

Residual Spleen Found on Denatured Red Blood Cell Scan Following Negative Colloid Scans

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The technetium-sulfur colloid liver-spleen examination is widely used to evaluate patients with idiopathic thrombocytopenic purpura for residual splenic tissue following splenectomy. Technetium-labeled heat-damaged red blood cell imaging is another sensitive test for residual splenic tissue. We recently encountered a patient with idiopathic thrombocytopenic purpura who was initially evaluated with a technetium sulfur colloid scan which was negative. A denatured red blood cell scan was subsequently performed which revealed intense focal activity in the region of the splenic bed. Surgery confirmed this to be splenic tissue. Our results emphasize the utility of the denatured red blood cell examination in the setting of strong clinical suspicion for residual splenic tissue following a negative sulfur colloid study.

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We recently encountered a patient who was post-splenectomy for idiopathic thrombocytopenic purpura (ITP) and because of recent relapse there was concern for residual splenic tissue. A ^{99m}Tc -sulfur colloid study, both planar and SPECT, was performed with no visualization of splenic region uptake despite careful windowing to maximize intensity and contrast. Because of high clinical suspicion for ITP, a ^{99m}Tc denatured RBC examination was performed. Intense uptake in the region of the splenic bed was seen on planar and SPECT images.

This case is presented to inform the nuclear medicine community of this phenomenon and to suggest an alternative imaging method in the appropriate clinical setting with a negative ^{99m}Tc -sulfur colloid study. We advocate the spleen-specific study since the potential risks of a second imaging study are far outweighed by the relative benefits of improved diagnosis and consequences of a false-negative result.

CASE REPORT

A 41-yr-old woman with a 20 yr history of ITP presented with epistaxis and diffuse cutaneous petechia. She had undergone

splenectomy in 1971 with good clinical response and had been in good health until this time. A CBC on presentation revealed a platelet count of 14,000, which was decreased from her previous value of 490,000.

The patient was admitted for evaluation and treatment. Physical exam was remarkable for diffuse cutaneous petechia and well healed low transverse and left upper quadrant subcostal surgical scars. The CBC on admission showed a white blood cell count of 10,000, hemoglobin of 11.8, hematocrit of 34.4, and platelets of 27,000. The increase in platelets from initial presentation CBC was attributed to initiation of IgG therapy.

A ^{99m}Tc -sulfur colloid scan, both planar and SPECT, was performed to search for residual splenic tissue. The scan was negative for any focus of tracer uptake in the splenic bed region despite deliberate overexposure of both the planar and SPECT images (Fig. 1). A technetium-labeled denatured RBC scan was then performed with planar and SPECT reconstructions, which showed intense radiotracer uptake in the posterior left upper quadrant (Fig. 2). Computed axial tomography detected two rounded soft-tissue density masses corresponding in location to the radiotracer uptake. The tissue was removed (along with the gallbladder) and was pathologically confirmed as splenic tissue. Platelet count was 148,000 on the second postoperative day.

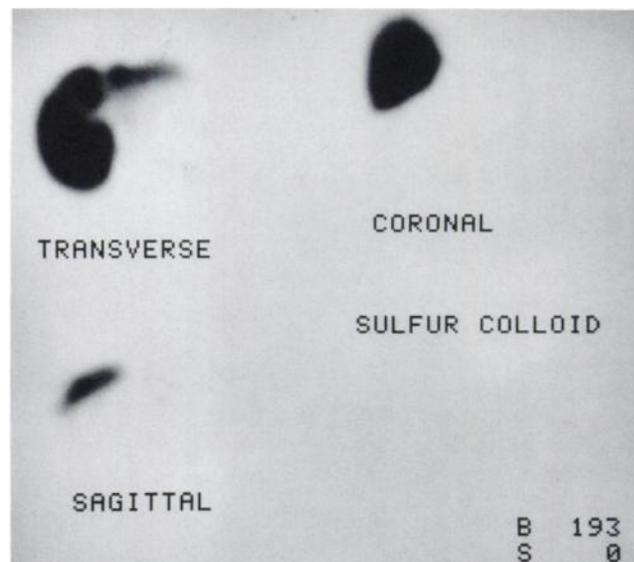


FIGURE 1. Technetium-99m-sulfur colloid SPECT images show intense uptake in the liver. No focal uptake is seen in the splenic bed.

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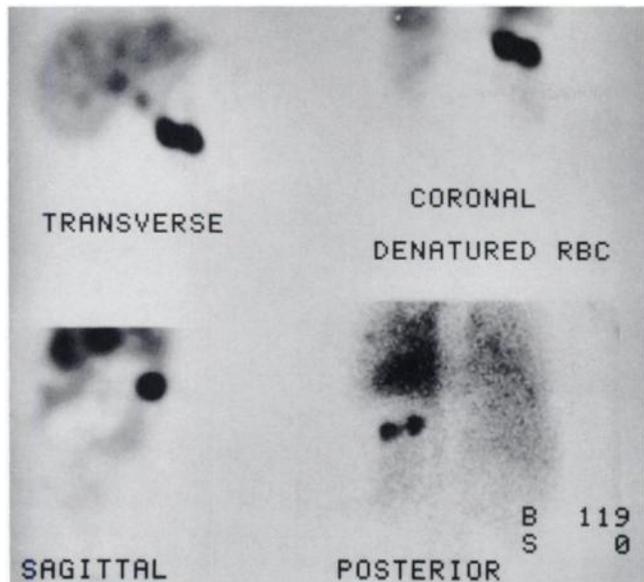


FIGURE 2. Technetium-labeled denatured erythrocyte SPECT and planar images show two intense foci of uptake in the splenic bed region. Intensity is greater than in the adjacent liver. Residual splenic tissue was confirmed surgically.

DISCUSSION

The majority of nuclear medicine departments use ^{99m}Tc -sulfur colloid scintigraphy to evaluate the spleen. The advent of SPECT has increased the sensitivity of this examination. In some institutions, "spleen-specific" examinations are performed using various agents, often ^{99m}Tc -labeled denatured RBCs. This method is reported to have increased sensitivity over ^{99m}Tc -sulfur colloid scintigraphy (1,2).

We have encountered reports of technetium-labeled de-

natured erythrocyte studies but are unaware of reports of false-negative studies obtained with ^{99m}Tc -sulfur colloid in similar instances.

Splenic uptake of radiolabeled pharmaceuticals is accomplished by specific mechanisms. The splenic function of removal of particulate matter is the basis for uptake of ^{99m}Tc -sulfur colloid (particle size 0.3–1.0 μm). It has been reported that splenic uptake is roughly 5%–10% of the administered ^{99m}Tc -sulfur colloid dose. Increasing the particle size to 5 μm is believed to increase uptake to 50% (3).

Removal of abnormal erythrocytes is the basis for denatured RBC uptake by functioning spleen. Denatured RBC fragments are larger than ^{99m}Tc -sulfur colloid particles and removal on the basis of particle size also occurs. Increased uptake of ^{99m}Tc -labeled RBCs relative to ^{99m}Tc -sulfur colloid by the spleen is well known; however, the reason for absent uptake by ^{99m}Tc -sulfur colloid in our case is not apparent.

We have had no experience with other spleen-specific agents such as other colloids or ^{111}In -oxine platelets to detect residual splenic tissue. Rather than speculate as to the reason for the discrepancy, we report this phenomenon and recommend consideration of a denatured RBC spleen-specific examination if faced with a negative ^{99m}Tc -sulfur colloid study in the appropriate clinical setting.

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