Short communication

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Restoration of Bile Outflow in Case of Damage to Hepaticocholedochus and Failure of the Biliary Anastomosis After Laparoscopic Cholecystectomy

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ABSTRACT The aspect of injuring bile ducts during laparoscopic cholecystectomy is still of current concern. Causes of this complication include insufficient experience of surgical team, poor knowledge of topographic anatomy of subhepatic space, particularly when perivesical inflammatory infiltrate presents, inadequate approach conversion and so on. Most of patients with bile duct injuries undergo repeated operation in the same surgical unit where cholecystectomy was performed. In many cases, this results in a shortening of the segment of the common hepatic duct, which is favorable for restoration. Subsequent reconstructive surgery is usually performed in the worse conditions with a high risk of complications such as failure of sutures, biliary fistula, anastomotic stricture, etc. Most specialists recommend to abstain from primary reconstruction of the biliary tree in hospitals with no proper experience in hepatobiliary surgery and to perform only the external drainage of subhepatic space with subsequent admission of patient to a specialized clinic. We report a case of a young woman who suffered an excision of hepaticocholedochus fragment during laparoscopic cholecystectomy. A primary reconstructive surgery (hepatico-hepaticoanastomosis) was performed in the same clinic and resulted in external fistula of the common hepatic duct. The subsequent operation (hepaticoejunostomy) was performed in a specialized department of the regional clinical hospital. The woman underwent right-sided hypochondrium laparotomy with debridement of postoperative scar tissues. The stumps of common bile duct were mobilized in compact inflammatory infiltrate. The operation ended with distal stump closure and hepaticoenteroanastomosis formation. The patient was discharged with recovery. Six months later, her condition was satisfactory, and she was engaged in occupational activity.

Keywords: laparoscopic cholecystectomy, bile duct injury, external fistula, common hepatic duct, bile duct reconstruction

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CHD – common hepatic duct
MR-cholangiopancreatography – magnetic resonance cholangiopancreatography
MSC-angiography – multi-slice computed angiography

INTRODUCTION

The most common damage to the extrahepatic bile ducts occurs during cholecystectomy in conditions of perivesical inflammatory infiltrate (0.06–3.5%) [1, 2], with laparoscopic access in 0.3–3% cases and widely available cholecystectomy in 0.1–1% cases [3].

The literature discusses methods for the prevention and treatment of various types of damage to the bile ducts. One of the reasons that determine the failure of bile duct reconstruction is an attempt at a reconstructive operation in general surgical hospitals that do not have sufficient experience in hepatobiliary surgery. Annually,

5–7 patients with bile ducts injury are hospitalized in the Department of Surgical Gastroenterology of the Irkutsk Regional Clinical Hospital, most of whom had an attempt to restore the passage of bile before being sent to the clinic. A total of 32 patients were under observation.

Clinical observation

On December 22, 2020, a 31-year-old woman independently applied to the emergency department with drains in the right hypochondrium, through which bile entered the trapping containers. Complaints of pain in the right side of the abdomen, weakness, discolored feces, fatigue, periodic rise in body temperature up to 37°C.

From the anamnesis it was established that a laparoscopic cholecystectomy was performed in a private clinic for acute calculous cholecystitis. She was discharged on the second day and soon noted the appearance of yellowness of the skin and sclera, dark urine. Then returned to the clinic.

Magnetic resonance cholangiopancreatography (MR-cholangiopancreatography) was performed. Damage to the common hepatic duct (CHD) was established. On November 19, 2020, a second operation was performed: subcostal laparotomy, biliobiliary anastomosis on the Kehr drainage, trapping drainage was installed in the subhepatic space. From the first day after the operation, bile flowed through both drains. She was discharged on the 4th day. Within a month she was observed by the operating surgeon, then she went to the regional hospital.

Upon admission to the Irkutsk Regional Hospital, the state of moderate severity, stable, consciousness was clear, the skin and visible mucous membranes were pale pink, of normal humidity. Auscultatory breathing in the lungs was vesicular, heard in all departments, there were no wheezing.

The tongue was moist, the anterior abdominal wall was symmetrical. There was a postoperative scar 12×0.5 cm in the right hypochondrium, along the anterior axillary line, the Kehr drainage was installed, through which light bile flew. Along the mid-axillary line on the right there was a drainage tube with a similar discharge (Fig. 1).

Fig. 1. The view of the anterior abdominal wall.

The abdomen was soft upon palpation, slightly painful in the paradrainage area and the right hypochondrium, the stool was regular, the feces were light brown. There were no deviations from the reference values in the general blood test. When studying the biochemical parameters of blood, an increase in the level of aspartate aminotransferase up to 175.5 IU/l, alanine aminotransferase up to 428.5 IU/l, and alkaline phosphatase up to 211.54 IU/l was revealed.

