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CASE REPORT | ENDOSCOPY

Restoration of Completely Transected Common Bile Duct Continuity Using Single Operator Cholangioscopy

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ABSTRACT

Common bile duct (CBD) injury, ranging from a partial tear to a complete transection, is a major surgical complication of cholecystectomy with significant morbidity and mortality. Proper management of these complex injuries depends on the type and extent of injury and time of recognition. Identifying and repairing injuries during cholecystectomy can prevent development of complications, but this only occurs in about one-third of cases. We report a novel technique to reconnect a transected CBD with assistance of single-operator cholangioscopy.

INTRODUCTION

Common bile duct (CBD) injury can be a devastating surgical complication. It can occur after any type of hepatobiliary surgery, but it is more common after laparoscopic cholecystectomy.[1-5] The reported incidence ranges from about 0.1% to 0.2% for open cholecystectomy and from 0.2% to 0.8% for laparoscopic cholecystectomy.[6] Treatment options depend on the type and extent of injury. Partial injury usually can be managed with either endoscopic or percutaneous techniques, or both in combination. Endoscopic retrograde cholangiopancreatography (ERCP) and transpapillary stenting with or without sphincterotomy is the procedure of choice in endoscopic management. However, complete bile duct transection is very challenging to manage, requiring a multidisciplinary approach including a hepatobiliary surgeon, an endoscopist, and an interventional radiologist to be managed well. In addition, complete CBD transection often makes opacification of the biliary tree beyond the injury impossible, making it difficult to accurately assess the extent of injury and facilitate stent placement. Even with a combined percutaneous and endoscopic approach (rendezvous procedure), successful stent placement is difficult to achieve in some cases because of the misalignment of the transected ends of the duct. Single-operator cholangioscopy (SOC) (Spyglass™ DS, Boston Scientific, Marlborough, MA) provides direct visualization inside the biliary system and helps in the selective cannulation of desired intrahepatic ducts and other therapeutic maneuvers. To our knowledge, the use of SOC in the management of CBD injury has not been reported.

CASE REPORT

A 63-year-old woman without significant past medical history underwent laparoscopic cholecystectomy, which was converted to open cholecystectomy because of a gangrenous gallbladder and the need to repair a cholecystoduodenal fistula. One Jackson-Pratt drain was placed in the gallbladder fossa before closure. There was postoperative bilious Jackson-Pratt drain output of around 500 mL/day. Although the fluid bilirubin level was not checked and there was no imaging study to support the diagnosis of bile leak, the appearance of bile in

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the Jackson-Pratt drain output was highly suspicious of a bile leak. Liver chemistries were within normal range with a total bilirubin 0.9 mg/dL. She was transferred to our institution for bile leak management.

During initial ERCP and after selective wire-guided cannulation of the bile duct, contrast was injected. There was complete cutoff of contrast at the middle third of the CBD (Figure 1). Trace contrast passed beyond the cutoff point, but it was not clear that the contrast was in the intrahepatic bile ducts; despite guide wire passage past that area, the intrahepatic bile ducts could not be opacified, raising the concern of complete CBD transection or Strasberg type E injury. Magnetic resonance cholangiopancreatography (MRCP) showed injury to the right hepatic artery, injury to the portal vein with portal venous thrombosis, and bile duct injury above the intrapancreatic portion. The status of the proximal ducts was difficult to assess given the lack of fluid within these segments.

The patient underwent a rendezvous procedure to reconnect the transected proximal and distal biliary tree to control the bile leak. First, right and left external biliary drains were placed by an interventional radiologist. Subsequently, ERCP performed to cannulate the distal CBD. We were able to negotiate the guide wire through the distal transected duct into the subhepatic free space. Concurrently, the interventional radiologist advanced a loop snare to lasso the wire that was passed through the CBD endoscopically. However, this was unsuccessful because the wire and snare aligned in different orientation. At this point, we decided to use the SOC through the distal CBD to facilitate the passage of the guide wire through the loop snare that was placed by the interventional radiologist.

The bile duct was explored endoscopically using the SOC, confirming the mid-CBD surgical injury (Figure 2). The Spyglass probe was advanced from the injury site through the subhepatic fossa into the liver hilum, and both the right external drain and snare were seen (Figure 3). The guide wire was passed through the cholangioscope and successfully lassoed by the loop snare (Figure 4). Then, the guide wire was pulled through the left percutaneous biliary drain under fluoroscopic assistance. To bridge the defect, one 10 mm by 10 cm fully covered self-expandable metal stent (FCSEMS) with proximal fenestration was placed into the left hepatic duct and ended in the mid-CBD, another 10 mm by 6 cm FCSEMS was advanced inside the first stent to achieve transpapillary drainage. Bile flowed through the stent. Finally, left and right 8-Fr internal/external percutaneous biliary drains were placed through the metal stents by the interventional radiologist. The biliary stents and percutaneous drains were in good positions at the end of the procedure (Figure 5).

