CASE REPORT

An Unusual Presentation of Abdominal Emergency—Spontaneous Perforation of Meckel's Diverticulum in an Adult: A Case Report and Review of the Literature

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Abstract

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract, resulting from incomplete obliteration of the omphalomesenteric duct during embryonic development. Although often asymptomatic and typically diagnosed in children under the age of 2, MD can lead to various complications, including intestinal obstruction, hemorrhage, inflammation, and, in rare cases, perforation or neoplasia. This report presents a rare case of perforated MD in a 21-year-old male, highlighting the importance of recognizing atypical presentations in adult populations. The patient presented to the Emergency Department with acute abdominal pain, nausea, and vomiting. Physical examination revealed generalized tenderness, rebound tenderness, and guarding. Laboratory findings showed leukocytosis and elevated serum amylase. Radiographic imaging demonstrated free air under the diaphragm, indicating gastrointestinal perforation. Emergency exploratory laparotomy revealed a broad-based, perforated diverticulum located 140 cm proximal to the ileocecal junction, adherent to the umbilical remnant. Segmental ileal resection and side-to-side anastomosis were performed. The patient had an uneventful postoperative course and was discharged in stable condition. Histopathological analysis confirmed the diagnosis of MD. While the incidence of MD complications in adults is low, this case emphasizes the need for a high index of suspicion when evaluating unexplained acute abdomen. Surgical management remains the definitive treatment for symptomatic MD, with the extent of resection determined intraoperatively. In cases of perforation or suspected heterotopic tissue, segmental resection with anastomosis is often warranted. Given the potential for serious complications and diagnostic ambiguity, especially in adults, prompt recognition and intervention are essential to improve outcomes in MD-related emergencies.

Keywords: Case report, Congenital anomaly, Diverticulitis, Exploratory laparoscopy, Gastrointestinal tract, Meckel's diverticulum.

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Introduction

Meckel's diverticulum (MD) is a common congenital anomaly of the gastrointestinal tract that arises from incomplete obliteration of the omphalomesenteric (vitelline) duct during the 5th to 7th week of fetal development.[1,2] This condition is most frequently diagnosed in children under the age of 2, with the diverticulum typically measuring approximately 2 inches in length and located approximately 2 feet proximal to the ileocecal valve. Its prevalence in the general population is estimated at 2%, a phenomenon encapsulated by the "rules of 2 s" associated with MD.[1] Although often asymptomatic, MD can lead to a range of complications, including intestinal obstruction, inflammation, hemorrhage, intussusception, ulceration, perforation, and rarely, neoplasia.[1,2] While perforation is an uncommon complication of MD, it was notably observed in the present case.[1] Although MD is less frequently diagnosed in adults, it has a male predominance.[1,3] Despite its rarity, in older age-groups, this report describes a case of perforated MD in a 21-year-old male, emphasizing the importance of recognizing and documenting such atypical presentations.

Case Presentation

A 21-year-old male presented to the Emergency Department with a chief complaint of abdominal pain. He mentioned that the pain began at 4:00 a.m, was generalized, and was accompanied by nausea and vomiting. Examination revealed generalized tenderness, rebound tenderness, and guarding. His history included intermittent diarrhea, which he reported was not bloody and resolved spontaneously without intervention. Initial laboratory

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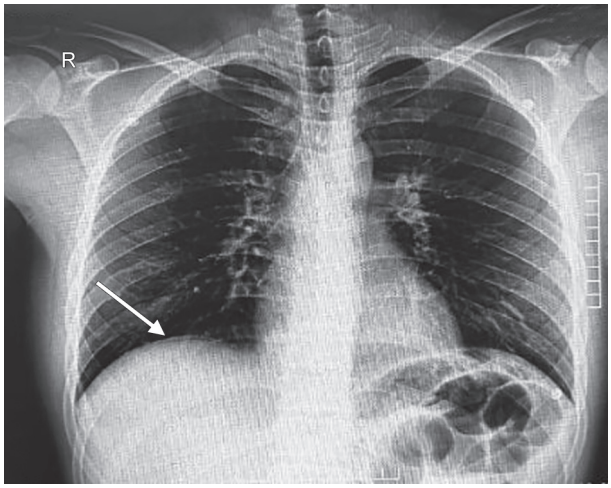

