

# The chain of postoperative complications after laparoscopic cholecystectomy

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## ABSTRACT

Bile duct injuries are among the most dreadful complications of cholecystectomy. As laparoscopic cholecystectomy has become increasingly popular, the incidence of this complication increased and has remained unchanged in spite the learning curve being completed. A 50-year-old female underwent elective laparoscopic cholecystectomy for gallstone disease. A complicated bile duct injury occurred during the procedure. As the injury was immediately recognized, it was treated with concomitant hepaticojejunostomy. In the postoperative period, biliary fistula, which was assumed to be the result of an anastomotic leak, was encountered. Diagnostic and therapeutic percutaneous transhepatic biliary drainage was considered. It revealed that the anastomosis was intact and the source of biliary leak was an aberrant right posterior sectorial branch. A severe bleeding through the biliary catheter occurred due to transmigration of the catheter into the portal vein. Bleeding was controlled with embolization by the interventional radiologist. The patient thereafter was re-operated, and the leakage was sealed by ligation of the aberrant right posterior sectorial branch. The postoperative period was uneventful. As long as cholecystectomy is performed, bile duct injuries will always exist. Therefore, every abdominal surgeon should be aware of possible consequences of complications related to this procedure.

**Key Words:** Cholecystectomy, bile duct injury, hepaticojejunostomy, percutaneous biliary drainage

## INTRODUCTION

Bile duct injury (BDI) is one of the most dreaded complications of cholecystectomy (1). There has been an increase in the frequency of BDIs with the introduction of laparoscopic cholecystectomy, and a significant reduction in the incidence has not been achieved despite the completion of the learning curve (1). Although the type of treatment varies according to the type of BDI, time of diagnosis and patient condition, the most commonly preferred method in complete transection of the common bile duct is bilio-enteric anastomosis (2, 3).

Anastomotic complications arising after bilio-enteric anastomosis are usually treated conservatively as long as the biliary fistula is kept under control, in other words unless bile peritonitis occur (1). In such cases, unfortunately, the role of endoscopic treatment is limited. That is why percutaneous transhepatic biliary catheterization has become popular in the treatment of persistent biliary fistulas (4). In these circumstances, percutaneous biliary drainage can both contribute to fistula healing and may be beneficiary in the next surgical procedure if the fistula persists (1).

The complication rate of percutaneous transhepatic biliary catheterization is approximately 0.4 to 6.5% (4). The most important complication is bleeding and constitutes 2-3% of all complications (5, 6). According to development mechanism, the bleeding can manifest as hemothorax, hemoperitoneum, subcapsular liver hematoma, hemobilia, melena, and bleeding through the percutaneous catheter (5, 6).

In this article, management of a patient who had a BDI during laparoscopic cholecystectomy that was performed for gallstone disease was presented. A concurrent bilioenteric anastomosis was performed, and a percutaneous transhepatic biliary drainage was applied due to postoperative anastomotic leakage. The drainage catheter then migrated into the right portal vein leading to severe bleeding within the catheter. The bleeding was treated conservatively in collaboration with radiology and surgery.

## CASE PRESENTATION

A 50-year-old female patient was admitted to the emergency department with jaundice and abdominal pain. The abdominal sonography and magnetic resonance cholangiopancreatography of the patient who was diagnosed with obstructive jaundice showed normal extra- and intrahepatic biliary tract with numerous millimetric gallstones within the gallbladder, there were no pathologies within the common bile duct. The patient was followed-up conservatively and was discharged with an appointment for cholecystectomy. The patient's medical history was uneventful.

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The patient was re-hospitalized for cholecystectomy 6 weeks after the emergency admission. During laparoscopic cholecystectomy, an iatrogenic bile duct injury occurred. It was converted to an open procedure, and the exploration revealed that the bile duct injury was approximately 1 cm caudal to hepatic duct bifurcation, with a complete transection of the common bile duct. A piece of the duct was extracted along with the surgical specimen and the caudal common bile duct end was clipped. The acting surgeon invited a senior surgeon to the operating room for intraoperative consultation. The senior surgeon defined the anatomy of bile duct injury (Strasberg classification type E2), then decided to proceed with hepaticojejunostomy. Following the preparation of the small bowel loop, a single layer, end-to-side hepaticojejunostomy was performed with 5-0 polydioxanone.

