

Early Outcome of Neonates with Suspected Intestinal Obstruction: A Retrospective Study

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ABSTRACT

Introduction: Neonatal intestinal obstruction is a common surgical emergency that can result from congenital and acquired conditions. This study aimed to determine the clinical presentation, management, and early outcomes of neonatal intestinal obstruction at a tertiary care center.

Methods: A retrospective observational study was conducted from January 2023 to December 2024 at a tertiary care center in Nepal. We reviewed medical records of neonates (≤ 28 days) admitted with clinical or radiologic evidence of intestinal obstruction. Demographic profiles, clinical presentations, and etiologic spectrum were reported comparing outcomes between medical and surgical cohorts. Ethical approval was obtained from the Institutional Review Committee (Reference No. 264/082/083).

Results: Of the 113 neonates included, 69 (61.06%) were male, and the mean age at presentation was 10.08 ± 7.63 days. The presenting symptoms included abdominal distension in 109 (96.46%), vomiting in 77 (68.14%), and failure to pass meconium in 73 (64.60%), with 35 (30.97%) presenting with all three classic symptoms. The etiologies were classified as medical in 56 (49.56%) and surgical in 57 (50.44%) cases. Among surgical causes, anorectal malformations 14 (12.39%) and Hirschsprung's disease 14 (12.39%) were reported anomalies, while sepsis-related ileus accounted for 50 (44.25%) of the medical cases. The overall recovery rate was 102 (90.27%), with an in-hospital mortality rate of 11 (9.73%).

Conclusions: Almost half of the patients had surgical causes of intestinal obstruction. Although overall survival is favorable, the high burden of sepsis-related ileus necessitates early diagnosis to reduce morbidity and mortality.



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INTRODUCTION

Neonatal intestinal obstruction (NIO) is a frequent, life-threatening surgical emergency in newborns, typically presenting with bilious vomiting, abdominal distension, and delayed meconium passage.¹⁻³ NIO comprises both structural surgical anomalies and medical conditions, most notably sepsis-related ileus that necessitate distinct diagnostic and therapeutic pathways.^{4,5} These presentations require prompt recognition to differentiate between those needing urgent surgery and those that are manageable through medical stabilization.

In developed settings, advances in antenatal screening often enable early detection and planned postnatal surgical correction of structural anomalies. The clinical practice in developing countries, including Nepal, is often characterized by late presentation and a high prevalence of infection-related

functional obstructions.^{6,7} This divergence requires localized clinical data to optimize management strategies. While global literature provides insight into NIO, evidence specific to the Nepalese healthcare landscape remains limited.^{8,9} This study characterized the clinical presentation, etiologies, and early outcomes of neonates with suspected intestinal obstruction, providing insights for early differentiation and triage in resource-limited settings.

METHODS

A retrospective observational study was conducted between January 2023 and December 2024 at the Tribhuvan University Teaching Hospital (TUTH) in Kathmandu, Nepal, a major tertiary pediatric referral center. The study included all neonates

(≤28 days) admitted to the Department of Pediatrics, NICU, and Pediatric Surgery Unit with a diagnosis of intestinal obstruction based on clinical and radiological evaluation. Cases with grossly incomplete medical records or severe multiple congenital anomalies incompatible with life were excluded from the study.

Data were collected using medical and operative records. Variables extracted included baseline demographic factors (birth weight, gestational age, sex), clinical presentation, preoperative presence of sepsis, etiological spectrum, type of surgical intervention, post-operative complications (such as sepsis, anastomotic leak), and final clinical outcomes. Neonates were categorized by birth weight into specific clinical subgroups (<1500g, 1500-2000g, 2500-3000g, and >3000g) in alignment with institutional recording protocols. The total study population was divided into two distinct cohorts based on their management pathway: a medical cohort (managed conservatively for non-surgical causes like sepsis-related ileus and necrotizing enterocolitis) and a surgical cohort (requiring operative intervention). Statistical analysis was carried out utilizing the Chi-square test and outcomes were analyzed for both medical and surgical cohorts, with a p-value of <0.05 considered statistically significant. Ethical approval was obtained from the Institutional Review Committee (Reference No. 264/082/083).

