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Original research article

Neonatal intestinal obstruction: A prospective observational study

[1]Dr. Harini Konkyana, [2]Dr. GN Karthik, [3]Dr. Pranav Chakrin, [4]Dr. K Kameswari

[1]Assistant Professor, Department of Pediatric Surgery, SV Medical College, Tirupati, Andhra Pradesh, India

[2]Consultant Pediatric Surgeon, KIMS, Amalapuram, Andhra Pradesh, India

[3]Andhra Medical College, Visakhapatnam, Andhra Pradesh, India

[4]Retired Professor and HOD, Department of Pediatric Surgery, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India

Corresponding Author:
Dr. Harini Konkyana

Abstract

Background and Objectives: Study of incidence, and enumerate the different causes of neonatal intestinal obstruction in and around our institute. And also to analyse the clinical presentation, different factors which influence the postoperative outcome like, Day of presentation, Birth weight, Maturity of the baby, Antenatal diagnosis, Early presentation, Surgical condition and on -table findings, Condition at the time of admission, Associated anomalies, and Economic status.

Materials and Methods: It was a prospective study conducted at KGH, Andhra Medical College. Methodical entry of records of neonates admitted and treated in our Institute. 117 Neonates with intestinal obstruction were admitted. Data were collected and analyzed for age, day of presentation, sex, gestational age, birth weight, clinical features, mode of presentation, surgical condition, a surgical procedure performed, complications, and their outcome.

Results: Age of the presentation was a few hours to 28 days. Male-Female ratio of 3.6:1. Gestational age varies from 32 to 42 weeks. Birth weight range -1.5 to 2.5 kg. Day of presentation varies among the diseases. Commonest cause in our series was anorectal anomalies followed by Intestinal atresias then H D and others. 18 cases had associated congenital malformations. Performed various surgical procedures. The mortality rate was around 17%.

Conclusion: Epidemiological importance... according to available statistics neonatal intestinal obstruction is more in our area, with 47% of neonatal admissions. Male preponderance was observed. The maturity of the baby is an important determinant in the neonatal surgical outcome, preterm babies succumbed in our study. Most of the neonates presented within 3 days and weighed more than 2.0 kgs. Surgical condition and on-table findings determine the prognosis. Various types of associated anomalies are present. Lower and middle-class babies are most commonly affected. The overall mortality rate was 17%.

Keywords: Neonatal intestinal obstruction, antenatal diagnosis, birth weight

Introduction

More than a third of neonates admitted to the paediatric surgery department within the first 28 days of life suffer from intestinal obstruction. The mode of presentation can be immediately after birth or late presentation with systemic complications leading to shock. Neonates with unrecognised intestinal obstruction deteriorate rapidly leading to increased morbidity and mortality, results of surgical treatment in those cases may be poor.

Early diagnosis depends largely on the prompt detection of obstructive manifestations by antenatal diagnosis, by the clinician postnatally and subsequent accurate interpretation of radiographic findings and other investigations, leading to definitive treatment, which should always be preceded by appropriate resuscitation/preparation of the patient. Management of intestinal obstruction will almost always be surgical apart from some notable exceptions. These cases require prompt surgical management by pediatric surgeons in the tertiary centers with facilities for paediatric anaesthesia, radiology, since delay may lead to respiratory complications due to splinting of the diaphragm by abdominal distension and possible aspiration of vomitus, to severe dehydration, resulting in peripheral circulatory failure, poor tissue perfusion and metabolic acidosis and possibly to perforation or gangrene due to compromised vascularity of the bowel and septicemia. With multidisciplinary care, the morbidity and mortality of cases of intestinal obstruction reported in recent studies is generally low. The poor results are mainly due to the coexistence of delay in presentation and diagnosis and other congenital anomalies (ex: cardiac) or other coexisting medical conditions. Newer treatments and future developments may reduce the residual

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mortality in such cases as ultra-short-bowel syndrome.
Epidemiological importance, according to available statistics neonatal intestinal obstruction is more in our area. In our institute, there is no current data regarding this study. Hence this study has been taken up to analyse and compare with others. Early diagnosis helps us to prevent the various complications. Ours is a Tertiary centre with all infra structural facilities and organised neoatal surgical unit, our outcome is better.

