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Neonatal Intestinal Obstruction – Our Institutional Experience

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Abstract

Aim : The aim of this study were to evaluate the cases of neonatal intestinal obstruction.

Objectives : To find out the cause, age of presentation, gender distribution, operative findings and their surgical management of neonatal intestinal obstruction at our institute.

Material and method: This study was conducted in 88 neonates who presented with complaints of vomiting or abdominal distension between December 2017 and November 2018 in the department of paediatric surgery at our institute.

Results : Duodenum is the most common site of neonatal intestinal obstruction (25 cases of duodenal atresia), followed by jejunal atresia (20 cases), ileal atresia (17 cases), Malrotation with volvulus (15 cases), colonic atresia and complicated meconium ileus (3 cases of each), meconium ileus and hereditary multiple intestinal atresia (2 cases of each), and 1 case of rectal atresia. Most of the neonates with obstruction were admitted here within 3 days of life, whereas cases of malrotation with mid gut volvulus were presented here 4 to 14 days of life.

Conclusion: Neonatal intestinal obstruction is a surgical emergency, but optimization of vitals and electrolytes warranted. The most common cause of neonatal intestinal obstruction is intestinal atresia.

Keywords: Atresia, Duodenal atresia, Malrotation, Meconium ileus, Neonatal intestinal obstruction.

Introduction

Neonatal intestinal obstruction is a surgical emergency for paediatric surgeon. It is warranted to optimize the vitals of neonates by correction of dehydration and electrolytes. Neonates with intestinal obstruction came with recurrent bilious or non-bilious vomiting. Neonates are very sensitive to loss of water in vomiting because neonatal gastrointestinal secretion (fluids and electrolytes) is

comparatively large in amount than adults and have poor compensatory mechanism, so they need rehydration timely [1]. Bilious vomiting in neonates is an indication of surgical problem. Neonatal intestinal obstruction may occur due to intestinal atresia, malrotation with or without mid gut volvulus, meconium ileus, hirschprungs disease and anorectal malformation. Neonates of intestinal obstruction clinically present with bilious vomiting, failure to pass meconium in first 24 hour of life, and abdominal distention depend on the level of obstruction [2]. An expert sonologist can diagnose this in antenatal sonography. Antenatal sonography showed polyhydramnios, dilated bowel loops proximal to obstruction.

Material and method

This study was conducted in neonates who came with symptoms of intestinal obstruction like bilious vomiting, abdominal distention, visible bowel loop, not passing meconium after 24 hour of birth etc. This study was done in 88 neonates (58 male and 30 female) between December 2017 and November 2018 in the department of paediatric surgery at our institute. A detailed history, thorough clinical examination was done in all neonates. All routine and needed investigations were done, like blood investigation, blood cross match, x-ray chest and abdomen, upper and lower gastro-intestinal dye study. Vital signs, hydration status, abdominal contour, visible bowel loops, anal opening were noted through clinical examination. Systemic examination of cardiovascular system, respiratory system, central nervous system was done.

Inclusion criteria

1- This study include all cases of intestinal atresia.

2 –This study include the cases of meconium ileus.

3 – This study includes the cases of malrotation with or without volvulus.

Exclusion criteria

1- All cases of NEC perforation were excluded.

2 – All cases of hirschprungs disease were excluded.

3 – Bowel perforation.

4 – Cases of anorectal malformation were excluded.

Results

This study include 88 neonates (58 male and 30 female) with intestinal obstruction having various etiologies. Male female ratio was 1.39:1. Bowel atresia was the leading cause of neonatal intestinal obstruction in our study. Duodenum wass the most common site of neonatal intestinal obstruction (25cases duodenal atresia - seven cases of type 1 and 18 cases of type 3), followed by jejunal atresia (20 cases - 7 cases of type 1, 9 cases of type 3a, 1 case of 3b and 3 cases of type 4), ileal atresia (17 cases – 1 case of type 1, 2 cases of type 2, 3a of each, 4 cases of type 3b, and 8 cases of type 4), colonic atresia (3 cases – 1 case of type 1,2,3 in each), hereditary multiple intestinal atresia (2 cases), and 1 case of rectal atresia. We found 15 cases of malrotation with volvulus were presented with bilious vomiting. There were 3 cases of complicated and 2 cases of meconium ileus in this study.

