

# Endoscopic Ultrasound-Guided Gastrojejunostomy and Rescue Technique to Simplify Endoscopic Retrograde Cholangiopancreatography in Surgically Altered Anatomy

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## ABSTRACT

Patients with surgically altered gastrointestinal anatomy are susceptible to gallstone disease and anastomotic strictures. In such cases, enteroscopy-assisted endoscopic retrograde cholangiopancreatography (ERCP) is traditionally used to access the biliary system through the Roux limb, with suboptimal success rates. With the advent of endoscopic ultrasound (EUS) and therapeutic tools including lumen-apposing metal stents, access to the biliary system in surgically altered anatomy has been made simpler. We report a case of EUS-guided transenteric ERCP done in a patient with surgically altered anatomy and a rescue technique for difficult gastrojejunal anastomosis creation.

## INTRODUCTION

Traditional access to the biliary tree in surgically altered anatomy has required either percutaneous or device-assisted endoscopic retrograde cholangiopancreatography (ERCP). Device-assisted ERCP is associated with suboptimal success rates between 50% and 70%.<sup>1</sup> Furthermore, dedicated instruments available for altered anatomy ERCP limit the ability to perform effective interventions. Percutaneous transhepatic biliary drainage (PTBD) is an effective drainage technique when ERCP fails but carries high adverse event rates ranging from 13% to 60%.<sup>2,3</sup> PTBD has several disadvantages including risk of accidental dislodgement of the external tube, recurrent infections, decreased quality of life, and high hospital readmission rates of up to 64%.<sup>4</sup> Endoscopic ultrasound (EUS)-guided drainage is becoming increasingly popular because of its minimal invasive nature. It is widely used as an effective treatment modality for EUS-guided drainage of the biliary system (EUS-BD) after failed ERCP and for management of pancreatic fluid collections.<sup>5-7</sup> The availability of the electrocautery-enhanced lumen-apposing metal stent (ECE-LAMS) (AXIOS; Boston Scientific, Marlborough, MA) has allowed single-step puncture, without the need for wire exchange. Novel endoscopic concepts have emerged, including EUS-directed *transgastric* ERCP (EDGE) where a novel connection is made between the gastric pouch and remnant stomach after gastric bypass to permit traditional duodenoscopic access to the papilla for ERCP. More recently, *transenteric* ERCP (EDEE) is an alternative to enteroscopy-assisted ERCP and PTBD in patients with surgically altered small bowel anatomy including hepaticojejunostomy after liver transplant or other hepatobiliary surgery.

## CASE REPORT

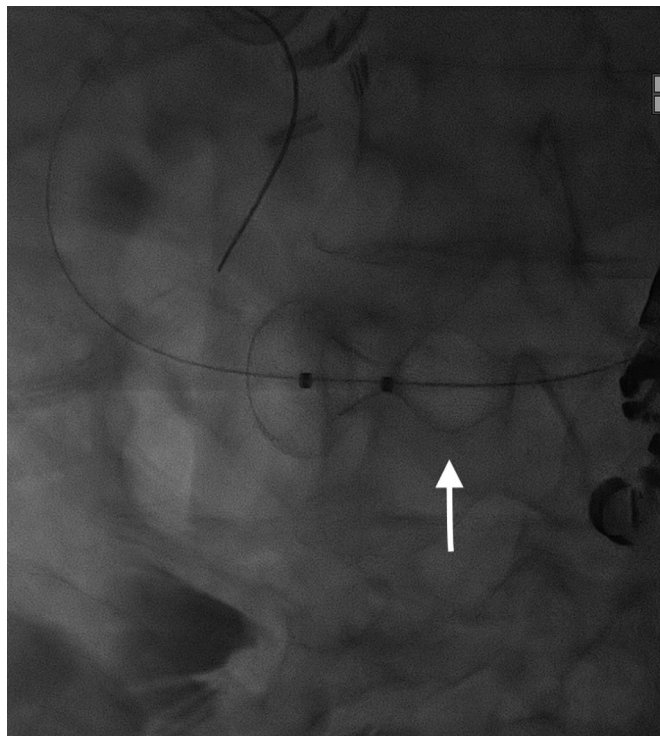
A 78-year-old woman presented with recurrent cholangitis secondary to anastomotic stricture in the setting of Roux-En-Y hepaticojejunostomy (separate right and left anastomoses) with extrahepatic ductal resection and cholecystectomy for type II biliary cyst in 2010. She experienced multiple failed enteroscopy-assisted ERCPs because of difficult surgical anatomy, leading to insertion of bilateral percutaneous biliary drains. These were complicated by frequent migration, occlusion, and leakage requiring more than 25 procedures to manage these issues.



**Figure 1.** Transgastric EUS-guided targeting of the contrast filled segment of small bowel near the choledochojejunal anastomoses. EUS, endoscopic ultrasound.