Patients and Methods
It was a prospective observational study. Methodical entry of records of babies admitted and treated in our Institute. Data was entered in the Proforma prepared for the study is collected. Data analysed for age, day of presentation, sex, gestational age, birth weight, clinical features, and mode of presentation, surgical condition, and surgical procedures performed, complications and their outcome. Over a period of 2.5 yrs, a total number of 1508 Cases were admitted to the paediatric surgical services of which 249 were neonates. Over the 30 months 117 Neonates with intestinal obstruction were admitted. It accounted for 47 % of neonatal admission.
Their ages ranged from a few hours to 28 days. Detailed history, careful clinical examination, and early instigation of general resuscitative measures like correction of hypovolemia, oxygen administration, intravenous antibiotics, gastric decompression, correction of electrolytes, then baseline radiological investigation**(**Fig8) a plain x-ray of the abdomen in the erect position and an upper or lower contrast study (Fig 6) for suspicious cases especially those with malrotation and high obstruction. Despite these measures, the actual cause of obstruction were done. Sometimes could not be determined until after exploratory laparotomy. Invertogram was done for anorectal anomalies. Blood was cross-matched before the operation. Cases of anorectal anomalies and Hirschsprung's disease were also included in this study.

Results
Out of 249 neonates admitted under surgical care in our institute, 117 patients were included in this study. Among 117 study population, 92 (78.5%) were male and 25 (21.3%) were female, with a male-female ratio of 3.6:1. This male preponderance was also observed in other centers.
Gestational age varies from 32 to 42 weeks and only 13% (15) of neonates were premature. The day of presentation varies among the diseases Table 1. The incidence of various types of obstruction is shown in Table 2. Most of the patients with ARM came directly to surgical care as the abnormality is externally obvious but in others, the majority of neonates came to surgical specialist after initial conservative management. Anorectal malformation was the commonest cause of neonatal intestinal obstruction in our series.
In A study by Ameh EA, Children LB, it was 68.9% and in the study of A.N. Gangopadhyay *et al*, it was 50.3%. When compared to Nigeria's study ARM incidence is more, but in comparison with the study of A.N. Gangopadhyay *et al*, it is less. Hanif *et al*. in their study in DMCH[14] and Ademuyiwa *et al*. in Nigeria [13], reported ARM (35.6%)followed by H D(23%), Meconium ileus(18.5%), intestinal atresia(14%), and malrotation of gut(6.3%). 04 (3.4%) cases of multiple atresias (fig7) were present in our series, and it was 32% in the study of prem puri and Takao fujimoto[9]. Atresia of the colon (fig 3) is rare and accounts for 2-8% of all intestinal atresias. In our series, it accounts for 4.27% (5 cases), 2 cases survived and 3 died due to low birth weight and prematurity. The incidence of Hirschsprung's disease in our study was 11.9%. In a study by AKSaha, MB Ali, SK Biswas, HMZ Sharif, and A Azim in their article it was 23% in Bang Med J (Khulna) 2012; 45: 6-10.

Birth Weight: Most of the patients weighed more than 2.5 kgs. 6 patients weighed less than 2 kgs, 13 neonates weighed between 2.1 to 2.5 kg where as 26 neonates weighed more than 2.5 kg in our study.

Clinical Presentation
Most cases presented with abdominal distension, with or without vomiting. Bilious vomiting is the common presenting feature in high intestinal obstructions and abdominal distension in lower intestinal obstruction, in our study, some neonates presented with respiratory distress, lump abdomen (2), and antenatal polyhydramnios in 4. In our study, 10 cases were presented with peritonitis. They are Meconium ileus 4, Necrotising enterocolitis 1, Atresia 5. Out of 117 neonates (2 patients died during resuscitation), 97 survived following initial treatment then surgeries were done. Aspiration, and Septicemia were the most common preoperative complications, followed by perforation of the gut.

