


CASE REPORT

Spontaneous perforated Meckel's diverticulum in adults: a case report

Thabet Alghazal^{1*}, Anwar Saeed Alzahrani² , Shomukh Abdullah Alshamrani³,
Mohammad A. Alshahri¹, Shoukat Bojal¹, Abduwahed Meshikhes¹

ABSTRACT

Background: Meckel's diverticulum (MD) is a common congenital gastrointestinal anomaly in children and is rarely diagnosed in adults. Hemorrhage, obstruction, and inflammation are the three most common complications resulting from Meckel's diverticulum. Perforated MD is very rare and mimics a perforated appendix on presentation.

Case Presentation: We report a case of spontaneous perforated MD in an adult female patient who presented with localized abdominal pain for 2 days. This pain gets worse and is progressively generalized to the whole abdomen. On physical examination her abdomen was distended with guarding. Based on the imaging, a provisional diagnosis of infectious enteritis was carried out. The patient was vitally unstable in which the patient pushed to operating room for exploratory laparotomy. Intraoperative findings of perforated MD were seen. Segmental resection with an end-to-end anastomosis was carried out and the patient uneventfully recovered well.

Conclusion: Diagnosis of MD in adults is challenging as its occurrence is rare, but it should be kept in mind. Early diagnosis with proper intervention provides the best outcomes and fewer complications.

Keywords: Spontaneous, perforated Meckel's diverticulum, adult.

Introduction

Meckel's diverticulum (MD) is a congenital true diverticulum of the intestinal wall [1,2]. It is a remnant of the omphalomesenteric duct that fails to obliterate during the intrauterine period [3]. MD is a common anomaly of the small intestine that occurs in approximately 2% of the population. A commonly quoted "rule of 2s" applies to MD: 2% of the population has the anomaly; it is roughly 2 inches in length; usually found within 2 feet of the ileocecal valve; it is often found in children less than 2 years of age; has two types of heterotopic mucosa; and it affects males twice as often as females. A 3:2 male to female ratio has been reported in the literatures [3].

MD is usually asymptomatic, but systemic reviews have shown that it can present symptomatically in 2%-4% associated with complications [4,5]. The most common presentation is gastrointestinal bleeding, intestinal obstruction, intussusception, neoplasm, and inflammation with or without perforation [6-8]. Based on the age groups, the most common presenting symptom of MD is gastrointestinal bleeding in children, whereas in adults, obstruction is a common, either due to intussusception or adhesions [8].

We report a case of spontaneous perforation of MD in a 36-year-old female patient, which was managed by primary resection.

Case Report

A 36-year-old previously healthy woman presented with abdominal pain for 2 days, stabbing in nature, which started in the lower quadrant of the abdomen and on the same day, it later became more painful and diffuse. One day prior, the patient was seen by an employee in the health clinic and was given Buscopan and Simethicone with no improvement. The abdominal pain was associated with vomiting and constipation. The patient was vitally

Correspondence to: Thabet Alghazal

*Department of Surgery, King Fahad Specialist Hospital, Dammam, Kingdom of Saudi Arabia.

Email: thabetsurg@gmail.com

Full list of author information is available at the end of the article.

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stable and the physical examination revealed a mild distended abdomen with tenderness on deep palpation in the left upper area, no palpable masses or organomegaly, and no rebound tenderness. Biochemical laboratory tests showed an elevated white blood cell count of $17 \times 10^3/\text{ml}$ (normal values $4.6\text{-}10.2 \times 10^3/\text{ml}$). Liver and renal function studies were normal.

Plain abdominal radiography was carried out, which was normal, and no definite radiopaque calcular shadow or pathological calcification was detected along the whole course of the urinary tract. A right-sided pelvic phlebolith was seen, and nonspecific distribution bowel gas was noted. No air-fluid level was detected (Figure 1). Abdomen ultrasound showed a small amount of free fluid within the right iliac fossa, which measured 3 ml and the appendix was not seen (Figure 2). Abdomen computed tomography (CT) with contrast showed diffuse circumferential wall thickening, involving the jejunum and proximal part of small bowel, and small pockets of air along the lateral margin of the small bowel. A provisional diagnosis of infectious enteritis was carried out (Figure 3).

The patient received proper antibiotics and analgesics, but she still complained of generalized abdominal pain. On re-examination, the patient looked unwell, in pain and respiratory distress, spiking fever with generalized abdominal tenderness, mainly in the left lower quadrant area.

