Small Bowel Volvulus Caused by Meckel's Diverticulum

Ann. Ital. Chir., 2025 96, 3: 282–285
https://doi.org/10.62713/aic.3883

Roberto Cammarata[1], Vincenzo La Vaccara[1], Silvia Angeletti[2,3], Lucrezia Bani[4], Roberto Coppola[1], Damiano Caputo[1,5]

[1]Operative Research Unit of General Surgery, Fondazione Policlinico Universitario Campus Bio-Medico, 00128 Rome, Italy
[2]Unit of Laboratory, Fondazione Policlinico Universitario Campus Bio-Medico, 00128 Rome, Italy
[3]Research Unit of Clinical Laboratory Science, Department of Medicine and Surgery, Università Campus Bio-Medico di Roma, 00128 Rome, Italy
[4]Medicine and Surgery, Sapienza University of Rome, 00185 Rome, Italy
[5]Research Unit of General Surgery, Università Campus Bio-Medico di Roma, 00128 Rome, Italy

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract, affecting 1–3% of the general population [1]. While most individuals are asymptomatic, a small subset can develop complications, with volvulus accounting for 7–18% of obstruction cases [2]. Although MD is rarely diagnosed in adults, it should be considered in the differential diagnosis of acute abdomen, as early surgical intervention can reduce associated morbidity and mortality. We present a noteworthy case involving a 53-year-old woman who came to the emergency room of our hospital with a one-day history of worsening epigastric pain and repeated vomiting. Her medical history included sub-occlusive episodes, diverticular disease, and gluten intolerance. In 2004, during surgery for an ovarian cyst, MD was incidentally noted but not removed. She had no history of other abdominal surgery.

At the presentation at the hospital, the temperature was 36.4 °C, the blood pressure was 120/70 mmHg and the frequency was 91 beats per minute. Blood tests showed leukocytosis and elevated lactate, with normal liver and renal function. On physical examination the abdomen was flat, mildly distended, palpable, slightly painful on superficial and deep palpation, with reduced peristalsis but no signs of peritoneal irritation. Despite the administration of Non-steroidal anti-inflammatory drugs (NSAID) the patient reported no relief while nasogastrictube aspiration drained 500 cc of enteric material. An abdominal ultrasound showed distended loops with minimal peristalsis. The computed tomography scan (CT scan), as shown in Fig. 1, revealed significant overdistension of the jejuno-ileal loops with multiple air-fluid levels. A transition point was identified in the mesogastrium, where an ileal loop appeared hypoperfused and heterogeneous, with small air bubbles near the wall suggestive of pneumatosis or ischemia. Another distended loop was noted caudally, alongside parietal thickening and a twisted Treitz ligament causing displacement of the jejunal loops to the right flank. The radiologist diagnosed mechanical small bowel obstruction with signs of vascular compromise affecting intestinal segments. In 2021, the patient had undergone laparoscopic removal of an ovarian cyst. Considering this prior pelvic surgery, the initial clinical suspicion was intestinal obstruction due to adhesions. However, the patient reported that during the aforementioned surgery, a Meckel's diverticulum was identified but not resected, shifting the diagnostic focus.

The overall postoperative course lasted seventeen days. The nasogastric tube was removed on the fifth postoperative day, as there was no output and the patient demonstrated progressive bowel function with the passage of gas and stools. At the same time, the gradual reintroduction to oral feeding was carefully monitored. On the tenth postoperative day, she developed a fever due to a catheter-related infection with S. epidermidis and a urinary tract infection with P. mirabilis. Targeted antibiotic therapy with Daptomycin (10 mg/kg) and Levofloxacin (750 mg/die) was administered. She was discharged on the seventeenth postoperative day in stable conditions (temperature 36 °C, blood pressure 100/70 mmHg and frequency 60 beats per minute). The study was conducted according to the Declaration of Helsinki and informed consent was obtained from the patient before discharge.

Analyzing the currently available literature, we believe that the clinical presentation discussed represents an unusual manifestation for a complication of MD. Clearly, the epidemiological data observed in this case differ from the existing evidence, as MD typically is present in children or adult males, as reported in an extensive review by Chen *et al.* [3]. At a further analysis it resulted that prevalence in adult females was 16% and adult males' prevalence was

Submitted: 23 November 2024 Revised: 31 December 2024 Accepted: 10 January 2025 Published: 10 March 2025
Correspondence to: Roberto Cammarata, Operative Research Unit of General Surgery, Fondazione Policlinico Universitario Campus Bio-Medico, 00128 Rome, Italy (e-mail: roberto.cammarata@policlinicocampus.it).

