CASE REPORT

Perforation of Meckel's diverticulum by an intact fish bone

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SUMMARY

Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract, with an overall incidence of approximately 2.2%. It is generally noted incidentally during laparotomy for management of other abdominal pathology. Complications are infrequent, developing in 4% of individuals with this abnormality, and are usually seen in childhood. Herein, we discuss the case of a 52-year-old Caucasian man presenting with a 1-day history of worsening central and right-sided abdominal pain. Initial evaluation posed a broad differential however, following conservative measures and unremarkable plain films, the patient developed peritoneal signs necessitating operative intervention. During diagnostic laparoscopy, a Meckel's diverticulum was noted to be inflamed and perforated by an intact fish bone. The patient was treated successfully with a segmental resection and primary anastomosis, and had an uneventful postoperative recovery.

BACKGROUND

Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract, with an overall incidence of approximately 2.2%.¹ It is caused by a failure of regression of the omphalomesenteric duct following physiological herniation of the midgut through the umbilicus during the fourth week of fetal development. Complications are infrequent, and usually manifest in childhood. They include haemorrhage, bowel obstruction, inflammation, intussusception and rarely, perforation. Foreign body perforation is exceedingly rare with a myriad of unexpected culprits. Correct pre-operative diagnosis poses a great challenge as patient presentations commonly mimic other more frequently seen gastrointestinal pathologies.

CASE PRESENTATION

A 52-year-old Caucasian man was referred to the emergency department with a 1-day history of sharp 'crampy' non-radiating right-sided abdominal pain that was relieved only by hospital-administered intravenous analgesia. This was associated with progressive anorexia and nausea. The patient denied vomiting, change in bowel habit and gross blood per rectum. He had no previous abdominal operations and his medical history was otherwise unremarkable. Of note is that he attended a colleague's wedding several days prior to his presentation and indulged in a variety of exotic foods. He has been a lifelong non-smoker and admitted to modest alcohol use.

Physical examination revealed a well-developed man, somewhat dehydrated, yet adequately nourished with normal vital signs and afebrility. Focused abdominal evaluation revealed non-localised tenderness to deep palpation extending from the right flank to the right iliac fossa. The abdomen was distended and tympanitic without evidence of rigidity or formal peritoneal signs. Eponymous signs such as McBurney's, Murphy's and Rovsing's could not be demonstrated on clinical evaluation. Rectal examination was unremarkable.

INVESTIGATIONS

Complete blood count revealed a mild leucocytosis of $13 \times 10^3/\text{mm}^3$ with a neutrophilia. Basic metabolic panel and liver function tests as well as a coagulation profile were within normal limits. Urinalysis was negative. An erect chest x-ray did not demonstrate pneumoperitoneum. A plain film of the abdomen did not reveal an obstructive pattern; there was no evidence of radio-opaque foreign bodies that is notable. An ultrasound of the abdomen was obtained, and although a technically difficult study owing to his habitus, it noted a normal liver, normal gallbladder and no sonographic findings of acute appendicitis.

DIFFERENTIAL DIAGNOSIS

Without clear objective radiographic data determining a specific diagnosis, the differential remained quite broad. Some of our considerations included acute appendicitis, relieved intussusception, colonic pathology, inflammatory bowel disease, acute cholecystitis and atypical renal presentations.

The working diagnosis remained early acute appendicitis and the patient was admitted for close monitoring, on continued support with fluid resuscitation and serial examinations.

TREATMENT

The patient was managed with fluid resuscitation and hydration while being kept NPO. Intravenous antibiotics were not administered as no source of infection was yet identified. Although CT scan of the abdomen and pelvis was scheduled for the following day, over the course of the next 16 h his physical examination worsened with declaration of peritoneal signs associated with rebound tenderness and abdominal rigidity. Further imaging was not deemed to be necessary as it would not considerably change management, and a decision was made to proceed with abdominal exploration after administration of intravenous antibiotics.

