

# Technetium-99m-HIDA Scintigraphy Versus Endoscopic Retrograde Cholangiopancreatography in Demonstrating Bile Leaks After Laparoscopic Cholecystectomy

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In two patients who had laparoscopic cholecystectomy, the post-operative course was complicated by continuous bilious drainage from the surgical drain in one and by jaundice in the other. In both patients, the findings of  $^{99m}\text{Tc}$ -N-substituted-2,6-dimethylphenyl carbamoyl ethyl iminodiacetic acid (HIDA) scanning were interpreted as clearly demonstrating a significant bile leak in one and the complete absence of bile passage from the liver to the intestines in the other. These findings could result from either spontaneous closure of the bile leak or false-positive HIDA scans. Subsequent endoscopic retrograde cholangiopancreatography (ERCP) showed the common bile duct and the cystic duct to be normal, without any evidence of bile leakage or any problem with drainage to the intestines. In all patients who have a positive  $^{99m}\text{Tc}$ -HIDA scan, ERCP should be performed before deciding on further surgical intervention.

**Key Words:** endoscopic retrograde cholangiopancreatography; laparoscopic cholecystectomy; bile leaks

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Laparoscopy rapidly has become the usual method of performing a cholecystectomy, one of the most commonly performed operations. Its use, however, has brought with it a significant increase in the occurrence of bile duct injuries and a new set of postsurgical problems (1). The most common problems include bile leaks from the cystic duct remnant or one of the main ducts; ductal injury, such as disruption or stricture; retained common bile duct stones; or postoperative biliary-pancreatic pain (1). The incidence of biliary tree disruption after this procedure has been reported to be between 0% and 7% (2,3). Minor bile leaks may be clinically insignificant, but major bile leaks may lead to biloma, the most common sequela, or bile peritonitis, the most serious (4).

Among the noninvasive procedures available,  $^{99m}\text{Tc}$ -N-substituted 2,6-dimethylphenyl carbamoyl ethyl iminodiacetic acid (HIDA) hepatobiliary scintigraphy is considered a sensitive method of detecting bile leaks (5,6). We describe two patients in whom  $^{99m}\text{Tc}$ -HIDA indicated a biliary leak after laparoscopic cholecystectomy, whereas subsequent endoscopic retrograde cholangiopancreatography (ERCP) failed to reveal any leakage.

## CASE REPORTS

### Patient 1

A 64-yr-old woman admitted for elective cholecystectomy had a long history of biliary colic, with cholelithiasis demonstrated by abdominal sonography. The physical examination was unremark-

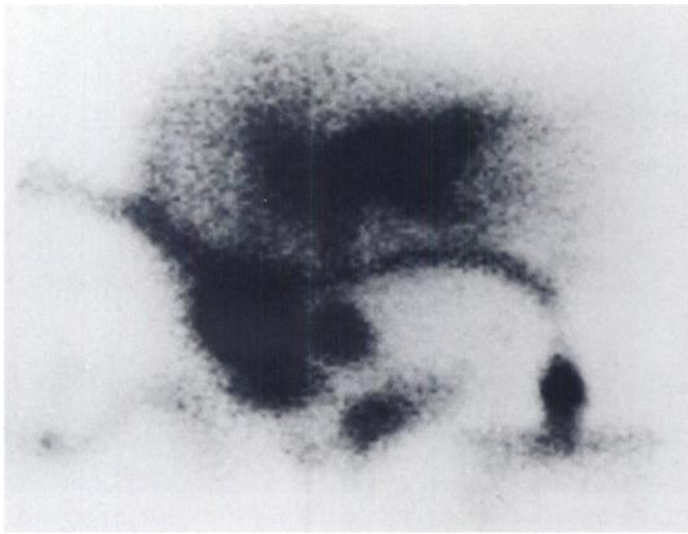
able. Laboratory values were: hemoglobin, 11.7 g/dl; white blood cell count (WBC), 7.0 K/ $\mu\text{l}$ ; bilirubin, 0.7 mg/dl; and alkaline phosphatase, 73 U/liter. Liver functions were normal. Persistent bilious drainage through the surgical drain was observed the day after laparoscopic cholecystectomy. The  $^{99m}\text{Tc}$ -HIDA scan performed 36 hr after surgery demonstrated an accumulation of the isotope in the liver and the subhepatic area, without passage into the duodenum (Fig. 1). Two hours later,  $^{99m}\text{Tc}$ -HIDA was seen passing through the surgical drain into the collecting bottle (Fig. 2). Abdominal ultrasound examination showed no fluid collection. In light of these findings, ERCP was performed 48 hr postoperatively. ERCP demonstrated the common bile duct and cystic ducts to be normal, with no evidence of bile leakage. There was good drainage of the contrast material into the intestinal tract (Fig. 3). The patient remained in good condition, without fever or abdominal tenderness. Laboratory tests showed the bilirubin level to be 0.7 mg/dl and alkaline phosphatase to be 68 U/liter. During the next 3 days there was a gradual reduction in the bilious drainage and the surgical drain was removed. The patient was discharged in excellent condition.

