Scintigraphic Demonstration of Accessory Hepatic Duct Leak Following Liver Transplantation

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Few noninvasive methods are available to diagnose complications following liver transplantation. Hepatobiliary scintigraphy can differentiate rejection from primary biliary complications such as obstruction or extravasation in patients with nonspecific clinical findings such as fever and rising liver function studies. In the following case report, an unexpected biliary leak from a recipient accessory hepatic duct was demonstrated by [^{99m}Tc] DISIDA scintigraphy following liver transplantation.

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Complications of biliary reconstruction have been reported to occur following liver transplantation in 19–50% of cases depending on the type of reconstruction (*1*, *2*). Recently, hepatobiliary scintigraphy utilizing one of many technetium-99m (^{99m}Tc) iminodiacetic acid (IDA) derivatives has been reported as a noninvasive method of evaluating these complications (*3*). In addition to biliary patency, vascular patency, and allograft function may also be demonstrated by this technique. The following case report illustrates the use of ^{99m}Tc diisopropyl-iminodiacetic acid (DISIDA) scintigraphy to diagnose extravasation from a previously unrecognized recipient accessory hepatic duct after liver transplantation.

CASE REPORT

A 30-mo-old female underwent orthotopic liver transplantation for nonmetastatic hepatoblastoma. Biliary reconstruction consisted of choledocho-choledochostomy (an end-to-end anastomosis of donor common bile duct to recipient common hepatic duct) without a T-tube. Pre-transplant chemistries revealed a total bilirubin of 0.6 mg/dl, SGOT of 289 IU/l, SGPT of 294 IU/l and an alkaline phosphatase of 429 IU/l. Immediately post-transplant liver function studies began to improve, resulting in a total bilirubin of 1.9 mg/dl, an SGOT of 46 IU/l, SGPT of 11 IU/l, and an alkaline phosphatase of 226 IU/l by the second postoperative day. At that time, [^{99m}Tc]DISIDA hepato-biliary scan revealed good hepatic extraction of radiotracer (99%) with apparently normal biliary excretion (Fig. 1).

By the fourth postoperative day, however, the patient developed a fever of 38.1° C and a total leukocyte count of 16,000. Liver function tests began to rise reaching a total bilirubin of 7.0 mg/dl, SGOT of 117 IU/l, SGPT of 119 IU/l, and an alkaline phosphatase of 332 IU/l by the fifth postoperative day. Physical exam was significant for mild abdominal distention. Acute transplant rejection was suspected.

Hepatobiliary scan was performed demonstrating normal hepatic extraction which was further confirmed by quantitative deconvolutional analysis (*4–6*). Abnormal extrahepatic accumulation of radiotracer was seen in the right upper quadrant after 40 min (Fig. 2). After 1 hr apparent biliary extravasation into the peritoneal space was seen, and bile leak was suspected (Fig. 3). Ultrasound demonstrated intraperitoneal fluid (Fig. 4).

During subsequent operative exploration, leakage of bile from the recipient common hepatic duct proximal to the recipient cystic duct but distal to the anastomosis was observed. This was determined to be secondary to a previously unrecognized accessory hepatic duct (Fig. 5). No evidence of rejection was seen on an intraoperative liver biopsy.

Postoperatively, the patient again improved, with the following results obtained on the second postoperative day: Total bilirubin 2.6 mg/dl, SGOT 48 IU/l, SGPT 73 IUl, and alkaline phosphatase 273 IU/l. A follow-up DISIDA scan revealed an intact biliary system with no evidence of biliary leak. Currently, the patient is doing well without evidence of recurrence of tumor 5 mo post-transplant.

