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Case Report
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Complicated Meckel's Diverticulum: An Uncommon Etiology of Acute Abdomen in Adults

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Abstract

Background: Abdominal pain secondary to Meckel's diverticulum is rare in adult patients. Diagnosis of complicated Meckel's remains challenging as it often presents with right lower quadrant pain that can be confused with acute appendicitis. As such, it is frequently diagnosed during abdominal exploration.

Case Report: A 35-year-old male presented after transfer from an outside hospital with concern for intussusception based on an outside interpretation of a computed tomography scan of the abdomen. Upon an independent review of imaging, there was a concern for complicated Meckel's diverticulum. He was managed by laparoscopically assisted extracorporeal small bowel resection with primary anastomosis. Pathological evaluation of the specimen confirmed performed Meckel's diverticulitis. His postoperative course was unremarkable, and he was discharged home on postoperative day three.

Conclusion: Complicated Meckel's diverticulum in adults is relatively uncommon and a high index of suspicion is needed for its diagnosis. The treatment of choice is operative management that can be accomplished with either open or minimally invasive approaches.

Keywords: Meckel's diverticulum; Diverticulitis; Operative management; CT

Abbreviations

CT: Computed Tomography; MD: Meckel's Diverticulum

Introduction

Meckel's Diverticulum (MD) is the most common congenital gastrointestinal tract abnormality and is present in 2% of the general population. It represents a true diverticulum that results from incomplete omphalomesenteric duct obliteration. Meckel's diverticulum typically contains ectopic mucosa, has an independent blood supply, and is commonly located along the antimesenteric border of the small intestine approximately two feet from the ileocecal valve [1,2].

Symptomatic patients present with complications related to MD such as neoplasm, intussusception, volvulus, hemorrhage, perforations, and diverticulitis. The lifetime incidence of complicated MD is approximately 4%. Furthermore, greater than 50% of patients with complicated MD develop symptoms before the age of 10. For this reason, complicated MD is rare in adults as the majority will remain asymptomatic [2,3]. As such, a high index of high suspicion for MD is needed in adult patients with right abdominal pain, no prior intra-abdominal procedures, and abnormal computed tomography findings. Here we present a case of perforated Meckel's diverticulitis managed by laparoscopically assisted extracorporeal small bowel resection with primary anastomosis.

Case Presentation

A 35-year-old male presented to an outside hospital with two days of worsening right lower quadrant abdominal pain. He reported associated persistent nausea and exacerbation of pain with oral intake. One day prior to presentation, he recounted an episode of hematochezia. His past medical history was significant for hypertension and no previous abdominal surgical procedures. Initial laboratory workup revealed leukocytosis of 11.4×10^3 per µL. A Computed Tomography (CT) scan of the abdomen and pelvis with intravenous contrast was performed and was concerning for entero-enteric intussusception with surrounding inflammation (Figure 1). As such, he was transferred to our facility for General Surgery evaluation with the provisional diagnosis of intussusceptions.

Following transfer, he remained a febrile and hemodynamically stable. On examination, his

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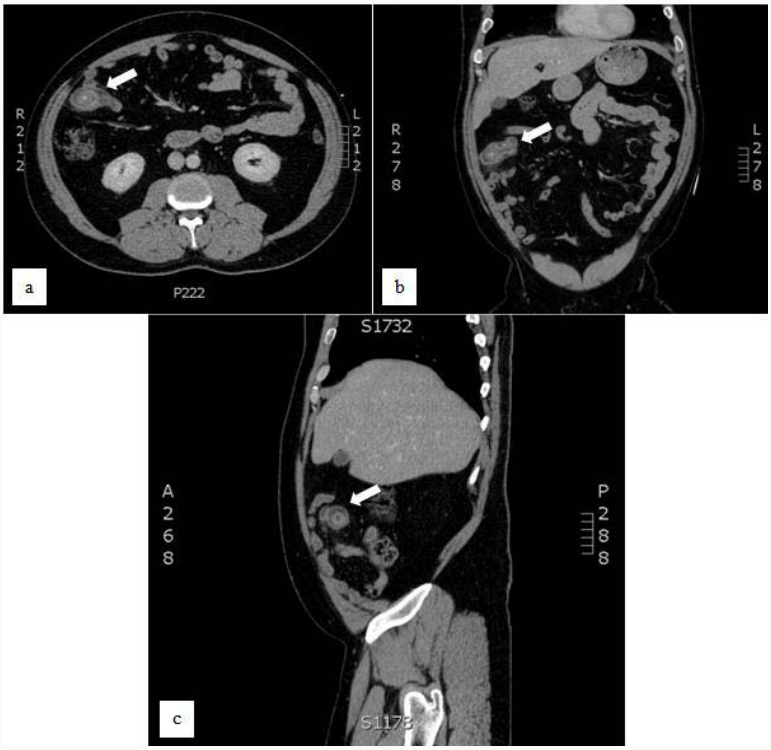

