

Detecting aorto-ureteric fistula by ^{99m}Tc -Labeled Red Blood Cell SPECT

Hadis Mohammadzadeh Kosari¹, Alireza Masoudifard¹, Rasoul Zakavi¹,
Mohammad Asl Zare², Salman Soltani³, Alireza Akhavan Rezayat², Atena Aghaei¹

¹Nuclear Medicine Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

²Urology Department, Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, Iran

³Urology Department, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran

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ABSTRACT

A 68-year-old male, known case of abdominal aortic dissection and recent aortic stent insertion, presented with gross hematuria. The urologists suspected aorto-ureteric fistula and performed open surgery (ureterolysis). Tc-99m labeled red blood cell (^{99m}Tc -RBC) scintigraphy was ordered to confirm the diagnosis and localize the possible aorto-ureteric fistula. Considering sustained gross hematuria and ongoing anemia, and the fact that the patient had some degrees of renal insufficiency consequently not a candidate for contrast Computed Tomography (CT) angiography, a ^{99m}Tc -RBC blood pool study was requested instead. The dynamic planar images showed a zone of abnormal radiotracer accumulation in the left side of the aorta, which remained till the end of study. SPECT images revealed a left aorto-ureteric fistula approximately 8cm above the aortic bifurcation.

Key words: RBC scintigraphy; Aorto-ureteric fistula; Aortic dissection; Gross hematuria; SPECT

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Corresponding author: Dr. Atena Aghaei, Nuclear Medicine Research Center, Mashhad University of Medical Sciences, Mashhad, Iran. E-mail: aghaeeat@mums.ac.ir

INTRODUCTION

A 68-year-old man was referred to our nuclear medicine department with history of abdominal aortic dissection and endovascular stent-graft repair 5 years ago. Lab test showed increased serum creatinine level, severe anemia and hematuria. Also, fresh blood in his urine bag was evident.

Abdominal ultrasonography revealed an aneurysm in the distal portion of the abdominal aorta with

thrombotic wall and abdominal aortic stent. Therefore, CT angiography was indicated, but because the patient had high serum creatinine level, ^{99m}Tc-RBC scintigraphy was ordered instead, to confirm the diagnosis.

In vitro labeling method of preparing ^{99m}Tc-RBC was performed to have less free technetium-99m and thus increase labeling efficiency.

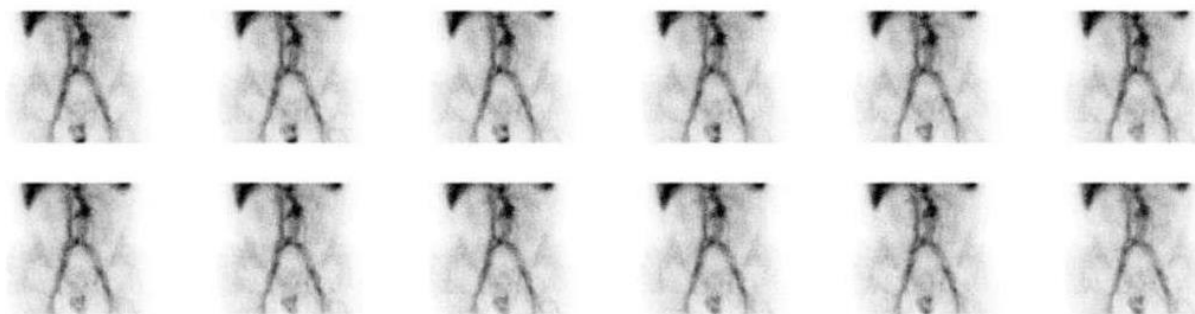


Fig 1. Dynamic imaging shows abnormal line of tracer activity in the left side of aorta

