International Journal Dental and Medical Sciences Research
Volume 5, Issue 3, May - June 2023 pp 514-519 www.ijdmsrjournal.com ISSN: 2582-6018

Neurogenic and Luminal Intestinal Obstruction in Neonates- Management and Complications in Rural Tertiary Centre

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Date of Submission: 01-06-2023 Date of Acceptance: 10-06-2023

ABSTRACT:
INTRODUCTION
Surgery in neonates is a challenging issue especially in developing countries
The incidence of surgical emergency in a neonate ranges from 1 to 4 per 100 births (M/C Intestinal obstruction)
AIM
To highlight different causesof neonatal intestinal obstruction, investigations, early diagnosis and intervention and complications in Government Villupuram medical college and hospital
METHODS
A prospective observational study, included 25 neonates who got admitted and diagnosed as Intestinal obstruction in Government Villupuram Medical college, during the span of 2 years between November 2020 and September 2022, as the study group
RESULTS
Among 25 neonates luminal causes of obstruction more prevalent with high incidence in preterm babies and sepsis most common complication and 4 babies died
CONCLUSION
To highlight different **causes** of neonatal intestinal obstruction, investigations, early diagnosis and intervention and complications
KEYWORDS: Obstruction, Contrast, Atresia

I. INTRODUCTION

Intestinal obstructions are the most common surgical emergencies in the neonatal period. Early and accurate diagnosis of intestinal obstruction is paramount for proper patient management. For evaluation and diagnosis, intestinal obstruction in neonates can be divided into either high or low obstruction on the basis of the number of dilated bowel loops present on the initial abdominal radiographs. Although three or fewer dilated bowel loops are typically seen with high intestinal obstruction, more than three are generally seen with low intestinal obstruction in neonates. High intestinal obstructions are defined as occurring proximal to the ileum, resulting in various combinations of gastric, duodenal, and jejunal dilatation according to the level of obstruction (Gastric atresia, Duodenal atresia, Jejunal atresia). In contrast, low intestinal obstructions involve the distal ileum or colon and typically result in diffuse dilatation of multiple small-bowel loops (Ileal atresia and meconium ileus). Although neonates with classic radiographic findings of high intestinal obstruction, such as duodenal atresia, may directly undergo surgery without any additional imaging, an upper gastrointestinal series is typically performed for further evaluation. Large bowel involves functional immaturity of colon and Hirschsprung disease, Similarly, an enema examination is used for further investigation of low intestinal obstruction in neonates.

II. MATERIALS AND METHODS

A prospective observational study, included 25 neonates who got admitted and diagnosed as Intestinal obstruction in Government Villupuram Medical college, during the span of 2 years between November 2021 and September 2022, as the study group
Study design : Prospective Observational Study
Sample size: 25
Study period: 24 months
Inclusion criteria: Newborn presenting with abdominal distension, Bilious vomiting, Not / Delayed / Prolonged passage of meconium
Exclusion criteria: Anorectal malformation
Analysis: Different causes, Investigations and Complications

Methods: Newborn with obstructive symptoms subjected to rectal wash to confirm status of meconium

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Its **presence** indicates **neurogenic** cause and **absence** with white plaques denotes **luminal** cause. Then proceeded to rectal contrast to confirm the same

Presence of dilated bowel proximally and collapsed bowel distally suggestive of Neurogenic and bowel with **filling defect** suggestive of Luminal cause.

Oral contrast shows proximal distension with narrow end –Atresia

Proceeded for **Emergency Laparotomy** and treated .If complicated proceeded for Relaparotomy

III. STATISTICAL ANALYSIS

Data was entered in excel spread sheet and analysed by SPSS software version 18. The continous data were expressed by means of mean ± standard deviation . Frequencies and proportions were also calculated. Appropriate test like spearman coefficient were used to determine significant association between various study variables and the final diagnosis. Significant association was considered with p value <0.05. Variables that showed significance in univariate analysis (p< 0.05) were further subjected to multivariate logistic regression analysis to determine the significant independent association of the variables and the final diagnosis of the study.