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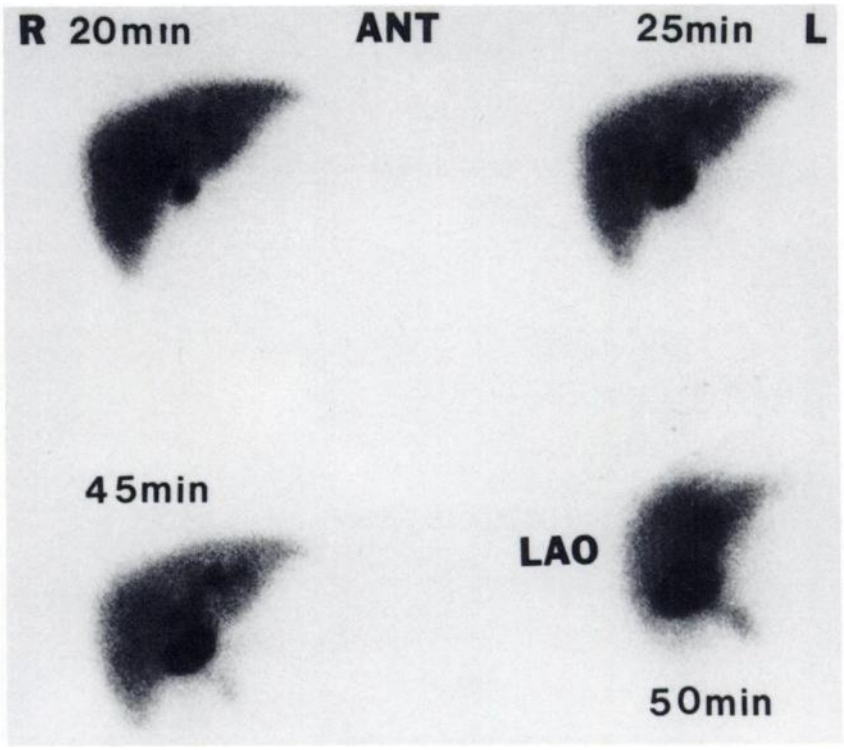

FIGURE 1
[^{99m}Tc]DISIDA scan two days after transplantation. Images are taken 20 to 50 min after injection.

DISCUSSION

Biliary extravasation may be associated with perforation of a gangrenous gall bladder (*7*), after blunt or penetrating trauma with intrahepatic or extrahepatic leakage (*8,9*), and postoperatively following upper abdominal surgery (*10*). Because of the ease, speed, sensitivity, and noninvasive nature of the study, hepatobiliary scintigraphy with ^{99m}Tc-labeled IDA derivatives has surpassed the use of iodine-131 rose bengal in the evaluation of these complications.

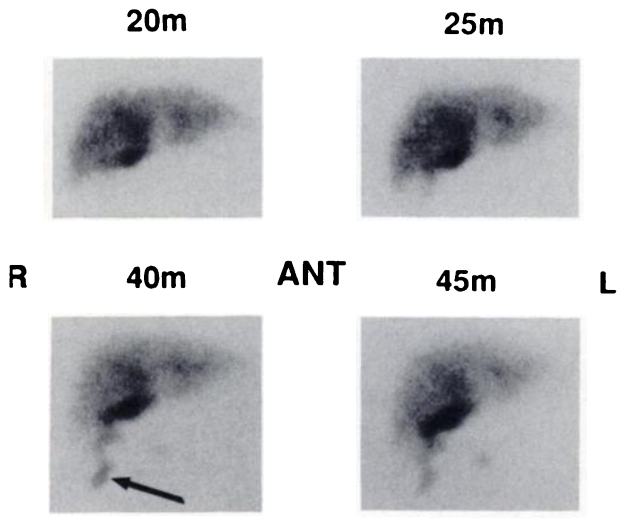

FIGURE 2
[^{99m}Tc]DISIDA scan 5 days after transplantation. At 40 min, extravasation becomes evident (arrow).

The present case report demonstrates an example of the role of DISIDA scanning in identifying a complication of biliary reconstruction in liver transplantation previously unreported in the literature.

During the initial experience with liver transplantation, differentiation between allograft rejection and biliary complications was difficult. Symptoms of fever, abdominal tenderness, abnormal liver enzymes and leukocytosis are common in both entities. Bile peritonitis or cholangitis from extravasation or obstruction, respectively, may have been inaccurately diagnosed and treated with additional immunosuppressive therapy for presumed rejection, with a high mortality from septic complications (*1*). Currently, the differentiation is more easily made. Although liver biopsy and cholangiography are the gold standards of diagnosis, the multifaceted role of hepatobiliary scintigraphy must be emphasized.

