Bile leakage after cholecystectomy in a patient with cholecystohepatic duct: a case report

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Abstract

Cholecystohepatic duct (CHD) is a very rare anomaly of the extrahepatic biliary tract. Herein we report on a case of bile leakage after cholecystectomy due to injury to the CHD, the presence of which had not been recognized before surgery. Follow-up computed tomography (CT) of an asymptomatic 63-year-old man 1 year after Roux-en Y reconstruction for advanced gastric cancer revealed a gallbladder mass, and so cholecystectomy was planned. Preoperatively, there was no indication of biliary anomaly by magnetic resonance cholangiopancreatography (MRCP). During surgery, a “string” was visualized between the cystic duct and the bed of the gallbladder. This “string” was ligated without intraoperative cholangiography and the gallbladder was removed. On postoperative day (POD) 5, bile peritonitis developed and percutaneous drainage was performed. Abdominal contrast examinations from the drainage tube enabled visualization of the intrahepatic duct of the posterior segment of the liver. Careful re-examination of preoperative MRCP images showed a confluence between the biliary duct and the neck of the gallbladder (i.e., a CHD), which drained the posterior segment of the liver. Although the end of the CHD was blind, the bile leakage improved following percutaneous abdominal drainage alone, without percutaneous transhepatic cholangiography or reoperation. In conclusion, CHD is a very rare biliary anomaly. However, it should be kept in mind during cholecystectomy to avoid serious complications.

Keywords: bile leakage, cholecystectomy, cholecystohepatic duct

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Background

Cholecystohepatic duct (CHD) is a very rare anomaly of the extrahepatic biliary tract\(^1,2\). Recent advances in diagnostic imaging have made it possible to now recognize CHD before surgery. However, biliary tract injuries, which may lead to bile leakage, bile peritonitis, and cholangitis, may still occur during cholecystectomy. The presence of such extrahepatic biliary anomalies must be established and correct surgery, including biliary tree reconstruction or preservation of the CHD, is vital. Herein we present a case of injury to the CHD after cholecystectomy that provides important lessons.

Case presentation

Follow-up computed tomography (CT) of an asymptomatic 63-year-old man 1 year after Roux-en Y reconstruction for advanced gastric cancer followed by adjuvant chemotherapy revealed a mass lesion in the gallbladder. Laboratory examinations (e.g., serum bilirubin and aminotransferase levels) were normal. Abdominal ultrasonography revealed a mass lesion measuring 21 mm in diameter in the bottom of the gallbladder. Positron emission tomography–CT revealed positive uptake of \(^{18}\)F-2-deoxy-2-fluoro-glucose in the mass lesion. Preoperatively, biliary anomalies were not recognized by magnetic resonance cholangiopancreatography (MRCP). Endoscopic retrograde cholangiopancreatography was performed because of the postoperative alimentary anatomy after gastrectomy with Roux-en-Y reconstruction. Thus, a diagnosis of a gallbladder tumor, such as primary or metastatic carcinoma, was made and cholecystectomy planned.

On laparotomy, marked adhesion was found in the abdominal cavity due to the previous surgery. After identification of the cystic duct and cystic artery, a “string” was visualized between the cystic duct and bed of the gallbladder (Fig. 1). This was considered to be an accessory hepatic duct because preoperative imaging did not reveal

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any biliary tract anomalies. Therefore, the “string” was ligated without intraoperative cholangiography and the gallbladder was removed. Macroscopically, the resected specimen showed no specific findings around the neck of the gallbladder, whereas postoperative microscopic examination revealed adenomyomatosis of the gallbladder.

On postoperative day (POD) 5, bile peritonitis developed and percutaneous drainage was performed. Contrast examination from the abdominal drainage tube enabled visualization of the intrahepatic duct of the posterior segment of the liver, but not the downstream bile duct (Fig. 2). In the retrospective view, the preoperative MRCP images showed confluence between the bile duct and the neck of the gallbladder (Fig. 3), specifically a CHD draining the posterior segment of the liver. Thus, the bile leakage was due to injury to the CHD. We took the further invasive drainage or reoperation including biliary tract reconstruction into consideration in order to overcome this situation. Although the end of the CHD was blind, the bile leakage improved gradually along with the reduction of quantitative discharge following percutaneous abdominal drainage alone, without percutaneous transhepatic cholangiodrainage or reoperation. The drainage tube was removed on POD 94 and the patient was discharged on POD 112. Five years after the initial gastrectomy with Roux-en-Y reconstruction, and 4 years after the cholecystectomy, although mild extension of the intrahepatic duct of the posterior segment of the liver remains, there

Fig. 1  Intraoperative photograph showing gallbladder.
A “string”, a confluence between the cystic duct and the bed of the gallbladder, was visualized (arrow). *, cystic duct; §, common hepatic duct; III, gallbladder.
is almost no liver atrophy and no liver dysfunction.

