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Laparoscopic Right Posterior Sectoral Bile Duct Injury Recognized Postoperatively: How to Manage it?

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ABSTRACT The right posterior sectoral bile duct (RPSD) draining segments 6 and 7 of the liver commonly unite with the anterior sectoral duct to form the right hepatic duct, which in turn is joined by the left hepatic duct at the liver hilum to form the common hepatic duct. Aberrant biliary anatomy and poor visualization of the operative field are the most common risk factors for injuries. Management of the patient is easier if the injury is diagnosed during the operation; but when it is diagnosed postoperatively, the management planning is more complicated. In this case report, a female patient diagnosed as right posterior sectoral duct injury one month after the laparoscopic cholecystectomy was reported while reviewing the literature for current strategies of diagnosis and management.

Keywords: Right posterior sectoral bile duct; Strasberg C injury; diagnosis; treatment

The right posterior sectoral bile duct (RPSD) draining segments 6 and 7 of the liver commonly unite with the anterior sectoral duct to form the right hepatic duct, which in turn is joined by the left hepatic duct at the liver hilum to form the common hepatic duct.[1] In the literature, anomalous drainage of the right posterior sectoral bile duct into the cystic duct, the gallbladder neck or the common hepatic duct is reported in around 2%-9% of patients.[1,2] Aberrant biliary anatomy and poor visualization of the operative field are the most common risk factors for iatrogenic RPSD injuries.

In this case report, we reviewed literature for the management strategies of patients who had RPSD injury: wait and watch by nonoperative approach (percutaneous drainage and/or endoscopic stenting) or consider operative treatment.

CASE REPORT

A 43 year old female patient referred to our hospital with dispepsy and abdominal pain. In physical examination only Murphy sign was positive. Her complete blood count, renal and hepatic function tests were in normal ranges. Abdominal ultrasonography was performed and multiple milimetric gall stones were found in gall bladder. After empiric antimicrobial therapy, analgesia and IV fluids, laparoscopic cholecystectomy was performed.

During the operation, it was seen that omentum had surrounded the inflammated gall bladder. Cystic artery and vein were clipsed, then were cut. During dissection of gall bladder from liver, a hollow structure entering to the gall bladder from left, was seen at about the middle of the gall bladder bed and since it was accepted as a blood vessel, it was clipsed and cut. A soft drainage catheter was placed subhepaticly. On the first postoperative day, there was 50 cc serous drainage from the catheter, so it was drawn out and the patient was discharged.

She readmitted to the hospital 5 days later with abdominal pain, and a subhepatic fluid collection of 36x18 mm was found on ultrasonography. At presentation, liver function tests were just above the normal ranges. She was rehospitalized with the prediagnosis of gallstone fallen into the common bile duct. A magnetic resonance cholangiopancreatography (MRCP) was performed and this revealed a collection of 3 cm at the gallbladder bed and normal biliary ducts. During her second hospitalization lasting 1 week, her liver function tests were followed and an abdominal computed tomography (CT) was performed to follow the nature and the size of the collection. Moderate elevation of liver function tests continued and CT revealed the same collection area with about the same size and nature. Since colon and omentum were adhered to the gallbladder and there was too much inflammation; so any interventional drainage was not done. The patient was discharged after starting investigation on other etiologies increasing the liver function tests.

At the end of first month postoperatively, follow-up control revealed mild abdominal pain and a normal physical examination. Moderate elevation of liver function tests was still continue. Abdominal ultrasonography was performed and it revealed a collection of 116 x 103 mm at the gall bladder bed. Since the collection was augmented in size, percutaneous drainage was done. First day there was 1000 cc serous drainage, but in second day it turned out as a bilious drainage of 600 cc. So the patient was re-hospitalized and CT imaging was done. It revealed that there was no conjointness between the tip of the catheter and bowels. Then an endoscopic retrograde cholangiopancreatography (ERCP) date was taken for 3 days later. During these 3 days, drainage amount decreased to 100 cc and liver function tests turned back to almost normal levels. In ERCP, common bile duct, left hepatic duct and right anterior hepatic duct were intact, but there was a leak at the level of hepatic confluence. When drain tube cholangiography was done, it was seen that radio-opaque substance was filling the right posterior hepatic duct from the leakage site. It was thought to be an injury of right posterior sectoral duct (Strasberg C according to the Strasberg-Bismuth Classification system). During ERCP, a 7 French nasobiliary catheter was placed, and it was planned to replace a stent into the aberrant bile duct with the help of percutaneous transhepatic cholangiography (PTC) at another date. Until this date, a bilious drainage of 50 cc per day continued. A few days later, PTC and ERCP assisted imaging was performed (Figure 1). Via PTC, a duct of 2-3 mm in diameter, having a clips at the tip was seen. A guide-wire passing through this duct was tried to join with another guide-wire transmitted via ERCP, but it wasn't succeeded. Na-

