Intrapancreatic Accessory Spleen Diagnosed by Technetium-99m Heat-Damaged Red Blood Cell SPECT

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This is a report of accessory spleen located within the tail of the pancreas which mimicked a tumor. The correct diagnosis was made noninvasively with ^{99m}Tc-HDRBC (heat-damaged red blood cell) SPECT.

Key Words: accessory spleen; pancreas; technetium-99m-red blood cells

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Accessory spleen is a frequently encountered normal variant. It is usually easily diagnosed, but it occasionally mimics tumor, making the diagnosis more difficult.

CASE REPORT

A 26-yr-old man with chronic renal failure complained of mild right hypochondral pain and underwent an ultrasound examination, which revealed bilateral atrophic kidneys and a low echoic round mass in the tail of the pancreas. A pancreatic tumor was suspected and dynamic CT was performed (Fig. 1). A round mass of approximately 1.5 cm in diameter was delineated in the tail of the pancreas. The mass was almost identical in density and structure to the main spleen on the plain CT image, as well as the arterial and late-phase contrast images. An intrapancreatic accessory spleen (IPAS) was suspected, but hypervascular pancreatic tumors, such as islet cell tumors, could not be ruled out since the mass apparently existed within the pancreas. To confirm the diagnosis of IPAS, SPECT imaging of the spleen with ^{99m}Tc-HDRBC was performed according to the following protocol. Ten milligrams of sodium pyrophosphate in 3 ml isotonic saline were injected intravenously. Thirty minutes later, 10 ml of blood were withdrawn from a vein into a heparinized syringe containing 740 MBq [^{99m}Tc]pertechnetate. The syringe was put into a water bath of 49.5°C for 30 min. The blood was then cooled to room temperature and reinjected into the patient. SPECT data acquisition started 60 min after the reinjection. Clear accumulation of the radionuclide was seen in the mass (Fig. 2), and the diagnosis of IPAS was made.

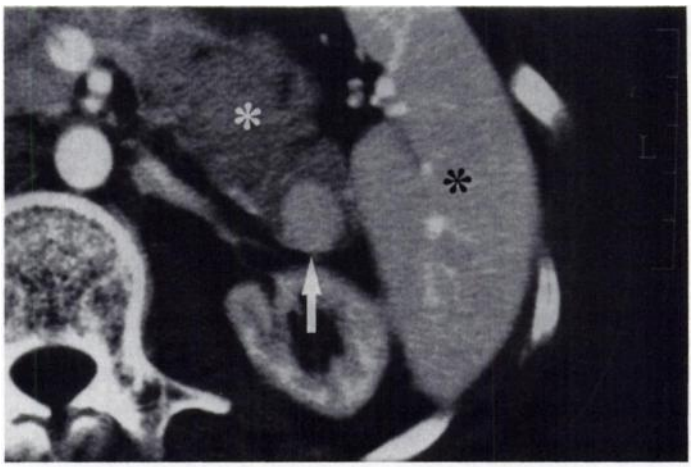

FIGURE 1. Arterial phase contrast-enhanced CT image of the IPAS. Mass (white arrow) is located in the tail of the pancreas (white asterisk). Mass density and structure are quite similar to those of the main spleen (black asterisk).

DISCUSSION

The most common site of an accessory spleen is the splenic hilum, but accessory spleens have been found in various other portions of the body, for example, in the wall of the jejunum, in the mesentery and even in the pelvis (*1,2*). Though rarely noticed radiologically, IPAS is not uncommon. In an autopsy study of 3000 patients, 61 of 364 (17%) accessory spleens were found in the pancreatic tail (*1*). The tail of the pancreas is the second most common site of the accessory spleen. In daily clinical practice, IPASs are rarely recognized probably because the spatial resolution of CT and MR images has been too low to detect them. As imaging techniques advance, they may be more frequently found.

It is important to differentiate accessory spleens from tumors as noninvasively as possible because accessory spleens pose no clinical problems, and no treatment is necessary unless patients are suffering from diseases such as an idiopathic thrombocytopenic purpura. Some accessory spleens, however, are located at uncommon sites and require invasive methods for diagnosis,

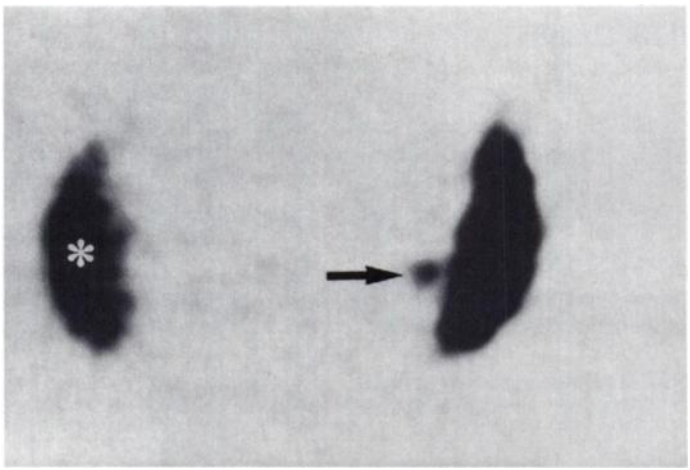

FIGURE 2. Technetium-99m-HDRBC SPECT image. Clear accumulation of radionuclide is seen at the site in question (arrow). A fair amount of liver uptake is also seen (white asterisk), probably due to excessive RBC damage.