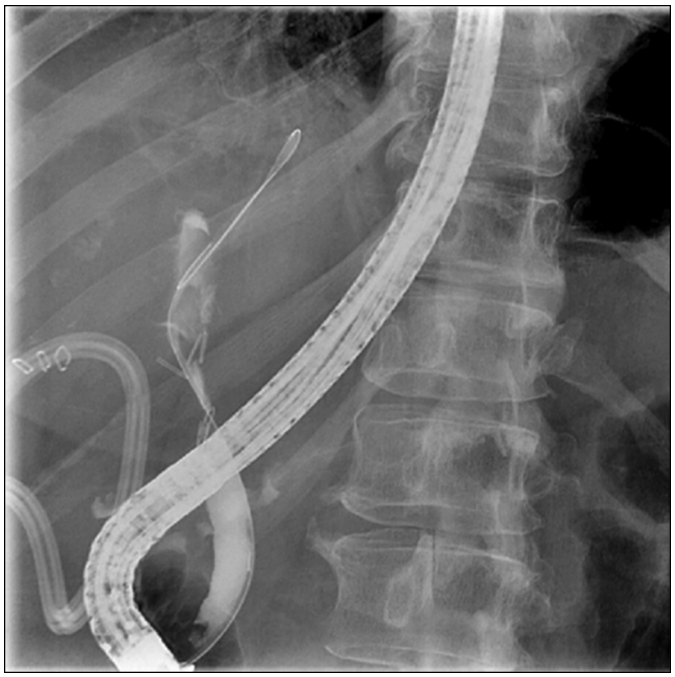

Figure 1. Endoscopic retrograde cholangiography (ERCP) showing the guide wire past the cut-off area at the middle of common bile duct. The intrahepatic ducts are not opacified.

The patient tolerated the procedure with no immediate complications. After the procedure, the Jackson-Pratt drain was removed, and the left and right percutaneous biliary drains output decreased dramatically. The patient was discharged in

Figure 2. Single-operator cholangioscopy (SOC) showing the site of transected common bile duct.

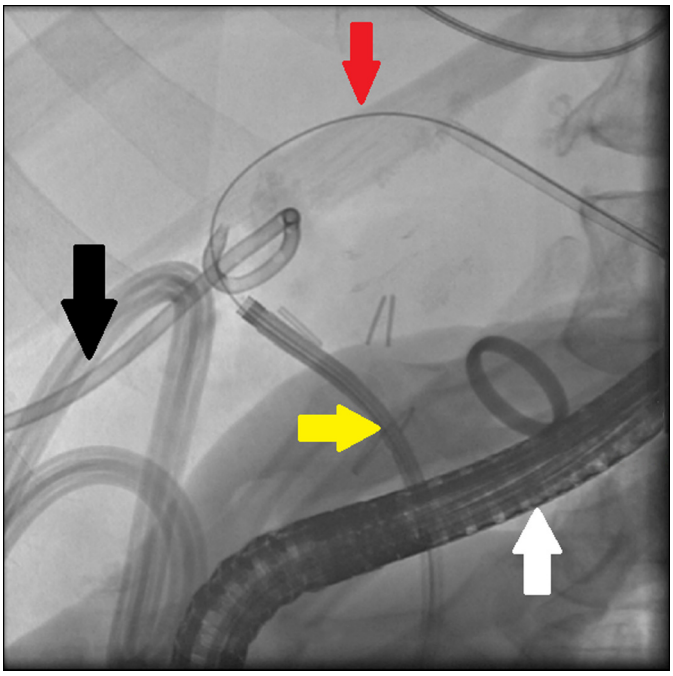

Figure 3. ERCP showing the guide wire lassoed with SOC assistance. This image shows the duodenoscope (white arrow), the SOC (yellow arrow), the right percutanous drain (black arrow), and the guide wire lassoed from the left percutanous biliary catheter (red arrow).

a stable condition, and she is scheduled to have a repeat abdominal computed tomography scan after 3 months, and the percutaneous biliary drains are expected to be removed.

DISCUSSION

Management of postcholecystectomy bile duct injury depends on the type and extent of injury and the time of recognition. The aim is to establish tension-free anastomosis and prevent complications such as bile leak, cholangitis, stricture, and secondary biliary cirrhosis. Despite general guidelines on the management of postcholecystectomy bile duct injury, every patient is a unique case. Strasberg's classification is one of the most commonly used by clinicians to define the injury, and the best intervention depends on the type of injury.[1] For instance, endoscopic intervention or bile leak control through a T tube drain can be effective in most cases of type A (cystic duct injury), type B (occlusion of aberrant right hepatic duct), and type C (transection without ligation of aberrant right hepatic duct) injuries. On the other hand, type D (lateral injury to a major bile duct) and type E (main hepatic duct injury and transection) injuries are more difficult to manage as they involve the major bile duct. Historically, restoration of postoperative transected bile duct has required another major surgery. Recently, a minimally invasive approach known as the rendezvous procedure has been used in the management of complete transection of the main bile duct.[7-8] A minimally invasive approach is much more favorable as it can allow a patient to recover and avoid early major operation. Given the lack of direct visualization of the bile duct system during the rendezvous procedure, successful restoration of biliary continuity is not always possible.

