

RESEARCH ARTICLE

INTESTINAL MALROTATION - A COMMON YET DEADLY CAUSE OF NEONATAL SMALL BOWEL OBSTRUCTION

Dr. Saurav Sultania, Dr. Arvind Kumar Shukla, Dr. Pramila Sharma, Dr. Dinesh Kumar Barolia and Dr. **Ankit Singh**

Department of Paediatric Surgery, SMS Medical College, Rajasthan University of Health Sciences, Jaipur, (Rajasthan,) India.

..... Manuscript Info

Manuscript History

Received: 20 January 2021

Neonatal Intestinal Obstruction,

Published: March 2021

Kev words:-

Volvulus

Final Accepted: 24 February 2021

Bilious Vomiting, Malrotation, Mid Gut,

Abstract

..... Background: This study was done at SMS Medical College, Jaipur with an aim of emphasizing the need of having a high index of suspicion in newborn presenting with bilious vomiting for the diagnosis of malrotation.

Methods: Cases of neonatal small intestinal obstruction due to malrotation presenting to the Department of Paediatric Surgery, SMS Medical College, Jaipur over a period of two years were evaluated. Results: A total of 48 newborns presented to our department with intestinal obstruction due to malrotation. Majority (82%) of the patients presented in the 2nd and 3rd week of life. 6 out of 48 patients presented with extensive gangrene of midgut. 9/48 patients died during the course of treatment and during follow-up.

Conclusion: Malrotation is a relatively common cause of neonatal small bowel obstruction. A high index of suspicion is required in neonates presenting with bilious vomiting. Prompt diagnostic tools and early laparotomy prevents fatal complication of extensive midgut gangrene due to volvulus.

Copy Right, IJAR, 2021,. All rights reserved.

.....

Introduction:-

Malrotation also known as intestinal rotation abnormality (IRA), constitute a spectrum of conditions that occur during the normal embryologic process of intestinal rotation, the clinical picture of which may vary from being totally asymptomatic to potentially fatal extensive midgut gangrene.

The classical presentation in a neonate is bilious vomiting with or without abdominal distention1. Bilious vomiting in the neonatal period is a primary sign of intestinal obstruction. The main causes of neonatal intestinal obstruction resulting in bilious vomiting are duodenal atresia, jejunoileal atresia, midgut malrotation and volvulus, necrotizing enterocolitis, and meconium ileus [2].

Bilious vomiting in a case of intestinal malrotation may occurs either due to obstructive compression of the duodenum by Ladds bands, an associated duodenal atresia or web, or (more ominously) midgut volvulus [3]. Midgut volvulus occurs around the narrow-based mesenteric pedicle, causing twisting of the SMA and SMV. Initially, the abdomen is not distended because the obstruction is very proximal. As intestinal ischemia develops, hematochezia, irritability, pain, abdominal distention, and peritonitis may be seen. As the midgut becomes necrotic, abdominal wall

Corresponding Author:- Dr. Pramila Sharma

Address:- Department of Paediatric Surgery, SMS Medical College, Rajasthan University of Health Sciences, Jaipur, (Rajasthan,) India.

erythema, septic shock, and death may also occur [3]. Thus every neonate with bilious vomiting should be assumed to have malrotation until proved otherwise.

The objective of this study is to strongly emphasize the need to have a high index of suspicion in a newborn presenting with bilious vomiting for the diagnosis of malrotation. This necessitates early surgical management preventing the fatal but preventable complications of midgut volvulus like extensive gangrene of small bowel and short bowel syndrome.

Methodology:-

There were 48 neonates of intestinal malrotation presented at out tertiary referral pediatric surgical centre SMS Medical College, Jaipur from November 2018 to October 2020. They were undergoing surgery for intestinal malrotation included in the present study.