MR-cholangiopancreatography and multislice computed angiography were performed to assess the vascular anatomy of the hepatobiliary area, the state of the bile ducts, and the location of the drainage tubes.

The abdominal aorta and its visceral branches, portal, splenic and superior mesenteric veins were evenly contrasted (Fig. 2).

On MR cholangiography, the intrahepatic ducts were visualized up to the subcapsular sections of the liver, not dilated. The lobar ducts were dilated up to 8 mm, without filling defects. CHD was visualized for 16 mm, then a defect with a length of 18 mm, after which its non-expanded segment was determined.

Through the anterior wall, the previously installed Kehr drainage, which proximal branch, bypassing the CHD along the anterior wall, compressed the confluence, passed along the right lateral wall of the right lobar duct in the liver parenchyma. From the lower edge of the visualized part of the CHD, there was a deviation of bile into the subhepatic space, where a trapping drain was installed (Fig. 3).

Fig. 2. MSCT scan of the abdominal cavity

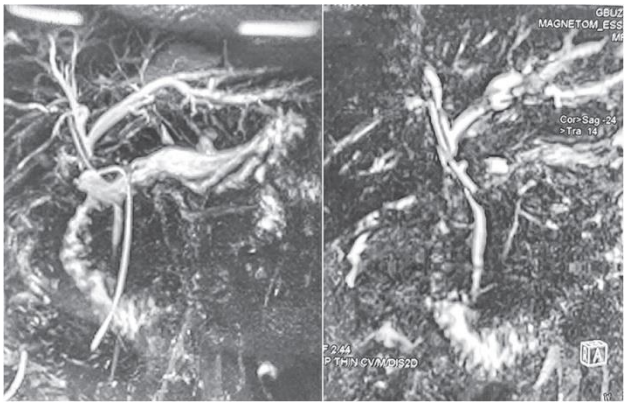

Fig. 3.MR cholangiography image.

Damage to the bile ducts type I was established according to the classification of H. Bismuth, or *E*1 according to S. Strasberg, or "+1" according to Galperin. Incomplete external biliary fistula.

After preoperative preparation, on December 24, 2020, a combined right subcostal laparotomy was performed with excision of the postoperative scar. There was a dense infiltrate in the subhepatic space. During mobilization of the presumed CHD, a Kehr drain was found. The anterior wall of the duct was absent for 15 mm, the posterior wall was represented by a cicatricial cord. Bile flew near the drainage. Dense layers of fibrin. Both branches of the Kehr drainage were firmly fixed with a prolene thread to the ends of the hepaticocholedochus (Fig. 4).

The drain was removed and there was a heavy flow of bile. The cicatricially modified posterior wall of the CHD was excised. The distal stump was sutured and bandaged. The walls of the right and left lobar ducts were isolated from the scars, before their confluence. The posterior wall of the confluence was preserved (Fig. 5).

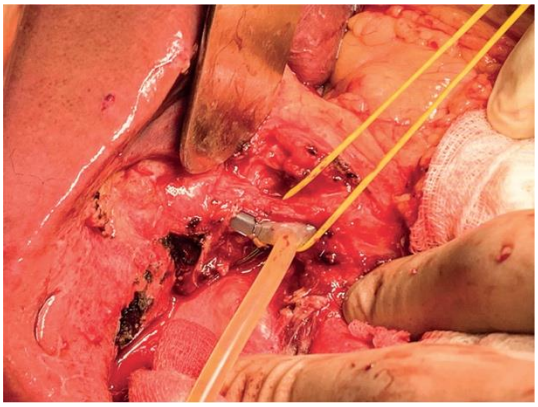

Fig. 4.Intra operation photo. Anterior wall defect, Kehr's drainage is in the lumen.

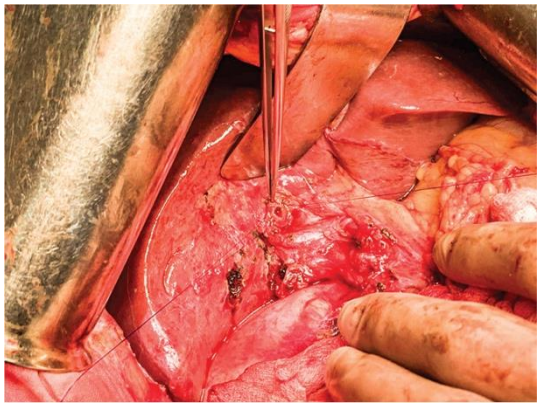

Fig. 5. Intra operation photo. Released lobar ducts in the confluence area.

The loop of the small intestine was disconnected according to *Roux*, at 80 cm hepaticojejunostomy was formed with separate interrupted sutures with a *PDS* 5/0 thread with drainage of the bile ducts according to Felker (Fig. 6). A trapping silicone drainage was installed in the subhepatic space.