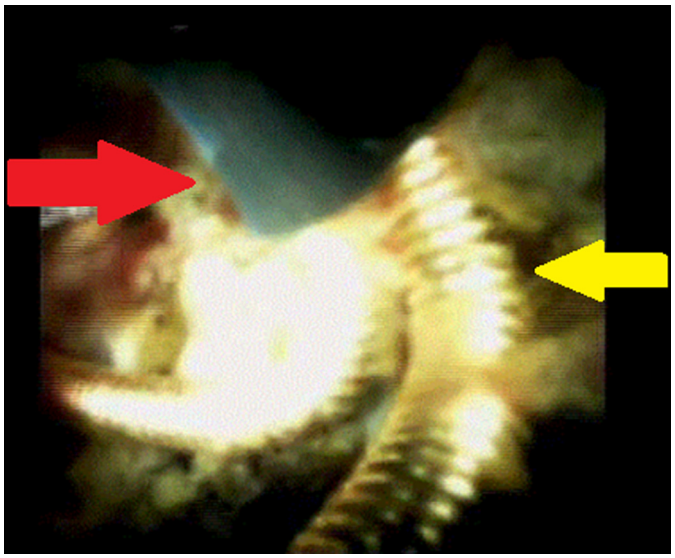

Figure 4. SOC showing the guidewire lassoed under direct visualization, with the snare (yellow arrow) and the wire passed through cholangioscope (red arrow).

Due to the novelty of this case, we used SOC (Spyglass™ DS) to manage a completely transected bile duct after an unsuccessful conventional rendezvous procedure. This was

Figure 5. Scout radiograph film showing a fully covered, self-expandable metalic stent with the right and left internal drain in place.

followed by stent placement to achieve biliary tree continuity. Although there are no comparative studies for stent use, we elected to use FCSEMS because of its durability. Other published techniques could be considered to reconnect the transected bile duct, such as percutaneous passage of extraction balloon, magnetic compression anastomosis, and triple rendezvous using percutaneous, endoscopic, and real-time computed tomography.[9-11]

DISCLOSURES

Author contributions: S. Emhmed Ali and WM Frandah wrote the manuscript. M. Salih and SJ Krohmer provided the images. H. Mardini edited the article. S. Emhmed Ali is the article guarantor.

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REFERENCES

1. Strasberg SM, Hertl M, Soper NJ. An analysis of the problem of biliary injury during laparoscopic cholecystectomy. *J Am Coll Surg*. 1995;180:101.
2. Branum G, Schmitt C, Baillie J, et al. Management of major biliary complications after laparoscopic cholecystectomy. *Ann Surg*. 1993;217:532.
3. Karvonen J, Gullichsen R, Laine S, Salminen P, Grönroos JM. Bile duct injuries during laparoscopic cholecystectomy: Primary and long-term results from a single institution. *Surg Endosc*. 2007;21:1069–73.
4. Bujanda L, Calvo MM, Cabriada JL, Orive V, Capelastegui A. MRCP in the diagnosis of iatrogenic bile duct injury. *NMR Biomed*. 2003;16:475–8.
5. Bergman JJ, van den Brink GR, Rauws EA, et al. Treatment of bile duct lesions after laparoscopic cholecystectomy. *Gut*. 1996;38:141–7.
6. Slanetz PJ, Boland GW, Mueller PR. Imaging and interventional radiology in laparoscopic injuries to the gallbladder and biliary system. *Radiology*. 1996;201:595–603.
7. Fiocca F, Salvatori FM, Fanelli F, et al. Complete transection of the main bile duct: Minimally invasive treatment with an endoscopic-radiologic rendezvous. *Gastrointest Endosc*. 2011;74:1393–8.
8. Miller T, Singhal S, Neese P, Duddempudi S. Non-operative repair of a transected bile duct using an endoscopic-radiologic rendezvous procedure. *J Dig Dis*. 2013;14:509–11.
9. Artifon EL, Uemura RS, Teran A, et al. Percutaneous passage of an extraction balloon to assist recanalization of the common bile duct after surgical transection. *Gastrointest Endosc*. 2015;81(4):1017–8.
10. Ersoz G, Tekin F, Bozkaya H, et al. Magnetic compression anastomosis for post-traumatic disconnected bile duct. *Acta Gastroenterol Belg*. 2016;79(1):60–1.
11. Wong JC, Durack JC, D'Angelica MI, et al. Triple rendezvous using percutaneous, endoscopic, and real-time CT to safely reanastomose bile duct transection following liver resection. *Endoscopy*. 2014;46(Suppl 1):570–1.