### Patient 2

A 35-yr-old man admitted for elective laparoscopic cholecystectomy had a history of hepatitis A and had been suffering from recurrent attacks of right upper quadrant abdominal pain, weakness and malaise. The physical examination revealed a slightly enlarged liver with tenderness on palpation in the right upper quadrant. Laboratory findings were: hemoglobin, 14.2 g/dl; WBC, 4.3 K/ $\mu\text{l}$ ; bilirubin, 2.4 mg/dl; alkaline phosphatase, 101 U/liter; glutamic-pyruvic transaminase (GPT), 257 U/liter; gamma glutamyl transpeptidase, 116 U/liter. Ultrasound examination demonstrated cholelithiasis. The day after laparoscopic cholecystectomy, the patient developed jaundice with bilirubin of 5.1 mg/dl, alkaline phosphatase 179 U/liter, lactate dehydrogenase 797 U/liter, serum glutamic-oxaloacetic transaminase 507 U/liter and GPT 591 U/liter. Ultrasound examination revealed an enlargement of the common bile duct and the intrahepatic bile ducts, without any fluid collection in the abdomen. Technetium-99m-HIDA scan performed 36 hr after surgery demonstrated accumulation of the isotope in the liver without its passage into the common bile duct or the intestine (Fig. 4). This accumulation in the liver persisted for 3 hr. When ERCP was performed 6 hr later, the common bile duct appeared normal with a slightly swollen papilla and there was no evidence of a bile leak or choledocholithiasis. There was good drainage of the contrast material into the intestines (Fig. 5). During the next few days, the patient's condition improved, the jaundice subsided and bilirubin levels returned to normal.

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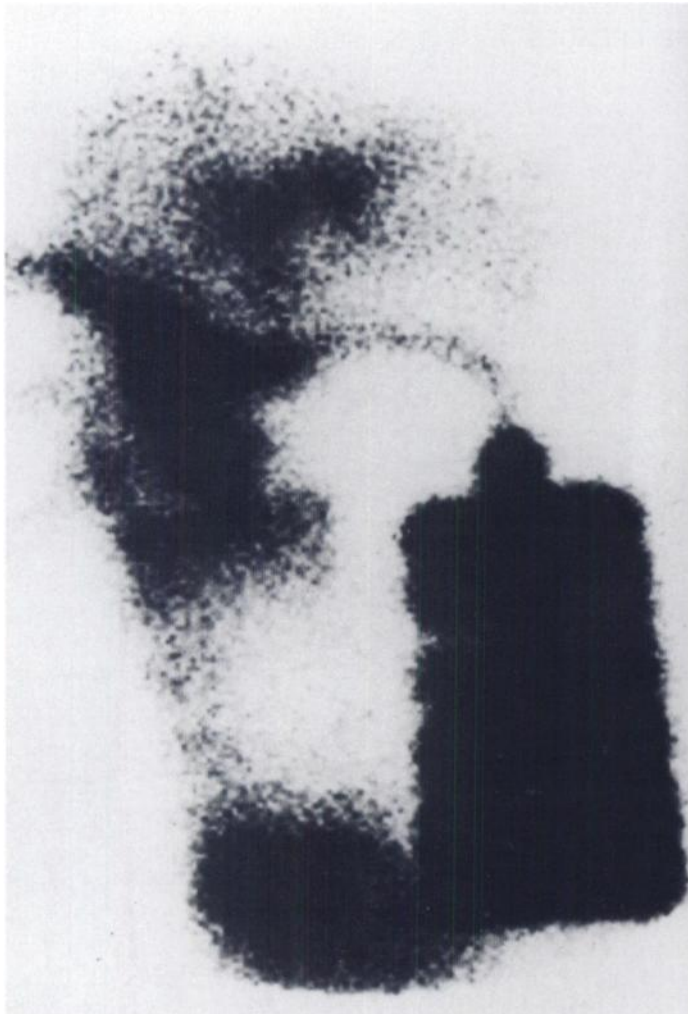
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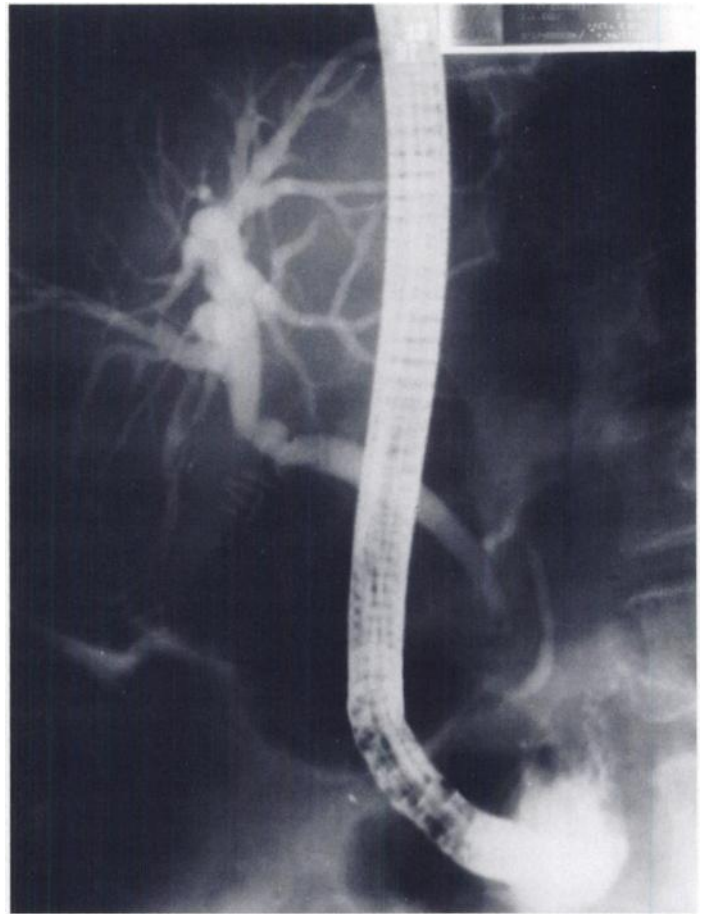
**FIGURE 1.** Initial  $^{99m}\text{Tc}$ -HIDA scan of Patient 1 at 36 hr after surgery shows accumulation of isotope in the liver, without passage into duodenum.

