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Gallstone Ileus resulting in Meckel's Diverticulitis

Mitchell Andrew Goettman, Bilal Kharbutli

ABSTRACT

Meckel's Diverticuli are remnants of the vitelline duct which totally obliterate during the 9th week of gestation in 98% of the population. Of the other 2% which retain a remnant of the duct, only a small proportion goes on to develop complications that need surgery. Gallstone ileus is an obstruction typically unrelated to Meckel's Diverticuli which results from inflammation and fistulization of the gallbladder to the small bowel or stomach with subsequent passage of a large stone. This case report describes a unique occurrence in which a gallstones ileus led to acute Meckel's diverticulitis. The approach to gallstone ileus should generally be enterotomy with stone extraction alone, while Meckel's Diverticulitis is treated with resection and primary anastomosis. When faced with concurrent diseases, stone extraction for a gallstone ileus can be performed after transecting the small bowel for resection of the Meckel's and prior to performing the anastomosis.

Keywords: Gallstone Ileus, Meckel's diverticulitis, Pneumobilia

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INTRODUCTION

First described by Johann Fredrick Meckel in 1809, Meckel's Diverticuli are outpouchings of all three layers of the small bowel wall located approximately 2 feet from the terminal ileum. They are present in approximately 2.1% of all people, and current research shows that they have a male to female preponderance of 1.3:1 [1]. The rule of 2's has become a common memory aid describing features of Meckel's diverticuli: location (2 feet from the terminal ileum), length (2 inches long), incidence (2% of the population), histology (2 types of tissue - gastric and pancreatic), and clinical significance (2% become symptomatic). Typical complications resulting from Meckel's diverticuli, which are often attributed to ectopic gastrointestinal tissues, include hemorrhage, obstruction/intussusception, hernia formation, development of neoplasms, and diverticulitis [2].

Gallstone ileus, on the other hand, is a far less common small bowel phenomenon. It usually results when a large (>2 cm) gallstone or common bile duct stone enters the alimentary tract as the result of a fistula formed between the gallbladder and either the duodenum or stomach. It accounts for approximately 0.095% of all mechanical small bowel obstructions and has a female preponderance, occurring in elderly females approximately 70% of the time [3].

Ideal surgical approaches to each Meckel's diverticulitis and gallstone ileus are still debated due in part to the rarity of these two diseases; however, some recommendations can be made based on the available literature. We present here a case of a gallstone ileus complicated by Meckel's diverticulitis along with our management and a short review of this literature.

CASE REPORT

A 67-year-old male with a past medical history of chronic obstructive pulmonary disease, coronary artery disease status post stent placement for which he was taking aspirin and clopidogrel, hypertension and deep vein thrombosis (DVT) was admitted with a one day history of sudden onset generalized abdominal pain radiating to his lower back that was associated with nausea and vomiting. He had no previous history of abdominal surgeries. He had no bowel movements for two days and he had not passed flatus for greater than 24 hours. Of note, the patient had one episode of GI bleeding with melanotic stools a year before while on anticoagulation for his DVT. He had a positive tagged red blood cell scan and negative esophagogastroduodenoscopy at the time. No further workup was done.

Resuscitation was initiated immediately in the emergency department with intravenous fluids. Nasogastric tube was placed. The patient appeared uncomfortable with a soft but distended abdomen with mild right lower quadrant abdominal tenderness. His vitals were significant for tachycardia and tachypnea and his labs were significant for lactic acidosis of 2.3 mmol/L, hypokalemic hypochloremic metabolic acidosis (consistent with history of vomiting), as well as a leukocytosis of 15.2 K/uL without left shift. His total bilirubin was 1.5 mg/dL (normal < 1.2) but the rest of his liver function tests were normal.

A non-contrast computed tomography scan obtained in the emergency department showed dilated small bowel loops without a definite transition point and air in the intrahepatic biliary tree but no stones identified.

With the above clinical and radiological findings surgical exploration was recommended and he underwent a diagnostic laparoscopy converted to exploratory laparotomy with small bowel resection and extraction of an obstructing gallstone.

After insufflating the abdomen and placing ports, the small bowel was run. A congested area with patchy serosal ischemic changes, which included a large indurated Meckel's diverticulum, was identified (Figure 1A, and B). As there was some residual small bowel that was adherent in the pelvis, which could not be assessed safely using laparoscopy, a small midline laparotomy incision was made and the rest of the small bowel was run. The distal bowel appeared slightly dilated but viable. The segment containing the indurated and inflamed Meckel's was felt to be the cause of his diseased state and was resected with healthy margins. A re-examination of the distal small bowel revealed a hard mobile mass at the terminal ileum. This was moved proximally towards the staple line which was opened and a large gallstone was removed and measured to be about 4.5 cm alongside several smaller stones. The small bowel anastomosis was then completed and the abdomen was closed.

The patient remained intubated post-operatively, but was hemodynamically stable. He was extubated on post-operative day (POD) #1. The rest of his hospital course was uneventful and on POD #5 he was discharged home. At his follow-up visit the patient was doing well with no complaints.

The final pathology showed a 5.0 x 2.0 x 0.8 cm Meckel's diverticulum. The adjacent small bowel had mucosal ischemic necrosis with ulceration, transmural acute inflammation, and acute peritonitis. Interestingly, a 1.2 x 0.5 cm ulcerated mucosal defect confined to the mucosa was noted 20 cm distal to the Meckel's.The black-green bosselated calculus measured 4.5 x 3.5 x 2.0 cm (Figure 2).

