e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com doi: 10.25258/ijpqa.16.1.46

International Journal of Pharmaceutical Quality Assurance 2025; 16(1); 305-310

Original Research Article

Retrospective Analysis of Intestinal Obstruction in Children in the Jharkhand Region

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Received: 03-11-2024 / Revised: 14-12-2024 / Accepted: 30-01-2025

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Conflict of interest: Nil

Abstract:

Background: Neonatal intestinal obstruction is a significant surgical emergency requiring prompt diagnosis and intervention to prevent life-threatening complications. Various congenital anomalies, including anorectal malformation (ARM), Hirschsprung's disease (HD), intestinal atresia, meconium ileus, and gut malrotation, contribute to this condition.

Aim: This study aimed to analyze the etiological patterns, gender distribution, and postoperative complications of neonatal intestinal obstruction in the Jharkhand region.

Methodology: A prospective comparative study was conducted at the Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, India, from Feb 2022 to Jan 2023. Eighty neonates who underwent surgery for congenital intestinal obstruction were included. Data were collected retrospectively from hospital records and analyzed using SPSS version 27.0. Statistical tests such as Student's t-test, Mann-Whitney U test, Chi-square, and Fisher's exact test were applied, with significance set at $p < 0.05$.

Results: The most common cause of neonatal intestinal obstruction was ARM (28.8%), followed by HD (21.3%), intestinal atresia (17.5%), and meconium ileus (15.0%). Male predominance (55%) was observed. Short-segment HD (53.8%) was the most frequent subtype. Ileal atresia (38.8%) was the most common type of atresia. Postoperative complications were primarily sepsis (58.8%), wound infection (17.5%), and aspiration pneumonia (11.3%).

Conclusion: ARM and HD were the leading causes of neonatal intestinal obstruction in this study. Early diagnosis, timely surgical intervention, and effective postoperative care are essential in improving survival rates and outcomes in affected neonates.

Keywords: Anorectal Malformation, Congenital Anomalies, Hirschsprung's Disease, Intestinal Obstruction, Intestinal Atresia, Neonatal Sepsis.

Introduction

Intestinal obstruction, a condition that can occur at any age, is characterized by the blockage of normal movement of intestinal contents. It is among the most common causes of emergency hospital admissions in children globally [1]. This obstruction can occur at any level of the intestinal tract and may be caused by a variety of factors, including congenital anomalies, inflammatory conditions, or mechanical obstructions such as adhesions, tumors, or volvulus. Intestinal obstruction is considered a surgical emergency because of its potential to cause intestinal ischemia, which can lead to perforation and peritonitis if left untreated [2]. The severity of the condition and the urgency of intervention depend on the cause, location, and duration of the obstruction.

In pediatric patients, intestinal obstruction is a common and serious concern. The majority of these patients present with symptoms such as abdominal distension, constipation or failure to pass meconium, vomiting, and fluid and electrolyte imbalance. These symptoms can vary in intensity and onset depending on the underlying cause. Neonatal intestinal obstructions are often associated with congenital defects, which may require staged surgical

interventions to ensure a good functional outcome [3]. Prompt diagnosis and appropriate management are crucial to prevent complications and improve the prognosis for affected infants.

One of the most common congenital causes of intestinal obstruction in neonates is Hirschsprung's disease, a condition characterized by the absence of ganglion cells in the distal colon, leading to a failure of peristalsis in that segment. Another important cause is duodenal atresia, which presents with bilious vomiting and a "double bubble" sign on radiographic imaging. Meconium ileus, often associated with cystic fibrosis, is another significant neonatal intestinal obstruction requiring early intervention [4]. In infants, hypertrophic pyloric stenosis is a common cause of obstruction that typically presents around the age of three weeks. This condition is characterized by projectile, non-bilious vomiting due to hypertrophy of the pyloric muscle, leading to gastric outlet obstruction. Ultrasonography is the diagnostic modality of choice, and surgical intervention in the form of pyloromyotomy provides excellent outcomes.

Intussusception is another frequent cause of intestinal obstruction in the pediatric age group, particularly in healthy children between the ages of six to eleven months. It occurs when a segment of the intestine telescopes into an adjacent segment, leading to compromised blood flow and bowel ischemia if left untreated [5]. The classic triad of symptoms includes intermittent abdominal pain, a palpable sausage-shaped mass, and "currant jelly" stools due to mucosal sloughing and bleeding. Ultrasound-guided hydrostatic or pneumatic reduction is the preferred non-surgical treatment, while surgical intervention is necessary in complicated cases.