### DISCUSSION

Noninvasive sonography and CT are helpful in determining the presence of abdominal fluid collections but are unable to differentiate between postoperative seroma, lymphocele or hematoma and a bile leak (3).  $^{99m}\text{Tc}$ -HIDA hepatobiliary scintigraphy is considered to be more sensitive than sonogra-



**FIGURE 2.** Later phase of  $^{99m}\text{Tc}$ -HIDA scan in Patient 1 at 38 hr after surgery shows passage of isotope through surgical drain and into drainage bottle.



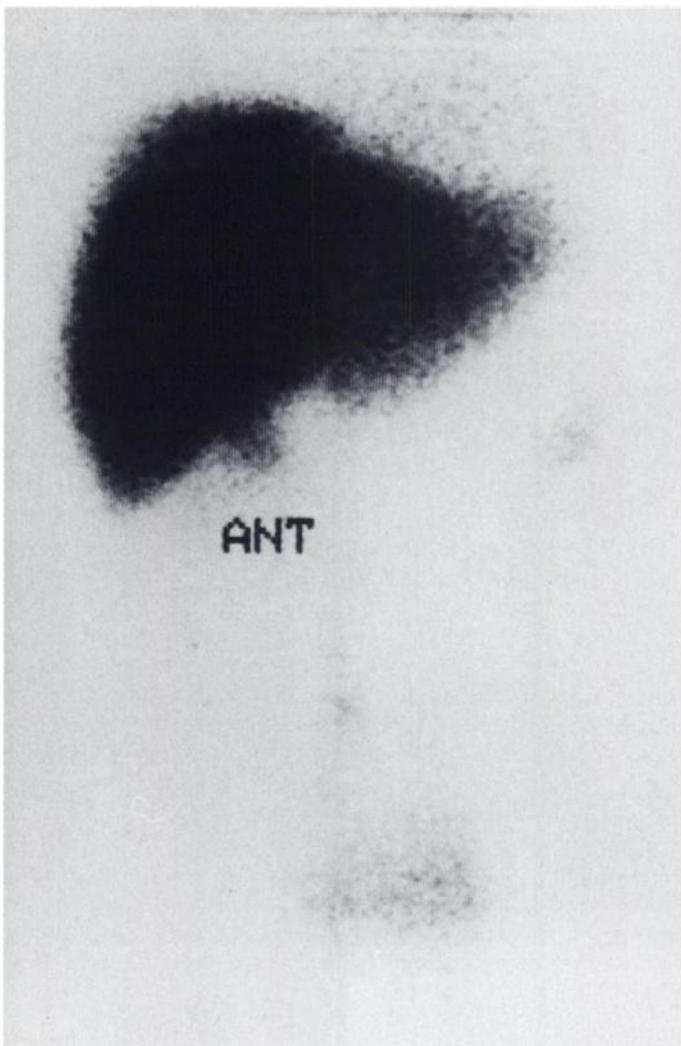
**FIGURE 3.** ERCP of Patient 1 shows normal common bile duct and cystic duct, with no evidence of leakage and good passage of contrast material into intestines.

