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# A Clinicopathological Study of Neonatal Intestinal Obstruction Pattern, Management and Various Outcomes in Babies Admitted in Tertiary Care Centre

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## Introduction

The neonatal period is defined as the first 28 days after birth[1] Neonatal intestinal obstruction is one of the most common newborn surgical emergencies.[2] Incidence of Neonatal intestinal obstruction is 1 in 1500 live birth.[3] Successful management of a newborn with bowel obstruction depends on timely diagnosis and prompt management.[4] Failure to recognize neonatal bowel obstruction can result in various complications such as aspiration pneumonitis, sepsis, mid-gut ischaemia or perforation and enterocolitis.[5]

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).[6] The degree of abdominal distension correlates roughly with the height of the intestinal obstruction.

The diagnosis and management of the patient with intestinal obstruction is one of the most challenging emergencies that a surgeon can come across. Although the mortality due to acute intestinal obstruction is decreasing with better understanding of pathophysiology, improvement in diagnostic techniques, fluid and electrolyte correction, much potent anti-microbials and surgical management, still mortality ranges from 3% for simple obstruction to as much as 30% when there is vascular compromise or perforation of the obstructed bowel. This is further influenced by the clinical setting and related co-morbidities. Early diagnosis of obstruction, skillful operative management, proper technique during surgery and intensive postoperative treatment yield gratifying results.

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 specialized neonatal surgical setup in our centre.

## Material and Methods

After obtaining approval from the ethical committee, the present study was conducted on all patients of neonatal intestinal obstruction in the S.N.C.U at a tertiary care centre during March 2016 to February 2017 after getting written informed consent from the patient's parents.

**Study Design:** Prospective Observational study

**Inclusion Criteria**

All neonates admitted with intestinal obstruction in S.N.C.U.

**Exclusion Criteria**

- Those patient's parents did not give consent to be included in the study and those who left the study in between.
- Those patient's presented with tracheoeoso-phageal fistula and necrotizing enterocolitis were not included in this study.

A detailed case history was recorded as per the proforma on admission. In majority of the cases, parents, particularly the mothers were the informants. Special attention was given to the pregnancy history and to whether the baby was term or preterm.

Importance was given to physical examination, which included a detailed head to toe examination to look for any congenital defects and a detailed local examination of abdomen. All neonates were examined thoroughly for associated anomalies with special focus on genitalia, spine and CVS.

Blood and urine examination was done routinely for all cases. All neonates with a suspected intestinal obstruction were advised erect X-ray abdomen. A USG abdomen was done in all to look for obstruction and to rule out renal anomalies. Those having cardiac murmur or skeletal deformity were investigated with 2-D ECHO or skeletal X rays.

**Observation & Results**

Out of the 100 cases 67 patients were males and 33 were females as per Table (1). A total of 82 (82%) neonates presented with in the first 7 days and the rest, 18(18%), presented after 7 days.

**Table-1** Sex Incidence

| Sex | Total | Percentage |
|---|---|---|
| Male | 67 | 67% |
| Female | 33 | 33% |
| Total | 100 | 100% |

Out of these 100 cases, 13 babies were born preterm and 87 were term as per Table (2). 91 out of 100 were delivered by normal vaginal route and 9 had lower segment caesarian section.

**Table-2** Sex Wise Maturity

| Maturity | Male | Female | Total | Percentage |
|---|---|---|---|---|
| Term | 58 | 29 | 87 | 87% |
| Preterm | 9 | 4 | 13 | 13% |
| Total | 67 | 33 | 100 | 100% |

The most common cause of intestinal obstruction in this series was anorectal malformation, accounting for 63% (63 patients) of the cases according to Table (3). The second most common cause of intestinal obstruction in this series was Hirschsprung's Disease which occurred in 13% (13 patients) of the cases. Other causes of intestinal obstruction were intestinal atresia in 11 patients, out of which 10 were having jejunoileal atresia and 1 having duodenal atresia, malrotation in 6, meconium ileus in 4 and infantile hypertrophic pyloric stenosis in 3 patients.

**Table-3** Cause of Obstruction

| Etiology | | No. of Cases | Percentage |
|---|---|---|---|
| ARM | | 63 | 63% |
| Hirschsprung's Disease | | 13 | 13% |
| Intestinal Atresia | Dudeonal atresia | 1 | 1% |
| | Jejunoileal atresia | 10 | 10% |
| Malrotation of Gut | | 06 | 06% |
| Meconium Ileus | | 4 | 4% |
| Infantile Hypertrophic Pyloric stenosis | | 3 | 3% |
| Total | | 100 | 100% |

A birthweight less than 2,500 grams is diagnosed as low birthweight. Low birth weight (LBW) babies constituted 32% out of 100 cases.

Clinical presentations [Table 4] include abdominal distension in 59(59%), failure to pass meconium in 54(54%) neonates, vomiting in 25(25%),

Irritability in 19(19%), abdominal pain in 21(21%), absent anal orifice in 58 (58%) and fever in 8(8%).