RESULTS

A total of 113 neonates met the inclusion criteria. The cohort included 69 (61.06%) males and 44 (38.94%) females. Term neonates comprised 74 (65.50%) of the cases, and 24 (21.20%) neonates had a birth weight of more than 2500 g. Antenatal risk factors were present in 25 (22.12%) patients.

The mean age at presentation was 10.08±7.63 days. Neonates presented with abdominal distension 109 (96.46%), vomiting 77 (68.14%), and failure to pass meconium 73 (64.60%) (Table 1). Among 25 patients, dilated bowel loops were present in 8 (7.07%) and the double bubble sign was present in 3 (2.65%) cases (Table 2).

The etiological distribution included medical causes in 56 (49.56%) and surgical causes in 57 (50.44%) cases. Sepsis-related ileus 50 (44.25%), followed by necrotizing enterocolitis 3 (2.65%), were among the medical causes. Among surgical causes, anorectal malformations 14 (12.39%) and Hirschsprung's disease 14 (12.39%), duodenal atresia 8 (7.07%) and jejunoileal atresia 7 (6.19%) were observed. Of the total study population, 43 neonates underwent surgical intervention (Figure 1).

Among the 43 neonates who underwent surgical procedures, complications observed included anastomotic leak, mortality, re-exploration, and septicemia (Figure 2). Overall, 11 neonates had mortality (9.73%), including 2 neonates (1.77%) from the medical cohort and 9 neonates (7.96%) from the surgical cohort.

Among neonates who underwent surgery, complications were observed in 19 (73.08%) term neonates and 10 (58.82%) preterm neonates, while mortality was observed in 5 (19.23%) term

neonates and 4 (23.53%) preterm neonates (Table 3).

Table 1. Baseline Demographic and Clinical Characteristics of the Study Population (N=113).

Variable	n(%)
Child's age (age at presentation)	
0–7 days	55(48.67)
8–14 days	28(24.78)
15–21 days	16(14.16)
22–28 days	14(12.39)
Birth weight	
<1500 g	16(14.16)
1500–2000 g	32(28.32)
2000–2500 g	41(36.28)
2500–3000 g	20(17.70)
>3000 g	4(3.54)
Gestational age	
Preterm	39(34.51)
Term	74(65.49)
Sex	
Female	44(38.94)
Male	69(61.06)
Mode of delivery	
LSCS	47(41.59)
Normal vaginal delivery	66(58.41)
Presenting symptoms*	
Vomiting	77(68.14)
Abdominal distension	109(96.46)
Failure to pass meconium	73(64.60)
All three symptoms	35(30.97)
Time from admission to surgery†	
2–4 days	27(62.80)
>4 days	16(37.20)

LSCS: Lower Segment Cesarean Section.

* Multiple responses were possible for presenting symptoms; therefore, percentages do not total 100%.

† Time from admission to surgery was available for 43 patients only, so percentages are based on those cases.

Table 2. Antenatal Risk Factors (N=25).

Risk Factor	n(%)
Polyhydramnios	10(8.84)
Oligohydramnios	4(3.53)
Dilated bowel loops	8(7.07)
Antenatal double bubble sign	3(2.65)

DISCUSSION

This study aimed to determine the clinical presentation, management, and early outcomes of neonatal intestinal obstruction (NIO) at a tertiary care center in Nepal. Neonatal intestinal obstruction poses a considerable diagnostic and therapeutic challenge in developing regions where delayed presentation and a high volume of functional, infectious obstructions complicate early triage.^{10,11} In our study, abdominal

distension 109 (96.46%) and vomiting 77 (68.14%) were the most frequently observed clinical symptoms, aligning closely with the classical presentations documented in international literature.^{12–14}

