Case Report

Symptomatic cholelithiasis in an ectopic retrocolic retroduodenal subhepatic duplicated gallbladder

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ABSTRACT

Gallbladder duplication is a rare anatomic variant of biliary anatomy, which can present diagnostic and treatment challenges. In this case, a 49-year-old male presented with classic symptoms of biliary colic to his primary care physician, and while computed tomography (CT) noted the presence of gallstones, neither CT nor ultrasound was able to locate a gallbladder within the gallbladder fossa. Initial surgery found and cauterized a rudimentary gallbladder, but symptoms persisted, requiring a second surgery and secondary analysis of CT, ultrasound, and magnetic resonance imaging with magnetic resonance cholangiopancreatography. Imaging helped clarify the diagnosis of gallbladder duplication (ductular type), where the first gallbladder’s cystic duct inserted high on the common hepatic duct, and the second retroplaced gallbladder’s cystic duct inserted into the midportion of the common bile duct. Thorough understanding of the numerous gallbladder duplication variants, careful interpretation of modern imaging, and close collaboration between surgeon and radiologist are essential for optimal management of patients with gallbladder duplications.

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Case report

A 49-year-old male presented with classic symptoms of biliary colic to his primary care physician. Prompt imaging at another institution included ultrasound, which failed to detect a gallbladder within the gallbladder fossa (Fig. 1), and computed tomography (CT) of the abdomen 3 days later, which showed a stone-filled gallbladder without comment about its ectopic location. During laparoscopic cholecystectomy with conversion to open laparotomy 6 weeks later, a rudimentary gallbladder was identified within the gallbladder fossa, with the cystic duct inserting into the common hepatic duct. Because of its small size, the gallbladder was cauterized, but, unbeknownst to the surgeon, it did not correspond to the large stone-filled gallbladder reported on CT.

Postoperatively, the patient’s symptoms persisted, and the surgeon carefully reviewed the operative findings and preoperative imaging studies with our radiologist. On the abdominal CT, a large stone-filled gallbladder with a long tortuous cystic duct was identified posterior to the colon and duodenum, inferomedial to the inferior tip of the right lobe of the liver, and anterolateral to the right kidney (Fig. 2). The intraoperative cholangiogram demonstrated that the cauterized rudimentary gallbladder inserted high on the common hepatic duct, near the confluence of the right and left hepatic ducts (Fig. 3). A partially filled tortuous tubular structure arising from the midportion of the common bile duct (CBD) was seen, thought to represent a second cystic duct.

Additional postoperative workup included ultrasound and magnetic resonance imaging (MRI) with magnetic resonance cholangiopancreatography (MRCP) 6 and 10 days after the surgery, respectively. Ultrasound showed a 3.2-cm structure with wall echo shadow sign in the region adjacent to the right kidney and liver, corresponding to gallbladder location on prior CT scan (Fig. 4). MRI with MRCP demonstrated a duplicated gallbladder located within the retroperitoneal space posterior to the colon. It was lateral to the duodenum at its lower portion and posterior to the duodenum superomedially near the CBD (Fig. 5A). The duplicated cystic duct inserted into the midportion of the CBD (Fig. 5B).

Forty-eight days after the initial surgery, a second operation (open cholecystectomy) resulted in successful removal of the large stone-filled gallbladder. A second intraoperative cholangiogram confirmed the connection of the retrocolic gallbladder with the midportion of the CBD, concordant with the preoperative MRCP. Repeat MRI with MRCP on the fourth
postoperative day due to abnormal blood work demonstrated a nonobstructing 2-mm calculus within the CBD (Fig. 6), but blood work resolved uneventfully without long-term recurrence.

**Discussion**

Gallbladder anomalies include abnormal development (rudi-
mentary gallbladder), morphology (eg, folded, septate, and Phrygian cap), location, and multiplicity. The classic description of a duplicated gallbladder involves 2 separate gallbladder cavities, each with a cystic duct and arising during the fifth to sixth week of embryologic development. It occurs in approximately 1 per 4000 people [1] and is associated with foregut malformations [2]. The position of the duplicate gallbladder may be anywhere in the abdomen, but a retrocolic gallbladder is extremely rare. Due to this variation and the potential need for reoperation [3,4], preoperative cholangiographic evaluation is important [5]. Acute cholecystitis in such patients may present with the right flank pain, instead of right upper quadrant pain, and therefore may be mistaken for renal colic. In symptomatic cases, both gallbladders should be removed, but asymptomatic cases do not require prophylactic cholecystectomy [6].

Several classification systems exist, dating back to Boyden [7]. Harlaftis classified double gallbladder into 2 groups: split primordial duplication and accessory gallbladder, with the latter referring to separate cystic ducts arising from distinct gallbladder primordia [8]. Causey et al. proposed a unified classification of multiple gallbladders that includes triple gallbladders. It follows the modified Harlaftis classification that includes a left trabecular variant in the type 2 classification, and it adds a third group that occurs when there is a combination of the anatomy of types 1 and 2 [9].

Ultrasound, CT, MRI with MRCP, and nuclear medicine hepatobiliary imaging have all been reported to aid in the diagnosis of gallbladder duplication, but literature reports indicate that <50% of gallbladder duplications are diagnosed preop-
eratively [10]. Gallbladder duplication is easily missed due to “satisfaction of search” when one of the 2 gallbladders is iden-

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**Fig. 3** – Intraoperative cholangiography at the conclusion of the first surgery. Intraoperative cholangiogram shows an incompletely filled (duplicated) cystic duct arising from the common duct at its midportion (arrow). The stone-filled duplicated gallbladder is not visualized, likely due to an obstructing calculus. The surgical clips within the gallbladder fossa are located at the site of the original laparoscopic cholecystectomy.

**Fig. 4** – Ultrasound imaging after the initial surgery due to persistent symptoms. Sagittal (A) and transverse (B) views of the abdomen in the decubitus position demonstrate a 3.2-cm structure with wall echo shadow sign indicating gallstones in the region adjacent to the right kidney corresponding to the region noted on prior CT scan.
Fig. 5 – Magnetic resonance imaging with magnetic resonance cholangiopancreatography after the first surgery. (A) Axial T2 fat-saturated MRI demonstrates a stone-filled gallbladder (long arrow) located posterior to the ascending colon (short arrow). (B) MRCP shows a long and tortuous cystic duct (thinner arrows) coursing posterior to the duodenum and inserting into the midportion of the CBD. The pancreatic duct is also shown (thicker arrow).

Fig. 6 – Magnetic resonance imaging with magnetic resonance cholangiopancreatography after the second surgery. (A) Axial MRI and (B) thin section MRCP demonstrates a 2-mm dependent nonobstructing calculus (long arrow) within the common bile duct just distal to the insertion of the cystic duct remnant (short arrow). This small calculus subsequently passed spontaneously.

where the first gallbladder inserted high on the common hepatic duct, and the second larger retroplaced stone-filled gallbladder inserted into the midportion of the CBD [10].

Conclusion

In this case, gallbladder duplication was found in a retrocolic retroduodenal subhepatic location that was undiagnosed preoperatively on imaging and intraoperatively during a laparoscopic cholecystectomy with conversion to open laparotomy, eventually requiring a second open surgery. Thorough understanding of the numerous gallbladder duplication variants, careful interpretation of modern imaging, and close collaboration between surgeon and radiologist are essential for optimal management of patients with gallbladder duplications.
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