Umbilical Varices: A Potential Pitfall in Gastrointestinal Bleed Scintigraphy Interpretation

Abstract

Tc-99m labeled red blood cell (RBC) scintigraphy is commonly used in the evaluation of acute gastrointestinal (GI) bleeding. On Tc-99m RBC studies, GI bleeding is seen as an initial focus of increased radiotracer activity that on subsequent images increases in intensity and changes position in a pattern that confirms to segments of bowel. We report a case of a patient with multiple episodes of GI bleeding referred to detect the source of bleeding. A Tc-99m labeled RBC scan was performed and the findings showed a focal abnormal hot spot in the mid quadrant of the abdomen, seen promptly in initial dynamic images. Subsequent static and single-photon emission computed tomography-CT (SPECT-CT) images found it to be umbilical varices. Most varices fill promptly as in this case and should not be misinterpreted as a focus of hemorrhage. SPECT-CT should be used in such cases so that that false-positive interpretation can be avoided.

Keywords: *False-positive, gastrointestinal bleed scintigraphy, single-photon emission computed tomography-computed tomography, umbilical varices*

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A 51-year-old male patient was a known case of the chronic liver disease with portal hypertension. He had a recent history of red color blood in the stool. He underwent upper and lower gastrointestinal (GI) scopy for the same, and no active bleeding source could be identified. His laboratory investigations suggested severe anemia. He was referred for GI bleed scintigraphy to identify the source of active bleeding if any. *In vivo* labeling of red blood cells (RBCs) was done by IV injection of 20 mCi of 99mTcO4 (technetium pertechnetate). Initial 1 h dynamic and static high-resolution images up to 6 h of the abdomen were acquired using Dual Head Gamma Camera GE Discovery NM 630. Regional Single-photon emission computed tomography (SPECT) was also acquired at 1.5 h. The regional CT scan was acquired separately, andSPECT-CT fusion was done using Xeleris 3.1. Scan findings did not show any focal abnormal tracer accumulation in any quadrant of the abdominal cavity suggestive of any source of active GI bleed. However, focal tracer uptake was noted in the mid quadrant of the abdomen in the region of the umbilicus since initial frames of dynamic images, which was not increasing in intensity or moving in any direction with time [Figure 1]. The static image at the completion of dynamic phase and at 1.5 h, postinjection showed no significant change in the focus [Figure 2]. SPECT at 1.5 h was acquired, which showed a linear area of increased tracer uptake extending all the way from the liver to umbilicus, which was difficult to appreciate on static planar images due to tracer in the underlying abdominal vasculature [Figure 3]. Regional noncontrast CT scan was also acquired for anatomical correlation, and SPECT-CT fusion was done. Fusion images showed tracer uptake in umbilical varices, extending from the liver to umbilicus [Figure 4] in this known case of portal hypertension secondary to chronic liver disease.

Discussion

Several potential false-positive findings can occur in GI bleed scintigraphy, which include splenosis, pancreatic pseudocysts, or nonenteric bleeding/hematoma.[1-3] Other reported sources of false-positive include renal activity from a morphologically normal kidney, transplanted or horseshoe kidney, urine in the bladder or urine contamination, urinary diversion, dilated abdominal aorta, bowel ischemia, hepatic hemangioma, vascular collaterals such as