The diagnosis of malrotation was suspected on a plain X-ray abdomen which was done after admission and initial resuscitation of neonates presenting with bilious vomiting. If the abdominal X-ray (Figure 1) was suggestive of gastro-duodenal dilatation with absence or paucity of distal gas, the child was subjected to a Doppler Ultrasonography, which was used as a noninvasive screening tool by identifying an abnormal orientation of the SMA and SMV and presence or absence of Whirlpool Sign. A diagnosis of malrotation was then made without subjecting the patient to upper or lower GI contrast studies and thus further avoiding delay in the definitive management.

All neonates were taken up for surgery after proper resuscitation. Exploratory Laparotomy with Ladds procedure was performed with the need of Resection and Anastomosis/Stoma in patients with intra-operative bowel gangrene. The steps of this procedure include de-rotation of volvulus if present, release of Ladd's bands, straightening of the duodenum, widening of duodeno-colic mesentery, ruling out intrinsic duodenal obstruction, appendectomy and placing the bowel in position of non-rotation. All patients were followed up in the immediate post-operative period and also up to the next 3 months duration.



Fig. 1 :-showed x-ray features of malrotation, dilated stomach and paucity of gas in abdomen. Fig. 2 :- showed intra operative photograph of intestinal malrotation with volvulus.

Table 1:- Age and sex wise distributio	n.
--	----

Age groups (N=48)	n	%
1st week of life	3	6%
2nd week of life	21	44%
3rd week of life	18	38%
4th week of life	6	12%

Sex (N=48)	n	%
Male	39	81%
Female	9	19%

Table 2:- Intraoperative findings (N=48).

	n	%
LADDS band	48	100%
Volvulus	37	77%
Gangrenous bowel	6	12%

Results:-

During the study period, 48 neonates underwent Exploratory Laparotomy for Intestinal malrotation. The chief complaint in all patients (48/48) was sudden onset of bilious vomiting in an otherwise normal neonate who had passed meconium after birth and was breastfeeding well before the onset of symptoms. Age of onset of symptoms ranged from birth to 26 days with the mean age at presentation was 15th day of life [Table 1]. A combination of gastro-duodenal obstruction on plain X-ray abdomen and orientation of SMA and SMV on Doppler USG abdomen was diagnostic in all cases except 2, in which extensive bowel gas shadows obscured the Doppler window.

Findings of malrotation were evident at laparotomy in all cases. 37 children (77 %) had findings suggestive of mid gut volvulus [Table 2]. 6 patients (12%) who had mid gut volvulus, also had extensive gangrene of small intestine and in all these 6 cases extensive resection of small bowel resulted in short bowel syndrome and intestinal failure. Postoperative complications were found among 10 patients. Most common complication was septicemia followed by AKI and MODS followed by wound sepsis.

Total mortality in the present series was 9/38 i.e. 19%. All 6 patients who developed intestinal failure died. One patient died on the 5th post-operative day due to sepsis and MODS. On follow-up, two patients died of unknown cause within the first 2 months post-surgery.

Discussion:-

The true incidence of intestinal rotational disorders is unknown, although some autopsy studies indicate that the incidence may be as high as 1% of the population [4]. Previous reports suggest that about 90% of patients with malrotation are diagnosed within the first year of life, with 80% of these diagnosed in the first month [5,6]. Male infants are more frequently affected than female infants [7] which was also the trend in our series (81% males).

The most frequent reported sign in neonates is bile-stained emesis [5]. In our case series, all 48 neonates had bilious emesis as the presenting complaint. Diagnosis was mainly based on clinical presentation and radiological investigations. Initially children were subjected to X-ray abdomen leading to suggestive findings like paucity of gaseous shadows beyond 2nd part of duodenum. A gasless abdomen associated with abdominal distension or tenderness may be a sign of strangulated midgut volvulus [8]. Doppler USG findings of a "whirlpool" or 'swirl" sign of twisting of superior mesenteric artery is diagnostic of volvulus [9,10]. In our case series, Plain X-ray abdomen and Doppler USG was diagnostic in all cases except two cases where extensive bowel gas shadows obscured the Doppler view.

