

Vomiting and Abdominal Pain in a 5-Year-Old Male

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Abstract

This case describes small bowel obstruction secondary to a Meckel's Diverticulum in a 5-year-old male patient with a chief complain of abdominal pain and vomiting. We review the pathophysiology, diagnosis, and management of Meckel's Diverticulum. This case report highlights the importance of considering a broad differential diagnosis during a clinical workup.

Keywords

Meckel's Diverticulum, abdominal pain, intestinal ischemia

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Presentation

A previously healthy 5-year-old male presents to the Emergency Department (ED) with a 2-day history of sudden onset of abdominal pain and vomiting. His abdominal pain is generalized and seems to come and go since its onset. The emesis is non-bloody/non-bilious and occurs after eating or drinking. The patient has only urinated once today. Family reports that the patient was evaluated at an urgent care facility earlier in the day and was diagnosed with constipation by X-ray. The patient was discharged home with instructions for a bowel clean-out with over-the-counter laxatives but now presents to our pediatric ED for further evaluation due to persistent emesis. The patient has a history of chronic constipation, but he has never had abdominal pain this severe. Parents note that his abdomen is mildly distended. Parents deny fever, chills, hemochezia, or diarrhea. Family history is unremarkable. There is no surgical history and no additional pertinent medical history.

Vital signs show a temperature of 36.7°C (98.1°F), heart rate of 146 beats/minute, respiratory rate of 30 breaths/minute, blood pressure of 90/60 mmHg, and oxygen saturation of 98% on room air. Physical exam reveals an ill but certainly non-toxic appearing child. Mucous membranes are dry with delayed capillary refill of 2 to 3 seconds. Abdomen is soft and slightly distended. Patient endorses generalized tenderness to palpation but does not guard or reveal rebound tenderness. His bowel sounds are decreased on auscultation.

Patient receives Ondansetron in triage and tolerates fluids by mouth while in the waiting room. Parents report that this is the first time the patient drank all day and appears much better after Ondansetron. Initial laboratory studies in the ED include the following: point-of-care-test for glucose of 200 [70-105 mg/dL], white blood cell count of 18.2 [4.50-13.00 K/ μ L], neutrophil percentage of 74.7 [27%-55%], lymphocyte percentage of 10 [36%-52%], hemoglobin of 11.7 [11.5-13.5 g/dL], hematocrit of 37.9 [34%-40%], platelet count of 328 [150-400 K/ μ L], sodium of 141 [136-145 mmol/L], potassium of 3.6 [3.5-5.1 mmol/L], chloride of 115 [98-107 mmol/L], carbon dioxide of 17 [21-30 mmol/L], blood urea nitrogen of 26 [8-21 mg/dL], creatinine of 0.5 [0.6-1.2 mg/dL], glucose of 176 [70-105 mg/dL], calcium of 7.4 [8.5-10.7 mg/dL], AST of 17 [$<$ 8-30 U/L], ALT of 8 [$<$ 9-35 U/L], C-reactive protein (CRP) of 14.0 [0.0-9.9 mg/L], lactate of 2.3 [0.5-1 mmol/L], beta hydroxybutyrate of 0.42 mmol/L [0.02-0.27], hemoglobin A1C 4.8 [4%-6%], and respiratory pathogen panel positive for rhinovirus/enterovirus.

The patient promptly receives a 20 mL/kg normal saline bolus after a syncopal episode during the initial

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workup. Abdominal X-ray shows dilated loops of bowel and abdominal ultrasound reveals a large amount of free fluid in the abdomen. Abdomen-pelvis computed tomography (CT) with intravenous contrast exposes ischemic bowel from the mid jejunum to the terminal ileum with moderate amount of ascites and a single locule of pneumoperitoneum. General surgery is consulted for emergent exploratory laparotomy.

Differential Diagnosis

The differential diagnosis for this 5-year-old male with abdominal pain and vomiting includes surgical and medical emergencies like appendicitis, diabetic ketoacidosis (DKA), and bowel obstruction. Other, less emergent, considerations include constipation, gastroenteritis, pneumonia, and urinary tract infection. Dilated loops of bowel raises suspicion for bowel obstruction during the initial work up. Appendicitis remains on the differential but is less likely given the patient's age, lack of fever, and a marginally elevated CRP. DKA is ruled out since glucose <250 mg/dL.

