

## Original Article

### Single-center experience of managing childhood intussusception

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## ABSTRACT

**Background:** Intussusception is one of the emergencies encountered in early childhood requiring emergent interventions. The purpose of the study is to determine the outcomes and prognosis of our methods and management strategies employed in children who developed intussusception.

**Methods:** This is a retrospective case series performed by reviewing the patient medical records, sonographic and radiological reports, and surgical notes of the patients managed for intussusception at our hospital from 2009–2018.

**Results:** A total of 355 cases of intussusception were managed during the study tenure. The etiology was idiopathic in 97.4% whereas the remaining patients had Meckel's diverticulum, lymphoma, and intestinal polyp as pathological lead point (PLP). Ultrasound was used for the diagnosis as the primary investigation tool in all the patients, with 100% diagnostic accuracy in the current study. Non-operative management by hydrostatic reduction was performed successfully in 79.43% of the patients. Total episodes with recurrence were 23 (6%); 30% had recurrence within 48 hours. Recurrence occurred by an average of 7.68 months after the successful reduction.

**Conclusion:** The majority has idiopathic etiology, but secondary cause with some pathological lead point is also not uncommon. Profound attention is required for prompt identification and treatment to avoid bowel ischemia. Ultrasound remains the preferred diagnostic modality in our patients. Even with recurring episodes of intussusception, the primary treatment remains hydrostatic reduction.

**Keywords:** Intussusception, Clinical presentation, Ultrasound, Hydrostatic reduction, Recurrence, Complications.

## INTRODUCTION

Intussusception is one of the common abdominal emergencies encountered in early childhood, especially in children younger than two years of age.[1] More than 90% of intussusception cases are considered idiopathic in etiology.[2] Pathological lead point (PLP) like tumors, polyp, or Meckel's diverticulum are more common in children of age over 5 years. They are also commonly suspected in cases where the condition is restricted to the small bowel.[3]

A classic triad of symptoms featured in intussusception is vomiting, abdominal pain, and per rectal bleeding. Ultrasonography is now a more commonly suggestive and preferable diagnostic modality in addition to plain radiography and contrast enema study.[4–8] If not recognized and treated promptly, intussusception may progress to intestinal ischemia needing a bowel resection.[9]

Saline, Barium, or gas enemas are mostly used to reduce uncomplicated intussusceptions, although it has been reported that 10% to 30% of cases eventually need sur-

gery.[10-12] Surgery is required when there are signs of intestinal perforation, shock with peritonitis, or failure of non-surgical reductions, or when a PLP is suspected.

These cases present challenges when it comes to surgical diagnosis and therapeutic management since each case may have a local cause of lead point, and if so, should surgical exploration be undertaken. This study is undertaken to determine the outcomes and prognosis of patients with intussusception managed in our unit.

## METHODS

This retrospective case series reviewed the medical records of 355 pediatric cases (age <13 years) with intussusception presented to Latifa Women's and Children's Hospital, Dubai, from 2009–2018. The recorded data was collected using hospital charts, radiological reports, and surgical notes. Demographic data, any related medical history, clinical symptoms, and signs with images were collected where available.

The final diagnosis of each case was made by ultrasound. Informed consent was obtained, and hydrostatic reduction was used to manage the intussusception as a first-line intervention. Surgery was required in cases with perforation, shock, peritonitis, or when non-surgical methods failed to reduce the intussusception. The surgical options employed included laparotomy, laparoscopy, manual reduction with lead point excision and closure primarily, resection of affected irreducible, obstructed, or gangrenous segment with primary anastomosis, etc. The resected part was sent for histopathology.

A single-recurrent episode of intussusception was defined as the episode that recurred only once, 12 hours post-reduction. Multiple-recurrent episodes of intussusception were defined as the episodes that recurred at least two times or more after hydrostatic reduction or surgery. Non-recurrent intussusception was defined as the cases that were reduced successfully by hydrostatic reduction or by surgery without recurrence. Data were presented as frequency and percentages.

## RESULTS

Three hundred and fifty-five (355) children with 378 episodes of intussusception were treated between 2009 and 2018. The patients consisted of 227 boys and 128 girls (M:F 1.7:1). The mean age of presentation was 1 year and 4 months (ranged from 3 months to 11 years). Two hundred fifteen (60.5%) cases were younger than 1 year of age (Table 1). No clear pattern was noted in incidence in terms of timing or season during the observation period.