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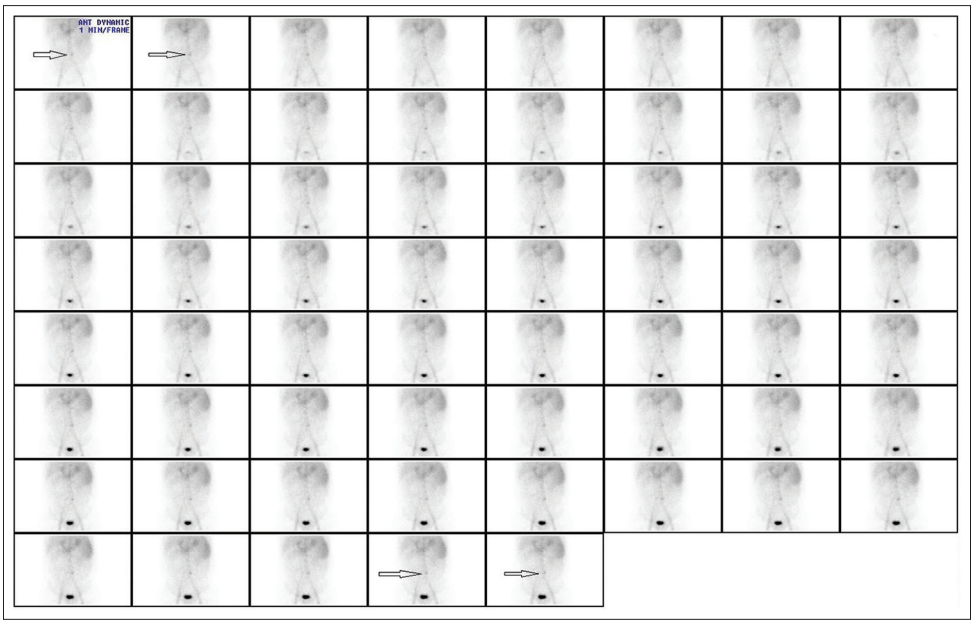

Figure 1: Anterior 60 min dynamic images show no focal abnormal increased tracer uptake in any quadrant of abdominal cavity suggestive of any active gastrointestinal bleed. Focal tracer uptake is noted in mid quadrant of abdomen in the region of umbilicus in initial dynamic images (arrow in initial two frames); persisting throughout dynamic phase without any significant change in intensity or direction throughout dynamic phase (arrow in last two frames)

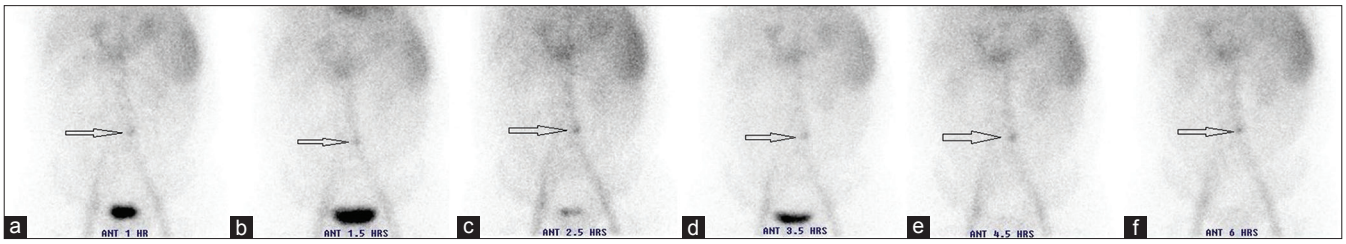

Figure 2: (a-f) Serial static anterior images show no significant change in intensity or direction of tracer uptake in mid quadrant of abdomen in the region of umbilicus (see arrows in serial static images)

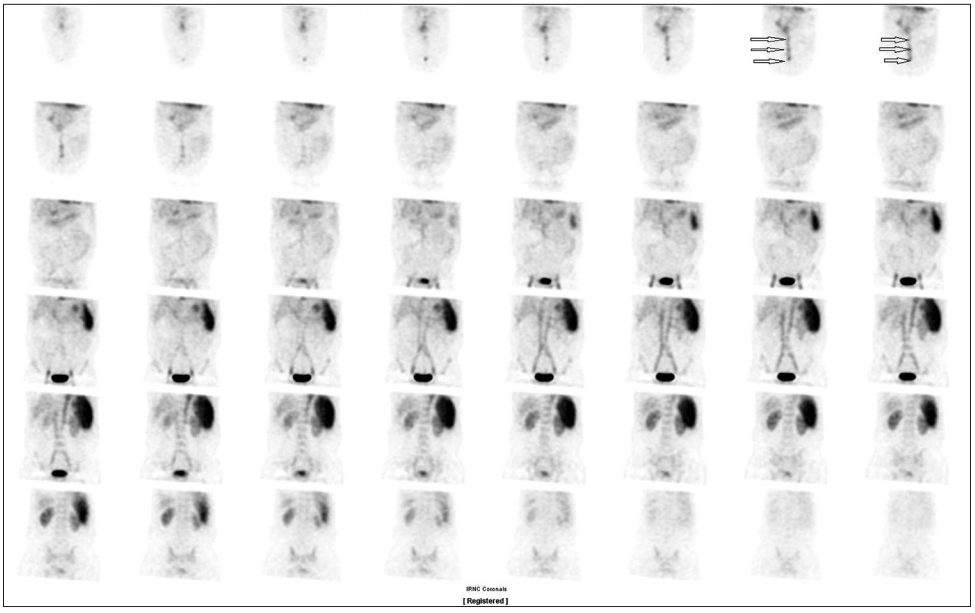

Figure 3: Single-photon emission computed tomography images were taken at 1.5 h postinjection. Coronal images show linear area of abnormal tracer uptake extending from the level of liver to the level of umbilicus in anterior most sections (see arrows in last two frames of 1st raw)

