Situs Inversus And Upper Gastrointestinal Bleeding On Red Blood Cell Scintigraphy

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Citation

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Abstract

A case report of bleeding in a right-sided stomach detected by scintigraphy in a patient with situs inversus is presented.

INTRODUCTION

The presence of situs inversus, if not known beforehand or recognized during interpretation, can result in mislocalization of a bleeding site on gastrointestinal bleeding scans. The aim of this article is to present a case where a labeled red blood cell scan has specific findings which lead to the diagnosis of active bleeding from a right-sided stomach in a patient with situs inversus.

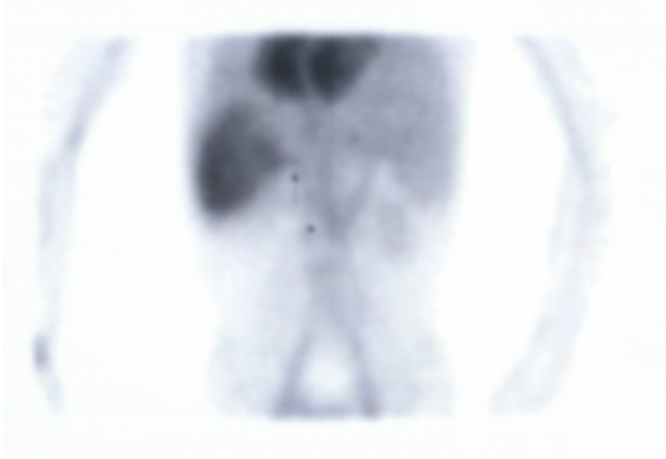
CASE REPORT

A 32-year old male with a history of situs inversus presented with hypotension, dropping hematocrit, and multiple melanotic stools. He required transfusion of 4 units of packed red blood cells. A nasogastric tube was passed with return of bright red blood. Emergent endoscopy was performed which demonstrated a 1.0 x 0.2 cm linear ulcer vs. tear in the distal esophagus at the gastroesophageal junction which was injected with epinephrine. This area was not actively bleeding during the endoscopy however and it was felt unlikely that a lesion of this size would require transfusion of 4 units. The patient continued to have gastrointenstinal bleeding with melanotic stools, dropping hematocrit, and furthur transfusions required.

A gastrointestinal bleeding scan was performed with 832 MBq of Tc-99m pertechnetate-labeled red blood cells (labeled by the in vitro Ultratag kit method). A focus of activity was seen to appear in the right upper quadrant early in the study (Fig. 1) and then move inferiorly (Fig. 2). At the time of interpretation the history of situs inversus was not known to the interpreting physicians and it was initially thought that the bleeding site might be in the duodenum. However, it was noted that the intense splenic blood pool activity as well as the cardiac apex lay on the right, which lead to the suspicion of situs inversus. The position of the stomach, liver and spleen was confirmed by reviewing a prior CT scan (Fig. 3).

Figure 1

Fig. 1. Early image from a labeled red blood cell scan demonstrates a right-sided spleenand left-sided liver. The spleen is recognized by its intense blood pool activity and smaller size relative to the liver. In addition, the cardiac apex is in the right hemithorax.



A focus of activity (arrow) appeared in the right upper quadrant medial to the spleen during the study, with a small amount moving inferiorly (arrowhead).

Figure 2

Fig. 2. A later image from the same study shows the initial right upper quadrant activity to have cleared, with more activity inferiorly (arrow). These findings are consistent with active bleeding from a right-sided stomach. However, if the abnormal splenic and cardiac positions were not noted, the same findings could be interpreted as a bleeding site in the first portion of the duodenum moving inferiorly into the second and third portions.

Figure 3

Fig. 3. CT scan of the upper abdomen demonstrates a right-sided stomach, left-sided liver and right-sided spleen.

Angiography was performed which demonstrated a focus of hypervascularity in the gastric fundus (Fig.4). After Gelfoam embolization (Fig. 5), the patient did not rebleed.

Figure 4

Fig. 4. Selective injection of the left gastric artery (arising from the right lateral aorta and extending to the right) demonstrates hypervascularity and arteriomegaly in the gastric fundus with surrounding vascular blush.

