Case Report

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T-shaped Meckel's diverticulum: a rare anatomical variant complicating small bowel volvulus

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ABSTRACT

The Meckel's diverticulum is a congenital diverticulum arising from the terminal ileum and is the unobliterated proximal portion of the vitellointestinal duct. Intestinal obstruction due to Meckel's diverticulum is the most common presentation in adults and is the second most common presentation in children. We present a case of a 58-year-old gentleman presented with acute abdomen who was later found to have Giant T- shaped Meckel's Diverticulum complicating small bowel volvulus on exploratory laparotomy. A T-shaped Meckel's diverticulum has not yet been described.

Keywords: T-shaped Meckel's diverticulum, Intestinal obstruction

INTRODUCTION

Meckel's diverticulum is caused by the incomplete obliteration of the omphalomesenteric duct in the developing embryo.1 It is the most prevalent congenital abnormality of the gastrointestinal tract.² The Meckel's diverticulum usually range's in size from 1 to 10 cm.² Often, these are completely asymptomatic. However, at time it can result in GI bleeding and abdominal pain due to acid secretion from the ectopic gastric mucosa within the diverticulum. Cases of giant Meckel's diverticula (>5 cm) are relatively rare and are associated with more severe complications, especially obstruction.^{3,4} The factors predisposing patients to axial torsion of Meckel's diverticulum include, the presence of mesodiverticular bands, a narrow base, excessive length, associated neoplastic growth and inflammation of the diverticulum. Here we present a case of a 58-year-old Gentleman presented with acute abdomen to Emergency Department and on emergency exploratory laprotomy found to be

small bowel volvulus complicated by T-shaped Meckel's diverticulum, a rare anatomical variant that has not yet been described.

CASE REPORT

A 58-year-old gentleman presented to the Emergency Department with acute onset of lower abdominal pain and a single episode of non-projectile vomiting. The pain did not radiate, and tenderness was elicited at the right iliac fossa and hypogastrium. The vomitus was watery, non-bilious and not blood stained. There was no history of fever, constipation, abdominal distention or difficulty in micturition.

On examination his pulse was 88 beats per minute, blood pressure was 130/90 mm of Hg and temperature 98.6oF. Bowel sounds were present. His total leukocyte count was11200/mm3 and differential leukocyte count was N85 L12 M3. An X-ray Abdomen revealed Dilated loops

of small and large bowel. USG Abdomen showed Intestinal obstruction with intra peritoneal free fluid. CECT Abdomen revealed Small bowel obstruction, likely secondary to internal hernia with increased risk of perforation. The patient was started on intravenous fluids and antibiotics.



Figure 1: CECT Abdomen showing volvulated bowel

After adequate hydration, he was taken up for emergency exploratory laparotomy, with small bowel resection and anastomosis under general anaesthesia. Intra operative finding revealed a Meckel's diverticulum about 11cm in size, approximately 2 feet proximal to the ileocaecal junction. There was a volvulus involving 189 cm of the small intestine. The volvulus was knotted by the T shaped diverticulum with gangrene of the distal end. The patient underwent bowel resection and anastomosis. His post-operative period was uneventful, and he was discharged on the 10th post-operative day without any complications. Histopathologic evaluation of the resected specimen confirmed: Resected segment of small intestine with jejunum and ileum with 'T' shaped Meckel's diverticulum - all showing gangrenous change.

Probable mechanism

As the small bowel volvulus progressed proximally, the T shaped Meckel's diverticulum was pulled towards the site of the volvulus.



Figure 2: Diagram tic representation of probable mechanism.

When the Diverticulum got pulled about the twisting loops of bowel, owing to its peculiar shape, its T shaped distal end probably got knotted around the bowel loops complicating the volvulus. Unable to unwind, the volvulus progressed to intestinal obstruction and gangrene.



Figure 3: On table appearance of gangrenous distal end of Meckel's Diverticulum and jejunum.



Figure 4: Resected specimen, showing gangrenous distal end of Meckel's Diverticulum, jejunum and ileum.

DISCUSSION

The Meckel's Diverticulum is a true diverticulum because it contains all the layers of the intestinal wall. Normally measuring between 3cm and 6cm.

Meckel's Diverticula are called giant when they are longer than 5cm.⁵ Males are more prone to suffer from complications, which occur twice as often among males than among females. 50% of these complications are observed in people under the age of ten years, and it seems as though the incidence diminishes with age. However, some cases have been observed in patients over 80 years old, most of them with hemorrhage in the lower digestive tract and with symptoms of intestinal obstruction.

Hemorrhage of lower digestive tract is a common complication, occurring in 25% to 50% of cases. It is related to the gastric mucosa of the diverticulum, which produces chronic acid induced ulcer in the adjacent ileum. Bleeding is more frequent in children and generally asymptomatic. Intestinal obstruction is a frequent clinical occurrence (25%-40%), especially in adults. It is usually due to invagination or volvulus around a connection or band to the abdominal wall.

Diverticulitis is found in 20% of these cases whether they have undergone perforation or not. Inflammation may develop because of foreign objects, such as fish bones, biliary stones etc.

There has been reports of phytobezoar related inflammation. One of the rarer complications is an axial torsion along the thin base, obstructing the blood flow of the diverticulum leading to ischemia and necrosis of the tissue. Another rare complication is necrosis due to enterocolitis. 6.7.8

Diverticulectomy following complication has a 2% mortality rate and a 12% morbidity rate. Incidental finding of a diverticula has a 1% mortality and 2% morbidity rate with long term complications occurring in 2% of these cases. 9.10

Fewer than 10% of cases are diagnosed prior to surgery. They are generally confused with acute appendicitis. CAT scans and sonograms provide little help in making this assessment. The use of Technetium 99 for contrast captured by the gastric mucus is common for the study of rectal bleeding. It is 85% sensitive and 95% specific for children, but only 46% sensitive in adults.

The case reported here, is an abnormal anatomical variant of Meckel's Diverticulum with a 'T' shaped distal end. Although atypical because of the complications described and the age of the patient, is a reminder that the Meckel's diverticulum is a pathology that should be considered whenever one encounters a patient with acute abdomen, regardless of diagnostic difficulty.

The embryological aspect

After the seventh week of intrauterine life, the vitellointestinal duct and the secondary yolk sac (omphalomesenteric duct), undergo regression and complete resorption. Both these structures lie in the extra embryonic coelom, surrounded by embryonic mesenchyme.

Ultimately the secondary yolk sac is compressed onto the chorionic surface of the placental plate by the expanding amnion and its fusion with the chorion. At the distal end of the vitelline duct, the secondary yolk sac progressively shrinks in size and is seen as a discrete pale yellow discoid tissue mass on the amniotic surface of the placental plate, near the insertion site of the umbilical

cord. Around the fifth week, haemopoesis followed by vasculogenesis begins in the yolk sac. In the present case, the horizontal part of the distal end of the T-shaped Meckel's Diverticulum represents the yolk sac remnant (Histopathological report: Section from solid part near tip shows Adipose tissue with hemorrhage).

CONCLUSION

Our case illustrates a rare case of intestinal obstruction by Meckel's diverticulum. In addition to the T shaped anatomical variant, this Meckel's Diverticulum measured 11cm and hence can be described as A Giant Meckel's Diverticulum. T shaped Meckel's diverticulum is an anatomical variation that has not been reported yet, to the best of our knowledge. The authors would like to name this 'T' Shaped variant as -

'VARS Diverticulum' {Vergis Paul, Anna Matthai, Ashly Thomas, Ramu R, Reesha PA, Sandhya Kurup, Kocheril Sheryl Mathews} after its contributors.

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