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Double cystic duct preoperatively diagnosed and successfully treated with laparoscopic cholecystectomy: A case report

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ABSTRACT

INTRODUCTION: A single gallbladder with a double cystic duct is a very rare finding. In addition, few cases with this rare condition are preoperatively diagnosed. However, the preoperative confirmation or suspicion of this rare condition could facilitate safe laparoscopic cholecystectomy, which is a minimally invasive therapeutic modality for gallbladder disease. We herein present a case of gallstone disease in a patient with a double cystic duct who was preoperatively diagnosed and successfully treated with laparoscopic cholecystectomy.

PRESENTATION OF CASE: A 57-year-old woman was admitted to our hospital with epigastric pain. Gallstone disease in the gallbladder and common bile duct was diagnosed by ultrasonography and computed tomography. Magnetic resonance cholangiopancreatography (MRCP) and endoscopic retrograde cholangiography (ERC) revealed that the aberrant cystic duct arose from the cystic duct and communicated with the intrahepatic bile duct of the posterior segmental branch. Laparoscopic cholecystectomy was successfully performed in combination with intraoperative cholangiography.

DISCUSSION: If an anomaly of the biliary duct system is not identified during surgery, it may turn out to be a bile leak. The preoperative diagnosis of a double cystic duct allows laparoscopic cholecystectomy to be performed safely in combination with intraoperative cholangiography.

CONCLUSIONS: A single gallbladder with double cystic duct is a very rare anomaly. However, laparoscopic surgery can be facilitated by the use of preoperative and intraoperative images.

1. Introduction

A single gallbladder with double cystic duct is an extremely rare biliary tract system anomaly; there were no reported cases in a study of the intraoperative cholangiograms of 3845 cases [1,2]. If this anomaly diagnosed during or after surgery, rather than before surgery, it might lead to bile duct injury or bile leakage [3,4]. We herein report a case of gallstone disease in a patient with a double cystic duct who was preoperatively diagnosed and successfully treated with laparoscopic cholecystectomy. This work has been reported in line with the SCARE criteria [5].

2. Case presentation

A 57-year-old woman was admitted to our hospital due to epigastric abdominal pain. A physical examination revealed no remarkable findings. Laboratory studies showed an elevated white blood cell count (10400/μL), aspartate aminotransferase (AST: 84 U/L), alanine aminotransferase (ALT: 39 U/L), alkaline phosphatase (ALP: 466 U/L), γ-glutamyl transpeptidase 205 U/L). Ultrasonography and computed tomography (CT) revealed small gallstones in the gallbladder and some stones in the common bile duct. A large liver cyst was also detected in S4. Thus, the patient was diagnosed with cholecysto-choledocholithiasis.

Laparoscopic cholecystectomy was planned after the complete removal of the gallstones in the common bile duct following endoscopic sphincterotomy (EST). However, a cystic duct which communicates with the intrahepatic bile duct of the posterior segmental branch was suspected based on the gross X-ray images obtained after the extraction of the bile duct stones. Therefore, the magnetic resonance cholangiopancreatography (MRCP) was performed. MRCP showed strong suspicion of a single gallbladder with a double cystic duct (Fig. 1). Thus, to confirm this rare

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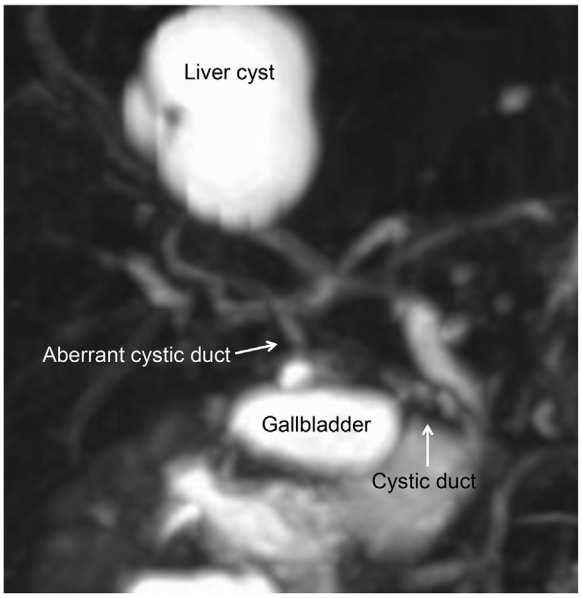

Fig. 1. A double cystic duct was suspected based on the MRCP findings.

