

# Outcome of Management of Neonatal Intestinal Obstruction at a Tertiary Center in Nigeria

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## ABSTRACT

**Background:** Intestinal obstruction in a newborn remains a significant emergency in pediatric surgery. Clinical presentation is often subtle with sudden deterioration of their clinical states. Clinical outcome in the developing countries is poor owing to a variety of factors. **Objective:** The objective of this study is to identify the factors affecting the management outcome in our environment. **Patients and Methods:** Data on clinical presentation, management, and outcome of all neonates managed for intestinal obstruction over a 13-year period at a tertiary center in Nigeria were retrospectively reviewed. Analysis of factors affecting the management outcome was also performed. **Results:** One hundred and seventeen neonates comprising 85 (72.7%) boys and 32 (27.3%) girls were managed for intestinal obstruction. The age at presentation ranged from 0 to 29 days, with a mean of  $6.86 \pm 8.4$  days. Seventy-five (64.1%) patients presented within a week of onset of symptoms and 42 (35.9%) patients later. Eighty-five patients (72.6%) presented with symptoms from birth. The most common causes of intestinal obstruction included anorectal malformation in 62 (53%) neonates and Hirschsprung's disease in 16 (13.7%) neonates. Other causes included obstructed inguinoscrotal hernias, duodenal atresia, jejunoileal atresia, malrotation, and annular pancreas. Eleven patients died with a mortality rate of 9.4%. The age at presentation ( $P = 0.001$ ) and the presence of postoperative complications ( $P = 0.009$ ) were significantly related to the duration of hospital stay. Furthermore, the presence of postoperative complications ( $P = 0.012$ ) was significantly associated with postoperative mortality. **Conclusion:** Early presentation and postoperative complications significantly affected the morbidity and mortality associated with the management of neonates with intestinal obstruction.

**KEYWORDS:** Intestinal obstruction, morbidity, mortality, neonate

## INTRODUCTION

Intestinal obstruction in the neonatal period is a common cause of emergency presentations requiring urgent surgical intervention.<sup>[1,2]</sup> Majority of the causes are congenital in nature as the disordered development of the intestine can lead to either partial or total occlusion of the bowel lumen. The obstruction is often mechanical in most cases but may be functional when it is caused by Hirschsprung's disease. The mechanical causes of neonatal intestinal obstruction are often found in the upper gastrointestinal tract producing vomiting,

failure to thrive, and constipation.<sup>[3-5]</sup> In Sub-Saharan Africa and other developing countries, mortality is still high due to late presentation, poor transport system, inadequate equipment, poor obstetric care, poverty, and presence of associated malformations. All these make active management of the neonates with intestinal obstruction very challenging in these countries.<sup>[3,6-9]</sup>

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This study presents our experience with perioperative care of newborns with intestinal obstruction in a typical pediatric surgery center in a developing country.

## PATIENTS AND METHODS

All neonates managed for intestinal obstruction from January 2005 to December 2017 at the University College Hospital, Ibadan, Nigeria, were studied. Data extracted from the clinical records of these patients included their demography, sources of referral, clinical presentation, diagnosis, initial treatment from the place of referral, associated congenital malformations, diagnosis, operative findings, procedure performed on the patients, postoperative complications, surgical outcome, and duration of hospital stay. These were analyzed using the Statistical Package for the Social Sciences (SPSS, version 23, Chicago, IL, USA). The relationship between the age, sex, preoperative serum potassium level, postoperative complications, and duration of hospital stay and management outcome in terms of mortality was also studied with  $P = 0.05$ . Ethical approval for the study was obtained from the Joint University of Ibadan and University College Hospital Ethical Committee (UI/UCH Ethics Committee No.: UI/EC/18/0461). All the procedures adopted were in accordance with the Helsinki Declaration of 1975 as revised in 2000.

