

Posterior Hepatic Duct Injury during Laparoscopic Cholecystectomy finally Necessitating Hepatic Resection: Case Report

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ABSTRACT

A case of bile duct injury during laparoscopic cholecystectomy finally necessitating right hepatic lobectomy is reported to re-emphasize the importance of preoperative and intraoperative assessment of the biliary tree. A 47-year-old Japanese woman underwent laparoscopic cholecystectomy for cholecystolithiasis. On postoperative day 5, fever and right hypochondralgia developed, and CT revealed fluid collection at the right hypochondrium.

Percutaneous drainage was performed, and subsequent fistulography revealed a communication of the cystic cavity with the right posterior bile duct, which suggested injury of the aberrant hepatic duct. Conservative therapy, including the adaptation of fibrin glue, was performed, but closure of the fistula and cavity was not obtainable. Finally, a right hepatic lobectomy was performed four months after cholecystectomy. In this case, endoscopic retrograde cholangiopancreatography was unsuccessful preoperatively, and intraoperative cholangiography was not done. This case report re-emphasizes that the preoperative and intraoperative examination of the biliary tree is mandatory to avoid bile duct injury.

Key Words: Laparoscopic cholecystectomy, Bile duct injury, Aberrant hepatic duct, Intraoperative cholangiography.

BACKGROUND

Laparoscopic cholecystectomy has taken the place of open cholecystectomy as a standard operative procedure for cholecystolithiasis. The importance of preoperative and intraoperative examination to recognize the anatomy of the biliary tree has been emphasized in order to avoid the bile duct injury during surgery; however, these procedures, in fact, are not performed routinely in many institutions because of their cost and difficulty in performing a cholangiography. The rate of bile duct injury during laparoscopic cholecystectomy has become higher than that of the era of open cholecystectomy because the laparoscopic procedure is limited in 3-dimensional visibility and tactile sense. We report a case of right posterior hepatic duct injury during laparoscopic cholecystectomy requiring the hepatic resection to warn the surgeon about importance of preoperative or intraoperative cholangiography for avoiding bile duct injury during laparoscopic cholecystectomy.

CASE REPORT

A 47-year-old Japanese woman presented with epigastric pain and was admitted to our hospital on November 4, 1998. Ultrasonography demonstrated an enlarged gallbladder due to incarceration of a stone at the neck of the gallbladder. Drip infusion cholangiography showed only normal choledochus, and no information of the gallbladder was obtainable (**Figure 1a**). Endoscopic retrograde cholangiography (ERC) was unsuccessful. The patient underwent laparoscopic cholecystectomy under the tentative diagnosis of cholecystolithiasis.

Upon insertion of the laparoscope, severe inflammation around the gallbladder was seen. The operative field was inadequate due to bleeding from the scarring gallbladder, and the dissection of the Calot's triangle was difficult. Two cord-like structures corresponding to the possible cystic duct and artery were identified and divided using double-clipping techniques.

Thereafter, the gallbladder was dissected from the neck to the fundus and was removed. A Penrose drain was placed in the right subhepatic space. Intraoperative cholangiography was not performed.

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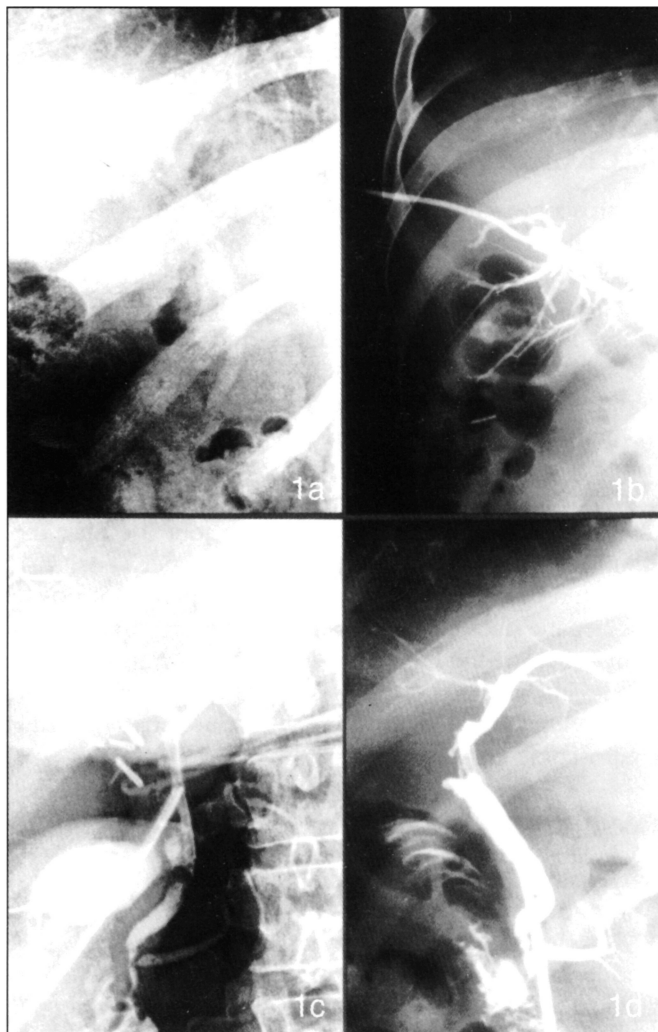