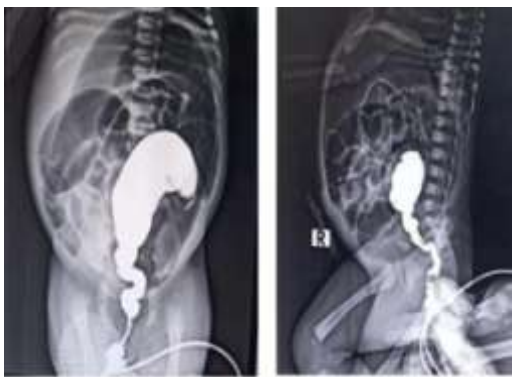
IV. RESULTS

Table1: Term vs Preterm neonates

Out of 25 neonates 15 are preterm and 10 term

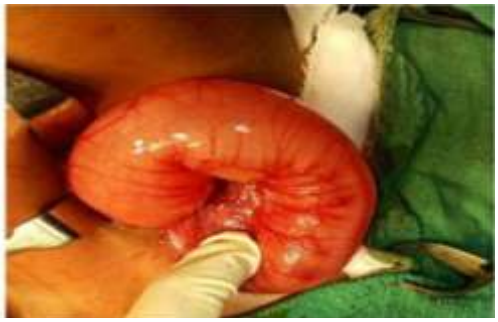
Pre term	Term
15	10

Figure1: Hirschsprung disease – Rectal contrast



Proximally dilated descending colon with distally collapsed large bowel loops(AP and Right Lateral)

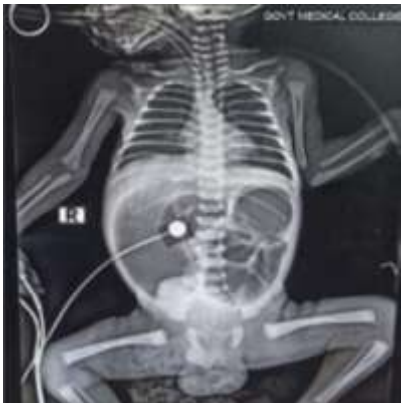
Figure2: Hirschsprung disease Intra OP



Proximal dilated descending colon with distal collapsed bowel

Figure3: Hirschsprung disease – Pre op Picture

Figure4: Jejunal Atresia



Plain Radiograph - Triple bubble appearance

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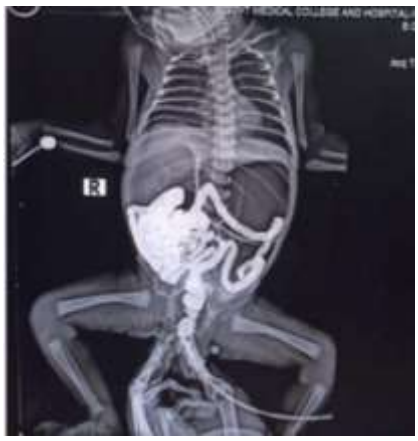
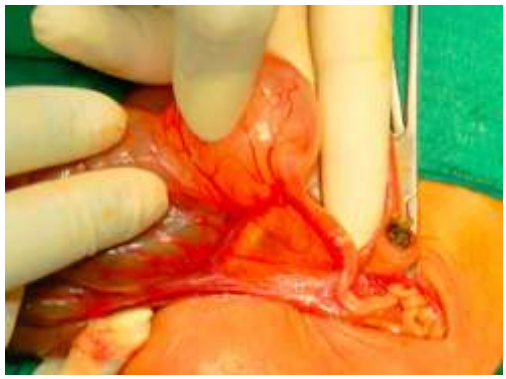
Figure5: Unused colon



Unused colon in high level obstruction in rectal contrast

Figure6:Jejunal Atresia



Intra Op Finding : Proximal dilated jejunal loops with Type I Atretic distal segment of bowel loops

Figure7:Meconium

Meconium passed while giving rectal wash indicating of neurogenic obstruction

Figure8: Duodenal atresia

Oral contrast – Dilated proximal small bowel loops with distal obstruction filling defect

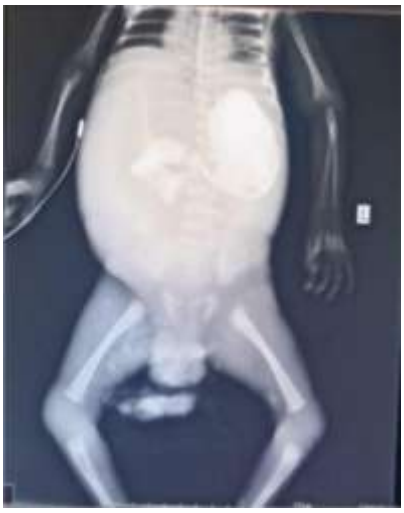
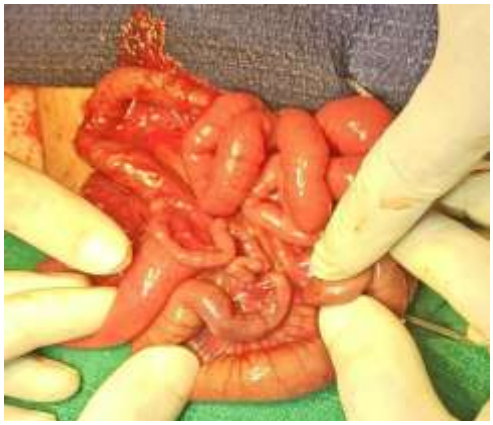


