CASE SERIES

BEYOND THE NORM: A CASE SERIES OF MECKELS'S DIVERTICULUM CAUSING INTESTINAL OBSTRUCTION IN THREE DIFFERENT WAYS

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Intestinal obstruction, a critical medical emergency, often attributed to factors like postoperative adhesions, hernias, rarely involves congenital anomalies such as Meckel's diverticulum. Despite its typical asymptomatic nature, Meckel's diverticulum can present challenges, including painless bleeding, and remains an uncommon but perplexing cause of acute intestinal obstruction in adults. This case series describes three unique instances of acute small intestinal obstruction attributed to Meckel's diverticulum, a congenital anomaly that is typically asymptomatic. In contrast to its usual manifestations of painless bleeding or diverticulitis, these cases presented with acute symptoms requiring surgical intervention. The first case involved a young child with a Meckel's diverticulum causing small intestinal obstruction through a narrow-based diverticulum with an obstructing stricture. The second case featured a patient with a Meckel's diverticulum causing intestinal obstruction via meso-diverticular band, while the third case involved an eight-year-old with a diverticulum contributing to intussusception. Surgical exploration revealed these uncommon presentations, highlighting the importance of considering rare anatomical variations in the diagnosis and management of intestinal obstruction. This atypical manifestation of Meckel's diverticulum underscores the necessity for timely surgical intervention to address unique presentations not conforming to the usual clinical patterns.

Keywords: Meckel's diverticulum; Intestinal obstruction; Meso-diverticular band

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INTRODUCTION

Intestinal obstruction refers to the partial or complete impediment of the normal flow of fluids and digested food through the intestines.[1] Acute intestinal obstruction remains a critical medical and surgical emergency, necessitating immediate intervention. It typically manifests with a non-specific array of symptoms, including bilious or non-bilious vomiting, nausea, loss of appetite, and abdominal pain.[2] Postoperative adhesions and hernias are commonly cited as the leading factors causing small bowel obstruction, congenital abnormalities such as Meckel's diverticulum are not routinely considered a frequent cause of acute small bowel obstruction.[3] Meckel's diverticulum arises from the partial closure and persistence of the vitelline, or omphalomesenteric duct during embryogenesis, making it the most prevalent congenital anomaly of the gastrointestinal tract.[4] Indeed, Meckel's diverticulum is classified as a "true diverticulum" as it possesses all the layers found in the small intestine containing gastric mucosa.[5] The majority of Meckel's diverticulum cases are asymptomatic, and they are often diagnosed incidentally during surgical exploration for other unrelated conditions or, less commonly, through diagnostic imaging procedures.[4] Meckel's diverticulum can lead to painless bleeding due to the production of ectopic gastric acid and pepsin in the diverticulum, arising from gastric or pancreatic tissue differentiation within the Meckel's diverticulum mucosa. This complication adds complexity to the clinical presentation. In cases of painless gastrointestinal bleeding of unknown origin, Meckel's Diverticulum should be considered as a potential cause. Intestinal obstruction caused by Meckel's diverticulum is considered rare according to most studies. However, it can account for 20–25% of obstructions in symptomatic cases. Most instances of Meckel's diverticulum are asymptomatic. The average age of patients with symptomatic Meckel's diverticulum is 31 years (median age of 27 years), with a male-to-female ratio of approximately 3:1.[6] Intestinal obstruction accounts for 21.8% of all acute surgical emergencies. However, studies rarely identify Meckel's diverticulum (MD) as a common cause of

such obstructions. Most frequently, MD leads to obstruction through intussusception or volvulus around an attachment to the abdominal wall. Additional causes include inflammatory adhesions, Littre's hernias, and diverticular strictures. Axial torsion and gangrene of MD are considered rare complications.[7] We report a unique case series of acute small intestinal obstruction caused by Meckel's Diverticulum with an unusual presentation, as it was found be causing obstruction of the bowel in the form a stricture, meso-diverticular band and intussusception. This case series highlights the importance of considering rare anatomical variations in the diagnosis and management of intestinal obstruction.

