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Case Report

De novo hepatico-gastric stent placement for biliary stricture via percutaneous transhepatic biliary approach

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A B S T R A C T

Biliary stricture formation is a known complication of hepatic surgery in cases of adult living donor liver transplant. In our case, successful percutaneous placement of a hepatico-gastric stent was performed for the drainage of an isolated bile duct after right liver transplant with Roux-en-Y biliary anastomosis in a 42-year-old male. The patient initially presented with cholangitis and a percutaneous transhepatic cholangiogram revealed an isolated stricture of the posterior bile duct. Multiple attempts at regaining continuity of the isolated bile duct with the jejunum were unsuccessful. Thus a tract was created via a percutaneous transhepatic and transluminal approach between the isolated duct and the stomach using a covered stent. The patient had no complications at 18-month follow-up.

Keywords: Biliary tract; Drainage; Liver transplantation; Stents

Introduction

Biliary stricture formation is a known complications of hepatic surgery, occurring in up to 67% of adult living donor liver transplant cases.[1,2] The two main factors that can contribute to stricture formation include ischemic changes of the biliary stump and biliary leakage.[3] Furthermore, anastomotic biliary strictures occurring in right liver living donor transplant cases can occur in a multibranched fashion given the high rate of multiple orifices in the right lobe graft.[3] Management techniques include percutaneous transhepatic cholangiography and biliary drainage, endoscopic retrograde cholangiopancreatography, and re-operation.[4] Soulez et al[5] performed left hepaticogastrostomy for biliary obstruction with stent placement in 35 patients. Their anastomosis was created under fluoroscopic, endoscopic, and laparoscopic guidance from the left lobe of the liver and an uncovered stent was deployed 15 days after the creation of the anastomosis. We present a case of a hepatico-gastric stent graft placement for the drainage of an isolated right posterior hepatic duct stricture via percutaneous transhepatic biliary approach.

Case Report

Institutional Review Board approval was obtained for this case report. A 42-year-old male status post right liver transplant with Roux-en-Y biliary anastomosis nine months prior presented with cholangitis. Initially, a percutaneous transhepatic external biliary drain placement was successful in the acute management of our patient, but we found that, due to his active lifestyle, he presented every few weeks for readjustment of his drains. The initial percutaneous transhepatic cholangiogram (PTC) showed an isolated right posterior hepatic duct, segment 7 (Fig. 1). Up to 10 attempts made using available multiple wires and angled tip catheters to regain continuity with the biliary tree were unsuccessful. A 6 Fr drainage tube was placed in the isolated right posterior hepatic duct and left to gravity drainage. Two months later, the patient returned for an attempt to regain continuity. A second access point to the right anterior bile duct was gained in order to access the isolated duct from a retrograde approach. This was also unsuccessful. An 8.5 Fr external biliary drain (Cook Medical, Bloomington, IN, USA) was left in the isolated ductal system and placed to gravity drainage, and an 8F internal/external biliary drain (UreSil, LLC, Skokie, IL, USA) was placed in the newly accessed hepatic duct, also left to gravity drainage. The patient returned

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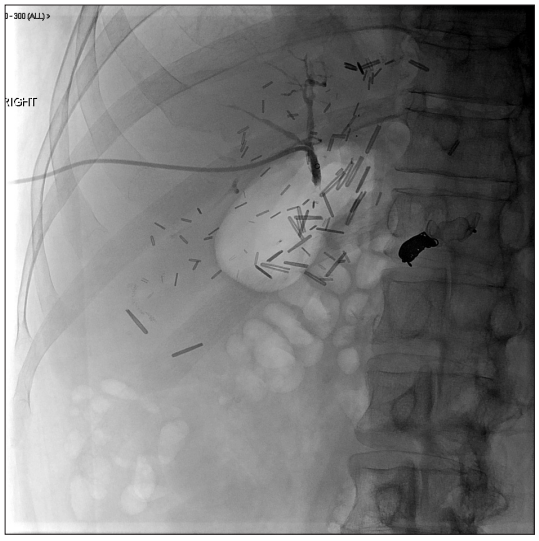

Fig. 1. Initial cholangiography showing complete occlusion of the right posterior hepatic duct after distal anastomosis. Amplatzer vascular plug and coils in the proximal segment of the splenic artery are from a previous procedure to increase flow to the transplanted hepatic artery as the patient was previously experiencing splenic artery steal.

