

Case Report

Biliary Reconstruction with Right Hepatic Lobectomy due to Delayed Management of Laparoscopic Bile Duct Injuries: A Case Report

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We report a case requiring biliary reconstruction with right hepatic lobectomy due to biliary strictures caused by continuous cholangitis after laparoscopic bile duct injury. The patient, a 55-year-old woman, underwent laparoscopic cholecystectomy for cholelithiasis at another hospital. Although a bile leakage from the intraabdominal drain was observed several days after the operation, the patient was not given adequate treatment to stop the leakage. Two months after the initial laparoscopic cholecystectomy, she was referred to our hospital. Endoscopic retrograde cholangiopancreatography (ERCP) showed complete obstruction of the common hepatic duct, which was caused by clipping during laparoscopic cholecystectomy. Cholangiography from percutaneous transhepatic biliary drainage (PTBD) catheters revealed that sections of the secondary branches of the right intrahepatic bile duct had become constricted due to persistent cholangitis. Fortunately, the left hepatic duct was judged to be normal by imaging. Therefore, we elected to perform a right hepatic lobectomy and left hepaticojejunostomy, because we felt that performing a hepaticojejunostomy without hepatic resection would put the patient at risk of continuing to suffer from cholangitis. The patient was discharged on the 55th postoperative day, and, 5 years after reconstructive surgery, is healthy and has remained free from biliary strictures in the remnant liver. Appropriate decision-making is essential in the treatment of biliary injury after laparoscopic cholecystectomy. Surgeons should not hesitate to perform biliary reconstruction with hepatic resection to reduce the risk of cholangitis or biliary strictures of the remnant liver. More importantly, preoperative clear imaging of the biliary tree and suitable management of any biliary injury which might occur are necessary to avoid having to perform reconstructive surgery.

Key words: biliary injury, laparoscopic cholecystectomy, hepatic resection

Although laparoscopic cholecystectomy is perhaps the most significant technical advance in performing cholecystectomy compared to open cholecystectomy,

the laparoscopic approach appears to be associated with an increased incidence of bile duct injuries [1-3]. The most common injury that occurs in this type of surgery is bile duct injury, due to misidentification of the common bile duct as the cystic duct. Once this injury occurs, immediate surgical management is required [4, 5]. The standard operation for reconstruction of major bile duct

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injury after laparoscopic cholecystectomy is hepaticojejunostomy; however, if a stricture of the intrahepatic bile ducts due to delayed or inadequate management of bile duct injuries occurs, biliary reconstruction becomes more complicated [6–8]. The authors report a case requiring biliary reconstruction with right hepatic lobectomy due to biliary strictures caused by continuous cholangitis after laparoscopic bile duct injury.

Case Report

The patient, a 55-year-old woman, underwent laparoscopic cholecystectomy for cholelithiasis at another hospital. Although leakage of bile from the intraabdominal drain was observed several days after the operation, the patient was not given adequate treatment to stop the leakage. Although the bile leakage ceased within a month after surgery, it was apparent the patient had jaundice. Eventually, transhepatic biliary drainage (PTBD) was performed into the left hepatic duct through the B3 branch. As major bile duct complications were detected by cholangiography through the PTBD catheter, the patient was referred to our hospital 2 months after the initial laparoscopic cholecystectomy.

Upon admission, the patient's total bilirubin was elevated to 11.3 mg/dl, and ultrasonography showed marked dilatation of the right intrahepatic bile duct. Therefore, additional PTBD catheters were inserted into

the anterior and posterior hepatic ducts (Fig. 1a). Endoscopic retrograde cholangiopancreatography (ERCP) showed complete obstruction of the common hepatic duct, apparently caused by clipping during the laparoscopic cholecystectomy (Fig. 1b). Cholangiography through the PTBD catheters showed that the biliary tree was divided into the left main, right anterior, and right posterior hepatic ducts by hilar obstruction, giving a similar appearance to that of advanced hilar bile duct cancer. In addition, sections of the secondary branches of the right intrahepatic bile duct were constricted due to the persistent cholangitis that had occurred as a complication of the earlier surgical mismanagement (Fig. 2). Fortunately, the left hepatic duct was free from infection, but *Candida albicans* was cultured in the bile derived from the right anterior and posterior hepatic ducts after improvement of the jaundice was shown from PTBD. Therefore, we elected to perform a right hepatic lobectomy and left hepaticojejunostomy, because we felt that performing biliary reconstruction with a standard Roux-en-Y hepaticojejunostomy would put the patient at risk of continuing to suffer from cholangitis in the remnant right hepatic lobe.

The patient was admitted to our hospital, and had to remain there for 2 months until her condition stabilized sufficiently to allow further surgery to be performed. Celiac angiography, which was done after recovery, showed that the right hepatic artery was free from injury.

