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Near missed diagnosis of perforated Meckel's diverticulitis in adult patient presenting with acute appendicitis: a case report

Pissanu Pana, M.D.[1,*]
Sarinee Suwannatada, B.N.S.[2]
Khajeepri Chaihanit, B.N.S.[2]

[1]*Surgery Unit, Medical Service Group, Phonthong Hospital, Roi-Et, Thailand*
[2]*Nursing Department, Phonthong Hospital, Roi-Et, Thailand*

ABSTRACT

Background: Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract. It is found in approximately 2% of the general population with usually asymptomatic. The common complications are bleeding, diverticulitis and intestinal obstruction. Perforation is very rare complication but life threatening if missed diagnosis.

Case Presentation: We report an adult case presented with clinically diagnosed acute appendicitis. The patient underwent conventional appendectomy with an inflamed appendix. Before abdominal wall closure, an inspection revealed perforated MD at 60 cm proximal to the ileocecal valve. A subsequent diverticulectomy was performed. The patient recovered and was uneventfully discharged on the 6th postoperative day.

Conclusions: Perforation is a very rare complication of MD. This case presented with secondary acute appendicitis cause perforation of MD due to fish fin. Two conditions may exist simultaneously, Meckel's diverticular perforation could be aware and suspected in the patient present with acute appendicitis.

Keywords: Perforated Meckel's diverticulum, Secondary acute appendicitis

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Corresponding Authors: Pissanu Pana
Surgery Unit, Medical Service Group, Phonthong Hospital, Roi-Et, Thailand.
E-mail: pissanupana@gmail.com

Introduction

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract. In 1809, Johann Friedrich Meck described its embryological and pathological feat-ure as a congenital true diverticulum of the distal ileum.[1] The omphalo-mesenteric duct normally undergoes obliteration during the eighth week of gestation. Failure or incomplete om-phalomesenteric duct obliteration results MD[1]

MD is a true and short diverticulum with a wide base which composed all the layers of normal small intestine. It locates in the antimesenteric side of the small intestine, usually found in the ileum within 100 cm of the ileocecal valve. Approximately 2% of the general population have MD.[2]

MD usually remains asymptomatic unless associated complication arise. The patient's lifetime incidence rate of complications has been estimated to be approximately 4% to 6%.[3] Less than 2% of patients with symptomatic MD experience in the first 2 years of life which significant cause of morbidity in children. However, complications infrequently occur in adults. The common complications are bleeding, inflammation, and intestinal obstruction. Bleeding is the most common presentation in children, whereas intestinal obstruct-ion is the most common presentation in adult followed by diverticulitis. Perforation is a rare complication of MD which represents only 5% of all complications.[4]

This case report describe a 47-year-old male who presented with right lower quadrant abdominal pain. Due to indistinguishable from acute appendicitis, conventional appen-dectomy and subsequently diverticu-lectomy was performed. The patient gave written informed consent to the publication of this case report.

Case presentation

A Thai 47-year-old male with no any underlying disease was referred from private clinic with a complaint of 2-day right lower quadrant abdominal pain, low grade fever, no nausea and vomiting. He visited our hospital with vital signs as follows: blood pressure 120/70 mmHg, pulse rate 72 beats/min, and body temperature 36.9 °C. He exhibited moderate pain on palpation over the right lower quadrant of the abdomen with rebound tenderness. Bowel sound was normoactive. He was clinically diagnosed with acute appendicitis. The initial laboratory findings were as follows: white blood cell count 19,650 mm^3 (neutrophils 84 %, lymphocyte 9%), hemoglobin 14 g/dL, creatinine 0.66 mg/dL, blood urea nitrogen 13 mg/dL. Urinary analysis results and radiological findings were unremarkable.

The patient received initial fluid resuscitation and intravenous antibiotics. He gave his written consent and was taken to the operating room for conventional appendectomy via Lanz's incision under spinal anesthesia. An inflamed appendix was identified and appendectomy was performed

(Figure 1). Minimal clear yellow peritoneal fluid in right iliac fossa, right paracolic, between the small intestinal loops and in the pouch of Douglas was observed and removed.

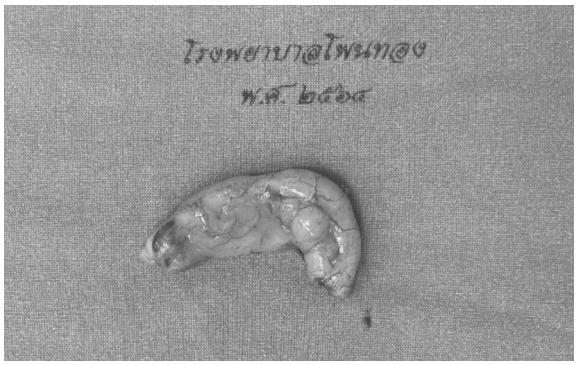

Figure 1 Gross finding of appendix, 6 cm in length and 0.5-0.9 cm in diameter. The serosa was congested. No definite ruptured was observed.