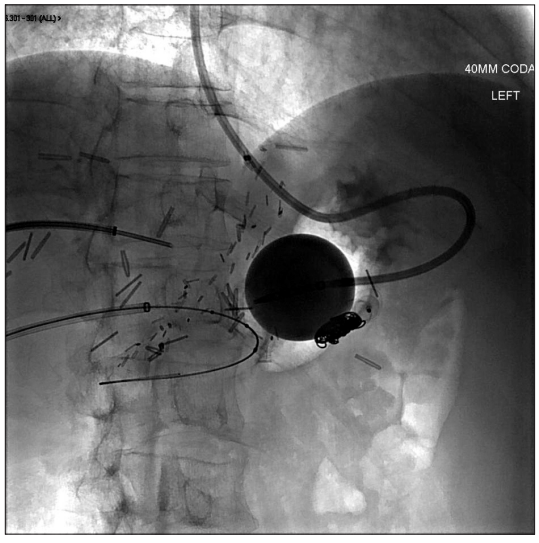

Fig. 2. Coda balloon seen in the stomach with Chiba needle (Cook Medical, USA) in the biliary system.

one month later for repeat attempt at internalization. Procedure was performed under general anesthesia due to long duration of the procedure as well as pain control. Both drains were exchanged for 10 Fr sheaths and a Colapinto needle (Cook Medical) was advanced through the sheath within the isolated duct. An 18 × 2 cm Atlas balloon (Bard Peripheral Vascular, Tempe, AZ, USA) was advanced from the second biliary access sheath and was inflated within the jejunum. Coaxially through the Colapinto needle, a 21-guage 20 cm Chiba needle (Cook Medical) was advanced in an attempt to puncture the balloon within the jejunum, thereby gaining access to the bowel. However, this was unsuccessful due to the triangular trajectory, and it was determined that it would be more feasible to create a new biliary drainage pathway by puncturing from the isolated duct into the stomach.

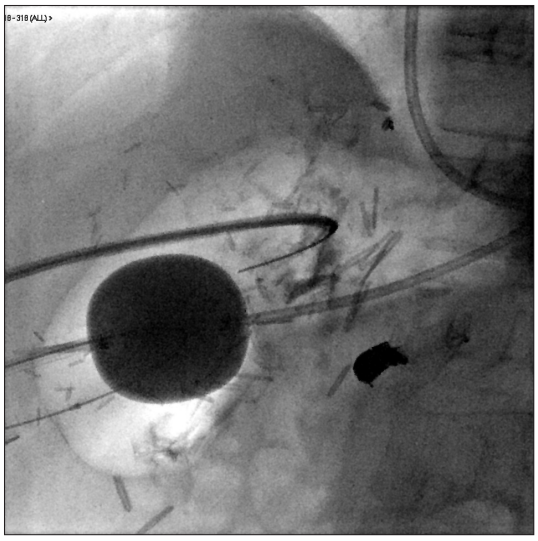

Fig. 3. Attempts at puncture of the balloon under steep oblique view using the Chiba needle (Cook Medical, USA).

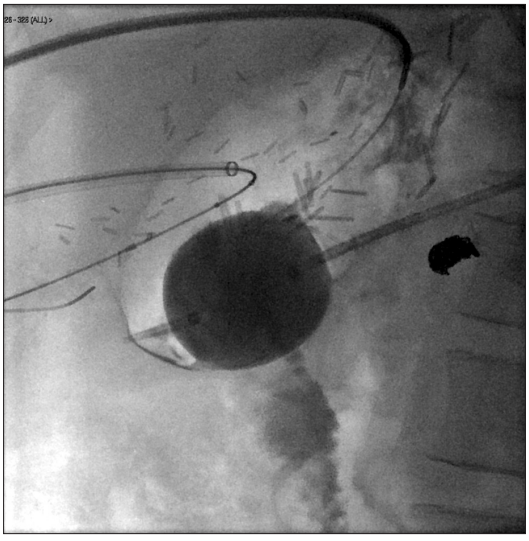

Fig. 4. Successful puncture of the balloon as confirmed by leakage of contrast into the stomach and jejunal loop.

Thus a Coda (Cook Medical) balloon was inserted thru the nasopharynx into the stomach and manually inflated with a 50 mL syringe filled with dilute contrast. After adding a curve to the distal tip of a 65.5 cm Chiba needle, it was placed coaxially thru the Colapinto needle (Fig. 2). Under steep oblique view, the Colapinto needle was directly targeted at the balloon in the stomach followed by multiple attempts of puncture by the Chiba needle (Fig. 3). Puncture of the balloon was confirmed by leakage of contrast media into the stomach and jejunal loop via the gastrojejunostomy (Fig. 4). A V-18 wire (Boston Scientific Corp., Marlborough, MA, USA) was advanced into the stomach and the 10 Fr sheath was advanced to the level of the gastric wall. A Soft-Vu 4 Fr high flow angiocatheter (AngioDynamics Corp., Latham, NY, USA) was advanced over the V-18 wire (Boston Scientific Corp.) into the stomach and the V-18 wire was exchanged for an

