

Cold Hematoma Visualized by Technetium-99m Labeled Red Blood Cells

Mark Beanblossom

Pawating Hospital, Niles, Michigan

Case Report:

A 64-yr-old male was admitted to the hospital with severe abdominal pain associated with vomiting. Upon examination, the patient's Hgb was 7.8 with a WBC count of 13.3, band cells of 7 and a reticulocyte count of 3.4, and no evidence of gastrointestinal bleeding. The patient's prior history revealed involvement in an automobile accident ~ 10 days prior to this admission. At that time, he suffered multiple contusions and abrasions with a fracture to his left clavicle. Apparently there were no episodes of abdominal pain or vomiting prior to the onset of illness perceived on the day of admission.

The patient's past medical history includes questionable cholecystitis, duodenal ulcers, emphysema, and mild thrombocytopenia. Previous surgeries have been performed for alleviation of inguinal and umbilical hernias. Other significant history includes chronic obstructive pulmonary disease and borderline diabetes mellitus.

Impressions and recommendations at this time were of an elderly male patient presenting with abdominal pain and anemia. The possibility of injuries to the abdominal structures exists as relating to previous history of trauma and will need to be determined.

A liver/spleen scan was then ordered by the emergency room physician. Four millicuries of ^{99m}Tc -sulphur colloid were intravenously injected using a bolus injection technique while obtaining multiple dynamic images. The flow study (Fig. 1) was unremarkable, demonstrating no abnormalities to the great vessels and good perfusion to both organs. Static images of the liver and spleen (Fig. 2) revealed a straightening or flatness to the lateral border of the spleen with a small diminished area of tracer sulphur colloid localization at the posterolateral aspect of that organ. This finding raised the suspicion that a small subcapsular hematoma had developed at the mid-posterolateral aspect of the spleen. The liver demonstrated normal perfusion with no other significant findings being observed. A recommendation was made by the radiologist that a follow-up liver/spleen study be completed. However, no specific date was assigned. The patient was then transferred directly to the intensive care unit.

Twenty-four hours after hospital admission, 4 units of packed RBCs were transfused into the patient. Shortly after delivery of the last unit, the patient's Hgb had risen to 9.7. By 48 hr

after admission, however, the Hgb had fallen to 7.6 indicating a rapid amount of blood loss. Although there was at this time still no evidence of abnormal bleeding, it was felt that because of the strong symptomatic correlation for internal bleeding, a radionuclide bleeding site study should be ordered and immediately performed.

The patient's RBCs were labeled employing an i.v. injection

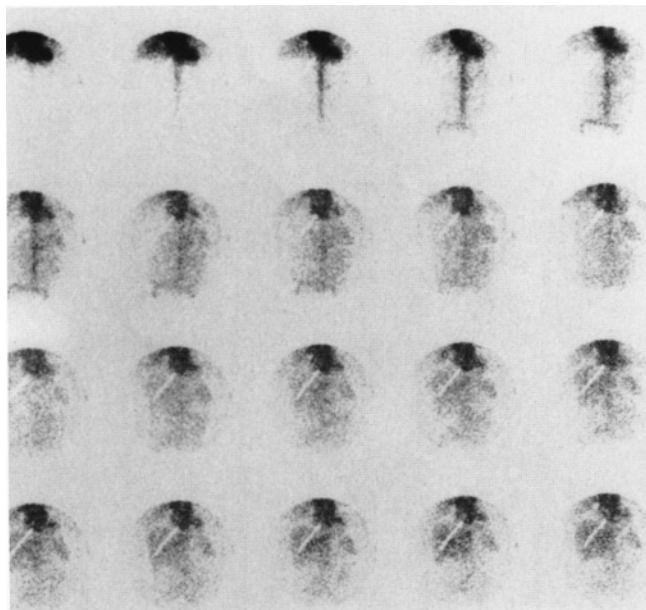


FIG. 1. Anterior flow study (2 sec/frame) using ^{99m}Tc -sulphur colloid showing normal liver and spleen perfusion.

