Complicated Meckel's Diverticulum: Two cases from a Tertiary Center in Oman

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Abstract

Meckel's diverticulum (MD) is a congenital true diverticulum resulting from the failure of obliteration of the omphalomesenteric duct. MD is often silent in situ; however, it can lead to serious complications such as bowel obstruction or gastrointestinal (GI) bleeding. We report on two cases of MD complicated by bowel obstruction and lower GI bleeding that were managed at our center and discuss the current literature on MD.

Keywords: Meckel's diverticulum, gastrointestinal bleeding, bowel obstruction, congenital gastrointestinal anomaly, case series

Introduction

MD is a congenital anomaly in which the omphalomesenteric duct persists during early gestation. As a true diverticulum, it contains all 3 main layers of the GI tract, i.e. mucosa, muscularis, and serosa. MD is prevalent in 2-4% of the general population.[1] The lifetime risk of developing complications with MD is estimated at 4%.[2] We report on two cases, presenting with bowel obstruction and Lower GI bleeding respectively and were found to have MD as the cause.

Case Report

Case one

A 17-year-old male, with a background of a solitary left kidney, hypertension, and an impalpable left undescended testis, presented with a 3-day history of periumbilical pain, nausea, and bilious vomiting. The patient denied any history of fever, constipation, or rectal bleeding.

The patient was distressed, with a distended and markedly tender abdomen concerning for acute obstructive abdomen. Supportive management was initiated. Laboratory investigations showed non-specific changes and an erect abdominal X-ray demonstrated dilated small bowel loops and a faded colon. We proceeded with an abdominal Computed Tomography (CT) scan **(figure 1**) which reported features consistent with closed-loop small bowel obstruction, which was suspected to be due to a band or an internal hernia.

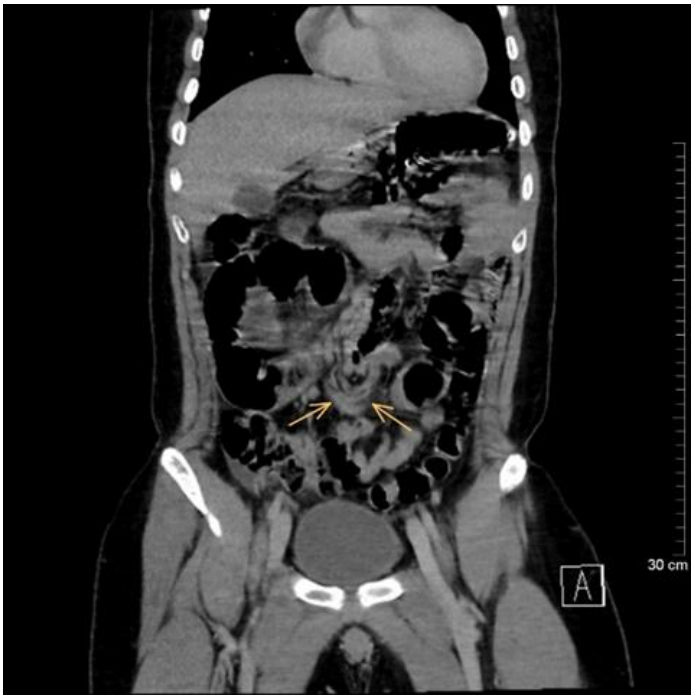

Figure 1: CT abdomen: A coronal section of the abdomen showing thickened small bowel loop twisting, giving the whirl sign (yellow arrows), with mild proximal small bowel dilatation.

The patient was taken for an emergency diagnostic laparoscopy under general anesthesia. MD was identified approximately 60cm from the ileocecal junction, attached to the midline, and causing bowel rotation (**Figure 2)**. Multiple interloop adhesions and mesenteric lymph nodes were also seen. We converted to laparotomy and performed a resection of the MD with side-to-side anastomosis of the bowel loops. Additionally, we performed adhesiolysis and acquired a mesenteric Lymph node for biopsy. The pathology report confirmed MD without features of dysplasia or malignancy (**figure 3a**), while the lymph node histopathology was negative for abnormalities.

The patient was admitted postoperatively for 5 days without complication. On follow-up 2 weeks after discharge, the patient reported no complications and was well.

