

True left-sided gallbladder with variations of bile duct and cholecystic vein

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Abstract

A left-sided gallbladder without a right-sided round ligament, which is called a true left-sided gallbladder, is extremely rare. A 71-year-old woman was referred to our hospital due to a gallbladder polyp. Computed tomography (CT) revealed not only a gallbladder polyp but also the gallbladder located to the left of the round ligament connected to the left umbilical portion. CT portography revealed that the main portal vein diverged into the right posterior portal vein and the common trunk of the left portal vein and right anterior portal vein. CT cholangiography revealed that the infraportal bile duct of segment 2 joined the common bile duct. Laparoscopic cholecystectomy was performed for a gallbladder polyp, and the intraoperative finding showed that the cholecystic veins joined the round ligament. A true left-sided gallbladder is closely associated with several anomalies; therefore, surgeons encountering a true left-sided gallbladder should be aware of the potential for these anomalies.

Key words: True left-sided gallbladder; Infraportal bile duct of segment 2; Anomaly of the cholecystic vein; Anomaly of the portal vein; Laparoscopic cholecystectomy

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Core tip: A left-sided gallbladder without a right-sided round ligament, which is called a true left-sided gallbladder, is extremely rare. We performed laparoscopic cholecystectomy on a patient with a true left-sided gallbladder which coexisted with an infraportal bile duct of segment 2 and cholecystic venous anomaly. Surgeons encountering a true left-sided gallbladder should be aware of the potential for these anomalies.

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INTRODUCTION

A left-sided gallbladder usually denotes that the gallbladder is located to the left side of the round ligament without situs inversus viscerum; however, most reported cases of left-sided gallbladder are associated with a right-sided round ligament, and such a case is called a "false" left-sided gallbladder^[1]. A left-sided gallbladder without a right-sided round ligament is called a true left-sided gallbladder^[1]. Several variations of infraportal bile duct were reported previously^[2-6]; however, the infraportal bile duct of segment 2 has never been reported in detail. Although the cholecystic veins are usually divided into two subgroups, small branches that directly enter the liver through the liver bed and those that run through the Calot's triangle, cholecystic venous branches entering the round ligament were confirmed intraoperatively. We report an extremely rare case of a true left-sided gallbladder with infraportal bile duct of segment 2 and cholecystic venous anomaly.

CASE REPORT

A 71-year-old woman was referred to our hospital due to an asymptomatic gallbladder polyp of 1cm in diameter that enlarged gradually. The laboratory data were within normal limits. An abdominal ultrasonography revealed a gallbladder polyp. An abdominal dynamic computed tomography (CT) examination revealed a gallbladder polyp, without enhancement, of 1 cm in diameter. The gallbladder was located to the left side of the middle hepatic vein and the normal anatomically positioned round ligament connected to the left portal umbilical portion, and was attached to the left lateral section of the liver (Figure 1). CT portography revealed an anomaly of portal venous divergence of the main portal trunk into the right posterior portal vein and the common trunk of the left portal vein and right anterior portal vein (Figure 2). CT arteriography showed that the hepatic artery was of normal type and the cystic artery diverged from the right hepatic artery. Drip infusion cholangiographic-CT (DIC-CT) demonstrated that the cystic duct joined the extrahepatic bile duct on the right side and created a hairpin turn anterior to the extrahepatic bile duct. Furthermore, one of the two bile ducts of segment 2 followed a route that was caudal to the umbilical portion of the left portal vein, that is, an infraportal course, and joined the extrahepatic bile duct (Figure 3).

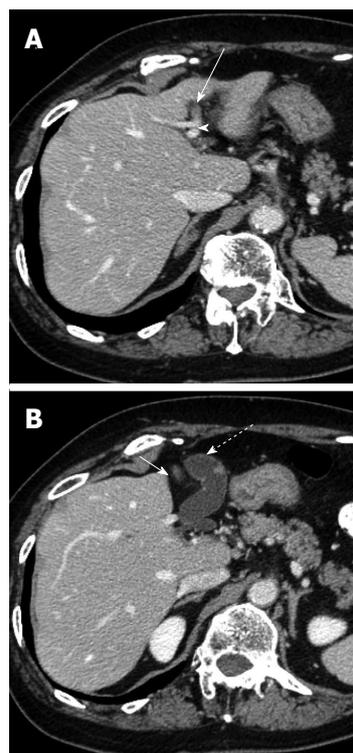


Figure 1 Computed tomography examination reveals a left-sided gallbladder. A: The round ligament (arrow) is connected to the left portal umbilical portion (arrow head); B: The gallbladder (dotted arrow) is located to the left side of the round ligament (arrow) and the middle hepatic vein, and attached to the left lateral section of the liver.