On the third postoperative day, biliary drainage was detected from the subhepatic drain. The biliary drainage amount has increased in the following days and reached 450 mL by the 7<sup>th</sup> day. The patient was diagnosed with bilioenteric anastomotic leakage, and her abdominal ultrasonography did not show any free fluid within the abdomen. Septic findings did not develop. In order to exclude concomitant vascular injury, Doppler examination was performed and the hepatic vascular structures were found to be patent. Due to the ongoing controlled biliary fistula, a percutaneous transhepatic biliary catheterization and drainage was planned on the 15<sup>th</sup> day. Hepatobiliary ultrasonography performed by the interventional radiologist did not show dilation of the extrahepatic or intrahepatic bile ducts. The diagnostic percutaneous transhepatic cholangiography revealed that there was no leakage in the bilioenteric anastomosis and that the leakage was caused by the aberrant right posterior sectorial branch. After the diagnostic procedure, an 8F internal drainage catheter was inserted. There was bloody drainage from the catheter, and identification of the source of bleeding was attempted by giving contrast agent. It was detected that the contrast agent was going into the systemic circulation, and it was considered that the catheter was in a portal vein branch. Then, the catheter was progressed and biliary drainage was observed. During the repeat radiography the biliary tree filled with contrast material. The catheter was secured and the procedure was ended.

After the percutaneous intervention, the daily biliary drainage amount from the percutaneous catheter and the surgical drain was 50 mL and 100 mL, respectively. On the fifth post-procedure day, a sudden and severe bleeding occurred through the percutaneous catheter after the patient was mobilized. The patient developed shock with nearly 2000 mL of bleeding from the catheter within 1 hour. The percutaneous catheter was clamped and the patient was rapidly resuscitated. A fluoroscopic evaluation was performed by injecting contrast material through the percutaneous catheter in order to determine whether the catheter was completely in a vein. Extravasation of the contrast agent was observed. A guide wire was inserted through the catheter, and the catheter was advanced over the guide wire. The control contrast imaging showed no contrast extravasation, the catheter was fixed in the same position and was closed. The patient was responsive to fluid and blood resuscitation, and was followed-up in the intensive care unit. The ultrasonography performed by the interventional radiologist in the intensive care unit suggested that the catheter may be located in the right portal vein. It was decided to

follow-up the patient since the bleeding has stopped and the patient responded to resuscitation.

The patient's general condition has improved 10 days after the bleeding. The contrast enhanced computed tomography of the abdomen did not show any abnormalities. On the 25<sup>th</sup> day after the bleeding, the patient was re-evaluated by the interventional radiologist for closure of the porto-biliary fistula and percutaneous catheter removal. Contrast material was given through the catheter and the portohepatic tract was visualized (Figure 1). The catheter tract was covered with gel foam and the catheter was removed. The patient was closely followed up for 48 hours after the procedure, and any hemodynamic changes did not occur. There was no evidence of bleeding on abdominal ultrasonography, and the patient was discharged with the surgical drain.

The patient was operated due to ongoing biliary fistula, 8 weeks after her discharge. The right sectorial branches which led to bile leakage were identified, and the surrounding parenchyma was dissected with an attempt to obtain the required length for reconstruction. However, reconstruction could not be performed due to the lack of sufficient length, and the open bile duct was sutured. The patient did not encounter any complications in the postoperative period, the abdominal drains were removed on the 4<sup>th</sup> day after observing pure serous drainage and the patient was discharged. Her liver function tests were normal on the third postoperative month, and she is being regularly followed-up. The patient was informed before the study, and a written consent was obtained.