Before abdominal wall was prepared for closure, small bowel was inspected. Inflammatory small bowel was inadvertently identified. An examination revealed perforated MD at 60 cm proximal to the ileocecal valve. (Figure 2; A) Diverticulectomy with hand-sewn primary anastomosis was performed.

Gross finding showed inflamed MD with retained fish fin inside the lumen. Perforation occurred at the tip. (Figure 2; B and C) The specimens of MD and appendix was examined by histopathologist. The MD specimen revealed a tubular invagination of small intestinal mucosa with all layers of intestinal wall and thin muscularis propia. Moderated neutrophils infiltration was present in muscularis propia. Serosa was covered

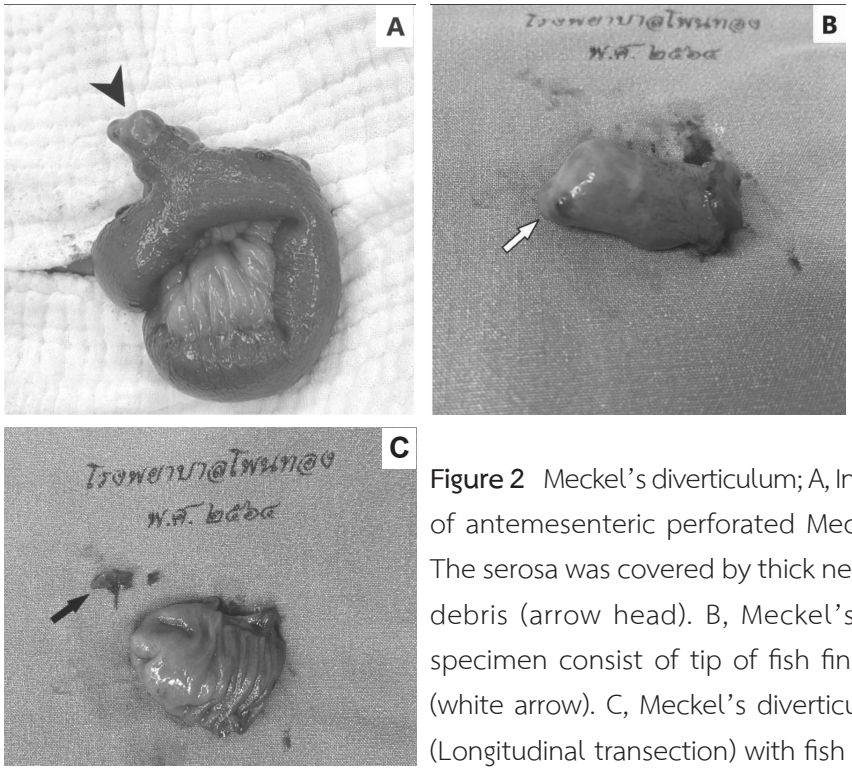

Figure 2 Meckel's diverticulum; A, Intra-operative finding of antemesenteric perforated Meckel's diverticulum. The serosa was covered by thick necrotic inflammatory debris (arrow head). B, Meckel's diverticulectomy specimen consist of tip of fish fin at perforation site (white arrow). C, Meckel's diverticulectomy specimen (Longitudinal transection) with fish fin (black arrow).

by thick necrotic inflammatory debris with numerous neutrophils. No ectopic gastric nor pancreatic tissue was identified. The appendix specimen revealed peri-appendicitis with congested and neutrophils infiltrated serosa and scattered neutrophils infiltration in the muscularis propia. Other layers were unremarkable.

After the operation, the patient was kept Nil by Mouth and watched for any sign of peritonitis for 8 hours. Intravenous fluids, systemic antibiotics, and analgesics were given. He uneventfully recovered and was discharged on the 6th postoperative day. At follow-up (2 weeks after operation), he could eat regular diet and was doing well.

Discussion

MD is a remnant of the ompha-lomesenteric duct and the most common congenital anomaly of the gastrointestinal tract. According to literature, rates of complications are 4% to 6% of the lifetime. The common complications include bleeding, diverticulitis and intestinal obstruct-tion.[3]

A rare complication of the MD is perforation which is secondary to gangrene, inflammation, intestinal obstruction, or peptic ulcer.[4] Foreign body is an unusual cause of perforation.[5,6] The Mayo Clinic has reported a series of 1476 patients with MD, 238 of them had diverticular complications. There were only 2 patients with perforation of the diverticulum by a fish bone.[7] Most of the patients did not recall the ingestion of the foreign body, therefore it is incidentally discovered by radiology or intraoperative inspec-tion. In general, these foreign bodies can pass through the gastrointestinal tract without any problems but in a small number of cases perforation may occur.

