CHILDHOOD INTUSSUSCEPTION: ROLE OF ULTRASOUND GUIDED HYDROSTATIC REDUCTION AS A PRIMARY THERAPEUTIC MODALITY – OUR EXPERIENCE

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Abstract

**Background:**
To study the feasibility and efficacy of ultrasound guided saline enema hydroreduction as a primary therapeutic modality in cases of childhood intussusceptions in a tertiary care center.

**Material and Methods:**
A retrospective review of cases of intussusceptions over a period of sixty months in a tertiary care center. Out of total fifty six patients with intussusception, seven were excluded from the study in view of poor selection criteria. Ultrasonography was the sole criteria for diagnosis and therapeutic purpose. Rest of the patients were subjected to saline enema hydroreduction. Successful reduction was considered achieved when saline refluxed to the distal ileum visualized by sonography.

**Results:**
Forty nine patients were subjected to saline enema hydroreduction. Twenty two (44.89%) of them had presented within twenty four hours and got completely reduced by hydro-reduction whereas out of rest twenty seven (55.10 %) late presenters only thirteen were successfully reduced and rest of the patients had to be subjected to surgery.

**Conclusion:**
Diagnosing intussusception in the first 24 hours will increase the rate of successful hydrostatic reduction and thus decrease the need for surgical intervention and prolonged hospitalization. Hence, we recommend saline enema reduction to be tried as the first choice in all cases of intussusception unless contraindicated.

**Keywords:** childhood intussusception, hydrostatic saline enema reduction, exploratory laparotomy, resection and anastomosis.

Introduction

Intussusception in the first two years of life is one of the most common causes of intestinal obstruction. No underlying cause is found in majority of the cases. The classical triad of abdominal colic, abdominal mass, and passage of red currant jelly stool is found in only 33% of cases [1]. Although clinical examination coupled with ultrasonography and saline enema is the standard method for the diagnosis and therapeutic reduction, a new method of using air as enema with ultrasound-guidance hydrostatic reduction is being used recently with successful results [2-4].

**Material and Methods**
The diagnosis was confirmed by ultrasonography. All the patients were studied with respect to age, sex, clinical presentation, underlying cause, investigations, mode of treatment, hospital stay, morbidity and mortality and incidence of recurrence. Hydrostatic saline enema reduction was performed in clinically and ultrasonographically proven cases of intussusception, who were <12 years of age and hemodynamically stable without any abdominal distension and peritonitis.

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Hydrostatic saline enema reduction was not advised in cases with signs of peritonitis or strangulation. Thus, exclusion criteria for ordering saline enema were age > 12 years, evidence of toxicity, temperature > 99°F on admission, gross distension of abdomen, guarding / rigidity. Saline enema reduction was performed by introducing a Foley's catheter into the rectum and secured by inflation of the balloon and holding the buttock tightly. A column of saline was delivered from a reservoir held at a height of 3 feet. The distribution within the colon was tracked under ultrasound guidance. Saline noted in the distal ileum was considered as successful reduction. Charcoal tablet after 12 hours and normal diet on the next day was given to these patients. Patients in whom reduction was contraindicated and in those where reduction under ultrasound guidance failed were then subjected to surgical management.

Children diagnosed as intussusception were retrospectively studied for the duration of 60 months from June 2008 to May 2015. There were fifty six patients ranging in age from 2 months to 10 years with a mean age of presentation of 4 months and 8 days. Twenty-two patients presented within 24 hours after their symptoms started. A palpable mass was present in 11 (20.37%). Hydrostatic saline enema reduction was tried in 49 patients with successful reduction in 35 patients (71.42%). Remaining patients required surgical treatment. Three patients had perforation of the bowel while attempting hydrostatic reduction. All those patients who came within 24 hours of their symptoms could be managed by hydrostatic saline enema reduction successfully, whereas of those who presented after 24 hours, 13 responded to reduction whereas 14 did not and needed exploration. Seven patients were di

