

## Varices: A potential pitfall in gastrointestinal bleeding scan interpretation

Brian Wosnitzer, MD, and Ernest Gordon DePuey, MD

Gastrointestinal bleeding scans are extremely useful for localizing the source of gastrointestinal bleeding before interventional radiology procedures. It is essential that physicians understand the numerous possible pitfalls when interpreting these scans. Understanding the potential causes of false-positive scan interpretation eliminates unnecessary procedures for the patient and minimizes costs. We report a case of a patient with cirrhosis who presented with gastrointestinal bleeding to emphasize intra-abdominal varices as a potential cause of false-positive bleeding scan interpretation. In addition, we reinforce the criteria needed for diagnosis of gastrointestinal bleeding on the nuclear bleeding scan.

### Case report

A 51-year-old female with a past medical history of cirrhosis presented with bright red blood per rectum. The patient was referred to the nuclear medicine department for a gastrointestinal bleeding scan to evaluate for the source of bleeding. An aliquot of the patient's red blood cells was radiolabeled with 25mCi of technetium 99m pertechnetate and reinjected. Sequential images of the abdomen and pelvis were then obtained in the anterior view for 75 minutes. The scintigraphic images demonstrated a focal area of moderately increased tracer concentration in the right lower quadrant of the abdomen that was present at the initiation of the imaging sequence and did not change in location throughout the entirety of the study (Fig. 1). The initial differential diagnostic considerations at the time included bleeding from the area of cecum, bleeding from the small bowel (less likely since small-bowel motility is much more rapid), and a large vascular aneurysm.

Immediately after the gastrointestinal bleeding scan, the patient was taken to interventional radiology for selective

catheter angiography. The angiogram demonstrated no evidence of active extravasation of intravenous contrast to suggest gastrointestinal bleeding, and therefore no embolization was performed. However, celiac arteriography revealed angiographic signs of cirrhosis, with a corkscrew pattern of the intrahepatic arterial branches and a small liver. Injection of the superior mesenteric artery revealed numerous large, dilated venous structures in the right lower quadrant of the abdomen, consistent with varices (Fig. 2). These large varices, isolated to the right lower quadrant, corresponded to the persistent radiotracer visualized in the right lower quadrant of the abdomen on the bleeding scan.

Five days later, the patient underwent a CT scan of the abdomen and pelvis following intravenous and oral contrast for further evaluation. The liver demonstrated cirrhotic features including nodular contour, prominent caudate lobe, and heterogeneous attenuation pattern without focal lesions present. In addition, the spleen was enlarged, and extensive varices in the right lower quadrant of the abdomen were again noted (Fig. 3). Since oral contrast was administered for the CT scan, evaluation for extravasation of intravenous contrast into the lumen of the colon could not be performed.

### Discussion

There are numerous causes of false-positive and false-negative interpretation of gastrointestinal bleeding scans. Understanding the full spectrum of potential pitfalls is necessary to avoid bleeding scan misinterpretation, which can lead to unnecessary procedures for the patient and increased costs.

---

**Citation:** Wosnitzer B, DePuey EG. Varices: A potential pitfall in gastrointestinal bleeding scan interpretation. *Radiology Case Reports*. (Online) 2011;6:608.

**Copyright:** © 2011 The Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs 2.5 License, which permits reproduction and distribution, provided the original work is properly cited. Commercial use and derivative works are not permitted.

The authors are both in the Division of Nuclear Medicine, St. Luke's Roosevelt Hospital Center, New York NY. Contact Dr. Wosnitzer at [bwosnitzer@chpnet.org](mailto:bwosnitzer@chpnet.org).

**Competing Interests:** The authors have declared that no competing interests exist.

DOI: 10.2484/rcr.v6i4.608

## Varices: A potential pitfall in gastrointestinal bleeding scan interpretation



Figure 1. Gastrointestinal bleeding scan demonstrates a focal area of moderately increased tracer concentration in the right lower quadrant of the abdomen that appears immediately in the imaging sequence and does not change in location throughout the entirety of the study. These findings could represent a bleed in the cecum or (less likely) the small bowel. An alternate explanation for the focus of persistent radiotracer concentration in the right lower quadrant is the presence of a large vascular aneurysm.



Figure 2. Angiogram after injection of the superior mesenteric artery demonstrates no evidence of extravasation or arterial lesion (left). However, the venous phase of the injection (right) demonstrates large varices (white arrow) isolated to the right lower quadrant, corresponding to the finding of persistent radiotracer in the right lower quadrant on the bleeding scan.

