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SMALL BOWEL OBSTRUCTION IN A 25-YEAR-OLD DUE TO MECKEL'S DIVERTICULUM (PATENT VITELLOINTESTINAL DUCT): A CASE REPORT

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INTRODUCTION

Meckel's diverticulum is a congenital outpouching of the small intestine resulting from an incomplete obliteration of the vitelline (omphalomesenteric) duct. It is the most common gastrointestinal malformation, occurring in approximately 2% of the populationscirp.org. Most Meckel's diverticula remain asymptomatic throughout life; if symptoms occur, they usually manifest in childhood – classically as painless gastrointestinal bleeding – with intestinal obstruction being a less frequent but significant complicationscielo.isciii.esscielo.isciii.es. In adults, however, small bowel obstruction is recognized as the most common complication of a Meckel's diverticulumscielo.isciii.es. A persistent vitellointestinal duct (a remnant connecting the ileum to the umbilicus) causing intestinal obstruction in an adult is exceedingly rare, with only a handful of cases documentedijsr.net. We report the case of a 25-year-old patient who presented with an acute small bowel obstruction caused by a Meckel's diverticulum forming a constricting band (patent vitellointestinal duct). This case underlines the importance of considering congenital anomalies in the differential diagnosis of bowel obstruction in adults with no prior surgical history.

Case Presentation

A 25-year-old patient presented to the emergency department with complaints of diffuse abdominal pain for 2 days. The pain was colicky in nature, non-radiating, and associated with abdominal bloating. There was no significant past medical or surgical history. On examination, the patient was conscious and oriented, with a heart rate of 120/min and blood pressure of 110/70 mmHg. The patient was afebrile. Abdominal examination revealed generalized tenderness with guarding, and bowel sounds were sluggish. There were no palpable masses or organomegaly. Initial laboratory tests (complete blood count, metabolic panel) were unremarkable, and there was no leukocytosis.

This patient's X-ray demonstrated diffusely dilated small bowel loops with multiple air-fluid levels, consistent with an acute intestinal obstruction. No free air was seen under the diaphragm. A contrast-enhanced CT (CECT) of the abdomen was obtained next, which confirmed small bowel obstruction with a clear transition point in the mid-ileum. The proximal small intestines were markedly distended (~3.5 cm in diameter on CT) with an abrupt cutoff in the mid-ileal region, beyond which the distal loops were collapsed. Notably, there was no obvious intussusception or mass lesion on the CT; instead, subtle swirling of mesenteric vessels (a "whirl sign") was observed around the transition, suggesting a possible twist caused by an internal bandijsr.net. These imaging findings raised suspicion of a congenital band (such as a vitelline duct remnant) as the cause of obstruction. In view of radiological evidence of obstruction and signs of peritonitis on exam, an emergency exploratory laparotomy was planned.

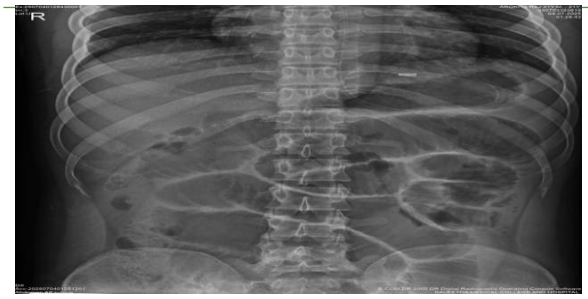

Figure1: Erect abdominal radiograph showing multiple air-fluid levels in dilated small-bowel loops, a classic sign of small bowel obstruction.

