CASE REPORT

Mesenteric Meckel's diverticulum: an unusual cause of small bowel intussusception

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SUMMARY

Meckel's diverticulum (MD) is the commonest congenital anomaly of the small intestine, affecting 1–4% of the population. Cardinal features emphasise an antimesenteric location two feet proximal to the ileocaecal valve, with a separate mesenteric blood supply and involvement of all layers of the small intestine. However, reports of MD arising from the mesenteric border of the small intestine are rare in the surgical literature. This report examines the case of a 45-year-old woman presenting with a 6-month history of episodic central abdominal pain and microcytic anaemia who underwent an elective diagnostic laparoscopy as initial CT findings were inconclusive. Intraoperatively, she was found to have small bowel intussusception approximately 40 cm proximal to the ileocaecal valve. Macroscopic examination of the resected small bowel segment revealed a mesenteric outpouching that was confirmed as mesenteric MD on histopathological analysis. Postoperatively, the patient recovered with no surgical complications and full symptom resolution.

BACKGROUND

Initially described by Johann Friedrich Meckel in 1809, Meckel's diverticulum (MD) is an omphalo-mesenteric remnant resulting from failure of the vitelline duct to involute by the eighth week of gestation and is the commonest congenital anomaly of the small intestine, affecting 1–4% of the population.^{1–3}

Early diagnostic criteria were developed by Jay *et al*, who defined MD arising from the antimesenteric location proximal to the ileocaecal valve with a separate mesenteric blood supply and involvement of all layers of the small intestine. Additionally, ectopic mucosa of other gastrointestinal origin such as gastric and pancreatic have been frequently reported.^{4–6}

However, in 1941, Chaffin *et al* first described an unusual variant of MD located on the mesenteric border of the small bowel, thought to have resulted secondary to traction from a persistent vitelline artery.⁴ Since then, there have been few reports regarding mesenteric MD.^{7–15}

This case report provides a review of the surgical literature regarding the mesenteric MD anomaly and emphasises the need for a general review of the diagnostic criterion for MD in order to ensure that this rare variant is not a forgotten differential as it may unsuspectingly present with complications such as pain, mesenteric diverticulitis, erosion, haemorrhage, intussusception and bowel obstruction.¹⁶

CASE PRESENTATION

A 45-year-old woman was referred to the general surgery outpatient clinic, with a 6-month history of episodic central colicky abdominal pain and microcytic anaemia. She was otherwise well with neither personal nor family history of coeliac or inflammatory bowel disease. No features to suggest gastrointestinal malignancy, such as rectal bleeding, change in bowel habit or weight loss, were identified. On examination, her vital parameters were stable and the abdomen was soft with mild periumbilical tenderness. No blood and no masses were identified on digital rectal examination.

INVESTIGATIONS

Initial blood results showed marked microcytic anaemia (haemoglobin 69 g/L and mean corpuscular volume 63.4 fL) with occasional target and pencil cells. Additionally, the patient had previously undergone an abdominal ultrasound and oesophago-gastroduodenoscopy, which were normal. Therefore an urgent CT scan was arranged to investigate the cause of the patient's symptoms and anaemia. It reported a blind ending tubular small bowel structure of which diagnosis was inconclusive, but differentials included a chronic internal hernia with fat congestion or a malignant process such as gastrointestinal stromal tumour (figure 1).

DIFFERENTIAL DIAGNOSIS

The spectrum of differentials is variable. In emergency cases with presentations of acute lower abdominal pain, differentials include appendicitis, Meckel's diverticulitis, sigmoid diverticulitis and visceral perforation. However, in the outpatient cases with presentations of chronic lower

Figure 1 CT image of blind ending small bowel tubular structure.

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abdominal pain, other differentials include malignancy, Crohn's mass, MD and intestinal duplication cyst.

TREATMENT

Initially, the patient's anaemia was treated with red blood cell transfusions and her pain was controlled with simple non-opiate based analgesia. However, given inconclusive CT findings, the patient subsequently underwent elective diagnostic laparoscopy to aid a conclusive diagnosis under the 2-week wait criteria for suspected malignancy.

Intraoperatively, an area of small bowel intussusception was identified approximately 40 cm proximal to the ileocaecal valve. As the cause for the intussusception was uncertain, the procedure was converted to open (laparotomy), and segmental small bowel resection of the affected segment was performed. The remaining bowel was joined by primary end-to-end anastomosis using 3-0 polydioxanone sutures.

On macroscopic examination of the resected small bowel specimen (55 mm×35 mm), a diverticulum on the mesenteric border was identified with haemorrhagic mucosa at the leading point of intussusception (figure 2). Histopathological analysis confirmed this to be a mesenteric MD with evidence of neither malignancy nor ectopic mucosa.

