

## ORIGINAL ARTICLE

## Neonatal intestinal obstruction : patterns, problems and outcome

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### Abstract

Neonatal intestinal obstruction is the most common surgical emergency in newborn. Ideally neonatal surgery should be done in an organized neonatal surgical unit. This study was done mostly in general surgical setup in Khulna without any facility of NICU and TPN. The aim of this study was to detect the patterns of neonatal intestinal obstruction and to find out the problems and outcome of surgical treatment. This retrospective study was done between January 2008 and December 2010, in Khulna Medical College Hospital, Khulna Shishu Hospital and a private clinic in Khulna. A total of 205 neonates with intestinal obstruction were treated surgically. Babies of both sexes up to 28 days of age were included in this study. Common causes of neonatal intestinal obstruction were anorectal malformation (ARM), intestinal atresia, Hirschsprung's disease (HD), meconium ileus and malrotation of midgut. Male-female ratio was 1.6:1 and about 13% was premature. Out of 205 neonates, there were ARM-73, HD-47, meconium ileus-38, intestinal atresia-29, malrotation-13 and others-5. Total 172 (84%) survived. Those were ARM (94%), Hirschsprung's disease (91%), meconium ileus (79%), intestinal atresia (55%), malrotation of gut (85%) and others (40%). Overall mortality after initial surgical treatment was 16%. Prognosis of surgical treatment depends on early intervention, expert anaesthesia, associated anomaly and complication, gentle handling of delicate tissue and intensive postoperative management. Medical practitioners were the first attending physician in most instances. So both physicians and surgeons have a contributing role in reducing mortality.

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### Introduction

Newborn babies are not only tiny human. They have unique anatomic, physiologic, pathologic and psychologic existence. Surgery on neonates is a sensitive issue, especially in a nonspecialized setup. Ideally it should be done in an organized neonatal surgical unit with facilities of neonatal intensive care unit (NICU), total parenteral nutrition (TPN), neonatal anaesthesia and specialized paediatric nursing care.<sup>1</sup>

The neonatal period is defined as the first 28 days after birth. Neonatal intestinal obstruction occurs in 1 in 1500 live birth.<sup>2</sup> Neonatal intestinal obstruction is one of the most common newborn surgical emergencies.<sup>3</sup> Successful management of a newborn with a bowel obstruction depends on timely diagnosis and prompt management.<sup>4</sup> Failure to recognize neonatal bowel obstruction can result in aspiration of vomitus, sepsis, mid-gut infarction or perforation and enterocolitis.<sup>5</sup> Common causes of neonatal intestinal obstructions are intestinal atresia, meconium ileus, anorectal malformation (ARM), Hirschsprung's disease (HD) and malrotation of the gut with or without volvulus.

The principal features of neonatal intestinal obstruction are bile-stained vomiting, failure to pass meconium and abdominal distension. Early vomiting, in the first 24 hours of life, indicates a high obstruction (duodenal or jejunal) while the later onset of vomiting indicates a lower obstruction (ileal or colonic).<sup>6</sup> The degree of abdominal distension correlates roughly with the height of the intestinal obstruction. In

duodenal and high jejunal obstruction the distension is restricted to the upper abdomen, whereas in ileal and colonic obstruction there may be generalized distension.<sup>7</sup>

The management of neonatal intestinal obstruction in developing countries remains challenging with poorer outcomes, compared with the results from the developed countries.<sup>8,9</sup> Some factors attributing to the high mortality in developing countries including prematurity, late presentation, associated severe congenital anomalies and complications of surgery as well as lack of intensive care facilities.<sup>3,8,10</sup>

The aim of this study was to detect the patterns of neonatal intestinal obstruction and to find out the problems and outcome of surgical treatment in non-specialized neonatal surgical setup in Khulna.

### Materials and methods

This retrospective study was done in Khulna Medical College Hospital, Khulna Shishu Hospital and a private clinic over a period of 3 years from January 2008 to December 2010. Data were collected from patients' hospital records and analysed for age, sex, gestational age, clinical features, mode of presentation, diagnosis, surgical procedure performed, complications and their outcome. A total of 216 neonates with neonatal intestinal obstruction were referred from pediatric units and pediatric practitioners to surgical unit. All patients got resuscitation after admission, nasogastric suction and

