

## DIGESTIVE HAEMORRHAGE: PLACE OF SCINTIGRAPHY COUPLED WITH TECHNICIUM 99

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### ABSTRACT

The acute gastrointestinal bleeding is associated with a high mortality risk. The cause of the bleeding is usually identified with an upper gastrointestinal endoscopy and a colonoscopy. Rarely, the etiology of hemorrhage is obscure and not found by endoscopy. The purpose of this work is to evaluate the contribution of single-photon emission computed tomography (SPECT)/CT in the diagnosis and management of obscure gastrointestinal bleeding, based on a clinical case of a 64-year-old patient, presenting with melaenas 10 days prior to her admission, requiring multiple blood transfusions. An upper gastrointestinal endoscopy, a colonoscopy, a capsule endoscopy and an abdominal angio-scan, did not find any active origin of the bleeding. The Tc<sup>99m</sup> red blood cells scintigraphy showed an active bleeding in the left hypochondrium. The SPECT/CT confirmed the diagnosis and guided the treatment by electrocoagulation. The Tc<sup>99m</sup> red blood cells scintigraphy is a useful diagnostic tool in objectifying a gastrointestinal bleeding without being able to specify its exact anatomical localization. The Hybrid SPECT/CT imaging can overcome this challenge. This diagnostic tool has taken a prominent position as it is non-invasive, easy to perform and able to detect intermittent bleeding.

**KEYWORDS:** Digestive bleeding, <sup>99m</sup>Tc-red blood cells, SPECT/CT.

### INTRODUCTION

Gastrointestinal bleeding corresponds to lesions located upstream or downstream of the Treitz angle. Occurring more frequently among the elderly, with an incidence of 20 cases per 100,000 inhabitants per year in the general population.<sup>[1]</sup> The etiologies are diverse and can be located in the upper or lower gastrointestinal tract. Inflammatory bowel disorders, benign or malignant neoplasia, various anorectal pathologies and arterio-venous malformations are responsible for much of the gastrointestinal bleeding.<sup>[2,3,4]</sup>

The acute GI tract bleeding is a common reason for emergency room visits, it is a matter of severe bleeding that may engage the patient's vital prognosis, requiring investigating beyond conventional endoscopic and radiological means if these are non-conclusive.<sup>[5]</sup>

Thus, the use of technetium scan is useful in obscure digestive bleeding, whose origin could not be determined by a complete endoscopic examination using

gastrointestinal endoscopy and colonoscopy performed under good conditions as well as CT Angiogram.<sup>[6,7,8]</sup>

We report the case of a 64-year-old patient who presents with melaenas that has been evolving for 10 days, and in which the front-line investigations did not reveal the origin of the bleeding.

### CASE REPORT

The patient is a 54-year-old woman with a medical history of diabetes treated with oral antidiabetic drugs. She was admitted for melaenas that had been evolving for 10 days. At the time of the admission, the patient was normotensive 120/60 mmHg, pulse was a regular rate of 80 beats/min, skin pallor was present, no tenderness and no abdominal mass were detected. Rectal examination showed a finger stained with melaenas.

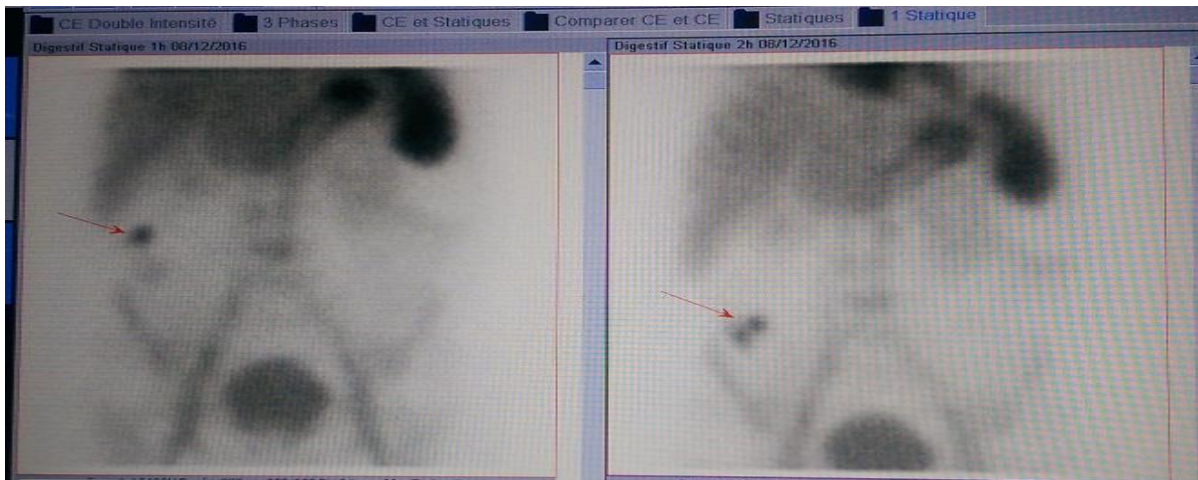
An initial paraclinical assessment was performed, including gastrointestinal endoscopy that objectified an erythematous pangastritis, with no lesions or vascular abnormalities which would explain the active

bleeding. The colonoscopy visualized a mucosal of the colon that was lined with blood all the way to the caecum, but with no indication of the origin of the bleeding. The CT angiogram showed no intestinal parietal thickening, intestinal obstructions nor digestive infiltration. A capsule endoscopy could not objectify an active origin to the bleeding.

