

Cystohepatic duct can be the bridge of calculous cholecystitis complicating cholangitis and obstructive jaundice

Yuesi Zhong*, Manhang Cai, Zaomao Zhong, Yi Zhang, Meihai Deng, Nan Lin

Department of Hepatobiliary Surgery, Third Affiliated Hospital, Sun Yat-Sen University, Guangzhou, Guangdong, China.

SUMMARY Cholestasis and obstructive jaundice can be extrahepatic or intrahepatic. Here we present one case with calculous cholecystitis who presenting with repeated obstructive jaundice and without bile duct dilation. The patient received laparoscopic cholecystectomy, and cystohepatic duct was identified intraoperatively, there was no cholestasis or obstructive jaundice postoperatively. Cystohepatic duct is a rare biliary anomaly observed in 0.7% of all surgical cases and in 1.5% of all cadaveric dissections. The cystohepatic duct can be the bridge of calculous cholecystitis complicating cholangitis and obstructive jaundice, here we for the first time presented this entity.

Keywords Cystohepatic duct, calculous cholecystitis, obstructive jaundice, cholecystectomy

Letter to the Editor,

Cholestasis and obstructive jaundice can be extrahepatic or intrahepatic. Extrahepatic obstructive jaundice is usually attributed to obstructed biliary system at the level of the common bile duct. The common causes of obstruction are stone, tumor and stenosis. The intrahepatic obstructive jaundice present with obstructive jaundice but without dilation of biliary system.

Several patients with repeated calculous cholecystitis and obstructive jaundice are encountered, and this kind of patients presented with no dilation of biliary system. Here we present one patient whose abdominal pain were mild or even without abdominal pain, and when antibiotic therapy had been administrated, obstructive jaundice relieved. The patient received laparoscopic cholecystectomy. Cystohepatic duct was identified intraoperatively and there was no cholestasis or obstructive jaundice postoperatively.

A 74-year-old male had a 7-year history of repeated right upper quadrant pain and medium cholestasis and obstructive jaundice. The patient was then diagnosed as calculous cholecystitis in local hospital. The patient was then admitted to our hospital, and received a routine abdominal contrast-enhanced computed tomography (CT) scan preoperatively. This abdominal contrast-enhanced CT scan showed multiple gallbladder stones, and the diameter of the biggest stone was 2 cm, without dilation of common bile duct. The total bilirubin was 68 $\mu\text{mol/L}$, and glutamic-pyruvic transaminase was 49 U/L. The gallbladder wall was thick and a little oedematous.

Antibiotic therapy was then administrated, and cholestasis and obstructive jaundice relieved gradually.

Subsequently the patient received laparoscopic cholecystectomy. After the cystic duct and cystic artery were identified and cut off respectively, the gall bladder was detached from the cholecystic bed. When the detaching proceeded to the bottom of gallbladder, a bile duct connecting the wall of gallbladder and cholecystic bed was encountered (Figure 1A). The diameter of this cystohepatic duct was 3 mm. The cystohepatic duct was then clipped with hemolock and cut off subsequently after being identified (Figure 1B). The patient recovered uneventfully and was discharged at day 2 postoperatively. The patient presented no cholestasis or obstructive jaundice during follow-up.

The cystohepatic duct was not noticed preoperatively because this kind of duct was small and not presented frequently. After the surgery, we reviewed the images of CT carefully and located this cystohepatic duct which connected the wall of bottom of gallbladder and cholecystic bed (Figure 1C).

Obstructive jaundice results from cholestasis. Cholestasis can be extrahepatic or intrahepatic. Obstructive jaundice is amenable to surgical treatment when the obstruction is extrahepatic.

Extrahepatic obstructive jaundice usually presents with cholestasis and dilation of main bile ducts. The etiology can be obstruction of common bile duct, for example, stone or tumor in common bile duct, or compression of common bile duct from outside to inside.

Complications of gallstones are usually considered to be acute cholecystitis, chronic cholecystitis, choledocholithiasis and MIRRIZI syndrome. To our knowledge, only MIRRIZI syndrome and

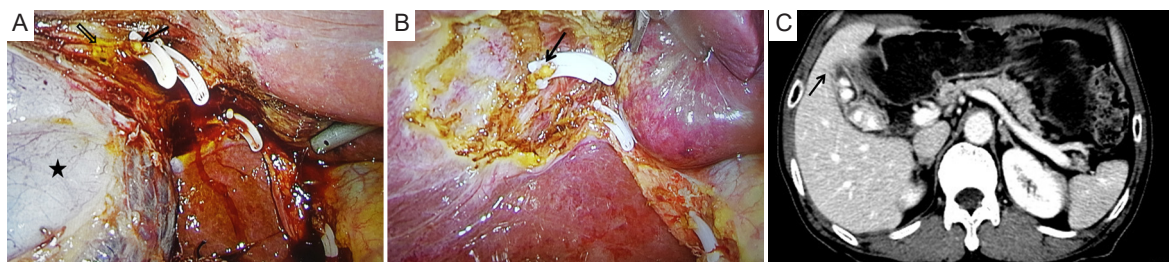


Figure 1. A. Intraoperative photo. During Laparoscopic cholecystectomy, when the detaching proceeded to the bottom of gallbladder (black star), a bile duct connecting the wall of gallbladder and cholecystic bed was encountered. The cystohepatic duct was cut off, and the photo showed the proximal cuff (black arrow) and distal cuff (hollow arrow). B. Intraoperative photo (gallbladder removed). The cystohepatic duct was clipped with hemolock and cut off subsequently after being identified, and the gallbladder was removed. The photo showed the proximal cuff (black arrow). C. Identifying the cystohepatic duct on image of computed tomography scan. Abdominal contrast-enhanced computed tomography scan showed the diameter of cystohepatic duct (black arrow) was 0.33 cm.

choledocholithiasis can cause dilation of main bile duct and extrahepatic obstructive jaundice. However, our case presented with repeated calculous cholecystitis and obstructive jaundice, whose abdominal pain were mild or even without abdominal pain, without dilation of biliary system.