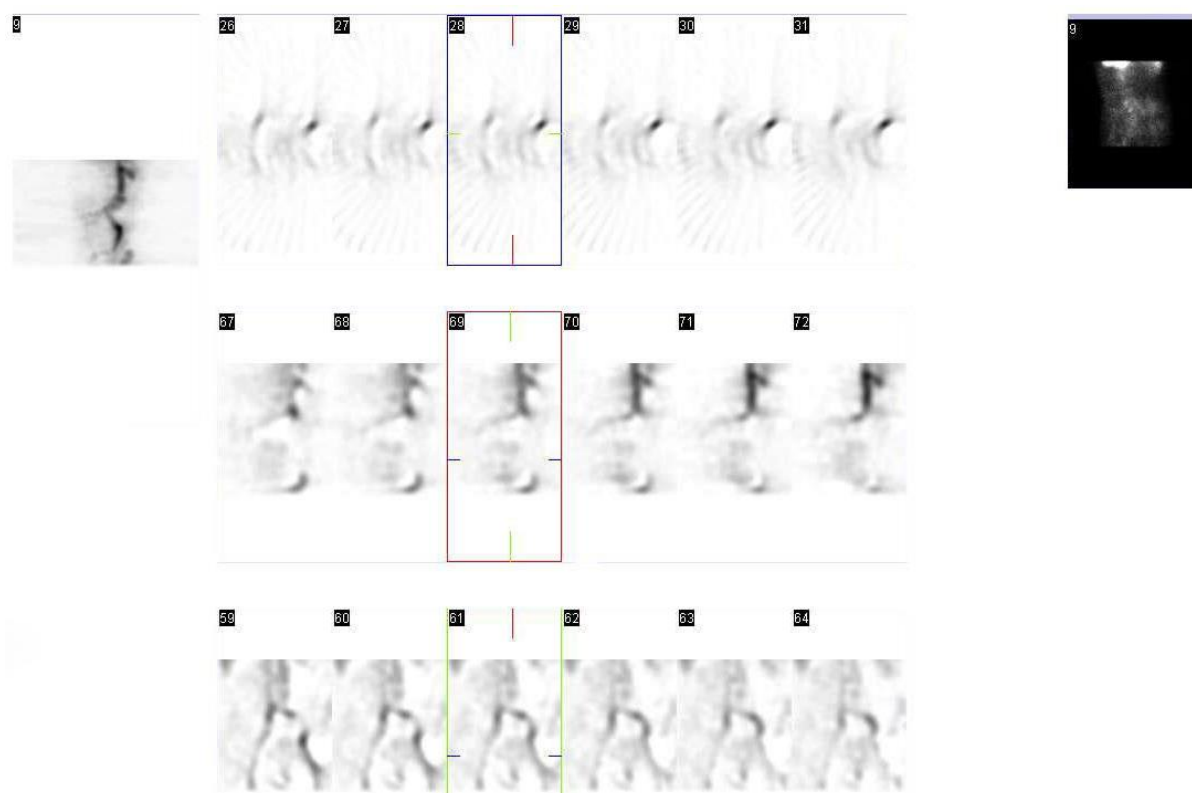


Fig 2. SPECT images shows an arc of tracer activity in the left side of aorta, indicating a fistula originating from abdominal aorta.