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such as surgery or needle biopsy. In particular, IPASs have been diagnosed correctly only after surgery (*3–5*).

The accessory spleen in this patient was also difficult to differentiate from hypervascular pancreatic tumors, such as islet cell tumors and acinar cell carcinomas, because the enhancement pattern of the mass was similar to that of those tumors, and the mass apparently was surrounded by normal pancreatic parenchyma. In this patient, however, we strongly suspected an IPAS by a careful examination of the CT and made a diagnosis using a spleen scintigraphy. Unnecessary invasive diagnostic methods were avoided.

Technetium-99mc-HDRBC scintigraphy is a highly sensitive and specific method for detection of splenic tissue (*6–9*), since up to 90% of the injected HDRBCs are trapped by splenic tissue (*9*). In our patient, the findings from dynamic CT, ^{99m}Tc-HDRBC scintigraphy and a careful review of previous reports made us believe that the mass should be diagnosed as an accessory spleen, although histopathological evidence was not obtained.

CONCLUSION

We noninvasively diagnosed accessory spleen in the tail of the pancreas using SPECT technetium-labeled heat-damaged RBCs. When a hypervascular mass is seen in the pancreas, IPAS should be in the list of differential diagnoses, and ^{99m}Tc-HDRBC SPECT should be considered.

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Evaluation of Solid-Phase Labels for Gastric Emptying Studies in Cats

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Development of appropriate radiolabeled diets for solid-phase gastric emptying studies in experimental animals is important for testing the effects of disease, drugs, surgical procedures and stress. This study evaluates the in vitro and in vivo stability of various radiolabels in commercially available dry, extruded and canned cat foods. **Methods:** Dry, extruded cat food was labeled with ^{99m}Tc-pertechnetate, ^{99m}Tc-sulfur colloid or ^{99m}Tc-disofenin. Canned cat food was labeled with ^{99m}Tc-Dowex resin beads, ^{99m}Tc-pertechnetate, ^{99m}Tc-sulfur colloid or ^{99m}Tc-disofenin. A sample of each labeled diet and ^{99m}Tc-sulfur colloid-labeled egg was digested in water, gastric juice, intestinal juice or gastric juice followed by intestinal juice. The samples were centrifuged and the activity in the samples counted before and after removal of the supernatant. Based on in vitro results, three labeled diets were fed to 10–12 cats for in vivo testing. **Results:** ^{99m}Tc-Dowex beads had the best labeling efficiency in vitro, but were not stable in vivo, resulting in unacceptable levels of circulating ^{99m}Tc. Technetium-99m-disofenin labeling resulted in in vitro percent solid-phase retention of 92.5% and 89.5% in water and gastric juice, respectively, for dry food and 86% and 94.9% in water and gastric juice, respectively, for canned food. **Conclusion:** Technetium-99m-disofenin is a suitable label for solid-phase gastric emptying studies using commercially available cat foods.

Key Words: technetium-99m-disofenin; radionuclide; gastric emptying; cat

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The use of physiologic meals and noninvasive methods, combined with the ease and accuracy of quantitation, has made scintigraphy the method of choice for gastric emptying studies (*1,2*). Scintigraphy is a valuable clinical and research technique that allows highly reproducible, quantitative characterization of different phases of gastric emptying (*3–8*).

Due to their size, ease of handling and similarities in physiologic and pharmacologic responses between monogastric mammals, dogs and cats are frequently used as experimental models in gastric emptying research (*5,9–28*). Unfortunately, with few exceptions (*11,13,14,21,23,26*), the diets used in these studies fail to meet the criteria of an appropriate test meal. Conclusions based on these models must be viewed with some skepticism.

The optimal solid-phase meal should: (a) be a diet of composition typical and physiologically appropriate for the subject; (b) have stable binding of the radiolabel; (c) experience no digestion, absorption or adsorption of the radiolabel in the stomach or small intestine; (d) be palatable; and (e) be readily available and easy to prepare (*11,29*). Labeled meals used for animal studies in the past have failed to meet many of these criteria. In many instances, the meal offered was not typical for the species and was not physiologically normal (*10,12,19,24,25*). Often, these meals were selected for palatability, ignoring issues of suitability for long-term maintenance or the period required to accommodate to these diets

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