Intra-operatively, approximately 200 mL of serous fluid was encountered upon entering the peritoneal cavity, and the small intestine was distended proximal to a lesion in the mid-ileum. A fibrous band was found encircling and constricting the mid-ileum at about 60 cm proximal to the ileocecal junction, causing an acute closed-loop obstruction. On careful inspection, this band was identified as a persistent vitellointestinal duct remnant: essentially, a Meckel's diverticulum on the anti-mesenteric border of the ileum, connected by a fibrous cord to the abdominal wall (near the umbilical region). The bowel segment just distal to the band was collapsed, and the proximal loops were dilated, but fortunately there was no bowel ischemia or necrosis noted. The constricting band was divided, and the Meckel's diverticulum along with the adjacent ileal segment was resected (wedge resection of the diverticulum and a small rim of ileal wall) to completely remove the vitelline duct remnant. An end-to-end primary anastomosis of the ileum was performed. Additionally, an appendectomy was done during the same operation (the appendix appeared grossly normal, but was removed prophylactically given the intra-abdominal exploration, to prevent future diagnostic confusion). The abdomen was irrigated and closed in layers after ensuring hemostasis.

Histopathological examination of the resected segment confirmed the presence of a Meckel's diverticulum. The diverticulum was a true diverticulum containing all layers of the intestinal wall, with no evidence of ectopic gastric or pancreatic tissue in this specimen. The margins of resection were free of any pathology. These findings corroborated that the obstruction was caused by a congenital vitelline duct remnant (patent vitellointestinal duct) acting as a band.

Postoperatively, the patient was managed with an enhanced recovery after surgery (ERAS) protocol. The patient had an uneventful recovery: nasogastric decompression was not prolonged, and bowel function returned promptly. The patient was started on clear fluids on postoperative day (POD) 1 and advanced to a soft diet by POD 2. Pain was managed with non-opioid analgesics and the patient was mobilized early. By POD 3, the patient was tolerating a regular diet. There were no signs of infection or anastomotic complication. The patient was discharged on POD 4 in stable condition, with advice on wound care and follow-up. At the follow-up on POD 10, the surgical incision was well-healed; sutures were removed and the patient remained asymptomatic, with normal bowel function restored.

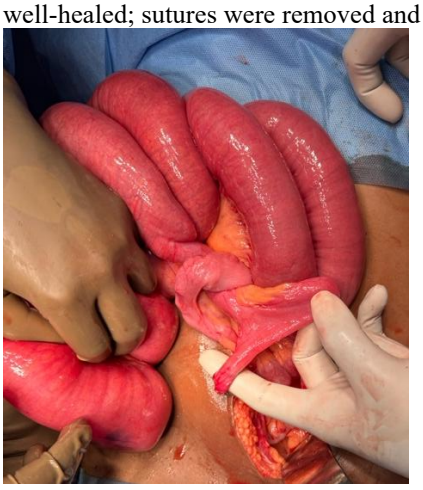

Figure 2: Fibrous band encircling the midileal loops causing obstruction. Fibrous band was later found to be the Meckels diverticulum.

