

Atherosclerotic Small Bowel Ischemia Causing Intestinal Obstruction and Volvulus.



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Abstract

Obstructions are the most common event requiring surgical intervention of the small intestine. Numerous factors can precipitate an obstruction, with adhesions from previous surgeries being the most common. It is rare for the obstruction to be caused by volvulus of the small bowel, and increasingly more rare for that volvulus to be caused by ischemia due to atherosclerosis. We discuss the unique presentation of a 70-year-old gentleman who presented to the emergency department with symptoms of epigastric and lower abdominal pain. After a thorough history, physical exam, and diagnostic testing, the patient was diagnosed with small bowel obstruction due to volvulus, secondary to atherosclerotic ischemia of the small intestine, and rushed to emergency surgery. After the surgical intervention and hospital stay, the patient has since made a complete recovery and was asymptomatic at his follow-up appointment.

Introduction

A Small bowel obstruction (SBO) is a mechanical blockage of the bowel that is a common surgical emergency. The leading cause in the developed world is intra-abdominal adhesions which commonly result from prior abdominal surgeries. The second most common etiology includes incarcerated hernias. Other etiologies include malignancy, inflammatory bowel disease, fecal impaction, foreign bodies, and volvulus. Patients commonly present with abdominal pain, distention, nausea, and vomiting. Physical exam often reveals reduced, high pitched bowel sounds, along with abdominal tenderness. There may be signs of peritonitis such as rebound or guarding which signify a late process. [3]

Volvulus occurs when a loop of intestine twists around itself and the mesentery and thereby causing an obstruction. This impairs the blood supply to that portion of the intestine, resulting in an ischemic bowel. Colonic volvulus account for nearly 2% of all cases of bowel obstructions in the U.S. Most cases occur in the sigmoid colon in adults, followed by the cecum. Risk factors include intestinal malrotation, adhesions from previous surgeries, Hirschsprung disease, and hospitalized patients with neuropsychiatric disorders. [5]

Bowel ischemia occurs when blood flow is reduced at least 75% for more than 12 hours. It is an uncommon condition with a high mortality rate. The intestine is supplied by 2 major arteries, including the superior mesenteric artery and the inferior mesenteric artery. Bowel ischemia can further be divided into acute and chronic cases. Diffuse atherosclerotic disease accounts for 95% of chronic cases with contributory factors such as smoking history, coronary heart disease, and peripheral artery disease. Small intestine ischemia accounts for 0.1% of all hospital admissions and has a mortality rate of 24%-94%. [4]

Case Report

This case reviews the medical evaluation and surgical management of a 70-year-old African-American gentleman who presented to his local emergency room with symptoms of abdominal pain which started at 3am the previous evening. The patient reported significant pain in the epigastric and bilateral lower quadrants of his abdomen, which he characterized as a dull, throbbing pain. During review of systems, he reported having a bowel movement the day before presenting to the hospital, but denied fever, chills, nausea, vomiting, melena, or hematochezia.

Physical examination in the emergency department revealed a temperature of 97.9 F, heart rate 55 bpm, blood pressure 181/122 mmHg and SpO2 99%. The patient was awake, alert and oriented with no signs of acute distress. His abdomen was soft and flat with tenderness to palpation in the right lower quadrant, left lower quadrant, and epigastric area. There was significant guarding during deep palpation. Rebound tenderness was not appreciated, and Murphy's sign was negative.

History of past illness

The patient has a medical history significant for hypertension treated with lisinopril 40 mg daily and hydrochlorothiazide 12.5 mg daily, and peripheral neuropathy treated with gabapentin 300mg TID. No past surgical history.

Personal and family history

The patient has a family history significant for diabetes, lung and throat cancer. He is a 50 pack year tobacco smoker and drinks approximately 3 standard alcoholic beverages a week.

Labs and Imaging Results

Laboratory tests revealed an elevated WBC count with neutrophilia, and an elevated lactic acid level of 3.1 (range 0.5-2.2 mmol/L). An ECG revealed sinus bradycardia, peaked T waves, and suspicion for left ventricular hypertrophy. Imaging studies were performed; small bowel series showed delayed small bowel transit time. Contrast did not definitively enter the colon after 5 hours and 30 minutes. The gastric lumen and pylorus were patent. Abdominal x-ray revealed a nonspecific bowel gas pattern with multiple loops of air-filled bowel. CT scan of the abdomen and pelvis with IV contrast showed high-grade mechanical small bowel obstruction with abrupt transition point to the left of the midline in the false pelvis and twisting of the small bowel on its mesentery. This was a concern for adhesions or an internal hernia. There were mild ascites and a stable, 1.5 cm capsular cyst on the liver. The abdominal aorta was noted to be severely atherosclerotic without aneurysm. No significant abnormalities were present in the abdominal wall.

