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Pictorial Review of Congenital Anomalies of the Gallbladder and Biliary Ducts: Findings on Hepatobiliary Iminodiacetic Acid Scan

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Gallbladder agenesis in association with biliary atresia; rarely
A 55 year-old man status post cholecystectomy was
Fluoroscopy-guided ERCP confirms the HIDA scan
Diagram illustration of the two most common congenital
HIDA dynamic imaging shows rapid
Double common bile ducts with one duct opening in the ampulla
A 2 month old infant presents with mild hyperbilirubenemia. Ectopic or floating gallbladder which is often associated with
Diagram showing prompt excretion of the radiotracer is consistent with a Todani type 1 choledochal cyst. In addition, it is important to report this
case report. Gallbladder agenesis is associated with biliary atresia; rarely gallbladder agenesis may occur in association with duodenal
Gallbladder diverticulum which is associated with multiple gallbladder pathologies including acalculous cholecystitis, recurrent cholangitis and cholangiocarcinoma.
Giant gallbladder which can reach up to 1.5 L in volume (exceeding the size of the liver).
Double common bile ducts with one duct opening in the ampulla of Vater and the other duct opening in different parts of the GI tract. This rare anomaly is associated with increased risk of pancreatitis and cholangiocarcinoma, and predisposes the patient to surgical complications if not recognized before surgery. Similarly, double ducts have also been reported.
Ectopic or floating gallbladder which is often associated with other biliary and hepatic anomalies (such as left or right hepatic bile lobes).

LEARNING OBJECTIVES
1. To become familiar with the imaging appearances on Hepatobiliary Iminodiacetic Acid Scan of congenital gallbladder and biliary duct anomalies.
2. To understand the diagnostic utility of functional imaging with HIDA when evaluating biliary tract anomalies.

CASE 1. (A) Dynamic HIDA imaging in a patient presenting with chronic right upper quadrant pain shows radiotracer egression from the liver into the bowel; gallbladder was not visualized up to one hour. (B) Delayed static image shows delayed appearance of a cystic duct structure in the expected location of the gallbladder consistent with a duplicated gallbladder (yellow arrow). (C) Subsequent MRCP was obtained and confirmed the duplicated gallbladder. (D) Dynamic imaging following CC-block injection showed prompt secretion of radiotracer from both gallbladders excluding biliary distension. Patients with right upper quadrant pain, HIDA can be used to evaluate for cystic duct anomalies that may have important clinical implications for the patient.

CASE 2. A 26 year old female with right upper quadrant pain for one year. (A and B) HIDA dynamic imaging shows rapid dislocation of the radiotracer from the blood pool, and accumulation within a circular structure in the expected location of the common bile duct (orange arrow) consistent with a Todani type 1 choledochal cyst. (C) Static 2 hour delayed anterior image shows the gallbladder (yellow arrow) adjacent to the cystic biliary structure, and excludes bilirubin dysgenesis in each of the gallbladders in the setting of a duplicated gallbladder. (D) Anteroposterior view showing the different types of gallbladder duplication variants based on the Boparren classification. Recognizing and reporting the duplicated gallbladder finding to the surgeon is important for surgical planning purposes because it may change the simple laparoscopic cholecystectomy into an open procedure to avoid bilirubin injury during surgery.

CASE 3. A 2-month old infant presents with minimal hyperbilirubenemia. (A) Dynamic sequential HIDA imaging over the anterior abdomen shows rapid clearing of the radiotracer from the blood pool, and accumulation within a circular structure in the expected location of the common bile duct (orange arrow) consistent with a Todani type 1 choledochal cyst. (B) Static 2 hour delayed anterior image shows the gallbladder (yellow arrow) adjacent to the cystic biliary structure, and excludes bilirubin dysgenesis. Patients with right upper quadrant pain, HIDA can be used to evaluate for cystic duct anomalies that may have important clinical implications for the patient.

CASE 4. A 55 year-old man status post cholecystectomy was referred from an outside hospital with RUQ pain. (A) HIDA scan shows linear radiotracer activity projecting from the liver towards the cholecystectomy bed (orange arrow) with an associated area of focal accumulation on delayed images (yellow arrow) consistent with a bileoma related to a missed accessory biliary duct during surgery. (B) Pancreography and ERCP confirmed the HIDA scan findings and demonstrates the accessory duct (orange arrow) projecting from the right posterior biliary duct with associated active contrast extravasation into the cholecystectomy bed (yellow arrow).

REFERENCES
Robie et al. Differentiating biliary atresia from other causes of cholestatic jaundice. Am Surg. 2014 Sep;80(9):827-31
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SUMMARY
Gallbladder congenital anomalies may present as incidental findings on HIDA.
Recognizing and reporting these incidental anomalies on HIDA may have important clinical implications for the patient.

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