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WJGS mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal surgery and covering a wide range of topics including biliary tract surgical procedures, biliopancreatic diversion, colectomy, esophagectomy, esophagostomy, pancreas transplantation, and pancreatectomy, *etc*.

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CASE REPORT

Laparoscopic cholecystectomy with communicating accessory hepatic duct injury and management: A case report

Peng-Ju Zhao, Yan Ma, Ji-Wu Yang

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Abstract

BACKGROUND

Laparoscopic cholecystectomy is considered the gold standard for the treatment of patients with gallstones. However, bile duct injury is one of the most serious complications of this surgery, with an incidence rate of 0.3%-0.7%. Variations in anatomical structures are one of the main reasons for such injuries.

CASE SUMMARY

We report a 26-year-old male patient who presented with repeated upper abdominal pain for 1 year. Ultrasound examination and blood tests indicated gallstones accompanied by chronic cholecystitis. The patient underwent laparoscopic cholecystectomy. During the surgery, a communicating bile duct connecting the gallbladder neck and the right hepatic duct was discovered and injured. Meticulous dissection identified it as a communicating accessory hepatic duct, which was then definitively ligated. Postoperatively, the patient recovered well, magnetic resonance imaging and magnetic resonance cholangiopancreatography showed no intrahepatic or extrahepatic bile duct strictures. The pathology report showed chronic cholecystitis with gallstones.

CONCLUSION

Carefully manage communicating accessory bile ducts in cholecystectomy using cholangiography or meticulous separation, followed by ligation is effective.

Key Words: Laparoscopic cholecystectomy; Bile duct injury; Accessory hepatic duct; Anatomical variation; Case report

Core Tip: This case report highlights the significance of recognizing and managing accessory hepatic duct injuries during laparoscopic cholecystectomy. Utilizing intraoperative cholangiography or indocyanine green fluorescence cholangiography can help identify biliary anomalies, while expert evaluation by a hepatobiliary surgeon is crucial. For confirmed communicating accessory hepatic ducts, total cholecystectomy with duct ligation offers an effective solution to prevent further complications.

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INTRODUCTION

Laparoscopic cholecystectomy is considered the gold standard for patients with gallstones. Bile duct injury is one of the most severe complications of cholecystectomy, with an incidence rate of 0.3%-0.7%[1,2]. One of the main causes of this injury is the variability in bile duct anatomy. Studies have shown that up to 47% of the population has anatomical variations in the biliary system[3].

The accessory hepatic duct is an anatomical variation of the biliary system, which is easily misidentified during surgery. Goor and Ebert defined communicating accessory hepatic ducts as those that communicate between major bile ducts but do not drain parts of the liver[4]. However, the actual prevalence rate is not clear. Correct identification and management of communicating accessory hepatic ducts during laparoscopic cholecystectomy is important. We share a case of communicating accessory hepatic duct injury and management during laparoscopic cholecystectomy.

CASE PRESENTATION

Chief complaints

We report a 26-year-old male patient who presented with recurrent upper abdominal pain for 1 year.

History of present illness

The patient experienced persistent abdominal distention pain in the upper abdomen a year ago after consuming fatty foods. The pain radiated to the right shoulder and was accompanied by nausea, but there were no symptoms of vomiting, fever, palpitations, shortness of breath, or chest pain. After taking ibuprofen, the symptoms were somewhat relieved. Since then, the abdominal pain has recurred multiple times. One month before admission, the abdominal pain worsened, and an ultrasound examination diagnosed "gallstones". The patient used traditional Chinese medicine for treatment, but the abdominal pain continued to recur.

History of past illness

The patient denies any history of chronic diseases such as hypertension, heart disease, or diabetes, and reports no history of surgery, trauma, or blood transfusion. There is no known drug allergy history, and the patient denies any history of acute or chronic infectious diseases.

Personal and family history

The patient's place of origin is Dali. The patient does not have smoking or alcohol habits. Both parents are alive and have no history of chronic diseases. There is no family history of hereditary diseases.

Physical examination

At the time of consultation, his vital signs were normal. Physical examination revealed tenderness in the right upper abdomen, with no signs of peritonitis, and a negative Murphy's sign.

Laboratory examinations

Blood tests were normal, including white blood cells, transaminases, alkaline phosphatase, and bilirubin levels.

Imaging examinations

Ultrasound examination showed that the size of the gallbladder was normal, but the wall was irregular, with an echogenic mass of approximately 23 mm accompanied by a shadow.

FINAL DIAGNOSIS

Based on the examination results, the final diagnosis was gallbladder stones with chronic cholecystitis.

TREATMENT

The patient was sent to the operating room. During the laparoscopic surgery, the cystic duct and the anterior branch of the cystic artery were separated. A duct connecting the gallbladder infundibulum and the right hepatic duct was found within the cystohepatic triangle. This duct was ruptured and bile leaked out during its separation. Careful separation during surgery confirmed this as a communicating accessory hepatic duct, and the stump was clamped. Postoperative exploration showed no bleeding or bile leakage from the stumps of the anterior branch of the cystic artery, the cystic duct, the posterior branch of the cystic artery, and the communicating accessory hepatic duct (Figure 1, Video).

