

Endoscopic Electrohydraulic Lithotripsy for Large Bowel Obstruction Secondary to Colonic Gallstone Impaction

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ABSTRACT

Large bowel obstruction secondary to colonic gallstone impaction is rare. We report an elderly patient who presented with colonic obstruction secondary to impaction of a gallstone in a diverticular segment of his sigmoid colon. He had severe comorbidities that precluded surgery, and it was not possible to remove the gallstone using standard endoscopic techniques. Endoscopic electrohydraulic lithotripsy (EHL) was performed to fracture the gallstone, and fragments were successfully removed. For comorbid patients who are not fit for general anesthesia, endoscopic stone retrieval should be considered. When faced with large or impacted stones, EHL can be utilized to fracture the stone.

INTRODUCTION

Colonic gallstone ileus is a rarely reported disease of the elderly. Colonic obstruction secondary to gallstones represents 2–8% of all cases of gallstone ileus.¹ This condition is historically managed with surgery; however, recent advances in endoscopy may permit endoscopic stone retrieval. We present a method of endoscopic stone removal using endoscopic electrohydraulic lithotripsy (EHL). EHL is typically used in the setting of endoscopic retrograde cholangiopancreatography (ERCP) to fracture large stones that cannot be grasped endoscopically into smaller fragments. EHL should be considered when surgery is contraindicated and endoscopic attempts at removal with a grasper have failed.

CASE REPORT

A 94-year-old man presented with a 7-day history of colicky lower abdominal pain and distension. The patient had multiple comorbidities, including chronic obstructive pulmonary disease, type 2 diabetes, and ischemic heart disease. The patient was assessed as being high-risk for a potential laparotomy and large bowel resection, with a Portsmouth Physiological and Operative Severity Score for Enumeration of Mortality and Morbidity (P-POSSUM) score predicting morbidity and mortality of 97.3% and 53.9%, respectively. His abdominal radiograph revealed a dilated large bowel, an incompetent ileocecal valve, and subsequent small bowel dilatation. There was no evidence of pneumobilia (Figure 1).

A provisional diagnosis of large bowel obstruction was made. An abdominal/pelvic computed tomography (CT) scan revealed pneumobilia and a cholecystocolic fistula (Figure 2). No residual gallstones were identified in the

ACG Case Rep J 2018;5:e33. doi:10.14309/crj.2018.33. Published online: May 9, 2018.

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Figure 1. Abdominal radiograph showing dilated large bowel (top) and dilated small bowel (bottom).

gallbladder. Large bowel obstruction was noted secondary to an impacted gallstone in the sigmoid colon. There was no evidence of bowel perforation.

Given the patient's comorbidities, it was felt that he was only suitable for endoscopic treatment. The gallstone was visualized via flexible sigmoidoscopy and several attempts were made to grasp and snare the gallstone. A small amount of

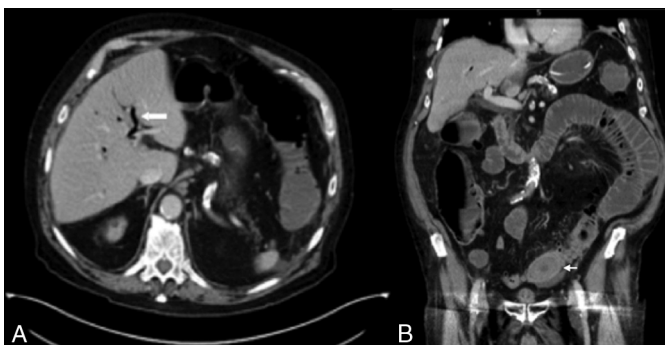


Figure 2. (A) Axial image showing the presence of pneumobilia. (B) Coronal image demonstrating the presence of a cholecystocolic fistula and large bowel obstruction secondary to an impacted gallstone in the sigmoid colon.

