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SELF-STUDY TEST

Gastrointestinal Nuclear Medicine

Questions are taken from the *Nuclear Medicine Self-Study Program I*, published by The Society of Nuclear Medicine

DIRECTIONS

The following items consist of a heading followed by numbered options related to that heading. Select those options you think are true and those that you think are false. Answers may be found on page 2125.

A 70-yr-old man was seen in the emergency room with episodes of intermittent melena and maroon-colored stools. The patient's vital signs were stable; his hematocrit was 35% and his hemoglobin was 10.2 g/dl. Images from a ^{99m}Tc-red blood cell study (Fig. 1) at 5, 30, and 90 min are shown along with a mucosal photograph obtained during subsequent colonoscopy (Fig. 2).

True statements concerning this patient include which of the following?

1. An air-contrast barium enema likely would be diagnostic.
2. A ^{99m}Tc-sulfur colloid study would likely have shown similar findings.
3. Angiodysplasia of the colon is present.
4. Selective magnification angiography of the superior mesenteric artery likely would be diagnostic.
5. The bleeding site is in the hepatic flexure.

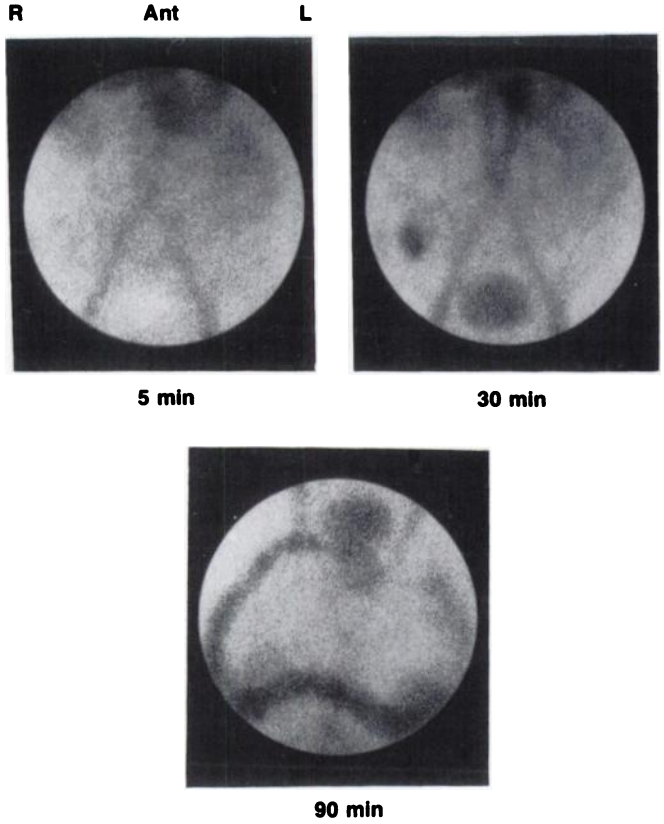

Figure 1

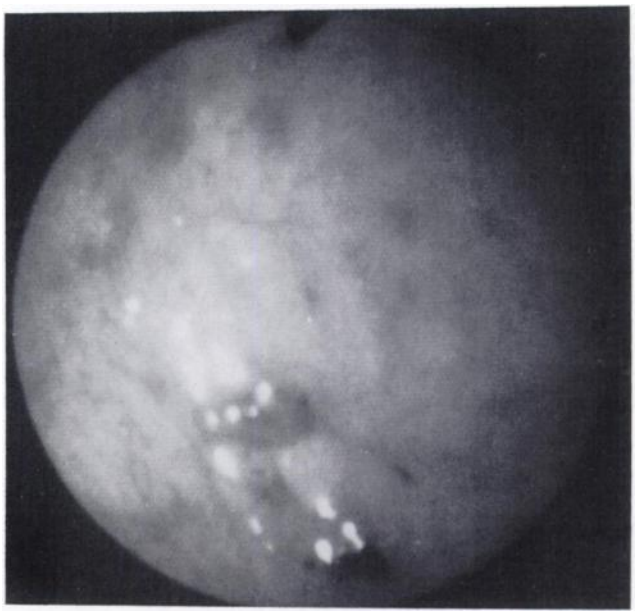

Figure 2

(continued on p. 2078)