**Discussion**

CHD is a very rare anomaly of the extrahepatic biliary tract, with a reported frequency of 0.7%–1.2% \(^1,2\). The CHD drains a certain area of the liver and is confluent with the gallbladder or cystic duct \(^3,4\). In 1945, Neuhof et al. \(^5\) first named this biliary anomaly as CHD, and in 1991 Campetier et al. \(^6\) subdivided CHD into three types depending on the area drained: a subsegment or segment, a sector, or the whole of the right lobe of the liver. In the case of confluence with the cystic duct, it is possible to make a diagnosis of CHD if a helical structure is found on the side of the common bile duct after it merges with the cystic duct \(^7\). The other types of CHD are believed to be variations of the extrahepatic bile duct where the cystic duct branches from the right hepatic duct or the right accessory duct \(^8\).

In the present case, the biliary anomaly was not recognized preoperatively and the CHD, which was draining the posterior segment of the liver, was confirmed preoperatively by magnetic resonance cholangiopancreatography. The postoperative imaging examination from the abdominal drainage tube enabled visualization of the intrahepatic duct (arrow), whereas the downstream bile duct was not seen (A). Computed tomography after injection of contrast medium from the drainage tube revealed that the intrahepatic duct was compatible as posterior branch of the liver (arrowhead) (B).
for the first time by bile leakage. Previous reports of the incidence of biliary tree injuries are in the range 0%–7%, whereas using the open approach resulted in a 0.25% incidence of biliary tree injuries. However, bile leakage due to injury of the CHD has been rarely reported. It is important to distinguish CHD from a communicating accessory bile duct or bile duct of Luschka (subvesi- cal or subserosal duct). The former travels between the main ducts without draining a specific area of the liver, whereas the latter travels on the surface of either the gallbladder or liver in contact with the wall of the gallbladder, passes into the liver, with most of it flowing into the right hepatic duct.

In many cases, the CHD is found during treatment of gallbladder or common bile duct stones. The surgical options when CHD is suspected during cholecystectomy are as follows: (1) preservation of the CHD and formation of a bile duct by, for example, using part of the gallbladder wall; (2) in cases where the drainage area of the liver is large, usual cholecystectomy and biliary tract reconstruction; and (3) in cases where the area of the liver drained is small, cholecystectomy and closure of the CHD. In addition, Longmire et al. recommended that the CHD be ligated in the absence of infection of the biliary tract if its diameter is ≥1 mm and the drainage area is small; but, if the diameter of the CHD is ≥2 mm and the drainage area is large, Longmire et al. recommend reconstructive surgery. Recent advances in diagnostic imaging make it possible to recognize CHD before surgery but after the presence of such extrahepatic biliary anomalies is confirmed, correct surgery, including biliary tree reconstruction, is vital.

There were two important missing in the present case: (1) not noticing preoperative biliary findings and recognizing the presence of a CHD; and (2) not performing an intraoperative cholangiogram, which could have helped prevent injury. If the “string” had been suspected as a CHD intraoperatively, a direct cholangiogram from the gallbladder would have been needed, because initial dissection of a CHD is considered dangerous and the cholangiogram would have confirmed the presence of a CHD. In this case, we would have reconstructed the duct if it had been proven to be a CHD because its diameter was >2 mm. Moreover, if the tumor had been shown to be adenomyomatosis before surgery, CHD-preserving cholecystectomy could have been performed, perhaps avoiding serious complications.

In the present case, 4 years after the cholecystectomy, laboratory examinations revealed that the patient had no liver dysfunction, whereas imaging revealed mild extension of the intrahepatic duct of the posterior segment of the liver, without liver atrophy. However, Aizawa et al. reported obstructive cholangitis of the accessory bile in a patient 30 years after cholecystectomy that required right hepatic lobectomy. Therefore, our patient must followed-up to determine any long-term complications.

Conclusions

CHD is a very rare biliary anomaly. However, during cholecystectomy, the possibility of CHD must be taken into consideration to avoid serious complications.

Authors’ contributions

SU and TN reported the case and wrote the manuscript. SU, TN, HK, JI, KF, ST, HM, and MK performed the surgery and perioperative management of the patient and helped in drafting the manuscript. SU, TN, and KH participated in revising the manuscript critically. All authors read and approved the final manuscript.

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