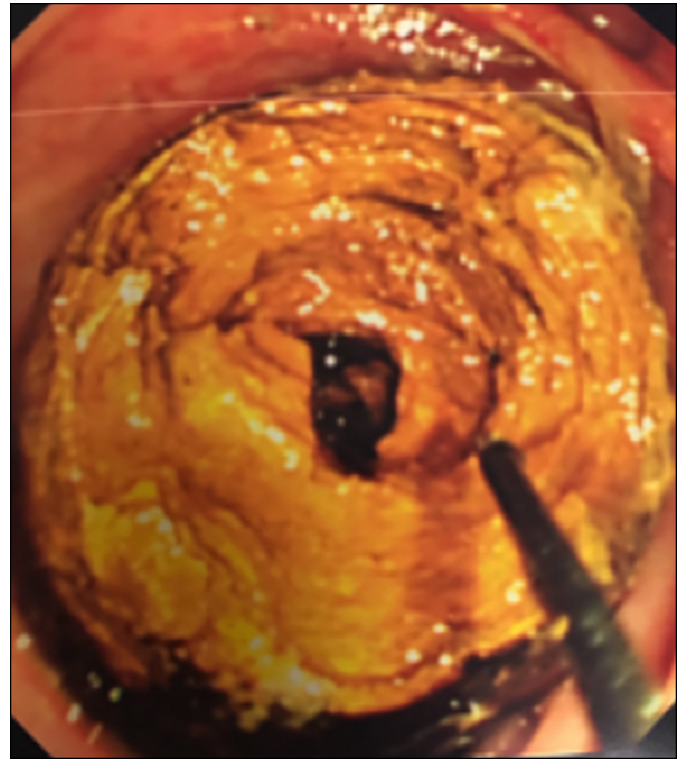


Figure 3. Endoscopic visualization of the colonic gallstone.

fragmentation was achieved, but the gallstone remained impacted in the sigmoid colon. It was determined that retrieval was not possible due to the size of the gallstone (Figure 3). After a multidisciplinary discussion, it was decided that the benefits of an attempted EHL outweighed the risks of laparotomy.

The gallstone was visualized with a colonoscope, and EHL (Northgate Technologies, Inc., Elgin, Illinois) was used to bore through the stone. The EHL probe was passed through a standard ERCP cannula to protect it. The colon was irrigated with normal saline to allow transmission of the shock wave generated by the high-energy spark between the two electrodes of the probe. The stone fractured, and the disimpacted remnants of the stone were removed endoscopically. Upon visualization of the transverse colon, the colonic mucosa appeared inflamed, but there were no complications such as perforation or hemorrhage after EHL (Figure 4).

Following the procedure, the patient passed flatus per rectum. He reported an immediate improvement in his symptoms, and his abdominal distension resolved. Over the next 24 hours, the patient passed feces per rectum, and his symptoms of nausea and vomiting ceased. He required physiotherapy and rehabilitation prior to discharge. With regard to the cholecystocolic fistula, a multidisciplinary discussion was undertaken to identify an appropriate management strategy. The patient's previous CT scan did not identify any residual

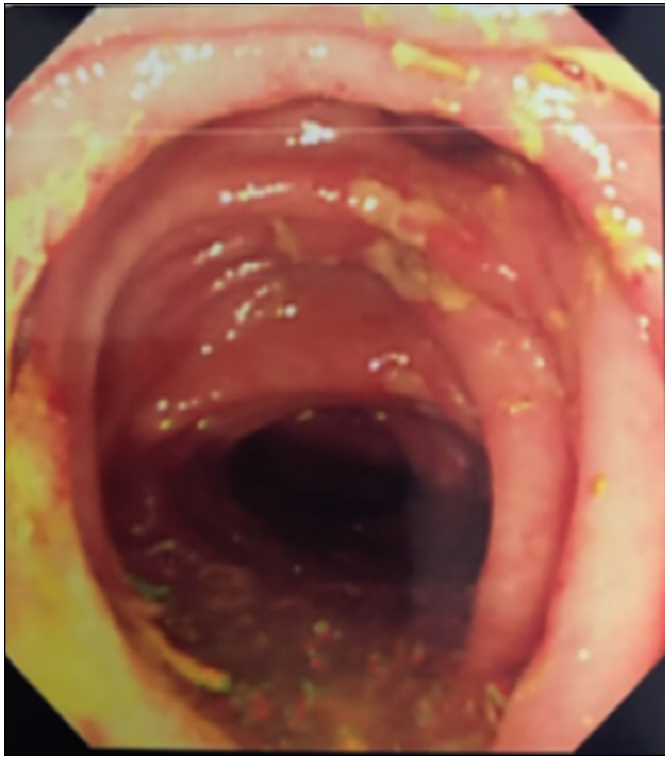


Figure 4. Endoscopic visualization following electrohydraulic lithotripsy.