Figure 1: Preoperative (a) Transverse, (b) Coronal and (c) Sagittal cross-sectional CT imaging of the abdomen and pelvis. There appears to be inflammatory changes around a suspected intussusception, later to be revealed a Meckel's diverticulum (arrow).

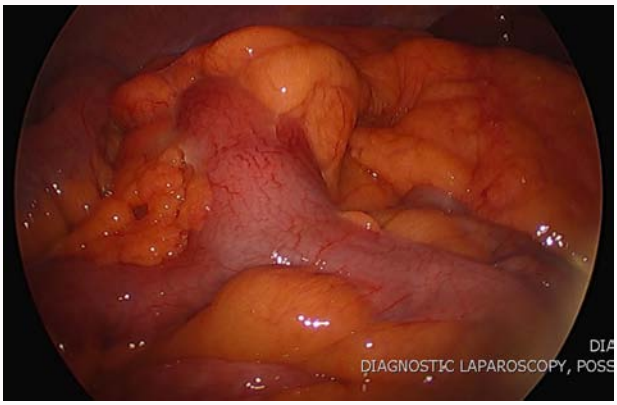

Figure 2: Intraoperative Photograph showing the Meckel's diverticulum that is partially covered with omentum.

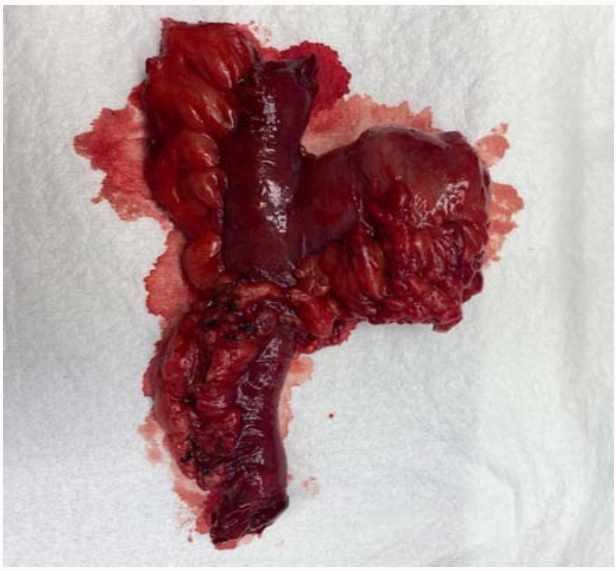

Figure 3: Surgical specimen demonstrating resected small bowel containing the perforated Meckel's diverticulum.

abdomen was mildly distended, and he had tenderness to palpation of the right abdomen without signs of peritonitis. After an independent review of the imaging, it was ascertained that his clinical picture was most consistent with complicated Meckel's diverticulum. After discussion of the risks and benefits of operative management, he was consented for a diagnostic laparoscopy with possible small bowel resection.

His abdomen was accessed at palmer's point by Veress needle insufflation for pneumoperitoneum of 15 mmHg followed by placement of a 5 mm optical trocar. Two additional 5 mm trocars were placed in the suprapubic and left lower quadrant positions. Upon entry, clear fluid was seen in the right abdomen. The cecum and appendix were identified and appeared normal. The small bowel was evaluated from the terminal ileum to the ligament of Treitz. A large and inflamed Meckel's diverticulum was discovered approximately two feet from the ileocecal valve and was partially covered by omentum (Figure 2). The remaining abdominal organs appeared normal. A small midline laparotomy was made and the involved small bowel was resected with primary anastomosis (Figure 3). The abdomen was closed in the usual fashion.

The remainder of his hospital course was unremarkable. His diet was sequentially advanced, and he was discharged home on postoperative day three. Histopathology findings were consistent

with perforated Meckel's diverticulum. At two-week postoperative follow-up, the patient was symptom-free and had resumed his regular diet, but reported some constipation.