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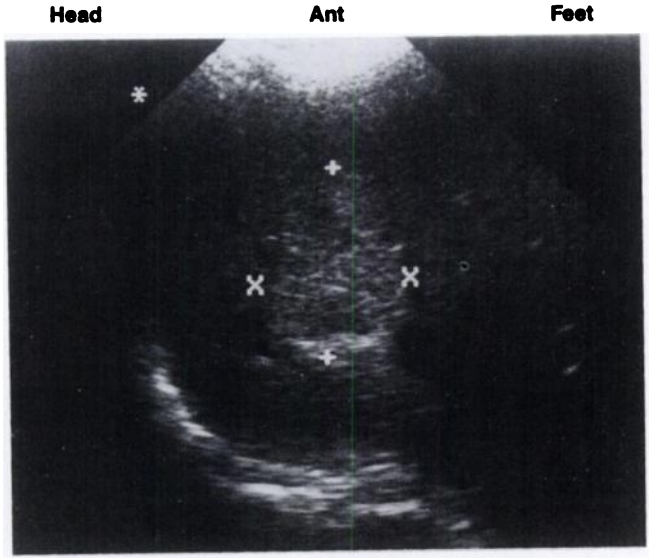
(continued from p. 2063)

SELF-STUDY TEST

A 43-yr-old woman with irritable bowel syndrome developed an episode of acute abdominal pain, which was not characteristic of her prior symptoms. You are shown both a hepatic sonogram (Fig. 3) and a hepatic blood-pool scintigram obtained with ^{99m}Tc-labeled red blood cells (Fig. 4).

Based on the *sonographic findings (in Fig. 3) alone*, which of the following diagnoses should be considered?

6. hepatic adenoma
7. cavernous hemangioma
8. simple hepatic cyst
9. metastasis
10. hepatocellular carcinoma



Longitudinal Scan

Figure 3

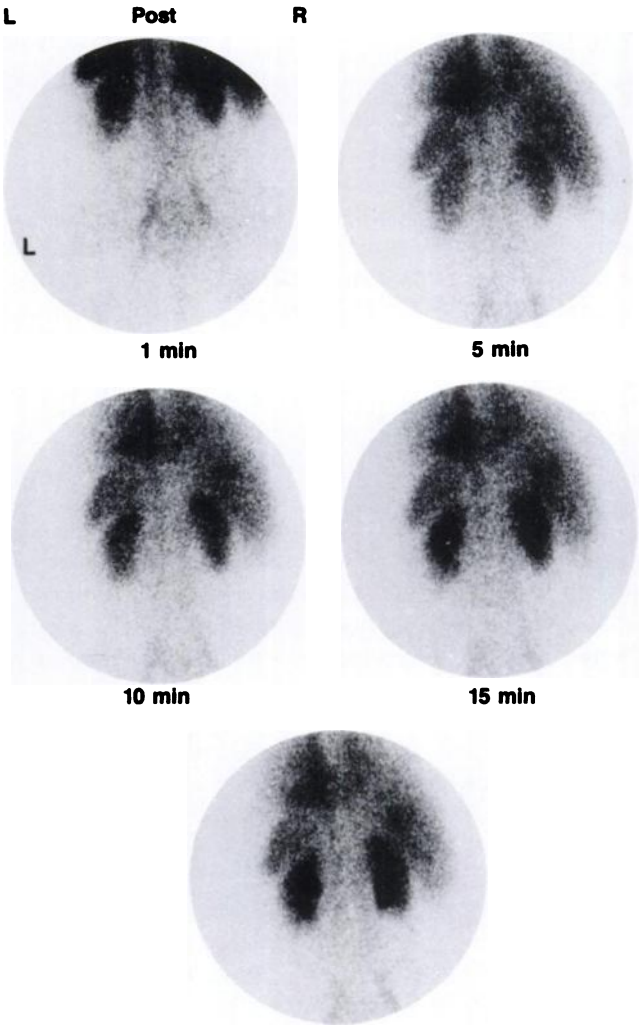


Figure 4A

True statements concerning the findings in this patient's labeled red blood cell study (Fig. 4) include which of the following?

11. Cavernous hemangioma is the most likely diagnosis.
12. SPECT is necessary for definitive diagnosis.
13. The likelihood of hepatocellular carcinoma is approximately 20%.
14. The likelihood of metastasis is approximately 20%.

Figure 4B

(continued on p. 2125)

important is the target/non-target ratio, which is affected by clearance of background radioactivity and specific binding site.

Nevertheless, basic animal studies of tracer kinetics are important since they provide valuable knowledge that can be utilized for the improvement of clinical PET studies.