The early postoperative period was uneventful, the trapping drain was removed on the 4th day after the intervention. On the 6th day, a control fistulography was performed, on which the right and left lobar and CHD were filled. Hepaticojejunostomy was passable, the contrast freely entered the small intestine (Fig. 7). She was discharged in a satisfactory condition with the Felker drainage blocked near the skin under the supervision of a surgeon at the place of residence.

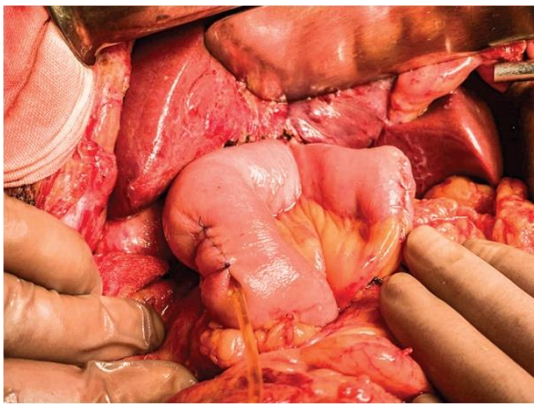

Fig. 6. Intra operation photo. The final look of the formed hepaticojejunal anastomosis

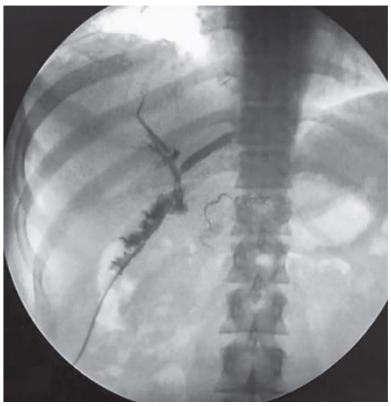

Fig. 7. Fistulography on day 7 after surgery.

The patient was seen in a month. She had complains of slight discomfort in the near-drainage area, the general condition was satisfactory. On the control ultrasound examination, the bile ducts were not dilated, free fluid and local accumulations were not detected. The drainage was removed on March 18, 2021.

DISCUSSION

Iatrogenic damage to extrahepatic bile ducts is not only a medical, but also a socio-economic problem, since it often leads a patient of working age to severe disability.

The most acceptable concept for the prevention of damage to extrahepatic bile ducts is published in the recommendations of the European Association for Endoscopic Surgery of 2013, which proposes such a concept as “critical view of safety”. This is a set of measures that should be performed during laparoscopic cholecystectomy in order to minimize the likelihood of injury to the extrahepatic bile ducts. The compliance with these criteria is mandatory.

As a rule, after an injury, the surgeon tries to reconstruct the biliary tree, which often shortens the CHD segment that is promising for reconstruction. Given this, many authors recommend to refrain from repeated restorative interventions in hospitals without proper experience in biliary surgery, because the prognosis for such operations is very doubtful [4, 5]. The mortality after repeated operations reaches 13–25% [6, 7].

In our observation, the first reconstructive operation was complicated by the failure of the biliary anastomosis and incomplete external biliary fistula, which required reconstruction under worse conditions (cholangitis, short CHD, infiltrate, local peritonitis).

The essential moment in the reconstruction is an adequate access, since an accurate revision, necessary manipulations, and exposure largely determine the outcome of the reoperation. In the reported case, an open operation was performed using a Kocher projection subcostal approach, which could not provide sufficient exposure.

Under the condition of 1.5-cm diastasis of the duct, the formation of a biliary anastomosis is associated with a high risk of anastomosis failure and (or) the formation of its stricture [5, 8], especially since the intervention was performed without magnifying surgical optics and atraumatic absorbable sutures, which are important conditions for the formation of a precision anastomosis.

The only indication for repeated operation at the site of cholecystectomy and damage to the bile ducts is the presence of biliary peritonitis. The purpose of the intervention should be revision, sanitation of the abdominal cavity, identification of the source of bile leakage and external drainage of the subhepatic space. After this, the patient must be referred to a specialized center.

CONCLUSION

Any intervention on the bile ducts due to their damage should be performed in specialized clinics by surgeons with experience in hepatobiliary surgery. Repeated operation in the institution where the bile duct injury occurred should be limited to adequate drainage of the abdominal cavity with further transportation of the patient to a specialized medical institution.

The best option for reconstruction is the formation of a biliodigestive anastomosis on the small intestine disconnected by Roux technique, at least 80–90 cm long, to prevent reflux cholangitis [9]. Biliary drainage according to Felker is advisable for possible sanitation of the ducts, decompression and radiological control.

FINDING

1. The surgery for extrahepatic bile ducts trauma during laparoscopic cholecystectomy in a general surgical department that does not have experience in reconstructive hepatobiliary surgery should be limited to debridement and external drainage of the subhepatic space. The patient should be referred to a specialized department.

2. Hepaticojejunostomy from a combined right-sided subcostal approach is the better option of bile excretion reconstruction when excising a fragment of the common hepatic duct.

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