ORIGINAL ARTICLE

Definitive endoscopic repair of transected bile ducts after cholecystectomy using EUS-guided hepaticogastrostomy and retrograde cholangioperitoneoscopy

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INTRODUCTION

Bile duct transection is a dreaded cholecystectomy adverse event. Standard treatment involves surgical repair, often with prior external biliary drainage.[1] Percutaneous rendezvous[2,3] or interventional EUS[4] can reconnect a transected bile duct (TBD); however, guidewire recanalization remains challenging and fails in up to two-thirds of cases.[4]

CASE DESCRIPTION

A 34-year-old woman underwent laparoscopic cholecystectomy. A bile duct tear was sutured intraoperatively; 2 Jackson-Pratt drains were placed. Persistent high-output (>800 cc/day) biliary leakage prompted ERCP locally on postoperative day 12. A TBD was noted and sphincterotomy performed. She was transferred for further endoscopic management. Repeat ERCP on postoperative day 20 confirmed a bile duct cutoff and massive contrast extravasation; the proximal TBD could not be opacified or accessed with a guidewire. Same-session transhepatic EUS-guided cholangiography revealed a Strasberg-E3 injury.[1,3] The gap across the transection measured 40 mm. A hepaticogastrostomy to liver segment 3 was performed with an 8-mm-diameter × 8-cm-long antimigration-covered biliary metal stent (BCG Hanarostent; M.I.Tech, Gyeonggi-do, South Korea), as reported[4] (Fig. 1). Bile output dropped to less than 100 cc per-day. One week later, the transhepatic stent was removed using a duodenoscope under fluoroscopy (Fig. 2). A guidewire was passed into the biloma through the mature hepaticogastrostomy. A new transhepatic 6-mm-diameter × 6-cm-long antimigration covered biliary stent was placed across the hepaticogastrostomy. The proximal transection site was balloon-dilated to 6 mm. A 7F nasobiliary tube was left through the hepaticogastrostomy into the biloma to secure the rendezvous guidewire during duodenoscope exchange (Video 1, available online at www.videogie.org). The duodenoscope was advanced alongside the tube to the papilla. After balloon dilation of the distal transection site, a digital

Figure 1. EUS-guided cholangiography showing a Strasberg-E3 injury; contrast extravasates into a biloma. An 8-cm-long antimigration covered metal stent is placed for hepaticogastrostomy. The transection gap matches the length between the stent middle and end markers (4 cm).

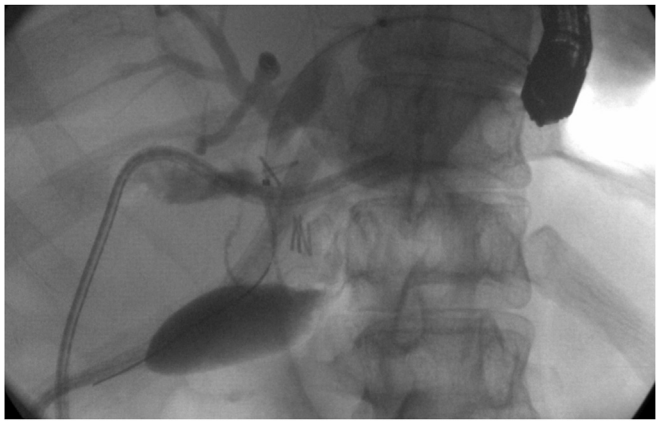

Figure 2. Antegrade transhepatic passage of the guidewire into the biloma across the mature hepaticogastrostomy using a duodenoscope from the stomach, 1 week after the index EUS-guided hepaticogastrostomy.

Abbreviations: CERES, combined ERCP and endosonography; HGS, hepaticogastrostomy; TBD, transected bile duct.

2468-4481
https://doi.org/10.1016/j.vgie.2024.03.016

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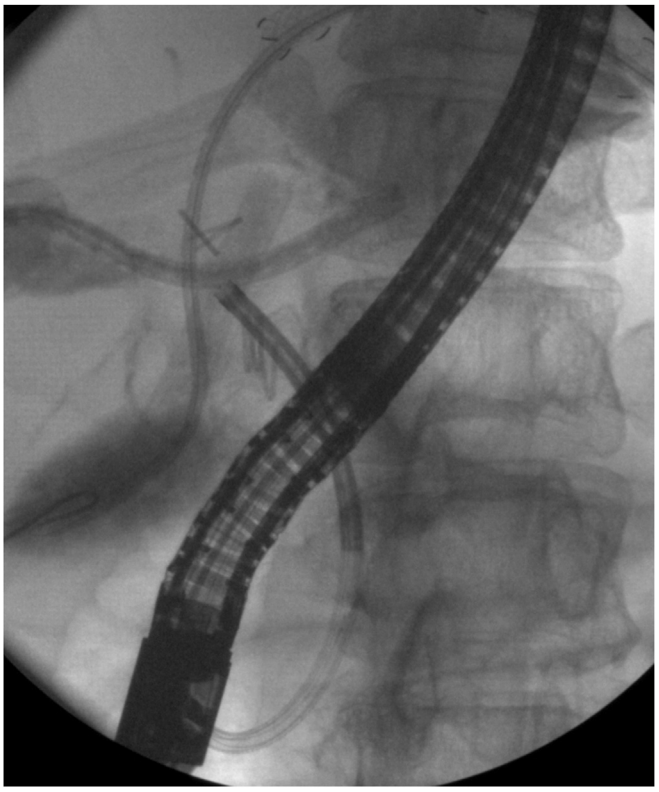

