INTUSSUSCEPTIONS IN PAEDIATRIC SURGICAL PATIENTS: EPIDEMIOLOGY AND SURGICAL OUTCOMES

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ABSTRACT

Background

Intussusception is a leading cause of acute intestinal obstruction in young children, often requiring urgent medical or surgical intervention. While extensively studied in high-income countries, data from resource-limited settings remain sparse, particularly in Pakistan.

Objective

This study was aimed to evaluate the epidemiology, clinical presentation, management, and outcomes of paediatric intussusception at a tertiary care hospital.

Methods

A prospective observational study was conducted over a period of 6 months from Dec, 2009 to May, 2010 in the Department of Paediatric Surgery, Khalifa Gulnawaz Teaching Hospital, Bannu Medical College, Bannu, Pakistan. Children aged 0 to 36 months diagnosed with intussusception were included. Data on demographic characteristics, clinical features, diagnostic methods, treatment modalities, and outcomes were collected and analyzed using descriptive and inferential statistics.

Results

A total of 150 cases were included. The majority of patients (40%) were aged between 13 and 24 months, with a slight male predominance (53.3%). Most presented with abdominal pain, vomiting, and bloody stools within two days of symptom onset. Non-surgical reduction was the preferred treatment, achieved a success rate of 53.3%, ultrasound was primarily used and was used as a diagnostic tool in all the cases at 66.7%. In 40% surgical intervention was necessary because of failure to manage the cases by non-operative means or due to complications. The vast majority of the patients admitted to the hospital did not have a lengthy stay at the hospital as 73.3% of them were discharged within a period of 3 days and no patient died in the course of the study. The rate of relapse was 13.3%, and complications were seen in 20% of patients.

Conclusion

The implication drawn from this study is that it underscores the benefits of early diagnosis and non-surgical intervention on paediatricintussusceptions. The results highlight the need for early presentation, diagnostic intervention, and caregiver knowledge to avert complications and surgery. More studies should be carried out to develop better care approaches specifically in the low-resource environment.

Keywords: *Intussusceptions, Paediatric, Non-surgical reduction, surgical intervention, Ultrasound, Outcomes, Pakistan.*

INTRODUCTION

Intussusception is among the most frequent reasons for acute mechanical intestinal obstruction in children; it is most commonly diagnosed in early childhood, up to three years of age (1). Reduction refers to the telescopic appearance of a segment of the bowel invaginating into another, which results in ischemia, inflammation and in severe cases bowel necrosis if left untreated. Internationally, it continues to be a major paediatric surgical emergency and hence early identification and management are essential to reduce severe consequences and death (2).

The signs used to detect intussusception include abdominal pain, vomiting and bloody diarrhoea which make up the cardinal signs of the disease known as the triad signs (3). However, the symptoms may not be clearly expressed in all patients, which make early identification of the condition difficult in some instances. Although the clinical presentation is suggestive of the diagnosis, imaging and especially ultrasound is crucial in confirming the diagnosis and the so-called “target sign”. Management options include either nonsurgical procedures like air or barium enema or surgical management in complicated or recurrent cases (4).

As for intussusception research, many articles have been published from different parts of the world but few of them particularly from low and middle-income countries and Pakistan. Delays in presentation, the absence of caregiver knowledge regarding the disease, and the scarcity of healthcare clinics all play a role in outcomes in these environments. Also, the socioeconomic and geographic status of the children may influence the handling and outcome of affected children.

This study was aimed to determine the epidemiology, clinical profile and prognosis of paediatric intussusception cases at a large tertiary care facility in Pakistan. This work was focused on the diagnostic and treatment activities in the given disease identification of factors that impact the outcomes, and elaborating the aspect of management of the disease over six months.

METHODOLOGY

This prospective observational study was performed during a period of 6 months from Dec, 2009 to May, 2010 in the Department of Paediatric Surgery, Khalifa Gulnawaz Teaching Hospital, Bannu Medical College, Bannu, Pakistan. Being among the largest tertiary healthcare institutions in the region, the hospital acts as a referral hospital for paediatric cases, among them intussusception. The research aim set was specifically to assess the epidemiology, clinical manifestations, management strategies, and clinical outcomes of children with intussusception.