## Varices: A potential pitfall in gastrointestinal bleeding scan interpretation

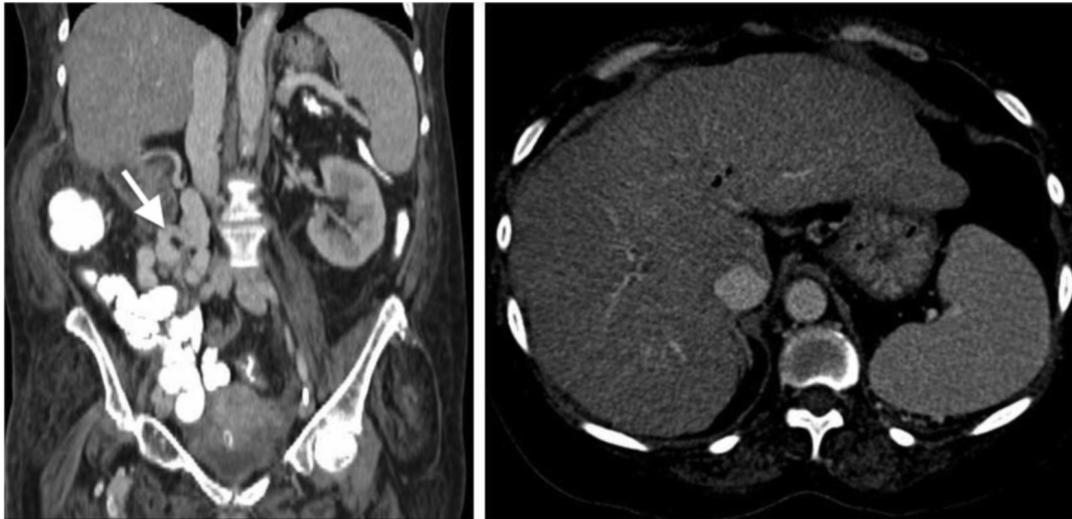


Figure 3. Coronal view (left) from CT scan of the abdomen and pelvis with oral and intravenous contrast demonstrates massive varices in the right lower quadrant of the abdomen (white arrow). Axial view (right) demonstrates a cirrhotic liver (nodular contour, prominent caudate lobe, and heterogeneous attenuation pattern) and splenomegaly.

We stress strict adherence to the three criteria necessary for diagnosing bleeding on a nuclear bleeding scan. First, tracer must appear where no tracer was present before. Second, the tracer must persist or increase in intensity throughout the duration of the study. Third, the tracer must move antegrade, retrograde, or both (1, 2). In this case, the bleeding scan demonstrates moderately increased tracer concentration in the right lower quadrant of the abdomen at the initiation of imaging. Therefore the first criterion is not met, since tracer does not appear where tracer was not previously visible. Although it is theoretically possible that the initial extravasation of tracer into the bowel lumen was missed due to a delay between tracer injection and the initiation of imaging, our protocol requires that sequential imaging begin before tracer injection, which eliminates this possibility. The persistence of increased tracer concentration in the right lower quadrant throughout this entire study satisfies the second criterion. However, since tracer does not move antegrade or retrograde during the study, the third criterion is not met. Therefore, since all three criteria are not met, this scan should be interpreted as a negative gastrointestinal bleeding study.

We highly recommend that any available correlative radiographic imaging be examined when interpreting bleeding scans. In this case, the CT scan and angiographic images confirmed varices as the cause of persistent radio-tracer in the right lower quadrant of the abdomen on bleeding scan. Since bleeding was not visualized on the bleeding scan or angiography, it is likely that the patient's bleed was intermittent, too slow for detection, or resolved on its own (1, 2).

In addition to varices, there are numerous other causes of false-positive bleeding scan interpretation. Any vascular or urinary structure may cause confusion during interpretation. For example, urinary-tract activity, particularly in an ectopic kidney, may be misleading. Other sources of false positives include aneurysms, accessory spleens, hepatic hemangiomas, uterine or penile "blush," or free technetium-99m pertechnetate from poor red-blood-cell labeling (1, 2).

### References

1. Mettler, F.A. and M.J. Guiberteau, *Essentials of nuclear medicine imaging*. 5th ed. 2006, Philadelphia, Pa.: Saunders/Elsevier. xi, 577 p.
2. Ziessman, H.A., J.P. O'Malley, and J.H. Thrall, *Nuclear medicine: the requisites*. 3rd ed. Requisites in radiology. 2006, Philadelphia: Mosby Elsevier. xii, 580 p.