ORIGINAL ARTICLE

Outcome of Management of Intussusception in Children Presenting To a Tertiary Care Hospital

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ABSTRACT

Objective: To describe the clinical presentation, management strategies, and early outcomes of patients with intussusception managed at our Centre highlighting the challenges faced during their management.

Study Design: Prospective observational design

Place and Duration of Study: Department of Pediatric Surgery, University of Child Health Sciences, The Children's Hospital, Lahore, from October 2023 to June 2024.

Material and Methods: After ethical approval the patients with intussusception managed at our department were recruited in the study as per inclusion criteria. Details about demography, clinical presentation, workup, management provided, complications and outcome were recorded on a proforma. Data were analyzed using SPSS version 29.

Results: A total of 80 patients with intussusception were included. The median age of presentation was 9 months. The median duration of presentation was 3 days. Idiopathic intussusception was found in 66 patients (82.5%), and pathological lead points (PLP) were identified in the remaining cases. All patients underwent surgical treatment. Ileo-colic intussusception was encountered in the majority (71.3%). About half of the intussusceptions (42; 52,6%) could be reduced manually. Bowel resection was required in 38 (47.6%) patients. The complication rate was 17.5%, including surgical site infection (5%), anastomotic leakage (3.8%), and stoma complications (1.3%). The median length of stay was 4 days (mean 4.5 days ± 2.03). One patient expired after redo surgery for postoperative gut necrotizing enterocolitis.

Conclusion: Most of our patients presented late, leading to bowel necrosis in about half of the cases. Hydrostatic reduction could not be performed due to late presentations. Furthermore, secondary complications complicated the postoperative recovery of a few patients.

Key Words: *Intussusception, Pathological lead point, Late presentations, Complications, Open surgery, Children*

INTRODUCTION

Intussusception, first described by Paul Barbette in 1674,[1] involves the telescoping of the proximal bowel (the intussusceptum) into the distal bowel (the intussuscipiens).[2] Despite medical advancements, intussusception, a frequent cause

of bowel obstruction in infants and young children, poses significant morbidity and mortality risks if left untreated.[3] While it commonly manifests under the age of 2 years, its highest incidence occurs between 4 to 9 months,[4] with males being more susceptible.[5]

The established management protocol for intussusception involves early diagnosis and nonoperative reduction as the primary approach.[6] However, despite advancements in radiological techniques, tertiary care facilities in developing nations often face challenges in diagnosing and successfully treating intussusception nonoperatively.[7] Notably, reports from developing countries indicate a routine surgical management for intussusception instead of nonoperative reductions.[2] These disparities in intussusception management between developed and developing nations underscore the need to elucidate the presentation pathways, management challenges, and outcomes specific to centers in developing regions.

Therefore, this study aims to delineate the clinical presentation, management strategies, and outcomes of childhood intussusception within our tertiary care center, while emphasizing on the local management challenges.

MATERIAL AND METHODS

Study Design: A prospective observational study (single-cohort) was done at the Department of Pediatric Surgery, The Children's Hospital and UCHS Lahore between October 2023 to June 2024.

Inclusion Criteria: All patients aged up to 12 years with intussusception were included in the study. Patients with comorbidities and those whose parents/guardians refused to participate were excluded. Patients with transient intussusception were also excluded.

Ethical Considerations: Approval from the Institutional Review Board of the hospital was obtained (letter number: 838/CH-UCHS). The legal guardians of the patients gave consent for participation in the study.

Data Collection: All patients with suspected intussusception were recruited from the surgical emergency department; a few were transferred from the medical departments. After taking a history and performing a clinical examination, including abdominal palpation to identify the sausage-shaped mass and digital rectal examination to document currant jelly stools, these patients were evaluated with an abdominal ultrasound to confirm pseudo-kidney or target signs and an abdominal x-ray when indicated. Baseline labs including CBC, serum electrolytes, and coagulations profile were sent and blood was arranged where indicated.

After confirming the diagnosis and rapidly optimizing the patients, surgical interventions or hydrostatic reductions were performed. Postoperatively, these patients were managed in the postoperative area or HDU/ICU, depending on their clinical condition. Patients who recovered well were discharged and followed up in the outpatient department.

Data were collected using a pre-designed proforma on demography, clinical presentation, treatment provided, complications, length of stay, and outcome.