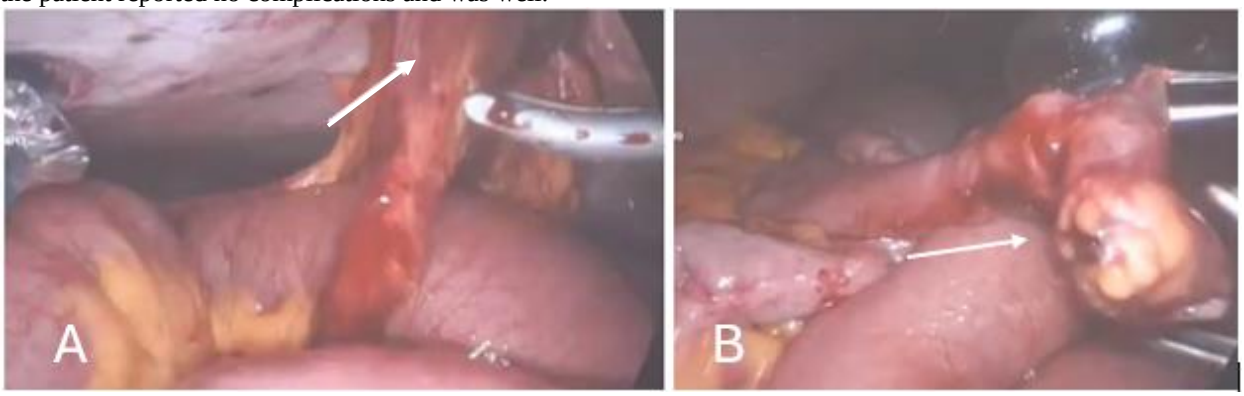

Figure 2: Intraoperative (laparoscopic) image: MD seen attached to midline, causing bowel rotation. Figure A and B show the MD before and after release.

Case two

A 52-year-old male, with background of solitary rectal ulcer and internal hemorrhoids, presented our center with a six-day history of large-volume, lower GI bleeding associated with left iliac fossa pain. Serial Laboratory samples showed a progressive dropping of hemoglobin (Hb) down to 7.7g/dl (3 g/dl from patients' baseline), so supportive management (including transfusion) was initiated.

An Esophagogastroduodenoscopy (OGD) done for the patient was reported as unremarkable, while his colonoscopy findings included hemorrhoids on retroflexion, large quantity of fresh blood and clots were seen in rectum and sigmoid as well as a few scattered diverticula with no obvious source of bleeding. Despite supportive management, serial Hb levels continued to trend downwards. We proceeded with a CT angiogram which showed tortuous mucosal/submucosal vessels from the bilateral middle rectal arteries without active extravasation, along with few colonic diverticulosis. The patient was discharged (with follow up) after 2 days of conservative management and his Hb stabilizing at a level of 10.1g/dl with no further deterioration.

Five days later, the patient presented unstable with a one-day history of fresh lower GI bleeding associated with left iliac fossa pain, and 1 episode of fall without loss of consciousness. After initial resuscitation of the patient, a proctoscopy was done revealing fresh per-rectal bleed with clots with no obvious source. Laboratory results showed that his Hb had dropped by 1 g/dl to a level 9.3g/dl, with other labs within range.

The patient was taken for a diagnostic laparoscopy where a wide based MD was identified 50 cm from the ileocecal valve with visible fresh blood and clots. Other small colonic diverticula were also noted. We proceeded with segmental resection of the MD followed by a side-to-side anastomosis of the bowel loop. The abdomen was thoroughly examined, with other pathologies noted.

Postoperatively, the patient recovered well with no further complications. His Hb level was stable on serial testing, at a level of 11.5g/dl before discharge. On follow up, the patient had no recurrence of symptoms. A Histopathology report confirmed the presence of MD with no ectopic tissue or other abnormalities (**figure 3B**). A follow-up colonoscopy is planned for the patient. **Figure 3:** Pathology section.