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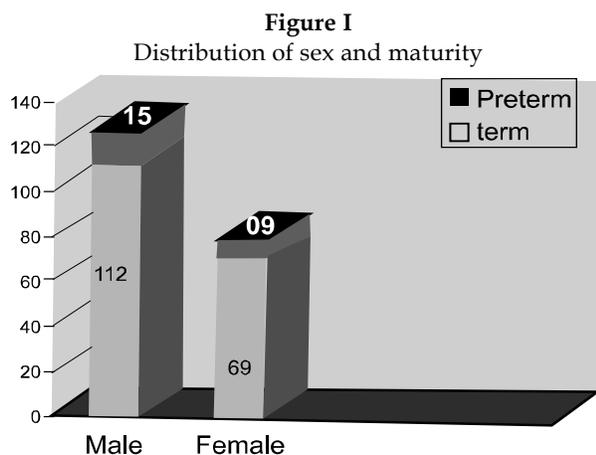
prophylactic broad-spectrum antibiotics preoperatively and blood was ready for transfusion prior to surgery. Conservative treatment initially attempted under pediatric care had failed and as a result all the patients underwent surgical treatment. Their ages ranged from 12 hours to 28 days. Most of the patients had a plain X-ray of the abdomen in the erect posture and a few suspicious cases, especially those with a high obstruction, had a contrast upper gut study with the water soluble contrast meal administered through a nasogastric tube. Despite these measures, the actual causes of obstruction were not determined until after exploratory laparotomies were conducted. Those who were not agreed with surgical treatment were excluded.

Type of surgical intervention was considered on the basis of diagnosis and condition of neonates. In this study, only initial surgical procedure was considered, in case of staged operation.

## Results

Out of 216 neonates admitted under surgical care, 205 (95%) neonatal intestinal obstructions were operated. Rest 11 (5%) neonates was either inoperable or improved after conservative approach or attending legal guardians refused surgical treatment. Among them, 127 were males and 78 were females (Fig. 1). Male-female ratio was

1.6:1. Gestational age varies from 32 weeks to 42 weeks and only 13% (24) of neonates were premature. Age distribution varies among the diseases (Table I).



Most common was anorectal malformation (ARM) (73-35.6%), followed by Hirschsprung's disease (47-23%), meconium ileus (38-18.5%), intestinal atresia (29-14%), malrotation of gut (13-6.3%). and others (congenital bands and adhesions 2, necrotizing enterocolitis 2 and gastric perforation 1) were 5 (2.4%). Majority of neonates with ARM, intestinal atresia and meconium ileus were presented within first week of their life (table I).

**Table I**  
Age of presentation

Name of disease	0-7 days	> 7 days	Age range (day)	Total
ARM	59	14	1-28	73
Hirschsprung's disease	21	26	3-28	47
Meconium ileus	33	5	1-8	38
Intestinal atresia	17	12	1-18	29
Malrotation	1	12	8-25	13
Others	2	3	3-15	5
Total	133	72		205

On the other hand neonates with Hirschsprung's disease and malrotation presented later on. Most of the patients with ARM came directly to surgical care as the abnormality is externally obvious but in others, majority of neonates came to surgical specialist after initial conservative management in a different unit (Table II).

Associated congenital anomalies (e.g. congenital heart disease, spinal dysraphism, urinary tract abnormality, duodenal atresia and limb abnormality) were common among ARM.

**Table II**  
Mode of presentation

Name of disease	Directly (%)	Indirectly (%)	Total (%)
ARM	53 (73)	20 (27)	73 (100)
Hirschsprung's dis	12 (26)	35 (74)	47 (100)
Meconium ileus	9 (24)	29 (76)	38 (100)
Intestinal atresia	10 (34)	19 (66)	29 (100)
Malrotation	2 (15)	11 (85)	13 (100)
Others	1 (20)	4 (80)	5 (100)
Total	87 (42)	118 (58)	205 (100)

Preoperative complications like perforation, volvulus and septicaemia were present among those neonates where diagnosis of surgical condition was delayed. Out of 205 neonates 172 survived following initial surgical treatment.

**Table III**  
Pattern and preoperative complication and associated anomaly

Name of the disease	Number(%)	Complication	Anomaly
ARM	73 (35.60)	7	11
Hirschsprung's dis	47 (22.93)	8	1
Meconium ileus	38 (18.54)	11	0
Intestinal atresia	29 (14.15)	13	2
Malrotation	13 (6.34)	3	0
Others	5 (2.44)	3	1
Total	205 (100)	45	15

Survival rate among them, anorectal malformation were 94% (69), Hirschsprung's disease 91% (43), meconium ileus 79% (30), intestinal atresia 55% (16), malrotation of gut 85% (11) and others 40% (2) (Table IV).

**Table IV**  
Outcome of surgical treatment

Name of disease	Survive (%)	Died (%)	Total (%)
ARM	69 (94)	4 (6)	73 (100)
Hirschsprung's dis	43 (91)	4 (9)	47 (100)
Meconium ileus	30 (79)	8 (21)	38 (100)
Intestinal atresia	16 (55)	13 (45)	29 (100)
Malrotation	11 (85)	2 (15)	13 (100)
Others	2 (40)	3 (60)	5 (100)
Total	172 (84)	33 (16)	205 (100)

Among 33 (16%) deaths following surgery, the highest mortality was observed in intestinal atresia and lowest among ARM. The ultimate causes of death were septicaemia, anastomotic failure, aspiration pneumonia and apnea.