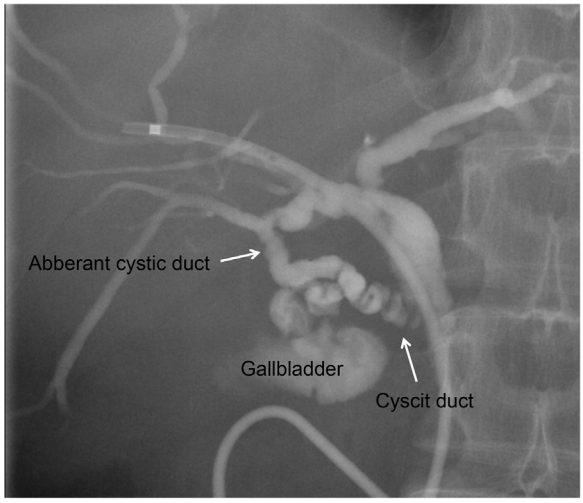

Fig. 2. ERC revealed that a normal cystic duct arose from the neck of the gallbladder, descended down and joined the common bile duct. In addition, an aberrant cystic duct arose from the cystic duct and communicated with the intrahepatic bile duct of the posterior segmental branch.

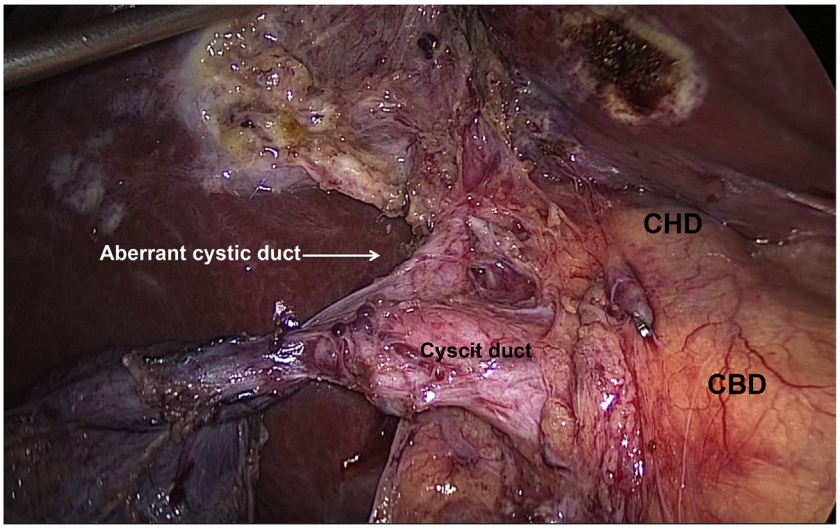

Fig. 3. The intraoperative findings revealed a double cystic duct. (CHD: common hepatic duct, CBD: common bile duct).

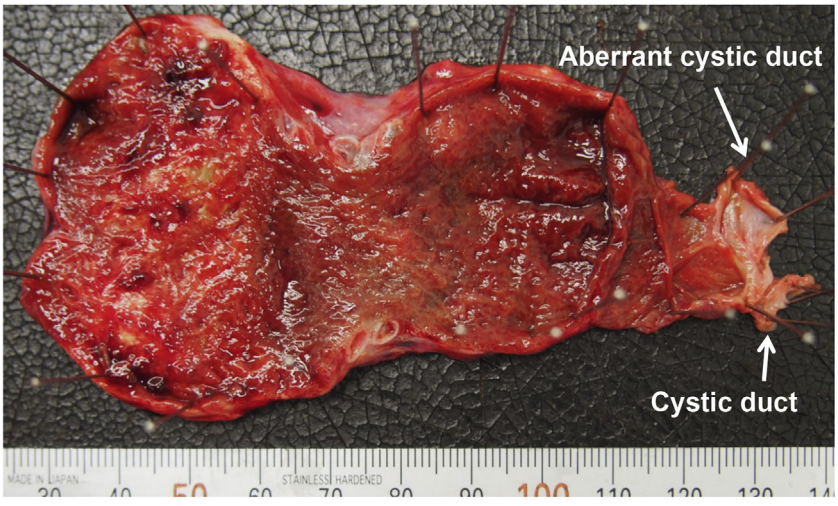

Fig. 4. An examination of the surgical specimen revealed two separate cystic ducts (arrows).

Table 1
Case reports of double cystic duct with single gallbladder treated with laparoscopic cholecystectomy.

Author	Year	Age (years)	Sex	Diagnosed preoperatively?	Elective or urgent surgery?	Diagnosed during surgery?	Intraoperative cholangiography	Surgical morbidity
Nakasugi et al. [9]	1995	50	F	yes	elective	yes	performed	uneventful
Ng et al. [10]	1996	60	M	no	elective	yes	not performed	conversion to open operation
Momiyama et al. [11]	1996	66	F	no	elective	no	performed	bile fistula
Hirono et al. [12]	1997	74	F	no	elective	yes	performed	uneventful
Tsutsumi et al. [13]	2000	74	F	yes	elective	yes	performed	uneventful
Lobo et al. [14]	2000	49	F	no	elective	yes	performed	uneventful
Shivhare et al. [15]	2002	46	F	no	elective	yes	performed	conversion to open operation
Huston et al. [16]	2008	43	F	no	elective	yes	performed	uneventful
Otaibi et al. [4]	2015	54	M	no	elective	yes	performed	uneventful
Samnani et al. [17]	2015	34	F	no	elective	yes	not performed	uneventful
Our case	2017	57	F	yes	elective	yes	performed	liver cyst infection