Figure9:Duodenal Atresia



Proximal dilated small bowel loops with atretic segment.Proceeded to **Resection and anastomosis of Atretic segment**

Table2:Analysis

Diagnosis Total cases 25	**Term 40%**	**Pre Term 60%**	**Total 100%**
Duodenal Atresia**16%**	1	3	4
Jejunal Atresia**20%**	3	2	5
Ileal Atresia**28%**	1	6	7

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Hirschsprung disease**32%**	4	4	8
Colonic Aganglionosis**4%**	1	-	1

Table3:Complications needs intervention(16%) N=4

Diagnosis	**Initial procedure**	**Complication managed by**
Total Colonic Aganglionosis 4%	Initially distal ileostomy done Biopsy taken from rectum, colon, appendix and proximal ileostomy site	Postop Biopsy shows immature cells in ileostomy – Relaparotomy proceeded to proximal jejunostomy
Ileal Atresia	Resection and Anastomosis of Atretic Segment	Anastomotic leak proceeded to Reanastomosis
Jejunal Atresia	Resection and Anastomosis of Atretic Segment	Anastomotic leak proceeded to Reanastomosis
Short segment Hirschsprung disease	Sigmoid colostomy Biopsy taken from ostomy	Postop Biopsy immature cells proceeded to Transverse colostomy

Table4: Post operative complications

Diagnosis	DA	JA	IA	HD	CA	Total
Sepsis	1	1	2	2	-	6(24%)
Wound infection	1	1	1	2	-	5(20%)
Anastomotic leak	-	1	1	-	-	2(8%)
Apnea	-	-	1		-	1(4%)
Well tolerated	2	2	2	3	-	9(36%)
Relaparotomy Immature cells	-	-	-	1	1	2(8%)

DA-Duodenal Atresia JA-Jejunal Atresia IA-Ileal atresia HD-Hirschsprung disease CA-Colonic Aganglionosis

Table5: Mortality rate

Diagnosis	**Total N=25**	**Well tolerated**	**Complicated**	**Death**	**Mortality Rate %**
Duodenal Atresia **16%**	**4**	**2**	**2**	**-**	**0%**
Jejunal Atresia **20%**	**5**	**2**	**3**	**1**	**4%**
Ileal Atresia **28%**	**7**	**2**	**5**	**1**	**4%**
Hirschsprung disease **32%**	**8**	**3**	**5**	**1**	**4%**
Colonic Aganglionosis**4%**	**1**	**-**	**1**	**1**	**4%**
Percentage	**25**	**9 32 %**	**16 64 %**	**4 16 %**	**4 16%**

Table6: Complications Luminal vs Neurogenic cause

Cause	No.of cases	Well tolerated	Complicated
Luminal	16	6 (37.5%)	10(62.5%)
Neurogenic	9	3 (33.3%)	6 (66.6%)
Total	25	9	16

In our study out of 25 cases, 16 cases found to be luminal cause in form of atresia comprising 64% compared with neurogenic cause in form of Hirschsprung disease 32% and total colonic aganglionosis 4% comprising 36% of cases. Among 25 neonates 60% term and 40% pre term babies(Table1)

Among 64% babies of atresia 16% duodenal atresia, 20% jejunal atresia, 28% ileal atresia

All atresia beongs to Type I of Martins (Figure10) classification of Intestinal atresia(Table5)

