CASE REPORT

Concurrent perforated Meckel's diverticulum and intestinal malrotation in an 8-year-old boy

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SUMMARY

An 8-year-old boy with a history of recurrent abdominal pain presented with a 12 h history of severe periumbilical pain, nausea and vomiting. On examination, he was found to have a tender, erythematous, paraumbilical mass. At operative exploration, an abscess cavity was identified and followed to reveal a gangrenous Meckel's diverticulum, perforated at its tip to create the abscess. Around this Meckel's diverticulum, the small bowel had torted to produce a significant small bowel volvulus on a shortened mesentery. The caecum and ascending colon were found to be in the left upper quadrant and an intraoperative diagnosis of malrotation was made. Following resection of the Meckel's diverticulum and surgical correction of the malrotation, the child made an excellent recovery. His abdominal pain has not recurred in 6 months of follow-up since the operation.

BACKGROUND

Intestinal malrotation describes a spectrum of anatomical midgut abnormalities that may present acutely in the first weeks of life or may have a more insidious presentation in later childhood or adulthood.^{1 2} Meckel's diverticulum, an omphalomesenteric (vitelline) duct remnant on the antimesenteric border of the distal ileum, has a prevalence of 1.5–2%.³ These two congenital abnormalities are rarely found together. In this report, we describe a case of an 8-year-old boy with both malrotation and a complication of Meckel's diverticulum, presenting as an emergency.

CASE PRESENTATION

An 8-year-old boy presented to the emergency department of our hospital, with a 12 h history of periumbilical pain, associated with nausea and non-bilious vomiting.

There was a history of six similar presentations to various units and teams ever since the boy was 4 years of age, which had all featured severe abdominal pain with nausea and vomiting, lasting up to 10 days. On previous occasions, conservative management with fluid resuscitation, analgesia and antiemetics had resulted in remission of symptoms, and a diagnosis of viral gastroenteritis or mesenteric adenitis had been presumed.

On specific questioning, the child also reported experiencing mild periumbilical pain on most days of the week for several years. His parents noted that he had been particularly irritable as an infant with possible colic. He was an otherwise healthy

child, with normal development, and on the 91st centile for weight and the 98th centile for height.

On examination, the boy was flushed and clearly unwell, febrile and tachycardic. A 3 cm tender erythematous mass was present, above and to the left of his umbilicus. The abdomen was mildly distended, but soft.

DIFFERENTIAL DIAGNOSIS

The presentation of fever, nausea and vomiting, with an erythematous tender paraumbilical mass, suggested sepsis, secondary to an abscess, or an incarcerated, strangulated hernia.

TREATMENT

Following intravenous fluid resuscitation, nasogastric tube placement and antibiotics, the patient was taken to the operating theatre for urgent exploration.

A small vertical periumbilical incision was made for initial exploration, and extended to laparotomy. The paraumbilical mass was found to be an abscess cavity containing foul-smelling pus, but the appearances were unusual. The abscess cavity was followed to reveal a long, gangrenous Meckel's diverticulum, perforated at its tip to create the abscess cavity. Around this Meckel's diverticulum, the small bowel had torted 360° in a clockwise manner to produce a significant small bowel volvulus on a shortened mesentery. There was no ischaemia of the small bowel, however, and it appeared viable. In addition, it was noted that the caecum and ascending colon were in the left upper quadrant with the right iliac fossa lying empty, and an intraoperative diagnosis of malrotation was made.

Figure 1 Intraoperative photograph demonstrating a Meckel's diverticulum held in a clip. The caecum and ascending colon were freely mobile and lying in the left upper quadrant, with the appendix pointing caudally.

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(figure 1). There were adhesions between the distal terminal ileum and caecum, producing a fused appearance and a short shared mesenteric blood supply. There were no adhesions to the peritoneal walls or Ladd's bands. The duodenum appeared normal and unrestricted by bands, and all other organs in the supracolic compartment were also normal. The remainder of the large bowel and rectum were in standard anatomical positions.

Pus in the periumbilical abscess cavity was suctioned and the body of the Meckel's diverticulum was detached. The abscess cavity and surrounding necrotic tissues, consisting of the perforated tip of the Meckel's diverticulum, were excised. Adhesions between the terminal ileum and caecum were divided. The Meckel's diverticulum was resected in a V-configuration and the ileum closed transversely with interrupted absorbable seromuscular sutures. The bowel was relocated to its normal anatomical position, and an appendicectomy was performed to remove any future diagnostic doubt regarding appendicitis. The abdominal cavity was washed with warmed saline, and the umbilical tissues were washed with iodine solution. A mass closure of the abdominal wall was performed, and the skin closed with interrupted non-absorbable sutures to allow further drainage if needed, given the degree of contamination.

OUTCOME AND FOLLOW-UP

The patient recovered well, and was discharged home on the fifth postoperative day.

Subsequent histology was in keeping with a Meckel's diverticulum, with perforated bowel lining the walls of the periumbilical abscess cavity. The appendix was normal, as anticipated.

In the 6 months following the procedure, the boy has remained well and has had no recurrence of his abdominal pain.

DISCUSSION

Malrotation describes a congenital anomaly of bowel development in which failure of the normal intestinal rotation at 10–11 weeks' gestation results in an abnormally positioned midgut.¹ In some cases, fibrous bands cross the duodenum and cause early high intestinal obstruction, often presenting within the first 3 weeks of life. In other variants, the abnormal position may predispose to volvulus, leading to a subacute or intermittent presentation of obstruction in children and adults.²

Meckel's diverticulum is an omphalomesenteric (vitelline) duct remnant on the antimesenteric border of the distal ileum.³ It has a prevalence of approximately 1.5–2% and is thought to be asymptomatic in up to 90% of cases. Complications include inflammation, perforation, small bowel volvulus and obstruction; all of which may lead to an acute presentation.

Two cases of concurrent Meckel's diverticulum and malrotation have been described in the literature to date.⁴ It is notable that, as in our case, both featured chronic abdominal symptoms that preceded the acute presentation by several years. It is likely

that these previous presentations represented episodes of subacute obstruction secondary to volvulus.² In all three cases, fibrous bands compressing the upper gastrointestinal tract were absent, likely contributing to the lack of acute presentation in the neonatal period. In addition, an association between malrotation, Meckel's diverticulum, bronchogastric fistula and pulmonary sequestration has been reported in two children.⁵ In both cases, the patients presented before the age of 2 years, with respiratory symptoms.

From the few cases reported, it may appear that the combination of malrotation and Meckel's diverticulum predisposes children to recurrent episodes of subacute volvulus prior to an acute presentation. The paucity of such cases with concurrent congenital anomalies described in the literature would suggest that this combination is a rare occurrence, likely due to chance. However, unusual anomalies should be considered in children presenting with chronic symptoms, prior to an acute event.

Learning points

- ▶ It is possible for malrotation and Meckel's diverticulum to occur in combination, and presentations later in childhood imply an anatomically lower level of obstruction, more distal in the gastrointestinal tract than the duodenum.
- ▶ Immediate resuscitation and supportive measures should remain the first priority in the management of septic children until the underlying diagnosis has been identified.
- ▶ Unusual anomalies should be considered in children with a history of recurrent abdominal pain presenting with an acute episode.

Contributors HT undertook the background research and drafted the manuscript (excepting the operative details). SB was the consultant surgeon operating in the case. She wrote the operative details and revised the manuscript. MV was the registrar operating on the case and provided editorial input to the manuscript.

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