**Table 4** Mode of Presentation

| Mode of presentation | No. of cases | Percentage |
|---|---|---|
| Abdominal distension | 59 | 59% |
| Vomiting | 25 | 25% |
| Failure of passage of meconium | 54 | 54% |
| Irritability | 19 | 19% |
| Abdominal pain | 21 | 21% |
| Absent anal orifice | 58 | 58% |
| Fever | 8 | 8% |

**Table 5** Showing Prevalance of Different Congenital Anomalies Detected in Neonates with Obstruction

| | | Associated Congenital anomalies | No. of Cases |
|---|---|---|---|
| 1. ARM | | (A) 'VACTREL' | |
| | | (i) Cardiac - VSD | 1 |
| | | (ii)Tracheo-oesophageal fistula | 2 |
| | | (iii) Limb deformity | 1 |
| | | (B) Hypospadias | 1 |
| | | (C) Down's syndrome | 1 |
| 2.Hirschsprung's Disease | | | |
| 3.Intestinal Atresia | DA | Down's syndrome | 1 |
| | JIA | - | - |
| 4. Malrotation of Gut | | - | - |
| 5. Meconium Ileus | | - | - |
| 6. Infantile Hypertrophic Pyloric stenosis | | - | - |

Four neonates (4%) were not operated. Two of them were critically sick, one with Hirschsprung's disease managed conservatively by digital stimulation and enema and called for elective procedure later on and the fourth one was a newborn with meconium plug managed with rectal saline washout and improved. Surgical intervention was performed on 96(96%) of the 100 cases.

Colostomy was done in 63(63%) neonates out of which 51(51%) were sigmoid colostomy and 12(12%) were transverse colostomy, anoplasty 10(2%), laparotomy and resection and end to end anastomosis done in 10(10%), laparotomy and ileostomy in 4(4%) patients, ladd's procedure in 6(6%) neonates with malrotation and ramsted pyloromyotomy in 3(3%) patients with infantile hypertrophic pyloric stenosis. [Table 7]

**Table-7:** Operative Procedure Performed

| Procedure | | No. of cases | Percentage |
|---|---|---|---|
| Cut back Anoplasty | | 10 | 10% |
| Colostomy | Transverse | 12 | 12% |
| | Sigmoid | 51 | 51% |
| Exploratory laprotomy with ileostomy | | 4 | 4% |
| Bowel resection and anastomosis | | 10 | 10% |
| Ladd's procedure | | 6 | 6% |
| RamstedPyloromyotomy | | 3 | 3% |

Postoperative early complications included wound infection in 10(10%) neonates, sepsis in 6(6%), pneumonia in 4(4%) and wound dehiscence in 3(3%). 3 neonates had stomal diarrhea out of 67 neonates with stoma and 2 patients had anastomosis leak (Table 8).

**Table-8** Post-Operative Early Complication

| Early Complication | No. of Cases | Percentage |
|---|---|---|
| Surgical site infection | 10 | 10% |
| Septicemia | 6 | 6% |
| Pneumonia | 4 | 4% |
| Colostomy Diarrhea | 3 | 4.47% |
| Wound Dehiscence | 3 | 3% |
| Anastomosis leak | 2 | 2% |

Out of 100 neonates in our study, 86(86%) survived and discharged. Overall, fourteen (14%) of the 100 cases died. The deaths include, 8 with anorectal malformation, 3 with intestinal atresia (2 with jejunal atresia and 1 with ileal atresia) and 3 with malrotation. Regarding case related outcomes, 8(12.69%) out of 63 cases with ARM died, 3 (27.27%) out of the 11 cases with intestinal atresias died and 3 (50%) out of the 6 cases with malrotation died (Table 9).

**Table-9** Outcome of Surgical Treatment

| Diagnosis | Survived(%) | Death(%) | Total |
|---|---|---|---|
| Imperforated Anus | 55(87.31%) | 8 (12.69%) | 63 |
| Hirschsprung's Disease | 13 (100%) | Nil | 13 |
| Intestinal Atresia | 8 (72.63%) | 3 (27.27%) | 11 |
| Malrotation of Gut | 3 (50%) | 3 (50%) | 6 |
| Meconium Ileus | 4 (100%) | Nil | 4 |
| Infantile Hypertrophic Pyloric stenosis | 3 (100%) | Nil | 3 |

In our study common cause of mortality was sepsis and anastomotic leakage. Sepsis was mainly due to late presentation leading to perforation. Preterm and LBW babies are especially prone to get sepsis and other complications such as anastomotic leakage, apnoea and electrolyte imbalance. Patients who were having some risk factor like prematurity, low birth weight, late presentation, associated severe congenital anomalies were more prone to have bad prognosis even after surgery.

