Interposition of the gallbladder – or the absent common hepatic duct and cystic duct

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Abstract. Interposition of the gallbladder is a rare anomaly, but its diagnosis is important since it represents a surgically correctable cause of jaundice. The patients present with jaundice, abdominal pain and sometimes an enlarged gallbladder. Radiological diagnosis may be difficult since the condition may be mistaken for a choledochal cyst, hydrops of the gallbladder or Caroli’s disease. The ultrasound, cholangiogram and surgical findings of dilated intrahepatic ducts adjacent to a normal or enlarged gallbladder with no dilatation of the common bile duct are presented in two children with this condition.

Jaundice in children is not an unusual clinical problem. It may be caused by a variety of diseases, including hemolysis; hepatic, metabolic or enzymatic abnormalities; hepatitis; bile duct obstruction, and congenital anomalies of the biliary tree. The etiology of the jaundice must be identified and appropriate therapeutic measures taken as early as possible. In some cases of bile duct obstruction surgical intervention may lead to a cure [1].

Interposition of the gallbladder is a rare, surgically correctable anomaly in which the cystic duct is absent and one or both hepatic ducts empty into the gallbladder, which in turn empties into the common bile duct [2, 3]. We present our experience with two cases of interposition seen at The Hospital for Sick Children, Toronto.

Case reports

Case 1

A 4-year-old boy was admitted with a 3-day history of jaundice and increasing right upper quadrant pain and mass. The child had previously undergone correction of esophageal atresia, tracheoesophageal fistula and anorectal malformation, and fundoplication for gastroesophageal reflux. Three days before admission the patient had become increasingly lethargic with nausea, vomiting and jaundice associated with dark urine and clay-colored stools. On physical examination, the patient was jaundiced. There was a tender mass in the right upper quadrant. Total bilirubin was 68 µmol/l (normal, 2–18 µmol/l) with a direct fraction of 60 µmol/l (normal, 0–4 µmol/l). The alkaline phosphatase (ALP) measured 290 IU/l (normal, 36–92 IU/l) and the aspartate aminotransferase (AST) 148 IU/l (normal, 10–30 IU/l). Repeat tests obtained 3 days after admission showed the total bilirubin had decreased to 32 µmol/l and the AST to 33 IU/l.

Fig. 1. a A longitudinal sonogram through a sludge containing the gallbladder (g-b), demonstrating an anomalous duct (d) entering the gallbladder above its neck (n). A second anomalous duct was visualized on adjacent scans. b A diagram showing the anomalous insertion of the right and left hepatic ducts, found at operation
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During the last episode, investigations at the referring institution found that total bilirubin was 56 μmol/l, direct bilirubin 46 μmol/l, AST 583 IU/l and ALP 497 IU/l. The hepatitis B surface antigen was negative. Repeat liver function tests obtained immediately before transfer to our hospital gave normal findings.

On admission here, the patient was not clinically jaundiced, and physical examination found the liver soft, nontender and palpable 3 cm below the right costal margin. The AST was mildly elevated (33 IU/l) and the alkaline phosphatase was very high (345 IU/l).

A sonographic examination showed dilated intrahepatic bile ducts, a normal size gallbladder and no dilatation of the common bile duct. A percutaneous transhepatic cholangiogram (PTC) confirmed the presence of dilated intrahepatic ducts with slow filling of the gallbladder (Fig.2a). The possibility of interposition of the gallbladder was suggested because no common hepatic duct could be seen. The upper common bile duct was very narrow but the caliber of the distal common bile duct was normal. To exclude a portal obstructing mass, a computed tomography scan was obtained immediately following PTC and no mass lesion was found.

At surgery, the left and right hepatic ducts were found to empty directly into the gallbladder. There was no common hepatic duct (Fig.2b). The proximal segment of common bile duct was severely stenosed due to its long (1.5 cm) intramural course through the gallbladder wall. The distal common bile duct was normal. Cholecystectomy leaving a small portion of gallbladder, and Roux-en-Y hepaticocholecystoenterostomy were performed, the portion of gallbladder being used to facilitate anastomosis of the bowel to bile ducts.

Postoperatively the patient did well and has had no further episodes of jaundice for the past 9 months. The liver function tests remain normal.

Discussion

The liver, gallbladder and biliary duct system develop from the hepatic diverticulum of the foregut [4]. The hepatic diverticulum divides into two parts: the larger, cranial, part gives rise to the liver, while the smaller caudal part develops into the gallbladder and cystic duct. Normally, the left and right hepatic ducts join together into a common hepatic duct. The cystic duct combines with the common hepatic duct to form the common bile duct.

In the rare anomaly best called interposition of the gallbladder, the hepatic ducts drain, separately or together, directly into the gallbladder, and the gallbladder drains directly into the common bile duct. The etiology of this condition is unknown. To the best of our knowledge, only two previous cases of this anomaly have been described, one in a child [2, 3]. Both these patients presented with jaundice and showed slightly different anomalies from those of our patients.

The clinical presentation of this anomaly is intermittent jaundice [2, 3]; in our patients there was also abdominal pain. It is apparent from our second case that the clinical presentation may suggest hepatitis. Hence, it is important to differentiate interposition