During the hospitalization, a complete blood count showed a hemoglobin level of 6 g/dl. The patient received several blood transfusions which did not compensate for her daily losses. In view of the persistence of active bleeding, The Tc<sup>99m</sup> red blood cells scintigraphy was performed. After the incorporation of

Tc-99m into blood cells, a Single-Photon Emission Computed Tomography-Computerized Tomography (SPECT-CT) is performed with the help of a gamma Symbia true camera.

An examination in vivo technical red blood cells was performed 5 days after admission. After pretreatment of the red blood cells with a reducing agent (stannous chloride) and labelling of the red blood cells with pertechnetate, a dynamic acquisition of sequential images centered on the abdomen followed. This showed a focal point for the accumulation of marked red blood cells in the right iliac fossa (Figure 1).

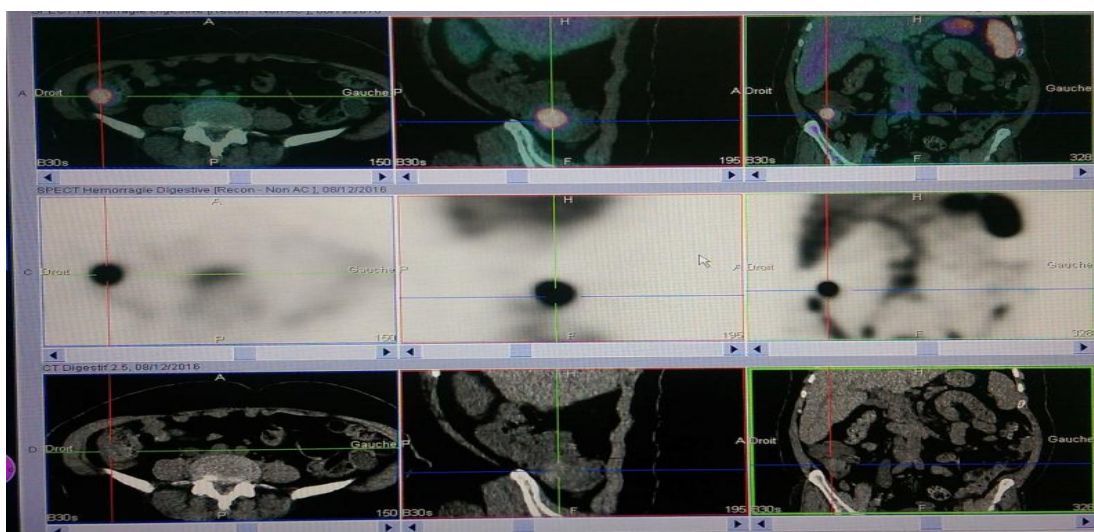


**Figure 1: Tc-99m RBC scintigraphy on anterior projection during the early phase dynamic: focal spot of abnormal accumulation of the radiotracer.**

Static images were then taken 2, 4 and 6 hours after injection, in an anterior and posterior view centered on the abdomen.

On the 3 static images taken, we noticed the persistence of the spot of abnormal accumulation of the radiotracer at the level of the right iliac fossa and the absence of any

other spot of hyperactivity. The NM exam has been completed with a CT scan coupled to the scanner (SPECT/CT) centered on the abdomen which concluded by the presence of an abnormal focal spot at the right iliac fossa spontaneously hyperdense in connection with probably caecal angiodysplasia lesion (Figure 2).



**Figure 2: SPECT (middle), CT (bottom) and SPECT/CT fusion images (top), in axial, sagittal and coronal slices, in the same area where the abnormal finding on the pertechnetate scan was found.**

The control colonoscopy highlighted lesions of caecal angiodysplasia with a stigmata recent hemorrhage. The patient was treated with argon plasma electrocoagulation (APC). The bleeding subsided and the hemoglobin levels were stable post-act.