Figure 3. Retrograde passage of the cholangioscope from the distal transected bile duct into the biloma. The nasobiliary tube passed through the hepaticogastrostomy stent is identified under cholangioperitoneoscopy, facilitating retrieval of the rendezvous guidewire.

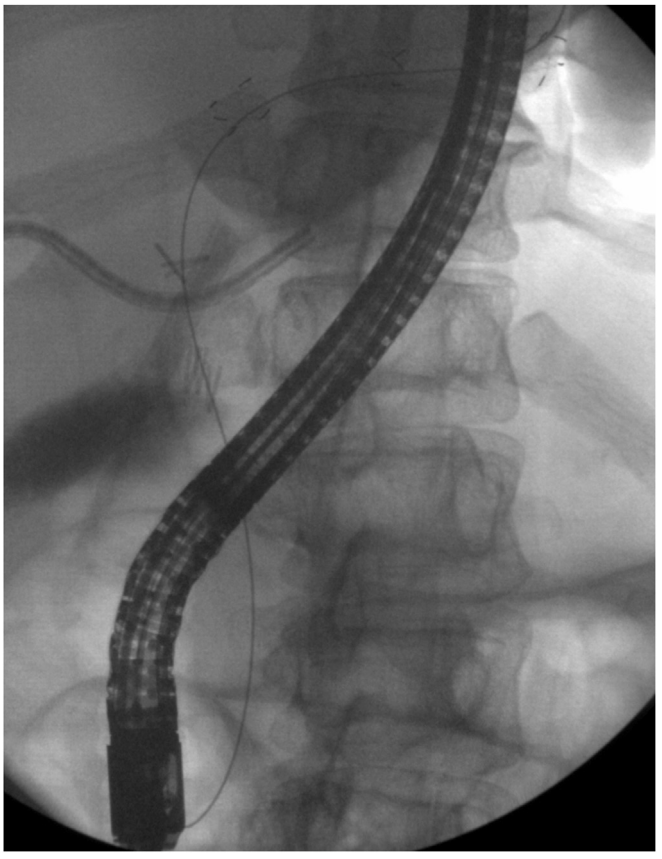

Figure 4. Antegrade guidewire grasped under cholangioperitoneoscopy and retrieved outside the duodenoscope, achieving duct recanalization.

cholangioscope was passed from the TBD into the biloma (Fig. 3). The nasobiliary tube was identified next to a Jackson-Pratt drain under cholangioperitoneoscopy and gently pulled back from the patient's mouth to help grasp the guidewire with a tripod forceps. The guidewire was retrieved into the duodenum and outside of the duodenoscope, as described[4-6] (Fig. 4). Following duct recanalization, plastic stents were placed by ERCP, a 7F double-pigtail stent into the biloma over a parallel wire, and another 10F straight biliary stent across the TBD into the left hepatic duct (Fig. 5). Bile output dropped to 20 cc/day for 3 days and then to 0 to 5 cc/day over 2 weeks until it dried out. The 2 Jackson-Pratt drains were sequentially removed at weekly intervals in the outpatient clinic before the next revision ERCP, scheduled 4 weeks after recanalization. Cholangiography showed a strictured but reconnected duct with no leakage (Fig. 6). The plastic biliary stents were removed. The TBD was bridged with a right-sided 8.5F, 12-cm plastic stent. Then a 6-mm-diameter × 10-cm-long antimigration covered metal stent (BCG Hanarostent) was placed across the TBD into the left hepatic duct using a rendezvous guidewire passed through the hepaticogastrostomy. The hepaticogastrostomy stent was definitively removed. Four months later, ERCP revealed a fully remodeled bile duct, with minimal contour irregularity (Fig. 7). Bilateral stents were exchanged for a right-sided 10F, 9-cm plastic and a left-

