperplasia [1,3,4]. Conservative management of intussusception is cost-effective, less time consuming and does not require much expertise. Moreover, the cons associated with surgery (anesthesia-related side effects, infections, and longer hospital stay) can be avoided. This is important particularly in the

Indian scenario, where most institutions do not have a specialized pediatric surgery set up. This method can even be used in a peripheral health-care set ups with specialist doctors and trained staff.

However, very little literature is available on this topic and especially in India, the study on management of childhood intussusception is scarce and data relating to nonsurgical/conservative management of childhood intussusception are almost nonexistent. Although, nonsurgical management of the illness is in practice but no data on the risk stratification or outcome of intervention is available in India. Steroids have been found to be efficacious in preventing relapses, but their role has never been validated in any studies in India. This study was an attempt to contribute to the existing literature and understand the factors and clinical features with the appropriate use of radiological/ultrasonological evaluation wherein nonsurgical management of childhood intussusception can be undertaken. The role of steroids in the prevention of recurrence will also be understood.

MATERIALS AND METHODS

This was a retrospective cross-sectional study, where all patients were of radiologically confirmed cases of intussusception admitted under the pediatric department of the hospital during January 2016-December 2016. However, patients with unusual conditions such as abdominal distension, symptoms suggestive

of peritonitis, other pre-existing surgical illness, recurrence of intussusception, and hemodynamic instability were excluded.

Data were collected of all the children admitted in the pediatric ward of the hospital with USG confirmed intussusception from the case files. Age, duration of symptoms, time period of initiation of treatment, and hospital stay duration were noted. A surgical consultation was taken in all the cases. The children with no hemodynamic instability had been kept nil per orally and treated with intravenous (IV) fluids and sodium phosphate enema. A Foleys catheter was inserted 3-5 cm into the rectum and secured in position by a micropore tape. Sodium phosphate enema was pushed in with adequate pressure under continuous hemodynamic monitoring. A repeat USG was done to confirm reduction of the intussusceptions. The data collected were analyzed using statistical package for the social sciences version 16. Fisher's exact t-test was used for statistical analysis. A $p < 0.05$ was considered statistically significant.

RESULTS

Out of the 25 cases, 22 cases were diagnosed accurately by USG. 3 cases needed confirmation by computed tomography (CT) scan abdomen. USG was used initially for diagnosis of intussusception. 3 out of 25 cases did not meet the diagnostic criteria on USG [5]. CT scan study was conducted in cases where USG was not confirmatory, and CT scan was advised by radiologist for confirmation. The remaining 22 cases confirmed on USG were categorized based on the exterior radiolucent rim of target into 2 groups. 16 cases had radiolucent rim between 0.6 and 1 cm and 6 cases had radiolucent rim > 1 cm. In the former cohort of 16 patients, 15 were managed conservatively by nonsurgical interventions, and out of 6 in the latter group, 4 were managed nonsurgically. The chart shows that greater the size of lucency, lesser is the chance of reduction by conservative management. Thus, early referral to for surgery can be made based on USG. This is illustrated by the following Chart 1.

Out of the 25 cases, 22 cases (88%) were successfully treated by nonsurgical methods (nil per orally, IV fluid, antibiotics, and enema). Even though the 2 cases fulfilled the inclusion criteria, the intussusception could not be reduced even after repeated enemas in one case, and progression of the intussusceptions occurred in another case. Hence were referred (Chart 1). Associations were checked between age at presentation, duration of symptoms at presentation, early initiation of treatment and duration of hospital stay, and successful nonsurgical management of intussusception. The results are described in Table 1. One may read from Table 1 that statistically significant associations were found between nonsurgical management and (i) younger age, (ii) duration (shorter) of symptoms, (iii) early initiation of treatment, and (iv) shorter hospital stay ($p < 0.05$ in each case).

Oral dose of steroids was protective against recurrence, as none of the cases had a recurrence in 1 week and 3 months follow-up.

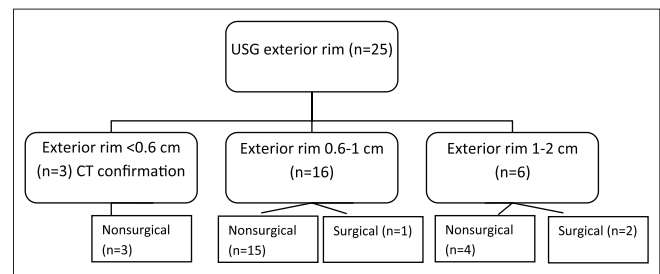


Chart 1: Distribution and management based on the exterior rim on ultrasonography

DISCUSSION

The diagnostic accuracy of USG in this study was 88% when compared to 100% diagnostic accuracy in the study by Wang and Liu, Verschelden et al. USG had a sensitivity of 98.5% in the study by Shanbhogue et al. [6-8]. Cases confirmed on CT scan abdomen in our study might have been very early in the course of illness and yet to developed substantial findings on sonography as justified by the fact that all of the 3 cases were successfully managed conservatively.