After multidisciplinary and patient discussion, a staged EUS-directed transenteric ERCP (EDEE) was pursued. First, a EUS-guided 15 mm LAMS was placed through the gastric antrum into the pancreaticobiliary limb targeting localizing contrast injected into the small bowel through the percutaneous drains (Figure 1). The gastric flange was malpositioned inside the gastric wall likely because the stent was slightly too short for the intended gastrojejunal tract (Figure 2). This was rescued by placing a longer 10 mm by 6 cm covered metal stent (Viabil; W.L. Gore, Flagstaff, AZ) coaxial to the AXIOS stent (Figure 3). The stents were left for 4 weeks to allow tract maturation.

At the subsequent procedure, the existing metal stents were removed, and a 20 mm × 6 cm fully covered metal through-the-scope stent (Taewoong Medical, Gyeonggi-do, South Korea) was placed through the matured gastrojejunal tract to maintain patency for repeat endoscopic access to the biliary anastomoses (Figure 4). This stent was balloon dilated to 20 mm, allowing immediate access to the hepaticojejunal anastomoses through which two 10 French plastic biliary stents were placed with a therapeutic gastroscope after percutaneous drain removal (Figure 5). The fully covered metal stent was left in situ and secured with endoscopic sutures to prevent early migration of the stent and to ensure easy access for future stent exchanges. Two subsequent biliary stent exchange procedures at 3 and 6 months were performed using this convenient gastrojejunal access to the Roux limb. At 6 months, the biliary stents were removed, and the covered metal gastrojejunostomy stent was



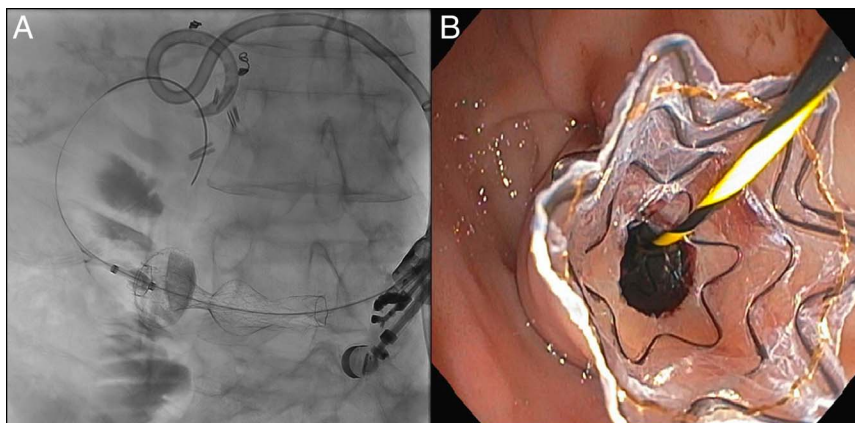
**Figure 2.** Maldeployment of the AXIOS stent with the proximal flange deployed in the gastric wall. Note the difference between the fully deployed flange toward the left of the image, with a nondeployed flange to the right (arrow).

removed and replaced with two 7 French by 4 cm plastic pigtail stents to maintain the gastrojejunostomy tract for future access to the Roux limb as needed.

## DISCUSSION

Endoscopic access and successful cannulation of the papilla or biliary anastomosis can be cumbersome in patients with surgically altered anatomy. EDGE and EDEE are innovative techniques that involve de novo creation of a transgastric or transenteric fistula to access the Roux limb for the management of pancreaticobiliary diseases in patients with Roux-en-Y gastric bypass (RYGB).<sup>8,9</sup> A recently published, multicenter retrospective study demonstrated high technical and clinical success (94.4%) of EDEE with a LAMS in 18 patients with complex *non-RYGB* surgical anatomy and complex hepatopancreaticobiliary diseases.<sup>10</sup> It is noteworthy that Ichkhanian et al reported technical feasibility of single session EDEE, followed by ERCP, most commonly using FNA needle puncture of the Roux limb with filling of saline or contrast as a target for EUS-guided LAMS deployment. This highlights the potential practicability of single session hepatobiliary interventions in urgent cases.

Our case demonstrates a modified EDEE procedure involving EUS-guided gastrojejunostomy and placement of a transenteric LAMS in a patient with previous hepaticojejunostomy with the

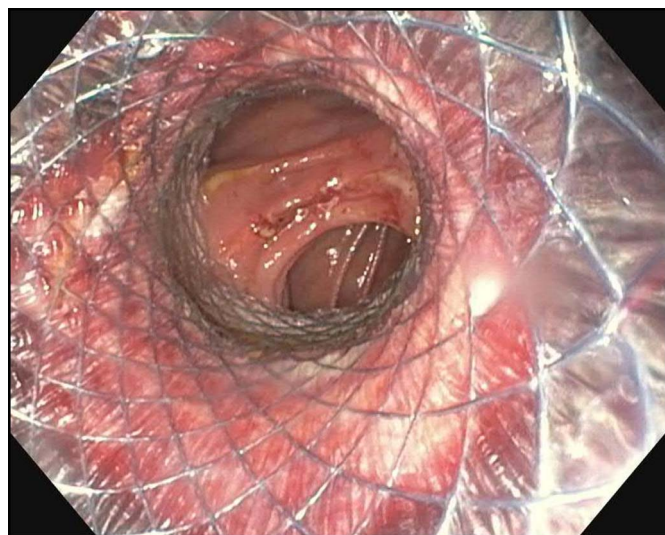


**Figure 3.** (A) Placement of a coaxial covered metal biliary stent to rescue the maldeployed lumen-apposing metal stent. (B) Covered metal stent used for rescue of the maldeployed lumen-apposing metal stent as seen from the stomach.