Data Analysis: The collected data were entered and analyzed using SPSS version 29. Qualitative variables (gender, etiology, type of treatment, type of intussusception, complications) were presented as frequency, percentage, and ratio, while mean, median, and standard deviation were calculated for quantitative variables (age, duration of symptoms, length of hospital stay). Where applicable, the student's t-test was applied to check associations among various variables.

RESULTS

During the study tenure, 110 patients with intussusception were managed, of which 30 cases of transient intussusception were not included in this study. Eighty patients (n=80) were enrolled in the study on fulfilling the inclusion criteria. Forty-six (57.5%) were male and thirty-four (42.5%) were female (M:F ratio of 1.3:1). The ages of the patients were ranged from 2 months to 144 months, with a median age of 9 months (mean age = 23 months ± 3.51; trimmed mean = 18 months). The peak incidence of cases occurred between 4 months and 9 months (fig 1). Seventy-six percent of patients were below 2 years of age at presentation.

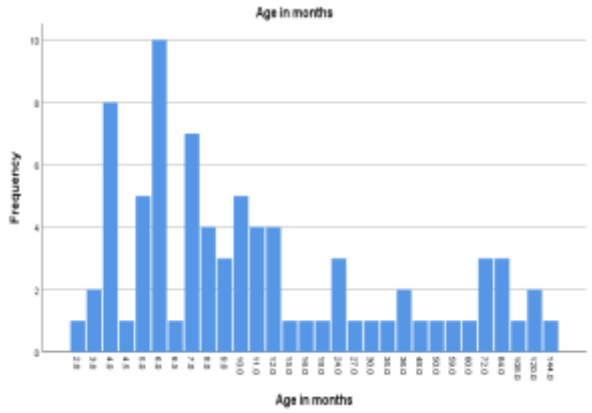

Fig 1: Distribution of patients according to age

The duration of symptoms ranged from 1 to 6 days, with a median duration of 3 days (mean: 3.13 days ± 1.2). The majority of patients (n=61; 76.2%) presented between the 2nd and 4th days (fig 2). Currant jelly stool was the most frequently presenting symptom, occurring in 63 (78.8%) of cases. The second and third most common symptoms were vomiting (61, 76.3%) and abdominal distension with leg drawing to the abdomen (indicating severe intermittent colicky abdominal pain), found in 58 (72.5%) patients each. An abdominal mass was palpable in only 20 (25%) patients. Twenty-two (27.5%) had a fever on admission. Twenty-nine (36.3%) presented with shock and needed resuscitation. On examination, 39 (48.8%) patients had abdominal tenderness. Thirty (37.5%) patients presented with a preceding history of diarrhea, while a cough was present in only 6 (7.5%) patients.

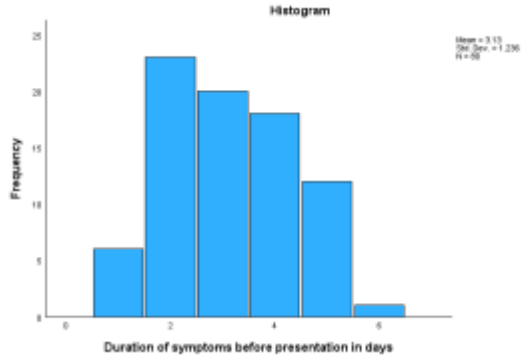

Fig 2: Duration of symptoms before presentation

Regarding the etiology of intussusception, 66 (82.5%) cases were idiopathic, while the remaining 14 (17.5%) patients had pathological lead points (table 1). Pathological lead points included Meckel's diverticulum in 5 patients (including 1 patient with inverted Meckel's diverticulum) (fig 3C), intestinal polyps in 6 patients, a mesenteric cystic mass, an intestinal feeding tube, and a mesenteric lymph node in 1 patient each. One patient with ileocolic intussusception had a history of abdominal trauma and was found to have Meckel's diverticulum during exploration, which was resected with an end-to-end ileal anastomosis performed. The patient who developed jejunojejunal intussusception due to an intestinal feeding tube had a preceding history of diarrhea. Upon exploration, the intussusception was reduced after removal of the feeding tube, but a 15 cm necrotic segment of the jejunum required resection.