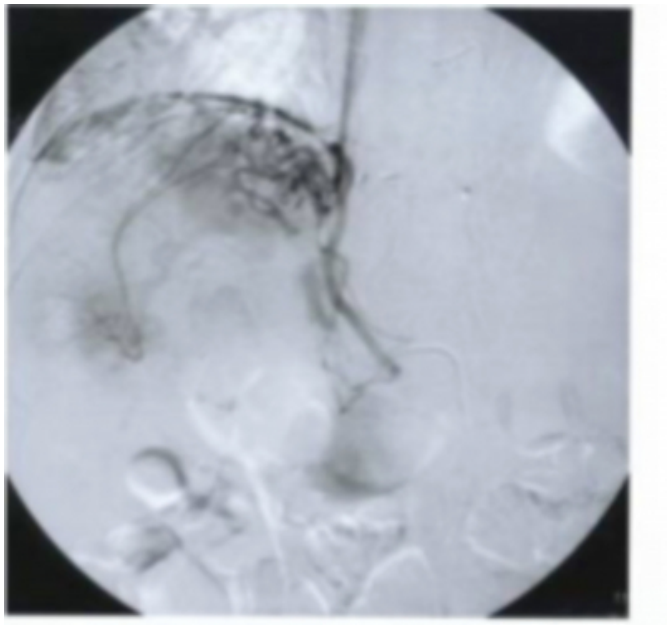
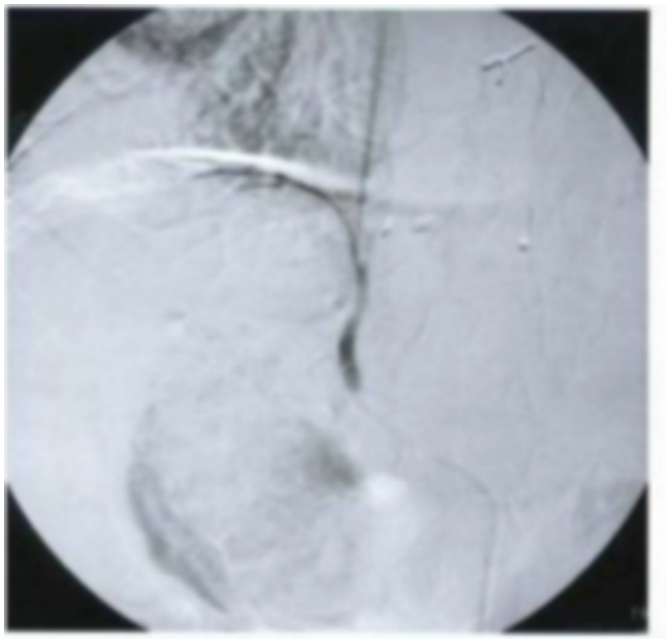


Figure 5

Fig. 5. Selective injection after Gelfoam embolization demonstrates no flow to the previously identified hypervascular area.



DISCUSSION

Situs inversus is seen in 0.01 % of the population. It is the mirror image of situs solitus. In situs inversus, the systemic atrium is on the left with a left-sided trilobed lung, liver, and

gallbladder. The pulmonary atrium, stomach, single spleen, and cardiac apex and aortic arch are on the right with a right-sided bilobed lung. Congenital heart disease is present in 3-5% of patients with situs inversus and Kartegener syndrome in 20% ([1,2]). While Tc-99m sulfur-colloid scans are often

used to search for splenic tissue in heterotaxy syndrome ([3]), the appearance of situs inversus on a Tc-99m labeled red blood cell scan has not been described. On labeled red blood cell scans, the spleen has greater blood pool activity than the liver which allows a right-sided spleen to be identified. In addition, a right-sided cardiac apex can be identified if the lower thorax is included in the field-of-view. If the history of situs inversus is not known and not identified on the scintigraphic images, right gastric bleeding sites could potentially be misidentified as duodenal or colonic.

Scintigraphy is rarely used for the diagnosis of upper gastrointestinal bleeding due to the high accuracy of endoscopy ([4]). However, scintigraphy should be considered when endoscopy fails ([5]) (endoscopy did not definitely localized the bleeding site in this case).

Scintigraphy is an accurate method for localizing active gastrointestinal bleeding sites ([6,7,8,9,10,11,12]). Either Tc-99m sulfur colloid ([6,13,14]) or Tc-99m pertechnetate-labeled red blood cells ([11,15]) can be used. In a tandem study of 100 patients by Bunker et al, thirty-eight true positive scinitigrams were obtained with labeled red cells, while sulfur colloid detected only five sites of hemorrhage ([16]). Labeled red cells have the advantage of remaining in the intravascular space, allowing monitoring for much longer periods of time. Disadvantages include a higher background and the potential for misinterpreting bleeding location on delayed scans. In cases where upper gastrointestinal bleeding is suspected, labeled red blood cells have the additional advantage over sulfur colloid of not having high activity in the liver and spleen, which might obscure upper gastrointestinal bleeding sites. However, the labeling method used must have a high binding efficiency as free pertechnetate is secreted by gastric mucosa and can mimic gastric bleeding. The in vitro Ultratag kit method has a 98.5% labeling efficiency ([17]). In addition, if there is a question of the presence of free technetium, the thyroid can be imaged.

There are many potential pitfalls in the interpretation of gastrointestinal bleeding studies ([18]). The bleeding site can be misidentified due to rapid retrograde or antegrade flow. False positives can result from many etiologies. Vascular lesions which can potentially cause false positives can be differentiated by the lack of movement. In this case, the focus in the right upper quadrant appear during the scan and moved inferiorly, confirming it as a bleeding site.

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