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Management of an Accessory Bile Duct Leak Following Pancreaticoduodenectomy: A Novel Approach Utilizing a Percutaneous and Endoscopic Rendezvous

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ABSTRACT

Biliary leaks are uncommon but morbid complications of pancreaticoduodenectomies, which have historically been managed with percutaneous drainage, reoperation, or a combination of both. We report a de novo percutaneous-endoscopic hepaticojejunostomy from an anomalous right hepatic duct injured during pancreaticoduodenectomy to the afferent bowel limb. The percutaneous-endoscopic hepaticojejunostomy was stented to allow for tract formation with successful stent removal after 5.5 months. One year after the creation of the percutaneous-endoscopic hepaticojejunostomy, the patient remains clinically well without evidence of biliary leak or obstruction.

INTRODUCTION

Over the past few decades the number of pancreaticoduodenectomies performed has increased significantly, especially in high-volume centers of excellence.¹ The complications associated with pancreaticoduodenectomy include delayed gastric emptying, pancreatic fistula, infection, hemorrhage, and bile leak, with the management of these complications involving interventional radiology (IR) in up to 44% of cases.¹ Specifically, biliary leak after pancreaticoduodenectomy has been reported to occur at a rate of 2-9% and most often involves the biliary anastomosis at the hepaticojejunostomy.² In non-dilated intrahepatic biliary systems, successful percutaneous access is reported in 70-100% of cases,³ and clinically successful percutaneous management of bile leaks occurs in 70% of cases, although this rate drops to 25% in leaks involving the plane of resection.^{4,5} Variant biliary anatomy occurs in up to 37% of people; this includes the presence of an accessory duct or atypical drainage patterns.⁵

CASE REPORT

A 48-year-old man initially presented to an outside institution with jaundice and was found to have an ampullary carcinoma on endoscopy. He underwent common bile duct stenting but declined surgery at that time. The patient presented again to the outside institution approximately 1 year later with worsening jaundice and expressed a desire for treatment. He was referred to our institution for endoscopic mucosal resection of the ampullary mass. Due to interval progression with local invasion of the pancreas and bile ducts, however, endoscopic management was not a viable treatment. The patient underwent a classic pancreaticoduodenectomy with a postoperative course marked by persistent leukocytosis ranging from 11,200 to 16,500/ μ L, an up-trending alkaline phosphatase from 65 to 128 mg/dL, and an up-trending total bilirubin from 1.0 to 1.6 mg/dL.

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Figure 1. Fluoroscopic image showing a 0.035-inch wire passed from the endoscope being snared from the percutaneous access in the anomalous transected right anterior bile duct.

On postoperative day 6, the patient developed bilious output from a surgically placed drain located near the hepaticojejunostomy. Magnetic resonance cholangiopancreatography showed a bile leak originating from a transected anomalous right anterior bile duct resulting in subhepatic bile collection. The patient was brought to the IR suite on postoperative day 7, where percutaneous transhepatic access into the non-dilated transected right bile duct was performed with placement of an 8-French internal-external Flexima biliary drainage catheter (Boston Scientific, Natick, MA) terminating in the subhepatic bile collection. A de novo hepaticojejunostomy was created between the transected bile duct and the adjacent afferent bowel limb. The patient returned to the IR suite 4 days after the initial percutaneous biliary access procedure. The existing biliary drain was removed over a 0.035-inch Coons wire (Cook, Bloomington, IN), and an 8-French 10-cm vascular sheath (Terumo, Somerset, NJ) was advanced over the wire into the transected biliary system. An Olympus TJF Q180V ultrasonography endoscope (Olympus America, Center Valley, PA) was advanced into the afferent bowel limb, and the 0.035-inch Coons wire was identified on endoscopic ultrasound as a target within the non-dilated anomalous duct. The transected duct was then endoscopically accessed using an EchoTip Ultra HD 19g FNA needle (Cook Medical, Bloomington, IN), through which a 0.035-inch Glidewire (Terumo, Somerset, NJ) was passed through the endoscopic needle into the biliary tree. The Glidewire was snared via the percutaneous access with a gooseneck snare (ev3, Plymouth, MN) and withdrawn through the sheath (Figure 1). A Quickcross catheter (Spectranetics, Colorado Springs, CO) was advanced percutaneously over the

