Triple Gallbladder
Preoperative Sonographic Diagnosis

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Triplication of the gallbladder (GB) (vesica fellea triplex) is a rare congenital anomaly of the biliary tract not likely to be revealed unless there are associated symptoms. To our knowledge, only 10 cases have been reported in the literature.1–10 The first reported case was described in a human cadaver in 1752.1 In the most recent case, reported in 2003, triple GB was diagnosed during laparoscopy, whereas preoperative sonography failed to show the abnormality.2 We present a case of this rare anomaly diagnosed preoperatively by sonography and endoscopic sonography confirmed on laparoscopic cholecystectomy.

Case Report
A 15-year-old girl came to the emergency department with complaints of vague epigastric pain and vomiting of several days’ duration without fever or a change in bowel habits. On physical examination, her pulse was 90 beats per minute; blood pressure was 107/78 mm Hg; and temperature was 36.9°C. There was no jaundice, and the abdomen was soft with mild right upper quadrant tenderness. No mass was palpable, and there was no hepatosplenomegaly. Blood test values (complete blood cell count, liver function tests, and amylase level) were all within normal limits. An abdominal sonographic examination showed normal liver, spleen, and kidneys. Three fluid-filled structures were noted in the GB fossa (Figure 1A). The largest was pear shaped (arrow) and almost completely filled with sludge, without thickening of the wall (Figure 1B). The other 2 contained clear fluid (Figure 1C). No connection between these structures could be seen; however, a normal-appearing common bile duct (CBD) was shown. A diagnosis of GB triplication was suggested. Duplication of the GB with tortuosity of one of the
cystic ducts could not be ruled out. Endoscopic sonography confirmed the diagnosis. Because the precise anatomic structures of the cystic ducts in relation to the 3 GBs were not entirely clear, magnetic resonance cholangiopancreatography (MRCP) was performed, which showed 3 separate GBs (Figure 2A). Two of the cystic ducts could be visualized becoming a common cystic duct (Figure 2B). The anastomosis of the third duct could not be visualized. This common cystic duct was shown to enter a normal-looking CBD (Figure 2C).

Because the patient continued to have right upper quadrant pain, a laparoscopic cholecystectomy was performed. Initially a dissection off the Calot triangle revealed 3 GBs appearing as 3 separate chambers, each bearing a separate cystic duct. All 3 cystic ducts joined into a common cystic duct that drained into the CBD. The larger GB contained sludge. There was no obvious anatomic obstacle that could be seen to interfere with the drainage of the larger GB; however, we can speculate that, during the drainage of the other 2 GBs, an interference affected the third one, causing stasis and sludge formation. After identification and ligation of the cystic artery and isolation of the common cystic duct, the GBs were dissected by retrograde cholecystectomy. Pathologic examination of the surgical specimen revealed a noninflamed triple GB. Each of the GBs had its own small cystic duct, and all converged into a larger cystic duct, which entered a single CBD. No calculi were found (Figure 3).

Discussion

Three types of GB triplication are described, depending on the anatomic structure of the cystic duct. In the first type, each of the 3 GBs drains
into the CBD through a separate cystic duct. The second type is characterized as 2 GBs connected to a common cystic duct and the third GB having its own separate duct. In the third type, 3 GBs share a single cystic duct. This type, found in our patient, has, to our knowledge, been described in previous literature only twice.\(^5\)

Several rudimentary vesiclelike outpocketings (bile duct buds) are situated along the bile ducts during embryologic life. Failure of the rudimentary bile ducts to regress eventually leads to formation of accessory GBs (double or, rarely, triple). The relationship of the GB to the cystic duct and to the CBD seems to be determined by the location of these buds: if the persistent bud originates from the hepatic duct or CBD, the GBs will have separate cystic ducts; if it arises from the cystic duct, the GBs will share single common cystic duct draining into a normal CBD.\(^1\)

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**Figure 2.** A, Coronal transverse relaxation time (T2)-weighted single-shot fast spin echo (SSFSE) MRCP image showing the 3 separate GBs of varying size (straight arrows), 1 of them containing sludge or calculi (curved arrow). B, Coronal T2-weighted SSFSE image showing 2 of the cystic ducts (arrows) joined together. C, Oblique T2-weighted SSFSE image showing convergence of a cystic duct (arrow) into a normal-looking CBD (arrowhead).
To our knowledge, all previously published cases were in adults, with ages that varied from 36 to 69 years. Our patient was an adolescent girl. Because 9 of the 10 published triple-GB cases were reported from 1926 to 1979, the preoperative imaging studies for the biliary tree were often limited and included oral or intravenous cholecystograms, fat meal studies, tomography, and postoperative T-tube cholangiography. In the most recently reported case, in 2003, sonography and endoscopic retrograde cholangiopancreatography, which were performed preoperatively, failed to reveal any anatomic abnormality of the biliary tract, and the diagnosis was made only at surgery. In our case, the diagnosis of triple GB was established by a preoperative sonographic study and confirmed by endoscopic sonography, MRCP, and laparoscopy. The limitation of sonography was the inability to define the precise anatomic structures of the cystic ducts, which were subsequently better established by MRCP.

The clinical importance of finding a double or triple GB, according to previous reports, is that there is high prevalence of pathologic conditions found in accessory GBs, including sludge, cholelithiasis, cholecystitis, cellular metaplasia, and even adenocarcinoma. Additionally, preoperative awareness of this anatomic variation can minimize the chance of an unexpected course of cholecystectomy and avoid damage to the biliary tract. Likewise, it seems appropriate for surgeons to know in advance about the anomaly so that they can remove all the GBs and avoid “postcholecystectomy syndrome” due to a retained accessory GB.

In summary, to our knowledge, only 10 cases of triple GB have been reported to date, none of which was diagnosed preoperatively on the basis of sonography. We described a case of GB triplication in which the anatomic abnormality was suggested preoperatively by ordinary abdominal sonography, thus giving surgeons the possibility of avoiding unexpected events during surgery.

References