

Impacted gallstone within a cholecystoduodenal fistula: endoscopic laser lithotripsy to the rescue

Jesse Hartpence, DO,¹ Jeremy Barber, DO,² Eric Nguyen, MD, JD³



We share here the case of a 67-year-old man who presented to the emergency department for evaluation of bloating, chills, and dyspepsia for 2 weeks. He was admitted 3 years earlier for similar symptoms, attributed to symptomatic cholelithiasis. Because his symptoms resolved, elective cholecystectomy was not pursued at that time. A CT scan on admission demonstrated pneumobilia with a large stone within the gallbladder and the question of emphysematous cholecystitis versus biliary enteric fistula (Fig. 1). Due to symptom improvement on antibiotics, he was discharged but returned after MRCP showed choledocholithiasis with bile duct enhancement, previously seen 3.5 cm stone in the gallbladder body, and pneumobilia concerning for a cholecystoduodenal fistula. Because of concerns for cholangitis, GI service was consulted for endoscopic management. EUS assisted delineation of biliary anatomy and was followed by ERCP with removal of purulent debris and 3 stones with a 9- to 12-mm extraction balloon followed by placement of a 10F × 7-cm plastic biliary stent.

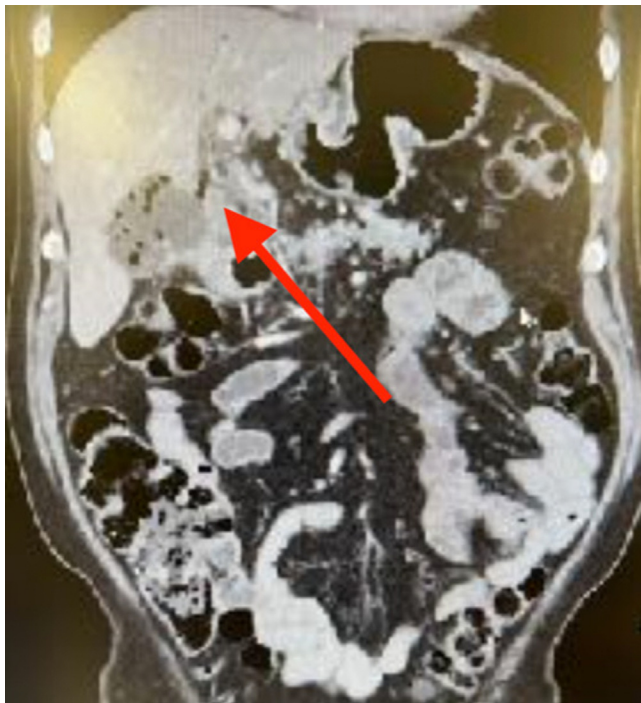


Figure 1. Coronal cut of initial CT scan demonstrating pneumobilia involving the gallbladder lumen and common hepatic duct.



Figure 2. Initial view of the impacted gallstone penetrating the wall of the duodenal bulb after the bilious coating was washed away.

Upon withdrawal of the duodenoscope, a cholecystoduodenal fistula was visible with a large, impacted gallstone penetrating the wall of the duodenal bulb (Fig. 2). A sterile saline rinse was infused into the duodenal bulb followed by electrohydraulic lithotripsy (EHL) with the probe inserted through the biopsy channel of the EGD scope at medium power, 10 pulses per activation. After numerous attempts, the stone started to fracture but remained impacted. A second endoscopic evaluation with EHL was performed the following day with removal of only 20% of the stone despite delivering 12,500 EHL pulses. A third attempt at EHL was made 2 weeks later with a total of 16,000 EHL pulses requiring 7 lithotripsy probes over 2.75 hours (Video 1, available online at www.giejournal.org). Three weeks later, dual holmium:yttrium-aluminum-garnet (YAG) laser lithotripsy was performed with neodymium-doped YAG at continuous power of 40 watts with a total of 2.76 joules used and holmium set at 2 joules at a rate of 40 pulses per second with 90% of the stone removed (Figs. 3 and 4). Several weeks later, he presented to the emergency department with severe abdominal pain and GI bleeding after being asymptomatic between the initial procedures. A CT scan was concerning for distal small-bowel obstruction. He underwent EGD, revealing a clean-based ulcer at the fistulous site (Fig. 5), suspicious for gallstone ileus, which eventually resolved with conservative management. Ultimately, surgical intervention



Figure 3. A large-cratered defect near the center of the impacted gallstone following endoscopic laser lithotripsy with the holmium:yttrium-aluminum-garnet laser.