Patient was showing signs of peritonitis and she started to develop tachycardia and shortness of breath with desaturation 1 day after presentation; chest X-ray showed a picture of atelectasis that required her to be put on O_2



Figure 1. Normal plain abdominal radiography.

supplements (Figure 4). In addition to the chest symptoms and family history of thrombophilia, CT angiogram was carried out to rule out pulmonary embolism which came negative for pulmonary embolism, but showed bilateral lower lungs consolidation.

After stabilizing the patient, the CT abdomen angiogram requested showed small bowel perforation, demonstrated air-fluid levels, and polypoidal projections in the middle of the small bowel (Figure 5). A diagnosis of acute abdomen with perforated viscous was carried out.

The patient was taken to the operating room for exploratory laparotomy. Intraoperatively, she was found to have fibrinous exudate with purulent fluid (1.5 l) and perforated MD, which was located 40 cm from the ileocecal junction (Figure 6). The MD was perforated at the base (Figure 7). The patient underwent removal of the diverticulum by segmental resection of the ileum with an end-to-end anastomosis. The pathology report showed MD with gastric heterotopia.

Postoperatively, the patient stayed for almost 9 days in the hospital because she developed acute respiratory distress syndrome that required her to be intubated and extubated twice and Bilevel Positive Airway Pressure (BIPAP) in between for the congested lungs before she improved clinically and was shifted to the ward, and then discharged home (Figure 8).

Discussion

MD is the most frequent anomaly of the gastrointestinal tract, resulting from failure of the vitelline (omphalomesenteric) duct to regress, that joins the primitive intestine to the yolk sac during the embryonic period [1].

It derives its name from Johann Friedrich Meckel, who described it in an article published in 1809 [2]. Normal intestinal mucosa (native ileal mucosa) and different heterotopic tissues can be found inside the diverticulum, such as gastric, duodenal and colonic tissues, and infrequently seen pancreatic mucosa tissues [1]. MD can occur at any age, but it is more common in children compared to the adult population. And because of the infrequency of cases in adults, preoperative diagnosis can be difficult and compelling as it can mimic other acute abdominal emergencies which have wide differential diagnosis [2].

The rule of 2s describes the characteristics of MD: it occurs in 2% of the population; 2% are symptomatic; mostly occurring in children less than 2 years; twice frequent in men; sited 2 feet proximal to the ileocecal valve; with a length ≤ 2 inches; and can have two types of mucosal lining. Heterotopic tissues were found in 15%-50% of the symptomatic cases [2,3].

As most of the cases are silent, preoperative diagnosis has been shown to be as low as 5.7% [4]. The lifetime complication rate of MD is 4%. Most common complications of symptomatic MD are obstruction, GI-hemorrhage, and inflammation with or without