## RESULTS

One hundred and seventeen neonates comprising 85 (72.7%) males and 32 (27.3%) females (M: F – 2.7:1) were managed for intestinal obstruction during this period. The age at presentation ranged from 0 to 29 days, with a mean of  $6.9 \pm 8.4$  days. Of these, 75 (64.1%) neonates presented in the early neonatal period (0–7 days) and 42 (35.9%) patients later [Table 1]. Eighty-five patients (72.6%) presented with symptoms from birth. These symptoms included abdominal distension in 38 (32.5%) patients, absent anus in 32 (27.4%) patients, constipation in 30 (25.6%) patients, vomiting and groin swelling in 21 (17.9%) and 15 (12.8%) patients, respectively. Congenital lower gastrointestinal obstruction was observed in two-thirds of the patients, whereas acquired causes of intestinal obstruction were observed in only 3.4% of the patients. The most common causes of intestinal obstruction were anorectal malformation occurring in 62 (53%) neonates and Hirschsprung's disease in 16 (13.7%) neonates. Of the anorectal malformations, seven (6.0%) patients had low malformations and 55 (47%) had either intermediate or high malformations. Other common causes included obstructed inguinoscrotal hernias

occurring in 17 (14.5%), duodenal atresia 6 (5.1%), jejunoileal atresia 6 (5.1%), malrotation 3 (2.6%), and annular pancreas 2 (1.7%) patients [Table 2]. The mean serum potassium ( $K^+$ ) at presentation was  $4.3 \pm 1.0$  mmol/l (normal: 3.5–5.5 mmol/l) and nine (7.7%) neonates had hypokalemia (serum  $K^+ < 3.5$  mmol/l).

A total of 73 (62.4%) patients had an initial diverting colostomy for Hirschsprung's disease, intermediate or high anorectal malformations and meconium ileus; 17 (14.5%) patients had herniotomy, eight (6.8%) had duodenoduodenostomy, seven (6.0%) had anoplasty, and six (5.1%) patients had enteroenterostomy [Table 3]. Postoperative complications were recorded in 16 (13.7%) patients. Of these, stomal complications and wound-related complications were observed in six (5.1%) each and three (2.6%) patients had sepsis. The length of hospital stay ranged from 1 to 59 days, with a median of 14 days. Overall, 11 patients died. Of these, four (36.4%) died within the 1<sup>st</sup> week of life and all the patients with sepsis died. The mortality rate was 9.4% [Table 1].

Presentation during the early neonatal period ( $P = 0.001$ ) and the occurrence of postoperative complications ( $P = 0.009$ ) were significantly associated with the length of hospital stay. Furthermore, the presence of postoperative complications ( $P = 0.012$ ) was significantly associated with the postoperative mortality [Table 4].

## DISCUSSION

It has been established that intestinal obstruction is a significant cause of emergency presentation in the newborn period.<sup>[1,2,10]</sup> Subtle onset of the symptoms and signs of obstruction at the initial stage may cause a delay in presentation with consequent poor outcome. In this series, 72.6% of the neonates had symptoms from birth, but 64.1% presented within the 1<sup>st</sup> week of birth. The male preponderance is similar to various reports from worldwide, which suggest that intestinal obstruction is more common in boys than in girls<sup>[1,3,5,11-14]</sup> [Table 4]. The lower gastrointestinal

**Table 1: Age range and outcome at discharge**

Age range (days)	Outcome at discharge		Total number (%)
	Number alive (%)	Number dead (%)	
0-7	67 (89.3)	8 (10.7)	85 (100.0)
8-14	11 (91.7)	1 (8.3)	9 (100.0)
15-21	12 (85.7)	2 (14.3)	14 (100.0)
22-28	16 (100.0)	0 (0.0)	16 (100.0)
Total	106 (90.6)	11 (9.4)	117 (100.0)

**Table 2: Diagnosis and admission outcome**

Diagnosis	Admission outcome		Total number (%) <sup>a</sup>
	Number alive (%)	Number dead (%)	
Anorectal malformation	56 (90.3)	6 (9.7)	62 (53.0)
Hirschsprung's disease	14 (87.5)	2 (12.5)	16 (13.7)
Obstructed inguinoscrotal hernia	17 (100.0)	0 (0.0)	17 (14.5)
Duodenal atresia	6 (100.0)	0 (0.0)	6 (5.1)
Jejunioileal atresia	5 (83.3)	1 (16.7)	6 (5.1)
Malrotation	3 (100.0)	0 (0.0)	3 (2.6)
Meconium ileus	2 (100.0)	0 (0.0)	2 (1.7)
Annular pancreas	2 (100.0)	0 (0.0)	2 (1.7)
Pyloric stenosis	1 (100.0)	0 (0.0)	1 (0.9)
Intussusception	0 (0.0)	1 (100.0)	1 (0.9)
Complicated NEC	0 (0.0)	1 (100.0)	1 (0.9)

