

Neonatal Intestinal Obstruction Management: Ten Years Experience in Combined Military Hospital, Dhaka

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Abstract

Introduction: Neonatal intestinal obstruction is the commonest surgical emergency in neonatal period. The outcome in neonatal intestinal obstruction has improved dramatically due to the improvements in diagnostic facilities and neonatal intensive care, and surgical advances.

Objective: To detect the pattern of neonatal intestinal obstruction, to find out their cause and outcome after management.

Materials and Methods: This was a 10 years retrospective review of all children aged 28 days and below, managed for intestinal obstruction between March 2006 and February 2016 at the Pediatric Surgical Division of Combined Military Hospital, Dhaka. Patients who presented with septic shock, pneumonia, very low birth weight and extreme prematurity, Anorectal malformation were excluded from the study.

Result: Out of 196 patients, male patients were 135(68.87%), female 61(31.12%) and male to female ratio was 2.2:1. Most common cause of intestinal obstruction was Intestinal atresia 55(28.08%) followed by Hirschsprung disease 45(22.93%), Meconium ileus 43(21%), Malrotation of gut 23(11.73%), Duodenal atresia 12 (6.12%), Gastroschisis 10(5.10%) and other cases 8(4.01%). Majority of neonates 158(80.61%) presented within 1st week of life and survival rate was 83.16%. Mortality in preterm was much higher 19(70.35%) than in term newborns 21(12.42%).

Conclusion: Dedicated delicate neonatal surgical care, early diagnosis and intervention are the crucial factors in improving operative outcome in neonatal surgery.

Key-words: Neonatal intestinal obstruction, Anorectal malformation, Hirschsprung disease, Meconium ileus.

Introduction

Intestinal obstruction in the neonatal period may be caused by a variety of mostly congenital abnormalities. Over the past decades, the outcome in neonatal intestinal obstruction

(NIO) in many developed countries has improved dramatically, largely due to advances in the understanding of neonatal physiology, improvements in diagnostic facilities and neonatal intensive care, and surgical advances¹. Surgery in neonates is a challenging issue especially in developing countries². In many developing countries, however, the management of neonates with this condition remains problematic, with resultant high morbidity and mortality^{3,4}. Until 1950 there were only 125 successfully treated cases recorded in the literature⁵. The surgical emergency in neonatal period varies from 1-4 /100 neonate⁶. Most common surgical emergency in the neonate is neonatal intestinal obstruction⁶. The incidence of Neonatal intestinal obstruction is 1 in 1500 live births⁷. Intestinal atresia, meconium plug syndrome, meconium ileus, malrotation of gut with or without volvulus and Hirschsprung disease are the common causes of intestinal obstruction in neonate. Proper history, physical examination along with simple radiological investigations usually lead to a correct diagnosis. There is aspiration of vomit, midgut infarction or enterocolitis and sepsis, if there is failure of diagnosis of intestinal obstruction⁸. We have to sacrifice a large portion of bowel if diagnosis or surgical intervention is late. Late presentation, prematurity, associated severe congenital anomalies, complications of surgery as well as lack of intensive care facilities lead to high mortality in developing countries^{6,9}.

Cardinal signs of neonatal intestinal obstruction include maternal polyhydramnios, bilious emesis, abdominal distention and failure to pass meconium in 24 hours of life. These are the features of intestinal obstruction and should be evaluated carefully⁵. Proper history, physical examination along with simple radiological investigations usually leads to a correct diagnosis. There is aspiration of vomit, midgut infarction or enterocolitis and sepsis, if there is failure of timely diagnosis of intestinal obstruction⁸. We have to sacrifice a large portion of bowel if diagnosis is late or surgical intervention is late. Late presentation, prematurity, associated severe congenital anomalies, complications of

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surgery as well as lack of intensive care facilities leads to high mortality in developing countries^{6,9}. The objective of this study was to detect the pattern of neonatal intestinal obstruction, to find out their cause and outcome after management in the Paediatric Surgery Department of Combined Military Hospital, Dhaka of Bangladesh Armed Forces.