CASE PRESENTATIONS

Case No. 1

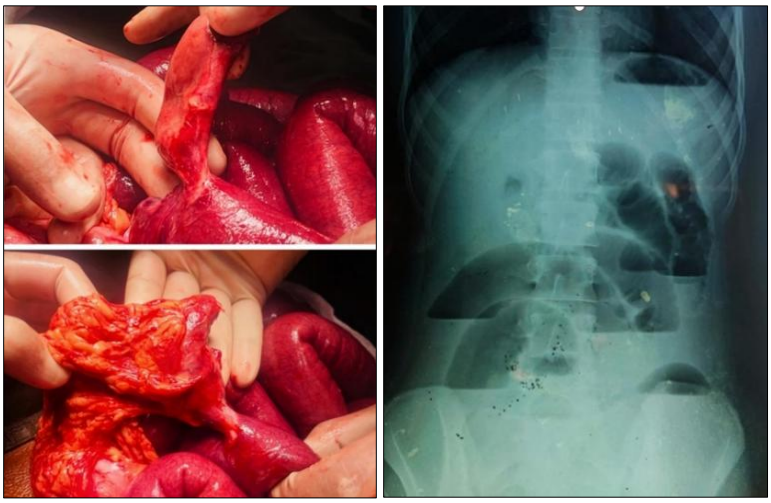

Figure-1: (a) Meckel's Diverticulum with and without adherent omentum. (b) Multiple air fluids level, X-Ray erect abdomen

A 12-year-old child came to the emergency room with abdominal pain, bloating, constipation, and vomiting of greenish color for the past 5 days. His pulse rate was 108 beats per minute, respiratory rate was 18 breaths per minute, and blood pressure was 105/70 mm Hg. On examination, his abdomen was distended and tense, resonant on percussion, and absent bowel sounds. Upon rectal examination, the rectum was found to be empty. An abdominal X-ray revealed enlarged bowel loops (stack coin appearance) with multiple air-fluid levels, indicating a possible blockage in the small intestine (Figure-1 (a). The patient was managed with nasogastric tube and intravenous fluids, and routine tests were conducted, which showed raised White cell count in the blood, but other parameters were normal. Despite conservative management, the patient did not show signs of improvement.

A follow-up X-ray abdomen revealed no changes, leading to the decision to perform an exploratory laparotomy. During the surgery, it was revealed that the patient had a sac-like protrusion connected to the ileum. The outpouching was concealed by the greater omentum, and adjacent dilated bowel loops were observed. Upon separating the omentum from the out-pouching, it became apparent that the sac was linked to the ileum through a narrow base. In close proximity to the attachment point, a meso-diverticular band was identified, causing obstruction. The appearance, texture, and gross examination suggested that this sac represented a continuation of the ileum and remnants of the vitelline duct—identified as Meckel's diverticulum (Figure-1 (b). The narrow-based Meckel's diverticulum with obstructing stricture, causing obstruction in this young individual, positioned approximately 43 cm above the ileocecal junction, the diverticulum led to gut dilation above the obstruction point and subsequent collapse of the bowel below it.

The diverticulum itself measured 8×3 cm and was located around 43 cm above the ileo-cecal junction. The diverticulum along with the obstructing stricture at its narrow base in ileum was resected, followed by end-to-end anastomosis. After the surgery, the patient's condition improved, and the nasogastric tube was removed on the third day. Bowel sounds were normal on examination, and the patient passed flatus and stool without any issues. On the fifth day, the patient was discharged and allowed to go home and was called for follow up in OPD with histopathology report, which confirmed the diagnosis of Meckel's Diverticulum without inflammation