gallstones within the gallbladder. In light of the patient's significant comorbidities and high anesthetic risk, he was determined to be an unsuitable candidate for surgery.

DISCUSSION

Large bowel obstruction frequently occurs due to intraluminal obstruction secondary to colorectal adenocarcinoma or diverticular stricture. Gallstone ileus is an uncommon cause of small bowel obstruction, with a reported incidence of less than 3% of all cases of small bowel obstruction.² The underlying pathology occurs in patients with gallstones. Frequent episodes of cholecystitis induce a chronic inflammatory disease process.³ The combination of chronic inflammation and the pressure effect of the gallstone on the gallbladder wall predisposes to cholecysto-duodenal fistula formation, which can lead to subsequent migration of gallstones into the small bowel.⁴ Large bowel obstruction secondary to gallstone impaction within the colon is a rare cause of large bowel obstruction, with a reported incidence of 2-8% of the literature.^{2,5}

Several different surgical treatment approaches have been described, ranging from enterotomy and stone removal to a formal Hartmann's procedure.^{5,6} Controversy remains around the management of the fistula. It has been argued that a one-stage procedure (stone removal and resection of fistula) should be undertaken to prevent further episodes of

obstruction.² This combined procedure, however, is associated with significant morbidity. A large case series of gallstone ileus highlighted that the morbidity accompanying a one-stage procedure was 16.9%, compared to a morbidity rate of 11.7% for enterolithotomy alone.¹ In patients managed with enterolithotomy, a recurrence rate of bowel obstruction of 5% was documented.¹ One can argue that the additional morbidity burden of fistula management in the acute setting is ill-advised.

Both of these treatment strategies entail a general anesthetic and the physiological impact associated with a surgical operation. This means that patients who are elderly and/or have multiple comorbidities may not be suitable candidates for surgical intervention.⁷ Our patient had severe comorbidities and therefore was a significant anesthetic risk. It was decided that surgery was not a safe or feasible treatment option. This is a common scenario for patients who develop gallstone or colonic ileus. The literature acknowledges that colonic gallstone ileus is a disease of the elderly.³ These patients often have a variety of medical comorbidities ranging from cardiovascular, endocrine, and concurrent respiratory disease.³ High postoperative morbidity and 30-day mortality of 25% have been reported in this patient demographic, likely due to delays in diagnosis and postoperative complications secondary to pre-existing medical conditions.⁷

The clinical team must decide whether active treatment should be pursued or if a palliative approach is required. In light of the morbidity associated with available treatment strategies, there has been a recent focus on less invasive treatment options to manage colonic gallstone ileus. This varies from laparoscopic assisted enterolithotomy to endoscopic stone removal. Endoscopic management has several advantages, including avoidance of general anesthesia and minimal physiological impact.

In our case, the gallstone was too large for endoscopic removal, even after attempted mechanical lithotripsy. We utilized EHL to fracture the stone, and the fragments were then removed endoscopically. This technique has only been described in limited individual case reports in the literature.⁸

In the context of an elderly comorbid patient with a gallstone colonic ileus who would not survive general anesthesia or surgical intervention, endoscopic stone removal should be considered. Large stones can be fractured with EHL. This technique has shown preliminary high success rates and low morbidity.

DISCLOSURES

Author contributions: All authors contributed equally to the manuscript. AJ Portal is the article guarantor.

Financial disclosure: None to report.

Informed consent was obtained for this case report.

Received October 16, 2017; Accepted March 23, 2018

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