Bowel obstruction can be thought of as either blockage within the intestines (stool impaction, foreign body ingestion, polyp/neoplasm, and inflammation) or intestinal strangulation from intussusception, incarcerated bowel herniation, or volvulus. Volvulus and intussusception are 2 common causes of bowel obstruction in children. Intussusception occurs when part of the intestine telescopes into itself. The resulting segment of compressed bowel can lead to ischemia and necrosis of the surrounding tissue if left untreated.¹ Volvulus is often associated with congenital malrotation and leads to obstruction from small bowel twisting. Ultrasound is an effective diagnostic tool for both intussusception and volvulus that avoids the radiation exposure associated with other imaging modalities.¹ Ultrasound evaluation for this patient was nondiagnostic but did reveal a large amount of free fluid concerning for a bowel injury. A CT scan confirmed this suspicion and prompted emergent surgical exploration.

Diagnosis and Patient Course

On opening the abdomen, surgeons visualized ischemic bowel that was completely eviscerated through a mesenteric defect. Further examination revealed a Meckel's diverticulum (MD) adhered to a mesenteric band. The band connected the distal tip of the diverticulum down to the mesenteric defect. An internal hernia through mesentery led to closed loop obstruction and bowel ischemia. Surgeons ligated

the mesenteric band at the distal end of the MD which released the incarcerated hernia. Surgeons resected approximately 215 cm of ischemic distal ileum to the cecum and anastomosed healthy small bowel to the colon. A pathology report of the ligated bowel confirmed a MD with gastric heterotopia and extensive ischemic necrosis. The patient was admitted to the Pediatric Intensive Care Unit for hemodynamic monitoring following the surgery. The patient had return of bowel function and tolerated PO post-operatively. He was discharged home on post-op day 6 with B12 supplementation. One month later, at his follow-up visit with general surgery, the patient was doing well, eating normally, and was discharged from clinic.

Discussion

MD is the most common congenital malformation of the GI tract.²⁻⁶ MD is the result of an incomplete obliteration of the vitelline duct, also known as omphalomesenteric duct, which is the primitive connection between the midgut and yolk sack. Remnants of the vitelline vasculature can attach a MD to the anterior abdominal wall or mesentery, resulting in a mesodiverticular band.²

The majority of MD are clinically silent and can be diagnosed incidentally during a surgical operation, autopsy, or less frequently with radiographic imaging. An estimated 4% to 16% of MD may lead to complications.^{2,3} Of those who develop symptoms from a MD, about half will present within the first 2 years of life and the incidence of complications decreases significantly in adults.³ Complications from a MD include gastrointestinal bleeding, inflammation, intussusception, and obstruction. Gastrointestinal bleeding is caused by acidic secretions from ectopic mucosa and ulcerative breakdown of adjacent ileal tissue. Small bowel obstruction related to a MD can occur from chronic inflammation, incarceration within a hernia, volvulus around a fibrous band, or entrapment against a band. Obstruction is the most common complication in the adult population, while painless gastrointestinal bleeding is more common in the pediatric population.^{3,4}

A Meckel's scan (with 99m technetium pertechnetate) is a routine diagnostic tool that evaluates for ectopic gastric mucosa seen in MD. Other routine workup for MD include wireless capsule endoscopy and double balloon enterostomy.^{3,4,7} MD is rarely diagnosed pre-operatively in an acute setting because radiographic or sonographic imaging is warranted

over the MD-specific tests.⁸ Furthermore, a Meckel's scan would likely result in a false negative diagnosis of MD in the setting of obstruction and bowel ischemia.⁵ Although surgical excision is the treatment of choice for symptomatic MD, preventative surgical excision of an incidentally discovered, asymptomatic MD is performed on a case by case basis and often left intact.⁶

Conclusion

The rule of 2's states that a MD is present in 2% population, usually presents in the first 2 years of life, often located 2 feet from the ileo-cecal junction, about 2 inches long, and complications are 2 times as likely in males than females.^{1,2,6} This case describes a 5-year-old who presented with abdominal pain out of proportion to physical exam, a hallmark of intestinal ischemia. The patient was ultimately found to have intestinal compromise related to a MD. While gastroenteritis and constipation are common causes of vomiting and abdominal pain, a differential should be broadened, and workup extended when clinical picture is inconsistent with preliminary diagnosis. Although age is an important tool to rule in or rule out certain pathologies in pediatrics, it is important to be mindful that outliers, while uncommon, are possible and may prompt further investigation.

Author Contributions

JW, SP, and RK: Contributed to the conception and design of this manuscript.

JW and SP: Drafted the manuscript.

JW and RK: Critically revised the manuscript.

JW, SP, and RK: Reviewed, edited, and gave final approval for submission.

Author Disclosure

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Ethical Approval

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