The incidence of midgut volvulus in symptomatic malrotation has been reported to be 45% to 80% [11,12] and that of strangulation is 15% [13] in the neonatal period. However, in our series, midgut volvulus was seen in 77 % whereas strangulation with bowel gangrene was found in 12% of the cases. Data from recent series reveal that mortality rates in adults and children operated on for intestinal malrotation range from 0-14% [14]. Higher mortality rates are seen in cases with acute onset of midgut volvulus, delayed diagnosis, or the presence of intestinal necrosis. In our series, the mortality rate was found to be slightly higher (19%) probably due to delayed presentation and relatively higher incidence of midgut volvulus among our cases.

Conclusion:-

Intestinal malrotation due to its life-threatening complication in the form of midgut volvulus, if not promptly diagnosed and treated, can lead to death or a lifelong dependence on total parenteral nutrition in survivors.

Therefore, a high index of suspicion and early surgical correction without any delay in establishing diagnosis is of utmost importance in a neonate with intestinal malrotation.

References:-

- 1. Applegate KE, Anderson JM, Klatte EC. Intestinal malrotation in children: a problem-solving approach to the upper gastrointestinal series. Radiographics 2006; 26(5):1485e500.
- 2. Kimura K, Loening-Baucke V. Bilious vomiting in the newborn: rapid diagnosis of intestinal obstruction. American Family Physician 2000; 61(9):2791e8.
- 3. Langer J.Intestinal Rotation Abnormalities and Midgut Volvulus. SurgClin North Am. 2017 Feb; 97(1):147-159.
- 4. Kapfer SA, Rappold JF. Intestinal malrotation-not just the pediatric surgeon's problem. J Am Coll Surg. 2004; 199:628-635.
- 5. Millar AJW, Rode H, Brown RA, Cywes S. The deadly vomit: malrotation and midgut volvulus. Pediatr SurgInt 1987; 2: 172–176.
- 6. Garg D, Barolia DK, Singh AP, Mathur V. Neonatal Intestinal Obstruction Our Institutional Experience. International Journal of Medical Sciences and Innovative Research. 2019; 4(1): 144-150.
- 7. Millar AJW, Rode H, Cywes S. Malrotation and volvulus in infancy and childhood. Semin Pediatr Surg 2003; 12:229-36.
- 8. Vecchia LKD, Grosfeld JL, West KW, Rescorla FJ, Scherer LR, Engum SA. Intestinal atresia and stenosis. Arch surg. 1998; 133:490-7.
- 9. Chao HC, Kong MS, Chen JY, Lin SJ, Lin JN. Sonographic features related to volvulus in neonatal intestinal malrotation. J Ultrasound Med. 2000; 19:371-6.
- 10. Pracros JP, GeninG, Tran-Minh VA, Morinde, FinfeCH, Foray Pet al. Ultrasound diagnosis of midgut volvulus: ?the whirlpool sign".PediatrRadiol. 1992; 22:18-20.
- 11. Yanez R, Spitz L. Intestinal malrotation presenting outside the neonatal period. Arch Dis Child. 1986; 61:682-5.
- 12. Stewart DR, Colodny AL, Dagget WC. Malrotation of the bowel in infants and children: a 15 years review. Surg. 1976; 79:716-20.
- 13. Torres AM, Ziegler MM. Malrotation of the intestine. World J Surg 1993; 17:326-31.
- 14. Wallberg SV, Qvist N. Increased risk of complication in acute onset intestinal malrotation. Dan Med J. 2013. 60:A4744.

Abbreviations:-

- IRA Intestinal Rotation Abnormality
- SMA Superior Mesenteric Artery
- SMV Superior Mesenteric Vein
- USG Ultrasonography

AKI - Acute Kidney Injury

MODS - Multi Organ Dysfunction Syndrome