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Etiological Spectrum and Outcome of Intestinal Obstruction of Neonate

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ABSTRACT

Background: Neonatal intestinal obstruction is the most common surgical emergency during the neonatal period and causes significant challenges, particularly in developing countries. Despite advancements in neonatal care, delayed diagnosis and limited access to specialized surgical facilities have contributed to high morbidity and mortality rates. This study aimed to evaluate the etiological spectrum and surgical outcomes of neonates with intestinal obstruction.

Methods: This retrospective study was conducted at Department of Pediatric Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from June 2017 to June 2021. Total 31 neonates who underwent surgery for intestinal obstruction between the study periods are included in this study following the selection criteria. Data were collected from medical records and analyzed using SPSS version 26.

Results: Among the 31 neonates, 16 (51.6%) were female, and 15 (48.4%) were male. The age of presentation ranged from 2 to 20 days, with a mean of 6.4 ± 2.9 days. Most cases (77.4%) presented within the first week of life and 74.2% were preterm. Duodenal atresia (54.8%) and jejunal atresia (19.4%) were the leading causes, followed by meconium ileus (12.9%), anorectal malformations (6.5%), strangulated inguinal hernias (3.2%), and congenital bands/adhesions (3.2%). The postoperative mortality rate was 25.8%, primarily because of sepsis.

Conclusion: Early diagnosis, timely intervention and improved access to neonatal surgical care are crucial for reducing mortality in neonates with intestinal obstructions. Strengthening pediatric surgical services in resource-limited settings is essential for improving outcomes.

Keywords: Neonatal intestinal obstruction, duodenal atresia, jejunal atresia, neonatal sepsis.

INTRODUCTION

Neonatal intestinal obstruction (NIO) represents a major surgical emergency during newborn care because it causes substantial worldwide neonatal morbidity and mortality numbers [1]. The normal gut process becomes impaired by multiple inherited and developed conditions that block matter transmission causing bilious vomiting together with distended abdomen and delayed stool passage [2]. A variety of factors cause NIO in different populations and these factors include atresias alongside malrotation and meconium ileus and Hirschsprung's disease and anorectal malformations (ARM) [3]. Neonatal intestinal obstructions cause significant difficulties in resource-poor regions because patients experience poor treatment outcomes due to late diagnosis and treatment access failures [4].

The immediate detection along with proper treatment of NIO requires urgent attention. Delaying medical intervention leads to three significant deadly conditions including bowel perforation and sepsis as well as short bowel syndrome [5]. The use of prenatal ultrasonography enables doctors to detect congenital intestinal problems early which leads to appropriate surgical treatments after birth in developed nations [6]. Access limitations to specialized neonatal care in low-resource settings make patients present late which leads to increased mortality rates [7]. Evidence shows that performing surgery immediately after diagnosis leads to better survival statistics thus requiring swift diagnostic procedures followed by referrals [8].

Research has been dedicated to understanding the causes as well as the possible outcomes of NIO. The most prevalent causes of obstruction in newborns consist of duodenal atresia along with jejunoileal atresia and Hirschsprung's disease according to retrospective research [9]. Studies have shown meconium ileus becomes more prevalent in areas where cystic fibrosis affects many patients but developing nations display higher rates of ARM [10]. The presence of preterm birth increases neonates' risk of developing intestinal obstruction due to their underdeveloped gut motility including their congenital abnormalities [11]. The etiological spectrum along with surgical outcomes of NIO within Bangladesh has insufficient supporting data. Research on appropriate evidence-based interventions requires additional study because of Bangladesh's distinct socioeconomic landscape and health care complications.

This study aims to determine the etiological spectrum and surgical outcomes of neonates with intestinal obstruction admitted to a tertiary neonatal intensive care unit in Bangladesh. The combination of prompt surgical intervention with enhanced perioperative care improves survival chances and minimizes postoperative complications in this patient group. By systematically analyzing the causes and outcomes of NIO, this research seeks to contribute valuable data to the field of neonatal surgery and enhance clinical management strategies in developing countries.

Objective

The objective of this study was to identify the etiological spectrum and surgical outcome of neonate with intestinal obstruction in a tertiary neonatal intensive care unit in Bangladesh.

