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# Retrospective and Prospective Study of Neonatal Intestinal Obstruction

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**Abstract**
*Intestinal obstruction in neonates is a common surgical emergency which requires a team approach for optimal outcome, as most cases in this age group have a congenital cause for obstruction. In our study, the aetiology and factors affecting outcome (morbidity and mortality) of surgery in neonatal intestinal obstruction were evaluated which included a retrospective period from April 1, 2011 to February 28, 2013 and a prospective period from March 1, 2013 to October 31, 2014. A total of 50 neonates were included who underwent surgery for intestinal obstruction during the three years and 8 months study period. The outcome following surgery was classified into three types namely 'alive without complications'(I), 'alive with complications'(II) and 'those who died'(III). Chi- square test was used to compare the difference with and without factors causing morbidity and mortality. It was observed that 58.0% (29/50) of the total neonates were alive without complications; 18.0% (9/50) were alive with complications and 24.0% (12/50) expired. The results of our study show that anorectal malformations (58%) are the leading cause of neonatal intestinal obstruction followed by Hirschsprung's disease (12%), Intussusception (8%), Obstructed hernia (8%), Malrotation(6%), Intestinal atresia (4%) and Hypertrophic pyloric stenosis (4%). Abdominal distension, constipation, vomiting, delay or failure to pass meconium are the common modes of presentation in neonates. It was found that gestational age, birth weight and delay in presentation significantly affected the outcome. It was also derived that mode of delivery, age at presentation, preoperative morbidity and preoperative antibiotics did not affect the final outcome of neonatal intestinal obstruction.*
**Keywords:** *Neonatal Intestinal Obstruction, morbidity, mortality*

## INTRODUCTION

Intestinal obstruction is a partial or complete blockage of the small or large intestine, resulting in failure of the contents of the intestine to pass through the bowel normally.[1] Intestinal obstruction occurs in about 1 in 1,500 live births.[2]

It should be suspected in any child with persistent vomiting, distension of abdomen and abdominal pain; because delayed diagnosis and treatment can lead to devastating consequences. Infants and young children with intestinal obstruction present with pain, irritability, vomiting, and abdominal distension. Undiagnosed or improperly managed obstructions can progress to vascular compromise, which causes bowel ischaemia, necrosis, perforation, sepsis and death.[2]

Congenital obstructive lesions of the intestines can be viewed as intrinsic (atresia, stenosis, meconium ileus, aganglionic megacolon) or extrinsic (malrotation, constricting bands, intra-abdominal hernias, duplication).[3] The aetiology of intestinal obstruction is tabulated in TABLE 1[4].

Neonatal surgery poses a major challenge, particularly in developing countries. A study done in Nigeria concluded that the morbidity and mortality following surgical management of neonates is still very high due to financial constraints. Emergency surgeries, delivery outside the hospital and tracheoaesophageal or gastro intestinal anomalies were significant contributory factors[5].

In the past few decades, a better understanding of neonatal physiology, advance in technology and neonatal intensive care has improved safety and outcome of neonatal surgeries. Neonates require and certainly deserve the highest level of surgical care.[6]

## MATERIAL AND METHODS

In this study, 50 neonates of intestinal obstruction undergoing surgery were included. This study included a retrospective period from April 1, 2011 to February 28, 2013 and a prospective period from March 1, 2013 to October 31, 2014. They were followed till their discharge.

The data collected included; gestational age, mode of delivery, birth weight, delay in presentation, need for pre operative intervention, symptoms of presentation, investigations (x-ray, ultrasound abdomen and invertogram), aetiology, name of operation, type of surgery, presence of pneumonia or sepsis and presence of wound infection. The presence of pneumonia, sepsis (clinical suspicion and positive blood culture), wound infection and presence of specific complications of a surgery were used to assess the morbidity following surgery. Factors which possibly could have been responsible for morbidity and mortality were identified from the above data.

All those who had a complication (morbidity) or did not survive (mortality) were identified. Then the effects of each of the predictors on the outcome were evaluated.