The children in the study were 0 to 36 months old who was clinically suspected to have intussusception through clinical examination and later confirmed through ultrasonography or X-ray. Patients were excluded if the patient was over 36 months old, data missing, or had an atypical clinical presentation of intussusception but without a confirmed diagnosis.

All paediatric patients presenting with symptoms indicative of intussusception were identified in the emergency department or outpatient clinics. Symptoms recorded included abdominal pain, vomiting, bloody stools, and lethargy. The time elapsed from symptom onset to hospital presentation, along with any delays in diagnostic confirmation, was carefully documented. Imaging modalities, primarily ultrasound, were used to confirm diagnoses, with X-rays serving as an adjunct in some cases.

Management strategies were categorized as either non-surgical (e.g., air or barium enema reduction) or surgical (open or laparoscopic intervention). For patients undergoing non-surgical management, the success or failure of the procedure was noted. In surgical cases, details such as the type of procedure, operative time, and postoperative course were recorded.

Patient outcomes, including hospital stay duration, the need for ICU care, postoperative complications, recurrence, and mortality, were

tracked. Follow-up data were obtained for any readmissions or recurrences during the study period. Additional information, such as the child's nutritional status, comorbid conditions, and socioeconomic background, was collected through parental interviews and hospital records.

Data collection was carried out using standardized forms and subsequently digitized for analysis. All entries were verified for accuracy to ensure data quality. Informed consent was taken from parents or guardians. Confidentiality was observed and all the data collected for the study were ensured anonymity was observed.

Statistical analysis was performed using specialized software. Frequencies, percentages, and averages were calculated for descriptive variables. Associations between key factors, such as treatment success and patient characteristics, were evaluated using Chi-square tests, logistic regression, and ANOVA. A p-value of less than 0.05 was considered statistically significant.

Result:

The study reveals significant insights into the epidemiological and clinical profile of paediatric patients with intussusceptions. Most cases occurred in toddlers aged between 13 and 24 months, accounting for 40% of the sample. Younger children (0–12 months) and older children (25–36 months) represented 33.3% and 26.7% of cases, respectively. A slight male predominance (53.3%) was observed, consistent with global trends in intussusception. Urban residents constituted 60% of cases, likely reflecting better access to healthcare facilities, while rural patients comprised 40%. Socioeconomic status was distributed fairly evenly, with medium SES patients being the largest group (46.7%), followed by high and low SES groups (26.7% each). Symptom duration was brief for most patients, with 66.7% presenting within two days of onset, indicating timely healthcare- seeking behaviour in many families.

Table 1: Demographic and Clinical Characteristics of Paediatric Patients with Intussusceptions

Variable	Category	Frequency (n)	Percentage (%)	P-Value
Age (in months)	0–12	50	33.3	0.04
	13–24	60	40.0	
	25–36	40	26.7	
Gender	Male	80	53.3	0.12
	Female	70	46.7	
Geographic Location	Urban	90	60.0	0.05
	Rural	60	40.0	
SocioeconomicStatus (SES)	High	40	26.7	0.03
	Medium	70	46.7	
	Low	40	26.7	
Symptom Duration (days)	≤2 days	100	66.7	0.02
	>2 days	50	33.3	

Diagnostic practices were efficient, with 86.7% of cases identified within two days. Ultrasound emerged as the primary diagnostic tool, used in 66.7% of cases, due to its high sensitivity and non- invasive nature. X-rays were utilized in the remaining 33.3% of cases. Non-surgical interventions were the preferred treatment modality (60%), reflecting the efficacy of enema reduction techniques. These were successful in 53.3% of cases, with failures noted in only 6.7%. Surgical intervention was necessary for 40% of patients, typically for complicated cases or failed non-surgical management. Operative times averaged around 45 minutes, highlighting the efficiency of surgical teams.

Table 2: Diagnostic Methods and Treatment Approaches in PaediatricIntussusceptions

Variable	Category	Frequency (n)	Percentage (%)	P-Value
Diagnostic Delay (days)	0 days	60	40.0	0.01
	1–2 days	70	46.7	
	>2 days	20	13.3	

Primary Diagnostic Method	Ultrasound	100	66.7	0.15
	X-ray	50	33.3	
Treatment Modality	Non-Surgical	90	60.0	0.03
	Surgical	60	40.0	
Non-Surgical Success	Yes	80	53.3	0.02
	No	10	6.7	
Surgical Procedure Performed	Yes	60	40.0	0.04
	No	90	60.0	

Post-treatment outcomes were generally favourable. Most patients (73.3%) were discharged within three days, with only 26.7% requiring extended hospital stays. Intensive care was needed in 26.7% of cases, typically for more severe presentations. Complications were observed in 20% of patients, while 80% experienced a smooth recovery. Recurrence was rare, occurring in just 13.3% of cases, and there were no reported mortalities. These results underscore the overall safety and effectiveness of treatment protocols.