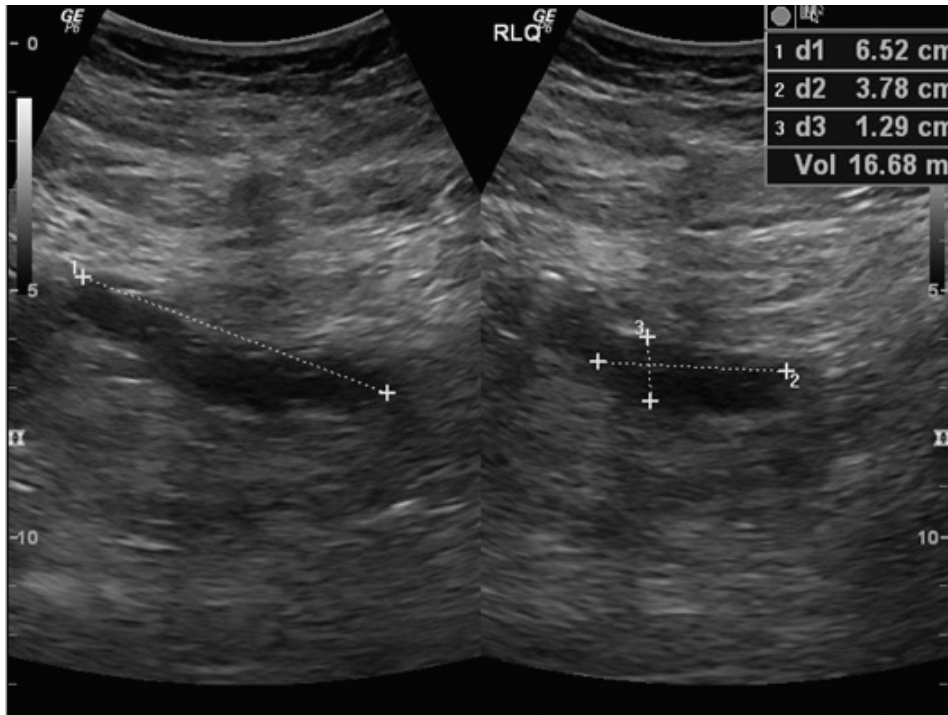


Figure 2. Ultrasound showed a small collection, a small amount of free fluid within the right iliac fossa.

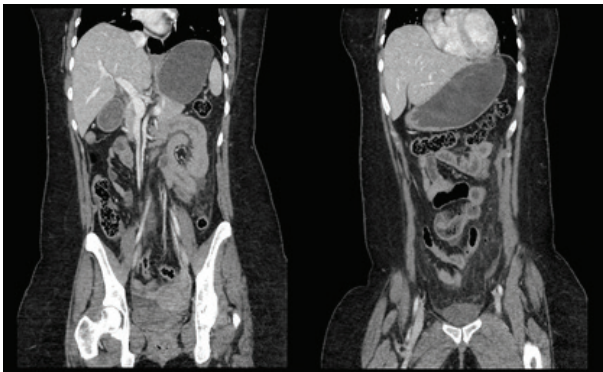


Figure 3. Diffuse circumferential wall thickening involving the jejunum and proximal part of the small bowel.

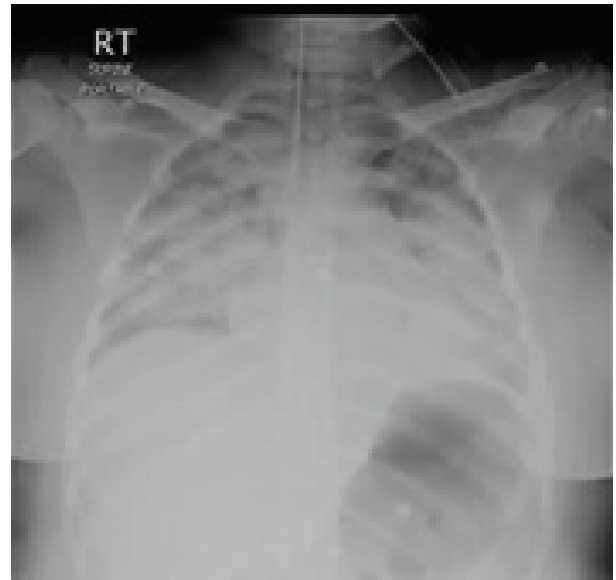


Figure 4. Chest X-ray showing atelectasis.

perforation, followed by intussusception, volvulus, and malignant transformation. GI-hemorrhage is more associated with ectopic gastric tissues [2-4]. However, perforation of MD is uncommon and might mimic acute appendicitis and present as an acute abdomen. Perforation might be due to pressure necrosis of the diverticulum wall caused by an irritation of a foreign body or progressive inflammation resulting from spontaneous perforation of secondary to peptic ulcer, ischemia, or diverticulitis. Some literature studies have reported that perforation can be induced by enterolith and trauma, including fish bone, chicken bone, peanut, and batteries [5-7]

MD is difficult to diagnose. Multiple imaging modalities for MD diagnosis are not specific, like plain film,

ultrasound, and CT. MD is usually indistinguishable from the normal loops of the small bowel on CT scan. However, MD-scan with ^{99m}Tc -technetium pertechnetate can lead one to diagnose MD as it is highly specific (95%) with promising modality. ^{99m}Tc -technetium pertechnetate is taken up by the heterotopic gastric mucosa in the MD as heterotopic gastric mucosa is present in 50%-60% of all MDs [7,8]. In our case, the perforation was