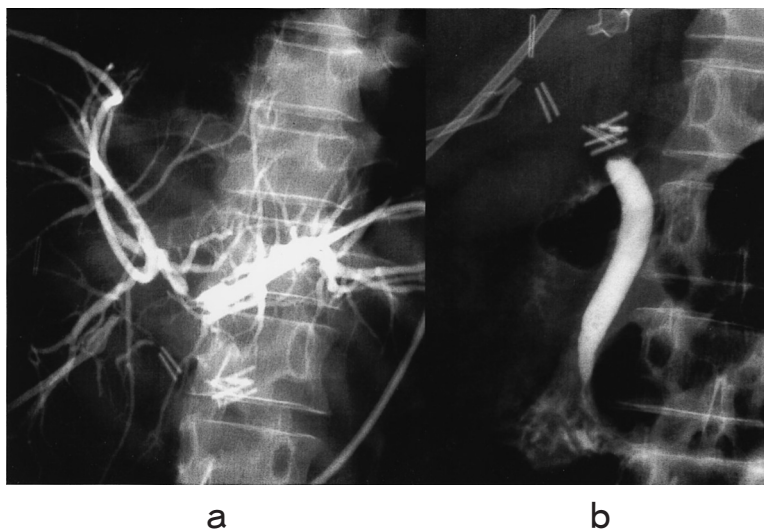


Fig. 1 a, Cholangiography showing that the biliary tree was divided into the left main, right anterior, and right posterior hepatic ducts by hilar obstruction. b, ERCP showing the obstruction of the common hepatic duct by intraoperative clipping.

A transileocecal right portal embolization (TIPE) was then performed. Two weeks after the TIPE and 144 days after the laparoscopic cholecystectomy, biliary reconstruction surgery was undertaken. During the operation, the right posterior hepatic duct was found to have been clipped in addition to the common hepatic duct. Although the post-inflammatory state of common hepatic duct made hepatic hilar dissection difficult, we successfully cut the left main hepatic duct, and performed a right hepatic

lobectomy followed by a left Roux-en-Y hepaticojejunostomy (Fig. 3).

Microscopic views of the specimen showed that the connective tissue was more abundant, and had a concentric configuration around the peripheral bile ducts. Focal necrosis of the hepatic cells, consisting of either the lytic or the eosinophilic type, was also observed. The patient was pathologically diagnosed as being in the pre-cirrhotic stage, due to chronic cholangitis caused by biliary injury

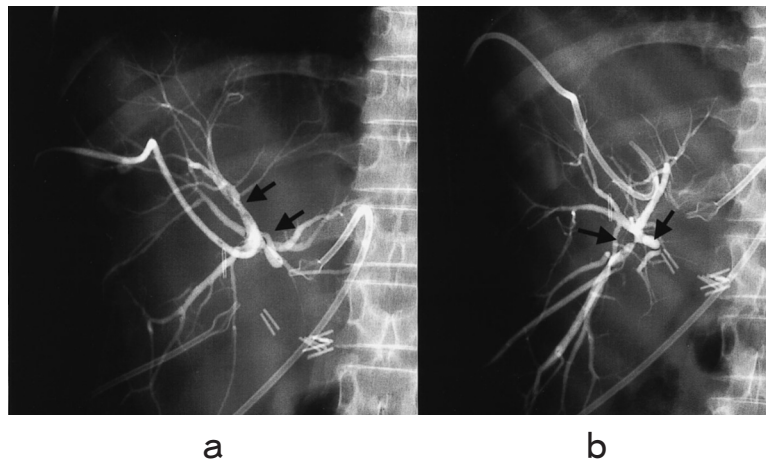


Fig. 2 Cholangiography showing strictures of the secondary branches of the intrahepatic bile duct, anterior hepatic duct (a), and posterior hepatic duct (b) (arrow).

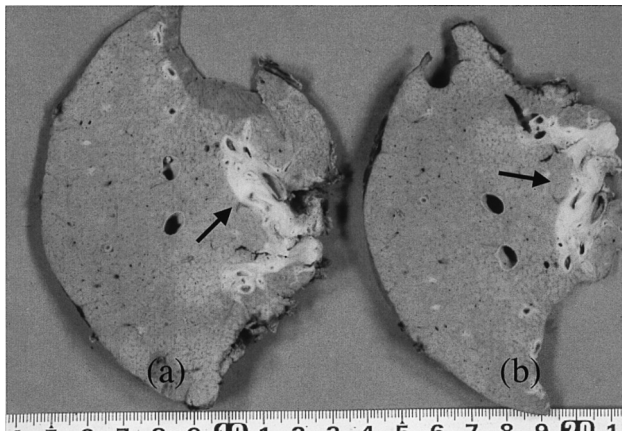


Fig. 3 Macroscopic findings of the specimen. The wall of the intrahepatic bile duct in the right lobe was markedly thickened by persistent cholangitis. Anterior branch (a) and posterior branch (b) (arrow).