Case No 2

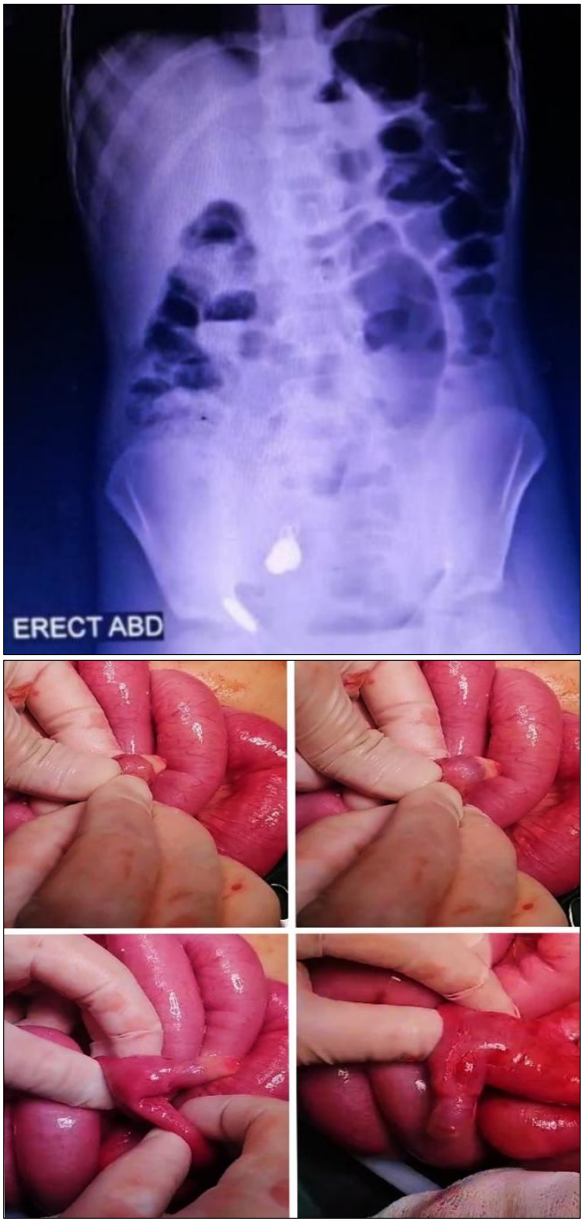

Figure-2 (a) X-ray erect abdomen with dilated bowel loops. (b) Intussusception reduction and the intussusceptum is Meckel's Diverticulum

An eight-year-old presented to the emergency room with abdominal pain and vomiting. Physical examination revealed a palpable mass in the right lower quadrant. Initial investigations showed a hemoglobin level of 10 g/dL, total leukocyte count of 12,000/µL, and ultrasound findings consistent with ileocolic intussusception and excessive bowel gas. Abdominal X-ray demonstrated dilated gut loops, leading to the patient's admission to the inpatient facility (Figure-2 (a).

A therapeutic plan involving hydrostatic reduction with normal saline was implemented, but a repeat ultrasound indicated persistent intussusception. Consultation with the on-call consultant surgeon led to the decision to proceed to the operating theatre. Exploration via a right transverse incision revealed an intussusception, which, upon manual reduction, was identified as a diverticulum with a broad base, contributing to the intussusception and resultant small bowel obstruction. Following successful reduction, thorough examination of the bowel revealed no additional pathology except for the aforementioned diverticulum (Figure-2(b). Wedge resection diverticulectomy was performed, followed by primary repair. The sample was collected and sent for histopathology, but due to the patient's financial constraints, the histopathology could not be performed.

The patient was subsequently transferred to the ward and maintained on nil per oral (NPO) status for three days. A smooth recovery ensued, and the patient was discharged on the fifth day post-surgery after the passage of stool.

Case No. 3

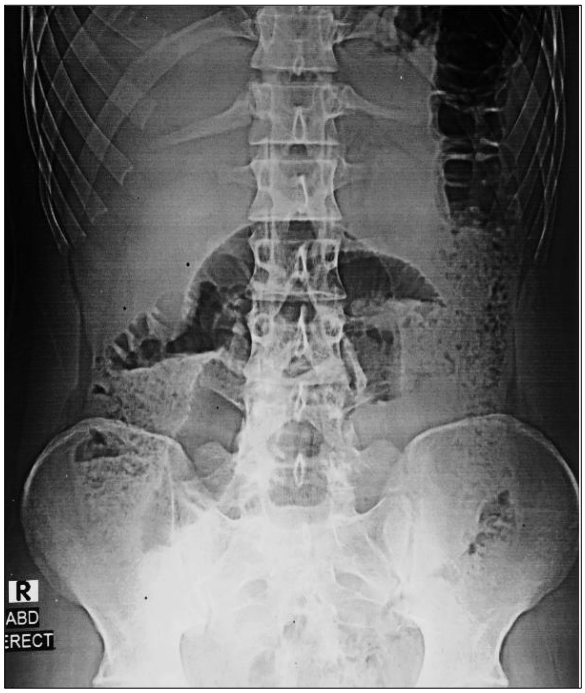

Figure-3: X-Ray abdomen erect with multiple air fluids level

A 19-year-old male patient with the history of and no bowel movement for six days and persistent vomiting for four days was referred from a peripheral hospital to a tertiary care facility. Examination revealed distended and tense abdomen. Despite two days of admission at the

peripheral facility, the patient's condition did not improve. X-rays revealed distended small bowel loops and multiple air-fluid levels, consistent with small bowel obstruction. Ultrasound indicated sluggish peristalsis with to-and-fro motion. Following admission to the tertiary care hospital, the patient was kept nil per oral (NPO), received intravenous (IV) fluids, IV antibiotics, and prokinetics. Although vomiting stopped, a repeat X-ray showed no improvement (Figure-3), prompting the decision for surgical exploration.

