

Gallbladder Visualization on Tc-99m-labeled Red Cell Scintigraphy: A Rare Finding with an Emphasis on Role of Single-photon Emission Computed Tomography/Computed Tomography

Abstract

Tc-99m labeled red blood cell (RBC) scintigraphy is one of the most sensitive tests to diagnose occult gastrointestinal (GI) bleed. Visualization of gallbladder is a rare finding in this study. Most of the previously reported cases with similar false-positive finding were associated chronic renal failure, anemia, and received multiple blood transfusions. Thus, while interpreting GI bleed scan, a thorough clinical history is of utmost importance to avoid any false-positive findings. Here, we report a case of gallbladder visualization in ^{99m}Tc-RBC scintigraphy confirmed by single-photon emission computed tomography/computed tomography in a patient with chronic renal failure and anemia with failed renal transplant within 3 months.

Keywords: *Chronic renal failure, gallbladder, gastrointestinal bleeding scintigraphy, single-photon emission computed tomography/computed tomography, Tc-99m red blood cell scintigraphy*

Introduction

Gastrointestinal bleeding scintigraphy (GIBS) is performed on patients with suspected gastrointestinal (GI) bleeding to determine whether the bleeding is active and to localize the bleeding site. GIBS enables continuous monitoring of the GI tract up to 24 h.^[1] The power of this study is to perform continuous imaging which increases the possibility of detection of intermittent bleeding over modalities which are limited to only a single-time point or periodic sampling.^[2-4] ^{99m}Tc-labeled red blood cell (RBC) and ^{99m}Tc sulfur colloid scans are two commonly used nuclear medicine procedures to detect active bleeding. More prolonged or delayed imaging is possible with ^{99m}Tc-labeled RBC, but a thorough knowledge of possible pitfalls is required to avoid misinterpretation of the bleeding location because of a higher likelihood of radiotracer movement through the bowel away from the bleeding site.

Case Report

A 16-year-old boy, known case of chronic glomerulonephritis underwent renal transplantation in October 2010, followed by graft failure within

3 months. The patient was kept on continuous ambulatory peritoneal dialysis and intermittent hemodialysis. Subsequently, he developed severe anemia (hemoglobin-5.0 mg/dl) and received multiple units of blood transfusion. The anemia deteriorated (hemoglobin-4.0 mg/dl) and abdominal CT angiography to locate the site of bleeding, was normal. ^{99m}Tc-labeled RBC scan was performed by modified *in vitro* method to locate the site of any occult GI bleed.

Static images at 2 h [Figure 1a] and 24 h [Figure 1b] revealed an abnormal focal tracer uptake in the right hypochondrium (blue arrow). Single-photon emission computed tomography/computed tomography (SPECT/CT) images of the abdomen [Figure 2a-f], acquired at 2 h to locate the site of tracer concentration (red arrow), revealed the tracer uptake at the gall bladder. Imaging was continued till 24 h to look for site of occult blood leak, but no further abnormal suspicious foci were found.

Discussion

Anemia is a common finding in patients with renal failure.^[5] Till now, only a few

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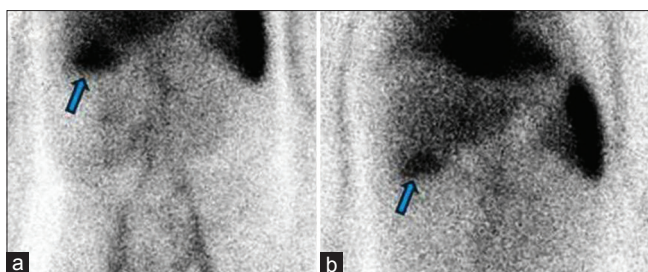


Figure 1: Static images at 2 h (a) and 24 h (b) revealed an abnormal focal tracer uptake in the right hypochondrium (blue arrow)

cases of gallbladder visualization during ^{99m}Tc -labeled RBC scintigraphy for occult GI bleed have been reported in the literature.^[6-9] The common conditions among the previously reported and current study are chronic renal disease and multiple blood transfusions to treat the severe anemia. One of the reasons for the gallbladder visualization is attributed to the bile labeling, probably due to the breakdown of hemoglobin to bilirubin. However, Dewanjee^[9] and Rehani and Sharma^[10] have demonstrated that most of the labeling of hemoglobin occurs on the Beta globin chains, the portion of the hemoglobin that does not contribute to the formation of bilirubin. However, Rehani *et al.* have reported that $75.8\% \pm 2.3\%$ of the labeling occurs on the globin chain, and $19 \pm 1.5\%$ labeling occurs on the heme part.^[10] Labeled heme part enters the biliary system as heme is the biochemical precursor of bilirubin. Another possible explanation proposed by David R Brill that prior multiple blood transfusions to treat renal failure-related anemia lead to the fragility of transfused cells, which abnormally accelerates the breakdown of these RBCs with unusual concentration of labeled bilirubin in the bile.^[3] Our patient was treated with multiple blood transfusions and erythropoietin injections, following which the final hemoglobin (8 mg/dl) was maintained.

Conclusion

SPECT/CT is a well-known modality known to provide better anatomical localization of tracer distribution. Even in our case, the confirmation of the anatomic localization was done by SPECT/CT. Hence, we recommend the use of SPECT/CT in case of abnormal tracer accumulation in the right hypochondrial region in the Tc-99m labeled RBC scintigraphy, done to avoid false-positive results as in our case. This is the first case reported from India which reveals gallbladder visualization during Tc-99m labeled RBC scintigraphy.

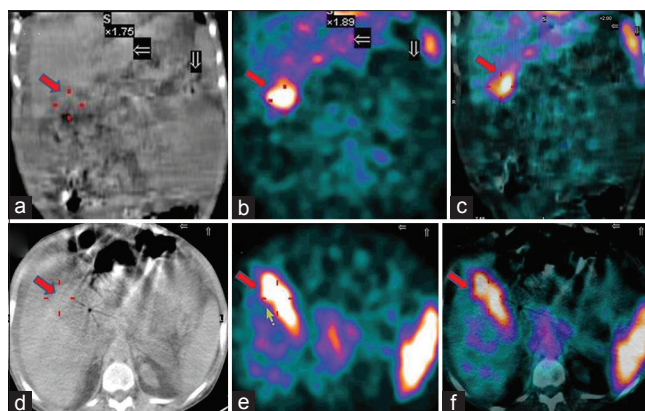


Figure 2: SPECT/CT images of the abdomen (coronal images [a: CT, b: SPECT, c: SPECT/CT fusion] and transaxial [d: CT, e: SPECT, f: SPECT/CT fusion]), acquired at 2 h to locate the site of tracer concentration (red arrow), revealed the tracer uptake at the gall bladder. SPECT/CT: Single-photon emission computed tomography/computed tomography

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Conflicts of interest

There are no conflicts of interest.

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