



Case report

Acute intestinal obstruction due to meckel's diverticulum: A case report and literature review

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ARTICLE INFO

Keywords:

Ileo-ileal resection
Meckel's diverticulum
Small bowel obstruction

ABSTRACT

Introduction: and Importance: Meckel's diverticulum is a rare congenital condition often detected incidentally. Meckel's diverticulum, a rare disease, may result in acute intestinal obstruction and is frequently misdiagnosed. This study aims to report a case of acute intestinal obstruction due to Meckel's diverticulum.

Case presentation: A 61-year-old Javanese man was admitted to the emergency room with a history of constipation, nausea, vomiting, and abdominal pain. Physical examination showed abdomen distention, tenderness in the lower quadrant, and hyperactive bowel sound. Rectal examination found that the rectal ampulla was collapsed. A plain abdominal Radiograph showed small bowel dilatation and air-fluid levels. The patient was diagnosed with small bowel obstruction due to suspected left-sided colon cancer and taken up for exploratory laparotomy.

Clinical discussion: On exploration, Meckel's diverticulum measuring 3.5 cm in length and with a 2 cm base was found about 70 cm proximal to the Bauhin valve; the thin part formed a band that entangled the small bowel. Ileo-ileal resection anastomosis was performed.

Clinical discussion: Meckel's diverticulum is an intestinal pouch caused by incomplete obliteration of the vitelline duct during gestation. This condition affects 2 % of the population and is within 2 feet of the Bauhin valve. The mesodiverticular band was found to be the source of the bowel obstruction. Surgical resection is required for complicated diverticulum.

Conclusion: Meckel's diverticulum can be difficult to diagnose and require a higher level of suspicion. Although Meckel's diverticulum is uncommon in adults, it should be considered a cause of small bowel obstruction.

1. Introduction

Meckel's diverticulum derived from an anomaly of incomplete obliteration of the Vitelline duct which occurred during embryonic development [1]. This issue remains the most common anomaly in congenital gastrointestinal maturity [2,3]. The diagnosing of Meckel's diverticulum relatively challenging due to vague presentation (constipation, perforation, gastrointestinal bleeding, or inflammation) [4].

Intestinal obstruction is the most common complication in adult cases [5]. Small bowel obstruction is a surgical emergency

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condition caused by mechanical bowel blockage. Small bowel obstruction can be caused by a variety of pathologic processes, the most common of which are intra-abdominal adhesions. As the risk of ischemia increases, total bowel obstructions frequently necessitate urgent surgical intervention [6].

The purpose of this review is to provide better knowledge and understanding of this condition by reporting a case of a small bowel obstruction as a result of Meckel's diverticulum.

2. Case Presentation

A 61-year-old Javanese man was admitted to the Emergency Department with a history of constipation, fever, nausea, vomiting, and abdominal pain for three days. The patient said this was the first time he had experienced symptoms like this, he had never suffered from any illness before. There were no similar complaints in the family. Physical examination showed a moderately ill patient, generally unwell, with blood pressure 100/60 mmHg, pulse 120 bpm, respiration 26 breaths/min, and temperature 38.5 °C. The abdomen appeared distended with tenderness in the lower quadrant and a hyperactive bowel sound. Rectal examination found that the rectal ampulla was collapsed. Plain chest and abdominal radiograph revealed small bowel dilatation and air-fluid levels without free sub-diaphragm air (Figs. 1 and 2). CT-Scan was not performed on this patient, because at that time CT-Scan was not available at our hospital.

The patient's oral intake was restricted, and a feeding tube was inserted to decompress the abdominal distention, but no production was obtained from the tube. The patient was given Ringer's lactate infusion and intramuscular ceftriaxone 1 g. The patient was diagnosed with small bowel obstruction due to suspected left-sided colon cancer and taken up for emergency exploratory laparotomy. On exploration, the small bowel was dilated approximately 70 cm proximal to the ileocecal valve and the distal segment was collapsed. Meckel's diverticulum measuring 3.5 cm in length and with a 2 cm base, was found about 70 cm proximal to the ileocecal valve; the thin part formed a band that entangled the small bowel (Fig. 3). Ileo-ileal resection anastomosis was performed.

