

Imaging

Case Report: A Multiple Radiopharmaceutical Approach to Situs Inversus

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Upon admission for gastrointestinal bleeding this 45-year-old white man was found to have elevated liver function test results (SGOT, alkaline phosphatase, bilirubin). He was referred to the nuclear medicine laboratory for liver-spleen scan and hepatic function study.

Liver-spleen imaging using Tc-99m sulfur colloid is widely utilized to identify focal lesions. When combined with the use of multiple tracer studies of the liver and spleen, increased specificity is achieved (1). This multiple radiopharmaceutical approach for the liver and spleen may involve the use of I-131 rose bengal, Se-75 methionine, Ga-67 citrate, and Tc-99m heat-damaged red blood cells—in addition to the conventional Tc-99m sulfur colloid imaging (2,3).

Case Discussion

Following the intravenous administration of 3-mCi Tc-99m sulfur colloid, static images of the liver and spleen were obtained (Fig. 1). An abnormal area of radiocolloid accumulation in the anterior mid-epigastrium of unknown etiology was revealed. The next day a hepatic function study was performed using 250- μ Ci I-131 rose bengal (Fig. 2). Images were obtained at 10-min intervals for 60 min. They showed prompt accumulation of the activity within the liver and excretion of activity into the bowel between 40 and 60 min postinjection, demonstrating the patency of the common bile duct. The anatomical configuration of the liver is unusual; it is elongated and extends across the midline in a "horseshoe" fashion. This also demonstrates mid-epigastric activity.

Comparison of the configuration of the liver on both studies revealed that the spleen had not been identified. This was due to the fact that I-131 rose bengal accumulates in the parenchymal cells of the liver as compared to reticuloendothelial cell accumulation of Tc-99m sulfur col-

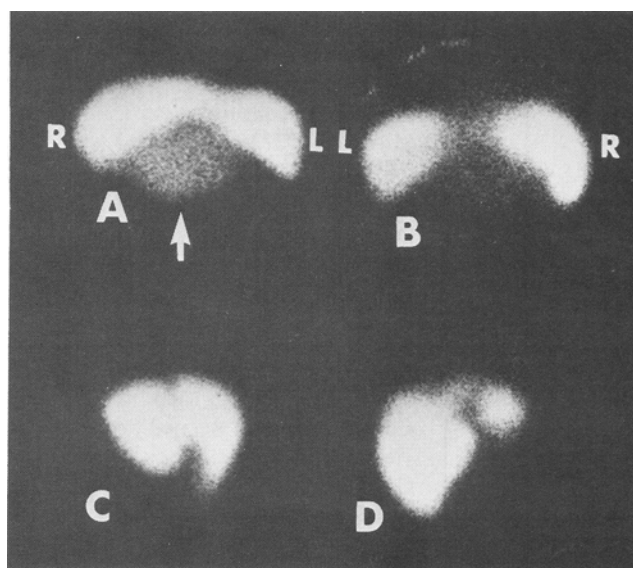


FIG. 1. Tc-99m sulfur colloid study: (A) anterior image demonstrates radiocolloid accumulation in the mid-epigastrium (arrow); (B) posterior; (C) right lateral; and (D) left lateral.

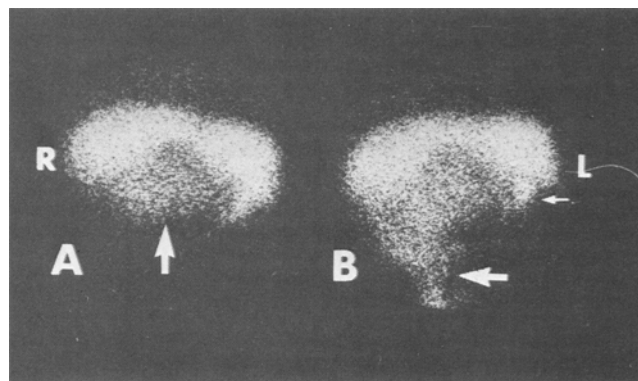


FIG. 2. I-131 rose bengal anterior study: (A) 30-min postadministration again demonstrates activity in mid-epigastrium (arrow); (B) 50-min postadministration demonstrates excretion of radioactivity into bowel (large arrow) and gallbladder (small arrow).