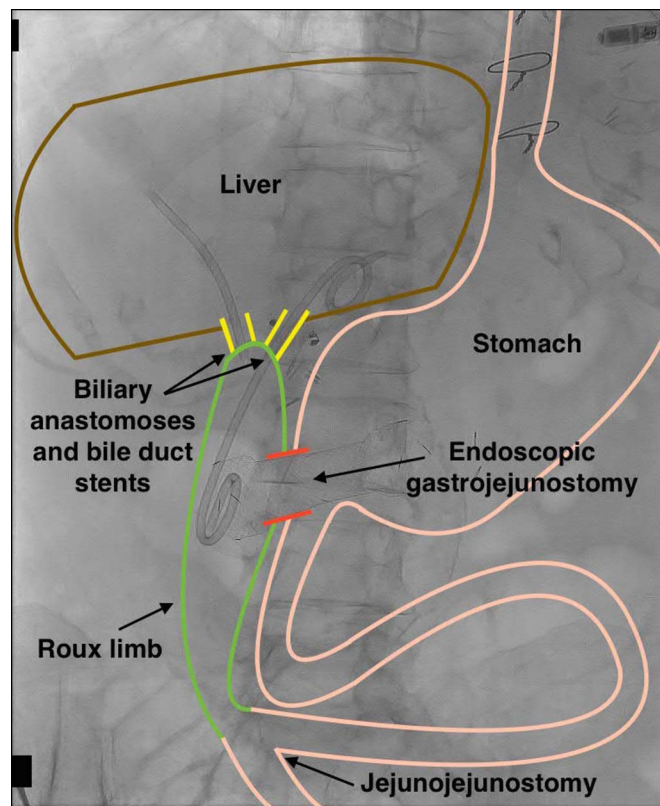
additional benefit of describing a successful rescue technique using a longer antimigration coaxial biliary stent when the LAMS was too short to successfully form the de novo gastrojejunostomy. The creation of a gastroenteric fistula allowed simple and direct access to the biliary anastomoses and internalization of her previously percutaneous biliary drainage. It is important to note that LAMS is currently approved by the FDA only for the treatment of pancreatic pseudocysts. Therefore, EUS-guided gastroenterostomy using a LAMS remains an off-label use of the LAMS.

A 15 mm diameter AXIOS stent was selected over the 10-mm stent to allow successful passage of a therapeutic channel gastroscopy through the LAMS. This is advantageous because it allowed ERCP to be performed with more standard instruments including larger 10 French stents, noting that only 7 French stents and catheters can be deployed through a device-assisted

enteroscope. Currently available LAMSs are 10 mm in length, although ideally longer LAMSs will be made available and would have been preferred in this case. The anticipated need for long-term repeat bile duct stenting makes EDEE attractive for a patient with surgically altered anatomy. Other perceived advantages of EDEE in our patient include reduced number of hospital visits for



**Figure 4.** Placement of a 20 mm × 6 cm fully covered metal stent through the mature gastrojejunal tract. The lumen of the small bowel near the choledochojejunostomy is seen through the aperture of the stent.



**Figure 5.** Diagram of the patient's anatomy after the EUS-Directed Trans-Enteric ERCP (EDEE) procedure. EUS is used to create a novel connection between the stomach (pink outline) and Roux, or biliary, limb (green). Access to the Roux limb is then simplified, also allowing placement of larger stents across the biliary anastomoses (yellow). ERCP, endoscopic retrograde cholangiopancreatography; EUS, endoscopic ultrasound.



percutaneous drain manipulation and avoidance of frequent adverse events associated with her previous PTBDs including cholangitis, drain dislodgement, leakage, and superficial cutaneous infections. That said, EDEE remains a technically demanding procedure with the potential for adverse events including stent maldeployment, with resulting bowel perforation, during the initial EUS-guided procedure. Potential longer-term adverse events related to creating a gastroenteric fistula includes potential for bile acid reflux, and so a transduodenal approach may be preferred when feasible. In addition, creation of an enteroenteric fistula may pose technical challenges for any future surgical interventions.

In summary, we describe the use of a LAMS to create an EUS-guided gastrojejunostomy to permit a “short cut” to the biliary limb in a patient with Roux-en-Y anatomy and side-by-side strictured hepaticojejunal anastomoses. Furthermore, we describe one option for management of a malpositioned “too-short” LAMS using a coaxial covered metal biliary stent.

## DISCLOSURES

Author contributions: J. Chin wrote the manuscript and reviewed the literature. AC Storm revised the manuscript for intellectual content and is the article guarantor.

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Informed consent was obtained for this case report.

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