Figure 1a. Drip infusion cholangiography demonstrating the normal common hepatic duct but not representing the gallbladder. **Figure 1b.** Fistulogram demonstrating the posterior segmental bile duct having no connection to the common bile duct. **Figure 1c.** Intraoperative cholangiography demonstrating a confluence of the right anterior hepatic duct and left hepatic duct without posterior segmental branch. The injured posterior hepatic duct was close to the clips. **Figure 1d.** Postoperative cholangiography after right hepatic lobectomy.

On postoperative day 5, the patient developed right upper quadrant pain, fever and bile discharge from the Penrose drain. Computed tomography (CT) showed fluid collection in the right upper quadrant (**Figure 2a**), and a percutaneous drainage guided by ultrasonography was performed. Purulent discharge containing bile was drained, and the Penrose drain was removed. Fistulography revealed a communication between the abscess cavity and the right posterior hepatic duct and no communication between the abscess cavity and the common hepatic duct (**Figure 1b**). This suggested possible injury of the aberrant right posterior hepatic duct during laparoscopic cholecystectomy. The volume of bile discharge from the drainage tube was about 100-150 mL/day. Conservative therapy, including application of fibrin glue, was performed, but the bile discharge was not reduced, and the cavity and fistula were not closed.

The presence of a subcapsular hematoma of the right hepatic lobe and of an abscess in the posterosuperior subsegment was observed (**Figure 2b**). Finally, the patient had to undergo laparotomy on March 1, 1999, four months after laparoscopic cholecystectomy. At first, choledochotomy and T-tube drainage were performed. Intraoperative cholangiography revealed the right anterior hepatic duct and the left hepatic duct, and the right posterior hepatic duct was not visualized (**Figure 1c**). Taken together with the fistulography, the injured right posterior duct was close to the clips. The dissection of the hepatic hilum revealed two ductal structures entering the common hepatic duct and pinched with the clips. One of them corresponded to the cystic duct and another to the right posterior hepatic duct. The fistula was in the dorsal portion of the right portal vein, and the wall was fibrously thickened. The proximal stump of the right posterior hepatic duct could not be identified (**Figure 3**). Due to the difficulty in approaching the right side of the hepatic hilum, right hepatic lobectomy was selected instead of posterior segmentectomy to excise the fistula and injured posterior hepatic duct completely. The patient's postoperative course was uneventful, and the postoperative cholangiography through T-tube demonstrated no biliary leakage from the biliary tree (**Figure 1d**).

DISCUSSION

Bile duct injury is one of the most serious complications during laparoscopic cholecystectomy, with the reported incidence rate being 0.2-0.6%.¹⁻³ The most frequent



Figure 2a. Computed tomography after laparoscopic cholecystectomy demonstrating an abnormal fluid collection in the right upper quadrant region. **Figure 2b.** Computed tomography before hepatic resection demonstrating a subcapsular hematoma of the right hepatic lobe and an abscess in the subsegment.

injury site is the common hepatic duct, followed by the cystic duct and the right hepatic duct.¹⁻³ Injury of the common hepatic duct occurs by misidentification of the cystic duct.¹⁻³ In half the cases, bile duct injury is recognized postoperatively, and, in most of such cases, intraoperative cholangiography is not employed.¹⁻³ In our case, a direct cholangiography was not performed preoperatively and intraoperatively, and the bile leakage was suspected by biliary discharge from the Penrose drain on postoperative day 5.