Figure 4. A large fragment was fractured using laser lithotripsy and obtained with a retrieval net.

was not pursued because of the concern that a traditional cholecystectomy would not be adequate treatment owing to the presence of the fistula. Endoscopic closure of the fistula was not attempted because it was open and draining with concern for residual stone burden. In this case, endoscopic therapy was attempted to remove the impacted gallstone to prevent gallstone ileus, cholecystitis, and future episodes of cholangitis.

A cholecystoduodenal fistula is a type of biliary enteric fistula that is an uncommon adverse event of cholelithiasis. In the presence of cholelithiasis, pressure exerted from a

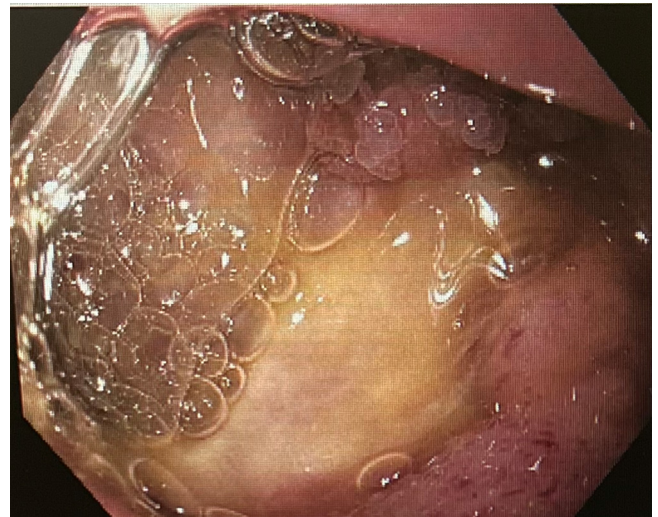


Figure 5. Ulcerated base at the site of the cholecystoduodenal fistula after gallstone ileus developed.

stone weakens and erodes the biliary wall, leading to a fistulous connection between the 2 organs.¹

Gallstone ileus is a potential adverse event from the aforementioned fistula creation, where passage and impaction of a large gallstone at almost any point in the gastrointestinal tract results in mechanical obstruction. The most common location of obstruction is in the ileum, less frequently occurring in the stomach or duodenum causing gastric outlet obstruction known as Bouveret syndrome.^{2,3}

After several tedious attempts with EHL, laser lithotripsy was chosen to reduce the number of repeat interventions. Endoscopy was performed with general anesthesia without the use of antibiotics. The holmium:YAG laser is a pulsed, solid state one that focuses light of a high-power density on a stone surface, creating an oscillating plasma bubble that fractures the stone with a shock wave.⁴ Since the mid-1990s, several research articles have explored the use of a holmium laser as an alternative for complex choledocholithiasis cases, but few have used this for impacted gallstones or Bouveret syndrome. This was a novel use of this device at our institution, previously used by interventional pulmonology. Although it proved efficacious, unfortunately the patient developed small-bowel obstruction felt to be indicative of gallstone ileus.

DISCLOSURE

Dr Barber is a consultant for Boston Scientific and Pentax. All other authors disclosed no financial relationships.

Abbreviations: EHL, electrohydraulic lithotripsy; YAG, yttrium aluminum garnet.

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McLaren Greater Lansing Medical Center, Lansing, Michigan (1), Spectrum Health, Grand Rapids, Michigan (2), McLaren Greater Lansing Medical Center, Lansing, Michigan (3).

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<https://doi.org/10.1016/j.vgie.2022.08.023>

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