Balloon overtube-assisted cholangioscopy and laser lithotripsy of large bile duct stones

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ERCP in patients with surgically altered anatomy continues to be challenging. In patients with Roux-en-Y reconstruction, the target site is difficult to reach; the success rates are reported to be as low as 60%.[1] The use of balloon-assisted enteroscopy (BAE) has improved the success rate of ERCP in patients with surgically altered anatomy.[2] The reported success rates of ERCP with BAE range from 64.1% to 98%.[3-7]

In this video, we describe successful balloon overtube-assisted ERCP with single-operator cholangioscopy, laser lithotripsy, and stent placement in a patient with surgically altered anatomy (Video 1, available online at www.VideoGIE.org). An 86-year-old woman with a history of gastric cancer, earlier distal gastrectomy with Roux-en-Y reconstruction, bilateral deep venous thrombosis of the lower limbs with inferior vena cava filter, atrial fibrillation, hypertension, diabetes mellitus type II, and GERD presented with abdominal pain, jaundice, and leukocytosis. A CT scan demonstrated multiple large bile duct stones.

All options for intervention, including enteroscopy-assisted ERCP, surgery, percutaneous drainage, and EUS-guided drainage, were discussed with the patient. She was deemed a poor candidate for surgical intervention or percutaneous intervention. EUS-guided drainage is an accepted alternative for biliary drainage in patients with long-limb anatomy, depending on available expertise. However, given the rate of adverse events with EUS-guided hepaticogastrostomy, we reserve this technique as a salvage therapy if enteroscopy is unsuccessful.[8-11]

After obtaining the patient's informed consent, we elected to perform double-balloon ERCP. Lithotripsy through a colonoscope has previously been reported in long-limb anatomy.[12] In this case, an initial attempt with a colonoscope was unsuccessful because of extensive diverticulosis of the small intestine causing sharp angulations in the bowel. There are also previous video case reports on the use of spiral enteroscopy as a conduit for metal stent placement[13] and double-balloon–assisted ERCP with direct cholangioscopy and electrohydraulic lithotripsy.[14] Although our video demonstrates similar techniques, our case is unique in that we used laser lithotripsy and a commercially available single-operator cholangioscope, along with placement of a 10F plastic stent directly through the balloon overtube.

The native papilla was reached by use of a double-balloon enteroscope (EN-450T5; Fujinon, Tokyo, Japan). The double-balloon overtube was not modified and had a diameter of 16 mm and a length of 1350 mm (TS-13149; Fujifilm, Tokyo, Japan). Cannulation of the bile duct was achieved with a Cotton Cannulatome (6-5F × 320 cm; Cook Medical Inc, Bloomington, Ind) and a 600-cm guidewire (Metro Wire; Cook Medical). A cholangiogram demonstrated multiple large filling defects in the bile duct, measuring up to 2 centimeters (Fig. 1A). A 7F stent was placed because of a concern for cholangitis, and a needle-knife sphincterotomy was performed with the stent in place to aid in future access (Fig. 1B).

Two months later, the patient returned for single-balloon ERCP for stone extraction. Single-balloon enteroscopy was

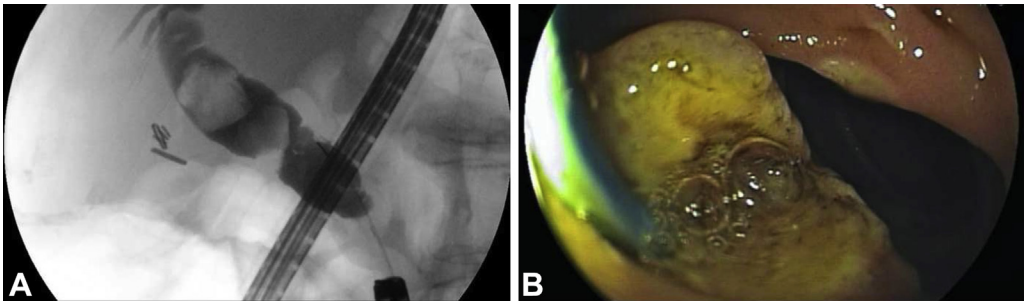

Figure 1. A, Initial cholangiogram demonstrating multiple large filling defects in the bile duct measuring up to 2 cm. **B,** 7F stent placement and needle-knife sphincterotomy.

Written transcript of the video audio is available online at www.VideoGIE.org.