Most of the cases of duodenal atresia were admitted at our hospital within first three days of life. 12 neonates out of 25 neonates of duodenal atresia were admitted within first three days of life. Same in jejunal atresia 9 out of 20, ileal atresia 11 out of 17, colonic atresia 1 out of 3, rectal atresia1 out of 1, meconium ileus 1 out of 2, complicated meconium ileus 2 out of 3 and hereditary multiple intestinal atresia 2 out of 2 were admitted within first three days.

But the cases of malrotation with mid gut volvulus only 1 case out of 15 was admitted in first 3 days of life. 7 neonates were admitted between 4-7 days, 6 were

admitted between 8-14 days and 1 was admitted between 15-28 days of life.

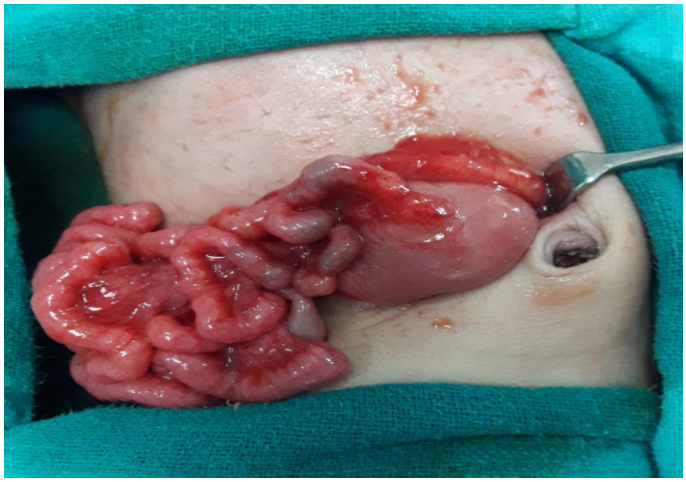

Fig. 1 - showed type 1 jejunal atresia.

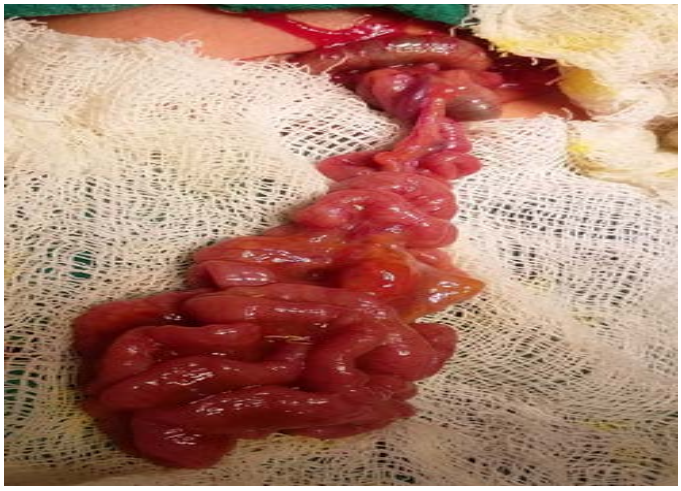

Fig. 2 - showed type 3b ileal atresia.