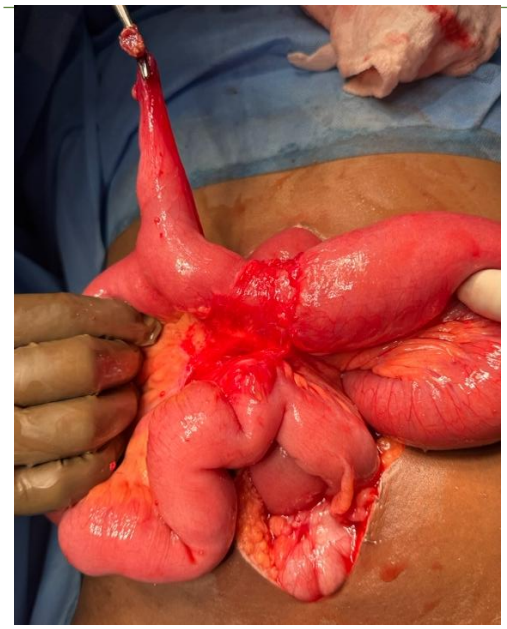

Figure 3: Intraoperative finding of meckels diverticulum

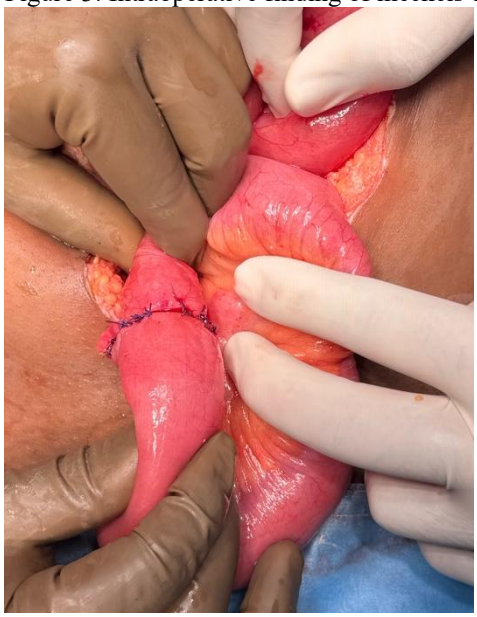

Figure 4: Wedge resection with anastomosis of the ileum

DISCUSSION

This case illustrates a rare cause of acute intestinal obstruction in an adult: a persistent omphalomesenteric (vitellointestinal) duct remnant. During embryonic development, the vitelline duct connects the primitive midgut to the yolk sac; it normally becomes a thin fibrous cord and is completely obliterated by the 5th to 9th week of gestationijsr.net. Failure of this duct to regress can result in a spectrum of anomalies. The possible remnants include:

- **Meckel's diverticulum:** a blind pouch on the anti-mesenteric side of the ileum (contains all bowel layers; the most common vitelline duct remnant)
- **Vitelline fistula (patent vitellointestinal duct):** a fully patent channel from the ileum to the umbilicus, which can present as feculent discharge at the umbilicus
- **Vitelline cyst:** a cystic lesion along the course of the duct, not connected to either the intestine or umbilicus

- **Umbilical sinus or mucosal polyp:** partial patency at the umbilical end, with an opening or polypoid mass at the umbilicus
- **Fibrous vitelline cord:** a fibrous band connecting the ileum to the underside of the umbilicus (also called a vitelline ligament), with no open lumenijsr.netscirp.org.

Meckel's diverticulum is by far the most common of these, whereas a completely patent vitelline duct (with an open umbilical fistula) is exceedingly rare (estimated in only 0.006–0.07% of individuals, mostly detected in infants)ijsr.net. Our patient effectively had a variant combining features of a Meckel's diverticulum and a fibrous cord – in other words, a diverticulum that remained tethered to the abdominal wall, creating a band across the intestinal lumen.

Vitelline duct remnants are often asymptomatic and may go unnoticed. In a large series of pediatric cases, only about 40% of vitelline duct anomalies were symptomatic, commonly presenting with rectal bleeding, intestinal obstruction, or umbilical discharge in childrenscirp.org. When symptoms do occur, their nature and timing depend on the type of remnant. Meckel's diverticulum, for instance, can harbor ectopic gastric mucosa and often presents with bleeding in children. In adults, however, Meckel's diverticulum more frequently comes to attention when it causes intestinal obstruction or inflammationscielo.isciii.esscielo.isciii.es. The lifetime risk of a Meckel's diverticulum becoming symptomatic is about 4–6%scielo.isciii.es. Bowel obstruction is the predominant complication in adults with Meckel's diverticulum, whereas in childhood it is the second most common complication (after bleeding)scielo.isciii.es. Intestinal obstruction due to a persistent vitellointestinal duct in an adult (as in this case) is extraordinarily uncommonijsr.net. Most patients with small bowel obstruction have more common etiologies such as postoperative adhesions (in those with surgical history) or hernias. In a patient with virgin abdomen (no prior surgeries), a congenital band should be considered as a rare cause of obstructionscirp.orgscirp.org. This case underscores that principle.