Discussion

The embryological origin of MD was first described by the German anatomist, Johann Fredrick Meckel, in 1908. The omphalomesenteric duct is a transient conduit that serves to connect the yolk sac to the developing fetus' midgut. It is present by the 4th week of gestation but degenerates during the 5th to 7th weeks. Abnormalities of this process can result in a myriad of developmental aberrations including umbilical intestinal fistulas, umbilical sinuses, omphalomesenteric ducts cysts, and MD [4].

Meckel's diverticulum is the most common congenital abnormality of the gastrointestinal with a reported prevalence of 2% to 4% of the general population. Although the majority of people with MD remain asymptomatic during their lifetime, approximately 4% of patients will present with complicated MD associated with neoplasms, intussusception, volvulus, hemorrhage, perforations, or diverticulitis [1]. Typically, patients with complicated MD presents with acute right lower quadrant abdominal pain that is often clinically indistinguishable from acute appendicitis in 20% of patients [3].

The natural history of MD differs among adult and pediatric populations. In 1976, Soltero and Bill first outlined the natural history of MD and complicated presentations in a cohort of 202 patients. They showed that the lifetime risk of complicated MD was 4.2%. However, there was a higher rate of developing complicated MD before the age of 20 (2% to 4%), which steadily decreased to 0% by the age of 75 [5]. Additionally, GI bleeding and small bowel obstruction are the most common presentations in pediatric patients, 47% and 40%, respectively [1,6]. While diverticulitis accounts for 14% of complicated MD in the pediatric population, in a recent observational study of 37 patients, Parvanescu et al. [1] showed that it is the most common presentation in the adult population, occurring in 35.1% of cases.

The likelihood of perforation from diverticulitis correlates with the dimensions of the diverticulum. In a 1983 observational study of 402 patients, Mackey and Dineen show that diverticula greater than 2 centimeters (cm) in length were associated with complicated presentations [7]. Additionally, in a recent case series of 15 patients, Ding et al. showed that MD with a narrow base (<2 cm) and length greater than 2 cm were predisposing factors for perforation [3]. Our case had one such high-risk feature as its length was 5.5 cm, predisposing it to perforation despite having a wide base (3 cm × 3.5 cm).

The difficulty in accurately diagnosing MD is emphasized by the famous Dr. Charles Mayo quote, "Meckel's diverticulum is frequently suspected, often looked for, and seldom found" [5]. Various imaging modalities have been utilized to diagnose MD including small bowel series, ultrasonography, CT, and scintigraphy. Despite improvements in diagnostic imaging including contrast-enhanced, multidetector CT, it is difficult to discern the difference between a diverticulum and intestinal loops of the small bowel. On average, CT accurately diagnoses complicated MD in only 24% of patients, with the highest detection rate in patients with Meckel's diverticulitis (38%). Our patient was transferred to our hospital with the provisional diagnosis of intussusception base on radiology interpretation of the imaging. However, given his symptomology as well as the location of the enteric inflammation, perforated MD was high on our differential. Nonetheless, preoperative diagnosis of MD is difficult and is often confirmed during surgery.

Surgical resection is the mainstay of treatment for complicated MD. Either diverticulectomy or segmental resection with primary anastomosis is acceptable surgical options. Diverticulectomy can be successfully performed if resection of the MD includes all ectopic epithelium and ulcers without narrowing of the intestinal lumen. As such, it is recommended that all diverticulectomy specimens be inspected with or without frozen section to confirm complete removal of ectopic mucosa. Diverticulectomy is contraindicated in cases where an ischemic and inflammatory process extends to adjacent ileum, wide mouth diverticulum with ectopic mucosa, suspicion for neoplasm, or pathological changes (edema, inflammation, or perforation, to the base of the diverticulum) [4,8]. Furthermore, several studies have shown the efficacy of minimally invasive approaches in comparison to open procedures. Given the wide base and surrounding inflammation, we elected for segmental resection with primary anastomosis.

While complicated MD mandates an operative intervention, the management of incidentally found MD remains controversial. If incidentally found on imaging, resection is not indicated given the overall low incidence of complicated MD and the risks associated with operative interventions. However, there is no consensus on asymptomatic MD found during abdominal exploration. Although a prior large systematic review did not support resection, some authors suggest a selective approach based on age, MD anatomic features, and the patient's clinical status [7,9,10].

Conclusion

Complicated MD is relatively uncommon and a high index of suspicion is needed for its diagnosis, especially in patients with right abdominal pain and radiographic abnormalities in the distal small bowel. Although diagnosis of complicated MD is difficult, independent review of imaging in conjunction with the patient's clinical picture can aid in ascertaining this diagnosis. Operative management is mandated for complicated MD with either open or minimally invasive approaches.

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