Perforation of MD remains a differential diagnosis of right lower quadrant abdominal pain which mimic, and it is indistinguishable from acute appendicitis and its complications. Both pathologies present acutely with peri-umbilical pain, migratory pain, right lower quadrant tenderness, fever and leukocytosis. In addition, perforation leads to peritoneal contamination and severe sepsis.[8,9,10] Due to the emergent condition of acute appendicitis, complicated MD is barely diagnosed before surgery. Without the index of suspicion, this might cause missed diagnosis.[11]

Imaging studies are often utilized to confirmed and most appropriate for patients in whom a diagnosis of acute appendicitis is unclear. Unless the patient requires immediate surgery for acute appendicitis, it is recommended that proper imaging studies, such as ultrasound and CT scan, should be performed prior to a more invasive approach.[3] Approxi-mately 11% of MD is misdiag-nosed as appendicitis on ultrasonography.[1,12] The CT scan has too low sensitivity for detection of MD and its complications. Enteroclysis is more accurate but usually not applicable in the acute presentation. Tc99m-pertechnetate scintigraphy can be helpful in the diagnosis of MD which contains associated ectopic gastric mucosa that is

capable for uptake of the tracer, and could yield accuracy up to 90%. Unfortunately, its accuracy is less than 50% in adult. Angiography is useful for localizing the site of bleeding during acute hemorrhage. Most MD accidentally found on radiographic imaging, during endoscopy or abdominal operation.[13] Perforation of MD is a very rare complication, and there is no investigation of choice during acute setting. Thus, perforation of MD is difficult to be diagnosed both clinically and radiologically. It may lead to a fatal outcome if surgeon did not early recognize due to normal appendix from imaging.

Nordback I et al. have described the term "Secondary appendicitis" as the direct invasion of inflammation to the appendix from an adjacent organ. 14 Secondary appendicitis is categorized as intrinsic and extrinsic pattern. Intrinsic appendicitis is caused by an inflammation of the organs connected to the appendix such as colon or cecum (colitis). Extrinsic appendicitis is an inflammation which spread from the surrounding organs such as the gallbladder, liver, urinary bladder, ovaries, kidney, small and large bowel (cholecystitis, liver abscess, Crohn's disease, cystitis, pyelonephritis, enteritis, and colitis).[15] On the other hand, primary appendicitis is caused by a blockage lumen of appendix with continued mucus secretion from the appendiceal lining. Distension and continuously increasing the intra-luminal pressure of appendix causes occlusion of the appendiceal veins and damages the mucosal barrier which induce bacterial entry and progressing inflammation.[15,16,17] Coexistence of acute appendicitis with perforated MD is a very rare situation.[9] In our case, we suggest "secondary appendicitis" more than two primary pathologies due to microscopic finding indicated peri-appendicitis as congested serosa with neutrophils infiltration, other layers are unremarkable.

The management of asymp-tomatic MD is controversial. In symptomatic cases, it can range from diverticulectomy or wedge and segmental resection. Generally, diverticulectomy is adequate for the incidental MD or when diverticulitis presents at the tip of the diverticulum. The extent of resection is determined according to the intraoperative findings and any intraoperative complications. The type of procedure depends on 1) the integrity of diverticulum base and adjacent ileum; and 2) the presence and location of ectopic tissue. As referred ectopic tissue, long diverticulum described as height-to-diameter ratio > 2 which ectopic tissue located at the body and tip, whereas short diverticulum have wide distribution of ectopic tissue including the base. Based on basic principles, when the indication of surgery is: 1) Simple diverticulitis or bleeding with long diverticulum, diverticulectomy can be performed but short diverticulum, wedge or segmental resection should be done; 2) Complicated diverticulitis with inflamed, perforated base, intestinal obstruction and tumor, wedge or segmental resection are the preferred methods

for resection. Minimal invasive surgery, as laparoscopic diveriticulectomy or small bowel resection were encouraged for benefit of cosmetics, less pain, and early recovery.[13,18,19,20]

In our case report, the diagnosis was made for acute appendicitis. Conven-tional appen-dectomy was performed. However, not only inflammatory of appendix was observed, but also distal ileum inflammation was identified. Our team correctly judged to proceed with mobilization and examination of the ileum which perforated MD could be found. This case report might remind us to have a high index of suspicion of perforated MD in patients who diagnosed with acute appendicitis, and routine bowel inspection should be performed during appendectomy.

Conclusion

Perforation by foreign body is a very rare complication of MD. This case presented with clinically acute appendicitis with secondary of perforation MD due to fish fin. Meckel's diverticular perforation should be aware in the patient present with acute right lower quadrant abdominal pain.

Competing Interests Declaration

The authors state that they have no known competing financial interests or personal ties that may have influenced the work presented in this study.

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