Associated Anomalies
18 cases of neonates with features of intestinal obstruction had associated congenital malformations. Associated congenital anomalies(e.g. congenital heart disease, spinal dysraphism, urinary tract abnormality, duodenal atresia, and limb abnormality) were common among ARM Congenital anomalies were more frequent among ARM (11%). (TABLE 3).

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Surgical Procedures

We have performed various surgical procedures in these cases i.e A. Derotation and Ladds Procedure in malrotation, B. Diaphragm excision,cyst excion, Bowel resections, Bowel anastomosis, Ileostomy...etc in small bowel Atresia cases,C.Colostomy and Anoplasty in Anorectal malformations and Hirschsprungs disease, ...etc. Conservatively managed 3 cases.

Postoperative Complications

Common postoperative complications were anastomotic leakage, septicaemia, wound infection, convulsions. The mortality associated with neonatal intestinal obstruction ranges between 21% and 45% in developing countries, unlike less than 15% in Europe. [3, 8, 10, 13, 16, 17].

Table 1: Day of presentation

Name of the disease	0-3 d	<7 d	>7 d
ARM	50	04	00
Hirschsprung's disease	03	05	06
Intestinal atresia Mec Ileus Malrotaion Necrotising enterocolitis	26	12	07
Others	02		02

Postoperative mortality (Table 4) in our study was 17% which was in between reported international publications.

In a study by Ameh EA, Childran LB it was 21.1% and in the study of S.dEBO Adeyemi, it was 47%. Hanif *et al* in their experience in DMCH observed postoperative mortality of 15.4% and Islam *et al*. reported 20.8% mortality in RMCH which is close to our series [14, 18]. In most developed countries, early diagnosis including prenatal diagnosis and planned delivery in a fully equipped pediatric surgical center has greatly improved survival in neonates [13]. This is not so in our country where a majority of surgical neonates present very late (fig 4). Uba *et al* also reported that late presentation increased the mortality rate in neonates with intestinal obstruction [10].

Table 2: Incidence of various types of obstruction

Type of obstruction	No. of cases	Percentage
Duodenal atresia(fig1)	03	2.5%
Jejunoileal atresia	18	15.0%
Volvulus /Malrotation (fig2)	09	7.6%
Colon atresia (fig 3)	05	4.2%
Meconium ileus (fig 6)	08	6.8%
Hirschsprung's disease	14	11.9%
Anorectal anomalies	54	46%
Necrotising enterocolitis	02	1.7%
Other causes	04	3.4%

Table 3: Associated Congenital anomalies

Associated anomalies	No: of cases
Cardiac	12
Down"s	02
Multiplecongenital anomalies	02
Cleft lip/palate	02

Table 4: Postoperative mortality

Cause of obstructions	No. of cases	No. of deaths	Percentage
Intestinal atresias	26	11	42%
Volvulus& Malrotation	09	02	22%
Meconium ileus	08	02	25%
Anorectal anomaly	54	02	04%
Others	04	01	25%
HD	14	02	15%

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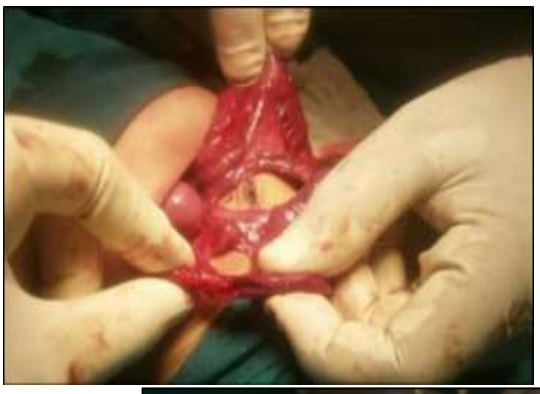


