

IMAGING FINDINGS OF SPONTANEOUS PERFORATION OF COMMON BILE DUCT IN AN INFANT

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Biliary leak can be readily demonstrated with hepatobiliary scintigraphy. Ultrasound and CT can define biliary collections, but cannot easily determine if there is an active leak. We describe a distinctive pattern of spread of the radioactive biliary agent (Tc-disofenin) in the peritoneal cavity, and a secondary reversible parenchymal change in the liver on CT scan, in an infant with a spontaneous rupture of the bile duct.

Case Report

An eleven-month-old infant presented with fever, vomiting and diarrhea. A transient jaundice lasting for four days developed, and was followed by severe abdominal distension associated with whitish stool and drop in weight. There was no history of trauma and the infant had been in good health before this. On physical examination, the infant was mildly distressed. The abdomen was distended with shifting dullness and there was bilateral greenish hydrocele. Urine analysis was normal and the stool was free of bilirubin. Serum bilirubin was 36 mmol/L, alkaline phosphatase 139 units/L, ALT 49 units, total protein 44 g/L, albumin 21 g/L, and PT was 18.4 sec. Diagnostic peritoneal tap revealed 60 WBCs (polymorph. 82%, lymphocytes 16%) and cholesterol 6.8 units. The ascitic fluid bilirubin was 365 mmol/L and the PTT was 58.9 sec. ??? peritoneal fluid protein concentrations and glucose. The gram stain and culture of the ascitic fluid were negative and blood culture showed no bacterial growth.

Diagnostic Imaging Evaluation

Ultrasound showed a large amount of free ascites in the abdomen and pelvis, the gallbladder could not be seen, and the liver appeared diffusely echogenic. The CT scan (Figure 1) showed a low-density liver (2 to 12 Hounsfield

units), consistent with fatty infiltration. The gallbladder was contracted. The ascitic fluid appeared slightly dense, measuring 15-20 Hounsfield units. Technetium 99m DNA scan using disofenin showed good uptake in the liver, with focal accumulation of radioactivity in the **portahepatis** appearing in a peanut shell-like collection (Figure 2A). This collection appeared to leak in a branching linear pattern downwards caudally to the right of the midline, and transversely to the left along the mesenteric root and mesocolon boundaries (Figure 2B). The radioactivity subsequently extended down to the pelvis and ascended to the left side of the abdomen, filling the peritoneal cavity (Figure 2C).

Surgical Pathological Findings

At laparotomy, the peritoneal serosa was congested throughout the abdomen and pelvis. An intraoperative cholangiogram through the fundus of the gallbladder showed a leak at the junction of the cystic duct and the common hepatic duct (Figure 3). This was due to a 1 cm linear tear at the common hepatic duct, starting from the level of the cystic duct and extending upwards towards the liver. The common bile duct distal to the cystic duct was

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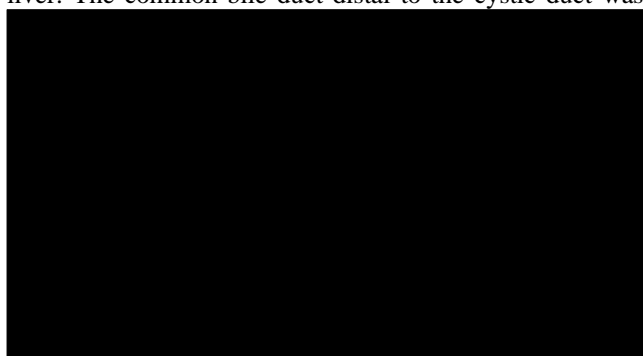


FIGURE 2. Sequential 4 min Tc disofenin images (DISIDA scan):A) Progressive leakage of radioactivity for the biliary tract in the hilum of the liver, resembling a germinating peanut shell with root-like extensionsB) Shows leak branching in a linear pattern downward caudally along the mesenteric root and mesocolon boundaries.C) Filling of ascites with radioactivity is noticeable at the periphery of the peritoneal cavity.