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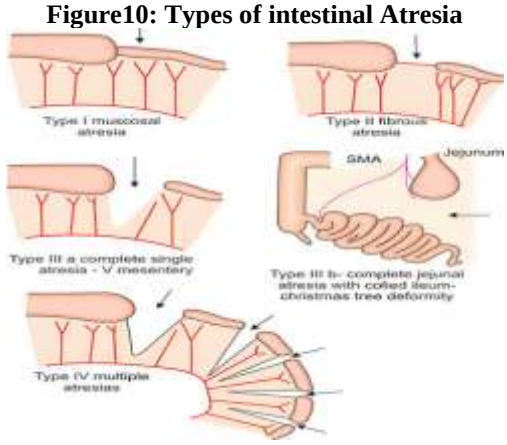
Type I: Membranous/mucosal with normal mesentery- 20%. Type II: The lumen is atretic-fibrous cord between proximal and distal parts of the segment involved (only one atretic segment) but mesentery is normal-40%. Type 111 (a): Atresia with complete separation of proximal and distal ends and V-shaped defect of mesentery-35%. Type Ill (b): Atresia with Christmas tree-shaped defect in mesentery with distal bowel beingsupplied by single artery-right colic/ileocolic/superior mesenteric-apple peel atresia. Type IV: Multiple atresias- 5%

Figure10: Types of intestinal Atresia



Among 25 cases 16 cases 64% complicated by sepsis 24%, Wound infection 20%, Anastomotic leak 8%.Among luminal causes (Table6)

Relaparotomy for immature cells in ostomy site 2(22%) cases out of 9(36% n=25) cases of neurogenic cause

Among 25 cases 4 cases died 16% equal in both luminal (2) and Neurogenic (2) causes

Complications needed relaparotomy for 4 (16%) of cases (Table3)

2 cases of neurogenic causes needed relaparotomy for biopsy showing immature cells and resurgery done and proximal ostomybiopsy shows mature cells and ostomy starts functioning.
2 cases needed relaparotomy for anastomotic leak (8%) and proceeded for reanastomosis.

V. DISCUSSION

In our study, atresia was the most common cause for neonatal intestinal obstruction. This finding was similar to other studies conducted in India where intestinal atresia was the most common cause of neonatal intestinal obstruction followed by Hirschsprung disease

Gestational age and birth weight which are also an important determinant in neonatal surgical outcome, were also comparable to that in other studies.

Bile stained vomiting is relatively frequent in the newborn, and it may be a sign of intestinal obstruction.Abdominal distension can be caused by mechanical or functional intestinal obstruction, ascites or abdominal masses. Gaseous abdominal distension is also common in the preterm with nasal continuous positive airway pressure.

Delayed, Not passing and prolonged passage of meconium suggests intestinal obstruction and it is confirmed that luminal or neurogenic by rectal wash like we did in our study

According to literatures, neonates who do not pass meconium for more than 48 hours after birth are at moderate risk for having Hirschsprung's disease (approximately 5–20 percent) and should be evaluated.

The diagnosis of Hirschsprung's disease is being increasingly made in the neonatal period in the developed countries, while the reverse situation is still prevalent in developing countries.

In our study, 15(60%) neonates were preterm (less than 37 completed weeks) and 10 (40%) were full term. Gestational age was variable between 31 and 40 weeks. State of maturity was an important determinants in neonatal surgical outcome.

The mortality associated with neonatal intestinal obstruction ranged between 21 and 45% in developing countries, unlike Europe where it was less than 15%. In our study mortality rate 16%.

Some of its factors attributing to the high mortality in developing countries included prematurity, late presentation, associated severe congenital anomalies and complications of surgery as well as lack of neonatal intensive care facilities

In most developed countries, early diagnosis including prenatal diagnosis and planned delivery in a fully equipped pediatric surgical centre, has greatly improved the survival in neonates

Intestinal obstruction in a neonate the surgical emergency which can be diagnosed clinically by abdominal distension, Bilious vomiting and not or delayed passage of meconium, rectal wash and radiologically by basic abdominal radiograph with and without contrast. In our study pre operative diagnosis matched 95% with intraoperative findings.

VI. CONCLUSION

The newborn with features of intestinal obstruction poses a diagnostic challenge to the neonatologist and surgeon. But, the systematic interpretation of history, physical examination,

radiograph and contrast imaging in select cases will enable a proper and timely diagnosis.

Intestinal atresia was the most common cause of neonatal intestinal obstruction in our study and septicaemia (anastomotic leak) was most common cause of morbidity and mortality.

Early diagnosis including prenatal diagnosis and planned delivery in a fully equipped centre prevents mortality.

VII. LIMITATION

Since our institute was a tertiary care centre in a rural area number of cases was comparatively low and higher centre care and protocol cannot be followed.

We diagnosed condition by basic abdominal radiograph with and without contrast and Traditional rectal wash and managed with our intense care.

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