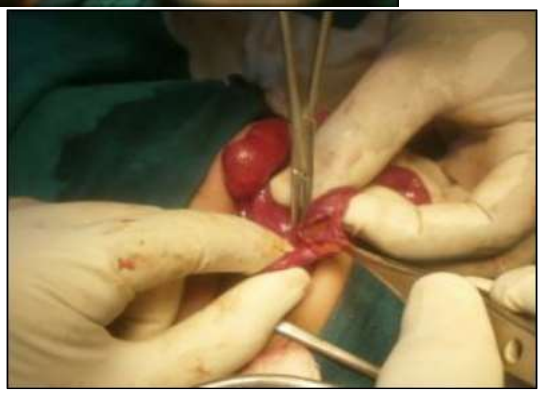
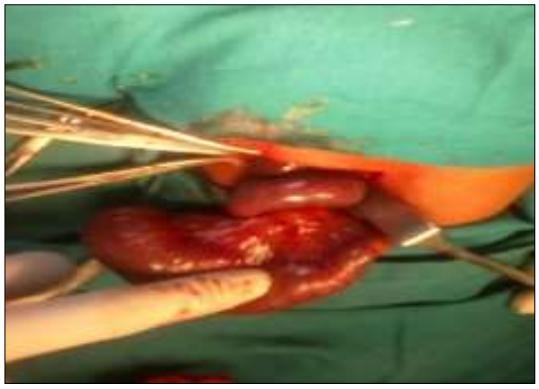


Fig 1: Mesentric Defects

Fig 2: Duodenal Atresia (Diaphragm)



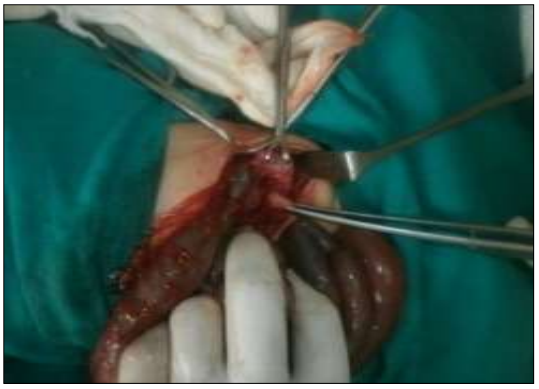
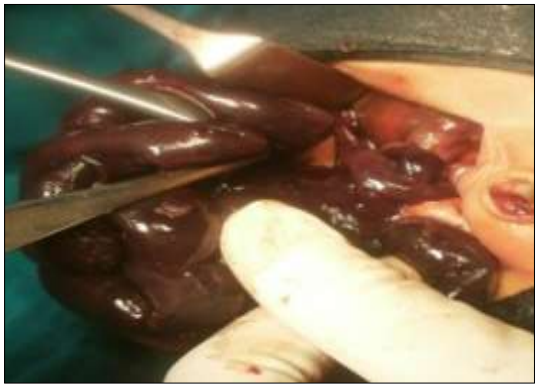