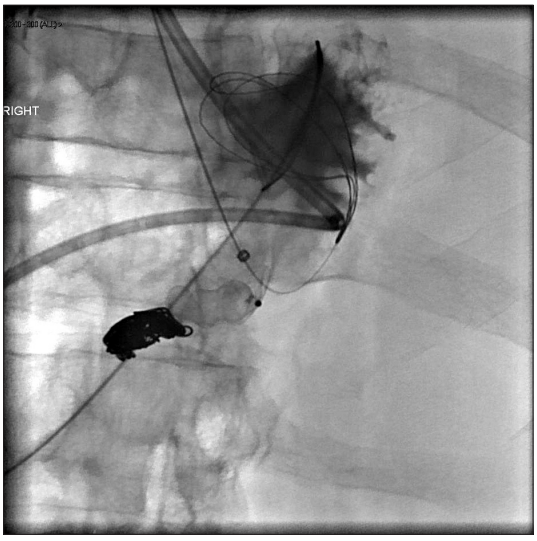

Fig. 5. Sheath and snare placed through the oropharynx to snare the Glidewire (Terumo, Japan) coming from the biliary system.

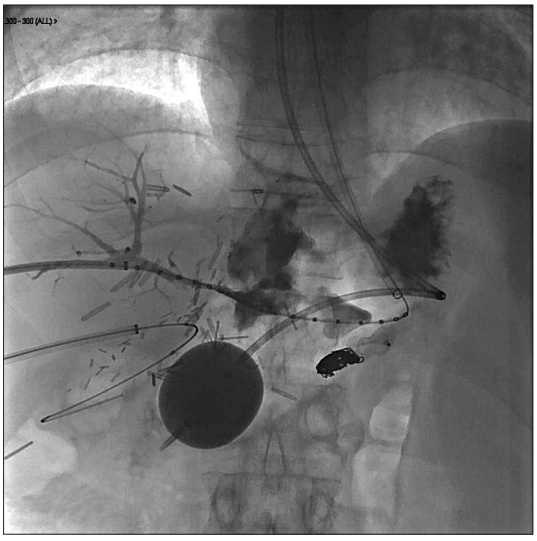

Fig. 7. Marker pigtail catheter used to measure the precise length of the stent.

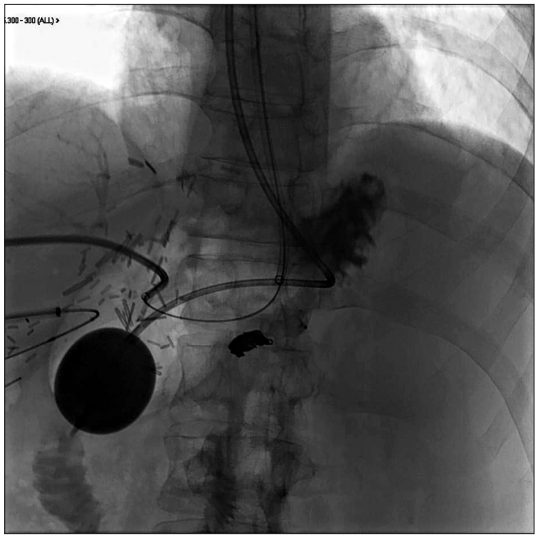

Fig. 6. Through and through wire access was obtained.

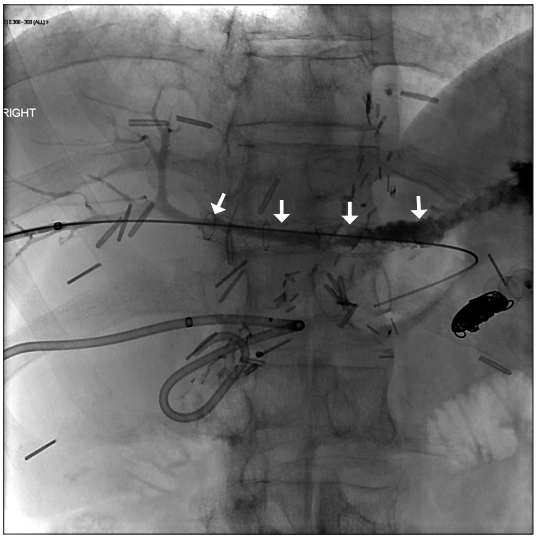

Fig. 8. Follow-up cholangiography after stent placement showing patent hepaticogastric stent (arrows).