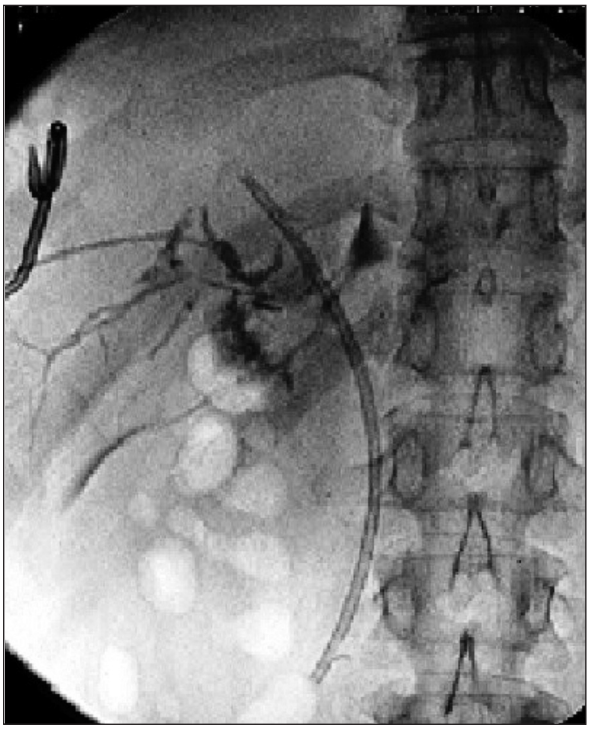

FIGURE 1: Billiary leakage in PTC and ERCP studies.

sobiliary catheter was changed with a 10 French stent, PTC catheter was left in the aberrant duct. During the following days, there was no drainage from PTC catheter and the amount from the abdominal catheter was decreased, then finished in 7-10 days. Liver function tests were almost normal. Follow-up imaging via sonography revealed no collection. All catheters were pulled out.

She remained well and asymptomatic at two tears of follow-up with undilated biliary tree on ultrasonography and normal levels of serum bilirubin, alkaline phosphatase and transaminases. A signed written informed consent was taken from the patient.

DISCUSSION

Sectoral and segmental bile ducts injuries are three main dangerous anatomical variants. Firstly, the cystic duct may be near to the segmental, or sectoral bile duct, secondly, the cystic duct may join one of these ducts, instead of the common bile duct, thirdly, the cystic duct may join the convergence of the sectoral or hepatic ducts so that these ducts may be injured during dissection.[3] In this case, RSPD had been misinterpreted as a vascular structure and then the clip placed at the end of the part joining to hepatic duct had not been closed adequately or it had been dislocated.

Many factors may lead to bile duct injuries such as patient related factors (advanced age, male gender, obesity, comorbid disease, anatomic variations of the biliary anatomy, congenital malformations), the presence of inflammation, poor visualization of the operative field, technical errors, and surgeon's experience.[4-6] In this case, obesity, inflammation, variation of the biliary anatomy were predisposing factors for the injury.

The biliary injuries may be recognized intraoperatively or usually within 3 weeks postoperatively.[2,7,8] If the injury of biliary tree can be recognized during the operation, Oddsdottir et al. suggest that if a segmental or accessory duct less than 3 mm has been injured, simple ligation is adequate.[9] However, if the injured duct is 4 mm or larger, it probably drains a number of hepatic segments, therefore needs to be repaired surgically. During postoperative follow-up, if there is a drainage catheter and bile leakage can be seen or there is no catheter but the patient has symptoms of persistent abdominal pain, nausea, vomiting, impaired intestinal motility, peritonitis, fever or hypothermia, bile duct injury should be considered. Elevated laboratory tests of cholestasis and leucocytosis may be seen.[10,11] Ultrasonography or CT is the first choice of imaging method to detect intraabdominal collection. In our case, when the patient was readmitted to the hospital with abdominal pain, she was evaluated first by sonogragraphy and a subhepatic collection with mild elevation of cholestasis enzymes were detected, then MRCP imaging was performed. Although MRCP is the most sensitive (approximately 85 to 100%) non-invasive method, in this case, MRCP result was normal.[11-13] At the end of first month postoperatively, on ultrasonography the size of the subhepatic collection was increased and cholestasis enzymes were still slightly elevated, therefore ERCP was done for both diagnostic and therapeutic purposes. During ERCP, internal stenting was performed. Stewart gives emphasis to that ERCP should be done first and may be followed by a PTC if the entire biliary tree can not be imaged.[14] In this case, after having done first ERCP, a few days later PTC and ERCP was performed at the same time. Another method for imaging injured bile ducts is percutaneous transluminal coronary angioplasty (PTCA) which also allows proper repair of small injuries by inserting a prosthesis.[13]

The management strategies of RPSD injuries include nonoperatively with combined percutaneous drainage and endoscopic stenting, or operatively ligation of injured duct and billiary reconstruction. Colovic and Christensen et al. reported that the outcomes of ligation of RPSD were not well and cholangitis and abscess had developed in most of the patients, leading even to death.[3,15] Percutaneous drainage in combination with endoscopic sphincterotomy and/or biliary stenting has recently been advocated as a way to eliminate the need for surgery and most of the patients have benefited in this way.[2,7] Though having done all of

these, if the biliary leakage persists more than 8 weeks, surgical management may be warranted.[2,3] Roux-en-Y procedure is often performed. However, the risk of late stricture at the anastomosis may be as high as 33% to 37%.[6] Other options reported in the literature, include induced atrophy or surgical resection of the involved liver segment.[2,7]

Finally, the diagnosis and management planning of an RPSD injury were quite difficult. Multidisciplinary approach with non-operative management should be first choice.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Sevim Turanlı;* ***Design:*** *Sevim Turanlı, Emine Kurt;* ***Control/Supervision:*** *Sevim Turanlı, Emine Kurt, Yavuz Pirhan;* ***Data Collection and/or Processing:*** *Emine Kurt, Yavuz Pirhan;* ***Analysis and/or Interpretation:*** *Sevim Turanlı;* ***Literature Review:*** *Sevim Turanlı, Emine Kurt;* ***Writing the Article:*** *Sevim Turanlı, Emine Kurt;* ***Critical Review:*** *Sevim Turanlı, Emine Kurt;* ***References and Fundings:*** *Emine Kurt, Yavuz Pirhan;* ***Materials:*** *Yavuz Pirhan.*

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