There are several mechanisms by which a Meckel's diverticulum or related vitelline remnants can cause small bowel obstruction. **Volvulus around a fibrous band** is one important mechanism: a fibrous cord (such as a mesodiverticular band from the tip of a Meckel's diverticulum to the mesentery, or an omphalomesenteric band to the umbilicus) can act as an anchor around which a loop of bowel twists and becomes obstructedradiopaedia.orgscielo.isciii.es. In our patient, the persistent duct formed a band under which a loop of ileum was trapped and constricted, producing a closed-loop obstruction. This is analogous to the "mesodiverticular band" entrapment described in the literature, wherein an ileal loop gets caught under a band between a Meckel's diverticulum and the mesenteryscielo.isciii.es. Such a band can also cause volvulus of the small bowel, evidenced by the CT whirl sign when presentijsr.net. Other reported mechanisms of obstruction from Meckel's diverticulum include **intussusception** (the diverticulum acts as a lead point for telescoping of bowel), **Littre's hernia** (the diverticulum incarcerates in an abdominal wall hernia defect), **strictures** caused by chronic inflammation, and **entrapment of bowel loops** in mesenteric defects associated with the diverticulumscielo.isciii.esscielo.isciii.es. In the present case, the obstructing mechanism was a fixed fibrous band causing extrinsic compression and kinking of the ileum. No intussusception or hernia was involved.

Preoperative diagnosis of Meckel's diverticulum or vitelline duct bands is challenging. Plain abdominal X-rays will typically show nonspecific signs of obstruction (multiple air-fluid levels, dilated loops) as seen in our patient. On CT scans, an abrupt transition of small bowel with bowel loop clustering or a "whirl" of mesenteric vessels may suggest a volvulus around a bandijsr.net. Retrospectively, the transition point in our patient's CT was at the mid-ileum where the band was found, but without obvious visibility of the band itself. In many cases, the definitive diagnosis is made during surgery for acute obstructionscielo.isciii.esscielo.isciii.es.

The management of a symptomatic vitelline duct remnant is surgical. Early intervention is crucial, especially in closed-loop obstructions, to prevent strangulation of the bowel. At surgery, the offending band or diverticulum should be resected. Resection can be performed either by diverticulectomy (wedge resection of the diverticulum) or segmental bowel resection if the base of the diverticulum is broad or if the bowel is compromised. In our case, we performed a limited ileal resection including the diverticulum, followed by primary anastomosis, to completely excise the tract. This approach is consistent with other reports, where resection of the involved segment and anastomosis is often done for patent vitellointestinal duct remnantsijsr.net. An appendectomy was also done in our patient; though not directly related to the obstruction, incidental appendectomy is a reasonable addition in such emergency laparotomies to eliminate future confusion, especially when the appendix is in the operative field. Postoperative recovery should follow standard protocols (such as ERAS) to enhance return of bowel function and reduce hospital stay.

CONCLUSION

This case highlights a rare etiology of small bowel obstruction in adults: a Meckel's diverticulum with a persistent vitellointestinal duct forming an obstructing band. Although congenital vitelline duct anomalies usually present in pediatric populations, they can occasionally manifest for the first time in adulthood with acute complications.

Surgeons should remain vigilant for unusual causes of obstruction, particularly in patients without prior abdominal surgery. Prompt surgical management of such cases is both diagnostic and therapeutic. Our patient's favorable outcome with timely surgical intervention emphasizes the importance of considering and treating this infrequent condition. Awareness of vitelline duct remnant complications in adults can lead to earlier diagnosis and intervention, ultimately improving patient outcomesijsr.net.

Learning Points: This case underscores that even in adult patients, a high index of suspicion for congenital anomalies like a persistent vitelline duct should be maintained when evaluating bowel obstruction without an obvious cause. Early imaging (CT) can localize the obstruction, but definitive treatment is surgical. Resection of the Meckel's diverticulum and any fibrous bands can lead to full recovery, as seen in this patient. Surgeons should be aware of this rare scenarioijsr.net so that timely intervention can be provided to avoid morbidity.

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