

ORIGINAL ARTICLE

Spectrum of bands causing intestinal obstruction in pediatric patients: A three year retrospective study.

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ABSTRACT... Objective: To identify the spectrum of bands causing intestinal obstruction in pediatric patients at two tertiary care hospitals of Sindh, Pakistan. **Study Design:** Retrospective, Descriptive, Cross-sectional study. **Setting:** Department of Pediatric Surgery, Ghulam Muhammad Mahar Medical College, Sukkur, and Chandka Medical College, Larkana. **Period:** 1st April 2020 to 30th March 2023. **Methods:** We reviewed the medical records of all patients under the age of 14 years who presented with intestinal obstruction. Data including demographic characteristics, clinical features, diagnostic modalities, etiology, treatment, and outcomes were noted and analyzed. **Results:** A total of 254 patients were included in our study. Congenital anomalies were the leading cause (63.0%), with malrotation (18.1%), intussusception (15.7%), and Hirschsprung's disease (11.4%) being most frequent. Acquired causes accounted for 27.2% of cases. Surgical intervention was required in 85.4% of patients. The mean hospital stay was 7.5 ± 3.2 days. The overall mortality rate was 4.7%, primarily associated with complex congenital anomalies and delayed presentation. **Conclusion:** Intestinal obstruction in children is predominantly caused by congenital anomalies. Timely surgical intervention can reduce the morbidity and mortality in most of the cases.

Key words: Adhesions, Congenital Anomalies, Intussusception, Malrotation, Pediatric Intestinal Obstruction.

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INTRODUCTION

Intestinal obstruction is one of the most common surgical emergencies in the pediatric population, which poses a significant diagnostic and therapeutic challenge worldwide.¹ It is usually characterized by a complete or incomplete blockage that disrupts the normal passage of intestinal contents, which potentially can lead to complications like gut ischemia, perforation and sepsis if the patient does not receive timely and proper management.² The clinical presentation can vary with age, from bilious vomiting and abdominal distension in neonates to abdominal pain and constipation in older children.³ The etiology of intestinal obstruction in pediatric patients vary vastly from adults and is intricately linked to the patient's age.⁴ In the neonatal period, congenital causes such as intestinal atresia, volvulus, and Hirschsprung's disease are the dominant causes.⁵ In infants and toddlers, intussusception is the leading cause⁶, whereas, in older children, acquired conditions like post-operative adhesions and incarcerated hernias are more common causes.⁷ The management options range from conservative

management to urgent surgery, depending on the underlying etiology and severity of the condition.⁸

Our study aimed to provide a comprehensive analysis of the etiological spectrum, management approaches, and clinical outcomes of intestinal obstruction in children at two different tertiary care hospitals of Sindh, Pakistan; thereby giving an insight to understanding of this condition in a specific regional context.⁹

METHODS

This is a retrospective, descriptive, cross-sectional study. It was conducted by reviewing the medical records of all pediatric patients admitted with a diagnosis of intestinal obstruction at two different tertiary care centers of Sindh Pakistan.

The study was conducted from 1st April 2020 till 30th March 2023. Prior ethical approval was obtained from the Institutional Review Board (Certificate No. GMMC/Suk/Estt/Br/103).

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This study included all patients diagnosed with intestinal obstruction with age range from birth to 14 years diagnosed with intestinal obstruction. All those patients with incomplete medical records were excluded. Patients in whom the obstruction was functional or if it was due to malignancy were also included.

We used a structured proforma to collect data including demographics, clinical presentation, diagnostic workup, etiology, management, and outcome measures including length of hospital stay, complications, and mortality. Diagnostic imaging, primarily abdominal x-ray and ultrasound, played an important role in confirming the diagnosis.¹⁰

Data was analyzed using SPSS version 24.0. Descriptive statistics were computed for all variables. Categorical variables were expressed as frequencies and percentages, and continuous variables as mean ± standard deviation.

RESULTS

A total of 254 patients were included in our study. The mean age was 4.8 ± 3.9 years, with a male dominance (58.3%). The most common presenting symptoms were vomiting (94.5%), abdominal distension (87.4%), and absolute constipation (72.0%).¹¹

The details of the etiological spectrum of intestinal obstruction is shown in Table I below. Congenital anomalies were the most prevalent (63.0%), followed by acquired causes (27.2%) and idiopathic cases (9.8%). This distribution is comparable to global data on pediatric intestinal obstruction, though regional variations do exist.¹²

Surgical intervention was done in 217 patients (85.4%), while 37 (14.6%) were managed conservatively. The management strategy by etiology is shown in Table-II. The high rate of surgical intervention is consistent with contemporary management strategies for pediatric intestinal obstruction.⁸

The mean hospital stay was 7.5 ± 3.2 days. Factors that influenced the length of hospital stay are complex and often require multivariate analysis for

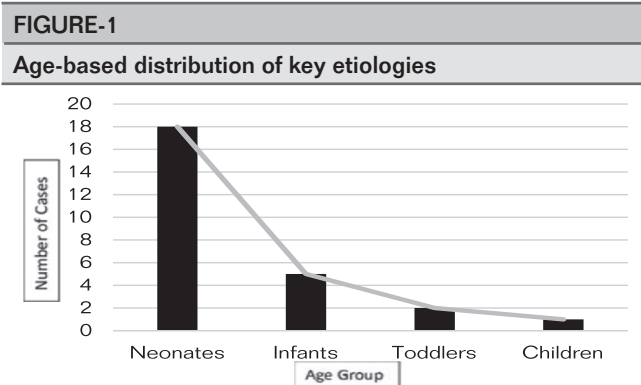
full understanding.¹³ Post-operative complications were observed in 28 patients (12.9% of the surgical group). The overall mortality rate was 4.7% (n=12), predominantly in neonates with complex congenital anomalies.¹⁴ Long-term outcomes of these cases remain an important area of study.¹⁵ The following graph illustrates the age-based distribution of key etiologies.

