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PERFORATED MECKEL'S DIVERTICULUM: A RARE MIMIC OF ACUTE APPENDICITIS

General Surgery

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ABSTRACT

Meckel's diverticulum (MD) is a congenital anomaly ensuing from the inadequate obliteration of the vitelline duct. While often asymptomatic, complications related to MD can range from mild as well as painless to potentially life-threatening, including bleeding, intestinal inflammation, perforation, as well as obstruction. Acute appendicitis mimicking MD is a rare presentation, but it does exist. A high index of suspicion is necessary to identify MD accurately along with its possible complications, since only 4–16 percent of cases result in complications. Perforation of MD is an infrequent occurrence, with limited case reports in the literature. Surgical management typically involves a segmental resection, wedge resection, or primary anastomosis, on the basis of the intraoperative findings. We reported a case of perforated MD, clinically resembling acute appendicitis which was effectively managed with segmental resection as well as primary anastomosis.

KEYWORDS

Abdominal pain, Appendicitis, Meckel Diverticulum, Perforation

INTRODUCTION

In1598, Fabricius Hildanus identified MD () which was later known after Johann Friedrich Meckel, a German anatomist, who performed an extensive examination of its pathological and embryological characteristics in 1809. MD (true diverticulum), comprises all 3 layers of the bowel wall, and contains ectopic tissue. Incomplete closure of the proximal omphalomesenteric duct during seventh week of gestation ascends this condition, rendering it highly congenital anomaly of gastrointestinal system. Following the “rule of two,” it is estimated that MD affects about 2 percent of population, with 2:1 ratio (male by female). Typically, it is positioned around 2 feet (60 cm) away from ileocecal valve, with an average diameter 2 cm & a length of approximately 5 cm (2 inches). It typically has 2 types of ectopic tissue, primarily pancreatic & gastric, oftenly diagnosed in patients under the age of two.

MD presents a range of clinical symptoms that can create considerable diagnostic difficulties, especially in paediatric patients. Common symptoms of MD include gastrointestinal bleeding, which may be followed by complications such as intussusception, diverticulitis, intestinal obstruction, as well as, in rare cases, perforation or neoplasm. This report details a case of spontaneous perforation of MD in a young male patient mimicking Acute appendicitis, which was discovered during laparotomy and later confirmed in the postoperative period.

Case Report

A previously healthy man (23-year-old) came to the Department of General Surgery, Grant Government Medical College, Mumbai, Maharashtra with history of pain in the right lower abdominal for 3 days. The onset had been insidious, gradually progressive, mild to moderate in intensity, colicky, and radiating towards the right thigh. The patient experienced nausea without vomiting and had one episode of high-grade fever that subsided with oral medication. There was no history of any urinary symptoms or altered bowel habits. This was the inaugural episode of such pain. There was no prior contact with ill individuals or recent illness; the medical and surgical history was unremarkable. He was neither a smoker nor a consumer of ethanol. The examination revealed a young man with an average body habitus.

The man was vitally stable, afebrile as well as hemodynamically normal. The results of the abdominal examination revealed a non-distended abdomen, positive rebound tenderness, guarding and tenderness in the right iliac fossa, and hypoactive bowel sounds. The Psoas sign as well as Obturator sign were not observed during the physical examination.

Laboratory test indicates leucocytosis $15x10^9$/L (reference range: 4.0–10.0x 10^9/L). Ultrasound of the Abdomen suggested features of Acute Appendicitis with interbowel fluid. Since a CT (computed tomography) scan was expected to have no effect on the patient's care, hence, it was not performed.

The patient has consented to undergo an open appendectomy under general anesthesia, based on the clinical findings. McBurney's incision was taken. Intra-operative findings revealed a perforated inflamed MD alongside a normal-looking Appendix.

Meckel's diverticulectomy with Side-to-side anastomoses and Appendectomy was done. Meckel's diverticulum and the appendix were the 2 pathological specimens that were acquired. The appendix was 7 cm by 0.5 cm and showed no signs of perforation, suggesting that it was normal and free of pathologic alterations. MD exhibited a bowel segment with a measurement of 6cm x 3cm x 1cm, with ulceration of 1.0cm x 1.0cm (segment of ileum with MD depicting gangrenous perforation & heterotopic tissue).

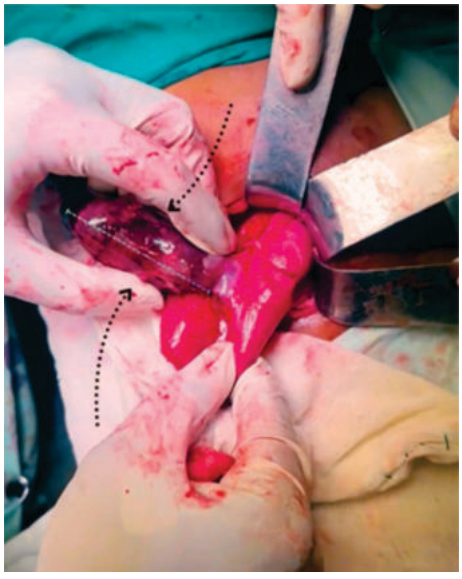

Figure 1: An Intraoperative View of a Perforated Meckel's Diverticulum (Approx.6 Cm) with Distal Inflammation