METHODOLOGY & MATERIALS

This retrospective observational study was conducted at Department of Pediatric surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from June 2017 to June 2021. A total of 31 neonates were included in the study, selected based on predefined inclusion and exclusion criteria. The sample size was determined using a purposive sampling method, ensuring the inclusion of all eligible cases within the study timeframe.

Selection Criteria:

Inclusion Criteria:

- Neonates diagnosed with intestinal obstruction.
- Age ≤28 days at presentation.
- Complete medical records available.

Exclusion Criteria:

- Incomplete or missing medical records.
- Congenital anomalies unrelated to intestinal obstruction.
- History of prior abdominal surgery before admission.

Data Collection Procedure: Data were retrospectively collected from hospital records, including admission registers, patient charts, operative notes, and discharge summaries. The variables recorded included demographic details (age, sex, gestational age), clinical presentation, etiology of obstruction, surgical procedures performed, postoperative complications, and outcomes. Imaging reports (X-rays and ultrasound) and intraoperative findings were reviewed to confirm the diagnoses. Confidentiality was maintained by anonymizing patient data.

Statistical Analysis: The data were analyzed using SPSS version 26. Descriptive statistics were used to summarize categorical variables as frequencies and percentages, whereas continuous variables were presented as means and standard deviations. The Chi-square test was used for categorical comparisons, and t-tests were used for continuous variables. Statistical significance was set at $P < 0.05$.

RESULTS

Table 1: Demographic characteristics of neonates with intestinal obstruction (n=31)

Characteristics		Number of patients	Percentage (%)
Age group	≤7 days	24	77.4
	>7 days	7	22.6
Age at presentation (days)	Mean±SD	6.4±2.9	
	Range	2-20	
Gender	Male	15	48.4
	Female	16	51.6
Gestational age	Pre-term	23	74.2
	Full-term	8	25.8

Table 1 presents the demographic characteristics of the study population. The majority of neonates (77.4%) presented within the first seven days of life, with a mean age at presentation of 6.4 ± 2.9 days (range: 2-20 days). The gender distribution was nearly equal, with 48.4% male and 51.6% female patients. Preterm neonates constituted 74.2% of cases, while full-term neonates accounted for 25.8%.

Table 2: Etiological spectrum of neonatal intestinal obstruction (n=31)

Etiology	Number of patients	Percentage (%)
Duodenal atresia/stenosis	17	54.8
Jejunal atresia/stenosis	6	19.4
Meconium ileus	4	12.9
Anorectal malformation (ARM) without hernia	2	6.5
Strangulated inguinal hernia	1	3.2
Congenital bands and adhesions	1	3.2

Table 2 outlines the etiological distribution of intestinal obstruction among the neonates. Duodenal atresia/stenosis was the most common cause, identified in 54.8% of cases, followed by jejunal atresia/stenosis (19.4%). Meconium ileus was observed in 12.9% of neonates. Less frequent etiologies included anorectal malformation (6.5%), strangulated inguinal hernia (3.2%), and congenital bands and adhesions (3.2%).

Table 3: Surgical outcomes of neonates with intestinal obstruction (n=31)

Outcome	Number of patients	Percentage (%)
Survived	23	74.2
Mortality	8	25.8

Surgical outcome shows in table 3. The overall survival rate was 74.2%, with 23 neonates surviving postoperatively. However, 25.8% of patients (n=8) did not survive despite surgical intervention.

Table 4: Postoperative complications among survivors (n=23)

Complications	Number of patients	Percentage (%)
Sepsis	6	26.1
Wound infection	4	17.4
Anastomotic leak	2	8.7
Prolonged ileus	3	13.0
Need for reoperation	2	8.7
No complications	6	26.1

Table 4 summarizes the postoperative complications observed in the 23 surviving neonates. Sepsis was the most frequent complication, affecting 26.1% of survivors, followed by wound infections (17.4%). Prolonged ileus and anastomotic leaks occurred in 13.0% and 8.7% of cases, respectively. Two neonates (8.7%) required reoperation, while 26.1% of the survivors had no recorded postoperative complications.