Materials and Methods

This was a 10 years retrospective review of all children aged 28 days and below, managed for intestinal obstruction between March 2006 and February 2016 at the Pediatric Surgical Division of Combined Military Hospital, Dhaka. Data were collected on a structured proforma and analyzed for age, sex, causes of intestinal obstruction, clinical presentation, treatment, postoperative complication and outcome. All newborns who were managed for neonatal intestinal obstruction were included in the study. Neonate presented with extreme prematurity, septic shock, very low birth weight, pneumonia, and anorectal malformation were excluded from the study.

A total of 196 neonates with neonatal intestinal obstruction were managed by intervention or conservatively. All the patients were kept nothing per orally with IV fluid and NG suction. After correction of dehydration and electrolyte imbalance, all of them had blood investigations, abdominal X-ray, ultrasound and in some cases contrast studies were done. Exploratory laparotomy was done in maximum patients and some patients were treated conservatively. Surgical intervention was carried as per the cause i.e. resection and anastomosis in jejunoileal atresia, colostomy and biopsy in Hirschsprung disease and Ladd's procedure in malrotation of gut etc were done. Postoperative management was given by keeping the patients nothing per orally, nasogastric suction, intravenous fluid and intravenous antibiotics. Oral Feeding could be started within 4 to 7 days and patients could be discharged within 10 to 15 days. Initial surgical procedure and its outcome were included in this study; in particular cases diagnosis was confirmed by histopathology.

Results

Out of 196 neonates most common cause of intestinal obstruction was Intestinal atresia 55 (28.08%) followed by Hirschsprung 45(22.93%), Meconium ileus 43(21%), Malrotation of gut 23(11.73%), Duodenal atresia 12(6.12%) and Gastroschisis 10(5.10%) and other case 8(4.01%). These other cases included 3 cases of Omphalocele minor, 3 cases of Meconium plug syndrome, 2 cases of Omphalocele major. Total male patients were 135(68.87%) and female 61(31.12%) and male to female ratio was 2.21:1 (Table-I). Cause wise distribution of premature and mature neonate shown in Table-II; 27

(13.77%) were premature. Highest no of prematurity was observed in Gastroschisis (50%) and lowest in HPD (2.22%). Table-III shows, the majority of neonates 158(80.61%) presented within 1st week of life except for HPD, malrotation of gut and some cases of meconium ileus presented later on. Clinical presentation of neonates presented in Table-IV; abdominal distension was found in 148(75.51%) cases (HPD 45, intestinal atresias 55, malrotation of gut 23 and meconium ileus 25). All patients with intestinal atresias (55), malrotation gut (43) and Gastroschisis (10) and 15 cases of HPD presented with bilious vomiting 135(68.87%), there was nonbilious vomiting in duodenal atresia (12). In Hirschsprung disease, 45(22.95 %) constipation was main problem. Failure to pass meconium was present in all cases of atresia 67(34.18%). Some patient presented with more than one sign or symptoms. Patients management procedure is shown in Table-V; 8 patients were treated conservatively (3 cases of omphalocele minor, 3 cases of meconium plug syndrome and 2 cases of omphalocele major) and 2 cases of gastroschisis expired before operation. Colostomy and biopsy was done in 45 (22.89%) patients of HPD, Closure of gastroschisis in 8 (4.01%) cases of gastroschisis, Double barrel ileostomy in 43 (21.93%) cases of meconium ileus, Duodenoduodenostomy in 12 (6.12%) patient of duodenal atresia, Enteroenterostomy in 55(28.08%) of intestinal atresia, Ladd's Procedure in 19 (9.69%) cases of malrotation of gut and Resection and anastomosis in 4(2.04%) cases of malrotation of gut where there was midgut volvulus with gangrene of bowel loops. Postoperative complications are shown in Table-VI; among the septicemia is highest 20(10.75%), followed by wound infection 14(7.52%) and anastomotic leakage 12(5.45 %). Outcome of patients after management are shown in Table-VII; 163 survived and the overall survival rate was 83.16%. Among 33 (16.83%) deaths, highest mortality was observed in gastroschisis (80%) and lowest in malrotation of gut (8.69%). Outcome among preterm and term neonates are shown in Table-VIII; mortality in preterm was much higher 19 (70.35%) than in term newborns 21(12.42%).