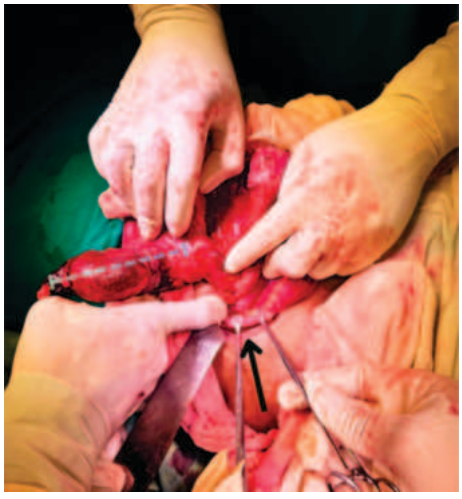

Figure 2: An Intraoperative View of Perforated Meckel's Diverticulum with Distal Inflammation (Dotted Line) and Normal Looking Appendix (Black Arrow)

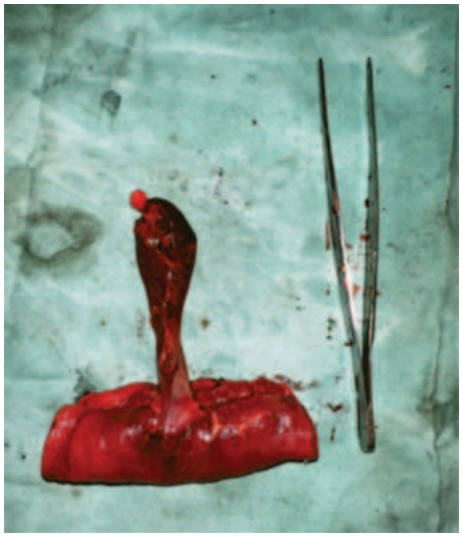

Figure 3: Image of the Resected Diverticulum (approx. 6 Cm)

DISCUSSION

In 1809, surgeon Sir Johann Friedrich Meckel provided the first description of inadequate obliteration of the omphalomesenteric duct, which is now regarded as MD.

The utmost prevalent congenital small bowel anomaly is MD. The omphalomesenteric/Vitello intestinal duct links midgut with yolk sac, it is completely obliterated as the midgut recedes into abdominal cavity during embryologic 10th & 12th weeks of gestation. MD is the "outpouching" that happens when the proximal omphalomesenteric/ vitello-intestinal duct is unable to obliterate. It appears when umbilical end of omphalomesenteric duct atrophies & ileal end remains patent.

A true diverticulum or MD, comprises all layers of the mucosa, muscularis externa, submucosa, & serosa of small bowel. Meckel's diverticula appears on the ileum's antimesenteric border. It emerges from the ileum's antimesenteric border. Nonetheless, instances of mesenteric origin of MD have been documented. [5,6]. The persistent vitelline artery, originating from distal ileal branch of superior mesenteric artery, supplies it. [7,8] Meckel's diverticulum typically measures between 1 and 10 cm, with an average length of 5cm, as reported in this case. Giant Meckel diverticulum more than or equal to 5 cm is uncommon & frequently linked to complications of intestinal obstruction.[9]

Physicians are trained on the "rule of 2's" concerning a MD, which encompasses several key data points: located "2 feet from the ileocecal valve (60cm), exhibiting 2 types of heterotopic tissue (gastric & pancreatic), occurring 2 times more frequently in symptomatic men, arising within first 2 years of life, extending over 2 inches in length (roughly 5cm), typically presenting 2 types of symptoms (bleeding & obstruction), as well as 2 percent of cases developing complications.

MD occurs in roughly 1–2 percent of the population (3,4). Only 2 percent of individuals with a MD experience complications. An uncomplicated MD appears as a normal loop of bowel, henceforth it is hard to detect on a CT scan (low sensitivity), however some findings indicate its existence (2). A blind-ending tubular structure on the antimesenteric location as well as secondary indications of an enterolith, a normal appendix, and inflammation (enteritis/colitis)" may be observed in the CT scan [3]. Secondary indicators of MD complications enhance the possibility of identifying a pathological MD.

CT imaging is essential for diagnosis and evaluation of Meckel's diverticulitis complications.

Cullen et al. reported that patients with symptomatic diverticulum were aged between less than one year and 82years, with an average of 23years (11). "Park et al. indicated that average age of symptomatic patients with MD was 27years (31 ± 3.5years), & that prevalence of symptomatic MD declines with advancing age in adult population. Eldest" patient seeking surgery for symptomatic MD was 91years old [13].

Intestinal obstruction is predominant complication in the adult patients. [10,17] Inversion of the diverticulum, neoplasm, volvulus, or intussusception are included. Meckel's diverticulum is extremely rare for neoplasms, but carcinoid tumours might be related to the anomaly. The most frequent presentation in children is haemorrhage, which occurs in more than 50% of cases. [15,16,14].