OUTCOME AND FOLLOW-UP

The patient made an uneventful postoperative recovery and was discharged within 48 h of admission. She reported complete recovery and resolution of symptoms at 6 weeks.

DISCUSSION

MD has been classically described to occur on the antimesenteric border and results from failure of the vitelline duct to involute by the eighth week of gestation.^{1 2} However, MD occurring on the mesenteric border is a rare occurrence. It was first postulated by Chaffin *et al* that mesenteric MD results secondary to traction of a persistent vitelline artery.⁴ Currently, there have been nine reports with reference to mesenteric MD identified on PubMed and Google Scholar literature review.^{7-15 17}

Since Chaffin's first theory in 1941, some authors have concluded that a shortened vitelline artery may contribute to mesodiverticular bands joining the diverticulum tip to the ileal mesentery, the result of which causes diversion of the diverticulum from the antimesenteric border during fetal development.⁹ Other authors have advocated that mesenteric MD is in fact an intestinal

duplication cyst.¹⁴ Nonetheless, Kurzbart *et al* have suggested otherwise, reporting a rare spontaneous regression of patent omphalomesenteric duct after birth. They found, after injection of contrast into a fourth lumen found within a transected umbilical cord of an infant (born at 28 weeks gestation), the contrast reached the small intestine, suggesting a patent omphalomesenteric duct at the time of injection. However, at 3 months of age, the infant underwent an umbilical hernia repair with no identification of any omphalomesenteric structure. Interestingly, a MD adherent to the mesentery was identified 40 cm proximal to the ileocaecal valve.¹⁷ This was a significant finding, as the differentiating factor between mesenteric MD and intestinal duplication cyst is that the prior is an omphalomesenteric canal remnant.⁹

The other important distinguishing feature is that MD has its own distinct mesenteric blood supply whereas intestinal duplication cysts share the blood supply from the adjacent small intestine.¹⁸ This feature may hinder a differential diagnosis as a separate vitelline artery has only been reported in 10% of MD and other cardinal features should thus support diagnosis.¹⁹ Furthermore, the spectrum of presentation of mesenteric MD reported in surgical literature is variable. There have been three previous cases reported in the elective setting of mesenteric MDs that have presented with rectal bleeding and following outpatient investigations were managed with planned operative resections.^{9 11 12} On the contrary, five cases have presented as surgical emergencies with features similar to acute appendicitis or an acute abdomen with peritonitis. In these cases, intraoperative findings have commented on an acutely inflamed mesenteric MD with either associated adenopathy, perforation or abscess formation.^{7 8 10 13 15} Therefore many authors have advocated prophylactic resection of incidental mesenteric MD due to its atypical location and fulminant complications that can ensue if left in-situ.^{4 7-9}

In the case presented, it was difficult to comment on presence of a distinct arterial blood supply to the mesenteric MD on pre-operative imaging. However, CT angiography may have been a more suitable test to help answer the question faced by previous authors regarding distinct blood supply. Clinical features, intraoperative and pathohistological findings supported our diagnosis of mesenteric MD. Additionally, our case is the first report of mesenteric MD presenting as an elective case with intraoperative findings of small bowel intussusception with a haemorrhagic leading point as a complication.

In conclusion, the classification of mesenteric MD from intestinal duplication cyst is still controversial and a matter of opinion between various authors. Therefore a review of the current surgical literature is required to aid classification of the

Figure 2 Intussuscepted small bowel segment on mesenteric side.

Learning points

- ▶ Mesenteric MD is a rare variant of MD and differentiation from intestinal duplication cyst remains controversial.
- ▶ In patients with inconclusive imaging, diagnostic laparoscopy may aid diagnosis and location of pathology. Diagnosis is confirmed by histological analysis.
- ▶ In patients presenting with features of acute appendicitis or an acute abdomen with peritonitis with no obvious cause found intraoperatively, it is recommended to inspect the small bowel and assess the mesenteric as well as antimesenteric borders for MD.
- ▶ Both incidental and symptomatic disease requires surgical resection to avoid serious fulminant complications.

two entities as well, to revisit Johann Friedrich Meckel's original criterion for diagnosing MD. This case highlights the complications of mesenteric MD, including intussusception and haemorrhage presenting as intermittent colicky abdominal pain, tenderness and profound anaemia. Other acute presentations of mesenteric MD include Meckel's diverticulitis, erosion and perforation. Therefore, surgical resection of the affected segment is advocated in symptomatic as well as incidental cases, to avoid such fulminant complications.

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