DISCUSSION

The diagnosis along with treatment of Neonatal intestinal obstruction (NIO) requires immediate surgical intervention to decrease both mortality rates and complications for affected newborns. The most common cause of NIO turned out to be duodenal atresia/stenosis along with jejunoileal atresia and meconium ileus and anorectal malformations. The 74.2% survival rate shows that early surgical intervention creates positive outcomes yet the mortality rate reaching 25.8% indicates ongoing difficulties in treating these babies especially in areas with constraints in healthcare resources.

The results from our study demonstrate duodenal atresia/stenosis prevalence which aligns with Grosfeld et al.'s previous study that highlighted its importance as a major cause of congenital gastrointestinal obstruction [13]. The research conducted by Vinocur et al. confirmed that duodenal atresia stands as a primary factor causing neonatal obstruction thus highlighting the critical importance of early prenatal diagnosis [1]. Our findings demonstrated a lower frequency of jejunoileal atresia compared to the results presented by Stollman et al. [8]. The differences in rates could result from genetic propensities as well as prenatal testing frequencies and specialized medical care centers near the patients.

Statistical data shows Meconium ileus exists in 12.9% of patients which corresponds to Best et al. who established its well-documented relationship with cystic fibrosis [2]. Our cohort showed decreased Hirschsprung's disease prevalence compared to Bradnock et al.'s study possibly because local hospitals lacked necessary diagnostic tools for confirming the condition through rectal biopsies and microscopic analysis [9]. The lower strangulated inguinal hernia incidence found in our study compared to previous reports is most likely due to earlier detection and preventive elective surgeries that avoid complication development.

The survival rate discovered in our study matches findings from Mohammed et al. because of improved neonatal surgical care quality in similar health centers [14]. The mortality rate stands higher for our study compared to high-income nations according to Wright et al. because of late patient presentations and insufficient intensive care support and elevated sepsis incidence [7]. Our findings indicated that infection-related complications held a major influence on postoperative outcomes because sepsis and wound infections proved to be the most frequent morbidities among our study participants. This result matched the findings of Catania et al. who highlighted surgical site infections as key factors affecting neonatal morbidity rates [15].

Duodenal atresia prevalence in neonatal obstruction cases exists due to the embryological failure of recanalization which occurs between the sixth to tenth weeks of gestation according to Sigmon et al. [3]. Evidence from Keckler et al. demonstrates the significance of extensive prenatal testing for high-risk pregnancies because duodenal atresia exists as a proven marker of chromosomal disorder [16]. Higher rates of sepsis detected among our patients show that infection control issues remain significant throughout surgical procedures. Catania et al. demonstrated how complete aseptic control measures combined with proper antibiotic usage help reduce surgical site infections since they stand as primary risk factors for adverse outcomes after surgery [15].

Our study confirms the powerful relationship between premature birth and adverse consequences in neonatal intestinal obstruction based on the research of Henry and Moss [12]. The situation requires specialized neonatal intensive care support which includes ventilatory assistance and early parenteral nutrition because these measures help patients recover better after surgery while decreasing their illness risks.

Our research supports the demand for advanced prenatal testing for duodenal atresia because it enables proper perinatal care planning with timely surgical treatment. The survival rates will increase significantly if neonatal surgical services expand and infection control strengthens alongside the implementation of standardized perioperative protocols.

CONCLUSION

Neonatal intestinal obstruction remains a significant clinical challenge requiring timely intervention. Strengthening prenatal screening, optimizing neonatal surgical protocols and improving postoperative care are essential for better outcomes. Advancements in neonatal intensive care and early diagnosis can further reduce the complications and mortality.

LIMITATIONS OF THE STUDY

This study is limited by its small sample size and single-center design, which may affect its generalizability. Lack of long-term follow-up restricted the outcome assessments. Future multicenter studies with larger cohorts and extended follow-up periods are recommended to validate these findings. Advancements in prenatal diagnosis and

neonatal intensive care should be explored to improve early detection and surgical outcomes and reduce morbidity and mortality in neonatal intestinal obstruction cases.

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