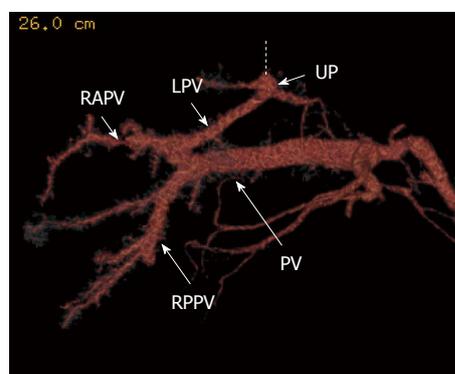


Figure 2 Computed tomography portography reveals the portal venous anomaly. The dotted line is the round ligament. PV: Portal vein; LPV: Left portal vein; RAPV: Right anterior portal vein; RPPV: Right posterior portal vein; UP: Umbilical portion.

The patient was diagnosed preoperatively as having a polyp of the true left-sided gallbladder with an infraportal bile duct of segment 2.

We performed laparoscopic cholecystectomy with four surgical ports. A good surgical field was obtained by retracting the round ligament using a thread fold via the abdominal wall. The gallbladder was located left of the round ligament and attached to the left lateral section of the liver and the round ligament, and Calot's triangle was covered by the gallbladder. Therefore, we first separated the gallbladder from

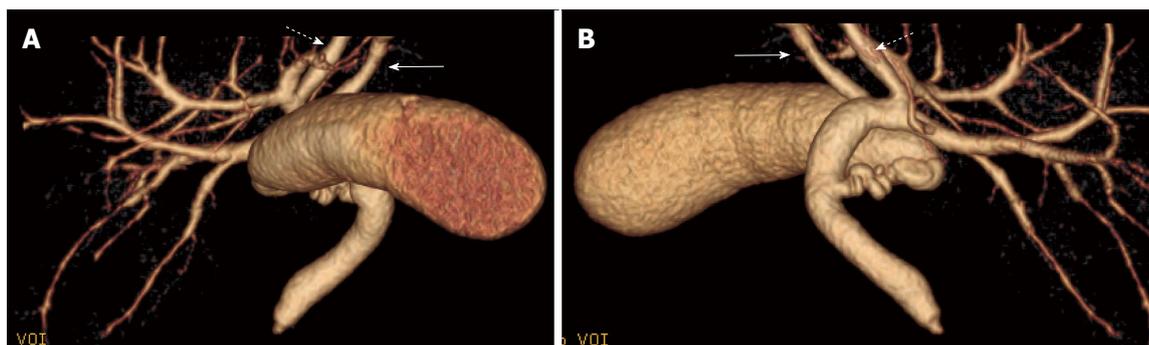


Figure 3 Drip infusion cholangiographic-computed tomography demonstrates that the cystic duct joins the extrahepatic bile duct on the right side and creates a hairpin turn anterior to the extrahepatic bile duct. One of two bile ducts of segment 2 (arrow) follows a route that is caudal to the umbilical portion of the left portal vein, that is, an infraportal course, and joins the extrahepatic bile duct; the other one (dotted arrow) follows a normal route, that is, a supraportal course. A: Computed tomography (CT) three-dimensional reconstruction, ventral view; B: CT three-dimensional reconstruction, dorsal view.

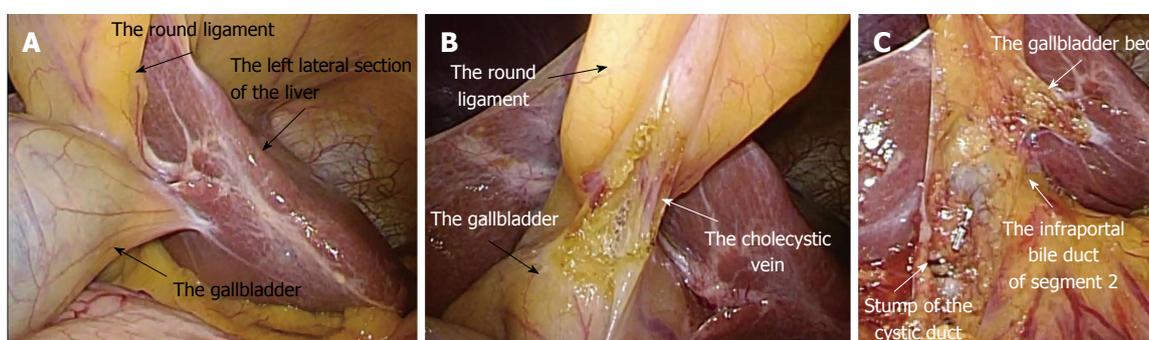


Figure 4 Intraoperative finding reveals a true left-sided gallbladder. A: Image before cholecystectomy; B: Anomaly of the cholecystic vein which enters the round ligament; C: Image after cholecystectomy.

the liver bed and the round ligament. Two cholecystic veins which enter the round ligament were confirmed and divided by ultrasonic scalpel. The cystic artery and cystic duct were clipped and divided respectively, and the gallbladder was finally removed. The anatomy was inspected again; we confirmed the liver bed located to the left side of the round ligament and the infraportal bile duct of segment 2 (Figure 4). Pathological examination revealed a cholesterol polyp without malignancy. The postoperative course was uncomplicated.