The onset of signs and symptoms in intestinal obstruction plays a crucial role in guiding the diagnosis. Acute obstructions present with sudden, severe symptoms, whereas chronic obstructions may manifest with milder, progressive symptoms [6]. Age, environmental, and social factors also contribute to the spectrum of etiologies. In developing countries, infections and malnutrition may increase the risk of intestinal obstructions, whereas in developed nations, congenital anomalies and post-surgical adhesions are more common. The diagnosis and management of intestinal obstruction require both clinical expertise and surgical proficiency [7]. A thorough history and physical examination are fundamental in assessing the severity and likely cause of the obstruction. Diagnostic imaging, including abdominal X-rays, ultrasound, and computed tomography (CT) scans, plays a crucial role in confirming the diagnosis and determining the appropriate course of action.

The traditional manifestation of intestinal blockage comprises stomach discomfort and vomiting; nevertheless, additional studies are crucial for establishing a preoperative diagnosis and formulating an appropriate treatment strategy. Conservative therapy, encompassing nasogastric decompression, intravenous fluid resuscitation, and rectification of electrolyte imbalances, may be pursued in specific instances. However, conclusive surgical intervention is frequently necessary to address the root cause and avert consequences such as intestinal necrosis and infection. Advancements in surgical procedures and perioperative care have markedly enhanced the prognosis for paediatric patients with intestinal blockage, resulting in increased survival rates and functional results. This study presents a retrospective analysis of intestinal obstruction in children within the Jharkhand region.

Methodology

Study Design: This is a prospective, comparative study conducted in the Department of General Surgery, Rajendra institute of medical science, Ranchi, Jharkhand, India.

Study Duration: The study was conducted over a period of Feb 2022 to Jan 2023.

Sample Size: A total of 80 participated in this study, selected based on predefined inclusion and exclusion criteria.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- All neonates who underwent surgery for congenital neonatal intestinal obstruction during the study period.

Exclusion Criteria:

- Neonates with inoperable conditions due to severe pneumonia.
- Cases complicated by septic shock.
- Extreme prematurity.
- Very low birth weight.

Data Collection and Analysis: Data were collected retrospectively from hospital records and included demographic information, clinical presentation, diagnosis, surgical procedures performed, and outcomes. The collected data were analyzed to assess the types of congenital neonatal intestinal obstructions, surgical interventions, and their respective outcomes.

Procedure: Upon clinical examination and hospital admission, all neonates received initial treatment with intravenous fluids, antibiotics, and nasogastric tube suction with free drainage. Following stabilization through dehydration correction and electrolyte balance restoration, diagnostic imaging such as abdominal radiography, ultrasonography, and contrast

X-ray was performed to categorize the type of obstruction. Laparotomy was performed in all cases, and surgical interventions were conducted based on the specific condition identified. The procedures included biopsy and colostomy for Hirschsprung's disease, resection anastomosis for intestinal atresia, colostomy for high variety anorectal malformation (ARM), double-barrel ileostomy or Bishop-Koop ileostomy for meconium ileus, Ladd's procedure for gut malrotation, duodenoduodenostomy for duodenal atresia or annular pancreas, and adhesiolysis for congenital bands and adhesion.

Statistical Analysis: Data were analyzed using SPSS version 27.0. Continuous variables such as hospital stay and pain scores were compared using the student's t-test or Mann-Whitney U test, while categorical variables like postoperative complications and recurrence rates were analyzed using the Chi-square test. A p-value < 0.05 was considered statistically significant.

Results

Table 1 shows the etiological pattern of newborn intestinal obstruction in 80 instances. Hirschsprung's disease (HD) accounted for 21.30% of cases, whereas anorectal malformation (ARM) accounted for 28.80% of cases. 15.00% of cases were caused by meconium ileus, whereas 17.50% were caused by intestinal atresia. In 11.30% of instances, gut malrotation was found, while the remaining 6.30 percent had other, less frequent causes. The study population's primary causes of newborn intestinal obstruction are ARM and HD, as seen by this distribution.

Table-1: Etiological pattern of Neonatal intestinal obstruction

Type of Obstruction	Frequency	Percentage (%)
ARM	23	28.80%
HD	17	21.30%
Atresia	14	17.50%
Meconium ileus	12	15.00%
Malrotation of gut	9	11.30%
Others	5	6.30%
Total	**80**	**100%**