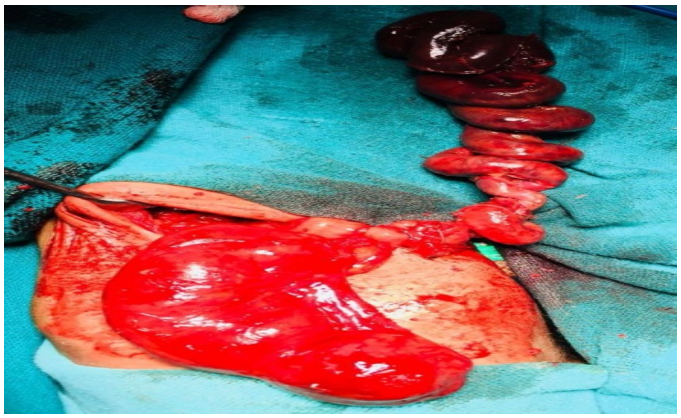

Fig. 3 – showed type 3b jejunal atresia.

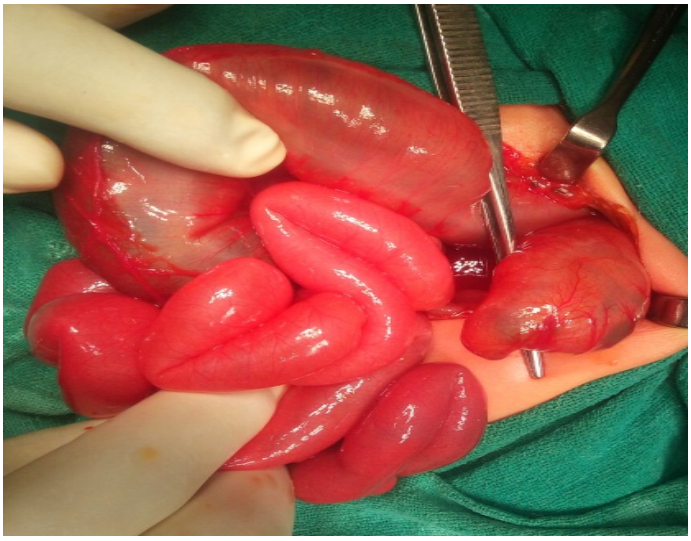

Fig. 4 – showed type 3 colonic atresia.

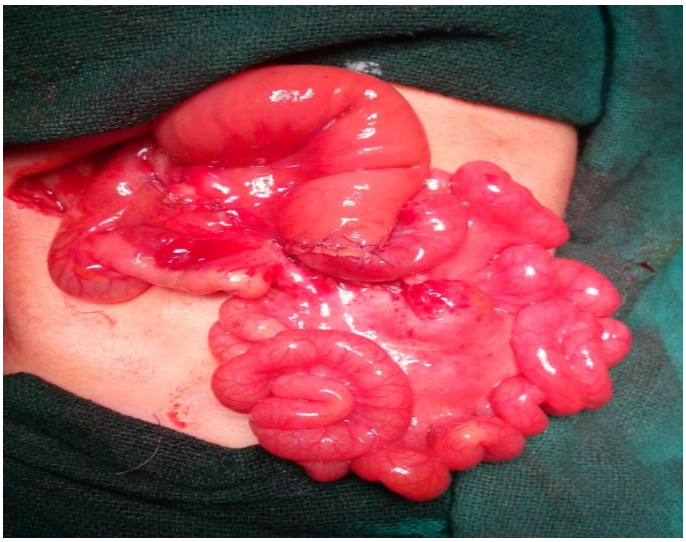

Fig. 5 – showed end to back anastomosis in atresia.

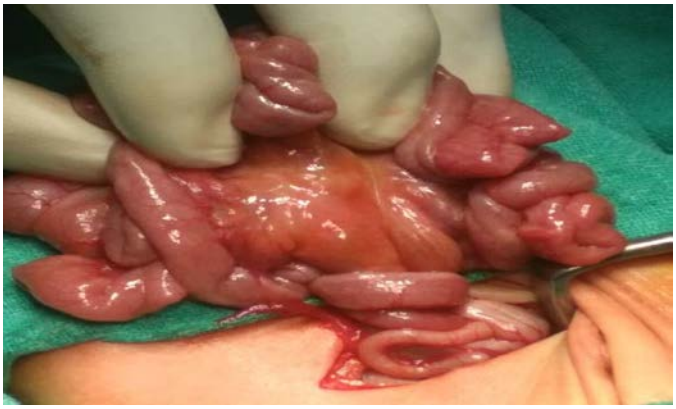

Fig. 6 – showed malrotation with mid gut volvulus.