Nonsurgical management was successful in 88% of the cases in this study. Similar results were reflected in the study by Riebel et al. and Flaum et al. where reduction was successful in 83% cases (in both studies) [9,10]. The reduction was successful in 85% of cases in the study by Wood et al. [11]. In this study, a significant association was found between younger age at presentation and successful nonsurgical management ($p = 0.033$). Older children with intussusception usually have associated pathology that serve as lead points, and the intussusception is of "small bowel in small bowel" type which does not facilitate nonsurgical management [12]. These might be the reason explaining the above findings.

Early presentation to hospital and early detection and initiation of treatment prevent the intussusceptions from progression and complications such as perforation and peritonitis, and nonoperative management reduces morbidity and shortens hospital stay [13]. These might be the reasons behind the significant association between shorter duration of symptoms ($p = 0.005$) and early initiation of treatment ($p = 0.001$) and successful nonsurgical management.

Similar results were reflected in the following studies. In a study by Khorana et al. [14], symptom duration > 3 days was identified as a risk factor for nonsurgical reduction failure ($p < 0.001$). Long duration of symptoms ($p < 0.001$) was a major predictor of failure of pneumatic reduction in the study by Tang et al. [15]. In a study by Hadidi and Shal, nonoperative management was attempted if history < 48 h, absence of toxicity and signs of peritonitis [16]. According to a study by Zachary, in 54 cases, there was an attempt at reduction with barium enema and in 33 it was successful. Among the factors which might be influencing the success or failure of the procedure delay before admission to hospital seemed the most likely. When the delay was < 24 h, 28 out of 40 were reduced (70%), whereas when the delay was more than 24 h, only 3 out of 12 (25%) were reduced [17].

Table 1: Distribution of patients over (i) ages (ii) duration of symptoms (iii) duration of treatment initiation and (iv) duration of hospital stay for different management of treatment

Management	Surgery/referral	Enema	Total	p (fisher's exact test)
Age of the patients (years)				
2	0	6	6	0.033
3	0	11	11	
4	1	3	4	
5	2	2	4	
Total	3	22	25	
Duration of symptoms (h)				
12	0	11	11	0.005
16	0	3	3	
18	0	5	5	
24	1	3	4	
72	2	0	2	
Total	3	22	25	
Interval between symptom onset and treatment initiation (days)				
3	0	9	9	0.001
4	0	12	12	
5	0	1	1	
8	1	0	1	
Not available	2	0	2	
Total	3	22	25	
Duration of hospital stay (days)				
1	2	0	2	0.002
2	0	17	17	
3	0	3	3	
4	0	1	1	
5	0	1	1	
10	1	0	1	
Total	3	22	25	

Surgical management is associated with several cons such as anesthetic side effects, prolonged IV antibiotics requirement, risk of infections, late initiation of enteral feeding, and failure of anastomosis. All these factors mandate a longer hospital stay. Enema therapy is relatively noninvasive and associated with minimal side effects. These might be contributing to the significantly shorter duration of hospital stay in nonsurgical management of intussusceptions in this study.

In a study by Lehnert et al. conservative treatment using an air, enema was successful in 79.5% of cases. A higher rate of surgical intervention was found in patients who had symptoms for more than 24 h and in referred patients [18]. According to Aydin et al. if examination and CT findings point toward a self-limiting intussusception, then conservative management with caution is

appropriate [19]. According to a meta-analysis performed by Gray et al. the risk of early (within 48 h) recurrence after enema reduction is low; suggesting outpatient management of well-appearing patients should be considered [20].

According to Mensah et al. total of 20 intussusceptions were managed in 18 patients over 9 months. In 15 patients (75%), the intussusception was reduced successfully [21]. In the study by Hung-Chang et al. four major sonographic findings were noted for the diagnosis of intussusception. Operative reductions were necessary in all 13 cases with exterior rims thicker than 1.6 cm. 15 of remaining 35 cases whose exterior rims were between 0.6 and 1.5 cm needed surgical management (p=0.003) [5].

In a study by Herwig et al. it was observed that hospitalized children with enema-reduced intussusception required minimal interventions, had a low rate of signs and symptoms requiring further radiographic studies, and had no enema-reduced serious complications during hospitalization [22]. In their study, Gorenstein et al. it was found that repeated, delayed pneumatic reduction of intussusception improved the subsequent outcome [23]. According to Gonzalez-Spinola et al. the accuracy of USG guided saline enema in achieving intussusceptions reduction is high (81.9%) [24]. In a study by Ravitch and McCune, in 27 patients treated primarily by barium enema, there were no deaths [25].

This study provides meaningful insights. However, they are subject to the fact that we did not get many observations. This might be a limitation of the study. More such studies with the higher number of cases would strengthen the findings.

CONCLUSION

Taking into consideration the vague nature of early symptomatology and a lack of trained sonologists, effective nonsurgical management may be delayed and complications may develop. The results of this study are helpful in proposing a risk stratification of factors favoring nonsurgical management of intussusception. The cost-effectiveness of enema therapy and relatively unskilled nature of administration might be a boon in India.

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