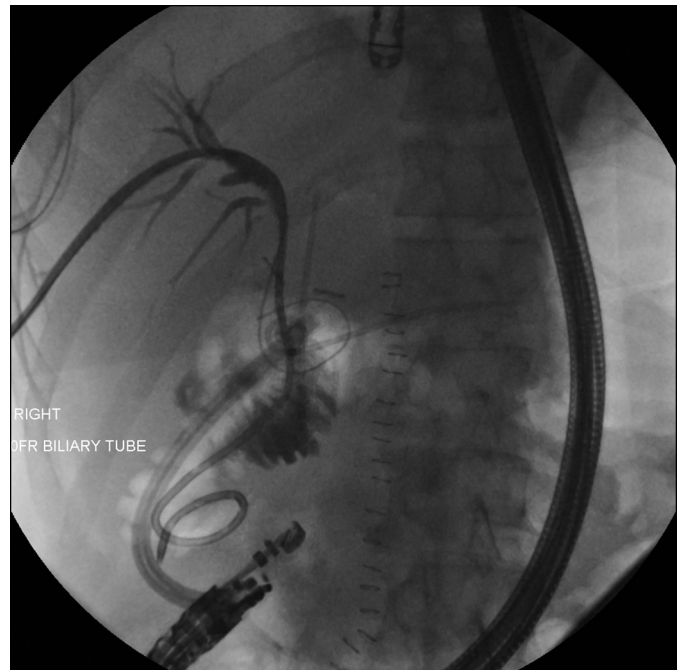


Figure 2. Fluoroscopic image showing the 8-French internal-external biliary drainage catheter crossing the newly created hepaticojejunostomy and terminating in the afferent bowel loop. The safety wire extends from the transected bile duct into the subhepatic space.

wire from the transected duct into the afferent bowel limb. The Glidewire was exchanged for a Coons wire through the percutaneous access, and the catheter and sheath were removed. An 8-French internal-external biliary drainage catheter was then advanced over the wire from the transected duct into the afferent limb to create a new hepaticojejunostomy (Figure 2).

Approximately 1 month later, due to persistent bilious output from the subhepatic surgical drain (10-100 mL/day), the patient underwent interrogation of the existing 8-French internal-external biliary drain with subsequent over-the-wire exchange for an 8-French all-purpose drain (Boston Scientific, Natick, MA) to eliminate the presence of sideholes along the maturing percutaneous-endoscopic hepaticojejunostomy tract. Additional sideholes were cut along the intrahepatic portion of the drain.

Approximately 3 months after the de novo hepaticojejunostomy creation, the percutaneous drain was removed over a wire and a 10 mm x 60 mm Viabil stent (Gore, Flagstaff, AZ) was placed endoscopically (Figure 3). The surgical drain was removed 12 days later after cessation of bilious output. Ten weeks after Viabil stent placement (5.5 months after hepaticojejunostomy creation), the patient returned for repeat endoscopy and removal of the Viabil stent. Endoscopic visualization of the percutaneous and endoscopically created hepaticojejunostomy orifice showed it to be widely patent (Figure 4). Endoscopic cholangiogram after stent removal demonstrated a patent hepaticojejunostomy without stricture or leak (Figure 5). Approximately 1 year after the



Figure 3. Endoscopic image demonstrating Viabil stent in place at the newly created hepaticojejunostomy.

percutaneous-endoscopic hepaticojejunostomy creation, the patient continues to do well with no clinical signs of bile leak or biliary obstruction.