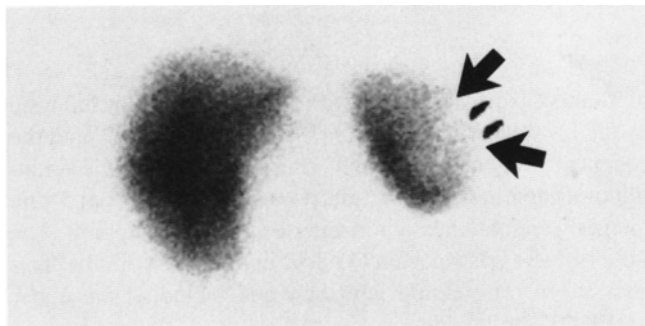


FIG. 2. Left anterior oblique static image of the liver and spleen demonstrated a flat lateral border (arrows) on the spleen.

For reprints contact: Mark Beanblossom, Nuclear Medicine Associates, Inc., 9700 Garfield Blvd., Cleveland, OH 44125.

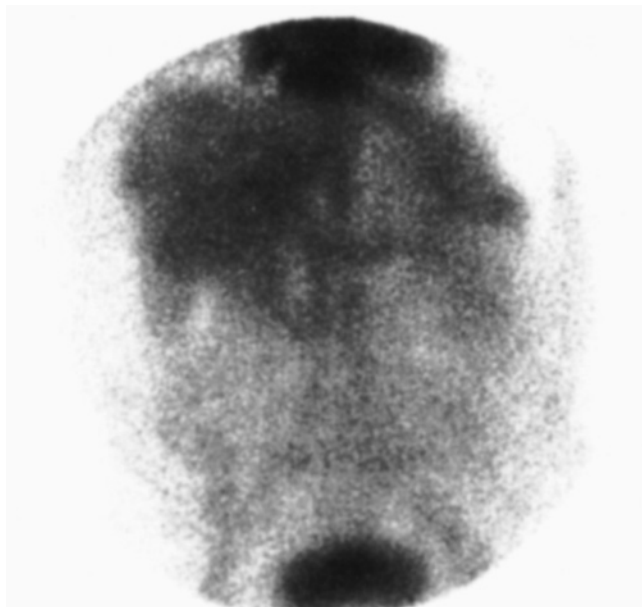


FIG. 3. The 10-min anterior ^{99m}Tc -RBC image demonstrates a cold defect adjacent to the spleen.

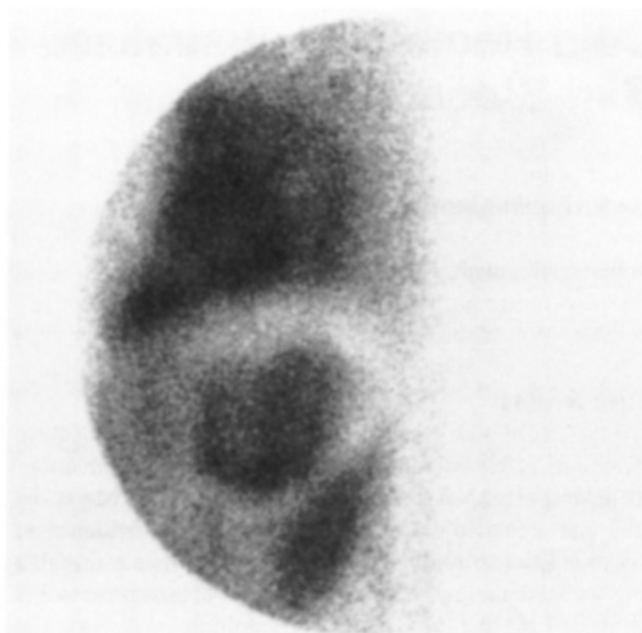


FIG. 5. ^{99m}Tc -RBC image from the left lateral projection demonstrates a halo surrounding the spleen.

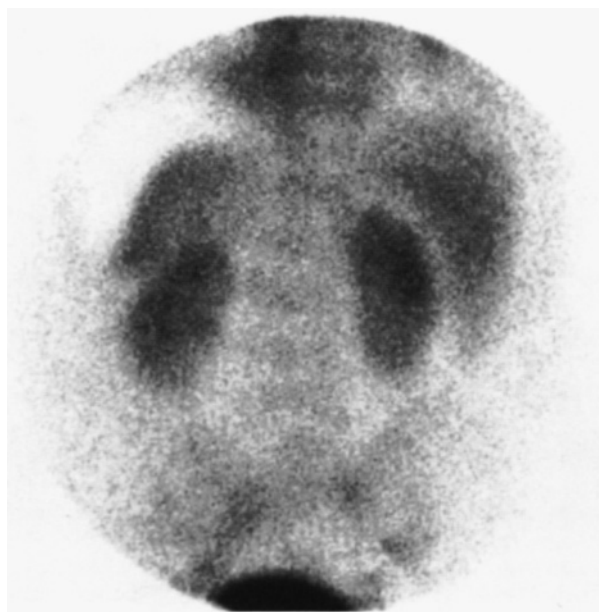


FIG. 4. The posterior ^{99m}Tc -RBC projection shows a lateral and superior photopenic area.