condition, endoscopic retrograde cholangiography (ERC) was additionally performed for a second time. This time, a normal cystic duct was found to arise from the neck of the gallbladder, from which it descended and joined the common bile duct. In addition, the aberrant cystic duct arose from the cystic duct and communicated with the intrahepatic bile duct of the posterior segmental branch (Fig. 2). Thus, we determined that the patient had a single gallbladder with a double cystic duct. An endoscopic nasobiliary drainage (ENBD) tube was placed for intraoperative cholangiography in order to protect the common bile and hepatic duct from injury during surgery. Laparoscopic cholecystectomy was performed under general anesthesia. During the procedure, the gallbladder was divided from the gallbladder bed in the fundus- to- hilar direction, in order to explore the double bile ducts. The main and aberrant cystic ducts and the common hepatic duct were identified by meticulous dissection and intraoperative cholangiography (Fig. 3). These cystic ducts were then ligated and precisely divided. Laparoscopic cholecystectomy was finished and no drain was placed. The excised specimen showed a duplicated cystic duct containing debris and chronic cholecystitis (Fig. 4). The patient experienced infection of the large liver cyst in S4. Percutaneous transhepatic abscess drainage was needed following treatment with antibiotics. The white-colored pus was drained. However, no bacteria were detected in the sample. The patient was discharged from hospital on postoperative day 18. MRCP, which was performed two months after surgery, revealed no stricture or abnormal passage on the biliary tree.

3. Discussion

Our case showed that an aberrant bile duct did not drain an individual segment of the liver, as well as intercommunication between the major biliary channels and gallbladder. Goor et al. reported various types of biliary tree anomalies. Based on that report, the anomaly in our case was considered to be a communicating accessory bile duct because it connected between the right hepatic duct and the cystic duct [6].

If an anomaly of the biliary duct system is not identified during surgery, it may turn out to be a bile leak. This causes significant postoperative complications, with morbidities in 0.2–2% of cases after laparoscopic cholecystectomy [7]. The preoperative identification of such anomalies is important for avoiding complications. MRCP is reported to have 66% sensitivity in identifying accessory bile ducts, whereas helical CT has up to 100% sensitivity [8]. The definite diagnosis of a double cystic duct was made by ERC in our case. In addition, the normal cystic duct and accessory cystic duct could be identified by intraoperative cholangiography.

Ten reports of double cystic duct with single gallbladder treated with laparoscopic cholecystectomy were found in PubMed through May 2017 after searching with the key words “double cystic duct”; “duplication of cystic duct” and “laparoscopic cholecystectomy” (Table 1) [4,9–17]. Only 3 cases (27.3%) were preoperatively diagnosed as double cystic duct; suggesting that a preoperative diagnosis might be difficult. However; 10 cases (90.9%) were diagnosed as double cystic duct during surgery. This high rate of intraoperative diagnosis might be due to the magnified visual effects of laparoscopic surgery and fine dissection. In the single case report of a misdiagnosis during surgery; the patient developed bile fistula after surgery and required re-operation on the first postoperative day [11]. Two cases (18.2%) required conversion to open operation because of suspicion of bile duct injury [10,15]. Complications occurred in 4 cases (36.7%). Seven cases (63.6%) were able to undergo laparoscopic surgery safely through the use of intraoperative cholangiography.

In our case, the patient experienced a liver cyst infection after the operation. We hypothesized that this might have been caused by bacterial contamination from the biliary tree and that it might have been accelerated by repeated preoperative- and intraoperative cholangiography that were performed to facilitate safe laparoscopic cholecystectomy.

In conclusion, a single gallbladder with double cystic duct is a very rare anomaly. However, laparoscopic surgery can be facilitated by the use of preoperative and intraoperative images.

4. Conclusions

In conclusion, a single gallbladder with double cystic duct is a very rare anomaly. However, laparoscopic surgery can be facilitated by the use of preoperative and intraoperative images.

Conflicts of interest

The authors declare that they have no competing interests.

Funding

None.

Ethical approval

This case report is not research study.
That is not applicable in this case report.

Consent

The patient provided her informed consent for the publication of this case report and any accompanying images.

Authors' contributions

All the authors contributed to diagnose and treat the patient. Atsushi Fujii contributed in drafting the manuscript. Masatsugu Hiraki and Junji Ueda edited the manuscript. Hirokazu Noshiro supervised and made the final approval of the manuscript. All authors read and approved the final manuscript.

Guarantor

Dr. Masatsugu Hiraki.

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