Finally from all the data collected, the aetiology and the factors which help in predicting the morbidity and mortality following neonatal surgery were identified and the effect of each of these factors on the outcome were evaluated. Chi-square test was used to compare the difference with and without factors causing morbidity and mortality. A p-value of $<0.05$ was considered statistically significant.

## RESULTS

In our study there were a total of 50 cases of neonatal intestinal obstruction, who underwent

surgery. The outcome was evaluated in three categories as under

I. Alive without Complications (AwoC) – 29 (58%)
II. Alive with Complications (AwC) – 9 (18%)
III. Died – 12 (24%)

In other words the morbidity of our study was 18.0% and the mortality was 24.0%. In our study it was observed that there were more male neonates (62%) than females (38%). The neonates were term (84%) and preterm (16%) based on their gestational age. (p-value=0.008; statistically significant). In our study 84% were born by normal vaginal delivery and 16% by lower segment caesarean section. Also, 30% of the neonates had delay in presentation, which significantly affected the outcome. (p value=0.03).

It was seen that low birth weight is a bad prognostic factor and adversely affects the outcome in neonates with intestinal obstruction. (p value<0.01) whereas pre-operative morbidity or pre-operative antibiotics did not significantly affect the surgical outcome.

The most common symptoms at presentation were abdominal distension and constipation (86% each), followed by vomiting (82%), delay or failure to pass meconium (62%) and blood in stool (20%). The results of our study show that anorectal malformations (58%) were the leading cause of neonatal intestinal obstruction followed by Hirschsprung's disease (12%), Intussusception (8%), Obstructed hernia (8%), Malrotation(6%), Intestinal atresia (4%) and Hypertrophic pyloric stenosis (4%).

The type of surgery also had an effect on the outcome; 37.5% of patients with dirty surgeries died as compared to 23.52% with contaminated surgery, 13.33% of patients with clean contaminated and 30% patients with clean surgeries.

Neonates with postoperative complications had an adverse outcome (83.3% mortality) as compared to patients without complications post-operatively.

## DISCUSSION

With better understanding of neonatal physiology, improvements in diagnostic facilities and Neonatal Intensive Care Units (NICU), the outcome of neonatal surgery has improved in developed countries. In developing countries, however, neonatal surgery is still problematic, particularly in the emergency setting.

In our study, the aetiology and; the factors affecting the outcome (morbidity and mortality) of surgery in neonatal intestinal obstruction were evaluated.

**Distribution of neonates according to age at the time of surgery:**

In our study neonates undergoing surgery were divided into 5 sub groups depending on the age at time of surgery:

- In the age group of '0-5' days old neonates, 19 (63.33%) neonates were alive without complications, 2 (6.66%) were alive with complications and 9 (30.0%) died out of a total of 30 in this age group.
- In the age group of '6-10' days old neonates, there was 1 neonate in this group who was alive without any complications,

- There was no patient in the age group of 11-15 days.
- In the age group of '16-20' days old neonates, there were a total of 6 neonates, of which 4(66.66%) were alive without complications, 2(33.33%) were alive with complications and none died.
- In the age group of '>20' days old neonates there were a total of 13 neonates of which 5(38.46%) were alive without complications, 5(38.46%) were alive with complications and 3 (23.07%) died.

However it was observed that the age group at the time of surgery did not significantly affect the outcome as the p-value for this was just 0.14.

Our study thus shows that age at the time of surgery does not affect the final outcome. This could probably be because the neonates were managed effectively once they reached hospital and they received good neonatal ICU facilities when needed post operatively.

**Sex distribution of neonates:**

In our study it was observed that there were more male neonates in all three categories. This could be that there is a possible preference for male child and hence more male neonates were brought to hospital for further management. This could also be also due to fact there is still high prevalence of female feticide especially in Punjab which are carried out when antenatal scans done detect congenital anomalies according to study done by Gill GK.[7]

**Distribution of neonates according to gestational age:**

In our study, the neonates were broadly classified into two categories namely term and preterm based on their gestational age. It was observed in the first category only 1 out of 29 was preterm. In the second category only 2 out of 9 was preterm, in the third category however 5 out of 12 were preterm neonates (p value<0.08). A study done in Copenhagen University Hospital which included 46 neonates concluded that preterm neonates were subject to considerable risk. Total mortality in this vulnerable group of patients was 15%. Although no obviously procedure-related deaths were observed, severe complications and postoperative morbidity occurred.[8]

A study done in Australia by Walker K et al in 2008, Prematurity and low birth weight were identified as independent risk factors for mortality[9] (p<0.001).