DISCUSSION

Etiologies of small bowel obstruction (SBO) can be extrinsic (Adhesions, hernia, extrinsic masses, cancer), intrinsic or intra luminal (intestinal tumors, gallstone and foreign bodies, stricture). Obstruction can be partial or complete.

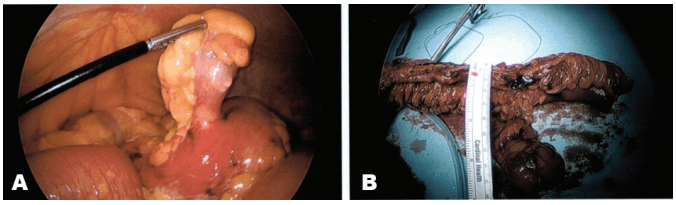

Figure 1 (A and B): (A) A large amount of inflammation and patchy ischemic necrosis was appreciated extending from the base of the Meckel's diverticulum in either direction along the small bowel. (B) Resection was taken to clean, healthy appearing margins.

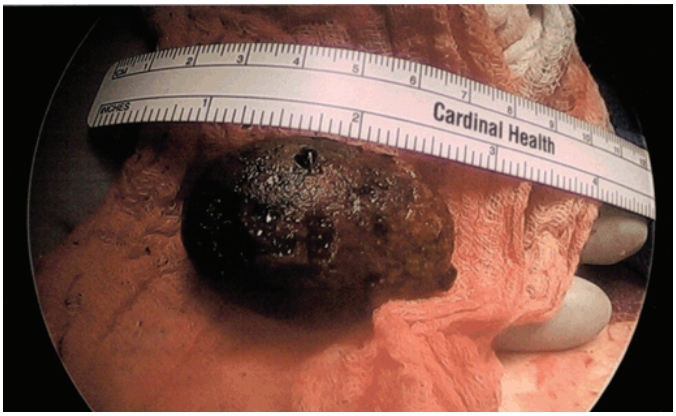

Figure 2: A large, bosselated gallstone was delivered through the anastomosis. The stone had become lodged and was obstructing at the level of the ileocecal junction.

In the United States, SBO are most commonly caused by adhesions followed by hernias and tumors, but the differential diagnosis should also include less common causes such as gallstone ileus. This is especially true in patients with no previous surgeries or identifiable hernias.

Gallstone ileus is only diagnosed about 50–60% of the time prior to operation [4]. A history of right upper quadrant pain and the physical examination findings of right upper quadrant tenderness and guarding, as well as radiographic findings of gallstones, inflammation, and pneumobilia should aid in the diagnosis.

Meckel's Diverticulitis may be even harder to diagnose pre-operatively and is often mistaken for acute appendicitis due to the similarities in clinical presentation, physical examination, as well as radiographic findings.

An early retrospective study published in 1994 concluded that the lifetime risk of developing complications from Meckel's Diverticuli requiring operation (6.4%), which did not improve with age, warranted the resection of such diverticuli when discovered incidentally regardless of the patient's age [5]. However, other studies have shown that the benefits of resection are mostly seen in younger patients (under age 50) whose diverticuli exhibit high length to width ratios [2]. A large retrospective review published in 2008, which seems to drive the current thinking, found that the number of incidental diverticulectomies needed to prevent one death was 758 and about 4% of diverticuli will become symptomatic in a lifetime [6]. The article concluded that such meager benefit did not outweigh the significant increase in post-operative complications (5.3% compared to 1.3% if no diverticulectomy performed).

Ectopic gastric mucosa is often present at the base of a diverticulum, especially in those with a low length to width ratio. Ligation at the base may leave such ectopic tissue behind [7]. External appearance as well as palpation seem to be poor predictors of location of ectopic mucosa. Also, ulceration from the acid secreted by ectopic gastric tissues are found in the small bowel adjacent to the diverticuli. For this reason, symptomatic diverticuli should be removed most often by ileal resection rather than diverticulectomy [8]. In the case of Meckel's diverticulitis, resecting to uninvolved margins based on external appearance of the small bowel is a reasonable approach. Our patient had a significant ulcer 20 cm from the diverticulum.

In regards to gallstone ileus, previous surgical decision making was based on a retrospective study of 1001 reported cases from the 20th century. This was the result of the infrequent occurrence of gallstone ileus and likely some misdiagnosis [9]. With electronic medical records, national databases, and improvement in radiologic technology we are now able to base surgical recommendations on data obtained from a much larger sample.

A study published in 2013 comparing four operative approaches to gallstone ileus, including enterolithotomy, enterolithotomy and cholecystectomy/fistula closure, bowel resection, and bowel resection with closure, discovered that enterolithotomy alone decreases mortality even after adjusting for comorbid conditions [3].

The current standard for straight forward gallstone ileus is enterolithotomy alone. Fistula closure can be justified only in selected patients in good condition and those able to withstand longer operations. Delayed cholecystectomy is only clearly justified in those who have persistent biliary symptoms after the resolution of the ileus [3].

CONCLUSION

No standard surgical approach exists to a patient with concurrent gallstone ileus and Meckel's diverticulitis. However, the primary objective in straight forward gallstone ileus is to relieve the obstruction via enterolithotomy alone. An attempt to take down the cholecystenteric fistula can only be justified in stable patients. Meckel's diverticuli should be resected with primary small bowel anastomosis when acutely inflamed, and should generally be left in situ when discovered incidentally and especially in older patients.

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Author Contributions

Mitchell Andrew Goettman – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published
Bilal Kharbutli – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

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Consent Statement

Written informed consent was obtained from the patient for publication of this case report.

Conflict of Interest

Authors declare no conflict of interest.