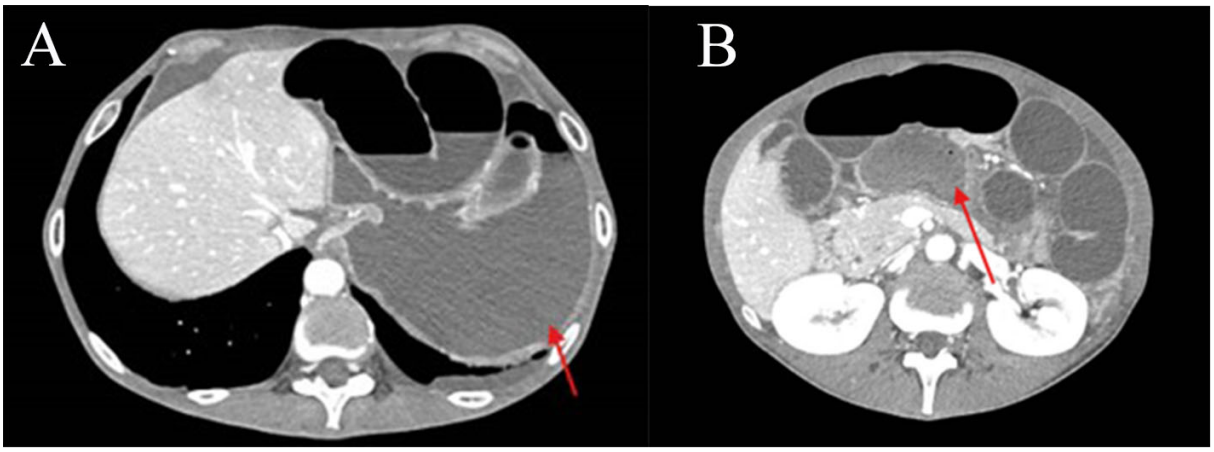

Fig. 1. Radiological findings at clinical presentation. (A) shows significant gastric distension, as indicated by the red arrow, while (B) shows distension of the small intestine and a hypodense formation in the mesogastrium with associated micro air bubbles (arrow). This finding raised suspicion of an ischemic intestinal segment rather than Meckel's diverticulum. Urgent abdominal surgery was performed. Initially, a laparoscopy was performed, but significant distension of the small Intestine and stomach was found, along with free citrine fluid and an ischemic bowel loop. Due to the lack of sufficient working space, the procedure was converted to a laparotomy, with a median incision. All intestinal loops were exteriorized, revealing a volvulus involving a Meckel's diverticulum (MD) located at the penultimate ileal loop (Fig. 2A,B). The volvulus had caused edema and congestion of all proximal loops up to the Treitz ligament. By means of a manual maneuver, the intestine was rotated. Following the maneuver, the intestine progressively regained vitality, while the MD remained ischemic. Considering the severe distension of the small intestine and the vascular compromise, it was concluded that an anastomosis in this situation would carry an unacceptably high risk of leakage. Consequently, the decision was made to resect only the diverticulum. Therefore, in line with routine practice at our department, the diverticulum was resected using a linear electric stapler. The caliber of the intestinal segment was then assessed to confirm the absence of stenosis. Given the tangential resection, a tubular drain was placed to safeguard the resection site. Intraoperative and perioperative antibiotic therapy (Cefazolin 2 g and Metronidazole 500 mg) was administered. The histopathological examination of the surgical specimen confirmed the diagnosis of 10 cm necrotic MD.

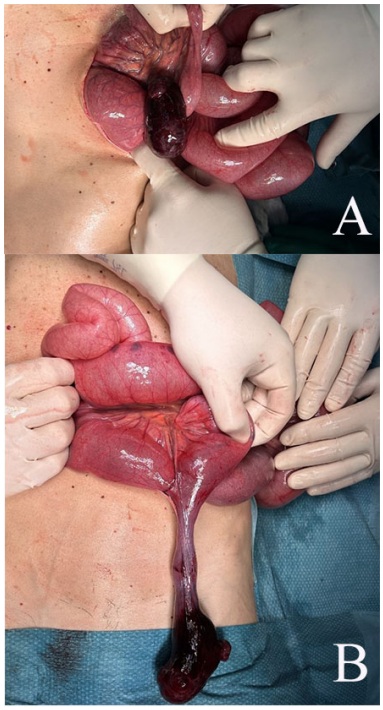

Fig. 2. Intraoperative findings. (A) Intestinal volvulus caused by ischemic MD. (B) Ischemic MD prior to resection.

84%, whereas the prevalence of the total pediatric patient population is 74%, of which 65% male [4]. Rarely, as analyzed by Chen *et al*. [3] and Zanchetta *et al*. [1], MD causes volvulus with concomitant ischemia of the entire small intestine. Interestingly, the dimensions of the MD observed here also exceed the average reported in previous studies, estimated to be around 3–4 cm [2]; in fact, as reported in Table 1 (Ref. [1–8]), only few reports have documented a diverticulum of comparable size to the one identified in our experience, measuring 1015 cm. To better understand the similarities and differences between our case and eight selected cases from the available literature (2019–2024), a detailed comparison is provided in Table 1.

There is now sufficient evidence to consider MD in the differential diagnosis of acute abdomen in adults. Currently, no consensus guidelines recommend routine resection in cases of incidental findings of MD. However, the potential complications, as well as albeit rare risk of malignancy, and the relative feasibility of surgical resection would justify resection in the case of an incidental MD finding, especially when risk factors such as abnormal length are present, as evident in this case. In conclusion, we propose that this work serves as a stimulus for further research aimed at confirming these findings and potentially revising current guidelines to reflect a more proactive surgical approach in specific cases of incidental MD findings.

