



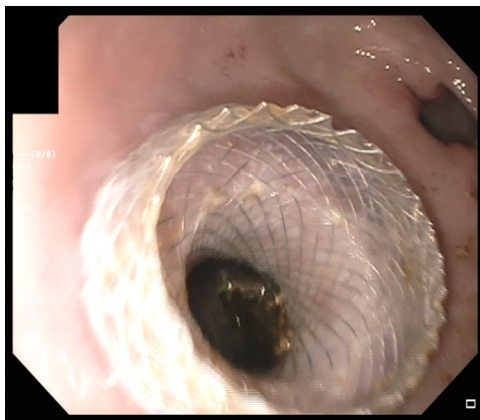
## Successful minimally invasive management of adverse events following EUS-guided gallbladder drainage in a suboptimal surgical patient

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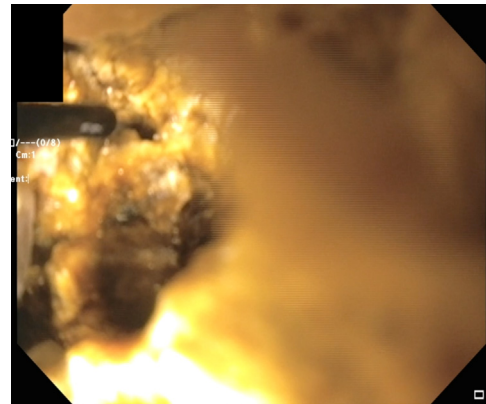
Endoscopic ultrasound guided gallbladder drainage (EUS-GB) is increasingly being used for patients who cannot undergo a cholecystectomy.<sup>1,2</sup> However, the procedure can be associated with adverse events, including pneumoperitoneum, biliary peritonitis, and perforation.<sup>3</sup> We present a case in which 2 adverse events—cholecystogastrostomy tract disruption and gallbladder wall perforation—were successfully treated with endoscopic interventions (Video 1, available online at [www.giejournal.org](http://www.giejournal.org)).

A 44-year-old woman with a prior right hemicolectomy and postoperative course complicated by chronic pain and opioid dependence presented with several months of intermittent right upper quadrant pain. Abdominal ultrasound showed cholelithiasis. The patient was offered a cholecystectomy, but given her previous postoperative opioid dependence, she refused. After a multidisciplinary discussion with surgery, the decision was made to pursue EUS-GB. The patient was aware that this would likely require multiple interventions and enthusiastically agreed to proceed.

A 15-mm AXIOS (Boston Scientific, Marlborough, Mass, USA) lumen-apposing metal stent was deployed with its distal flange in the gallbladder and its proximal end in the gastric antrum (Fig. 1). A transgastric approach was chosen per discussions with our surgeons in case a



**Figure 1.** A 15-mm AXIOS (Boston Scientific, Marlborough, Mass, USA) lumen-apposing metal stent deployed between gastric antrum and gallbladder as viewed from the stomach.

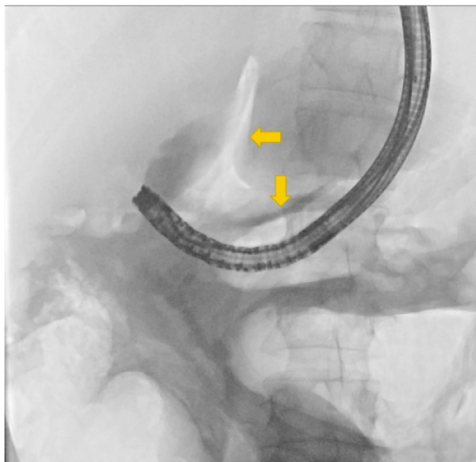


**Figure 2.** Electrohydraulic lithotripsy being performed through the new cholecystogastrostomy fistula tract.

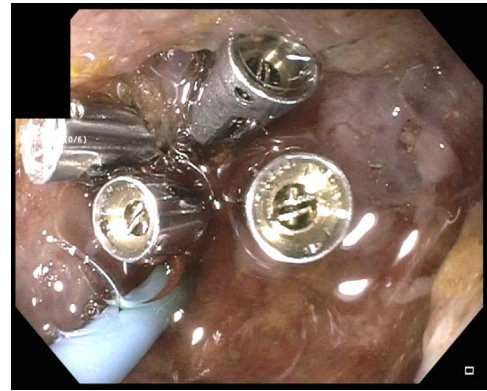
subsequent completion cholecystectomy was required. One month later, the patient underwent electrohydraulic laser lithotripsy (Fig. 2). Several stones were removed, but because of the extent of cholelithiasis, 2 double-pigtail stents were placed in the tract and she returned 2 weeks later for further treatment.