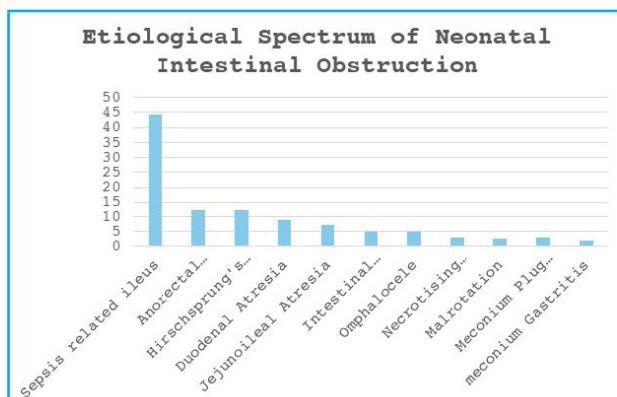


Figure 1. Etiological Spectrum of Neonatal Intestinal Obstruction (N=113).

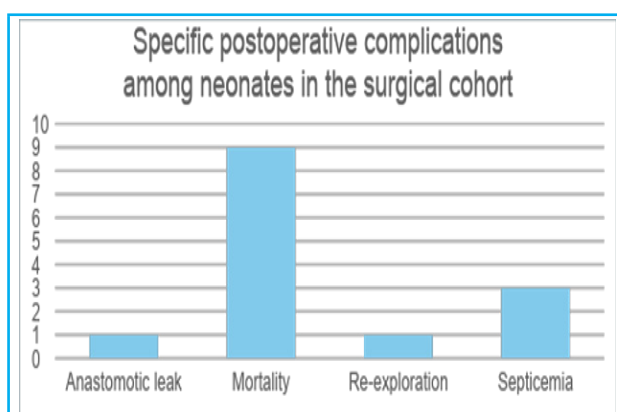


Figure 2. Distribution of specific postoperative complications among neonates in the surgical cohort (N=113).

Table 3. Comparison of early outcomes stratified by gestational age (N=43).

Age	Complications present	No Complications	Mortality
Pre-Term	10(58.82)	3(17.65)	4(23.53)
Term	19(73.08)	2(7.69)	5(19.23)

Our findings indicate a near-equal split between medical and surgical etiologies, with 56 (49.5%) and 57 (50.5%) cases, respectively. Within the surgical spectrum, anorectal malformation (ARM) in 14 (12.39%) cases and Hirschsprung's disease in 14 (12.39%) cases were the common causes, followed by intestinal (duodenal and jejunoileal) atresia in 15 (13.27%) cases. This disease pattern mirrors several previous reports from developing countries. In a separate study conducted at Kanti Children's Hospital in Nepal, ARM was also found to be the predominant cause (42.9%), followed by intestinal atresia and Hirschsprung's disease.⁸ Similarly, multiple studies from Africa have consistently identified ARM as the leading cause of NIO.^{15,16} However, this contrasts with some Indian studies, such as one that reported duodenal atresia (30.2%) as the primary etiology.¹²

This variance might be attributed to differences in institutional referral patterns or regional genetic and environmental factors.

A key finding of our study is the high prevalence of sepsis-related ileus, which comprised 50 (44.2%) cases of the entire cohort and 51 (67.1%) cases of the medically managed group. Preoperative sepsis was significantly higher in the medically managed cohort compared to the surgical cohort. The inclusion of this large functional obstruction group significantly influenced the overall disease pattern and morbidity profile observed. While medical management of functional obstructions avoids surgical intervention, it underscores the substantial burden of systemic neonatal infections within our patient population.