**Table-10** Comparison of Mortality in Preterm and Full Term Newborns

| Newborns | Survive(%) | Death(%) | Total |
|---|---|---|---|
| Preterm | 6 (46.16%) | 7 (53.84%) | 13 |
| Fullterm | 80 (91.96%) | 7 (8.04%) | 87 |

## Discussion

Neonatal intestinal obstruction is a common surgical emergency requiring intervention in new born. Among 100 study population 67 patients were males and 33 were females. Male: female ratios are equal as per reported by literature; in our study the ratio of males was higher (2.01:1). This ratio was similar to the study by Anjali Verma et al (1.5:1) and the study conducted by A K Saha et al 152(1.6:1) 23(23%) patients were low birth weight (<2.5 kg) at birth whereas rest of the babies, 77(77%) were >2.5 kg which is similar to Bhat et al study150 and D Rathore study151.

In this study, 13 (13%) neonates were preterm (less than 37 completed weeks) and 87 (87%) were full term. Gestational age was variable between 32 and 42 weeks. State of maturity is an important determinants in neonatal surgical outcome. Most of the neonates presented to us within first week of life (82%) which was similar to the study conducted by D Rathore et al in Ahmedabad, Gujrat and A K Saha et al in Khulna. 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.

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. 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'. 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.

The most frequent causes of intestinal obstruction were ARM (63%), Hirschsprung's disease (13%), intestinal atresia (11%), malrotation of gut (6%), meconium ileus (4%) and Hypertrophic Pyloric Stenosis (3%) in this study. Nearly similar observation was reported by Amed EA et al, Gangopadhyay study, Osifo OD and Amarjeet Singh Kuka study.

The most common symptoms at presentation were abdominal distension (59%), failure to pass meconium(54%) and vomiting (25%). Bhat et al and A Nagpure et al also had similar presenting complaints in their study.

7 (7%) patients (6 neonates with ARM, and 1 with duodenal atresia) had associated congenital anomaly. Two patients had Down syndrome, one had hypospadias and the rest four had VACTREL association. Multiple congenital anomalies including VSD (in one patient), tracheoesophageal fistula (in two patients) and limb deformity (in one patient) were the associated congenital anomalies in patients with ARM. One baby with duodenal atresia had down's syndrome. Similar results were reported by M Mustafa in his study done at Ethiopia.

Postoperative complications were observed in 54 events. In order of frequencies, the complications were Skin excoriation 28.35%, septicemia 6%, anastomotic leakage 20%, surgical site infection 10%, pneumonia 4%, and others (wound dehiscence, stomaldiarrhea, stomal retraction, stomal prolapse and anal stenosis)

Out of 100 neonates in our study, 86 (86%) survived and 14 (14%) died following initial surgical treatment. Survival rate among Hirschsprung's disease 100%, meconium ileus 100%, Infantile hypertrophic pyloric stenosis 100%, anorectal malformation (ARM) were 87.31%, intestinal atresia 72.63% and malrotation of gut 50%.

The mortality associated with neonatal intestinal obstruction ranges between 21% and 45% in developing countries, unlike less than 15% in Europe. Postoperative mortality in our study was 16.4% which was in between reported international publications. Bhat et al., in their experience in SKIMS, Kashmir observed a postoperative mortality of 14.1%, D Rathore et al reported 13.61% in BJMC, Ahmadabad and Saha et al., reported 16% mortality in Khulna which is close to our series

In our study most common cause of mortality was sepsis followed by anastomotic leakage. Sepsis was mainly due to late presentation leading to perforation or in cases of meconium ileus leading to peritonitis . Preterm and LBW babies are especially prone to get sepsis and other complications such as anastomotic leakage, apnoea and electrolyte imbalance.

Prevention of postoperative sepsis and complications like anastomotic dehiscence and burst abdomen which require a repeat surgery, are necessary for improved survival. With advanced surgical techniques, better paediatric anaesthesia support and improved neonatal intensive care, survival of newborns after surgery has increased tremendously in the recent years. Patients who were having some risk factor like prematurity, low birth weight, late presentation, associated severe congenital anomalies were more prone to have bad prognosis even after surgery. Not much can be done about prematurity and associated anomalies; but delay in diagnosis and treatment, which is a considerable factor is subject to

correction. The type of surgical condition as well as the surgery performed also affects the outcome of patients in an institute. Last but not the least there are some important unresolved, non-countable and concealed issues like motivation for surgical treatment, socioeconomic condition, better infrastructure etc. which are difficult to report and record.

**Conclusion**

Antenatal diagnosis with early referral, improved surgical skills and technologies, adequate staff and post operative care can be made possible by collaborative efforts of paediatricians as well as paediatric surgeons along with investments in neonatal surgery subspecialty are all required to reduce mortality and ensure better outcome in newborns with intestinal obstruction in developing countries. Sepsis was the major determinant of mortality in neonates with NIO in this study. Early presentation, prevention and prompt management of sepsis is needed to decrease the high mortality seen in this study.

As this study was the first of it's kind to occur in our tertiary care center on the topic of NIO, we were focusing mainly on the observation of the clinico-pathological data, management and it's outcome. We are hoping that in the following years further studies will occur on this topic for which our study could be a stepping stone.

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