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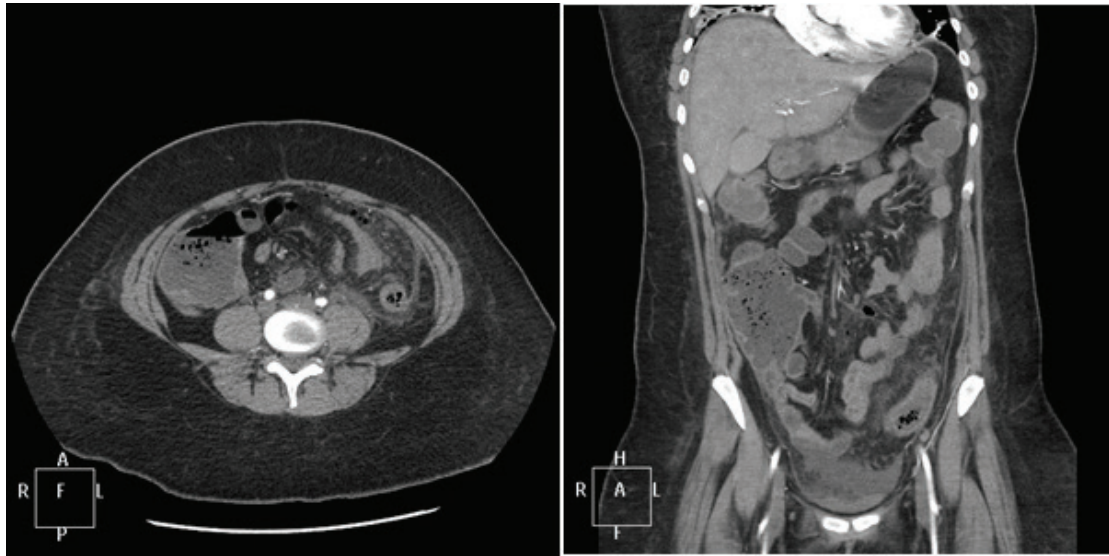


Figure 5. CT abdomen angiogram showed small bowel perforation.



Figure 6. Perioperative view of the perforated MD.

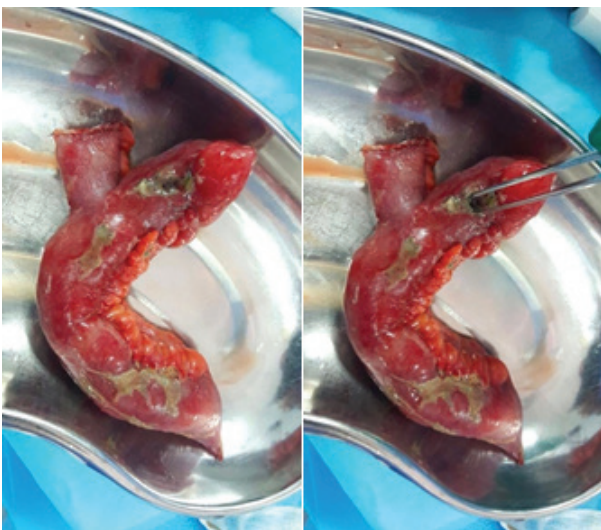


Figure 7. Perforated MD after excision.

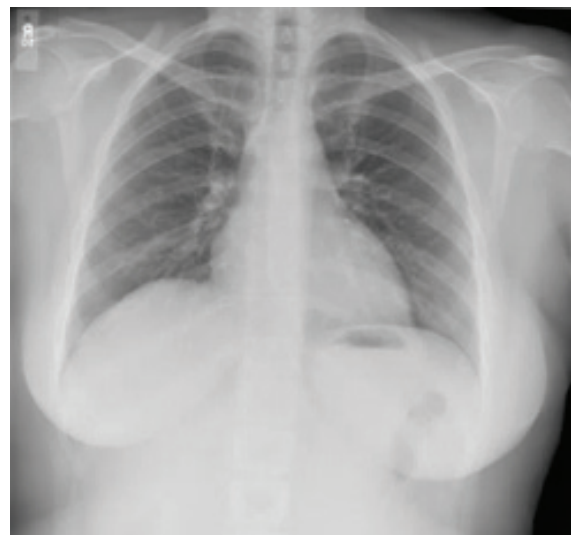


Figure 8. Chest X-ray after recovery.

seen by CT abdomen angiogram that showed small bowel perforation and was then confirmed by surgery. Scintigraphy has up to 90% accuracy in the pediatric population, while it drops to 46% accuracy in the adult population [9-11].