DISCUSSION

Though bile leaks are not a common postsurgical complication of pancreaticoduodenectomy, they are serious problems resulting in significant morbidity. The management of postoperative bile leaks varies from internal-external drainage to external drainage alone to repeat surgery for hepaticoenterostomy.¹⁻⁴ Percutaneous transjejunal access to the biliary

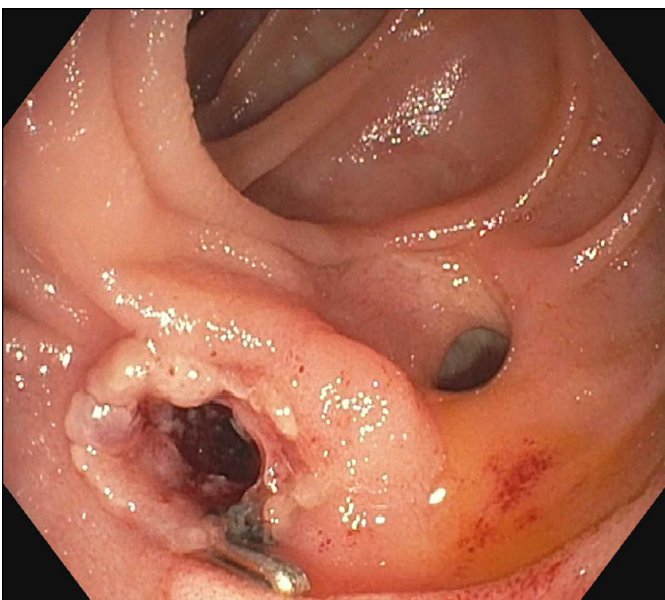


Figure 4. Endoscopic image demonstrating the hepaticojejunostomy orifice after removal of the Viabil stent.



Figure 5. Endoscopic cholangiogram after removal of the covered metallic stent showing a patent hepaticojejunostomy without stricture or leak.

system has been described for bile leak management, though in a majority of the reported literature, surgical fixation of the bowel to the abdominal wall with surgical clips placed for fluoroscopic identification was performed to facilitate repeated percutaneous puncture of the bowel loop for re-interventions.⁶⁻⁹ Cases of percutaneous transjejunal biliary intervention without a fixed bowel loop have been reported, although these were cases of benign strictures and stone disease and carried associated morbidity.¹⁰ Mansueto et al recently reported a case series of neoanastomoses with percutaneous hepaticojejunostomies in dehiscenced surgical hepaticojejunostomy after oncologic surgeries when rendezvous with endoscopy was attempted but was not technically feasible due to anatomical limitations.¹¹ However, as noted by Mansueto, when attempting a percutaneous hepaticojejunostomy, an endoscopic rendezvous is preferred if anatomically feasible as it avoids the complication and morbidity of percutaneous puncture of the afferent bowel limb.

Another minimally invasive approach to biliary drainage and intervention status post pancreaticoduodenectomy is endoscopic ultrasonography-guided hepaticogastrostomy, although this technique has anatomical limitations¹² and requires dilated intrahepatic ducts,¹³ which prevented the use of this technique for our patient. Our case is unique in that a de novo hepaticojejunostomy between an anomalous right anterior hepatic duct and an afferent bowel limb was successfully created with a combined percutaneous and endoscopic approach without requiring additional surgery for bowel wall fixation and avoiding the need for a surgical hepaticojejunostomy. In this case, adequate fixation of the bowel related to

postoperative inflammation and scarring allowed prompt passage of an internal-external biliary drain from the transected duct into the adjacent afferent limb without pre-dilatation.

To our knowledge, this is the first case where a percutaneous-endoscopic hepaticojejunostomy has been performed with a rendezvous approach in a completely non-intact biliary system involving a transected anomalous anterior duct. The combined percutaneous-endoscopic approach allowed for successful control of a postoperative bile leak, ultimately without the need for a drain or stent to maintain the hepaticojejunostomy. This case highlights collaboration across disciplines as a key to patient care and to the development of novel minimally invasive therapies. Long-term follow-up will be required to ensure the patency and viability of this type of hepaticojejunostomy formation.

DISCLOSURES

Author contributions: All authors participated equally in manuscript creation. G. Rapp is the article guarantor.

Financial disclosure: JG Lee receives honoraria from Cook Medical, Inc., for speaking.

Informed consent was obtained for this case report.

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