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A Rare Presentation of Meckel's Diverticulum Causing Internal Herniation with Acute Small Bowel Obstruction

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ABSTRACT

INTRODUCTION: Meckel's diverticulum (MD) is a congenital anomaly found in ~2% of the population. While usually asymptomatic, it can cause complications like bleeding, inflammation, and obstruction. Internal herniation due to MD is a rare but serious cause of small bowel obstruction (SBO).

CASE PRESENTATION: A 19-year-old male presented with colicky abdominal pain, vomiting, and constipation. Imaging showed closed-loop SBO in the distal ileum. Intraoperatively, an internal hernia was found—formed by adhesion between the tip of a Meckel's diverticulum and adjacent ileum. Wedge resection and anastomosis were performed. Histopathology confirmed Meckel's diverticulitis.

DISCUSSION: Internal herniation due to MD is rare and often missed preoperatively. Similar cases are scarcely reported. CT may detect obstruction but rarely identifies MD. Early diagnosis and surgical management are key to preventing complications like ischemia.

CONCLUSION: MD should be considered in young patients with SBO and no prior surgeries. Rare presentations like internal hernia demand high clinical suspicion and timely surgical intervention.

KEYWORDS: Meckel's diverticulum, internal hernia, small bowel obstruction, congenital anomaly, wedge resection.

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INTRODUCTION

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract, occurring in approximately 2% of the population. It results from incomplete obliteration of the vitelline (omphalomesenteric) duct during embryonic development and is typically located on the antimesenteric border of the ileum, approximately 2 feet proximal to the ileocecal valve [1]. Although MD is usually asymptomatic, a subset of patients may develop complications such as gastrointestinal bleeding, inflammation, intussusception, volvulus, and bowel obstruction [2].

One of the more serious and potentially life-threatening complications of MD is **small bowel obstruction**, which may result from a variety of mechanisms. These include volvulus around a fibrous band, intussusception with the MD as a lead point, or obstruction from entrapment in an internal hernia. However, internal herniation specifically caused by Meckel's diverticulum is extremely rare and often misdiagnosed preoperatively due to its nonspecific clinical and radiological features [3].

Internal hernias themselves are an uncommon cause of SBO, accounting for less than 1% of all cases. When they do occur, they are typically associated with congenital mesenteric defects or postoperative changes. Meckel's diverticulum can form a potential hernial orifice if it adheres to adjacent mesenteric structures or the abdominal wall, allowing small bowel loops to herniate through the resulting defect [4]. Such internal herniation has the potential to rapidly progress to ischemia and bowel necrosis if not treated promptly.

In rare cases, MD may remain tethered to the anterior abdominal wall by a fibrous remnant of the vitelline duct, forming a bridge through which a segment of small bowel can herniate. This was illustrated in a case by Bellini et al., where an MD attached to the umbilicus via the obliterated omphalomesenteric duct led to SBO confirmed through multidetector CT and surgical exploration [5].

Another documented mechanism is the entrapment of small bowel between MD and mesenteric bands or loops, forming a blind-ending pouch or internal ring. A recent case involving a 15-year-old girl demonstrated this scenario, where the MD tip was adherent to the small bowel mesentery, forming an internal hernia that led to closed-loop obstruction [4].

Another rare entity is the Littre's hernia, in which a Meckel's diverticulum is found within a hernial sac. In some cases, the MD

herniates through defects in the omentum or mesentery, as was reported by Aslam et al. in a 65-year-old female who presented with SBO due to a trans-omental internal hernia containing a non-inflamed Meckel's diverticulum [6].

Despite the established complications associated with MD, its clinical diagnosis remains elusive due to the non-specificity of symptoms and signs. It often mimics more common pathologies such as appendicitis or adhesive bowel obstruction. Moreover, preoperative imaging may not always detect the diverticulum or the internal hernia, especially when there is no prior surgical history to suggest adhesions [7]. This diagnostic ambiguity frequently leads to delayed treatment and increases the risk of complications.

Furthermore, histopathological analysis often reveals heterotopic mucosa—gastric or pancreatic—in a subset of MD cases, which can further complicate clinical presentation by causing ulceration, bleeding, or perforation. However, in cases of internal herniation, inflammation at the site of adhesion is a common finding, suggesting chronic irritation or repeated subclinical torsion events [8].

In a broader review of cases, Henry et al. (2020) reported that Meckel's diverticulum can cause internal hernias even in the absence of abdominal wall tethering, such as through an interloop fibrous band, further underscoring the anatomical variability and diagnostic challenges posed by MD [9].