Discussion

Incidence of neonatal intestinal obstruction is 1 in 1500-2000 live births [2,3]. When intestinal obstruction is proximal to ileum is called “high” obstruction and when the obstruction is in ileum and colon is called “low” obstruction. High obstruction manifest early in life and low obstruction can tolerate neonates comparatively, so presentation of symptoms is late [4].

In our study the most common cause of neonatal intestinal obstruction was intestinal atresia (68 out of 88) followed by malrotation with volvulus and meconium ileus. The study of Verma A, and Dr. Rao et. al. reported the same order of cause of neonatal intestinal obstruction in their study [5,6].

Duodenal atresia – Duodenal atresia occurs due to failure of recanalization. Recanalization of duodenum normally occurs between 9 and 11 weeks of gestational age. Duodenal atresia may be associated with other congenital anomalies, like additional intestinal atresias, congenital heart disease, esophageal atresia, vertebral anomalies etc. Antenatal duodenal atresia can be diagnosed by presence of polyhydramnios and ultrasonography [6]. There were 25 cases (17 male, 8 female) of duodenal atresia in our study, presented with bilious vomiting and low birth weight. X-ray abdomen showed double bubble sign.

Gray and Skandalakis classified three types of duodenal atresia. Type I - these have a web formed by mucosa and submucosa with or without central defect. Thin web may present as windsock deformity. Base of the membrane found at second part of duodenum in windsock deformity. The incidence is 92%. Type II – duodenal ends are atretic, both ends are attached by a cord. Incidence is 1%. Type III - duodenal ends are atretic, separated by some distance but without any tissue intervening. The incidence is 7% [7]. Type 3 duodenal atresia is the common finding 68% and type 1 is 32% in our study.

Jejuno-ileal atresia – etiology of jejuno-ileal atresia is vascular accident during intrauterine life [8]. In our study total cases of jejuno-ileal atresia were 37. Male female ratio of jejuno-ileal atresia was 1.46:1 in this study. Dilated segment of proximal bowel was resected and end to back anastomosis done. But multiple atresias need multiple anastomoses and preserving the length of bowel. Some modifications in surgical techniques such as tapering enteroplasty, use of TPN, and adequate investigations for congenital cardiac anomalies, may improve the outcome [9]. De Lorimier AA et. al. were reported that in jejunal atresia plication of the dilated proximal bowel and end-to-oblique anastomosis. They found that it was preventing functional obstruction of the dilated bowel, and it preserves the mucosal absorptive surface. We did plication of dilated proximal bowel loop in two cases and got good result [10].

Hereditary multiple intestinal atresia – These neonates had multiple atresia and difficult to preserve the bowel length. We did multiple anastomosis but both the neonates were expired.

Colonic and rectal atresia – Colonic atresia is a rare cause of neonatal intestinal obstruction. The incidence of colonic atresia is 1:66,000 live births [11]. We are reporting here 3 cases of colonic atresia. These were one case of type 1, one case of type 2 and one case of type 3. We did loop colostomy in type 1, double barrel loop colostomy in type 2 and 3 colonic atresia.

Rectal atresia – Rectal atresia is an extremely rare cause of neonatal intestinal obstruction. It presents with normal anal opening and atretic rectum. An in utero ischemic accident explains the etiopathogenesis of this rectal malformation. The incidence is 1%-2%. [12].We are reporting here a case of rectal atresia in female child, who

admitted on day three of life with abdominal distention and bilious vomiting.