Surgical Management

Upon discovery of the volvulus and small bowel obstruction, the patient was urgently rushed to the operating room for emergency surgery. An exploratory laparotomy was performed and the ischemic segment of the small bowel was removed. The specimen recovered was a C-shaped 26.5cm x 2.5 cm portion of small bowel with a purple- pink, dusky, smooth serosal surface. There was a 0.8 cm area of stenosis located 1.5 cm from the nearest mucosal margin. The mucosa was pink and flattened, and the bowel wall measured 0.2 cm in thickness. Areas of perforation were not identified.

After the surgery, the patient's condition stabilized and he was discharged from the hospital X days later. One month after discharge, the patient presented to the clinic for follow-up where he made no complaints or concerns. He reported a return to normal diet and activity, complete resolution of pain, normal bowel movements, and no symptoms of nausea or vomiting.

Discussion

Small bowel obstructions occur mostly in the setting of adhesions secondary to previous surgeries. It is exceedingly rare, as in the case presented within this report, that they may occur due to volvulus [6]. This case is unique in that the inciting event was significant small bowel ischemia, likely from uncontrolled hyperlipidemia and atherosclerosis as evidenced by the CT findings of a severely atherosclerotic abdominal aorta. The ischemia then made way for the necrotic segment of the small bowel to twist upon its mesentery and cause a closed loop obstruction and further compromise of the blood supply to the small intestine.

The presentation of a volvulus in the small intestine is not as easily recognizable on radiographs as a sigmoid and cecal volvulus as it is rare to present in such a location [6]. The classic "birds beak" phenomenon characteristic of any volvulus on contrast enhanced plain film was not visualized in this patient. The patient's imaging was consistent with a small bowel obstruction, however, the etiology was not definitively defined until an exploratory laparotomy was performed. It is likely that this patient had a chronic underlying process of mesenteric ischemia prior to presenting with this volvulus that was never diagnosed until they presented with the small bowel obstruction.

It is imperative that ischemia be considered as a differential or possibly as an underlying factor for future management when working up a patient for bowel obstruction. Swift intervention in this scenario likely prevented outcomes such as perforation and severe hemodynamic instability. This patient would benefit from cholesterol lowering medications and possibly endovascular repair to prevent future recurrence [7].

References

- [1] Lanzetta, M. M., Masserelli, A., Addeo, G., Cozzi, D., Maggialetti, N., Danti, G., Bartolini, L., Pradella, S., Giovagnoni, A., & Miele, V. (2019, April 24). *Internal hernias: A difficult diagnostic challenge. Review of CT signs and clinical findings.* *Acta bio-medica : Atenei Parmensis.* Retrieved March 11, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC625567/>
- [2] Martin, L. C. (n.d.). *Review of internal hernias: Radiographic and clinical findings.* *AJR. American journal of roentgenology.* Retrieved March 11, 2022, from <https://pubmed.ncbi.nlm.nih.gov/16498098/>
- [3] Schick, M. A. (2021, July 22). *Small bowel obstruction.* StatPearls [Internet]. Retrieved March 11, 2022, from <https://www.ncbi.nlm.nih.gov/books/NBK448079/>
- [4] Theodoropoulou, A., & Koutroubaki, I.-E. (2008, December 28). *Ischemic colitis: Clinical practice in diagnosis and treatment.* *World journal of gastroenterology.* Retrieved March 11, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2778113/>
- [5] U.S. National Library of Medicine. (2021, September 14). *Volvulus.* StatPearls [Internet]. Retrieved March 29, 2022, from <https://www.ncbi.nlm.nih.gov/books/NBK441836/>
- [6] Sparks, D. A., Dawood, M. Y., Chase, D. M., & Thomas, D. J. (2008, September 22). *Ischemic volvulus of the transverse colon: A case report and review of literature.* *Cases journal.* Retrieved March 29, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2564907/>
- [7] Hohenwarter, E. J. (2009, December). *Chronic mesenteric ischemia: Diagnosis and treatment.* *Seminars in interventional radiology.* Retrieved March 29, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3036470/>