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Case Report

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Neonatal intestinal obstruction secondary to Meckel's diverticulum with associated band and ileal stricture: A case report with review of literature

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Meckel's diverticulum,
Mesodiverticular band,
Ileal stricture

ABSTRACT

Background: Symptomatic Meckel's diverticulum is exceptionally rare in neonates, often presenting as intestinal obstruction or perforation. The differential diagnosis may encompass more prevalent conditions like intestinal atresia, malrotation, or Hirschsprung's disease.

Case Presentation: We present a case of a 21-day-old female who presented with intestinal obstruction. Exploratory laparotomy revealed Meckel's diverticulum with a mesodiverticular band causing closed-loop obstruction along with three passable strictures in the ileum. Surgical resection of the affected bowel and the creation of an ileostomy were performed due to bowel ischemia and hemodynamic instability.

Conclusion: Early diagnosis and prompt surgical intervention are pivotal in managing neonatal Meckel's diverticulum, reducing risks of bowel necrosis and complications.

INTRODUCTION

Neonatal intestinal obstruction (NIO) is a frequent cause of admission to neonatal intensive care units (NICU), affecting 1 in every 2000 live births.[1] The most commonly reported causes of NIO include intestinal atresia, Hirschsprung's disease, malrotation of the gut, and meconium ileus.[2] Meckel's diverticulum (MD) is a rare occurrence in neonates and extremely uncommon as a cause of NIO. The most frequent clinical manifestations of symptomatic neonatal MD are bowel obstruction (58.3%) and perforation (33.3%).[3] Herein, we present a rare case of NIO secondary to MD with an associated band and ileal stricture in a 21-day-old term neonate.

CASE REPORT

A 21-day-old female neonate, born at full term with a birth weight of 3.1 kg via normal vaginal delivery following an uncomplicated pregnancy, presented with abdominal distension, bilious vomiting, and loose stools for the past 2 days. There was no history of delayed passage of meconium and she was passing stool normally and regularly until 2 days before presentation. On examination, she was tachypneic with a respiratory rate of 64 breaths per minute, dehydrated, lethargic with a random blood glucose level of 62 mg/dL. She had an increased capillary refill time (>4 seconds). Her temperature was 36°C, her blood pressure was 64/36 mm Hg, and her pulse was weak with a rate of 176 beats per minute. The abdomen was distended and tense with visible bowel loops. There was no history of bleeding per rectum. Local examination of the genitalia revealed normal female external genitalia with a normally placed anal opening.

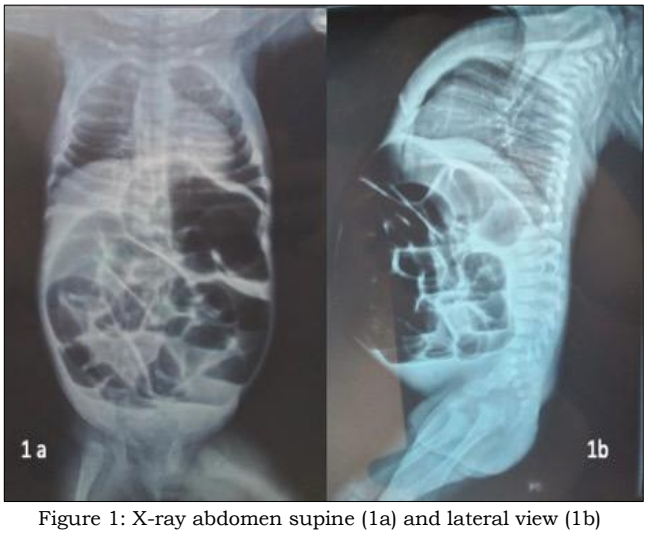

Figure 1: X-ray abdomen supine (1a) and lateral view (1b) showing dilated small bowel loops with air-fluid level.

After initial resuscitation, an x-ray abdomen was done which showed dilated small bowel loops with air-fluid levels, suggestive of small bowel obstruction (Fig. 1).

Laboratory data were within normal limits except for total leukocyte count of 19,400/mm3, hyponatremia (129 mEq/L) and hypokalemia (3.2 mEq/L). Venous blood gas analysis at admission revealed metabolic acidosis with a pH of 7.27, decreased bicarbonate of 18 mEq, and a base deficit of -6, along with raised lactate levels. After fluid resuscitation, the baby was hemodynamically and thermodynamically stable and was planned for exploration.

Figure 2: Intraoperative picture showing Meckel's diverticulum with mesodiverticular band (white arrow) obstructing with three passable ileal strictures (yellow arrow).

Intraoperatively, MD was found approximately 30 cm proximal to the ileocecal junction (ICJ) at the antimesenteric border. Additionally, a mesodiverticular band (MDB) was identified, resulting in a closed-loop obstruction by compressing three loops of the ileum. This led to a 10 cm segment of congested, dusky, and pre-gangrenous bowel with three passable strictures at intervals of 3-5 cm each (Fig. 2). Due to the patient's hemodynamic instability resulting from intraoperative hypotension, a decision was made to perform resection of the pre-gangrenous bowel along with the creation of an ileostomy. Postoperatively, the child was shifted to the NICU and required inotropic support for the next two days. The child was discharged seven days after surgery, tolerating oral feeds with a functional ileostomy. Histopathological examination of the resected specimen confirmed the presence of MD, without any ectopic mucosa. At three-month follow-up, the child underwent ileostomy closure without any associated complications. She is currently 6 months old and thriving well.