TABLE-I
Etiological distribution of intestinal obstruction (N=254)

Etiological Category	Specific Cause	Number of Cases (%)
Congenital (n=160)	Malrotation	46 (18.1%)
	Intussusception	40 (15.7%)
	Hirschsprung's Disease	29 (11.4%)
	Intestinal Atresia	25 (9.8%)
	Anorectal Malformations	12 (4.7%)
	Meconium Ileus	8 (3.1%)
Acquired (n=69)	Post-operative Adhesions	32 (12.6%)
	Incarcerated Inguinal Hernia	25 (9.8%)
	Tuberculous Abdomen	7 (2.8%)
	Miscellaneous	5 (2.0%)
Idiopathic (n=25)		25 (9.8%)
Total		254 (100%)

TABLE-II
Management strategy by primary etiological category

Etiological Category	Total Cases	Surgical Management n (%)	Conservative Management n (%)
Congenital	160	156 (97.5%)	4 (2.5%)
Acquired	69	52 (75.4%)	17 (24.6%)
Idiopathic	25	9 (36.0%)	16 (64.0%)
Total	254	217 (85.4%)	37 (14.6%)



DISCUSSION

The findings of our study conclude that congenital anomalies are the most common cause of intestinal obstruction in pediatric population in upper Sindh region. This pattern is consistent with the natural history of pediatric surgical diseases.^{4,11} The high prevalence of life-threatening conditions like malrotation and intussusception necessitates the prompt diagnosis and timely medical or surgical intervention. Malrotation with volvulus represents a particular surgical emergency, as it can progress to total bowel necrosis within hours if not timely diagnosed and managed.^{2,5} The significant diagnostic challenge lies in differentiating these conditions from other causes of abdominal distress in pediatric patients, necessitating a high index of suspicion among clinicians.

The significant number of cases were due to intestinal atresia and Hirschsprung's disease. This points out that the congenital anomalies in our pediatric population play a substantial role in the pathology of intestinal obstruction. These conditions require specialized surgical care and sophisticated postoperative care. Delayed presentation, limited access to tertiary care facilities and specialized centers may increase the morbidity and mortality.^{13,14} The management of these conditions often demands multi-stage surgical procedures and long-term follow-ups. This places a significant burden on scarce healthcare resources and specialized pediatric services in our country.

The observed rate of adhesive small bowel obstruction, a post-operative complication of abdominal surgery, emphasizes on the significance of meticulous surgical technique and suggests a positive role for minimally invasive surgical techniques to reduce or prevent the adhesions formation.¹⁵ This finding is particularly relevant in our clinical context, as it underscores the need for standardized surgical protocols and postoperative care pathways to mitigate this common complication. The implementation of adhesion prevention strategies could significantly impact long-term patient outcomes and reduce the burden of recurrent hospital admissions.

The overall mortality rate of 4.7% is comparable to reports from other developing nations^{9,13}, with

a strong association observed in neonatal cases involving complex anomalies and systemic sepsis upon presentation. This finding points unequivocally to the need for strengthened perinatal diagnosis, efficient neonatal transport systems, and enhanced critical care capabilities.¹⁶ The development of regionalized care networks with established referral pathways could significantly improve outcomes for these vulnerable patient populations.

The comprehensive management of these patients, especially those with prolonged postoperative courses, often requires sophisticated nutritional support strategies to ensure optimal recovery and growth.¹⁷ The metabolic demands of the postoperative period, combined with the catabolic state induced by surgical stress, necessitate careful attention to nutritional requirements. Implementing standardized nutritional support protocols could potentially reduce complication rates and improve overall recovery times.

The strategic use of advanced and rapid imaging modalities, particularly ultrasound, has been demonstrated to improve diagnostic accuracy and should be promoted as a first-line investigation in emergency settings^{18,19}. The availability and appropriate utilization of these diagnostic tools, coupled with trained radiologists and sonographers, are essential components of an effective diagnostic pathway for pediatric intestinal obstruction.

This being a retrospective study has many limitations. These include potential selection bias and inconsistency in record-keeping that may affect our data accuracy and completeness. Relying on medical records for data collection brings in the possibility of information bias, particularly regarding subtle clinical findings and documentation consistency across different clinicians. Furthermore, as this study was conducted at tertiary care referral centers, which typically manage more complex cases, the observed spectrum of etiologies and outcomes may not be fully generalizable to primary or secondary care settings.²⁰ The lack of long-term follow-up data significantly limits our analysis of chronic complications, functional outcomes, or growth-related sequelae, which are crucial aspects of comprehensive pediatric surgical care.

Additionally, the single-region focus of this study may limit the generalizability of findings to other geographical areas with different demographic characteristics and healthcare delivery systems. Future prospective studies with multi-center collaboration and extended follow-up periods would help address these limitations and provide more comprehensive insights into the long-term outcomes of pediatric intestinal obstruction.

CONCLUSION

In conclusion, intestinal obstruction in children is predominantly driven by congenital etiologies, requiring surgical intervention in most cases.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

1	Nabi Bux: Concept, study design, manuscript drafting.
2	Mumtaz Ahmed Qureshi: Data analysis.
3	Roshan Ali: Manuscript writing.
4	Imtiaz Ahmed Qureshi: Critical analysis.
5	Habibullah Malto: Revisions.
6	Noor Ahmed Sheikh: Data entry.