OUTCOME AND FOLLOW-UP

Postoperatively, the patient's liver function showed no significant changes. He was discharged 3 days later. During the 2 weeks postoperative follow-up, magnetic resonance imaging and magnetic resonance cholangiopancreatography showed no signs of intrahepatic or extrahepatic bile duct stricture, and the patient was in good condition. The pathology report showed chronic cholecystitis with gallstones (Figure 2).

DISCUSSION

Accessory hepatic ducts are bile duct branches that drain bile from liver lobes, segments, or subsegments and connect directly with extrahepatic bile ducts, cystic ducts, or the gallbladder body. However, there is no consistent definition for them. 94% accessory hepatic ducts drain the right lobe of the liver, and only 6% drain the left lobe[5]. Hisatsugu and their colleagues divided accessory right hepatic ducts based on their convergence with the cystic duct into the following types: (1) Type I, cystic duct converges with the accessory right hepatic duct; (2) Type II, accessory right hepatic duct and cystic duct converge at the same location on the common bile duct; (3) Type III, accessory right hepatic duct drains into the common hepatic duct; (4) Type IV, accessory right hepatic duct drains into the distal common bile duct of the cystic duct; and (5) Type V, accessory right hepatic duct drains into the cystic duct[6].

Intraoperative cholangiography plays an important role in understanding biliary anatomy and can reduce the incidence of bile duct injuries during laparoscopic cholecystectomy[7]. However, the procedure is complex, extends operation time, and involves radiation exposure, so it is not routinely performed in many institutions. In recent years, numerous studies have shown that using fluorescent laparoscopy for indocyanine green fluorescence cholangiography can significantly reduce the risk of bile duct injury[8,9]. Simultaneously, if bile duct injury is detected during surgery, it should ideally be handled by an experienced hepatobiliary surgeon who performs careful separation and exploration to identify the type of injury and anatomical anomalies, avoiding thermal damage from electrocautery[10,11]. In this case, intraoperative exploration and postoperative magnetic resonance cholangiopancreatography showed no segmental intrahepatic bile duct dilation, confirming that the abnormal duct communicated with the right hepatic duct on one end and the gallbladder infundibulum on the other, suggesting it was a communicating accessory hepatic duct.

According to Kurahashi *et al*'s classification[12], an abnormal duct communicating with the cystic duct is classified as type A, which is considered high risk. Subtotal cholecystectomy can avoid bile duct injury but was not included in this study[12]. Goor and Ebert[13] classified communicating accessory hepatic ducts into four types: (1) F1, connecting the right hepatic duct and the common hepatic duct; (2) F2, connecting the right hepatic duct and the cystic duct; (3) F3, connecting the right hepatic duct and the gallbladder neck; and (4) F4, connecting the right and left hepatic ducts. In cholecystectomy, F2 and F3 types are mainly involved. Therefore, for patients with communicating accessory hepatic ducts found during laparoscopic cholecystectomy, total cholecystectomy combined with ligation of the communicating accessory hepatic duct is a viable option.

CONCLUSION

Our study indicates that if bile duct injury is found during laparoscopic cholecystectomy, an experienced hepatobiliary surgeon should carefully separate and explore the injury type and anatomical anomalies, and intraoperative cholangiography or indocyanine green fluorescence cholangiography should be performed when necessary. If confirmed as a communicating accessory hepatic duct, total cholecystectomy combined with ligation of the communicating accessory hepatic duct should be considered. In conclusion, we further validated the effectiveness of this research through a surgical video that we produced. This video not only offers a detailed demonstration of the key steps but also enhances the understanding of the communicating accessory hepatic duct ligation.