Table 1. Similarities and differences between our case and eight selected cases among all the currently available literature reports (from 2019 to 2024).

Case	Age (years)	Sex	Clinical manifestation	Treatment method	Diverticulum length	Prognosis
Case 1 [4]	20	M	Acute abdomen, volvulus of large intestine	Surgical resection of redundant colon, small bowel, and Meckel's diverticulum (laparotomy)	Not specified	Good
Case 2 [1]	50	M	Acute abdominal pain, vomiting and constipation, acute peritonitis after laparoscopic appendicectomy	Surgical resection of Meckel's diverticulum (laparoscopy)	3 cm	Good
Case 3 [5]	27	M	Severe abdominal pain, complete intestinal obstruction, ischemic ileum	Surgical resection of Meckel's diverticulum (laparoscopy)	Not specified	Good
Case 4 [6]	56	M	Severe abdominal pain	Surgical resection of small intestine including Meckel's diverticulum (laparotomy)	15 cm	Good
Case 5 [3]	20	M	Acute abdominal pain	Surgical resection of small intestine including Meckel's diverticulum (laparotomy)	12 cm	Good
Case 6 [2]	39	M	Previous episodes of obstructive ileus, acute abdomen	Surgical resection of loop of ileum, including Meckel's diverticulum. (laparotomy)	5.5 cm	Good
Case 7 [7]	70	M	two-day history of abdominal pain associated with inability to pass gas or stool, nausea and vomiting	Surgical resection of ischemic distal ileum bearing a necrotic Meckel's diverticulum (laparotomy)	7.5 cm	Good
Case 8 [8]	21	F	Acute abdominal pain, bilious vomiting, abdominal distension, and absence of gas, ileal necrosis	Surgical resection of ischemic ileum and Meckel's diverticulum (laparotomy)	15 cm	Good

F, Female; M, male.

Availability of Data and Materials

All experimental data included in this study can be obtained by contacting the corresponding author.

Author Contributions

Conceptualization: RCo, DC, SA, RCa. Data Collection: RCa, SA, LB, VLV. Data Analysis: RCo, RCa, SA, LB, VLV, DC. Writing-Original Draft: RCa, SA, LB, VLV, DC. Writing-Review & Editing: RCo, DC, SA. All authors contributed to important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study was conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from the patient prior to discharge. This study did not require ethical approval as it was conducted using retrospective, fully anonymized data, and did not involve any direct interaction with patients. Therefore, in accordance with institutional guidelines, ethical committee approval was not deemed necessary.

Acknowledgment

Not applicable.

Funding

This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest. Damiano Caputo is serving as one of the Editorial Board of this journal. We declare that Damiano Caputo had no involvement in the peer review of this article and has no access to information regarding its peer review.

References

[1] Zanchetta M, Inversini D, Pappalardo V, Grappolini N, Morabito M, Gianazza S, *et al*. Meckel's Diverticulum Causing Ileal Volvulus and Peritonitis after a Recent Appendectomy: A Case Report and

Literature Review-We Should Likely Resect an Incidental MD. Life (Basel, Switzerland). 2023; 13: 1996.
[2] Sapalidis K, Sevva C, Magra V, Manaki V, Koulouris C, Roulia P, *et al*. Internal Hernia and Volvulus in an Adult Male Caused by Meckel's Diverticulum: A Case Report. Medicina (Kaunas, Lithuania). 2021; 57: 443.
[3] Chen Y, Liu Y, Jiang L, Jiang F, Zhu T. Axially torsional Meckel's diverticulum accompanied by small bowel volvulus: a case report. The Journal of International Medical Research. 2021; 49: 3000605211053554.
[4] Blum B, Grimes AD, Carroll HL, Stettler GR. Cecal volvulus secondary to mesodiverticular band. Journal of Surgical Case Reports. 2024; 2024: rjae296.
[5] Vargas Aignasse RA, Pantoja Pachajoa DA, Llahi F, Parodi M, Doniquian AM, Viscido GR. Emergency laparoscopic intervention for fibrous band-induced intestinal obstruction and ischemia associated with Meckel's diverticulum: A case report. International Journal of Surgery Case Reports. 2023; 109: 108614.
[6] Zieliński M, Kaczor P, Jarczyk G, Jackowski M. Small bowel segment with Meckel's diverticulum volvulus related to short mesodiverticular band: a case report. Journal of Medical Case Reports. 2023; 17: 109.
[7] Evola G, Caramma S, Caruso G, Schillaci R, Reina C, Reina GA. Intestinal obstruction and ischemia by necrotic annular Meckel's diverticulum: Case report and review of the literature. International Journal of Surgery Case Reports. 2021; 82: 105897.
[8] Musteata L, Geraldo RF, Ndasu Matendo H, Reitz A, Krasovski V, Nitu V, *et al*. Meckel Diverticulum Causing Intestinal Volvulus. Case Reports in Surgery. 2020; 2020: 8872668.