As we know, intrahepatic obstructive jaundice presents with cholestasis, obstructive jaundice and without dilation of biliary system, which can be caused by drug-induced hepatitis, autoimmune hepatitis, acute viral hepatitis, acute alcoholic hepatitis, primary sclerosing cholangitis, sickle cell crisis, total parenteral nutrition and so on. Our case was with repeated calculous cholecystitis, obstructive jaundice and mild transaminitis, and without dilation of biliary system, however, when antibiotic therapy had been administrated, obstructive jaundice relieved. The patient presented with infective cholangitis and cholestasis. Most importantly cystohepatic duct was identified intraoperatively and there was no cholestasis or obstructive jaundice postoperatively. Pathological findings revealed that bile ductule was normal.

The key point to our case is that there was cystohepatic duct and repeated calculous cholecystitis. As we know, gallstones normally don't cause infective cholangitis and cholestasis, because the bile flow is normal and from intrahepatic to extrahepatic. When there is cystohepatic duct, bacteria can spread from calculous gallbladder to intrahepatic bile ducts and causes infective cholangitis and cholestasis.

Variations of the anatomy of the biliary ducts are attributed to abnormalities during embryological development of the biliary tract. It was reported that there were about 10% of humans with anomalous biliary tracts (1-3). The biliary ducts that communicating between the liver and the gallbladder was one kind of anomalous biliary tract, which was firstly reported by Luschka, and was named as cystohepatic duct subsequently (4-7).

Cystohepatic ducts are bile ducts of the right hepatic lobe and may serve a subsegment or segment, a sector, or exceptionally the whole of the right hepatic lobe, and drain into the gallbladder.

The incidence of cystohepatic duct was 0.7% of all surgical cases, and 1.5-30% of postmortem dissection according to published reports (8). It was recommended that magnetic resonance cholangiopancreatography would be helpful in identifying anomalous biliary tract (9).

For the first time, we report here that calculous cholecystitis can affect intrahepatic biliary tract *via* cystohepatic duct, and cause obstructed jaundice and cholangitis without bile duct dilation. This entity sometimes could be misdiagnosed, according to our experience, the appropriate treatment for this entity is laparoscopic cholecystectomy.

Funding: This work was supported by National Natural Science Fund of China (81470860, Yuesi Zhong).

Conflicts of interest: The authors have no conflicts of interest to disclose.

Ethics: This study was approved by Ethics Committee of the third affiliated hospital of Sun Yat-sen university. Written informed consent was taken from the patient for publication of case details and photographs.

References

- Noji T, Nakamura F, Nakamura T, Kato K, Suzuki O, Ambo Y, Kishida A, Maguchi H, Kondo S, Kashimura N. ENBD tube placement prior to laparoscopic cholecystectomy may reduce the rate of complications in cases with predictably complicating biliary anomalies. *J Gastroenterol.* 2011; 46:73-77.
- Berci G. Biliary duct anatomy and anomalies. The role of intraoperative cholangiography during laparoscopic cholecystectomy. *Surg Clin North Am.* 1992; 72:1069-1075.
- Foster JH, Wayson EE. Surgical significance of aberrant bile ducts. *Am J Surg.* 1962; 104:14-19.
- M Hashimoto, M Hashimoto, T Ishikawa, T Iizuka, M Matsuda, G Watanabe. Right hepatic duct emptying into the cystic duct: report of a case. *Surg Endosc.* 2002; 16:359.
- Yamamoto S, Sakuma A, Rokkaku K, Nemoto T, Kubota K. Anomalous connection of the right hepatic

- duct into the cystic duct: utility of magnetic resonance cholangiopancreatography. *Hepatogastroenterology*. 2003; 50:643-644.
6. Benson EA, Page RE. A practical reappraisal of the anatomy of the extrahepatic bile ducts and arteries. *Br J Surg*. 1976; 63:853-860.
 7. Sureka B, Bansal K, Patidar Y, Arora A. Magnetic resonance cholangiographic evaluation of intrahepatic and extrahepatic bile duct variations. *Indian J Radiol Imaging*. 2016; 26:22-32.
 8. Mogrovejo E, Manickam P, Jury RP, Cappell MS. Anomalous accessory hepatic duct draining into the cystic duct in an asymptomatic patient: MRCP and ERCP findings. *Gastrointest Endosc*. 2015; 81:1491-1492.
 9. Minutoli F, Naso S, Visalli C, Iannelli D, Silipigni S, Pitrone A, Bottari A. A new variant of cholecystohepatic duct: MR cholangiography demonstration. *Surg Radiol Anat*. 2015; 37:539-541.
- Received September 22, 2022; Revised November 15, 2022; Accepted December 12, 2022.
- *Address correspondence to:*
Yuesi Zhong, Department of Hepatobiliary Surgery, Third Affiliated Hospital of Sun Yat-Sen University, Guangzhou 510630, China.
Email: zhyues@mail.sysu.edu.cn
- Released online in J-STAGE as advance publication December 18, 2022.