Finally, rapid surgical intervention is often necessary to resolve the obstruction and prevent ischemia. Techniques such as wedge resection or segmental resection with anastomosis are generally employed. Early laparoscopic intervention can be advantageous, as seen in cases where MD-related internal hernias were successfully managed with minimal morbidity [10]. Although Meckel's diverticulum is a relatively common congenital anomaly, its complication in the form of internal herniation leading to small bowel obstruction is exceedingly rare and diagnostically challenging. Heightened clinical awareness and timely surgical management are critical for favorable outcomes.

CASE HISTORY

A 19-year-old male presented to the emergency department with complaints of acute abdominal pain that had begun three days prior. The pain was colicky, gradually increasing in intensity and localised around the periumbilical region. He reported associated symptoms of constipation for the past two days and multiple episodes of bilious vomiting for one day, totalling around seven to eight episodes. He had no prior history of similar complaints, abdominal surgery, or any chronic gastrointestinal disorders. On general physical examination, the patient appeared mildly dehydrated and was hemodynamically stable. Abdominal examination revealed noticeable distension with generalized tenderness, more pronounced in the periumbilical area. Guarding was present, but there were no signs of rigidity or rebound tenderness. Bowel sounds were sluggish. Per rectal examination showed normal anal tone, collapsed rectal walls, and absence of fecal or blood staining, suggesting a distal obstruction.

A plain erect abdominal X-ray showed multiple air-fluid levels and dilated small bowel loops, consistent with small bowel obstruction (Figure 1). A contrast-enhanced CT (CECT) of the abdomen confirmed the diagnosis, revealing a closed-loop obstruction in the distal ileum situated in the right pelvic region (Figure 2). Given the severity of symptoms and imaging findings suggestive of mechanical obstruction, the patient was taken up for emergency exploratory laparotomy.

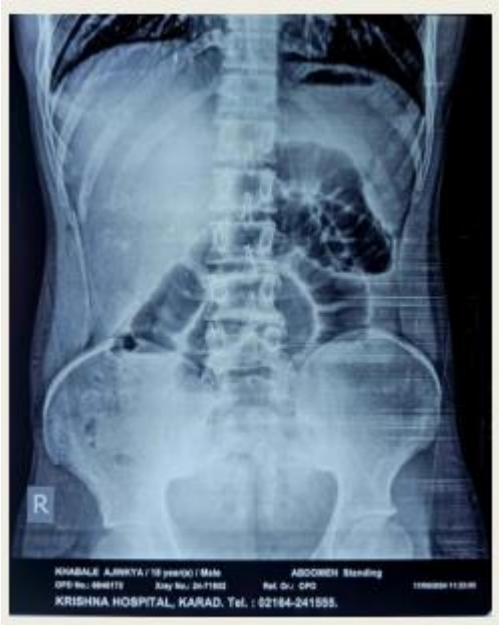

Figure 1: X-ray erect abdomen shows multiple air fluid levels

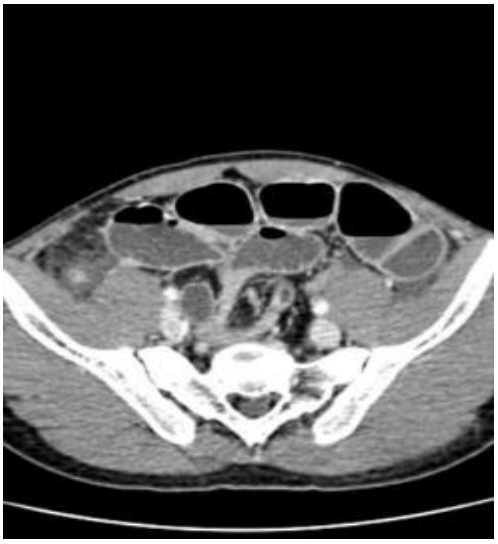

Figure 2: CECT abdomen – close loop small bowel obstruction in the distal ileum in the right half of pelvis

Intraoperatively, a segment of the distal ileum was found herniated through a loop formed by an adhesion between the tip of a Meckel's diverticulum and the adjacent ileal segment approximately 6 cm proximal to the ileocecal junction. The Meckel's diverticulum was located roughly 50 cm proximal to the ileocecal valve on the antimesenteric border of the ileum (Figure 3). The adhesion between the tip of the diverticulum and the ileum had created a ring-like defect, through which small bowel loops had herniated, leading to closed-loop obstruction. The herniated loops appeared congested but viable, and no evidence of perforation or ischemia was noted. The adhesive band was carefully dissected, the Meckel's diverticulum was freed from the ileum, and a wedge resection of the diverticulum was performed. The bowel was then reconstructed with a primary anastomosis (Figure 4).