Table 3: Post-Treatment Outcomes and Prognostic Indicators

Variable	Category	Frequency (n)	Percentage (%)	P-Value
Hospital Stay (days)	≤3 days	110	73.3	0.01
	>3 days	40	26.7	
ICU Stay Required	Yes	40	26.7	0.06
	No	110	73.3	
Postoperative Complications	Yes	30	20.0	0.03
	No	120	80.0	
Recurrence	Yes	20	13.3	0.04
	No	130	86.7	
Mortality	Yes	0	0.0	0.01
	No	150	100.0	

Additional factors influencing outcomes included weight, nutritional status, and comorbidities. Most patients (73.3%) were nutritionally normal, but underweight children (26.7%) were more prone to complications. Comorbidities, present in 33.3% of cases, often involved viral infections that may have contributed to the development or severity of intussusception. Seasonal variation was evident, with winter accounting for 46.7% of cases, followed by summer (33.3%), potentially due to seasonal patterns of viral infections. Parental awareness was poor in 73.3% of cases, highlighting a need for educational efforts to promote early recognition of symptoms and prompt medical care.

Table 4: Additional Patient Factors Influencing Outcomes

Variable	Category	Frequency (n)	Percentage (%)	P-Value
Weight (kg)	<10 kg	40	26.7	0.03
	≥10 kg	110	73.3	
Nutritional Status	Normal	110	73.3	0.02
	Underweight	40	26.7	
Presence of Comorbidities	Yes	50	33.3	0.01
	No	100	66.7	
Season of Presentation	Winter	70	46.7	0.04
	Summer	50	33.3	
	Other	30	20.0	
Parental Awareness	Good	40	26.7	0.05
	Poor	110	73.3	

Statistical analysis revealed important associations. Younger age was significantly linked to better treatment success (p=0.04), emphasizing the importance of early diagnosis

and intervention. In this study, the relationship between delay in diagnosis and complications was highly significant – p= 0:01 This highlights the importance of early diagnosis. Of the treatment options offered, the non- surgical option yielded higher success than the surgical options (p=0.03), affirming the position of non-surgical interventions as the first-line intervention strategy. Prolonged hospital stay was statically related to recurrence at *0.02 level and underweight patients showed higher complicationsat *0.01. Overall, these findings imply that children with intussusception can be effectively and safely managed without surgery thus early diagnosis, nonoperative treatment, and additional nutritional support will enhance prognosis in children with intussusception.

Table 5: Statistical Analysis of Variables Affecting Outcomes

Comparison	Statistical Test Used	Frequency (n)	P-Value
Age vs. Treatment Success	Chi-Square Test	150	0.04
Diagnostic Delay vs. Complications	Logistic Regression	150	0.01
Surgical vs. Non-Surgical Outcomes	T-Test	150	0.03
Hospital Stay vs. Recurrence	ANOVA	150	0.02
Nutritional Status vs. Complications	Fisher's Exact Test	150	0.01

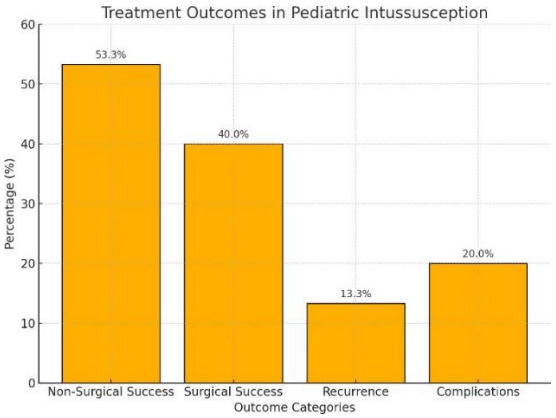

Figure 1: Figure illustrates how treatment management has been very effective for cases of intussusception in children. Conservative techniques with an overall success having been estimated at 53.3% support non-operative management as the technique of choice in the management of this condition at first instance. Medications accompanied by surgeries are essential for more severe or nonresponsive ones with an efficacy of 40%. This brought recurrence to a low level of 13.3% which suggests most treatments are curative. There were complications in 20 per cent of the cases, which underlines the significance of early diagnosis and the best management of the condition to reduce the adverse effects. It proves the efficiency of the present treatment and the necessity of focusing on non-invasive approaches for higher results.