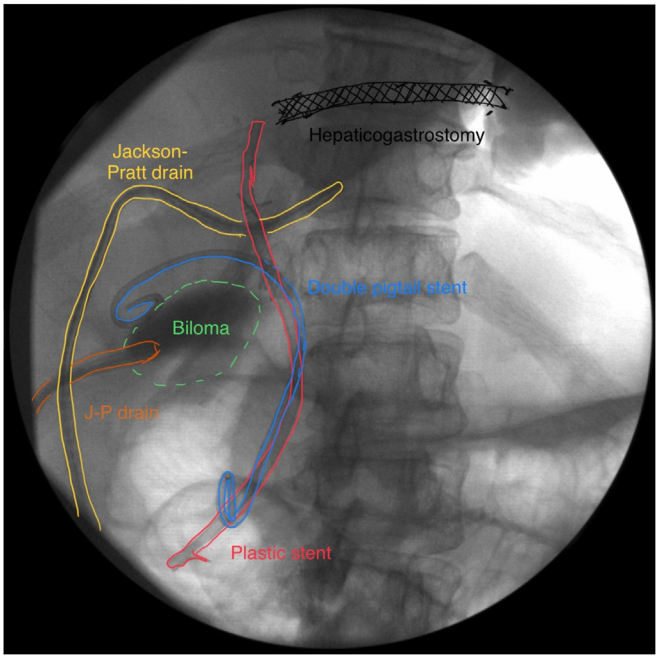

Figure 5. Transpapillary double-pigtail stent placed into the biloma parallel to a 10F plastic straight biliary stent placed across the transected bile duct into the left hepatic duct.

Figure 6. First outpatient ERCP revision for transpapillary biliary stent upgrade from single left plastic to bilateral 8.5F plastic and 6-mm diameter covered metal stents, showing a strictured but reconnected bile duct. The transection gap is shortened to 18 mm.

Figure 7. Second outpatient ERCP revision after a sequential 4-month stenting period with bilateral plastic and covered metal stents, showing a completely remodeled bile duct with minimal contour irregularity adjacent to surgical clips.

sided 8-mm-diameter × 8-cm-long antimigration covered metal stent. Six months later, all stents were removed; cholangiography (Fig. 8) and cholangioscopy (Video 1) demonstrated a healed bile duct. Twenty months after bile duct injury, and 9 months after definitive biliary stent removal, the patient remains asymptomatic with normal liver chemistries (grade A biliary patency[1]). Annual follow-up is planned for 5 years, based on reported median recurrence intervals of 40 months for endoscopically remodeled TBDs.[2]

DISCUSSION

EUS imaging of intrahepatic bile ducts is possible in 55% of patients with post-cholecystectomy TBDs.[4] EUS-hepaticogastrostomy can be attempted in TBD patients with dilated intrahepatic ducts in tandem with ERCP, thus avoiding subsequent percutaneous transhepatic biliary drainage and its risks of fluid and electrolyte loss.[2,5] Combining ERCP and endosonography-guided interventional cholangiography (a procedure termed CERES) appears feasible and convenient in TBDs,[4] as it does in hilar malignancy.[7] CERES restores internal biliary drainage, allowing acute leakage control in TBD patients. CERES for TBDs has been reported as a temporizing measure before surgical repair, as a portal for subsequent recanalization (staged CERES), or alternatively, as definitive biliary drainage.[4] The choice of any of these 3 diverging treatment pathways is based on individual patient features and preference. Elective antegrade biliary access through the mature hepaticogastrostomy can be performed as early as a week after stent placement.[8]

Following antegrade access via hepaticogastrostomy, TBD recanalization can be achieved under fluoroscopy, with or without cholangioscopy (antegrade, retrograde, or both[4]). In the present case, a subhepatic biloma was used for rendezvous; fluoroscopic guidance alone would have been less reliable.[3] Retrograde cholangioperitoneoscopy facilitated guidewire retrieval. This approach has been reported by others using percutaneous access,[5,6] and by ourselves using EUS.[4] Progress in interventional EUS is associated with a decreased use of percutaneous transhepatic biliary drainage in different clinical scenarios[9,10]; however, percutaneous access may still be required for rendezvous ERCP when the proximal TBD is collapsed.[2-6]

Prompt splinting of TBDs with covered-metal stents might enhance duct remodeling.[4-6] Yet, careful covered metal stent choices and technique are advisable in hilar injuries to avoid segmental cholangitis; antimigration[4,9] or nonforeshortening[5,6] stents, together with contralateral (transpapillary or transhepatic) duct drainage,[4,9] have all been used successfully. Definitive nonsurgical repair of TBDs is a real possibility to be entertained[2-4]; neither elective surgery[5] nor indefinite stenting[6] should be considered mandatory following endoscopic repair of TBDs.

Figure 8. Final cholangiogram after removal of bilateral 10F plastic and 8-mm diameter covered metal stents placed for a third sequential transpapillary stenting period, showing a repaired bile duct that resulted in grade-A patency over a 9-month follow-up.

Reported[2,4] late stricture recurrence rates of 10%, however, make long-term follow-up warranted.

DISCLOSURE

Dr Perez-Miranda is a consultant for Boston Scientific, Olympus, Medtronic, and M.I.Tech.

ACKNOWLEDGMENT

This case report won gold at the ASGE World Cup of Endoscopy during DDW 2023, Chicago, IL.

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