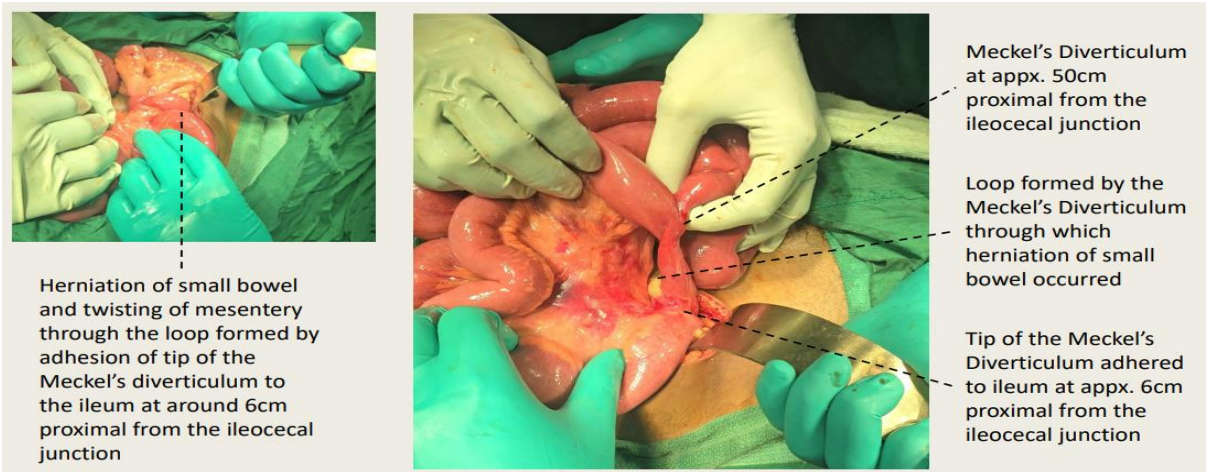

Figure 3: Intraoperative illustration showing herniation of small bowel loops through a fibrous loop formed by adhesion of the tip of Meckel's diverticulum (located ~50 cm from the ileocecal junction) to an ileal segment approximately 6 cm proximal to the ileocecal junction. This adhesion created an internal hernial defect, leading to small bowel entrapment and twisting of the mesentery, resulting in closed-loop obstruction.

Figure 4: Meticulous dissection done and tip of Meckel's diverticulum separated from ileum and wedge resection done followed by anastomosis

Postoperative recovery was uneventful, and the patient was discharged in stable condition. Histopathological examination of the resected specimen confirmed Meckel's diverticulitis with inflammation and no evidence of ectopic mucosa or neoplasia (Figure 5). This case highlights a rare cause of small bowel obstruction due to internal herniation caused by an inflamed and adherent Meckel's diverticulum, an important yet often overlooked differential in young patients presenting with signs of intestinal obstruction.

Figure 5: Wedge resection of Meckel's Diverticulum

DISCUSSION

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract, yet it is often clinically silent. Symptomatic cases typically present with complications such as bleeding, inflammation, intussusception, or obstruction. Among these, small bowel obstruction (SBO) accounts for a significant proportion, particularly in adult patients. However, internal herniation caused by MD is a very rare and unusual mechanism of obstruction.

Classically, SBO in MD is due to mechanisms such as volvulus around a fibrous band, intussusception with the diverticulum acting as a lead point, or entrapment in external hernias like Littre's hernia. In contrast, the present case involves internal herniation caused by an adhesion between the tip of the Meckel's diverticulum and an adjacent ileal loop, creating a defect through which small bowel loops herniated. This formed a closed-loop obstruction, a surgical emergency due to the risk of bowel ischemia. This mechanism is infrequently reported in literature, making this case a rare and valuable addition.

Past reports have documented similar rare presentations. For example, Aslam et al. (2022) described a case of a trans-omental internal hernia containing MD, while Lai et al. (2024) reported a pediatric case where the tip of the MD was adherent to mesentery, forming an internal hernial defect and causing obstruction. These cases, along with the current one, highlight the diversity in MD-related complications and the diagnostic challenge they pose, especially in patients without previous abdominal surgery—where adhesions are less likely to be the cause [6,4].

Imaging techniques like CT scans are useful in identifying small bowel obstruction, but they rarely pinpoint MD as the underlying cause. In most cases, including ours, definitive diagnosis is only made intraoperatively. Surgical treatment—either wedge resection or segmental resection with anastomosis—remains the gold standard.

CONCLUSION

Meckel's diverticulum, though commonly asymptomatic, can rarely lead to life-threatening complications such as internal herniation and small bowel obstruction. This case highlights an unusual mechanism where adhesion of the diverticulum created a hernial defect. Early clinical suspicion, timely imaging, and prompt surgical intervention are crucial for favorable outcomes. Clinicians should consider Meckel's diverticulum in young patients with signs of obstruction, especially in the absence of prior abdominal surgery, to prevent delays in diagnosis and management.

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