**Distribution of neonates according to mode of delivery:**

In our study, a total of 42 out of 50 neonates were born by normal vaginal delivery and 8 neonates were born by LSCS. Thus the mode of delivery did not significantly affect the outcome in the neonates undergoing surgery in our study as reported earlier in similar studies[10-12].

**Distribution of neonates according to delay in presentation:**

In our study the delay in presentation significantly affected the outcome (p value=0.03). A study in 2004 at PGI Chandigarh (India) found that; in neonates with anorectal malformations; delay in referral, low birth weight and major associated

anomalies were the three important factors that lead to worse outcome in neonates[13].

**Distribution of neonates according to birth weight:**

The outcome of neonates according to birth weight has been shown in GRAPH 1. Birth weight significantly affected the outcome.

A study done in Nigeria by Sowande OA et al showed that the admission weight of the neonate significantly affected the outcome of the surgery. This study has shown that the mean weight of those that survived is higher than those that died. It also showed that the lower the admission weight before surgery, the more likely the mortality. Heavier infants are less likely to be physiologically deranged and hence better able to tolerate surgery.[14] similar findings have been reported from studies done in USA[15] and Brazil[16]

**Distribution of neonates according to preoperative morbidity:**

In our study various preoperative morbidity were considered like anaemia, dehydration, sepsis, pneumonia, jaundice. But the preoperative morbidity didn't significantly affect the outcome. However, earlier studies identify pre-operative sepsis and pneumonia as factors which severely affect outcome in neonates undergoing surgery[13,17].

**Distribution of neonates according to aetiology of intestinal obstruction:**

It is summarised in TABLE 2. (FIGURE 3, FIGURE 4)

**Distribution of neonates according to general postoperative complications:**

General postoperative complications like pneumonia and sepsis were included in determining the outcome of neonates following surgeries. Previous studies have found that post-operative complications like pneumonitis and septicaemia significantly affect the final outcome in neonates undergoing surgery. [21,22]

**Distribution of neonates according to procedure specific complications:**

It was observed that specific complications related to the surgery significantly determined the outcome in our study.(GRAPH 2) There were no surgery related complications in the Category I. 5 out of 9 had surgery related complications in the Category II while 3 out of 12 had surgery related complications in the Category III . So a total of 8 neonates undergoing surgery had complications. Of the 8 neonates who had procedure specific complications, 4 neonates had anastomotic leak, 4 neonates had wound dehiscence related to laparotomy. Post operative specific complications related to the type of surgery have been known to affect the final outcome. In a study in Nigeria it was concluded that, reoperation, either due to anastomotic breakdown or due to wound dehiscence was one of the major determinants of mortality in neonates with intestinal obstruction.[23]

**Distribution of neonates according to the outcome:**

In our study all the neonates who came under Category I i.e. 'alive without complications' had no morbidity which was 58.0% (29 out of 50). Those in the Category II i.e. 'alive with complications' were considered as the group with morbidity which was 18.0% (9 out of 50). The ones in the Category III i.e. 'dead' were considered as the group with mortality which was 24.0% (12 out of 50). (TABLE 3)

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**TABLE 1:**

| AETIOLOGY OF INTESTINAL OBSTRUCTION IN NEONATES[4] | |
|---|---|
| *Intraluminal* | • Meconeum ileus<br>• Meconeum plug syndrome<br>• Inspissated milk syndrome |
| *Intramural* | • Gastric atresia<br>• Intestinal atresia/stenosis<br>• Hirschsprung's disease<br>• Anorectal malformations with imperforate anus<br>• Small left colon syndrome |
| *Extraluminal* | • Malrotation with or without volvulus<br>• Duplication cyst<br>• Obstructed hernia<br>• Congenital bands<br>• Intussussception<br>• Adhesions |