Our patient is an adult who presented with signs of acute abdomen and the provisional diagnosis was infectious enteritis as the patient was vitally unstable with an elevated white blood cell count and imaging showed diffuse thickening of the jejunum and the proximal part of small bowel. The patient was managed first by fluids and electrolyte repletion and symptomatic care, but did not improve in which emergent laparotomy was decided. The patient required resection of the affected bowel segment and anastomosis for definitive diagnosis and management. Surgical resection is considered the gold standard treatment of symptomatic MD.

Conclusion

Perforation is a rare complication of MD and the presentation can mimic other acute abdominal conditions. Therefore, early diagnosis with proper intervention provides the best outcomes for these patients and will decrease the risk of complications.

List of Abbreviations

md	Meckel's diverticulum
CT	computed tomography
BIPAP	Bilevel Positive Airway Pressure

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

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Consent for publication

Written informed consent was obtained from the patient.

Ethical approval

Ethical approval is not required at our institution to publish a case report.

Author details

Thabet Alghazal¹, Anwar Saeed Alzahrani², Shomukh Abdullah Alshamrani³, Mohammad A. Alshahri¹, Shoukat Bojal¹, Abduwahed Meshikhes¹

1. General Surgeon, Department of Surgery, King Fahad Specialist Hospital, Dammam, Kingdom of Saudi Arabia
2. Imam Abdulrahman Bin Faisal University IAFU, King Fahad Specialist Hospital, Dammam, Kingdom of Saudi Arabia
3. Imam Abdulrahman Bin Faisal University IAFU, King Fahad Specialist Hospital, Dammam, Kingdom of Saudi Arabia

References

1. Tas I, Culcu S, Duzkoylu Y, Eryilmaz S, Deniz M, Yilmaz D. A rare cause of acute abdomen: perforation of double Meckel's diverticulum. *Case Rep Gastrointest Med.* 2015;2015:648417. <https://doi.org/10.1155/2015/648417>
2. Blouhos K, Boulas K, Tsalis K, Baretas N, Paraskeva A, Kariotis I, et al. Meckel's diverticulum in adults: surgical concerns. *Front Surg.* 2018;5:55. <https://doi.org/10.3389/fsurg.2018.00055>
3. Hansen CC, Søreide K. Systematic review of epidemiology, presentation, and management of Meckel's diverticulum in the 21st century. *Medicine (Baltimore).* 2018;97(35):e12154. <https://doi.org/10.1097/MD.00000000000012154>
4. Ekwunife CN, Mbadugha TN, Ogbue UN. Isolated Meckel's diverticulum perforation as a sequel to blunt abdominal trauma: a case report. *J Med Case Rep.* 2014;8(1):111. <https://doi.org/10.1186/1752-1947-8-111>
5. Farah RH, Avala P, Khaiz D, Bensardi F, Elhattabi K. (2015). Spontaneous perforation of Meckel's diverticulum: a case report and review of literature. *Pan Afr Med J.* 2015;20:319. <https://doi.org/10.11604/pamj.2015.20.318.5752>
6. Pirzada U, Tariq H, Azam S, Kumar K, Dev A. A rare cause of abdominal pain in adults: meckel's diverticulitis. *Case Rep Gastroenterol.* 2018;12:709–14. <https://doi.org/10.1159/000494752>
7. Zhu Y, Dong M, Weng W, Yang J. Spontaneous perforation and intraabdominal abscess due to Meckel's diverticulum revealed on SPECT/CT with 99m-technetium pertechnetate. *Medicine.* 2018;97(43):e13004. <https://doi.org/10.1097/MD.00000000000013004>
8. Pandiaraja J. Spontaneous rupture of adenocarcinoma of Meckel's diverticulum- a rare entity. *J Clin Diagn Res.* 2015;9(11):PD13–4. <https://doi.org/10.7860/JCDR/2015/14110.6825>
9. Gueye ML, Thiam O, Seck M, Gueye MN, Toure AO, Cisse M, et al. Perforated mesenteric Meckel's diverticulum in an adult: a real variant? *J Surg Case Rep.* 2015;2015(9):rjv115. <https://doi.org/10.1093/jscr/rjv115>
10. Liu K, Wu Y. Spontaneous perforation of Meckel diverticulum. *Medicine.* 2017;96(52):e9506. <https://doi.org/10.1097/MD.0000000000009506>
11. Fraser AA, Opie DD, Gnecco J, Nashed B, Johnson DC. Spontaneous perforation of Meckel's diverticulum in an adult female with literature review. *Surg Case Rep.* 2018;4(1):129. <https://doi.org/10.1186/s40792-018-0536-y>