Meconium Ileus (Complicated or Uncomplicated) - Meconium ileus is defined as obstruction caused by inspissated, tenacious meconium that adheres to the mucosa of the distal small bowel. A pancreatic enzyme deficiency can leads to more "sticky" and dense than usual. 20% to 30% neonates who have cystic fibrosis can present with meconium ileus [13].There were 2 cases of meconium ileus and 3 cases of complicated meconium ileus. All these cases were admitted within first week of life. Saha AK et. al. were also reported that cases of meconium ileus admitted within first week of life [14].

Malrotation with or without volvulus – Our study showed that malrotation is the next common cause of neonatal intestinal obstruction after intestinal atresia. The study done by Dr. Rao et. al. also reported the same incidental order of malrotation [15]. Intestinal fixation during embryogenesis occurs in three stages. This occurs between 4 to 12 weeks of embryogenesis. Stage 1 is physiological herniation of gut – this occurs in small peritoneal cavity due to differential growth of developing bowel and herniates through umbilical cord. Stage 2 – this is the return of the gut in peritoneal cavity with counter clock wise rotation around the superior mesenteric artery. Stage 3 is fixation of mesentery to the posterior abdominal wall. Aberration in this embryogenesis leads to malrotation. These neonates present with bilious vomiting. [16]. There are 15 cases of malrotation with mid gut volvulus, presented with bilious vomiting. X-ray abdomen of these neonates showed gas filled dilated stomach and duodenum with paucity of gas in abdomen. Ultrasonography of these neonates showed whirlpool sign.13 cases were admitted between 4 to 14 days of life in this study. Derotation and ladds procedure is the surgery of choice.

Conclusion

Neonatal intestinal obstruction is a challenging task to the paediatric surgeons. Because optimization of the vitals by correction of dehydration and electrolytes before surgery. This is mandatory to decrease the morbidity and mortality. The most common cause of neonatal intestinal obstruction is intestinal atresia. In our study duodenal atresia is most common cause of intestinal atresia followed by jejunal atresia, ileal atresia, colonic atresia and least common rectal atresia. Most cases of obstruction were admitted within first week of life except malrotation with volvulus who present late symptoms.

Table 1 – Gender distribution in cases of neonatal intestinal obstruction

S.no.	Cause of NIO	Male	Female	Total
1	Duodenal atresia	17	08	25 (28.4%)
2	Jejunal atresia	12	08	20 (22.7%)
3	Ileal atresia	10	07	17 (19.3%)
4	Colonic atresia	02	01	03 (3.4%)
5	Rectal atresia	00	01	01 (1.1%)
6	Malrotation with volvulus	11	04	15 (17.04%)
7	Meconium ileus	02	00	02 (2.27%)
8	Complicated meconium ileus	02	01	03 (3.4%)
9	Hereditary multiple intestinal atresia	02	00	02 (2.27%)
	Total	58	30	88

Table 2 – Showed distribution of age of neonate at admission time in our institut

S.no.	Cause of NIO	0-3 days	4-7 days	8-14days	15-28 days	Total
1	Duodenal atresia	12	6	3	4	25
2	Jejunal atresia	09	7	3	1	20
3	Ileal atresia	11	4	2	0	17
4	Colonic atresia	01	1	0	1	03

5	Rectal atresia	01	0	0	0	01
6	Malrotation with volvulus	01	7	6	1	15
7	Meconium ileus	01	1	0	0	02
8	Complicated meconium ileus	02	1	0	0	03
9	Hereditary multiple intestinal atresia	02	0	0	0	02
Total		40	27	14	7	88

Table 3 – Showed diversity of atresia in neonatal intestinal atresia

S.no.	Cause of NIO	Type 1	Type 2	Type 3a/3	Type 3b	Type 4	Total
1	Duodenal atresia	8	0	17	-	-	25
2	Jejunal atresia	7	0	9	1	3	20
3	Ileal atresia	1	2	2	4	8	17
4	Colonic atresia	1	1	1	-	-	03
5	Rectal atresia	1	0	0	-	-	01

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