The patient was admitted to intensive care for one day and treated with broad-spectrum antibiotics and rational nutritional support. On postoperative day 7, the patient recovered without complications, the symptoms improved, the laboratory parameters were normal, and thus the patient was uneventfully discharged. Histopathologic analysis of the specimen confirmed the presence of Meckel's diverticulum with ectopic gastric mucosa.

3. Discussion

The most frequent congenital gastrointestinal anomaly due to incomplete closing of the vitelline valve while in development, connecting the developing midgut with the yolk sac is Meckel's diverticulum [7]. Meckel's diverticulum is a real diversion and consists of whole layers of the small intestine wall that are located at the ileum's antimesenteric borders [5]. The rule of twos of this condition includes (1) approximately 2 % of the population, (2) a 2:1 male-to-female ratio, (3) 2 cm from the Bauhin valve, (4) roughly 2 cm long and (5) affect age around 2.5 years old [8].

Approximately 4 % of patients experienced one or more complications (Table 1) [9]. Small bowel obstruction and diverticulitis are the most common problems in Meckel's diverticulum due to heterotopic pancreatic or gastric tissue [10]. The strangulation due to a mesodiverticular band trapping around the small bowel or other problems (intussusception, volvulus) caused a bowel obstruction, which led to an intestinal emergency [9].

The diverticulum is occasionally discovered accidentally on imaging or during a laparotomy. Anamnesis, physical examination, abdominal radiography in a standing position, abdominal CT scan, and laboratory tests are all used to diagnose complicated Meckel's

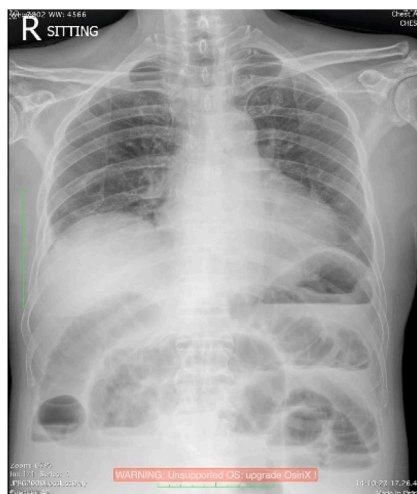


Fig. 1. The chest radiograph showed no free air sub-diaphragm.

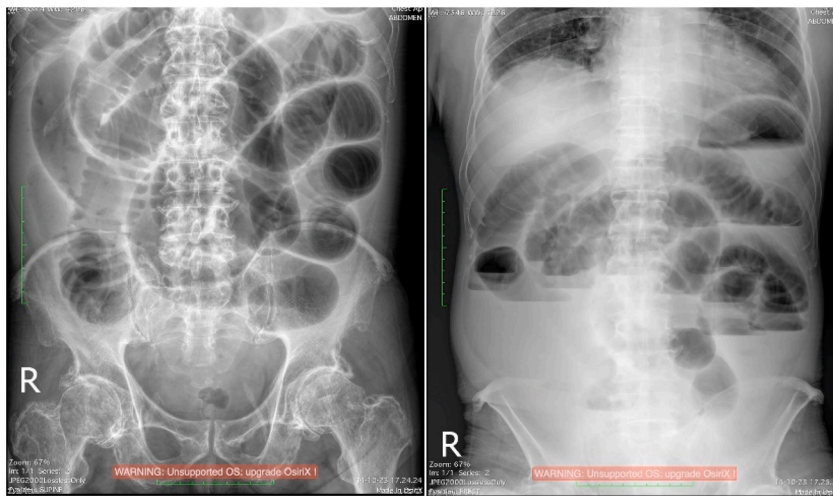


Fig. 2. Abdominal plain radiograph showed small bowel dilatation and air-fluid levels.