## DISCUSSION

The gastrointestinal endoscopy is usually the first examination performed in a patient presenting with abundant hematemesis, melaenas or rectal bleeding. It is a diagnostic test and sometimes has therapeutic purposes aimed at stopping the hemorrhage or preventing its recurrence.<sup>[3,5, 9,10,11]</sup> Colonoscopy is often difficult to perform in the short term because it requires an intestinal preparation that is often impossible to perform in an emergency setting. In 80% of the cases, the etiological diagnosis of the bleeding is found.<sup>[1]</sup> In our observation, the gastrointestinal endoscopy and the colonoscopy could not identify the origin of the bleeding. The clinical presentation depends on the speed, source and volume of blood loss.<sup>[12]</sup>

The complete blood count reflects the loss of red blood cells and later shows cellular abnormalities related to martial deficiency. It will show anemia (hemoglobin levels under 13 g/dL for men and 12 g/dL for women), a decreased in the number of red blood cells (less than 4.5 million/mm<sup>3</sup>). For our patient, the CBC showed normochromic normocytic non-regenerative anemia.

Video capsule endoscopy (VCE) is indicated in 2nd intention after unrevealing standard endoscopic examinations and in the absence clinical or radiographic evidence of relevant bowel obstruction. It highlights lesions that may explain the bleeding in 55-76% of cases. Its limitations include a rapid transit through the duodenum which may result in missing small duodenal angiodysplasia lesions and an incomplete visibility of the intestinal mucosal surface due to the poor bowel preparation.<sup>[1]</sup> For our patient, the video capsule was indicated but was not performed **because the patient could not afford care.**

The angiography is indicated when the origin of the hemorrhage is suspected in the small bowel. Bleeding is characterized by spontaneous hyperdensity within the lumen of the bowel or endodigestive extravasation of iodine contrast agent, visible as soon as the bleeding flow exceeds 0,3 ml/min. The detection of the extravasation will make it possible to specify the anatomical site of the hemorrhage and guide endoscopic or surgical acts.<sup>[2,3,10]</sup> For our patient, the angiography did not demonstrate a thickening image, obstructions nor a digestive infiltration.

Scintigraphy is a diagnostic method for inactive obscure digestive hemorrhages. Its principle is based on the localization of the bleeding site through the extravasation and accumulation within the lumen of the bowel of the contrast agent which was previously injected into the

bloodstream. It can be performed by two different tracers.<sup>[1,10,17]</sup> The first is 99mTc-sulfur colloids: they are taken up by spleen, liver, and bone marrow. The sensitivity of exam is decreased, especially for an intermittent bleed due to background activity in the reticuloendothelial system and short imaging time.

The second uses 99mTc-RBCs that can either be marked in vivo, or in vitro (Ultra Tag – Covidien) which further increases the sensitivity of the NM exam. It is more superior due to long intravascular half-life, which allows longer imaging duration up to 24 hours after injection, increasing the likelihood of detection of digestive bleeding when it is intermittent.

Multiple studies have shown that, the scintigraphy has a sensitivity of 80 to 98% in detecting digestive hemorrhage with a percentage of false localizations that varies from 3 to 50% of the cases.<sup>[1,5]</sup> It can help select patients with active hemorrhage for which arteriography can be useful.

The labelling can also be done with indium which has the advantage of having a prolonged half-life of 67 hours (67 hours) than technetium, allowing bleeding to be detected several days after the start of the examination. However, it is a more expensive, more radiating and more labor-intensive technology than 99mTc labeling.

Bleeding, in its dynamic phase is manifested by an extravasation of the radiotracer from the vascular compartment and movement of radiotracer in an anterograde and/or retrograde fashion in the bowel lumen.

Extravasated blood exerts a cathartic effect stimulating Tc99m labeled RBC transit in the bowel, which can sometimes move in a retrograde fashion. Dynamic imaging minimizes timing errors encountered with static images which may show blood in the gut that has already traveled distal to the actual site of bleeding, this underlines the importance of continuous recording of images.<sup>[1,11,17]</sup> The diagnostic performance of the exam has improved significantly since the advent of hybrid SPECT/CT imaging, providing the anatomical and morphological context required for etiological orientation.

In summary, a 99mTc-RBCs scintigraphy showed in our case an active bleeding which was not demonstrated by any of the previously performed endoscopic and imaging techniques. The visualization of intense activity in the right iliac fossa contributed to the location of the bleeding in an area corresponding to the caecum. A second look colonoscopy was performed, reaching the caecum leading to the discovery of several angiodysplasia lesions that had been treated with argon plasma electrocoagulation (APC). The subsiding of the bleeding followed immediately after the act.

## CONCLUSION

The origin of gastrointestinal bleeding is sometimes difficult to diagnose, requiring invasive investigations that are often non-conclusive. The <sup>99m</sup>Tc-RBCs scintigraphy plays a complementary role in the diagnosis of gastro-intestinal bleeding after unrevealing by standard endoscopic examinations. It is a simple and sensitive examination that can confirm the diagnose of the bleeding and sometimes locate it.<sup>[19]</sup>

## Déclaration de liens d'intérêts

Authors declare that there is no conflict of interest.

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