The male-to-female ratio in our cohort was approximately 1.57:1 (69 males vs. 44 females), which agrees with the widely recognized male predominance in NIO highlighted by multiple global studies.^{13,15,17} Our cohort predominantly comprised term neonates, 74 (65.49%), with 73 (64.60%) infants having a birth weight between 1500–2500 g. Structural anomalies such as duodenal or jejunoileal atresia are more readily detected via antenatal screening compared to functional obstructions or ARM; however, our low overall detection rate reflects the ongoing challenges of limited routine maternal ultrasound screening in the region.^{17,18}

The mortality rate within our surgical cohort alone was 20.90% (9/43). This aligns closely with historical surgical mortality rates in developing regions, such as the 21.95% reported in Kathmandu, 26% reported in other literature, and 21.1% reported in Nigeria.^{8,15} The overall in-hospital mortality rate in our series was 9.7% (n=11). The improved survival in our center could partially be attributed to the large number of medical cases resolving without surgery, as well as advancing NICU care protocols. Late presentation to the hospital, resulting in severe preoperative sepsis, observed in 67.1% of our medical cohort, remains a critical hurdle.^{5,6} Mortality was significantly higher in the surgical group (20.9%) compared to the medical group (2.9%), indicating that the severity of the primary surgical condition increases the risk of poor outcomes, which is consistent with findings from regional studies on neonatal emergency surgery.^{8,9}

This study provides valuable, locally relevant data on 113 neonates with intestinal obstruction at a Nepalese tertiary center, offering a comprehensive etiological profile that includes a significant cohort of medically managed sepsis-related ileus. The documented overall survival rate of 90.3% demonstrates that conservative treatment is effective for functional ileus, while survival after surgery was similar to previously reported regional outcomes.

Stratified early outcomes within the surgical cohort (n=43) demonstrate that complications occurred in 19 (73.1%) of the 26 term neonates compared to 10 (58.8%) of the 17 preterm neonates. However, preterm neonates experienced a higher mortality rate within this group (23.5%, n=4 vs. 19.2%, n=5 for term neonates). This outcome likely reflects the greater

complexity of surgeries required for term infants, who often present with structural blockages requiring extensive repair. In contrast, preterm infants were more often managed with medical or functional treatment plans. This difference underscores the physiological fragility of premature infants, whose systems are less able to tolerate surgical stress, increasing the risk of systemic failure.

According to our recorded data, the documented postoperative complications within the surgical cohort included septicemia (n=3), anastomotic leaks (n=1), and cases requiring re-exploration (n=1), alongside a surgical cohort mortality of 9 cases. These complications prolonged hospital stays and required intensive nutritional support during recovery. The finding that preterm neonates had a higher mortality rate (23.53%) despite undergoing less complex surgical interventions demonstrates their extreme physiological fragility. This indicates that their survival depends upon pre- and post-operative care focused on maintaining metabolic stability and providing nutritional support.

This study identifies important clinical management challenges that require further investigation in the local healthcare setting. Neonatal infection control and early sepsis care continue to be major diagnostic and therapeutic priorities, as demonstrated by the high proportion of medically managed sepsis-related ileus in the sample. Abdominal distension and vomiting should raise an initial high index of suspicion for sepsis in addition to structural obstruction because clinicians are frequently the first line of defense in circumstances such as ours, where antenatal diagnosis is limited. Despite the major challenges of delayed referral and scarce resources, the fatality rate of 9.7% indicates the effectiveness of the current NICU treatment standards.

These results highlight that neonatal infection control and early sepsis identification remain core diagnostic and therapeutic priorities, given the high burden of sepsis-related functional ileus. Abdominal distension and vomiting should raise a high index of suspicion for underlying sepsis alongside structural anomalies, particularly in environments where antenatal screening remains limited. Future multicentre studies are required to track definitive

timelines from symptom onset to tertiary admission to objectively evaluate referral pathways and regional survival outcomes.

The limitations of this study include its retrospective design and data collection restricted to a single tertiary center. Long-term follow-up beyond immediate hospital discharge was outside the scope of this review.

CONCLUSION

This study at a specialized center demonstrates a high survival rate for neonatal intestinal obstruction (NIO). Anorectal malformations, Hirschsprung's disease, and intestinal atresia constitute the majority of surgical obstructions in our environment. Differentiation of surgical and medical cases is important, and timely appropriate intervention improves outcomes.

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