

# Confirmation Of A Gastrointestinal Bleed Detected On Subtraction Scintigraphy: Case Studies

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## Citation

G Currie, J Wheat. *Confirmation Of A Gastrointestinal Bleed Detected On Subtraction Scintigraphy: Case Studies*. The Internet Journal of Nuclear Medicine. 2006 Volume 3 Number 2.

## Abstract

This article reports the role of subtraction techniques in two interesting cases of lower gastrointestinal haemorrhage (LGIH) using  $^{99m}\text{Tc}$  red blood cell (RBC) scintigraphy.

## INTRODUCTION

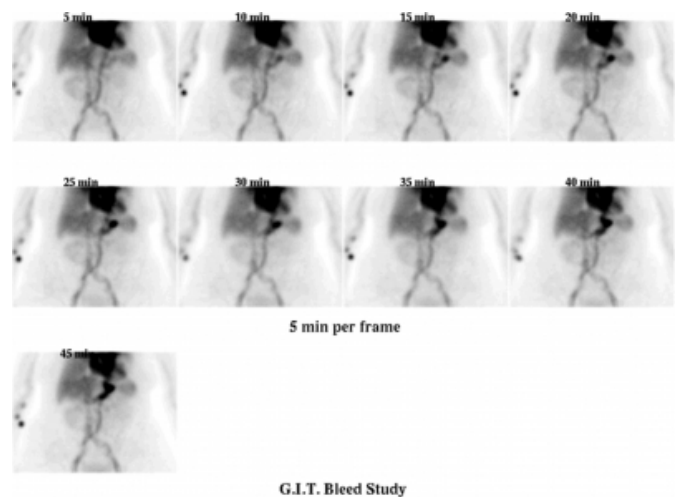
An 82 year old male and an 84 year old female independently presented for evaluation of suspected LGIH with  $^{99m}\text{Tc}$  RBC scintigraphy. Acquisition parameters included a 128x128 matrix continuous dynamic acquisition over 60 minutes at 60 seconds per frame. A rapid 3 second blood flow dynamic preceded the 60 second dynamic. The study was performed using an in vitro  $^{99m}\text{Tc}$  RBC label using a commercially available kit preparation. Blood pool data was displayed and interpreted as conventional 60 second frames and after summation to five minute frames.

## FINDINGS

The dynamic data for the 84 year old female demonstrated marked  $^{99m}\text{Tc}$  RBC accumulation in the region of the stomach suggestive of an upper gastrointestinal haemorrhage (UGIH) (Fig. 1). Diffuse stomach activity, however, may be associated with  $^{99m}\text{Tc}$  RBC breakdown with free pertechnetate demonstrating a similar gradual accumulation over time. The overlying vascular structure limits evidence of bleed transit on conventional scintigraphy (Fig. 2). Subtraction scintigraphy was used to further evaluate the data. Using alternate sequential subtraction scintigraphy (ASSS) (1), a new data set was created by replacing each frame in the dynamic sequence (f) with the result of subtracting each previous frame (f-1) from each subsequent frame (f+1). The resulting images represent altered biodistribution in the period between the two frames. Thus, a bleed should appear as an area of increased accumulation of the radiotracer. The ASSS study (Fig. 2) provides convincing evidence of activity transit in the duodenum providing confirmation of an UGIH.

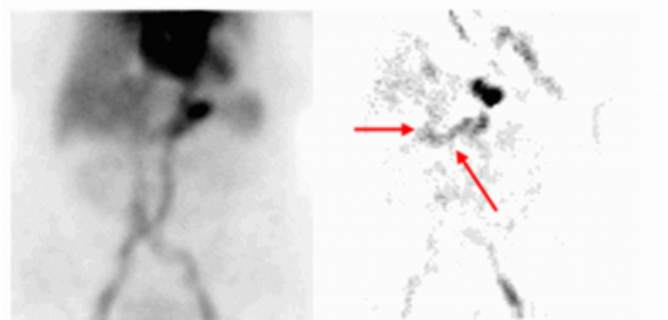
**Figure 1**

Figure 1: Five minute dynamic blood pool data.



**Figure 2**

Figure 2: Stomach activity with little convincing evidence of bleed transit on conventional scintigraphy (left). The ASSS study (right) provides convincing evidence of activity transit in the duodenum providing greater confidence in an UGIH.