Fig. 1: Subdiaphragmatic free air

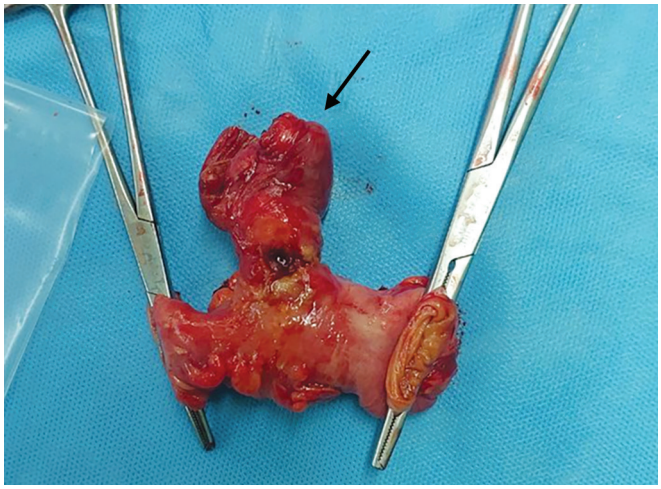

Fig. 2: Meckel's diverticulum with a broad and perforated base

investigation revealed leukocytosis (19,200/μL) and an elevated serum amylase level of 192 U/L. Imaging studies, including a chest X-ray, revealed the presence of free air under the diaphragm (Fig. 1), indicative of perforation. Given these findings, the patient was urgently taken to the operating room for exploratory laparotomy. Intraoperative findings revealed a broad-based, perforated diverticulum located 140 cm proximal to the ileocecal junction, which was adherent to the remnant of the umbilicus (Fig. 2). Segmental resection of the affected bowel was performed, followed by side-to-side anastomosis via a linear stapler. The patient was discharged on the second postoperative day in stable condition. Histopathological examination of the resected specimen confirmed the diagnosis of MD.

Discussion

Meckel's diverticulum is the most common congenital anomaly of the intestine, resulting from the persistence of the omphalomesenteric duct, a structure that connects the small intestine to the yolk sac during embryonic development. Its reported prevalence ranges from 0.2 to 4.0%, with the majority of cases being diagnosed during childhood. The lifetime risk of associated complications is estimated to be between 4.0 and 6.4%.[4]

In general, the clinical presentation of MD is described by the term "rule of 2s": The condition occurs in approximately 2% of the population, the diverticulum is typically located within 2 feet of the ileocecal valve; it measures approximately 2 inches in length; there are two distinct types of heterotopic mucosa; and symptoms often manifest before the age of 2 years.[4]

The presence of heterotopic mucosa in MD can lead to the development of various tumor types, which may be either benign or malignant. The risk of tumor formation in the MD is greater than that in any other region within the small intestine. Carcinoid metaplasia is the predominant type, accounting for approximately two-thirds of the tumors that arise in MD. Other tumor types include sarcoma, adenocarcinoma, gastrointestinal stromal tumors, lymphoma, and lipoma.[5]

In adults, the presentation of MD often manifests as obstruction due to adhesions or intussusception. This condition is frequently misdiagnosed as appendicitis in both adults and children, primarily because of its anatomical location in the lower right quadrant of the abdomen. Diverticulitis is observed in approximately 20% of symptomatic individuals, particularly in the adult population.

The prevalence of MD perforation is exceedingly rare among older adults, with the most symptomatic cases reported in children, where perforation remains a rare event as well.[4] Perforation typically occurs when a stercolith obstructs the diverticulum, leading to inflammation and necrosis. Less commonly, perforation may result from the penetration of foreign bodies, including items such as fish bones, toothpicks, chicken bones, coins, batteries, and peptic ulcerations.[5]

There are different approaches for managing MD. For example, double-balloon enteroscopy is a valuable tool for various therapeutic interventions, including argon plasma coagulation, balloon dilation, and biopsy procedures. Some clinicians have successfully used this technique for the endoscopic management of bleeding MD.[6] Surgical resection remains the primary treatment for MD, despite recent advancements in endoscopic therapeutic procedures. However, the question of whether all incidentally identified MDs should undergo resection remains controversial.[7]

In general, determining the increased risk of complications linked to incidentally identified MD through intraoperative palpation or inspection examination is unreliable.[7] Therefore, the intraoperative management of asymptomatic or incidentally discovered MD continues to be a topic of discussion, and because of the high mortality of untreated MD, many surgeons use resection as first-line treatment.[7]

Symptomatic MD necessitate surgical intervention, which can be executed through laparotomy, laparoscopy, or laparoscopy-assisted techniques.[8] Typically, wedge resection of the diverticulum is conducted, and in certain cases, end-to-end anastomosis is performed following resection of a segment of the ileum. The extent of resection is contingent upon intraoperative findings and any complications that may arise during the procedure. In cases where the omphalomesenteric remnant is narrow-based and no palpable mass is detected within the ileal lumen, simple wedge resection may suffice, followed by primary closure of the resultant defect. Conversely, if the diverticulum exhibits a broad base, if heterotopic tissue is identified, or if there are ischemic or inflammatory changes in the adjacent ileum, resection of the

involved intestinal segment along with end–end anastomosis is warranted. In cases of gastrointestinal hemorrhage, segmental ileal resection is essential, as the source of bleeding is typically located in the adjacent ileum. The management of benign tumors within the diverticulum can often be addressed through simple diverticulectomy, whereas malignant tumors require more extensive resection of both the intestine and mesentery.[7,9,10]

Conclusion

Complications of MD in adults are rare, and perforation of MD is seldom the cause of acute abdomen in this population. In such cases, the decision to resect the diverticulum—with or without a portion of the adjacent ileum—is based on the surgeon's intraoperative assessment.

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Author Contributions

All authors have contributed significantly to the manuscript, have read and approved the final version, and agree to be accountable for all aspects of the work.

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