<sup>a</sup>Column percentages used. NEC=Necrotizing enterocolitis

**Table 3: Procedures performed**

Procedure	n (%)
Ramstedt's pyloromyotomy	1 (0.9)
Duodenoduodenostomy	8 (6.8)
Enteroenterostomy	6 (5.1)
Ladd's operation	3 (2.6)
Insertion of peritoneal drain	1 (0.9)
Bowel resection + ileotransverse anastomosis	1 (0.9)
Herniotomy	17 (14.5)
Colostomy	73 (62.4)
Anoplasty	7 (6.0)

**Table 4: Factors associated with length of hospital stay and mortality**

Factor	P	
	Length of hospital stay	Mortality
Sex	0.270	0.721
Age	0.001*	1.000
Serum K+	0.781	0.237
Delayed treatment	0.550	0.160
Postoperative complications	0.009*	0.012*

obstruction was observed to be more common than upper gastrointestinal obstruction. Expectedly, congenital anomalies were the most significant etiologies of bowel obstruction in the neonates. Of these anomalies, anorectal malformations were the most common anomalies causing obstruction, a finding that agrees with similar reports.<sup>[3,11,12,15]</sup> Anorectal malformation is distantly followed by Hirschsprung's disease, suggesting that Hirschsprung's disease is increasingly being diagnosed in our center.<sup>[12]</sup> In our center, rigorous preoperative resuscitation is practiced to correct fluid and electrolyte anomalies while controlling infection and the temperature of the patients. We lack adequate neonatal intensive care unit with few ventilators to cater for the patients, a situation that is

very common in other centers around the country. The initial practice was to perform procedures with minimal exposure to general anesthesia in the earlier part of this study; however, the last 4 years witnessed a significant improvement in neonatal anesthetic management with the arrival of an anesthetist with postfellowship training in neonatal anesthesia and the postoperative care of the very sick neonates in the intensive care unit. Thus, initial diverting stomas were established in the neonatal period, whereas the definitive procedures were performed beyond neonatal period.

The pattern of postoperative complications is similar to the reported patterns from other parts of the world, with sepsis being the most common complication observed.<sup>[1,3,11]</sup> However, the overall postoperative complication rate of 13.7% observed is comparably low to the reported rates from other centers.<sup>[1,11-13,15]</sup> Furthermore, the mortality rate of 9.4% observed is comparably low to the variously reported rates that ranged from 15.1% to 35% [Table 5].<sup>[1,3,11-13,15-17]</sup> The reported high morbidity and mortality rates may be connected to the challenges of late presentation, poor transport system, inadequate equipment, poor obstetric care, and poverty associated with the management of the surgical neonate.

The patients' age and postoperative complications significantly affected the length of hospital stay. Early age at presentation was associated with longer duration of hospitalization. This may not be unrelated to the congenital nature of the conditions predominant in this age group, to the acute nature of presentation, and to the type of procedure required in this group. Postoperative complications also significantly affected the mortality as all the patients with sepsis died postoperatively.

## CONCLUSION

The age of the patient at presentation and the presence of life-threatening postoperative complications such as

**Table 5: Comparison with previous studies**

Study	Number of neonates	Sex ratio (male:female)	Commonest etiology	Complication (%)	Mortality (%)
Ademuyiwa <i>et al.</i>	63	2:1	ARM	-	28.6
Ameh <i>et al.</i>	151	3:1	ARM	16.8	21.1
Adeyemi D	211	1.5:1	ARM	-	35.0
Ekenze <i>et al.</i>	128	-	ARM	41.1	30.0
Osifo <i>et al.</i>	71	2.7:1	ARM	40.8	25.4
Verma <i>et al.</i>	298	1.8:1	Intestinal atresia	-	16.4
Singh <i>et al.</i>	53	3:1	Intestinal atresia	35.9	18.8
Talari <i>et al.</i>	86	2.07:1	ARM	34.5	15.1
Present study	117	2.66:1	ARM	13.7	9.4

ARM=Anorectal malformation

sepsis in the neonates may determine the morbidity and mortality associated with the management of intestinal obstruction in the neonates. Improved neonatal support facilities, paying close attention to details of initial preoperative management, and early presentation are essential for an improved outcome in the newborn.

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### Conflicts of interest

There are no conflicts of interest.

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