DISCUSSION

MD, a true diverticulum of the small intestine, is the most common congenital anomaly of the gastrointestinal tract. It originates as a remnant of the omphalomesenteric or vitelline duct, which typically undergoes regression during the 5th–7th week of gestation. It is classically associated with the "rule of 2"; present in 2% of the population, twice as often in males, situated within 2 feet from the ileocecal valve, measuring around 2 inches in length, and may present before the age of 2 years.[3]

Around 60% of symptomatic MD cases occur during childhood, particularly after the age of 3 years, with symptomatic MD notably uncommon in the neonatal period.[4] Common presentations of neonatal MD as reported in the literature include bowel obstruction, perforation, intussusception, gastrointestinal bleeding, and ileal volvulus.[3,5,6,7] However, intestinal obstruction is the most common and represents approximately 58% of symptomatic neonatal MD cases.[3]

In the literature review, only a few case reports of NIO secondary to MD could be found.[3,5,6,7,8,9,10,11] Table 1 provides a concise overview of the reported cases of NIO attributed to MD. The mechanisms of obstruction as documented include volvulus, intussusception, bands, Littre's hernia, internal hernias, and strictures. Additionally, MD has been reported as a lead point in intussusception, as well as causing adhesive small bowel obstruction through perforation of an inflamed diverticulum, small bowel volvulus around an adhesive band attached to a MD or direct compression of the small bowel by a band originating from the MD. In the index case, a MDB led to closed-loop obstruction by compressing ileal loops, alongside three passable ileal strictures. Our case was unique due to the presence of three passable strictures near MD, in addition to the MDB causing obstruction.

Surgical management options for MD include wedge resection, bowel resection with anastomosis, and bowel resection with ileostomy formation. In previously reported cases, resection and anastomosis were the preferred surgical procedures, with one of them being performed using minimally invasive surgery. The benefits of laparoscopic procedures are numerous, provided the surgeon is sufficiently trained. However, in neonates, performing laparoscopic surgery can be particularly challenging, especially in the context of small bowel obstruction. In the index case, we opted for bowel resection and ileostomy formation due to the unhealthy appearance of the bowel which was dusky, congested, and pre-gangrenous.

Due to the rarity of symptomatic neonatal presentations, MD may be mistaken for other more common causes of NIO such as intestinal atresia or malrotation. Diagnosing NIO caused by MD is challenging, as there are no distinguishing clinical features. Plain abdominal X-rays are usually non-specific and typically show features suggestive of small bowel obstruction. Therefore, a high index of suspicion is necessary for this diagnosis and it is

essential to consider a differential diagnosis of MD and its associated complications before proceeding with further management.

Table 1: Literature review for neonatal intestinal obstruction secondary to Meckel's diverticulum

Sr. No.	Author	Year of publication	Clinical presentation	Operative findings	Management
1.	Sy et al [5]	2002	Bilious vomiting, abdominal distension, palpable bowel loops	MD with ileal volvulus, necrosis of Meckel's diverticulum, and adjacent small bowel	Resection and anastomosis
2.	Yu et al [6]	2005	Bilious vomiting, abdominal distension	Large MD with ileocecal intussusception	Manual reduction of intussusception with diverticulectomy
3.	Aziz et al [8]	2012	Abdominal distension, non passage of meconium	Obstruction due to floppy MD	Laparoscopic-assisted extracorporeal resection of MD and anastomosis
4.	Bertozzi et al [3]	2013	Bilious vomiting, failure to thrive, abdominal distension	Pseudocystic MD causing intestinal obstruction	Resection and anastomosis
5.	Kunitsu et al [9]	2015	Bilious vomiting, abdominal distension, palpable distended bowel loops	MD with short mesodiverticular band causing a direct compression on proximal bowel.	Wedge resection
6.	Oukhouya et al [10]	2018	Bilious vomiting, abdominal distension, nonpassage of stools	MD encircled around adjacent bowel and attached to the mesentery causing obstruction	Resection and anastomosis
7.	Kotinatot et al [11]	2022	Bilious vomiting, intolerance of feeds, born with Trisomy 13	MD with band causing volvulus	Resection and anastomosis
8.	Honig et al [7]	2023	Fresh Per rectal bleed, abdominal distension	Closed loop intestinal obstruction with necrosis closely adhered to MD.	Resection and anastomosis
9.	Index case	-	Bilious vomiting, abdominal distension, loose stools with visible and palpable bowel loops.	MD with mesodiverticular bands causing closed loop obstruction and three passable strictures in the ileum	Resection of affected bowel and ileostomy

Key: MD=Meckel's Diverticulum

To conclude, Meckel's diverticulum is indeed a rare cause of intestinal obstruction in neonates. Successful management depends on early diagnosis and prompt surgical intervention to prevent catastrophic events such as bowel ischemia and perforation. A high index of suspicion and increased awareness of this rare entity are essential for timely intervention and better outcomes in neonates.

Conflict of Interest: None.

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