In terms of symptoms, common presentations were intermittent and colicky pain, demonstrated by 95% of our patients. Emesis was the next common symptom, oc-

curred in 85% of the cases followed by bloody stools reported in 30% of our cases.

Table 1. Total cases with ages and management

Age	Number	Non Operative	Surgery	Lead point
<1YR.	215 (60.5%)	169 (78.6%)	46 (21%)	1 (0.46%)
1-3 YRS	97 (27%)	84 (86.5%)	13 (13.4%)	3 (3%)
>3YRS	43 (12%)	29 (67.44%)	14 (32.55%)	5 (11.6%)
<b>Total</b>	<b>355</b>	<b>282</b>	<b>73</b>	<b>9</b>

Clinical examination was done in the patients following the suspicion of intussusception. An abdominal mass was palpable in 30% of patients only, and abdominal distension in even fewer patients (10%). All diagnoses and suspicions were confirmed by abdominal ultrasound. Ultrasound with axial and longitudinal scanning and color Doppler ultrasounds were done.

The hydrostatic reduction was chosen as the treatment modality, it was successful on 282 out of 355 patients (79.5%) and failed on 73 out of 355 patients (20.5%). Open reduction was suggested soon after failed conservative treatment in symptomatic patients after confirming persistent pathology of intussusception by ultrasound scans.

Surgery was done in 73 (20.56%) out of 355 patients. Fifty-one out of 73 (69.86%) patients underwent laparotomy and manual reduction of the intussusception. Laparoscopically reduction was done in six patients (8.2%). The surgical findings of 4 patients out of 51 (7.8%) found already spontaneously reduced intussusception. Resection and anastomosis were needed in 16 patients (21.9%). On analyzing the cases that needed surgery, we found the average age was 6.5 years. The range was between 3 months to 11 years.

PLP was found in 9 cases including Meckel's diverticulum in 6 patients with an average age of 3.87 years. Polyps were noted in 2 cases and one patient had a lymphoma. In cases of Meckel's diverticulum and lymphoma, resection of small bowel with primary anastomosis was performed. The average age of patients who had PLPs was 5.8 years.

We recorded recurrent intussusception in 13/355 patients (3.66%) with 23 total episodes. Of these 13 patients, 9 were male and 4 were females. Four patients had recurrence within 48 hours (30%). The average time from successful reduction to recurrence was 7.68 months with a range of 1 day to 3 years. There were 8 patients with less than 7 months duration from 1st episode to recurrence episode (61%). The age distribution of these patients was from 7 months to 3 years with a mean age at 1st recurrence- 17 months.

Table 2. Episodes and management

N	Episodes	Hydrostatic Reduction	Surgery	Lead Point
1	6	6	0	0
1	5	4	1 (On 4 <sup>th</sup> episode)	0
1	2	2	0	0
10	1	8	2	1- lymphoma

Ten patients had only one recurrence (Table 2). Of these, eight were treated with hydrostatic reduction, and two needed surgeries (one of these had lymphoma as PLP). Other than that, one of the patients had 6 episodes and all were treated with hydrostatic reduction. Another case had five episodes and he was operated only on the fourth episode in view of failed hydrostatic reduction, another episode happened later in the same child but was again treated with hydrostatic reduction.

Two patients presented with postoperative intussusception one with post-appendectomy and another post laparotomy with 6 days and 1-month interval, consequently. Both were reduced hydrostatically. One patient in our series developed terminal ileal stricture on the follow-up that needed resection and anastomosis for small bowel obstruction. This child was initially managed with open manual reduction of intussusception. The rest of the patients are doing fine

## DISCUSSION

One of the common surgical emergencies in children is intussusception. The current study was aimed at describing the clinical assessment of children with different sorts of treatment modalities utilized with their results. We assessed 355 cases of intussusception, diagnosed by ultrasound during the study period. Among the children, most intussusceptions develop in the initial 2 years of life. The incidence of intussusception in less than three months and above six years of age is rare.[13-18] The same was observed in our series as over 80% of the patients were younger than 2 years.

The majority of the studies concluded that 60 to 75% of children who developed an intussusception, were male.[19-22] In our study, we also found that 63% of the patients were males with M:F ratio of 1.7:1. Weihmiller et al. [22] showed male gender as an important predictor for intussusceptions.