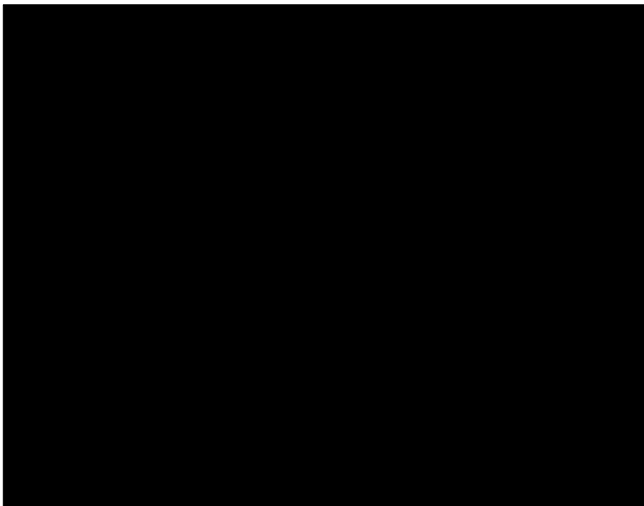


FIGURE 3. Intraoperative cholangiogram shows the leakage of contrast medium from the biliary tract to the peritoneal cavity (↔).

very small and could not be filled with contrast material due to the large leak. The liver appeared soft and a wedge biopsy was taken. Histopathological diagnosis was macrovesicular steatosis with normal architecture. There was evidence of moderate fatty infiltration of the liver. The peritoneal biopsy revealed bile peritonitis. A cholecystectomy and choledochoduodenostomy was performed.

Follow-up Diagnostic Imaging Evaluation

One month after surgery, a repeat Technetium 99m disofenin scan showed normal uptake in the liver and patient biliary tract without leakage. A CT scan showed a normal appearance of the liver with a density measuring 56 Hounsfield units, compared to spleen density measuring 58 Hounsfield units.

Discussion

Tc-IDA cholescintigraphy has been found to be sensitive in demonstrating spontaneous biliary rupture.²

In our patient we report a distinct technetium disofenin imaging pattern of radioactivity leakage into the gallbladder fossa and along the mesenteric folds in the abdomen, caused by the perforated extrahepatic bile duct. The appearance mimicked a peanut shell germinating with roots forming in caudal and transverse directions. The CT finding of high-density ascitic fluid was consistent with peritonitis causing an exudate type fluid. This finding has previously been reported in other types of peritonitis,³ however, the finding on the CT scan of marked fatty infiltration confirmed by the echogenic liver on ultrasound has not been reported before in this condition. The etiology of the fatty infiltration of the liver could be due to lack of digestion action of the bile within the bowel, resulting in malabsorption and malnutrition, as well as disturbance of the lipid transport mechanism in the liver due to the interruption of the enterohepatic circulation secondary to the leakage of the bile into the peritoneal cavity.⁶ Fatty infiltration proved reversible, with the liver returning to normal on follow-up CT and ultrasound scans, after surgical repair and normalization of the biliary drainage.

References

1. Hammoudi SM, Alauddin A. Idiopathic perforation of the biliary tract in infancy and childhood. *J Ped Surg* 1988;23:185-7.
2. Haller JO, et al. Spontaneous perforation of the common bile duct in children. *Radiology* 1989;172:621-4.
3. Rivila F, et al. Bile peritonitis in the newborn. *Acta Scand* 1989;76:782-3.
4. Hawkins HB, et al. Diagnosis of spontaneous perforation of the gallbladder by technetium 99m DISIDA. *Clin Nucl Med* 1984;9:708-9.
5. Lee JKT. Computed body tomography with MRI correlation, 2nd edition. ??????Chapter 16, 688-9.
6. Sherlock S, Dooley J. Nutritional and metabolic liver disease. In: Sherlock S, Dooley J, editors. *Diseases of the liver and biliary system*. London: Blackwell, 1993;408-13.