Various Methods for Reconstruction of Bile Duct Continuity after Damage during Laparoscopic Cholecystectomy

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Abstract

Laparoscopic cholecystectomy is one of the most common procedures in the abdominal cavity. While this technique is promoted for its low invasiveness, it also bears the risk of complications. Injury to the bile duct is particularly dangerous and should be quickly diagnosed and treated. The method of reconstruction should be chosen carefully, as further complications may be possible following reconstruction. The complications could include stenosis of the anastomosis or recurrent choledocholithiasis. In the event of such complications, we should be able to reach the created anastomosis in the least invasive way to diagnose the issue and, if possible, treat it immediately. In this case report, we present two patients who underwent reconstructive procedures after an iatrogenic injury of the bile duct. In one of the patients, a Roux-en-Y hepaticojejunostomy was created. Several months later, the patient was diagnosed with narrowing of the anastomosis and had to be re-operated due to insufficient tool length. In the other patient, a different approach was used. Reconstruction was performed using an isolated jejunal tube anastomized with common bile duct end to side and with a duodenum end to side. A jejunal-jejunal end to end anastomosis was also created. This procedure resulted in an easily accessible and patent anastomosis, which was visualized by endoscopy several months after the reconstruction. In conclusion, performing the anastomosis using the isolated jejunal tube connected to the duodenum provides the possibility of using an endoscopic method for the treatment of further complications.

Introduction

Surgery for cholelithiasis is one of the most common surgical procedures. Laparoscopic cholecystectomy is currently the gold standard for the treatment of most gallbladder disorders. Despite this technique’s safety, it is burdened with the risk of complications, and the most dangerous ones include damage to the extrahepatic bile ducts. The treatment for this damage includes various methods of bile duct reconstruction depending on the type and size of damage and the time from diagnosis. One of the late consequences of repair operations may be bile duct stenosis or recurrent lithiasis. It seems that the optimal repair operation should include the possibility of both diagnostics and endoscopic treatment of possible recurrent stenoses after this type of surgery. This paper presents two patients with extrahepatic biliary duct damage during laparoscopic cholecystectomy who received different techniques to repair the damage.

Case Presentation

Case 1

A 46-year-old patient was operated for gallbladder gallstones as planned. The treatment went without complications, the site was drained after the gallbladder was removed, and the tube was removed on the first day. On the third day after surgery, yellowing of the eye sclera was observed. Laboratory tests showed elevated values of transaminases, bilirubin, FA and GGTP. The cholangio-MR examination revealed moderate dilatation of the intrahepatic and extrahepatic biliary ducts (right and left hepatic duct in the liver cavity of approximately 5 mm, common hepatic duct of 7.5 mm) and a partial excision of Common Bile Duct (CBD) over 23 mm in length. The stump length of approximately 17 mm visible at 17.5 mm was then amputated. There was no signal from the bile ducts. The patient underwent reoperation and anastomosis of the common bile duct with the separate loop of the small intestine Roux-en-Y by the end to the side. The anastomosis was shunted with a Kehr’s drain. On the sixth day after the re-operation, the patient was discharged home. The

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Kehr’s drain was removed as planned after cholangiography.

Eight months after the surgery, there was a narrowing at the site of the hepaticojejunal anastomosis. An attempt was made to perform endoscopic dilatation using an SBE enteroscope. The site of the anastomosis was visible, but due to the small diameter of the anastomosis and the insufficient length of the enteroscope and working tools, it was not possible to perform an effective dilatation. The patient was operated on again to create a plasty of the hepaticojejunal anastomosis.

Case 2

A 42-year-old female patient was admitted to our department for biliary fistula on the 16th day after laparoscopic cholecystectomy. Prior to the admission, damage to the right hepatic duct was found and drainage, ERCP and papillotomy were performed in the hospital, where the cholecystectomy was conducted. At admission, fluid reservoirs under the diaphragm in the abdominal cavity and in the smaller pelvis were found in ultrasound examination. In addition, there was a calcified deposit of 5 mm in diameter near the liver cavity and small deposits in the distal part of the CBD with dilatation up to 18 mm. The patient was treated for ulcerative colitis for 16 years. Previously, she was operated because of varicose veins and appendicitis. At admission, the laboratory tests were an ALAT of 56 IU/l, an ASPAT of 61 IU/l, an amylase in serum of 117 IU/l, an alkaline phosphatase of 140 IU/l, a GGTP of 144 IU/l, and a total bilirubin of 8.0 umol/l. The patient was operated. After dissection of the structures of the liver cavity and identification of CBD, a fragment of the jejunum was dissected along with the mesentery, which was pulled into the liver cavity. Anastomosis of the common bile duct with the isolated part of the jejunum was made end to side. Next, the entero-duodenal anastomosis was made end to side. The intestinal-intestinal anastomosis was also made end to side to restore continuity of the gastrointestinal tract. The postoperative course was without significant complications. On the sixth day after the procedure, normalization of biochemical parameters was observed: ALAT was 40 IU/l, ASPAT was 36 IU/l, alkaline phosphatase was 109 IU/l, GGTP was 77 IU/l, and total bilirubin was 7.9 umol/l. On the 10th day after the operation, she was discharged home in good general condition. After four months, a control endoscopy of the upper gastrointestinal tract was performed, in which a wide and patent ductal and intestinal anastomosis was visualized through the intestinal insert.

Discussion

Damage to the bile ducts after laparoscopic cholecystectomy is one of the most serious complications that are challenging both therapeutically and diagnostically [1]. The most common method of surgical reconstruction is hepatico-jejunostomy using the Roux-en-Y loop, which was demonstrated in many studies [1-3]. There are also several modifications to this procedure, which can also be performed using the latest robotic surgery techniques, as shown by recent reports. When choosing a technique [4,5], however, one should take...
into account the extent of interference in the physiological passage of the gastrointestinal tract and thus the physiology of the digestive process. Abnormal functioning of the hormonal axis of the digestive system, as well as the reflux of bile content to the stomach, may be the cause of peptic ulcers. Crema et al. [6] decided to use the technique of reconstructing the physiological route of bile flow in the form of an insert made of a fragment of jejunum based on the mesentery and joined it on the one side with the amputated bile duct and on the other with the duodenum. This operation was demonstrated to be a good and safe solution, as well as a relatively simple procedure [6]. Similarly, endoscopic techniques are notably popular in the reconstruction of bile ducts. Cholecystolithiasis and choledocholithiasis may sometimes be recurrent. In addition to prophylaxis and compliance with medical prescriptions, the risk of another surgical intervention should be taken into account along with the risk of further complications. In such cases, for both therapeutic and diagnostic purposes, the least invasive techniques are worth recommending. Due to the lack of proper equipment and personal experience, for our patient, we used the technique applied and described in the work of Crema et al. [6] This technique was demonstrated to be sufficiently effective that it enabled us to further visualize the bile ducts with the help of the basic version of the equipment for performing endoscopic retrograde cholangiopancreatography. However, we suggest performing tests and observations of a larger group of patients after reconstruction of the bile ducts.

**Conclusion**

Performing the anastomosis using the isolated loop of the small intestine connected to the duodenum provides the possibility of applying the endoscopic method to treat complications, such as stenosis at the anastomosis site or recurrent lithiasis. In addition, this method reproduces the physiological pathway of bile flow and is relatively easy to use.

**References**