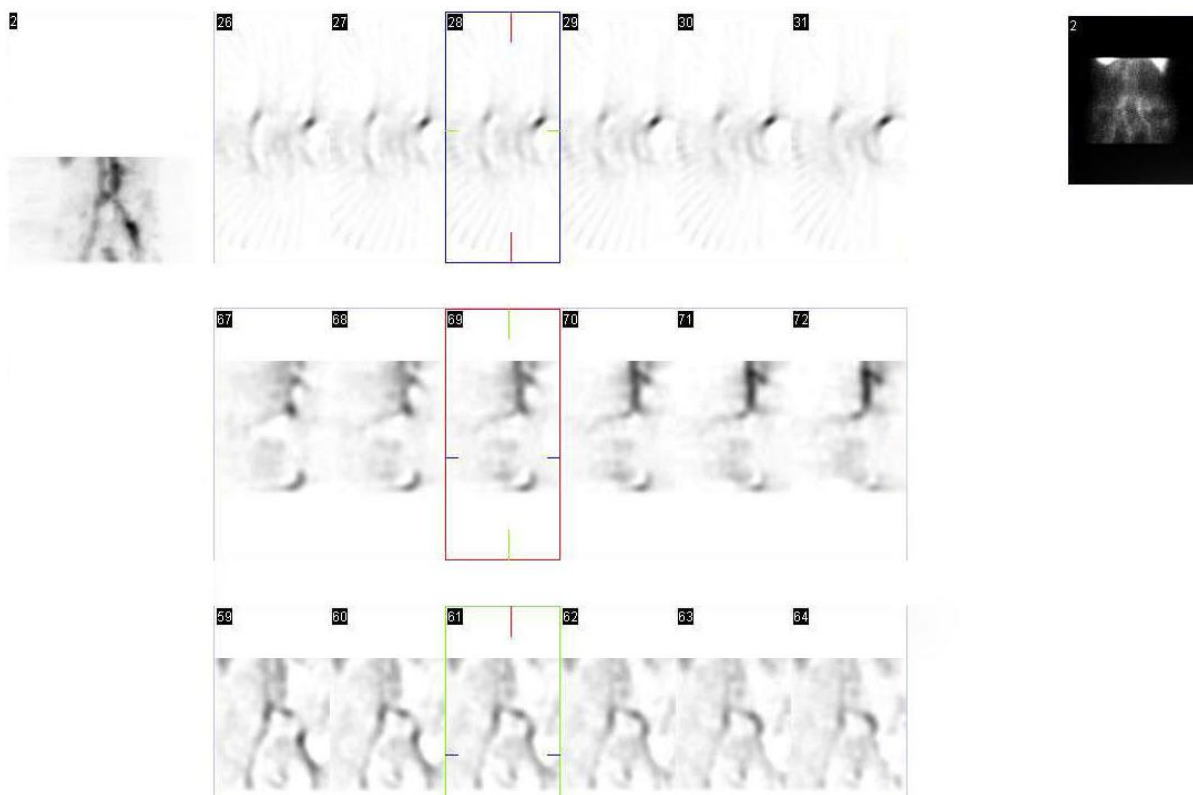


Fig 3. SPECT images showing aorto-ureteric fistula 8 cm above the aortic bifurcation.

CASE PRESENTATION

Immediately after intravenous injection of 20mCi of ^{99m}Tc-RBC, Dynamic imaging was performed from the abdominopelvic region using a dual-head variable angle gamma camera with Tc-99m photopic (30 second/frame intervals for 40 minutes).

The scan revealed normal visualization of the liver, spleen and abdominal vessels indicating good labeling efficiency. Quality control report of the prepared kit showed 96% labeling efficiency. The dynamic images showed an abnormal tracer activity in the left side of aorta (Figure 1). Therefore, Single-photon emission computed tomography (SPECT) was performed and the site was rapidly located. Unfortunately, our institution was not equipped with SPECT/CT camera at that time.

The SPECT images showed an abnormal arc of the radiotracer in the left side of the abdominal aorta (arrow), which was approximately 8cm above the aorta bifurcation (Figure 2 and 3). The scan pattern was in favor of the left aorto-ureteric fistula.

DISCUSSION

Scintigraphy with ^{99m}Tc-RBC is frequently used to locate the site of gastrointestinal bleeding and also is commonly used for evaluation of hepatic hemangioma [1] but can also be used to locate active bleeding or detect formation of a hematoma at virtually any site

(intraperitoneal, intraarticular, pericardial, vascular), especially when conventional investigations fail to identify the bleeding site [1, 2].

The most common site of abdominal vessel and organ fistula formation is between aorta and duodenum, occurring in about 80% of the reported cases [3]. The most common cause is arteriosclerosis of the aorta with aneurysm formation [4], which occurs in 1% of all patients with abdominal aortic aneurysm [4, 5]. Other causes include aortic dissection, posttraumatic aneurysm, infective aneurysm (including syphilitic, tuberculous, and mycotic), pancreatic pseudocyst, and carcinoma of the pancreas [4, 6]. The exact mechanism of fistula formation is unknown. A possible mechanism is aortic inflammatory changes producing adhesions between the duodenum and the aorta.

CONCLUSION

To our knowledge, this is the first case in which ^{99m}Tc-RBC scan was performed to localize aorto-ureteric fistula. Because this scan relies on labeling of red blood cells, we can conclude that it would be helpful for detection of any site of RBC accumulation, such as hematoma, hemangioma, vascular aneurysms, etc. our case shows the utility of this scan in detection of aorto-ureteric fistula. Incorporation of SPECT/CT images can certainly improve localization accuracy.

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