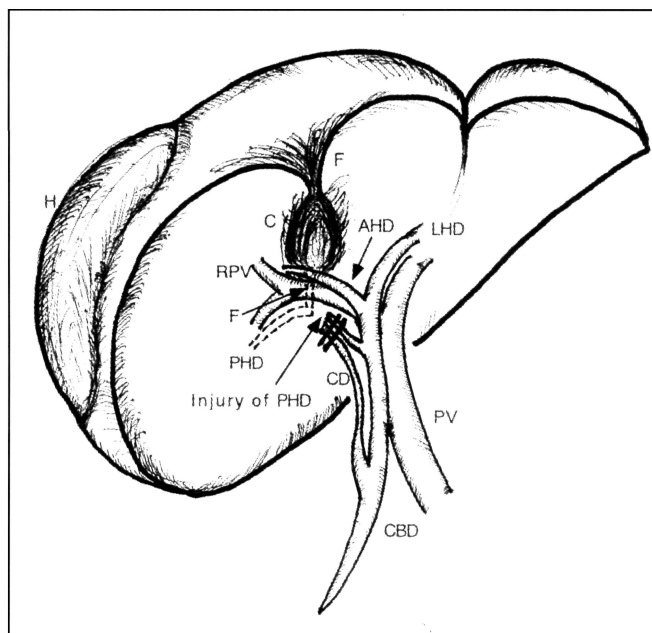


Figure 3. A schema of the biliary system during hepatic resection in our case. F: Fistula by percutaneous abscess drainage; C: Cavity; H: Hematoma; AHD: Anterior hepatic duct; PHD: Posterior hepatic duct; LHD: Left hepatic duct; RPV: Right portal vein; PV: Portal vein; CBD: Common bile duct; CD: Cystic duct, which ran in parallel with CBD and entered in lower part of CBD.

The choice of therapeutic management is varied and is pursued by individual surgeons based on their preference and judgement.¹⁻⁵ Recently, ERC and its therapeutic modalities have become the first choice of the therapeutic option for the management of bile leaks diagnosed in the postoperative state.^{4,5} ERC and insertion of an endoprosthesis are the best initial approaches.^{4,5} When the endoscopic drainage is difficult, a percutaneous transhepatic approach should be applied. Only percutaneous CT- (or ultrasonographic) guided drainage will be efficient for localized intra-abdominal bile collection due to unknown injury site of peripheral branch, and endoscopic sphincterotomy should be added if the sphincter stenosis or choledocholithiasis contributes to the development of bile leak.⁴ Occlusion of bile duct with fibrin glue for extinction of biliary secretion was reported useful in the case of intractable biliary-cutaneous fistula.⁶ If these conservative methods have failed, open repair of end-to-end bile duct anastomosis or hepaticojejunostomy and drainage are recommended.¹⁻⁴

Although there is no report of hepatic resection for bile duct injury after laparoscopic cholecystectomy in English literature, partial hepatectomy is necessary in cases where the restoration of the bile flow to the bowel and closure of bile fistula are impossible.

In our case, we first applied conservative therapy -- that is, to make liver parenchymal atrophy with impaction of the biliary tree with fibrin glue,^{6,7} which developed subcapsular hematoma and abscess of the liver. At the time of the second operation, the right posterior hepatic duct was completely transected without a connection to the common hepatic duct, and the injured right posterior hepatic duct could not be identified due to inflammation. Therefore, right hepatic lobectomy was selected.

It is well known that there are many variations of biliary branching, and the reported rate of the presence of aberrant hepatic duct is 14-30%.^{8,9} A branching pattern of the aberrant posterior segmental hepatic duct entering the common hepatic duct, as seen in our case, is the most frequent,^{8,9} in which there is a short distance between the cystic duct and the aberrant hepatic duct.⁹ The aberrant posterior branch often runs so near the liver bed that bile duct injury may happen during cholecystectomy.⁸ Regarding the preoperative analysis of the biliary branching variation, endoscopic cholangiography is useful,⁹ and newly developing magnetic resonance cholangiography (MRC) is also valuable, even in unsuccessful cases of endoscopic retrograde cholangiography.¹⁰ However, these examinations are costly and not performed routinely as preoperative tests. They should be performed selectively on patients having severe cholecystitis. The majority of bile duct injuries during laparoscopic cholecystectomy occur in cases of acute cholecystitis, but some reports showed the effectiveness of routine intraoperative laparoscopic cholangiography to avoid the bile duct injury.^{11,12} Intraoperative cholangiography is the last way to avoid bile duct injury and to recognize the injury during the operation. However, intraoperative cholangiography is not performed routinely at most of institutions because it is difficult to perform.^{11,12} The present case serves as a good lesson for re-emphasizing the importance of intraoperative cholangiography, whenever preoperative cholangiography is not obtainable. The possible presence of biliary anomaly should be kept in mind at laparoscopic cholecystectomy.

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