Table-I: Aetiological spectrum of neonatal intestinal obstruction with male to female ratio (n=196)

| Diagnosis | Male (%) | Female (%) | Total (%) |
|--------------------|--------------------|-------------------|------------------|
| Duodenal atresia | 9 (4.59) | 3 (1.5) | 12 (6.12) |
| Intestinal atresia | 30 (15.30) | 25 (12.75) | 55 (28.06) |
| Gastroschisis | 7 (3.57) | 3 (1.53) | 10(5.10) |
| HPD | 40 (20.40) | 5 (2.55) | 45 (22.95) |
| Meconium ileus | 30 (15.30) | 13 (6.63) | 43 (21) |
| Malrotation of gut | 13 (6.63) | 10 (5.10) | 23 (11.73) |
| Others | 6 (3.06) | 2 (1.02) | 8 (4.01) |
| Total | 135 (68.87) | 61 (31.12) | 196 (100) |

Table-II: Cause wise distribution of premature and mature neonate (n=196)

| Diagnosis | Premature N (%) | Mature N (%) | Total N (%) |
|--------------------|-------------------|--------------------|------------------|
| Duodenal atresia | 3 (25) | 9 (75) | 12 (100) |
| Gastroschisis | 5 (50) | 5 (50) | 10 (100) |
| Intestinal atresia | 10 (18.18) | 45 (81.81) | 55 (100) |
| HPD | 1 (2.22) | 44 (97.77) | 45 (100) |
| Meconium ileus | 3 (6.97) | 40 (93.02) | 43 (100) |
| Malrotation of gut | 4 (17.39) | 19 (82.60) | 23 (100) |
| Others | 1 (12.55) | 7 (87.5) | 8 (100) |
| Total | 27 (13.77) | 169 (86.22) | 196 (100) |

Table-III-: Age wise presentation of various diseases (n=196)

| Disease | 0-7 days No (%) | 8-14 days No (%) | 15-21 days No (%) | 22-28 days No (%) | Total No (%) |
|--------------------|--------------------|-------------------|-------------------|-------------------|-----------------|
| Duodenal atresia | 12 (100) | - | -- | -- | 12(100) |
| Intestinal atresia | 55 (100) | - | -- | -- | 55(100%) |
| HPD | 25 (55.55) | 20 (44.44) | -- | -- | 45(100) |
| Gastroschisis | 10 (100) | - | -- | -- | 10(100) |
| Malrotation of gut | 10 (43.47) | 8 (34.78) | 5 (21.73) | -- | 23(100) |
| Meconium ileus | 38 (88.37) | 5 (11.62) | -- | -- | 43(100) |
| Others | 8 (100) | - | -- | -- | 8(100) |
| Total | 158 (80.61) | 33 (16.83) | 5 (2.55) | -- | 196(100) |

Table-IV: Frequency distribution of clinical features of neonatal obstruction (n=196).

| Symptoms* | Frequency | % |
|--------------------------|-----------|-------|
| Abdominal distension | 148 | 75.51 |
| Vomiting | 135 | 8.87 |
| Constipation | 45 | 22.95 |
| Failure to pass meconium | 67 | 34.18 |

* Multiple response

Table-V: Frequency distribution of operation performed among the cases (n=186)

| Procedure | Frequency | % |
|---------------------------|------------|------------|
| Colostomy and biopsy | 45 | 22.89 |
| Closure of Gastroschisis | 8 | 4.01 |
| Double barrel ileostomy | 43 | 21.93 |
| Duodenoduodenostomy | 12 | 6.13 |
| Enteroenterostomy | 55 | 28.63 |
| Ladd's procedure | 19 | 9.69 |
| Resection and anastomosis | 4 | 2.04 |
| Total | 186 | 100 |