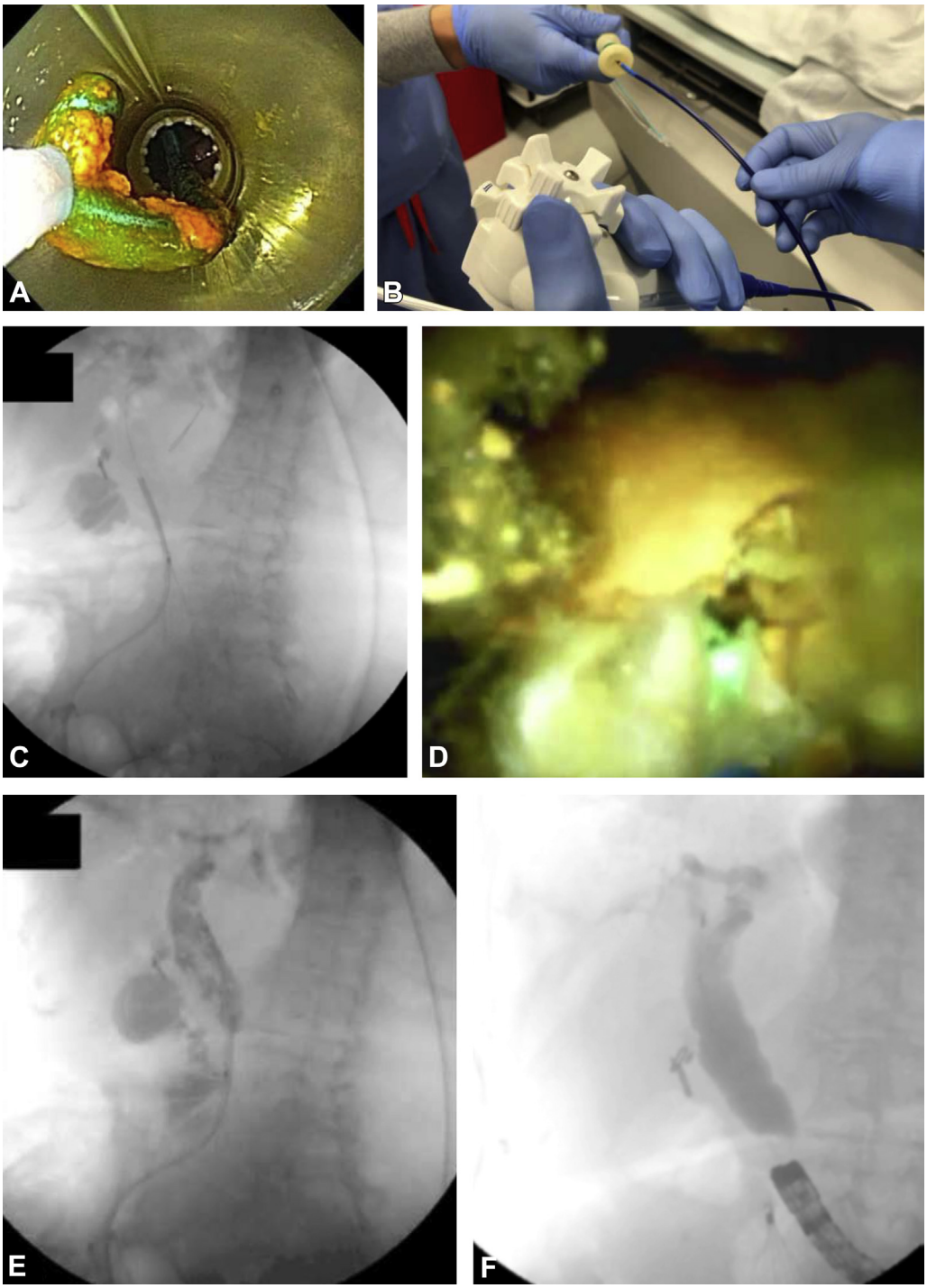

Figure 2. A, Stent removal through the overtube. **B,** Single-operator cholangioscope being advanced over the guidewire directly into the overtube. **C,** Cholangioscope in bile duct. **D,** Cholangioscopic view of a large bile duct stone during laser lithotripsy. **E,** Cholangiography demonstrating complete stone fragmentation after lithotripsy. **F,** Follow-up cholangiogram showing that no filling defects are seen.

chosen over double-balloon to allow for removal of the endoscope through the overtube (Fig. 2A). The single-balloon overtube was not modified and had an outer diameter of 13.2 mm and a total length of 1400 mm (ST-SB1; Olympus Corp, Tokyo, Japan). The major papilla was reached with the single-balloon enteroscope (SIF-Q180; Olympus), and the stent was removed through the overtube. The endoscope was replaced to its position in the duodenum through the overtube, and guidewire access of the bile duct was obtained. The papilla was dilated to 15 mm with a controlled radial expansion

balloon; however, this alone did not allow for extraction of the large stones. The endoscope was then removed from the overtube while the guidewire was left in place in the bile duct. The Spyglass DS digital cholangioscope (Boston Scientific, Marlborough, Mass) was advanced through the overtube, over the guidewire, directly into the bile duct (Figs. 2B and C). Extensive laser lithotripsy was performed at a power setting of 1.2 joules and 10 hertz for 12 watts of power (Fig. 2D) by use of a Holmium laser (VeraPulse P20; Lumenis Ltd, Yokneam, Israel). Owing to the inherent challenges of removing stones with an enteroscope, the goal was for complete stone fragmentation to simplify the extraction process (Fig. 2E). After fragmentation, stone fragments were subsequently removed by use of an extraction balloon (Multi-3V plus; Olympus). A plastic stent was placed over the guidewire under direct fluoroscopic guidance through the overtube without the use of an endoscope. This allowed for placement of a 10F stent, which otherwise would not fit through the channel of an enteroscope.

After 3 months, repeated single-balloon ERCP was performed to clear the bile duct of all stones. No stone fragments were seen on the cholangiogram, suggesting that any remaining fragments had passed spontaneously (Fig. 2F). Several balloon sweeps were performed and confirmed complete clearance of the bile duct. The time to reach the papilla for each procedure was 15 to 20 minutes, and the total procedure time ranged from 1 hour to 3 hours. At her 3-month follow-up visit, the patient had normal liver test results and no abdominal pain.

ERCP in surgically altered anatomy is challenging. However, large bile duct stones can be successfully managed with balloon enteroscopy-assisted ERCP. Use of the balloon overtube allows for direct cholangioscopy over a guidewire allowing for intraductal lithotripsy to be performed.

DISCLOSURE

All authors disclosed no financial relationships relevant to this publication.

Abbreviation: BAE, balloon-assisted enteroscopy.

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