**TABLE 2:** Comparative analysis of aetiology of neonatal intestinal obstruction

| **Aetiology** | **Amed EA Study[19](n=151)** | **Gangopadhyay Study[20](n=769)** | **Osifo OD Study[21](n71)** | **Present Study(n50)** |
|---|---|---|---|---|
| ARM | 104(68.9%) | 385(50.3%) | 28(39.4%) | 29(58%) |
| Hirschprung Disease | 11(7.3%) | 115(15.7%) | 8(11.3%) | 6(12%) |
| Intussusception | 0(0.0%) | 30(4%) | 0(0.0%) | 4(8%) |
| Obstructed Hernia | 11(7.5%) | 77(10%) | 4(5.6%) | 4(8%) |
| Malrotation | 6(4.0%) | 45(5.9%) | 6(8.5%) | 3(6%) |
| Intestinal Atresia | 10(6.7%) | 60(7.8%) | 8(11.3%) | 2(4%) |
| Hypertrophic Pyloric Stenosis | 0(0.0%) | 0(0.0%) | 0(0.0%) | 2(4%) |

**TABLE 3**: Comparative analysis of morbidity and mortality of neonatal intestinal obstruction

| Outcome | Ahmed EA Study(n-151)[18] | Osifo OD Study(n-71)[5] | Present Study (n-50) |
|---|---|---|---|
| Morbidity | 16.8% | 22.5% | 18.0% |
| Mortality | 21.1% | 25.4% | 24.0% |