exchange length 0.035 inch Glidewire (Terumo, Tokyo, Japan). Subsequently, a sheath and snare were advanced through the oropharynx into the esophagus and the Glidewire was snared and pulled out of the mouth (Fig. 5). Through and through wire access was obtained (Fig. 6). A marker pigtail catheter was advanced over the wire and measurements were made with distention and collapse of the stomach by air insufflation and suctioning via the Coda balloon to measure the precise length of the stent (Fig. 7). A 10 × 10 cm Viabil covered stent, 8 cm fully covered and 2 cm with fenestrations (Gore Medical, Flagstaff, AZ, USA), was then deployed from the gastric lumen into the isolated biliary ductal segment (Fig. 8). About 0.5 cm of distal segment of the stent was deployed within the stomach and remaining part in the gastrohepatic ligament, liver, and the biliary tree in sequences. An hourglass shaped narrowing of the stent at the entry site of the stomach was observed. The stent was suboptimally dilated with an 8 mm balloon on the stomach side thereby taking advantage of the thick muscular component of the stomach wall to prevent possible migration of stent. A 7 mm balloon was used in the central part of the stent for dilation, and a 6 mm balloon on the hepatic ductal side of the stent even if it will be fully expanded gradually and spontaneously at the end. Cholangiogram demonstrated a widely patent stent with no biliary ductal dilation and flow of contrast through the stent into the stomach. Both sheaths were exchanged over the wire for 10.2 Fr Cook biliary drainage catheters. Final cholangiogram demonstrates patency of both biliary drains and the stent between the biliary ducts and the stomach. The patient returned for follow up eight months later and was doing clinically well with improved cholangitis and normalized total bilirubin. There was no evidence of stent migration and both external biliary drains were removed. Follow-up magnetic resonance imaging scan after 4 months showed luminal patency of the stent (Fig. 9). The follow-up period was eighteen months with maintained stent luminal patency.

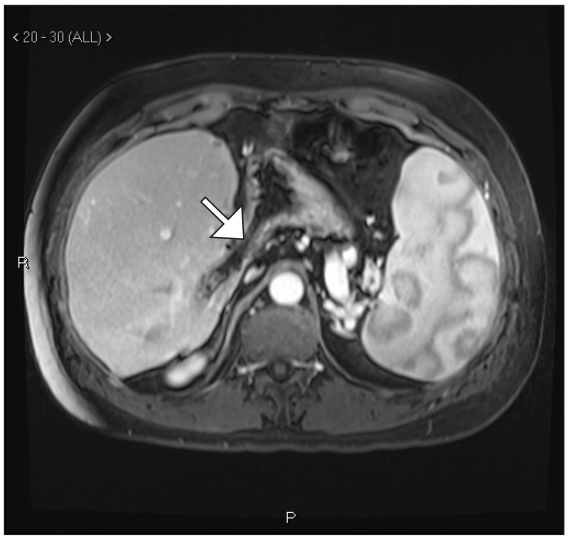

Fig. 9. Follow-up magnetic resonance imaging showing patent hepaticogastric stent (arrow) after 4 months post procedure.

Discussion

Biliary stricture is a known complication of right liver living donor transplants and in patients with Roux-en-Y hepaticojejunostomy, as in our case, is initially treated with percutaneous transhepatic balloon dilation and/or stenting.[3] Living donor liver transplants have a biliary complication rate of up to 67% as compared to up to 15% in cadaveric transplants.[1,2,6] Cadaveric transplants only requires one anastomosis between the intact hepatic duct of the donor and the recipient common bile duct.[6] However, in cases of right liver living donor transplant, a single right hepatic duct is only found in up to 50% of cases and thus up to 40% of all cases require multiple anastomosis.[6,7] Thereby increasing the incidence of biliary complications in right liver living donor liver transplants.

Initially, a percutaneous transhepatic external biliary drain placement was successful in the acute management of our patient, but we found that, due to his active lifestyle, he presented every few weeks for readjustment of his drains. The PTC with external drainage helped to preserve the patients liver function and manage his cholangitis; however, internalization of the biliary drainage helped to improve his quality of life. Given the unique anatomic challenges of this case and failed attempts at regaining continuity of the isolated bile duct with the jejunum, it was determined that it would be more feasible to create a new internal biliary drainage pathway, which is what lead to the percutaneous transhepatic and transluminal tract formation using a covered stent. Potential problems that may present with this approach include dislodgement of stent from stomach or bile ducts with eating and activity, and reflux of gastric fluid into the biliary tree; however, Soulez et al[5] suggest that this reflux is a common phenomenon in cases of choledochoduodenostomy or endoscopic sphincterotomy with no reported consequences. Bernstein et al[8] do note that increased exposure of the gastrointestional tract to bile acids is associated with increased reactive oxygen species production and the induction of apoptosis leading to the development of cancers of the gastrointestinal tract. In conclusion, our case provides an alternative procedural approach for the management of a biliary stricture.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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