phy. An accumulation of  $^{99m}\text{Tc}$ -HIDA in the gallbladder bed or over the surface of the liver is considered to be evidence of a bile leak (5–7). However, in the event of a positive HIDA scan, ERCP should be performed (4).

ERCP has emerged as a method for both diagnosis and treatment of bile duct injuries and other problems arising after laparoscopic cholecystectomy. It facilitates the diagnosis and treatment of bile leaks and simple strictures (1). ERCP with sphincterotomy, balloon dilatation and stenting is an accepted alternative approach for treating bile leaks and short strictures resulting from laparoscopic injury or primary repair (8).

ERCP is well tolerated in the postoperative period and may be performed under sedation. Complications are rare (9). However, complex biliary tree strictures, complete disruptions or major bile duct lesions are not amenable to endoscopic therapy and should be treated surgically (1,9).

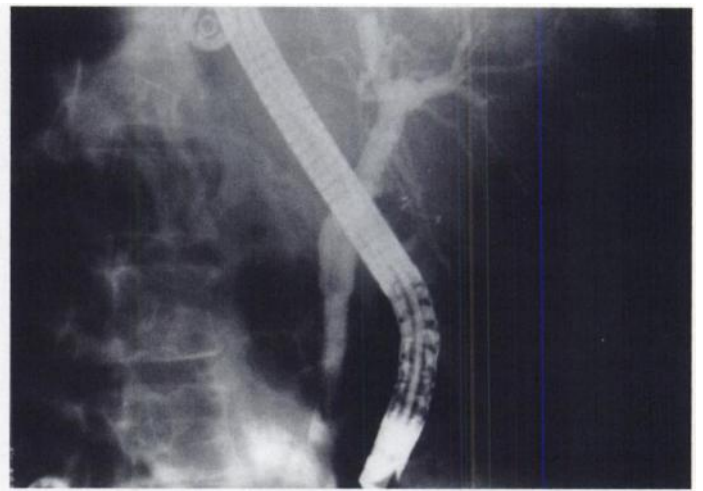
In our two patients, the postoperative course after laparoscopic cholecystectomy was complicated by continuous bilious drainage from the surgical drain in one and jaundice in the other. Although the findings of  $^{99m}\text{Tc}$ -HIDA scans in both patients were interpreted as clearly demonstrating a significant bile leak in one and complete absence of bile passage from the liver to the intestines in the other, subsequent ERCP showed the common bile duct and cystic duct to be normal, without any evidence of bile leakage or any problem with drainage to the intestines. Thus, we were able to avoid unnecessary surgical intervention. The difference between the results of the HIDA scan and that of ERCP may be attributable to either spontaneous closure of the bile leak or false-positive scans.



**FIGURE 4.** Technetium-99m-HIDA scan of Patient 2 at 36 hr after surgery shows accumulation of isotope in the liver, without passage into common bile duct or intestine.

### CONCLUSION

Bile duct injury and bile leaks must be considered in patients who have had laparoscopic cholecystectomy and in whom abdominal pain, jaundice, fever or continuous bilious drainage from a surgical drain develop (2). Hepatobiliary scintigraphy is valuable as a noninvasive method of investigating possible bile



**FIGURE 5.** ERCP performed 42 hr after surgery in Patient 2 shows normal common bile duct and cystic duct, with slightly swollen papilla, without evidence of bile leak and with good drainage of contrast material into intestinal tract.

leaks or other biliary tree disruptions but cannot be relied on absolutely when determining the need for reoperation. This is clearly demonstrated by our two patients in whom the HIDA scan was positive. Thus, a positive HIDA scan must be followed by ERCP, which can serve as both a diagnostic and a therapeutic tool.

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