DISCUSSION

Since Hochstetter first described a left-sided gallbladder in 1886^[7], many cases have been reported in the literature; however, most reported cases of left-sided gallbladder are associated with a right-sided round ligament, and such a case is called a “false” left-sided gallbladder^[1]. A left-sided gallbladder without a right-sided round ligament is called a true left-sided gallbladder^[1], and is extremely rare. To our knowledge, only two cases of a true left-sided gallbladder have been reported previously^[1,8]. A true left-sided gallbladder is an anomaly of the gallbladder; however, a “false” left-sided gallbladder is not an anomaly of the gallbladder, but of the round ligament^[9]. Therefore, we think that a true

left-sided gallbladder should be clearly distinguished from a “false” left-sided gallbladder. Gross^[10] reported that the embryologic development of a left-sided gallbladder may occur in one of two ways. The first way in which this anomaly may develop is as follows: the gallbladder anlage begins as a normal embryologic bud from the hepatic diverticulum and migrates to the left, where it becomes fixed by the developing peritoneum to the undersurface of the left lateral section of the liver. This accounts for the normal entrance of the cystic duct into the extrahepatic duct. The second one is as follow: a gallbladder develops on each side, with the left-sided gallbladder persisting on the left and the right-sided one becoming atrophic and disappearing. In such a case, the cystic duct joins the extrahepatic duct or left hepatic duct from the left side. We consider that the true left-sided gallbladder in our case was caused in the first way, because the cystic duct joined the extrahepatic bile duct on the right side.

Although several authors reported that a left-sided gallbladder is not identified preoperatively^[11-13], a left-sided gallbladder can be diagnosed preoperatively with improvements in diagnostic imaging methods^[1,14,15], and we were able to diagnose this anomaly by CT examination.

It has been reported that a true left-sided gallbladder is closely associated with multiple anomalies of the

portal vein and bile duct^[1]. In our case, the patient had anomalies of not only the portal vein and bile duct, but also the cholecystic vein. The portal vein anomaly in our case was the same as in the previous report^[1]. Several types of infraportal bile duct, such as the infraportal bile duct of the caudate lobe^[2], left lateral section^[3,4], segment 3^[3-6], and right posterior section^[4,6], have been reported. To our knowledge, the infraportal bile duct of segment 2 has been described in only two studies^[3,4]; therefore, we think that this variation is a rare type. Kitami *et al.*^[4] reported that infraportal courses of the bile duct are observed more frequently in patients with portal vein variation, such as our case, than without portal vein variation. The surgeon should initiate the dissection as close to the gallbladder as possible in order to prevent injury of the infraportal bile duct of segment 2 in a patient with true left-sided gallbladder.

The cholecystic veins are usually divided into two subgroups, small branches that directly enter the liver through the liver bed and those that run through Calot's triangle^[16,17]; however, cholecystic venous branches entering the round ligament were confirmed in our case. We think that these cholecystic veins are the specific anomaly of a true left-sided gallbladder. The surgeon should pay special attention to the possibility of this cholecystic venous anomaly when a true left-sided gallbladder is dissected from the round ligament. We reported this extremely rare case to emphasize that laparoscopic cholecystectomy can be performed safely for a true left-sided gallbladder when the surgeon is familiar with the anatomical variations.

COMMENTS

Case characteristics

The patient had no symptoms.

Clinical diagnosis

There were no clinical findings.

Differential diagnosis

Gallbladder carcinoma.

Laboratory diagnosis

The laboratory data were within normal limits.

Imaging diagnosis

Computed tomography revealed that the gallbladder was located to the left side of the middle hepatic vein and the normal anatomically positioned round ligament connected to the left portal umbilical portion, and the infraportal bile duct of segment 2 joined the extrahepatic bile duct.

Pathological diagnosis

Cholesterol polyp of the gallbladder.

Treatment

Laparoscopic cholecystectomy.

Related reports

To date, only two cases of a true left-sided gallbladder have been reported previously.

Term explanation

A left-sided gallbladder without a right-sided round ligament is called a true left-sided gallbladder.

Experiences and lessons

Laparoscopic cholecystectomy can be performed safely for a true left-sided gallbladder when the surgeon is familiar with the anatomical variations of the bile duct and cholecystic vein.

Peer-review

A rare case of true left-sided gallbladder has been reported. Surgeons need to face different gallbladder anomalies to be ready to manage ambiguities during cholecystectomy.

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