Fig 3: Volvulus **Fig 4:** Colon Atresia



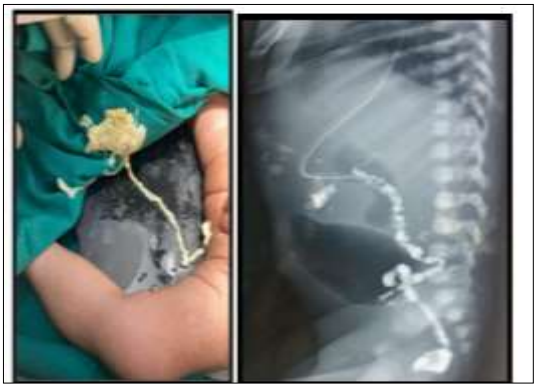


Fig 5: Volvulus WTH gangrene bowel **Fig 6:** Meconium Ileus

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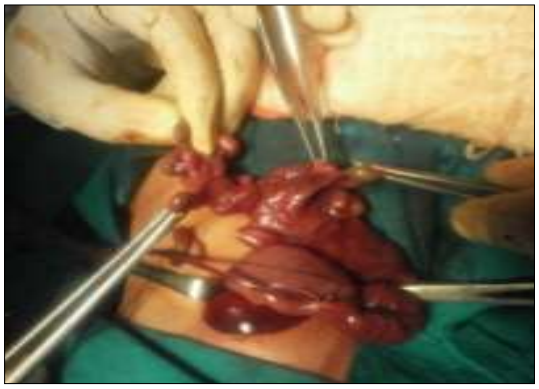

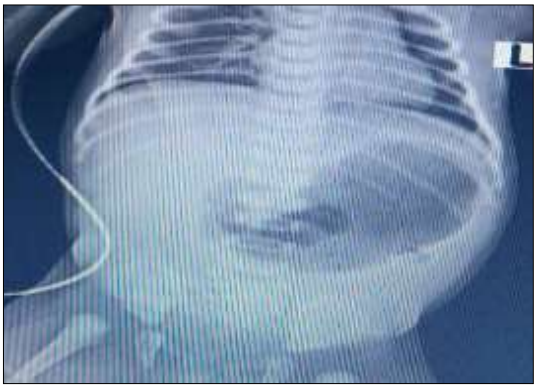

Fig 7: Multiple Atresia **Fig 8:** Early Abdomen X-Ray

Discussion

Neonatal intestinal obstruction is one of the commonest diagnoses at admission in a neonatal surgical unit requiring intervention in newborn. Neonatal intestinal obstruction occurs in 1/1500 live births. Intestinal obstruction in the newborn may be due to a variety of conditions, including atresia and stenosis, annular pancreas, malrotation, volvulus neonaturum, duplication cyst, meconium ileus, meconium plug syndrome and neonatal small left colon syndrome, Hirschsprung's disease, and anorectal malformations and other rarer causes like omphalocele minor with obstruction....etc. There are 4 cardinal signs of intestinal obstruction in newborns: (1) maternal polyhydramnios, (2) bilious emesis, (3) failure to pass meconium in the first day of life, and (4) abdominal distention. The presentation may vary from subtle and easily overlooked findings on physical examination to massive abdominal distention with respiratory distress and cardiovascular collapse. The principal feature of neonatal intestinal obstruction is bile-stained vomiting with or without abdominal distension. Early vomiting, in the first 24 hrs of the life, indicates a high obstruction while the late onset of vomiting indicates a lower obstruction.

Conclusion

Neonatal intestinal obstruction is a common paediatric surgical emergency at our center, 47% of the neonatal admissions. Male preponderance was observed with a 3.6:1 ratio. 6 cases antenatally detected -- 4 cases presented with polyhydramnios, 2 cases with lump abdomen. Maturity of the baby is an important determinant in neonatal surgical outcome, preterm babies succumbed in our study. Most of the neonates presented within 3 days and weighed more than 2.5 kgs. Bilious vomiting is the common presenting feature in high intestinal obstructions and abdominal distension in lower intestinal obstruction, in our study. Surgical condition and on table findings determines the prognosis. Various types of associated anomalies are present in 15% of Cases, Most of them are cardiac anomalies. Lower and middle-class babies are most commonly affected. The overall mortality rate was 17%, which was relatively high because of late presentation due to late referrals, poor literacy, poor antenatal care, and low socioeconomic status. Other contributing factors were prematurity, low birth weight, and various associated anomalies. The desired goal of healthy survival of neonatal intestinal obstruction requires a coordinated interaction of medical, nursing, and rehabilitative specialties in an organized team. Early surgical intervention is paramount and may mean all the difference between intestinal salvage and crippling short gut syndrome.

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Conflict of Interest: None

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