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>No. of patients</th>
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<tbody>
<tr>
<td>Vomiting</td>
<td>49 (87.5%)</td>
</tr>
<tr>
<td>Bleeding per rectum</td>
<td>35 (62.5%)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>50 (89.28 %)</td>
</tr>
<tr>
<td>Irritability</td>
<td>33 (58.92%)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>19 (33.92%)</td>
</tr>
<tr>
<td>Abdominal distention</td>
<td>29 (51.78%)</td>
</tr>
<tr>
<td>Reluctance to feed</td>
<td>43 (76.78%)</td>
</tr>
</tbody>
</table>
rectly operated without attempting hydrostatic reduction in view of poor selection criteria and hence were excluded from the study.

To sum it up all, hydrostatic saline enema reduction was successful in 35 patients (71.42%). There were no deaths. Three recurrent cases were managed conservatively by adequate hydration, antispasmodic medications and nil by mouth for 36-48 hours.

Results
A total of 56 infants and children were treated for intussusception. There were 34 boys and 22 girls. The mean age of all patients was 4 months and 8 days. The majority of patients were between four and six months (Fig. 1). The average hospital stay was 2.2 days after saline enema reduction and 6.3 days after surgical exploration.

On review of the clinical presentation of these patients, 22 presented within 24 hours of the onset of symptoms, 19 presented within 48 hours and 15 presented at 72 hours or more. Abdominal pain was the most common symptom followed by vomiting and reluctance to feed (Table 1). Review of the clinical signs of these patients (Table 2) revealed the presence of abdominal distension in 31 and red current jelly stool on per rectal examination in 34 patients. The predominant location of the mass in majority of the patients was in the right upper quadrant. Fever was seen in 15 patients. Two patients presented with generalized peritonitis due to gangrenous bowel, they presented 72 hours after the onset of the symptoms. Ultrasound of the abdomen was done in all patients and was diagnostic in 53 patients.

In three patients, saline enema was complicated by perforation of the colon. Complete hydrostatic reductions of intussusception were seen in 35 patients but 14 had to be operated after failed attempt at hydroreduction. Lead point could be identified in only 12 (21.42%) patients. Meckel’s diverticulum was the most common finding in 4 patients followed by enlarged lymph nodes in 3 and polyp in 2 patients. Three patients had nodular growth in resected specimen of intussusception which was diagnosed as Non-Hodgkin’s lymphoma on histopathological examination. These patients were started on chemotherapy post-operatively. Surgical treatment was simple reduction in 15 and resection with anastomosis in 3 patients. In 3 patients resection and stoma was done. Three patients who had perforation secondary to saline enema hydroreduction were explored. A tiny perforation proximal to the splenic flexure was found in one patient and in 2 patients tiny perforation in ascending colon was found. All three perforations repaired primarily, proximal intussusception mass resected and a stoma created. All patients who underwent bowel resection (n = 3) presented late (more than 48 hours) after their symptoms started (Table 3).

Saline enema hydroreduction was successful in all 22 patients who presented before 24 hours of onset of symptoms (success rate 100%). However, in rest 34 patients who presented after 24 hrs, saline enema reduction was successful in only 13 out of 27 patients subjected to hydrostatic reduction. Success rate was 48.14%. Forty-seven patients had ileo-colic intussusception, 4 patients had ileo-ileo-colic and 5 patients had colo-colic type of intussusception. A lead point was identified as Meckel’s diverticulum in four cases and enlarged mesenteric lymph nodes in three cases. There were three recurrences and there were no deaths in this series. Four patients had chest infection post-operatively which responded to antibiotic therapy. Three patients had surgical site wound infection.