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Diagnostic laparoscopy was performed with the open Hasson technique and a modest amount of purulent fluid was noted in the right iliac fossa. Surprisingly, identification of the appendix at the base of the caecum demonstrated a normal, non-injected appendix. The gallbladder was without abnormality. The bowel was then run from the ileocecal valve proximally. At approximately 90 cm, an inflamed Meckel's diverticulum was noted. Closer inspection revealed a perforation at its antimesenteric border with a foreign body identified as an intact fish bone (figure 1). Segmental resection was then performed along with a primary small bowel anastomosis in the usual fashion.

Histology demonstrated normal small intestinal mucosa without evidence of heterotopic gastric mucosa (figure 2). The mucosa was lined by goblet type cells with occasional paneth cells observed in the crypts. Further histological section at the point of perforation showed an ulcer. The ulcer bed consisted of extravasated red blood cells with a dense inflammatory infiltrate consisting mostly of neutrophils and necrotic tissue representing reactive rather malignant glandular cells (figure 3).

OUTCOME AND FOLLOW-UP

The patient's postoperative course was unremarkable. He was transitioned to an oral diet by postoperative day 3, and discharged without incident on postoperative day 6.

DISCUSSION

In 1598, Hildanus was the first to describe the presence of Meckel's diverticulum. It is, however, eponymously attributed to the German anatomist Johann Freidrich Meckel who first identified the anatomic abnormality necessary for its development.^{2 3} It is caused by a failure of regression of the omphalo-mesenteric duct following physiological herniation of the midgut through the umbilicus during the fourth week of fetal development. It is a true enteric diverticulum encompassing all layers of the bowel wall, and is the most common congenital anomaly of the gastrointestinal tract with an overall incidence of

Figure 2 Histological section of the specimen demonstrating normal small bowel mucosa without evidence of gastric heterotopia.

2.2%. It is more common in men than in women, and only one in five tend to be symptomatic.^{4 5}

The most common complications of a Meckel's diverticulum are haemorrhage, obstruction, diverticulitis, intussusception, ulceration and rarely, perforation or volvulus. Haemorrhage is most common in children whereas obstruction and inflammation occur mostly in adults. Perforation by a foreign object is an extremely rare complication. Foreign object culprits are myriad—they include cherrystone, wood splinters, chicken and fish bones in addition to tomato skins, grape seeds and even button batteries.^{6–12}

Accurate preoperative diagnosis continues to remain a major challenge, as most individuals do not remember ingesting a foreign body. The presentation is that of worsening abdominal pain or an acute abdomen that necessitates surgical intervention, and is most commonly assumed to be acute appendicitis. As in this case, diagnostic laparoscopy for continued abdominal pain without a confirmed diagnosis can help guide subsequent management. Furthermore, there is no doubt that complicated Meckel's diverticula should be managed by surgery, either via a diverticulectomy if the anatomy is favourable or segmental bowel resection with primary anastomosis.

Figure 1 Resected Meckel's diverticulum specimen alongside the intact fish bone causing the perforation.

Figure 3 Magnified histological section of ulcer bed at the point of perforation with extravasated red blood cells and surrounding inflammation.

This case represents an example of a preoperative diagnostic dilemma of a man with worsening abdominal pain suspected of acute appendicitis in which a perforated Meckel's diverticulum by an intact fishbone was diagnosed appropriately after diagnostic laparoscopy. Surgeons should have a heightened index of suspicion for complicated Meckel's diverticulitis in patients presenting with atypical right iliac fossa pain.

Learning points

- ▶ Meckel's diverticulum is the most common congenital anomaly affecting the gastrointestinal tract.
- ▶ Perforated Meckel's diverticulitis, although uncommon in an older patient demography, should continue to remain a diagnostic possibility in the surgeon's mind.
- ▶ Definitive treatment is surgical intervention, and supplementary radiographic imaging should not delay surgical intervention in patients with peritonitis.

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