**FIGURE 1**: Showing distribution according to birth weight.

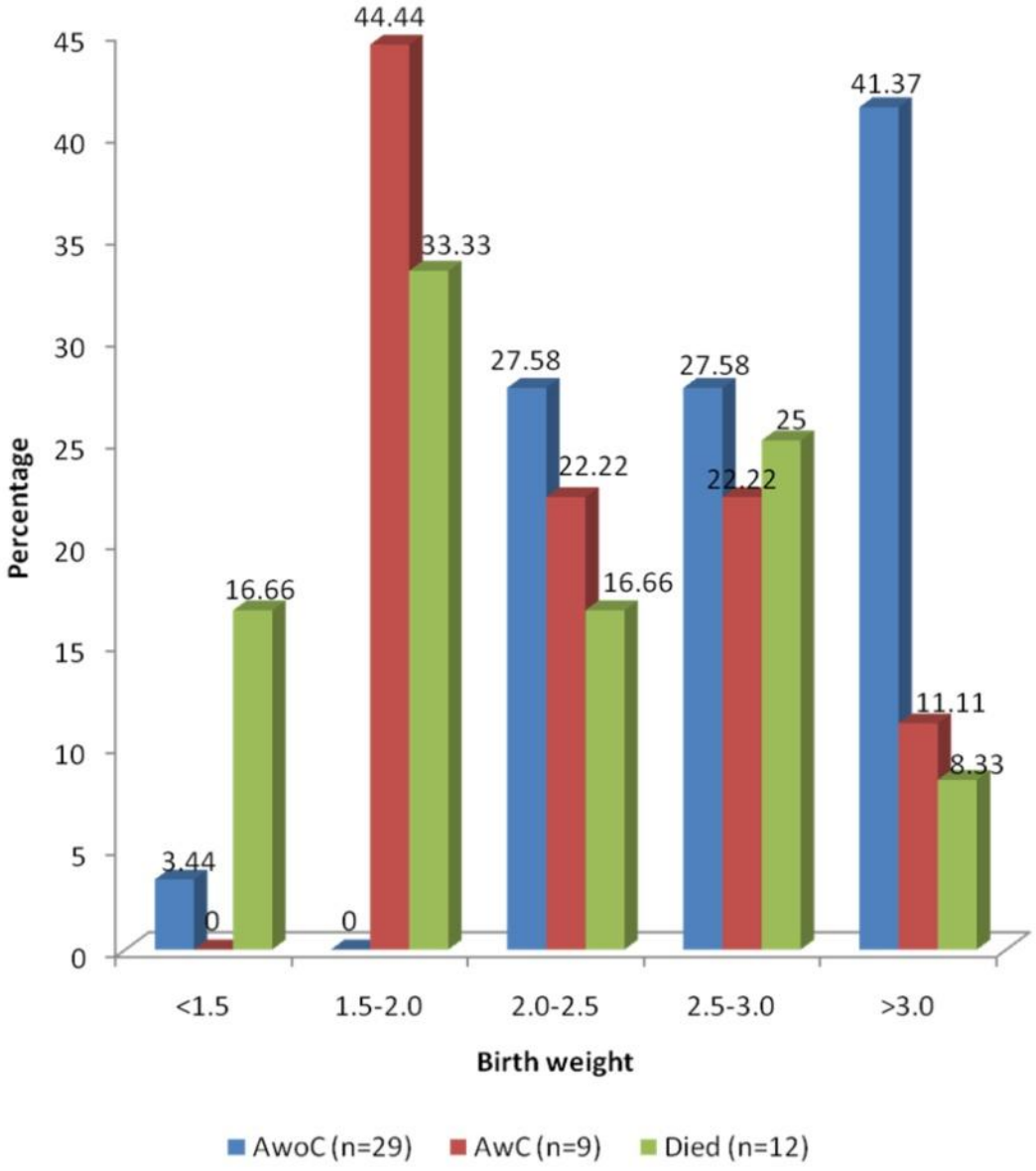


**FIGURE 2:** Showing Distribution of Neonates according to post operative specific complications

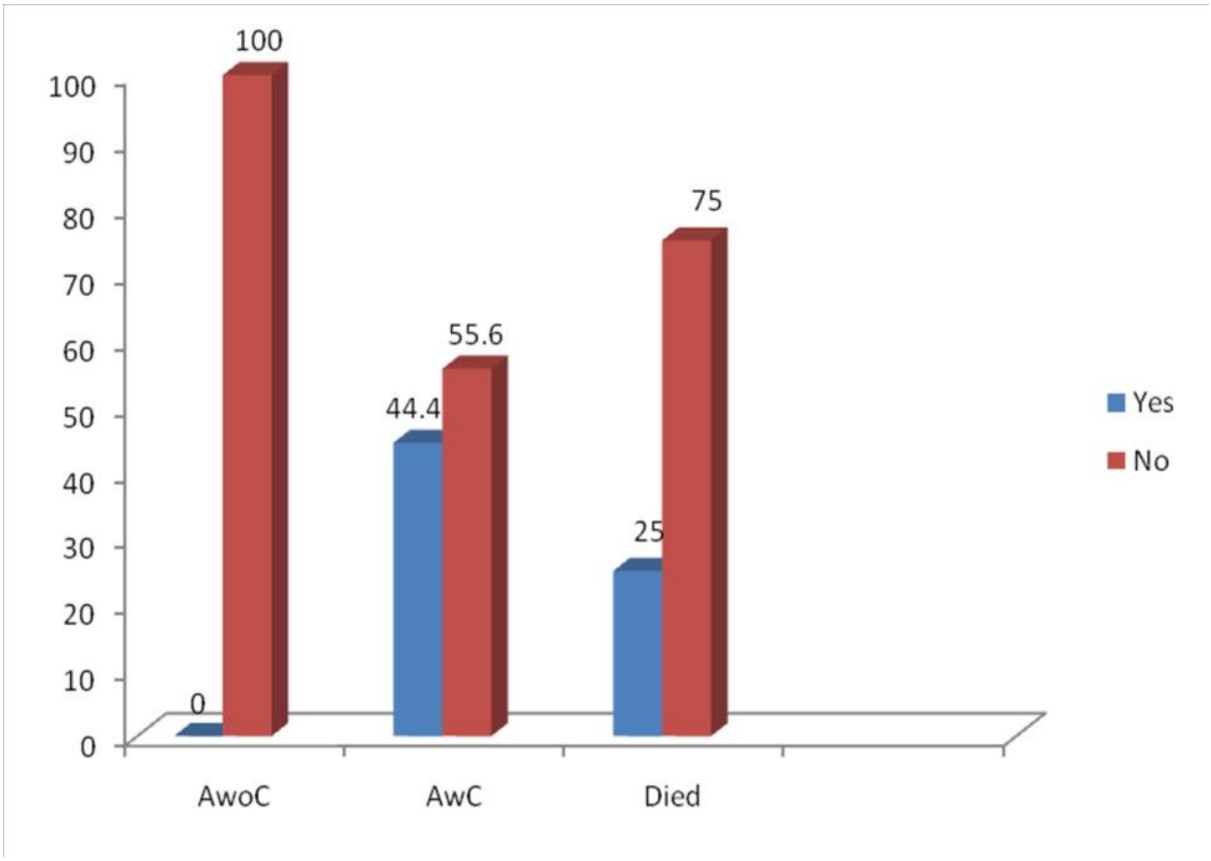