of stannous pyrophosphate (PYP) and a 45-min delay followed by the i.v. injection of 10 mCi [^{99m}Tc]pertechnetate. With the patient in a supine position and using a large-field-of-view scintillation camera with an all-purpose collimator, serial 5-min images were obtained of the anterior abdominal region. The field of view was selected to allow imaging of both the liver and spleen progressing inferiorly and including the upper portion of the bladder.

The initial images (Fig. 3) from this study appeared to have normal perfusion throughout the abdominal region and were

unremarkable. No radiotracer pooling was noted in the stomach, colon, or abdominal cavity. There was, however, a small region where a relatively diminished area of activity was observed along the peripheral portion of the superolateral aspect of the spleen. This "cold" region was highly suggestive, with regards to the previous abnormal finding in the liver/spleen scan, of a hematoma consisting of blood previously pooled from a rupture in the spleen before the introduction of the radiolabeled RBCs. Reasoning that the patient had been in the supine position for the infusion of the packed RBCs, it was felt that if a hematoma had materialized it would be better observed by obtaining images from posterior and lateral imaging angles. With the patient remaining supine, the camera was rotated 180° and placed under the imaging table. This enabled us to clearly demonstrate that, as suspected, a very large hematoma existed along the superior lateral aspect of the spleen (Fig. 4). A left lateral image of the spleen revealed an impressive cold halo surrounding the spleen (Fig. 5). Surgery performed on the patient confirmed that the spleen was ruptured and that a large hematoma had formed as a result of the blood loss previously incurred.

DISCUSSION

Two points should be given specific note in this case. First, while it is accepted that PYP reduced RBCs labeled with [^{99m}Tc]pertechnetate for a bleeding site study will generally be effective only if there is blood loss evidenced to be at least of 1 ml/hr or greater at the time of their administration, there was probably not active bleeding in this patient prior to and during this bleeding study. In such cases it has been suggested that an alternative method of gastrointestinal scanning with

^{99m}Tc -sulphur colloid may be more sensitive (1). However, greater sensitivity may be limited to the gastrointestinal tract. Whereas this patient did appear to be a candidate for this procedure, there was in fact neither active abdominal bleeding nor bleeding in the gastrointestinal tract occurring at the time of the scan. Either of these findings would probably have rendered this technique ineffective in this case. Both together would most certainly have done so, a fact at least substantiated in part by the inability of the previously administered bolus injection of sulphur colloid particles to demonstrate either a bleeding site or the cold hematoma.

Of secondary note is the importance of history to this case. The patient's history of having had trauma to the abdominal area as a result of an automobile accident is crucial in the selection of the correct follow-up bleeding site technique. Since our patient was not bleeding at the time of the scan, the sulphur colloid scan would not have a high enough background level to allow demonstration of the cold hematoma (2). It is precisely this background that is demonstrated by the positive findings of the labeled RBCs.

In conclusion, although it is well documented that liver spleen imaging is a good diagnostic aid in determining internal damage to the liver or spleen caused by trauma, this technique often is not capable of adequately defining all injuries to the organ. Figure 2 clearly demonstrates an abnormality to the posterolateral aspect of the spleen. The sulphur colloid image, however, is unable to delineate its precise cause. This case has demonstrated the ability of ^{99m}Tc labeled RBCs to visualize a cold lesion caused by a hematoma. This procedure may be successfully employed as an additional study to demonstrate an active or previously active bleeding site from a lesion on an organ in cases where traumatic injuries have occurred or may be suspected.

REFERENCES

1. Alavi A. Detection of gastrointestinal bleeding with ^{99m}Tc sulfur colloid. *Sem Nucl Med* 1982;12:126-37.
2. Baum S, Vincent NR, Lyons KP, et al. *Atlas of Nuclear Medicine Imaging*. New York: Appleton-Century-Croft, 1981:1-80.