The classical three symptoms are abdominal pain, emesis, and per-rectal bleeding. In the current study, the common presentation was intermittent abdominal colicky pain with an excessive cry, demonstrated by 95% of our patients, followed by emesis and bloody stools. Khan

et al.[23] documented that about 78% of the patients presented with abdominal pain; Julie et al. [24] documented the vomiting, distension abdomen, blood in stool, and abdominal palpable mass in 85% of cases. Contrarily in our study, we could find palpable abdominal mass in only 30% of patients and abdominal distension in even fewer patients (10%).

Diagnosis of intussusception depends on history and physical assessment. Ultrasonography is the best-recommended tool for diagnosing intussusception and therapeutic hydrostatic enemas lessen unnecessary extra radiations exposure to patients. Ultrasound has a sensitivity of about 98-100% and specificity of almost 98% to diagnose intussusceptions.[6-8] In our study, ultrasound helped in almost every case for the diagnosis; and ultrasound-guided hydrostatic reduction as well in the majority of the patients. Hydrostatic reduction is an urgent emergency intervention and should be performed soon after diagnosis with preparation for possible surgical intervention. our study showed a successful hydrostatic reduction in 282 out of 355 patients (79.43%). In other studies, contrast reduction under ultrasonic guidance possesses an identical success rate, of approximately 80-95%.[20] ultrasound-guided hydrostatic reduction failed in 73 out of 355 of our patients (20.5%).

The surgical option for reduction of intussusception was done immediately after the failure of non-operative treatment. Surgery is indicated when we suspect necrotic bowel or peritonitis, in case of perforation, and in multiple recurrences with a strong suspicion of PLP. Delayed diagnosis and presentation have significant predictive value in the management of intussusceptions.[25] In our study, we performed Surgery in 73 (20.56%) out of 355 patients.

The best approach for operative management of intussusception as laparotomy versus laparoscopy is debatable.[26] Of the 73 patients, 51 (69.86%) underwent laparotomy with manual reduction. Six patients (8.2%) were treated with laparoscopic reduction. In 4 patients (5.4%) the intussusception was already reduced spontaneously before the procedure was started. If the manual reduction is not possible, then resection of the affected part is necessary with end-to-end anastomosis. In the current study, resection and anastomosis had to be done in 16 (21.9%) patients.

Generally, 90% of cases are considered idiopathic, and the pathological lead point of intussusceptum is noticed in less than 5% of intussusception.[17] PLP is documented in over 60% of the patients who are older than 5 years of age.[17-27] The commonly reported PLPs are Meckel's diverticulum, polyp, duplication cyst, inverted appendiceal stumps, Henoch-Schoenlein purpura, Cystic fibrosis, Ascaris lumbricoides, anastomotic suture lines, ectopic pancreatic tissue, post-transplant lym-

phoproliferative diseases, enterostomy tubes, hemangioma or malignant conditions like Kaposi sarcoma, and lymphoma.[27-34] In this study, 97.4% of the cases had idiopathic cause and in 2.5% (9 cases) pathological lead points were found. Meckel's diverticula, polyp, and lymphoma were the PLPs found in our study.

Recurrence after non-operative reduction in childhood is not uncommon. In many studies, recurrence after hydrostatic reduction of intussusception is found in 5% to 10% of the cases.[12-14] Incidence of recurrence post-surgery has been documented in only 0% to 5.4% of the patients.[13,16,17] In the present study we recorded recurrence in thirteen out of 355 patients (3.66%), and the total episodes of recurrence were 23. We had one patient (7.6%) with recurrence after surgical reduction. Consensus has not been established about recurrent intussusception in literature either to repeat enema reduction or surgery should be offered with recurrences and what should be optimum timing for surgery. Wei-Lun et al. demonstrated the recurrence risk was high after the third episode; they considered surgery rather than continuing with hydrostatic reduction at the third episode. The incidence of postoperative recurrent episodes in their series was 1.7%.[35] In our study, 87% of recurrent episodes were reduced successfully by contrast enema.

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## CONCLUSION

Although intussusception has a classical history and clinical presentation, diagnosing and managing such patients may be a challenge for pediatric physicians, surgeons, and radiologists. Most cases have idiopathic etiology and but intussusception secondary to lead point is also not uncommon. Majority of patients in this series presented with colicky abdominal pain. Ultrasound remained the most useful diagnostic tool and helped in hydrostatic reduction of the intussusception which was successful in the majority of patients. Surgical intervention was indicated in cases of failed hydrostatic reduction.

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