During a third endoscopy, the cholecystogastrostomy fistula tract was dilated to 15 mm with a 12- to 15-mm balloon. Holmium laser lithotripsy was performed, and several stone fragments were removed from the gallbladder via the fistula tract. Increased abdominal distension was noted, and fluoroscopy revealed contrast extravasation from the cholecystogastrostomy tract (Fig. 3). Further stone removal was deferred and a 20-mm AXIOS stent was placed within the tract. Injection of contrast under fluoroscopy confirmed lack of extravasation from the gallbladder, and abdominal distention improved.

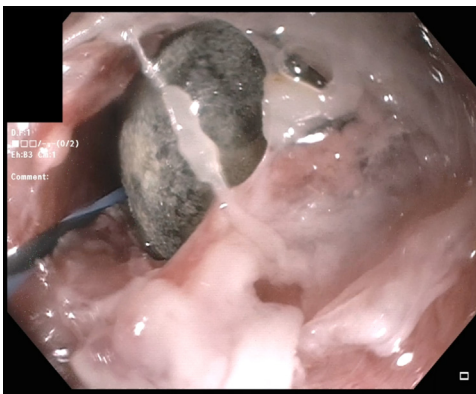
Two weeks later, the AXIOS stent was removed, revealing a healed tract, and the remaining stones were removed from the gallbladder body. A separate large stone was found in the gallbladder neck (Fig. 4). Water irrigation was used to move the stone into the gallbladder body. Lithotripsy was performed using short bursts of laser thermal energy while maintaining visualization of the proximal end of the stone fragments. After stone removal, a 1-mm perforation was seen in the gallbladder neck (Fig. 5). The case was



**Figure 3.** Fluoroscopy showing extravasation of contrast from the cholecystogastrostomy fistula tract.



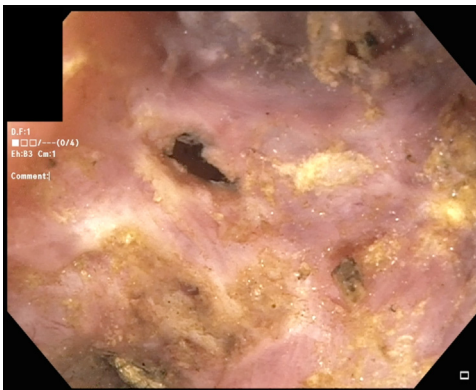
**Figure 6.** Four endoscopic clips were deployed in the gallbladder and closed the perforation.



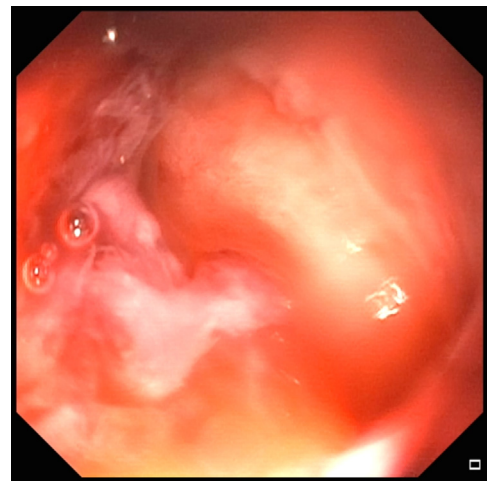
**Figure 4.** A large stone visualized in the gallbladder neck.



**Figure 7.** Fluoroscopy after placement of the endoscopic clips showed no contrast extravasation.



**Figure 5.** A 1-mm perforation in the neck of the gallbladder.



**Figure 8.** Three months later, the endoscopic clips were able to be removed, revealing a healed gallbladder wall.

discussed with the surgical team intraoperatively, and it was decided that endoscopic clip closure would be a reasonable intervention. Four endoscopic clips were placed with complete closure of the perforation (Fig. 6). Fluoroscopy showed no contrast extravasation (Fig. 7). The patient was admitted for observation and was discharged the following day on ciprofloxacin and metronidazole. During an endoscopy 3 months later, all endoscopic clips were removed, revealing a healed gallbladder wall (Fig. 8). Repeat fluoroscopy confirmed lack of extravasation from the gallbladder.

EUS-GB is an option to treat cholecystitis and cholelithiasis for those who are unable to tolerate a surgical approach. A 2019 meta-analysis by Mohan et al<sup>4</sup> showed that the most common adverse events associated with EUS-GB include bleeding, stent occlusion/migration, and perforation. In this case, the cholecystogastrostomy tract was disrupted during either dilation or stone removal, and the gallbladder wall was perforated by the rapid movement of sharp stone fragments post-lithotripsy. There was also a potential for cautery-related injury given transient loss of visualization during stone fragmentation.

The cholecystogastrostomy tract disruption was treated with AXIOS stent placement. Meanwhile, the gallbladder perforation was treated with endoscopic clips. This technique has been previously described in the literature but with the addition of cyanoacrylate glue.<sup>5</sup> This case shows that endoscopic clips alone can close a gallbladder wall defect, and how after healing, these clips can be removed.

## DISCLOSURE

*All authors disclosed no financial relationships.*

*Abbreviation: EUS-GB, EUS-guided gallbladder drainage.*

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