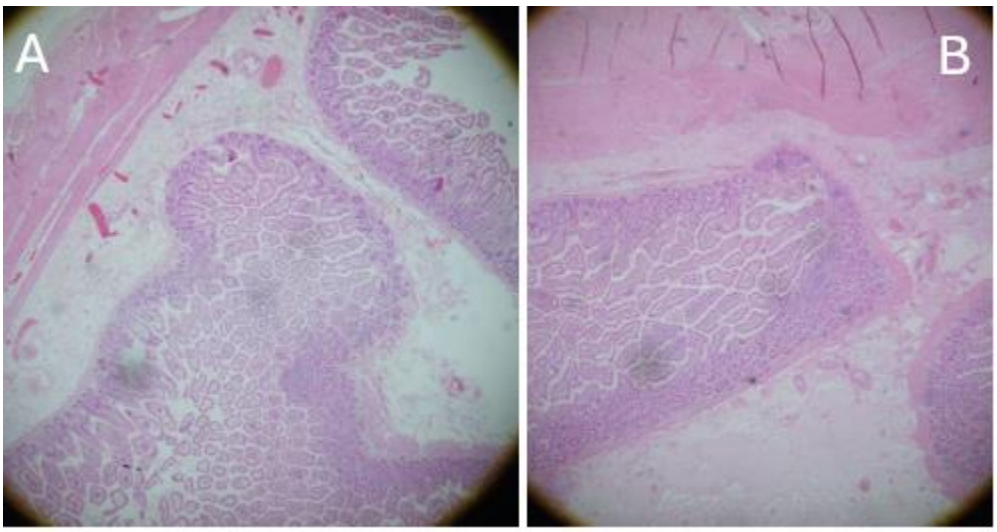

Figure 3: Figure A and B represent histopathology from case presentations 1 and 2 respectively) A 20x magnification view of small bowel wall with invagination of all mucosal layers consistent with the diagnosis of Meckel's diverticulum. No ectopic or other abnormal tissue was identified.

Discussion

Park et al.[3], a retrospective study on 1476 patients with MD, suggested that patients with the following features are associated with an increased likelihood of developing symptomatic MD: 1) Age of less than 50 years old, 2) Male sex, 3) MD length greater than 2 cm, 4) Presence of histologically abnormal tissue.

Bowel obstruction in patients with MD can result through multiple mechanisms such as, volvulus, intussusception, mesodiverticular etc.[4] In our first case, bowel obstruction occurred due to bowel looping around the fixed MD (to abdominal wall).

43% of patients with MD will have ectopic tissue including gastric, pancreatic, and carcinoid.[5] GI bleeding occurs due to secretions from ectopic gastric and pancreatic mucosa resulting in peptic ulceration. Despite this, no ectopic tissue was identified in our histology sections. We speculate that this could be due to irritation, chronic inflammation or sampling error that could have missed the ectopic tissue.

Despite a wide array of diagnostic tools available to physicians, preoperative diagnosis of MD poses a significant challenge. In cases of suspected bowel obstruction, imaging techniques such as X-ray, CT imaging, or barium studies rarely delineate features of MD as a cause.[2] Conversely, these imaging techniques may instead demonstrate features of bowel obstruction- as in our first case.

Whereas, in cases of lower GI bleeding, a CT angiogram can identify the source and detect active bleeding. If MD is suspected, then a 99mTc-petechnate (Meckel's scan) can exploit the tendency of MD to concentrate gastric mucosa (which uptakes the radioactive 99mTc-petechnate tracer), thereby detecting the MD via radiotracers. A Capsule endoscopy (CE) and double balloon enteroscopy (DBE) have been used to visualize the small bowel and detect MD along with associated complications such as bleeding. In our case, our patient had undergone an OGD and colonoscopy, both of which are limited by the reach- so MD was not detected. The accuracy of a Meckel's scan in detecting MD is lower in adults (like our patient) (46%) when compared to children (90%). This coupled with the fact that our patient was unstable and that no ectopic tissue was detected histologically, makes the Meckel's scan obsolete in our case. A diagnostic laparoscopy or laparotomy is an invasive but definitive way to both visualize and manage complicated MD, which was how MD was demonstrated in both cases.

The primary management of symptomatic MD is surgical, particularly in cases complicated by bowel obstruction or gastrointestinal bleeding. Surgical options include Meckel's diverticulectomy, wedge resection, or segmental bowel resection with primary anastomosis.[5] The decision is based on:

a) Integrity of diverticulum base and adjoined bowel segment: If preserved diverticulectomy can be performed, or else wedge or segmental resection is preferred

b) The possible presence and location of ectopic tissue: It is difficult to discern ectopic tissue in surgery, but estimation can be made based on whether the height-to-diameter ratio is less or greater than 2. In Long MD (where ratio is more than 2), ectopic tissue is assumed to be closer to the tip of MD, so a diverticulectomy may be performed. In contrast, wedge or segmental resection is preferred in Short MD (with a ratio<2)

In both cases we opted for segmental resection of MD, to achieve wider margins and minimize risk of residual pathology.

Bowel obstruction is the leading complication of MD in adults, while gastrointestinal bleeding is the leading complication in the pediatric age group. The complications rate for symptomatic MD, based on Yamaguchi et al.[6], are as follows: obstruction, 13.7%; inflammation or diverticulitis and perforation, 12.7% and 7.3%, respectively; hemorrhage, 11.8%; neoplasm, 3.2%; and fistula, 1.7%.

Conclusion

MD is represented as a small percentage of the population. Most of these patients will be asymptomatic. However, at least 4% of patients with MD may suffer from serious complications such as Bowel obstruction, bleeding, inflammation, etc. With a high index of suspicion, appropriate investigation, and timely management, most patients can achieve good clinical outcomes

Disclosure

All patients were contacted via telephone to obtain verbal consent. None

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