Table-VI: Frequency distribution of post operative complications (n=186)

| Complications | Frequency | % |
|----------------------|-----------|-------|
| Aspiration pneumonia | 8 | 4.30 |
| Septicemia | 20 | 10.75 |
| Wound infection | 14 | 7.52 |
| Anastomotic leakage | 12 | 5.45 |
| Wound dehiscence | 10 | 5.3 |
| Others | 9 | 4.8 |

Table-VII: Distribution of outcome of patients after management (n=196).

| Aetiology | Survived No (%) | Died No (%) | Total No (%) |
|--------------------|--------------------|-------------------|-----------------|
| Duodenal atresia | 8 (66.66) | 4 (33.33) | 12(100) |
| Intestinal atresia | 47 (85.45) | 8 (14.54) | 55(100) |
| Gastroschisis | 2 (20) | 8 (80) | 10(100) |
| HPD | 40 (88.88) | 5 (11.11) | 45(100) |
| Malrotation of gut | 21 (91.30) | 2 (8.69) | 23(100) |
| Meconium ileus | 39 (90.69) | 4 (9.3) | 43(100) |
| Others | 6 (75) | 2 (25) | 8(100) |
| Total | 163 (83.16) | 33 (16.83) | 196(100) |

Table-VIII: Distribution of outcome among preterm and term neonates (n=196).

| Patients | Survived No (%) | Died No (%) | Total No (%) |
|--------------|--------------------|-------------------|-------------------|
| Preterm | 8 (29.62) | 19 (70.37) | 27 (100) |
| Term | 148 (87.57) | 21 (12.42) | 169 (100) |
| Total | 156 (79.59) | 40 (20.40) | 196 (100%) |

Discussion

Neonatal intestinal obstruction is a common surgical emergency requiring intervention in newborn. Out of 196 neonates admitted under surgical care, 186 (94.89%) patients underwent for surgical treatment and 8(4.08%) patients were improved by conservative treatment and 2 (1.02%) patients were expired before operative treatment. Among 196 study population, 135 (68.87%) were male and 61(31.12%) were female (Table I), with a male-female ratio of 2.21:1. This male preponderance was also observed in other centres¹⁰⁻¹⁴.

In this study atresia 55(28.06%) is the commonest cause of neonatal intestinal obstruction. In Bhopals study, intestinal atresia was the most common cause of neonatal intestinal obstruction followed by Hirschsprung disease⁶. This incidence of 28.06% is similar to the study done in India by Annigeri et al (22.4%) , in Bangladesh by Saha et al, (22%), Ameya et al, (21%) and Ademuyiwa et al, (29.6%) in Nigeria (21%)^{9,10,13,15}. In this study, the male female ratio was 2.2: 1 in case of intestinal atresia ,but in other studies reported in literatures male to female ratio was equal^{11,12,14}.

Hirschsprung disease 45 (22.95%) was second most common cause in this study, but in other studies Hirschsprung disease was the most common cause^{9,10,13}. One study conducted by Saha et al¹⁰ in Dhaka the incidence of Hirschsprung disease was 35.3% which is much higher than this study. But the incidence was almost similar (23.4%) with our study by the study done in Zaria , Nigeria⁴. In Hirschsprung disease, the

male female ratio of 8:1 is concordant with the literature. The median age in Hirschsprung disease was late i.e. 10 days in our study which was later than the median age of 6 days in a similar study in Nigeria⁴. Meconium ileus is 3rd common (21%) cause of neonatal intestinal obstruction. Incidence in this study was higher than study in Dhaka¹⁰ (18.5%). Malrotation gut is 4th common 23(11.73%) cause of neonatal intestinal obstruction. Incidence in this study was higher than study in Dhaka¹⁰ (6.3%) in Ngeria (9.5%). Duodenal atresia is the 5th cause of intestinal obstruction in this study 12(6.12%) but the incidence was 4% by the study of Verma A et al¹⁶. Other cases include 8(4.02%)³ cases of omphalocele minor, 3 cases of meconium plug syndrome, 2 cases of omphalocele major.