TABLE 1: Various lead points identified in our patients

Lead point	Frequency	Percentage
Idiopathic intussusception	66	82.5
Intestinal polyp	6	7.5
Meckel's diverticulum	5	6.3
mesenteric lymph node	1	1.3
Mesenteric cyst	1	1.3
Feeding tube	1	1.3
Total	80	100

Fig 3: Various Pathological lead points identified in our patients. A) Meckel's diverticulum, B) mesenteric mass, C) Inverted Meckel's diverticulum

The intussusception was preoperatively diagnosed clinically and confirmed on abdominal ultrasound (fig 4). The specific diagnosis of intussusception was made during surgery. Although hydrostatic reduction was attempted in 2 patients, it was not successful; both cases turned out to be ileo-ileal intussusception upon exploration. The most frequent type of intussusception was ileo-colic (fig 5), accounting for 71.3% (57) of cases; the second common type was ileo-ileal (17.5%, 14 cases), followed by colo-colic (5.0%, 4 cases), jejunojejunal (3.8%, 3 cases), ileo-ileo-colic (1.4%, 1 case), and a combination of ileoileal and jejunojejunal (1.4%, 1 case).

Fig 4: Ultrasound of various of our patients showing a positive target sign indicative of intussusception

Fig 5: Operative pictures of intussusception found in our patients

All patients ultimately required open surgery. Manual reduction with standard technique was successfully performed without any complications in 36 cases (45%). Whereas in 5 (6.3%) other cases, manual reduction was successful but a small blanched area was observed after reduction which was oversewn (fig 6B). In another case despite successful manual reduction, diversion ileostomy was given for a large colonic serosal tear. Thirty-eight out of 80 children (47.6%) required bowel resection, with either primary anastomosis in 25 cases (31.3%) or stoma creation in 13 cases (16.3%). Of the 38 cases requiring bowel resection, bowel necrosis was found in 31 (38.8%) patients, and iatrogenic multiple perforations occurred while attempting reduction in 7 (8.8%) patients (fig 6). The extent of bowel resection ranged from 5 cm (usually for a lead point) to 25 cm (for gangrenous bowel) (table 2).

Fig 6: Various complications especially gangrenous/Compromised gut after reduction

TABLE 2: Distribution of patients according to surgical procedures

Procedure	Fre-quency	Percen-tage
Manual reduction	36	45.0
Bowel resection + anastomosis	25	31.3
Bowel resection +stoma	13	16.3

Manual reduction +oversewing of white line	5	6.3
Manual reduction + serosal tear repair + diversion	1	1.3
Total	**80**	**100.0**

Postoperative complications were found in 14 (17.5%) patients. Surgical site infection was observed in 4 patients (5%), and managed with local wound care. Eight patients required reoperations: 3 due to anastomotic leakage, 2 due to wound dehiscence, and 1 each due to stomal necrosis, bowel perforation, and recurrence (table 3). One patient developed recurrent ileocolic intussusception 3 months after the initial reduction and also underwent an appendectomy considering it a pathological lead point.

TABLE 3: Complications of treatment

Complications	Fre-quency	Percen-tage
No complication	66	82.5
Superficial site infection	4	5.0
Anastomotic leakage	3	3.8
Failure of treatment (in case of hydrostatic reduction)	2	2.5
Wound dehiscence	2	2.5
Recurrence	1	1.3
Stoma refashioning	1	1.3
Perforation	1	1.3
Total	**80**	**100.0**

Another case involved a 2-month-old male patient who initially had ileocolic intussusception managed with manual reduction. He required re-exploration on the 7th postoperative day due to postoperative necrotizing enterocolitis, which was managed with resection of the gangrenous gut and ileostomy creation. Unfortunately, the patient was in septic shock and did not survive postoperatively.

The median length of hospital stay was 4 days (mean: 4.5 days ± 2.03). The length of hospital stay was significantly longer in patients who developed postoperative complications (p = .000). During follow-up, we performed stoma closure in 2 patients, while other patients were waiting for their turn. On follow-up, all patients were doing fine except for 5 patients: 3 with peristomal rash and 2 with stomal diarrhea. These patients are receiving conservative management.

DISCUSSION

Intussusception is a common cause of intestinal obstruction in infancy and childhood, and it can lead to significant morbidity and mortality if not treated promptly.[1,2] In this study, we described the clinical presentation, management challenges, and follow-up details of our patients with intussusception.