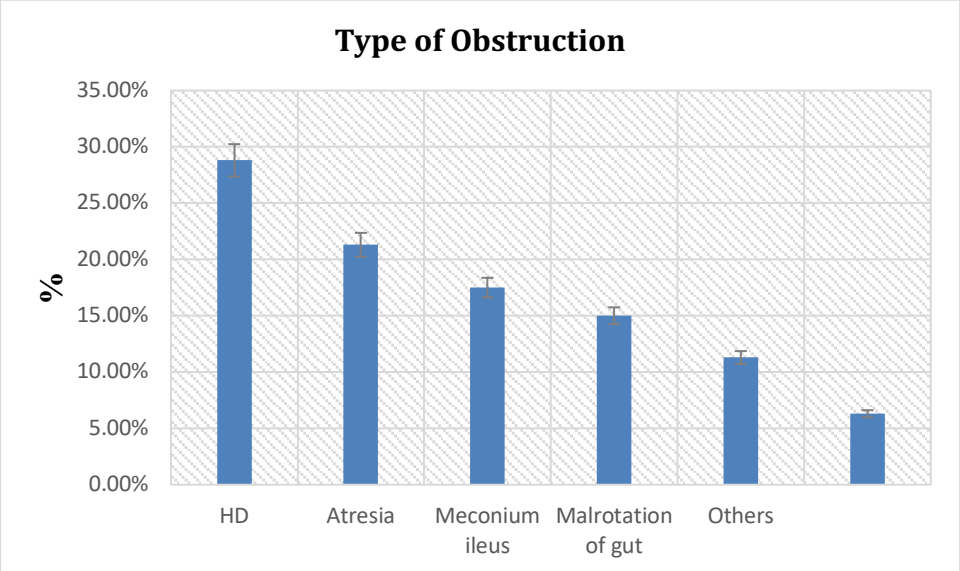

Figure 1. Etiological pattern of Neonatal intestinal obstruction

Table 2 shows the gender distribution of newborn intestinal obstruction cases with various aetiologies among 80 patients. More males (44 instances) than females (36 cases) were impacted. The most prevalent ailment, anorectal malformation (ARM), affected 10 girls and 13 males. Eight men and six females had atresia, and nine males and seven females had Hirschsprung's disease (HD). Males had a somewhat higher prevalence of meconium ileus (7 instances) than females (6 cases). Four ladies and five males had intestinal malrotation. There were two male and three female instances in the "Others" category. Overall, the results show that newborn intestinal obstruction is somewhat more common in men across the majority of aetiologies.

Table 2: Gender Distributions							
Sex	**ARM**	**HD**	**Atresia**	**Meconium ileus**	**Malrotation of gut**	**Others**	**Total**
Male	13	9	8	7	5	2	**44**
Female	10	7	6	6	4	3	**36**
Total	**23**	**16**	**14**	**13**	**9**	**5**	**80**

Table 3 shows the distribution of different kinds of Hirschsprung's disease (HD) among 80 patients. With 53.80% of instances, the short-segment type was the most common, followed by the long-segment type with 43.80%. The least frequent condition, total colonic aganglionosis (TCA), was seen in just 2.50% of patients. This distribution shows that TCA is still uncommon among the afflicted newborns, although short-segment HD is the most common kind.

Table 3: Type of HD		
Variables	**Frequency**	**Percentage (%)**
Long segment	35	43.80%
Short segment	43	53.80%
TCA	2	2.50%
Total	**80**	**100%**

Table 4 shows the distribution of different forms of atresia across 80 instances. With 38.80% of instances, ileal atresia was the most prevalent kind, followed by jejunal atresia (32.50%). Colonic atresia was the least common, accounting for just 7.50% of cases, but duodenal atresia was seen in 21.30% of cases. According to this data, colonic atresia is very uncommon among afflicted infants, while ileal and jejunal atresia are the most common types.

Table 4: Type of Atresia		
Variables	**Frequency**	**Percentage (%)**
Ileal	31	38.80%
Jejunal	26	32.50%
Duodenal	17	21.30%
Colonic	6	7.50%
Total	**80**	**100%**

Table 5 depicts the distribution of complications in 80 cases of newborn intestinal blockage. Sepsis was the most prevalent consequence, affecting 58.80% of patients, indicating a considerable influence on newborn outcomes. With 17.50% of instances, wound infection was the second most common consequence, followed by aspiration pneumonia with 11.30% of patients. Anastomotic leaking occurred in 7.50% of patients, with additional problems accounting for 5.00%. The high incidence of sepsis as a significant postoperative concern is highlighted by this findings, underscoring the need of efficient infection control and postoperative care in the management of newborn intestinal obstruction.

Table 5: Complications		
Variables	**Frequency**	**Percentage (%)**
Sepsis	47	58.80%
Anastomotic leakage	6	7.50%
Aspiration pneumonia	9	11.30%
Wound infection	14	17.50%
Others	4	5.00%
Total	**80**	**100%**

Discussion

The findings of this study provide a comprehensive understanding of etiological patterns, gender distribution, disease subtypes, and complications associated with neonatal intestinal obstruction. The data presented in Table 1 indicate that anorectal malformation (ARM) (28.8%) and Hirschsprung's disease (HD) (21.3%) were the most common causes of neonatal intestinal obstruction, followed by intestinal atresia (17.5%) and meconium ileus (15.0%). The relatively lower incidence of gut malrotation (11.3%) and other causes (6.3%) suggests that while multiple etiologies exist, ARM and HD are the predominant concerns in neonatal intestinal obstruction. These findings are consistent

with existing literature, which also reports ARM as a leading cause of congenital intestinal obstruction in neonates. According to estimates, the prevalence of duodenal atresia is 1 in 6000–10,000 live births [8]. More often than not, boys are impacted. In our study, we found that eight out of nine patients with duodenal atresia were male. There were congenital abnormalities in almost 50% of individuals with duodenal atresia, and the characteristic double bubble sign on an abdominal X-ray is sufficient to determine duodenal blockage [9]. In our investigation, 9 (33%) of the 27 instances were of duodenal atresia, which is more prevalent in males, and 5 cases had accompanying abnormalities, which is consistent with the documented literature.