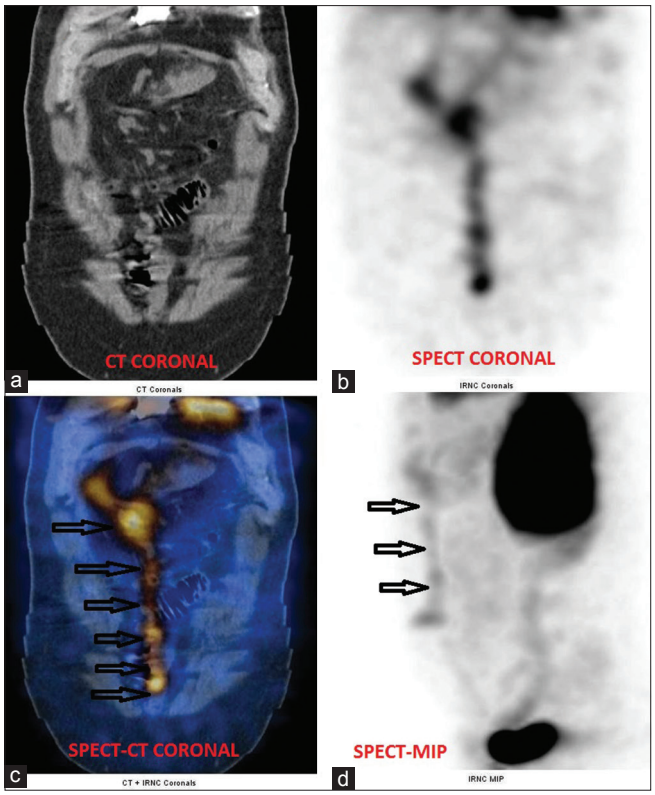

Figure 4: (a-d) Single-photon emission computed tomography-computed tomography images confirm that linear area of increased tracer uptake seen in single-photon emission computed tomography images extending from liver to umbilicus actually correlate with the umbilical varices (see arrows)

caput medusa or dilated mesenteric veins, angiodysplasia, left ovarian artery, and gallbladder in patients with renal failure, penis, uterus, and uterine leiomyoma.[1,4] Normal postoperative hyperemia can also cause false-positive results. Inflammatory bowel diseases such as Crohn's disease, diverticular abscess, and hypervascular neoplasm may also make interpretation difficult.[1,4] If the site of the activity is unclear, SPECT/CT with fusion may be helpful in detecting the location of uptake and aid in the diagnosis.[5,6]

Adherence to three important diagnostic criteria is necessary for diagnosing bleeding on GI bleed scintigraphy. First, the tracer must appear where no tracer was present before. Second, the tracer must persist or increase in intensity throughout the study. Third, the tracer must move anterograde, retrograde, or both.[7,8] In this case, scan reveals focal increased tracer uptake in the mid 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. It is possible that the initial extravasation of tracer into the bowel lumen can be missed due to a delay between tracer injection and the initiation of imaging. Hence, sequential imaging should begin before tracer injection, which eliminates this possibility. The persistence of increased tracer uptake without a significant increase in intensity in the mid quadrant throughout this entire study partly satisfies the second criterion. However, since tracer does not move anterograde 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 GI bleeding study. It is highly recommend that any available correlative radiographic imaging be examined when interpreting bleeding scans.

Tc-99m labeled RBC scans are often the first line study used in the evaluation of lower GI bleeds and usually lead to the correct diagnosis. However, there are entities including varices which can simulate GI hemorrhage on GI bleed scintigraphy, which physicians should be aware of to minimize potential false-positive interpretations. SPECT-CT should be used to avoid such false positives.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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