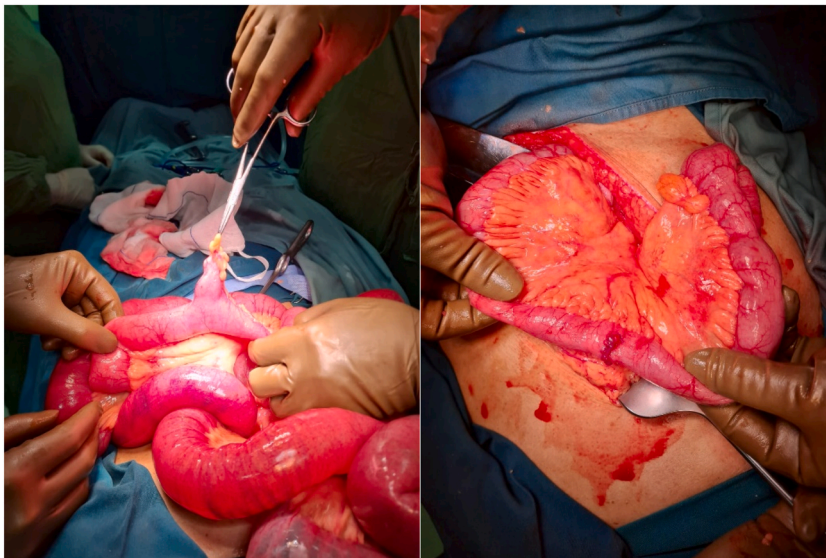


Fig. 3. Meckel's diverticulum was found intraoperatively and proceeded with ileo-ileal resection anastomosis.

diverticulum [5,11]. In cases of unexplained gastrointestinal bleeding, a Meckel scan (technetium scan) may identify Meckel's diverticulum. Meckel's diverticulum shows a tubular structure from an ileal loop on ultrasound examination [12]. Meckel's diverticulum can be seen as a small bowel loop on a contrast-enhanced CT scan in uncomplicated conditions. However, a CT scan is the test of choice for complicated diverticulum [13].

This case describes a patient who experienced an acute onset of symptoms indicating bowel obstruction. The patient had the classic tetrad of bowel obstruction, which includes nausea, vomiting, abdominal distension, and constipation. Imaging examination revealed air-fluid levels, a hallmark finding in Radiograph of small bowel obstruction.

Interestingly, Meckel's diverticulum was not suspected as a cause of obstruction at the beginning of this case, we initially suspected that this patient's bowel obstruction was caused by a left-sided colorectal malignancy which is the most typical cause of bowel obstruction in the elderly in our hospital, but it was discovered intraoperatively. An abdominal CT scan was not available in this case. Total bowel obstruction with sepsis was an indication to perform an emergency exploratory laparotomy.

During the exploration, the Meckel's diverticulum was found about 70 cm proximal to the ileocecal valve; the thin part formed a band that entangled the small bowel. This mesodiverticular entrapment caused a small bowel obstruction. The mesodiverticular band is a vestige of the vitelline artery, which supplies Meckel's diverticulum and creates an embolic bridge for bowel loops that are protruded, clenched, gangrenous, ischemic or mechanically blocked [14,15].

Simple diverticulectomy may be recommended to treat uncomplicated Meckel's diversion. However, extensive bowel reparations

Table 1
Complications of Meckel's diverticulum [4].