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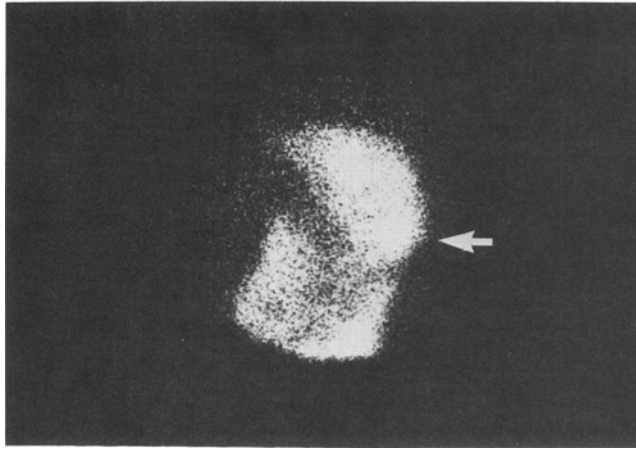


FIG. 3. I-131 rose bengal left lateral image suggests accumulation of activity in gallbladder (arrow).

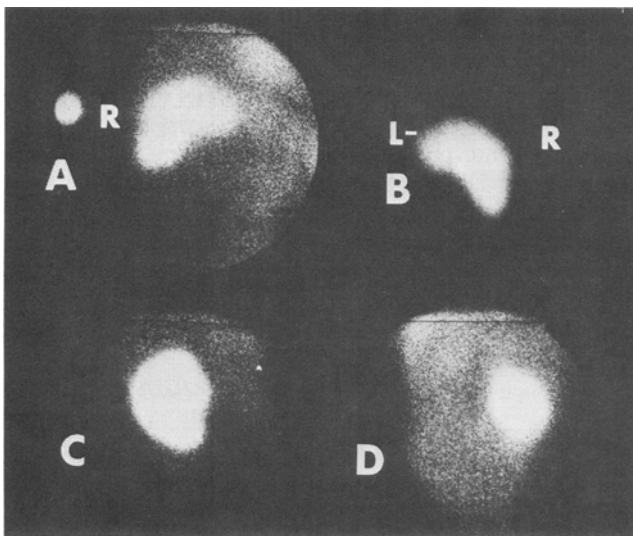


FIG. 4. Four-hr, Tc-99m heat-damaged red blood cell study: (A) anterior upper right quadrant image demonstrates presence of spleen; (B) posterior; (C) right lateral; and (D) left lateral.

loid in the liver and spleen. The structure visualized on both studies is therefore undoubtedly the liver.

Close observation of the 50–60 min I-131 rose bengal image disclosed a focus of increased activity accumulation in the upper left quadrant. An additional image was obtained in the left lateral position (Fig. 3); this image suggested that the increased accumulation represented the gallbladder. We then raised the possibility that this was a case of situs inversus—an uncommon congenital inversion of the abdominal viscera.

To determine the presence and location or absence of the spleen, a splenic sequestration study was performed with heat-denatured red blood cells. The patient's red blood cells were withdrawn, labeled with 10-mCi Tc-99m, heat damaged, and intravenously administered (4).

Spleen images were obtained 1- and 4-hr postinjection (Fig. 4). The spleen was visualized in the posterior right upper quadrant and distribution of activity throughout the spleen is homogeneous.

Conclusion

This series of nuclear medicine examinations presented a case of situs inversus, complicated by congenital anomalies of the liver (5). The diagnosis of situs inversus was confirmed by the demonstration of inversion of the stomach, small bowel, and colon on an upper gastrointestinal radiographic series and a barium enema radiographic series. The patient's liver function tests returned to normal following therapy for his gastrointestinal bleeding.

References

1. Lomas F, Dibos PE, Wagner HN: Increased specificity of liver scanning with the use of ^{67}Ga gallium citrate. *New Engl J Med* 286: 1323–1329, 1972
2. McCreedy VR: Scintigraphic studies of space-occupying liver disease. *Semin Nucl Med* 2: 108–127, 1972
3. Winston MA, Blahd W: ^{131}I -rose bengal imaging techniques in differential diagnosis of jaundiced patients. *Semin Nucl Med* 2: 167–175, 1972
4. Gutkowski RF, Dworkin HJ: Kit-produced $^{99\text{m}}\text{Tc}$ -labeled red cells for spleen imaging. *J Nucl Med* 15: 1187–1191, 1974
5. Shah KD, Neill CA, Wagner HN Jr, et al: Radioisotope scanning of the liver and spleen in dextrocardia and in situs inversus with levocardia. *Circulation* 29: 231–241, 1964