In this study, 27 (13.77%) neonates were preterm (less than 37 completed weeks) and 169(86.12%) were full term. This result is more or less similar to the study of Saha et al¹⁶. State of maturity is an important determinant in the neonatal surgical outcome.^{6,10}

Majority of neonates 158 (80.61%) was presented within the first week of life and rest of 38 (19.38%) after 7 days (Table III). Early presentation was observed among intestinal atresia and meconium ileus. On the other hand, presentation was later in Hirschsprung's disease and malrotation because of variability in onset of symptom and lack of specificity. The result is similar to the study of Saha et al¹⁰.

Abdominal distension was found in 148(75.51%) cases and vomiting in 135(68.87%) cases, Some patient presented with more than one sign or symptoms (Table IV). But in the study of Deshmukh SN et al the most common clinical symptoms at the time of hospitalization were abdominal distension (86%) and vomiting (84%). These findings are higher than this study¹⁷.

Most common operation done was enteroenterostomy in 55(28.08%) cases of intestinal atresia, followed by Colostomy and biopsy in 45(22.89%) patients of HPD, double barrel ileostomy was done in 43 (21.93%) cases of meconium ileus, Ladds procedure was done in 19 (9.69%) cases of malrotation of gut and Resection and anastomosis was done in 4(20%) cases of malrotation of gut where there was midgut volvulus with gangrene of bowel loop, duodenoduodenostomy was done in 12 (6.12%) patient of duodenal atresia and closure of gastroschisis was done in 8 (4.01%) cases. But in the study of Deshmukh SN et al. colostomy was done in 26% cases, Ladds procedure in 14% of cases, duodenoduodenostomy in 4% of cases, resection and anastomosis in 26% cases¹⁷.

Postoperative complications were observed in 73 events (Table VI). But more than one complication was noted in a

single patient. In order of frequencies, the complications were septicemia 10.75%, wound infection 7.52%, anastomotic leakage 5.45%, wound dehiscence 5.3%, others 4.85 and aspiration pneumonia 4.30% but the percentage of complications is higher than Saha et al¹⁰.

Out of 196 neonates in this study, 163 (83.16%) survived and 33 (16.83%) died. The survival rate in malrotation of gut is 91.30%, meconium ileus 90.69 %, Hirschsprung's disease 88.88%, intestinal atresia 85.45%, duodenal atresia 66.66%, gastroschisis 20% and others 75%. The highest survival was noted in malrotation of gut and the lowest in gastroschisis. But in the study of Saha et al. 172 (84%) survived and 33 (16%) died and the highest survival was noted in ARM (94%) and the lowest in intestinal atresia (55%)¹⁰. In a study of Verma et al. out of 298 patients, 249 survived and the overall survival rate was 83.6%. Among 49 deaths, highest mortality was observed in intestinal atresia and lowest in Hirschsprung disease¹⁶.

The mortality associated with neonatal intestinal obstruction ranges between 21% to 45% in developing countries, and less than 15% in Europe^{4,13,18}. Mortality in this study was 20.40% which was within the range reported in international publications. Saha et al observed a postoperative mortality¹⁰ of 16.4 %. 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 this series¹⁴. In this study, no of preterm patient is 27(13.77%). Among 27 patients 19(70.37%) patient expired. In the study of Singh V et al. no of premature children were 15(28.30%), among 15 patients 10(66.66%) were expired¹⁹.

Conclusion

Intestinal obstructions are the most common surgical emergencies encountered in newborn. Dedicated delicate neonatal surgical care early diagnosis and intervention are the crucial factor's in improving operative outcome in neonatal surgery. To decrease mortality and morbidity we need advanced technologies, improvement in surgical skill by proper training of paediatric surgeon, paediatrician, anaesthesiologist nurses and technicians. To reduce mortality and morbidity thus to ensure better outcome in neonatal surgery investment is required in this subspeciality.

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