#### DISCUSSION

Bile duct injuries that are noticed during surgery (which constitute the minority) can be treated by different methods (2). The type of bile duct injury and the surgeon's experience are the most important factors that affect the success of treatment (2). Hepaticojejunostomy is the recommended form of treatment for type E2 injuries according to Strasberg classification or complete transection in an area less than 20 mm away from the common bile duct bifurcation (2, 7). Another important suggestion is that an experienced hepatobiliary surgeon rather than the surgeon in charge should perform the repair, because there is a significant difference between the two success rates (80% versus 30%) (1). In fact, if a hepatobiliary surgeon is not available at the time of surgery, it is recommended that only drainage without repair should be done and the patient should be sent to an experienced center. In this case, the



Figure 1. Portobiliary fistula tract occluded with gelfoam

surgeon in charge acted in the right way and invited a senior operating surgeon. The senior surgeon has enough experience in BDIs and their treatments, and deemed the patient appropriate for concurrent repair.

Percutaneous transhepatic biliary drainage is the most preferred method in case of breakdown of hepaticojejunostomy anastomosis and subsequent persistent biliary fistula (2). Unlike anastomotic strictures, intrahepatic bile ducts do not dilate in this type of leakage. Previously, this situation was considered as an obstacle to percutaneous transhepatic biliary drainage. However, nowadays, experienced interventional radiologists do not accept it as a limitation (4-6). In our case, although there was no bile duct dilation, we were able to apply percutaneous transhepatic biliary drainage since an experienced interventional radiologist is involved in our team. Despite successful intervention, one of the catheter related complications, catheter migration, occurred.

The surgeon in charge could benefit from intraoperative cholangiography to rule out the possibility of a concomitant variation, despite clear view of the anatomy of the common bile duct injury. In this way, perhaps, he would have identified the concomitant right sectorial branch injury and would have performed the repair during the same session. Thus, an additional complication would have been prevented.

If in this patient there was an isolated right sectorial branch injury without common bile duct injury, and this was unnoticed during surgery, a diagnostic endoscopic retrograde cholangiopancreatography would be applied first in case of persistent biliary fistula development. An endoscopic sphincterotomy would be performed after identification of the injury (8). If the fistula persisted, preferably reconstruction and if reconstruction could not be completed then over-sewing of the duct would be performed. In this case, the reason for not preferring endoscopic procedures was the existence of hepaticojejunostomy anastomosis. Similarly, the reason for suturing the right sectorial branch was not being able to obtain sufficient length for reconstruction despite parenchymal dissection.

The cause of sudden bleeding through the percutaneous biliary catheter could have been a fistula between the bile duct and the hepatic artery or portal vein as a complication of the procedure. However, since we already knew catheterization of the portal vein during the percutaneous intervention, the source of bleeding was thought to result from migration of the catheter into the portal vein. If we could not have verified this with contrasted radiography, we would have proceeded with an emergency laparotomy for bleeding control.

In this case, an important question is whether conservative management of the patient with follow-up is a more appropriate treatment since there are no signs of bile peritonitis and the fistula is under control. In retrospect, naturally, conservative treatment would be outweighed. However, a different scenario could have developed: The percutaneous transhepatic cholangiography that was performed due to persistent post-operative biliary fistula after a bilioenteric anastomosis may have detected an anastomotic leakage, and treatment would have been possible by the internal biliary catheter inserted percutaneously without any complications and without requirement for an additional surgical procedure.

Interventional radiologists treated the bleeding that resulted from migration of the biliary catheter into the portal vein successfully. Otherwise, a surgical intervention would be required and maybe such a surgical procedure would result in failure or perhaps require a major liver resection.

Finally, in case of anastomotic complications in patients with repair of the BDI during cholecystectomy, the presence of concomitant vascular injury should be investigated (2). Bile duct injuries are most commonly accompanied by hepatic artery injuries. Although, these vascular injuries rarely lead to clinically significant results and therefore usually do not require repair, they can lead to ischemia that will result in subsequent bilioenteric anastomotic complications (1, 2).

## CONCLUSION

The main aim of this case report was to emphasize how cholecystectomy, which is a routine part of the daily practice of a large number of general surgeons, may lead to severe consequences. As a result, bile duct injuries will continue to occur as long as cholecystectomy is performed, therefore, each general surgeon should be familiar with the possible consequences of bile duct injuries.

**Informed Consent:** Written informed consent was obtained from patient who participated in this case.

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