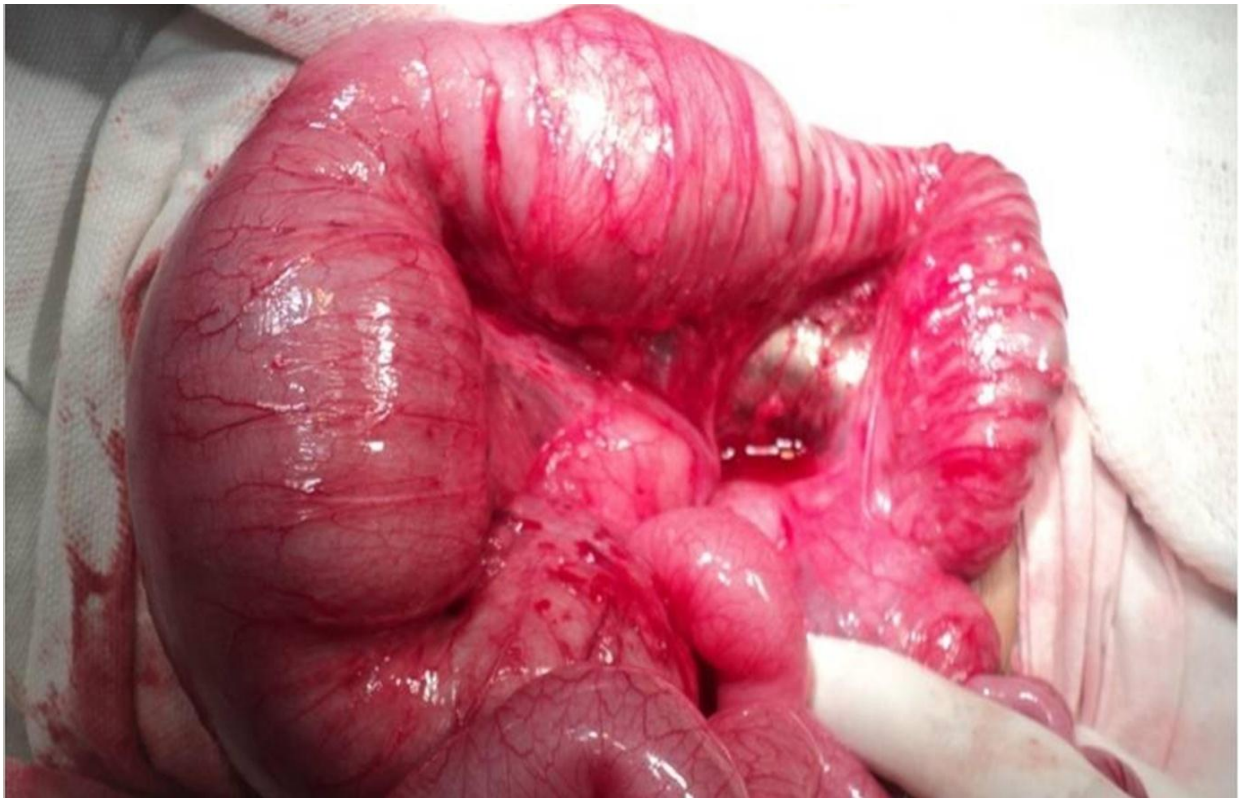



**FIGURE 3**: Anorectal malformation showing Imperforate anus.

FIGURE 4: Hirschsprung's disease



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