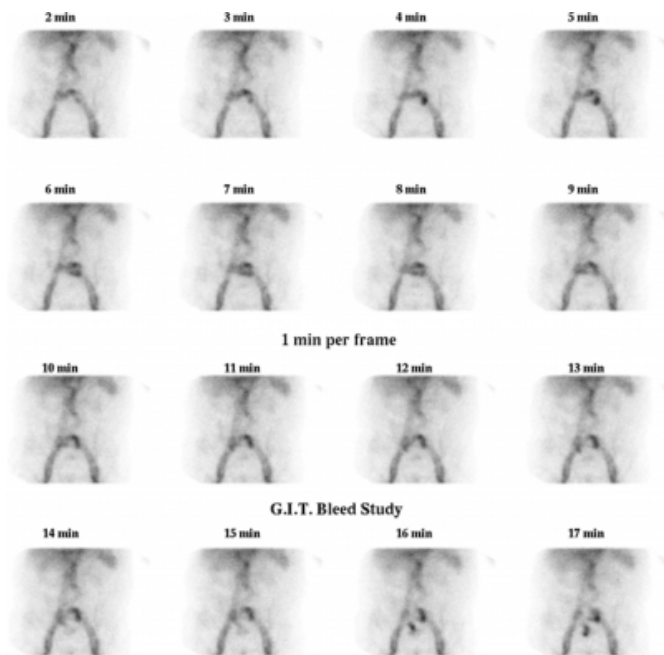


The dynamic data for the 82 year old male demonstrated

marked  $^{99m}\text{Tc}$  RBC accumulation centrally in the lower abdomen suggestive of a small bowel bleed (Fig. 3). Superimposition of the bleed on blood vessels obscures the bleed origin (Fig. 4). While not particularly problematic in this patient, an obscured bleed site may delay detection and result in less accurate localisation; hindering successful management. Subtraction scintigraphy was used to further evaluate the data. Using ASSS (Fig. 4) allowed convincing evidence of the bleed origin.

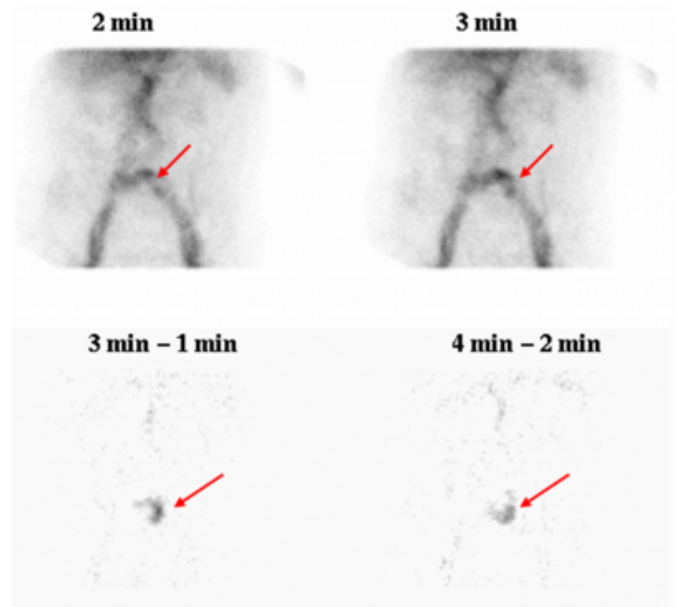
**Figure 3**

Figure 3: One minute dynamic data.



**Figure 4**

Figure 4: A small bowel bleed where the origin is superimposed on blood vessels on conventional scintigraphy (top). ASSS (bottom) allows removal of superimposed vasculature. While the bleed is readily identified after transit of blood in subsequent frames, the case highlights the potential role of ASSS in early identification and, perhaps in patients with only small or intermittent bleeding, the only chance for bleed detection.



**DISCUSSION**

These cases highlight the interpretation difficulties associated with  $^{99m}\text{Tc}$  RBC scintigraphic evaluation of LGIH. The high background activity of  $^{99m}\text{Tc}$  RBCs and the normal biodistribution in vascular structures confounds interpretation on occasion which may result in either false positive or false negative findings. Subtraction scintigraphy offers an interpretive aid that combines the high contrast of  $^{99m}\text{Tc}$  sulphur colloid imaging in LGIH with the extended time for imaging using  $^{99m}\text{Tc}$  RBCs. These cases highlight the potential role of subtraction scintigraphy in aiding conventional scintigraphy for earlier bleed detection and more accurate bleed localisation.

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**References**

1. Currie, G, Towers, P & Wheat, J 2006, Improved detection and localization of lower gastrointestinal haemorrhage using subtraction scintigraphy: phantom

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