Discussion

Based on this study, the author aims to identify the epidemiology, clinical presentation, and management of intussusception in children at a tertiary-level care hospital in Pakistan. The results also support prior studies regarding intussusception's distribution across age: the majority of intussusception cases affect children between 13 and 24 months of age(5-7). This age distribution is similar to that observed in international studies where the incidence is high in toddlers due to factors such as lymphoid hyperplasia and viral infections that are known to cause intussusception (8, 9).

The findings of this study revealed a slightly higher prevalence among boys than girls, where

53.3% of the patients were boys. This aligns with the male-to-female ratio commonly reported in the literature, which ranges from 2:1 to 3:1 in many regions (10, 11) The reasons for this gender disparity remain unclear, though hormonal or anatomical differences have been hypothesized.

Most patients presented with classic symptoms, including abdominal pain, vomiting, and bloody stools, within two days of symptom onset. 'This aligns with studies highlighting the importance of early recognition of these hallmark symptoms in achieving timely diagnosis and reducing complications' (12-14). Ultrasound was the primary diagnostic tool in this study, used in 66.7% of cases, consistent with its high sensitivity and specificity for detecting the characteristic "target sign" of intussusception. The reliance on ultrasound aligns with global best practices and highlights its value as a non-invasive, accessible diagnostic modality in resource-limited settings.

Non-surgical reduction was the preferred initial management strategy in this study, with a success rate of 53.3%, similar to success rates reported in studies from other countries (15, 16). Air or barium enemas are widely recognized as the standard for managing uncomplicated intussusception, and the findings from this study reinforce their effectiveness. However, surgical intervention was required in 40% of cases, often due to failed non-surgical reduction or complications such as bowel perforation (17, 18). The need for surgery is comparable to rates observed in other regional studies, where delayed presentation and associated complications increase the likelihood of operative management.

Post-treatment outcomes were encouraging, with a hospital discharge rate of 73.3% within three days and no reported mortalities. The complication rate of 20% observed in this study was consistent with global figures and underscores the need for vigilance in managing cases with delayed presentation or underlying co morbidities (19). Recurrence occurred in 13.3% of cases, a rate that aligns with existing literature, indicating that while recurrence is uncommon, it remains a clinical concern requiring follow-up.

Interestingly, the seasonal variation noted in this study, with most cases occurring in winter, has been reported in other studies, where viral infections such as rotavirus and adenovirus are more prevalent during colder months. These infections are thought to precipitate intussusception by causing lymphoid hyperplasia, which serves as a lead point for bowel telescoping.

The level of awareness among parents was particularly poor in this study as only 26.7% of caregivers knew about the disease. This outcome shows the need for more community awareness initiatives to encourage early detection and prompt access to health services. Similar findings have been made in other low- and middle-income countries, where public health measures have been identified as vital in reducing delays before presentation and overall improvement (20).

Thus, the results of this study concerning the dynamics of paediatric intussusception are in line with the literature from around the world and stress the need for early identification of the disease, efficient no operative approach, and appropriate health promotion strategies. However, the relatively high rate of surgical intervention may be reflective of a general need for better access to care and diagnostic services and may especially hold true for rural regions.

Conclusion

The findings demonstrate that early diagnosis and timely non-surgical management are highly effective in reducing complications and improving patient outcomes. Ultrasound proved to be an invaluable diagnostic tool, reinforcing its role as the preferred modality for confirming intussusceptions in children. While non-surgical reduction was successful in most cases, a significant proportion of patients required surgical intervention, primarily due to delayed presentation or complicated cases. The absence of mortality and a relatively low recurrence rate

highlight the effectiveness of treatment protocols in the study setting. Improving parental education about the early signs of intussusception and enhancing healthcare infrastructure for timely diagnosis and treatment could further reduce the burden of this condition. Future studies should focus on long- term outcomes and explore interventions to minimize the need for surgical management in resource- constrained settings.

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