The cause of intussusception in children remains a dilemma, as it is largely idiopathic.[2,8] In our study, 82.5% of patients had idiopathic intussusception, while 17.5% had a pathological lead point. Various pathological lead points have been identified in the literature, such as Meckel's diverticulum, intestinal polyps, the vermiform appendix or appendiceal stump, lymphoid hyperplasia of the bowel, and gut masses.[2,9,10] Similarly, we found various PLPs in our patients, including Meckel's diverticulum (with one case of inverted Meckel's diverticulum, which appears to be rarely reported) and intestinal polyps. While the vermiform appendix is considered a pathological lead point in the literature,[2,10] we have not included it in our list, as we are unsure about its role in our patients.

The early clinical presentation of intussusception typically includes a triad of crampy episodic abdominal pain, vomiting, and currant jelly or bloody stools.[2] If the diagnosis is delayed, patients may develop complications such as electrolyte imbalance, lethargy, shock, and peritonitis. This type of delayed presentation is often observed in the literature from developing countries.[10-13] In our study, the clinical presentation was similar to that reported in other developing countries, with most patients presenting late (between 2 to 4 days). This contrasts with developed countries, where the duration before presentation is typically in hours.[4,5] Moreover, the reported early presentation includes crampy abdominal pain in over 90% of patients, vomiting in about 70% of patients, and passage of currant jelly stool in 35% of cases.[5] However, in our study we have noted currant jelly stools in the majority of our patients (78.8%) which is likely a consequence of delayed presentation.

Clinicians should maintain a high index of suspicion for intussusception and rule it in or out through a thorough clinical examination and/or

radiological investigations. Among radiological investigations, ultrasound is considered the gold standard for diagnosing intussusception in the pediatric population, with a sensitivity of 98%.[14-17] It can also help determine whether the bowel can be reduced non-surgically or if surgery is needed.[17] Similarly in our series, all the patients had undergone ultrasound abdomen to confirm the clinical suspicion of intussusception.

Intussusception is a true surgical emergency, and patients should receive intervention as early as possible. In cases of early presentation, pneumatic or hydrostatic reduction is the standard of care, with a reduction rate of as much as over 90%.[7,18,19] However, in cases with delayed presentation, especially when complications have occurred, an open or laparoscopic approach is vital to managing the condition. Similarly, in our study, the majority of patients presented more than 24 hours after developing intussusception, necessitating open surgery. We attempted hydrostatic reduction under ultrasound guidance in a few of our patients, but were unable to achieve reduction, so we converted to open surgery.

The main challenges we faced while managing these cases included delayed presentation, resorting to open surgery in most instances, complications requiring gut resections due to necrosis, and resultant redo surgeries. As time progresses after the development of intussusception, gut ischemia begins to appear, which hampers hydrostatic reduction and compels surgeons to opt for open surgical approaches. This has implications for the patients' postoperative course, length of hospital stays, and overall cost of treatment, in addition to the pain management required for open surgeries.

Due to delayed presentation, we had to resect necrotic or perforated bowel in about half of our patients, and many underwent stoma formation. This further increased the challenges in terms of cost and complications related to anastomosis or stoma, as indicated by 8 patients needing redo surgeries. Open surgery also posed issues with surgical site infection, which was encountered in 5 of our patients, further prolonging their hospital stay. Notably, most patients who undergo pneumatic or hydrostatic reduction can be discharged on the same day or the next day.[19]

Our study provides recent data on the management of intussusception from a tertiary care university hospital in a developing country and discusses the associated management challenges. However, the limitations of our study include its single-center design and its non-experimental nature.

CONCLUSION

Most of our patients presented late, with currant jelly stools as the main complaint, along with other clinical features. Bowel resection was required in about half of our patients due to gut necrosis, perforations, or pathological lead points. Although half of the patients underwent manual reduction of intussusception, hydrostatic reduction could not be performed due to late presentations. Additionally, secondary complications complicated the postoperative recovery of a few patients. Management challenges included late presentations leading to gut compromise, postoperative complications, and prolonged hospital stays. These factors contributed to the high cost of treatment, although this was not measured in our study.

Conflict of interest: Nil

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