Diverticulitis and perforation, which together account for nearly 20% of adult complications, are the second most common complications, they are frequently mistaken for acute appendicitis until visualized in the operating room.

Acute appendicitis is typically the presentation of Meckel's diverticulitis and MD perforation, with the exception of the pain site [12]. The most frequent preoperative diagnosis in complex MD cases is appendicitis. In this instance, limited peritonitis resulted from the MD's perforation; however, assuming that it was caused by perforating appendicitis.

The radiological diagnosis of MD could be challenging, especially if it is not initially suspected. Adult patients with symptomatic MD are hard to diagnose preoperatively when there is no bleeding, as was the case in our case. Preoperative diagnosis for symptomatic MD cases are less than 10% [11]. With the exception of intussusception, ultrasound is primarily used to diagnose nonspecific abdominal pain, but it has certain limitations when it comes to diagnosing MD. Furthermore, Groebli et al. indicated that CT successfully diagnosed Meckel's diverticulum in merely 1 out of 14 patients [12]. Ultrasound was unable to diagnose this case, most likely because pelvic fluid did not indicate an MD perforation.

Plain x-ray films and fluoroscopic examinations primarily reveal MD's complications, including perforation or bowel obstruction, whereas ultrasonography predominantly indicates peritoneal fluid in most instances and rarely identifies an inflamed diverticulum, which is challenging to differentiate from an inflamed appendix. CT scan is considered extremely sensitive cross-sectional imaging technique which is needed to diagnose complicated MD when a normal appendix is observed. [22]

The majority of cases are preoperatively diagnosed as acute appendicitis, despite advancements in imaging techniques making it challenging to diagnose symptomatic MD [18]. Technetium-99m pertechnetate scintigraphy is the preferred modality, with sensitivity and specificity up to 90%–95% [19,20]. However, in adult patients, its sensitivity (63%), specificity (2%), and accuracy (46%) are lower because prevalence of heterotopic gastric mucosa in symptomatic MD decreases with age. As a result, "evaluation of acute abdomen is hardly employed unless there is a strong clinical suspicion. [21]

The risk factors associated with symptomatic diverticula were identified by the Mayo Clinic on a comprehensive review of 1476

patients which are as follows– (1) patient younger than 50 years; (2) male gender; (3) diverticulum length more than 2 cm; and (4) ectopic or abnormal features within a diverticulum. The" literature revealed that the percentage of symptomatic MD was 17 percent, even if one criterion was met. As a result, it suggested eliminating all incidental diverticula that fulfilled either of the above-mentioned criteria.[13]

"Cullen et al. indicated that early postoperative morbidity stood at 12 percent, with a mortality rate of 2 percent, contrasting with 1 percent mortality rate observed in patients undergoing incidental diverticulectomies (11). Park et al. stated a postoperative complication rate of 13 percent", noting that there were no fatalities (13). Additionally, Grobli et al. identified 2 postoperative complications within an asymptomatic group of 52 patients & 1 in a symptomatic group of 67 patients, with no fatalities recorded in any group (23). The primary postoperative complications noted are prolonged ileus, anastomotic leaks, & wound infections. While previous studies reported operative mortality rates between 11-20 percent related to MD complications, recent findings indicate mortality rates nearing 0 percent. In this case there was no complication noted with patient had a smooth recovery.

There are no distinguishable physical indicators that would allow Meckel's diverticulitis to be distinguished from acute appendicitis. Although a perforation of the MD was identified in this instance, it is not astonishing that acute appendicitis was diagnosed clinically. Research reveals that a MD should be considered when the appendix appears normal, but the search for a MD becomes debatable if the appendix is inflamed. Some authors have proposed that routinely searching for a Meckel's diverticulum is advisable (24), while others have stressed the importance of thoroughly examining surrounding organs, despite a diagnosis of appendicitis (25). We advise investigating for MD even after diagnosing acute appendicitis, as these conditions can coexist in older patients and exhibit similar clinical presentations.

CONCLUSION

The most prevalent congenital gastrointestinal anomaly is MD, it can cause serious difficulties, even though it only affects a small portion of the population. MD are typically asymptomatic benign entities but may occur with symptoms resembling life-threatening conditions or acute appendicitis. A CT scan is essential for diagnosing certain conditions, including secondary inflammatory changes of colitis or enteritis, a normal appendix, & blind-ending tubular structure in antimesenteric location, with or without an enterolith. It is essential to evaluate the rare condition, MD, along with its complications, when a patient exhibits elevated white blood cell count, abdominal pain as well as fever. If MD is complicated by perforation, operative management is required; however, if it is found incidentally, surgical treatment is not needed unless the patient is under 40 years of age, the diverticulum exceeds 2 cm in length, has a narrow neck, is associated with a fibrous band, or contains suspected ectopic gastric tissue.

Even after confirming acute appendicitis, we must practice looking for Meckel's diverticulum because these illnesses might coexist in elderly patients and present with identical symptoms.

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