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REFERENCE

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(continued from p. 2078)

SELF-STUDY TEST
Gastrointestinal Nuclear Medicine
ANSWERS

Note: For further in-depth information, please refer to the syllabus pages included at the beginning of *Nuclear Medicine Self-Study Program I: Part I.*

ITEMS 1-5: Angiodysplasia of the Ascending Colon

ANSWERS: 1, F; 2, F; 3, T; 4, T; 5, F

The initial 5-min image of the ^{99m}Tc-labeled red blood cell study is normal (Fig. 1). At 30 min, there is a focal collection of tagged red blood cells in the right lower quadrant in the general area of the cecum (not the hepatic flexure), consistent with active bleeding. Some renal excretion has occurred and bladder activity is present. By 90 min activity has moved throughout the entire colon. A ^{99m}Tc sulfur colloid study most likely would have been negative in this patient, because initial bleeding was not clearly seen until 30 min.

The colonoscopy (Fig. 2) demonstrates ectatic superficial vascular tufts in the cecum with focal areas of hemorrhage. This was confirmed to be angiodysplasia at angiography and surgery.

Angiodysplasia is a degenerative disease of the bowel most often seen in the elderly. Angiography is usually diagnostic and demonstrates clusters of small arteries with vascular tufts in which contrast pools. The lesions, which tend to be multiple, are usually located on the antimesenteric border of the cecum or the ascending colon and are associated with characteristic early draining veins or slowly emptying veins. Colonoscopy occasionally can be diagnostic, as well (as in this patient). Air-contrast and single-contrast barium enemas are normal in angiodysplasia.

References

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ITEMS 6–10 and 11–14: Red Blood Cell Imaging of Hepatic Hemangioma

Answers: 6, T; 7, T; 8, F; 9, T; 10, T; 11, T; 12, F; 13, F; 14, F

The ultrasound study (Fig. 3) shows a hyperechoic lesion in the right lobe of the liver. When small and highly echogenic intrahepatic masses are detected incidentally on sonography they usually can be assumed to be hemangiomas or, less likely, angiomyolipomas. They may have homogenous or inhomogenous echo patterns that likely are due to the multiple small interfaces between the walls of the cavernous sinuses and the blood within them. With degeneration and fibrosis the pattern becomes more inhomogenous. The differential diagnosis of a solitary echogenic mass also should include hepatocellular carcinoma, hepatic adenoma, focal nodular hyperplasia, and metastasis. In general, hepatic adenomas more commonly appear as hypoechoic lesions, although they may show some complex central echoes. A hepatic cyst would be sonolucent and is unlikely in this patient. If either a metastatic lesion or a primary hepatic neoplasm is a clinical consideration, other studies are needed. For evaluation of suspected hemangioma, labeled red blood cell scintigraphy is less expensive and easier to perform than dynamic contrast CT or MRI, particularly when several masses are present.

The patterns of early perfusion (angiographic phase) and late (blood-pool phase) mismatch (i.e., a hypoperfused lesion with increased blood-pool activity) is the classic pattern of hepatic cavernous hemangioma by red blood cell scintigraphy. Uncommonly, hemangiomas, particularly small lesions, may show increased arterial flow. False-negative labeled red blood cell studies have been reported when fibrosis of much of the lesion is present, although this is an uncommon finding. The angiographic study in this patient (Fig. 4A) is not helpful because the technologist positioned the camera too low and most of the liver is out of the field of view. The diagnosis of hemangioma can be made with near certainty, however, because of the lesion's characteristic, increasing blood-pool activity with time (Fig. 4B). The delayed blood-pool activity corresponds to the slow flow and late filling, which has been described with CT where peripheral enhancement by contrast is followed by a slow progressive central enhancement of these lesions.

By comparison, hepatocellular carcinomas are characteristically hypervascular during the angiographic phase and also in the early static images. The vast majority of hepatomas show relatively decreased activity compared with adjacent normal hepatic tissue on delayed images, although uncommonly the lesion is of the same or slightly greater intensity than the liver. Only rarely are metastatic lesions hyperperfused on the angiographic images and they do not exhibit increased activity on delayed blood-pool images. Hence, neither hepatocellular carcinoma nor metastasis has a likelihood approaching 20% in this patient.

The recent study by Brodsky et al. has shown that planar scintigraphy with labeled red blood cells is usually sufficient for confirming the presence of a hemangioma when the lesion is 3 cm or larger on ultrasonography or CT. SPECT imaging improves the method's sensitivity, but is most helpful for detecting smaller lesions. In this patient, the lesion's diameter is greater than 3 cm in the ultrasound study and the lesion can be seen easily in the posterior aspect of the right lobe of the liver on the planar images. SPECT may reveal additional smaller lesions not seen with planar imaging but there is no need to use SPECT in this patient to confirm the benign nature of this large lesion.

References

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