Table 2 highlights the gender distribution of neonatal intestinal obstruction cases, revealing a slight male predominance across most etiologies. Out of 80 cases, 44 (55.0%) were male, while 36 (45.0%) were female. The highest incidence was observed in ARM, where 13 males and 10 females were affected. Similarly, atresia was slightly more frequent in males (8 cases) than in females (6 cases), while Hirschsprung's disease was diagnosed in 9 males and 7 females. Meconium ileus had a nearly equal distribution, with 7 males and 6 females affected, whereas intestinal malrotation was observed in 5 males and 4 females. The "Others" category had 2 male and 3 female cases. While these findings indicate a slight male predominance, the overall gender distribution is relatively balanced compared to other studies that have reported a more pronounced male bias in congenital intestinal obstruction. In our investigation, the majority of the neonates experienced symptoms from birth and presented within the first week of life, which was consistent with previous studies [10]. The prevalence of intestinal blockage in males was comparable to that of females, according to a number of publications from throughout the world [11–12].

The analysis of Hirschsprung's disease subtypes (Table 3) shows that the short-segment variant (53.8%) was the most common form, followed by the long-segment variant (43.8%), with total colonic aganglionosis (TCA) being rare (2.5%). This pattern is consistent with global epidemiological data, which highlight short-segment HD as the predominant presentation of the disease. The low incidence of TCA underscores the rarity of this severe condition and emphasizes the need for early diagnosis and intervention in long-segment and short-segment HD cases. Islam et al. reported a postoperative death rate of 20.8% , which is comparable to our series, while Hanif et al. reported a postoperative mortality rate of 15.4% [13-14]. Sepsis and anastomotic leaking were the leading causes of death in our research. The primary causes of sepsis were either late presentation, which resulted in perforation, or meconium ileus, which resulted in peritonitis [14].

Regarding atresia types (Table 4), ileal atresia was the most frequently encountered (38.8%), followed by jejunal atresia (32.5%), duodenal atresia (21.3%), and colonic atresia (7.5%). The predominance of ileal and jejunal atresia supports previous research findings that suggest these forms of atresia are more commonly encountered in neonatal intestinal obstruction. The lower incidence of colonic atresia highlights the rarity of this condition and its potentially unique clinical implications. Our research's 9.2% death rate is less than that of a 2012 local study by Ngendahayo et al., which found that 28% of patients with intussusception died [15]. This mortality was greater than the results of previous studies conducted in Kenya, Malawi, Nigeria, and India, which ranged from 2.9% to 7.8% [16], but it was equivalent to the 11.2% mortality identified in Ghana10 in the retrospective review.

The distribution of complications (Table 5) indicates that sepsis (58.8%) was the most common postoperative complication, followed by wound infection (17.5%) and aspiration pneumonia (11.3%). The significant incidence of sepsis underscores the need for stringent infection control measures, early antibiotic therapy, and improved postoperative care strategies. Anastomotic leakage (7.5%) and other complications (5.0%) were relatively less frequent but remain critical concerns in neonatal surgical management. These findings emphasize the importance of meticulous surgical techniques, vigilant postoperative monitoring, and proactive management strategies to reduce morbidity and mortality associated with neonatal intestinal obstruction.

Conclusion

The findings of this study provide a comprehensive analysis of neonatal intestinal obstruction in the Jharkhand region, highlighting its etiological patterns, gender distribution, and complications. Anorectal malformation (28.8%) and Hirschsprung's disease (21.3%) emerged as the most common causes, followed by intestinal atresia (17.5%) and meconium ileus (15.0%). The study revealed a male predominance (69.2%), suggesting a genetic or hormonal predisposition in congenital gastrointestinal anomalies. Among Hirschsprung's disease cases, the short-segment type was the most prevalent (53.8%), while ileal atresia (38.8%) was the most frequent type of atresia observed. Postoperative complications were common, with sepsis (58.8%) being the leading cause, emphasizing the importance of timely intervention and infection control. The study underscores the need for early diagnosis and appropriate surgical management to reduce morbidity and mortality. Advancements in surgical techniques and perioperative care have

improved outcomes, but further efforts are needed to enhance neonatal care and reduce postoperative complications in this population.

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