In a review of 56 liver transplants performed from 1982–1985, Loken et al. (*3*) were able to detect biliary leak or obstruction, vascular compromise, and mass lesions, such as hemorrhage, using the ^{99m}Tc-labeled IDA derivatives, PIPIDA and later DISIDA. Rejection and infection are both manifest by depressed uptake and clearance of the radionuclide and therefore, liver biopsy was performed to improve specificity of the diagnosis in most of these patients. Specific examples of biliary leak after T-tube removal (*11*) and obstruction (*12*) demonstrated by this radionuclide study have also been reported in the literature.

The current case report illustrates the use of [^{99m}Tc]DISIDA to diagnose an unusual source of biliary

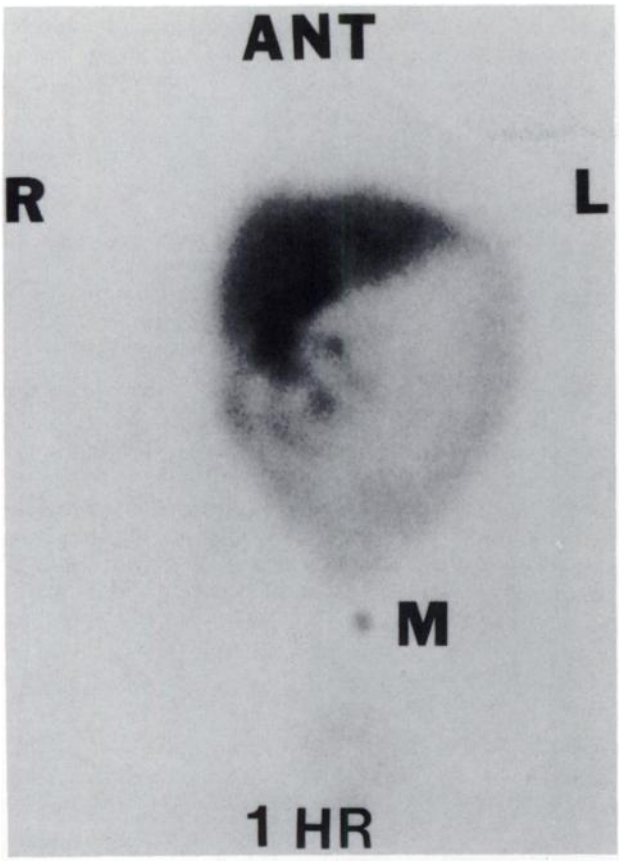

FIGURE 3
By 1 hr, diffuse intraperitoneal extravasation is noted. M = marker over pubic symphysis.

FIGURE 5
Extrahepatic biliary anatomy demonstrating accessory hepatic duct. A = Anastomosis, B = Recipient accessory hepatic duct, C = Recipient cystic duct. (Adapted from *Surg Gynecol Obstet* 1976; 142:487).

leak in a liver transplant—an accessory hepatic duct—an extra bile duct exiting, in most cases (95%) from the right lobe of the liver and entering the extrahepatic biliary tree. The incidence of this anomaly varies from 1%–31% in operative and autopsy series (*13*). This discrepancy in prevalence may be due to dissection technique, confusion with other potential ductal anomalies, and differences between utilizing operative and cadaver specimens. Seventy-seven percent of accessory hepatic ducts are single. Drainage into the common hepatic duct occurs in 55% of all cases in one series (*14*). Other areas of drainage include the gall bladder, right hepatic duct, and cystic duct. Because luminal diameter is small, recognition intraoperatively can be difficult. Identification of this entity is important, since unrecognized division of this duct may lead to bile

FIGURE 4
Ultrasound demonstration of intraperitoneal fluid in the left upper quadrant (arrow). S = spleen.

peritonitis or fistula formation, abscess, or fatal sepsis in the immunocompromised liver transplant patient.

In summary, in the pediatric transplant patient described above, hepatobiliary scintigraphy rapidly and noninvasively diagnosed a biliary tract leak from an unrecognized accessory hepatic duct in the setting of fever, leukocytosis, and rising liver function tests.

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