Discussion
Intussusception is common in pediatric patients [5]. The condition has been known to have a male preponderance [6-8] which is consistent with our study where male: female ratio was 1.54: 1 (34 male, 22 female); in most cases intussusception occurs in the first year of life 60% to 94% as seen in our study (85.71 %) [8-10]. The consistency of getting intussusception in all seasons was the same. The other age groups are not immune to this condition. We have seen a wide range from 2 months to six years.
Twenty-two patients had presented within 24 hours of the onset of symptoms, while 19 presented at 48 hours and 15 presented at 72 hours or more. This indicates a late presentation of our patients, which may be due in part to the illiteracy of parents or missing the diagnosis by family doctors. Diagnosis was delayed in our cases because of abdominal colic, palpable abdominal mass and rectal bleeding seen in only 30% of our patients. This combination has been reported in a range from 12% to 40% of cases [1, 12].

Frequency of symptoms and signs in patients of intussusception may vary from study to study. The most common symptoms in our patients was abdominal pain followed by vomiting and reluctance to feed, which was comparable with other studies [9, 10].

Saline enema hydrostatic reduction under ultrasound guidance is the method of choice for the treatment of intussusception. It is equal or superior to other techniques of reduction, while having the obvious advantage of avoiding radiation exposure [16]. We performed hydrostatic reduction in 35 of our patients with a success rate of 71.42%. Hydrostatic reduction in 1317 saline enemas from 11 reviews showed a success rate ranging between 19% and 85% [10]. Air contrast enema for diagnosis and reduction of intussusception has been reported to be reliable, safe and effective [3, 4] but the outcome depends primarily on the experience of the radiologist [17].

The diagnostic accuracy of ultrasound with respect to intussusception was found to be very high (96.1%). Diagnostic signs on ultrasonography are ‘bowel in bowel appearance’ pseudo kidney sign and ‘target or doughnut sign’ [18]. Ultrasound was found to be a reliable diagnostic screening modality in suspected cases of intussusception and a promising technique for therapeutic reduction of intussusception [2, 13]. Twenty-one cases underwent surgical intervention with simple reduction, resection and anastomosis and stoma in 15, 3 and 3 patients respectively. Late presentation of our cases was the prime reason for reduced viability of the affected bowel thus increasing the resection rate in our series.

Ileo-colic intussusception was seen in most of our cases, which was similar to the findings in many studies. Meckel’s diverticulum was the most frequent. Pathological lead points were seen occasionally. This observation was reported in other studies also [5, 10, 11]. Other lead points that can cause intussusception are lymphoma, polyps, a nodule of ectopic pancreas, enterogenous cyst and small bowel tumors [5, 14, 15].

The reported mortality of 3079 patients with intussusception from 13 reviews ranged between 0% and 3.4% [10]. We had no mortality in our series. Three patients had a perforation of the colon attributed to hydrostatic reduction. Three of our patients had recurrence. The overall recurrence rate reported is 4% to 14% [11].

**Conclusion**
The most important point to note is that the diagnosis of intussusception has to be made as early as possible (preferably in the first 24 hours) for the hydroreduction technique to have any significant chance of successful reduction. Delay in initial presentation is therefore supposed to increase the need for surgical intervention, the degree of morbidity and the period of hospitalization. Saline enema reduction is the treatment of choice in all cases of intussusception unless contraindicated. Ultrasonography plays an integral part in the management of intussusception as it has both diagnostic and therapeutic value.

<table>
<thead>
<tr>
<th>Reduction</th>
<th>No of patients subjected to</th>
<th>No of patients with successful reduction</th>
<th>No of patients with failed reduction</th>
</tr>
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<tbody>
<tr>
<td>49</td>
<td>35</td>
<td>14</td>
<td></td>
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<table>
<thead>
<tr>
<th>Surgical intervention</th>
<th>Indication for the surgical intervention</th>
<th>Surgical procedure done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure of reduction</td>
<td>Poor selection criteria, signs of peritonitis and/or perforation</td>
<td>Manual reduction</td>
</tr>
<tr>
<td>(including the three with 2 perforation)</td>
<td></td>
<td>Resection and end to end anastomosis/stoma (3 stoma cases include the three with secondary perforation)</td>
</tr>
<tr>
<td>14</td>
<td>7</td>
<td>15</td>
</tr>
</tbody>
</table>

**Table III:** Distribution of modality of therapy
REFERENCES