	Hemorrhage	Intestinal Obstruction	Inflammatory process (diverticulum and perforation)		Tumor	
Incidence	25 %–50 %	22 %–50 %	20 %		0.5 %–1.9 %	
Children	The most common presentation	The second most common complication	–		–	
Adults		The most common complication	The second most common complication		–	
Cause	Heterotopic mucosa (gastric and pancreatic), neoplasm (carcinoid tumors, adenocarcinomas, benign mesenchymal tumors, melanoma, lymphoma, lipomas), phytobezoars	Intussusception, volvulus, Littre's hernia, mesodiverticular band, stricture, enteroliths, band extending between the diverticulum and the base of the mesentery, tumors, impacted meconium, cecal volvulus, gallstone ileus, phytobezoars	<i>Diverticulitis</i> Obstructions due to fecalith or foreign body or parasites, peptic ulceration of the ileal mucosa due to ectopic gastric mucosa, diverticular torsion	<i>Perforation</i> Progression of diverticulitis, ulceration of adjacent ileal mucosa secondary to acid produced by the ectopic gastric mucosa, trauma due to ingested foreign body, tumors	<i>Malignant group</i> Carcinoids, mesenchymal tumors, adenocarcinomas, desmoplastic small round cell tumor	<i>Benign group</i> Lipoma, neuromuscular and vascular hamartoma
Symptoms	<ul style="list-style-type: none"> • Dark red or maroon stools or stools with blood or mucus (often in children) • Melena and crampy abdominal pain (often in adults) • Chronic and insidious hemorrhage leading to anemia or iron deficiency 	<ul style="list-style-type: none"> • Cramping abdominal pain and obstipation (depending on the etiology of the obstruction and the location and degree of obstruction) • Bloating • Nausea and vomiting • Diarrhea • Constipation 	<ul style="list-style-type: none"> • Abdominal pain or discomfort that ranges from mild to severe • Right lower quadrant tenderness, mimicking acute appendicitis • Fever • Nausea and vomiting 	<ul style="list-style-type: none"> • Abdominal pain • Localized or generalized tenderness with rebound and guarding due to peritonitis • Distention • Fever • Nausea and vomiting 	Tumors can have various manifestations: acute abdominal pain, perforation, bleeding, intussusception and intestinal obstruction, making it an emergency	

can be required in patients with a complication [5]. Our patient underwent ileo-ileal resection anastomosis; there were no post-operative complications on postoperative day 1 in ICU, and the patient was discharged on postoperative day 7.

A study from Cullen et al. at the Mayo Clinic in Minnesota discovered that the incidence of Meckel's diverticulum complications requiring surgery was 6.4 %. The mortality rate for these patients was 1.5 %, and the morbidity rate was 7 % [16]. Delays in diagnosing a complicated Meckel's diverticulum can result in high morbidity and mortality [17]. This case aligns with literature on MD and their complications, but all cases were diagnosed intraoperatively, suggesting a lack of preoperative diagnosis. Clinical suspicion is currently the only way to diagnose complicated MD in our center.

4. Limitations

This review discusses a case report and describes the experience of a single center having an unusual etiology of acute small bowel obstruction. Its sample size is limited. Further multicenter studies evaluating Meckel's diverticulum as an etiology of acute small bowel obstruction will support the findings presented.

5. Conclusion

Meckel's diverticulum can be difficult to diagnose and requires high suspicion. Although relatively rare in adults, Meckel's diverticulum should be considered as a cause of acute small bowel obstruction. Early surgery is required in order to prevent strangulation or gangrene. Delayed surgical intervention and inadequate treatment result in high morbidity and mortality.

Ethics approval

This case report does not require any ethical approval by our institution. Furthermore, this case report is intended to develop information to be shared for medical or educational purposes.

Clinical trials registration

This observational case report does not require clinical trial registration based on the International Committee of Medical Journal Editors (ICMJE). Purely observational studies (those in which the assignment of the medical intervention is not at the investigator's discretion) will not require registration.

Consent to participate

Written consent to publish this study has been obtained from the patients.

Parental consent

Written informed consent was obtained from the patient's parents/legal guardian for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Underlying data and material

All supporting data are available within this study.

Funding

The author(s) declared that no grants supported this study.

Guidelines

We followed The SCARE 2020 Guideline: Updating Consensus Surgical Case Report (SCARE) Guidelines.19.