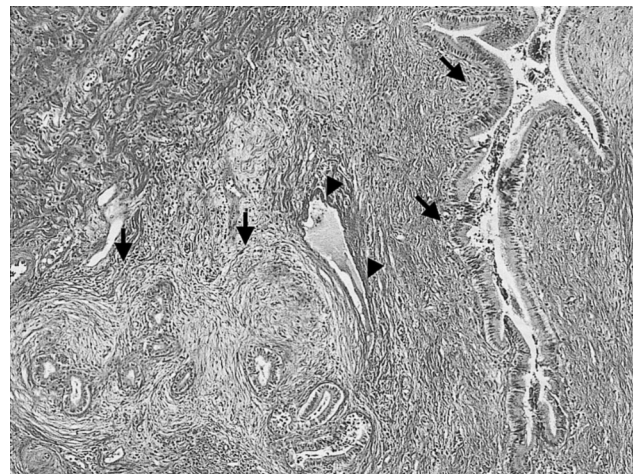


Fig. 4 Microscopic findings of the specimen. Connective tissue was more abundant, and formed a concentric configuration around the peripheral bile ducts (arrow) due to chronic cholangitis. In addition, the embolized peripheral portal vein was observed (arrow head).

after laparoscopic cholecystectomy (Fig. 4).

Although the postoperative course was complicated by mild liver failure, the patient was discharged on the 55th postoperative day, and in the 5 years that have passed since the second operation, has remained healthy. No biliary strictures have appeared in her remnant liver.

Discussion

Since laparoscopic cholecystectomy was introduced in the 1990s, the procedure has gained widespread acceptance among Japanese surgeons. Compared with open cholecystectomy, the advantages of performing laparoscopic cholecystectomy include less postoperative pain, a shorter hospital stay, and a better cosmetic outcome. However, these advantages have forced surgeons to perform laparoscopic cholecystectomy without adequate training in laparoscopy-guided procedures. As a result, biliary injury complications during laparoscopic cholecystectomy, due to misidentification of the cystic duct, probably occur more frequently than in open cholecystectomy. In fact, the statistics bear this out, as a comparison of laparoscopic cholecystectomy with open cholecystectomy has shown that laparoscopic cholecystectomy is associated with a significantly higher incidence of bile duct injuries (1.09% *vs.* 0.51%). [9]

Most reported injuries have occurred as a result of inadvertent diversion of the common or hepatic bile duct (which had been misidentified as the cystic duct), uncontrolled clipping, or liberal use of cautery. [10] In the present case, we found that both the common hepatic duct and posterior hepatic duct, which was supposed to be an anomaly of the right hepatic duct, had been clipped. It is possible that the former was misidentified as the cystic duct, the so-called "classical injury," and that the latter occurred during the attempts which were made to stop bleeding from the liver bed. In addition, there have been several reports of injury to aberrant right hepatic ducts during laparoscopic cholecystectomy. The segment of the aberrant right hepatic duct which is located between the entry of the cystic duct and the junction with the common hepatic duct, is thought to be the cystic duct. [11] To avoid this type of injury, routine preoperative cholangiogram by ERCP is recommended.

Bile leakage from the drain suggests potential inadvertent injury to the bile duct. When this leakage is observed, percutaneous drainage of every biloma present should first be performed. Next, if technically possible, ERCP

should be undertaken, as this procedure serves both a diagnostic and therapeutic role [12].

PTBD could not only have decompressed the distal bile duct after injury, but reduced the possibility of cholangitis. In this case, delayed management after the clipping of the common hepatic duct and posterior hepatic duct, due to misidentification, led to continuous cholangitis from the posterior segment to anterior segment, which resulted in biliary strictures in the right hepatic lobe. The goal of managing a biliary stricture is to assure bile flow into the proximal gastrointestinal tract in a manner that prevents cholangitis, sludge or stone formation, re-stricture, and biliary cirrhosis [13]. Although most surgeons chose hepaticojejunostomy to repair a bile duct injury, a high rate of re-stricture (17%) and cholangitis (85%) have been reported [6-8]. In the present case, biliary strictures in the right hepatic lobe were already present, and hepaticojejunostomy was not thought to be the optimal procedure for resolving the continuing cholangitis. Thus, hepatic resection and the removal of the parenchyma drained by the injured ductal system was chosen to avoid high anastomosis of the intrahepatic bile duct, and to reduce the possibility of long-term complications, such as cholangitis or late stricture formation [12, 14-16]. Although hepatic resection is not routinely chosen for the treatment of bile duct injury without injury to the hepatic artery, it has been claimed to be a good solution for patients with high biliary strictures or concomitant arterial transections.

Appropriate decision-making is essential in the treatment of biliary injury after laparoscopic cholecystectomy. Surgeons should not hesitate to perform biliary reconstruction with hepatic resection to reduce the risk of cholangitis or biliary strictures of the remnant liver. More importantly, preoperative clear imaging of the biliary tree and suitable management for biliary injury are recommended to avoid having to perform reconstructive surgery.

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