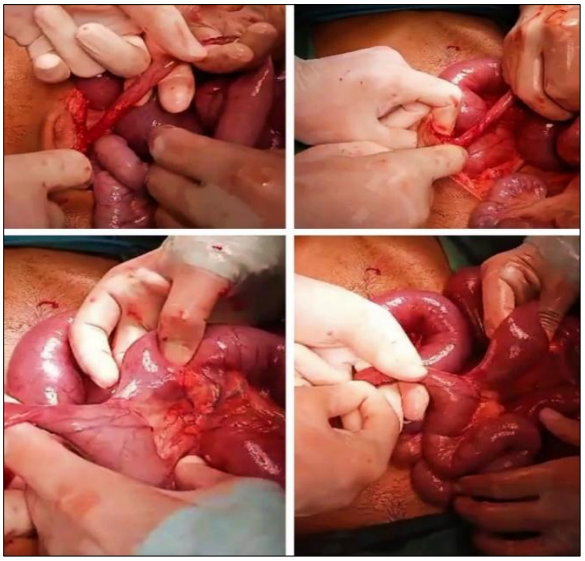

Figure-4: Meckel's Diverticulum attached to the umbilicus and distaly continues with ileum, with Meso-diverticular band.

During exploratory laparotomy, a hollow gut-like loop of approx. 10 cm originating approximately 2 feet proximal to the ileo-cecal junction (ICJ) and attached to the umbilicus was identified. Adjacent to its origin, a meso-diverticular band was found, causing complete small bowel obstruction with proximal distension and distal collapse of gut loops. The loop's lumen was continuous with the proximal lumen of ileum (Figure-4).

A Meckel's diverticulum was diagnosed, the band was released and a wedge diverticulectomy was performed with end-to-end anastomosis using an interrupted hand-sewn technique. The patient was kept NPO for three days and gradually recovered, experiencing one episode of vomiting. On the third day post-surgery, the patient passed stool without assistance. Following a smooth recovery and observation for three more days, the patient was discharged on the sixth day with instructions for outpatient follow-up, including a histopathology report that confirmed the diagnosis of Meckel's Diverticulum.

DISCUSSION

Meckel's diverticulum is an anomaly resulting from incomplete obliteration of the vitelline or omphalomesenteric duct, presents as a true diverticulum incorporating all intestinal layers.[4] Its prevalence ranges from 0.3–2.9% in the general population, typically situating itself 7–200 cm proximal to the ileocecal valve, with dimensions of 0.4–11.0 cm in length and 0.3–7.0 cm in diameter. Symptoms occur in 4–9% of patients, with males experiencing this condition up to four times more frequently. Symptomatic cases, prevalent among the young population, are characterized by obstruction (46.7%), hemorrhage (25.3%), or inflammation (19.5%).[8] Obstructive symptoms, including volvulus, intussusception, torsion (small bowel twists around a fibrous band originating from Meckel's diverticulum), inversion into the bowel or mesodiverticular band entrapment, complicate the pre-operative diagnosis.[4]

For patients with symptomatic Meckel's diverticulum, surgical resection remains the primary treatment, utilizing laparoscopic or open procedures.[8] The choice of specific surgical techniques, such as diverticulectomy, wedge, or segmental resection, depends on factors like diverticular base integrity, proximal ileum condition, and the presence of ectopic tissue.[4] Adopting a midline surgical approach for cases initially presenting as complex appendicitis, which may ultimately be diagnosed as perforated Meckel's diverticulitis, is Judicious.[9] In cases of small bowel obstruction, recommendations favor wedge or segmental resection. The presented case series highlights successful outcomes with two cases undergoing wedge resection and one case opting for segmental resection with end-to-end anastomosis, resulting in complete recovery and symptom resolution.[4] The rarity of Meckel's diverticulum underscores diagnostic challenges, emphasizing the critical need for expeditious surgical intervention in symptomatic cases.

In conclusion, an atypical case series has surfaced where patients encountered intestinal obstruction, an uncommon consequence associated with Meckel's diverticulum—a congenital anomaly. While Meckel's diverticulum typically remains asymptomatic, these instances presented with acute small bowel obstruction. Surgical exploration revealed variations in each case, with consistent findings of meso-diverticular band, stricture and intussusception. This departure from typical manifestations, such as painless bleeding or diverticulitis, underscores the need for surgical intervention to diagnose and address these unique presentations.

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