CRediT authorship contribution statement

Cecilia Evan: Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Kezia Christy:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Methodology, Investigation. **Ricarhdo Valentino Hanafi:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology. **Maman Wastaman Rodjak:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] S. Nose, H. Okuyama, T. Sasaki, et al., Torsion of Meckel's diverticulum in a child, *Case Rep Gastroenterol* 7 (1) (2013) 14–18.
- [2] S. Akbulut, Giant Meckel's diverticulum: an exceptional cause of intestinal obstruction, *World J. Gastrointest. Surg.* 6 (3) (2014) 47.
- [3] C.R. López-Lizárraga, M.P. Sánchez-Muñoz, G.E. Juárez-López, et al., A rare case of a strangulated Littre's hernia with Meckel's diverticulum duplication. Case report and literature review, *Int J Surg Case Rep* 33 (2017) 58–61.
- [4] S. Kuru, K. Kismet, Meckel's diverticulum: clinical features, diagnosis and management, *Rev. Esp. Enferm. Dig.* 110 (11) (2018) 726–732.
- [5] I. Yildiz, Y.S. Koca, I. Barut, An unusual case of intraabdominal abscess and acute abdomen caused by axial torsion of a Meckel's diverticulum, *Annals of Medicine and Surgery* 6 (2016 Mar 1) 74–76.
- [6] M. Pisano, L. Zorcolo, C. Merli, et al., 2017 WSES guidelines on colon and rectal cancer emergencies: obstruction and perforation, *World J. Emerg. Surg.* 13 (2018) 36, <https://doi.org/10.1186/s13017-018-0192-3>. Published 2018 Aug 13.
- [7] H.B. Bhattarai, M. Bhattarai, S. Shah, et al., Meckel's diverticulum causing acute intestinal obstruction: a case series, *Clin Case Rep* 10 (11) (2022) e6518, <https://doi.org/10.1002/ccr3.6518>. Published 2022 Nov 6.
- [8] J. An, C.P. Zabbo, Meckel diverticulum [Updated 2023 Jan 30], in: StatPearls, StatPearls Publishing, Treasure Island (FL), 2024 Jan, <https://www.ncbi.nlm.nih.gov/books/NBK499960/>.
- [9] T. Almas, A.K. Alsubai, D. Ahmed, et al., Meckel's diverticulum causing acute intestinal obstruction: a case report and comprehensive review of the literature, *Ann Med Surg (Lond)*. 78 (2022) 103734, <https://doi.org/10.1016/j.amsu.2022.103734>. Published 2022 May 7.
- [10] K. Blouhos, K.A. Boulas, K. Tsalis, et al., Meckel's diverticulum in adults: surgical Concerns, *Front Surg* 5 (2018) 55, <https://doi.org/10.3389/fsurg.2018.00055>. Published 2018 Sep. 3.
- [11] N. Tenreiro, H. Moreira, S. Silva, et al., Unusual presentation of a Meckel's diverticulum: a case report, *Int J Surg Case Rep* 16 (2015) 48–51.
- [12] J. Lequet, B. Menahem, A. Alves, et al., Meckel's Diverticulum in the Adult, vol. 154, *Journal of Visceral Surgery*. Elsevier Masson SAS, 2017, pp. 253–259.
- [13] A. Platon, P. Gervaz, C.D. Becker, et al., Computed tomography of complicated Meckel's diverticulum in adults: a pictorial review, *Insights Imaging* 1 (2) (2010) 53–61.
- [14] C. Yazgan, T. Sahin, M. Ozmen, Unusual cause of small bowel obstruction: mesodiverticular band of Meckel's diverticulum demonstrated by CT, *BJR|case reports* 3 (1) (2017) 20150255.
- [15] N.T. Sethi, A. Chauhan, S. Tiwari, Meckel's diverticulum with mesodiverticular band: an unusual presentation, *Med. J. Armed Forces India* 65 (1) (2009) 75–76.
- [16] D. Jaymi, Complications of Meckel's diverticula in adults, *Can. J. Surg.* 49 (5) (2005) 353–357.
- [17] N. Tenreiro, H. Moreira, S. Silva, et al., Unusual presentation of a Meckel's diverticulum: a case report, *Int J Surg Case Rep* 16 (2015) 48–51.