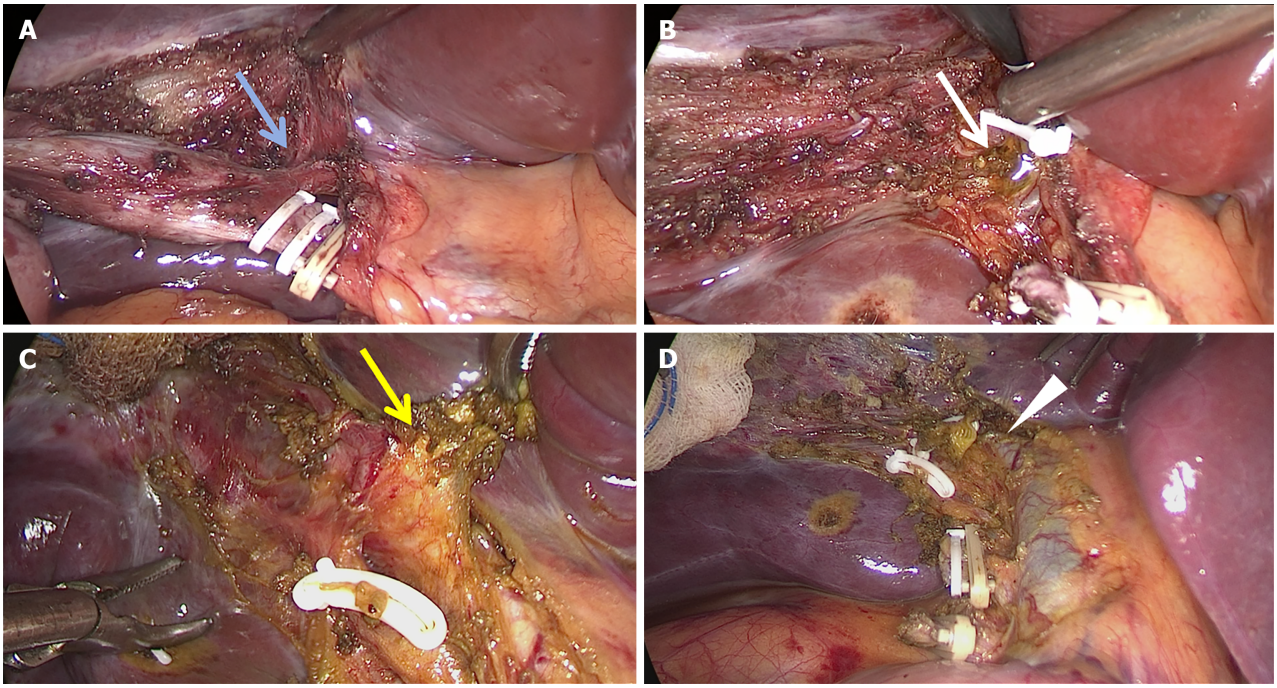

Figure 1 Laparoscopic view during cholecystectomy. A: Anomalous duct (blue arrow) was found extending from the gallbladder ampulla to inside the liver; B: Bile leak (white arrow) was detected from the cut end of the anomalous duct, confirming it is an aberrant bile duct; C and D: Confirmation that the other end (yellow arrow) of the injured bile duct was connected to the right hepatic duct (white arrowhead), identifying it as a communication accessory hepatic duct, which was clipped with a vascular clamp.

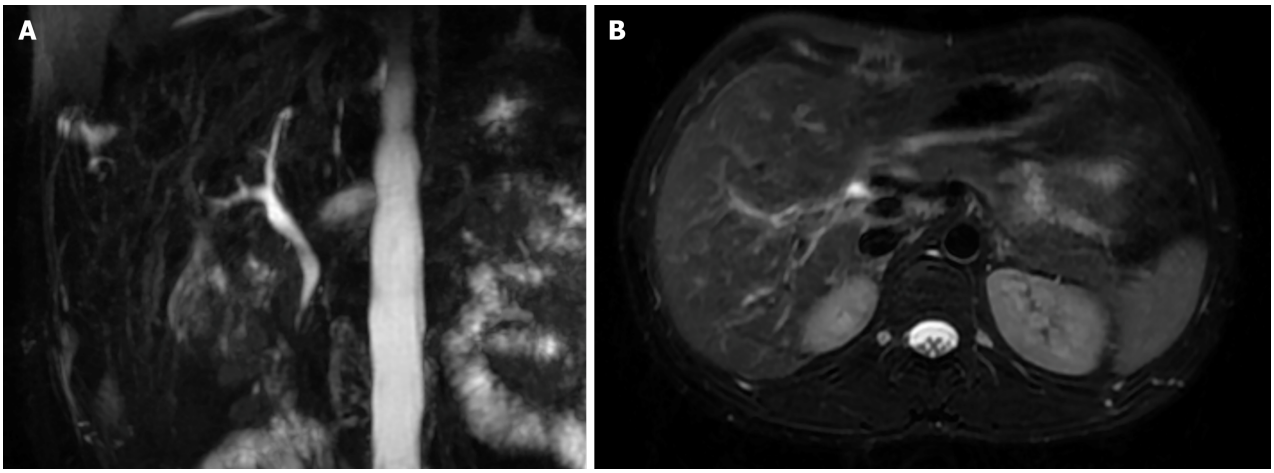

Figure 2 Magnetic resonance imaging and magnetic resonance cholangiopancreatography after surgery. A and B: Two weeks after surgery, follow-up magnetic resonance imaging and magnetic resonance cholangiopancreatography showed no intrahepatic or extrahepatic bile duct strictures or dilatation.

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FOOTNOTES

Author contributions: Zhao PJ participated in the surgical procedure and collected data; Ma Y supported postoperative management and rehabilitation; Yang JW supervised the surgery and managed the clinical aspects; Zhao PJ, Ma Y, and Yang JW wrote the manuscript.

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