**Table V**  
Distribution of post-operative complications

Complication	Number (%)
Anastomotic leakage	7 (12.5)
Septicemia	22 (39.29)
Wound infection	13 (23.21)
Apnea	7 (12.5)
Aspiration	5 (8.93)
Others	2 (3.57)
Total	56 (100)

## Discussion

Neonatal intestinal obstruction is a common surgical emergency requiring intervention in new born. Out of 216 neonate admitted under surgical care 205 patients included in this study and rest 11 excluded because of disagreement with surgical treatment, inoperability and improvement after conservative treatment. Among 205 study population, 127(62%) were male and 78 (38%) were female (Fig. 1), with a male-female ratio 1.6:1. This male preponderance was also observed in other centres.<sup>11-14, 17-18</sup>

In this study, 24 (13%) neonates were preterm (less than 37 completed weeks) and 181 (87%) were full term. Gestational age was variable between 32 and 42 weeks. State of maturity is an important determinants in neonatal surgical outcome.<sup>3,10,13</sup>

Majority of neonates 133 (65%) was presented within first week of life and rest of 72 (35%) after 7 days (Table I). Early presentation was observed among ARM, intestinal atresia and meconium ileus. Early

onset of symptom and rapid deterioration of patient's condition in intestinal atresia and meconium ileus and easy approach to diagnosis in ARM was probably the cause of early presentation. On the other hand presentation was later in Hirschsprung's disease and malrotation because of variability in onset of symptom and lack of specificity. About 42% (87) neonates (Table II) were admitted elsewhere before surgical care. This is very important because lack of high degree of suspicion of surgical disease may cause delay in diagnosis and referral. Again 58% (118) neonates came directly to surgical specialist, mostly ARM and meconium ileus because of early diagnosis and externally evident abnormality.

In most developed countries, early diagnosis including prenatal diagnosis and planned delivery in a fully equipped pediatric surgical centre, has greatly improved survival in neonates.<sup>13</sup> This is not so in our country where a majority of surgical neonates present very late. Uba et al also reported

that late presentation increased the mortality rate in children with intestinal obstruction<sup>10</sup>. Again, the early presentation is a reflection of the severity of the case; later, presentation may be due to the less severe lower gastrointestinal obstruction, which the neonate may tolerate. Thus the type of surgical condition as well as the operation performed may affect outcome.<sup>13</sup>

The most frequent causes of intestinal obstruction (Table III) were ARM (35.6%), Hirschsprung's disease (23%), meconium ileus (18.5%), intestinal atresia (14%) and malrotation of gut (6.3 %) in this study. Nearly similar observation was reported by Hanif et al. in their study in DMCH14 and Ademuyiwa et al. in Nigeria.<sup>13</sup>

Preoperative complications and anomalies were defined less rigidly on the basis of clinical features and conventional investigations. Congenital anomalies were more frequent among ARM (15%). Septicaemia was the most common preoperative complication, followed by perforation of gut and volvulus neonatorum. These factors are also important determinant of surgical outcome.<sup>15</sup>

Out of 205 neonates in our study, 172 (84%) survived and 33 (16%) died (Table IV) following initial surgical treatment. Survival rate among anorectal malformation (ARM) were 94%, Hirschsprung's disease 91%, meconium ileus 79%, intestinal atresia 55%, malrotation of gut 85% and others 40%. So the highest survival was noted in ARM and the lowest in intestinal atresia. Postoperative complications were observed in 56 events (Table V). But more than one complication was noted in a single patient. In order of frequencies, the complications were septicaemia 39.29%, anastomotic leakage 12.5%, apnea 12.5%, aspiration pneumonia 8.93%, wound infection 3.21%, and others (persistent jaundice and hypothermia)

3.57%. Those who died mostly had some risk factor like prematurity, late presentation, associated severe congenital anomalies and complications like anastomotic leakage and or sepsis.

The mortality associated with neonatal intestinal obstruction ranges between 21% and 45% in developing countries, unlike less than 15% in Europe.<sup>3,8,10,13,16,17</sup> Postoperative mortality in our study was 16% which was in between reported international publications. Hanif et al in their experience in DMCH observed a postoperative mortality of 15.4% and Islam et al. reported 20.8% mortality in RMCH which is close to our series.<sup>14,18</sup>

At last but not at least there are some important unresolved, non-countable and concealed issues like motivation for surgical treatment, socioeconomic condition, pediatric anaesthesia support etc. which are difficult to record and report.

### Conclusion

Dedicated delicate neonatal surgical care and early diagnosis and intervention are the crucial factors in improving operative outcome in neonatal surgery. Medical practitioners were the first attending physician for early diagnosis in most instances. So both physicians and surgeons have a contributing role in reducing further neonatal mortality within these existing facilities.

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