



CASE REPORT

**Incidental detection of obstructed inferior vena cava filter with [<sup>99m</sup>Tc]Tc-stannous-pyrophosphate red blood cells scintigraphy**

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ABSTRACT

[<sup>99m</sup>Tc]Tc-PYP-RBC is used for the scintigraphy of liver hemangiomas. These images show the incidental detection of portal hypertension caused by vena cava filter obstruction on scintigraphy with [<sup>99m</sup>Tc]Tc-PYP-RBC in a 31-year-old man. The patient was referred to scintigraphy because there was suspicion of liver hemangioma on ultrasound. Scintigraphy showed enlarged and tortuous abdominal veins and a high suspicion of an inferior vena cava filter obstruction was established. The patient was referred to CT where thrombosis of the inserted filter was seen, together with radiological signs of impairment in splanchnic blood flow. Scintigraphy showed signs of an inferior vena cava filter obstruction before the clinical signs were visible.

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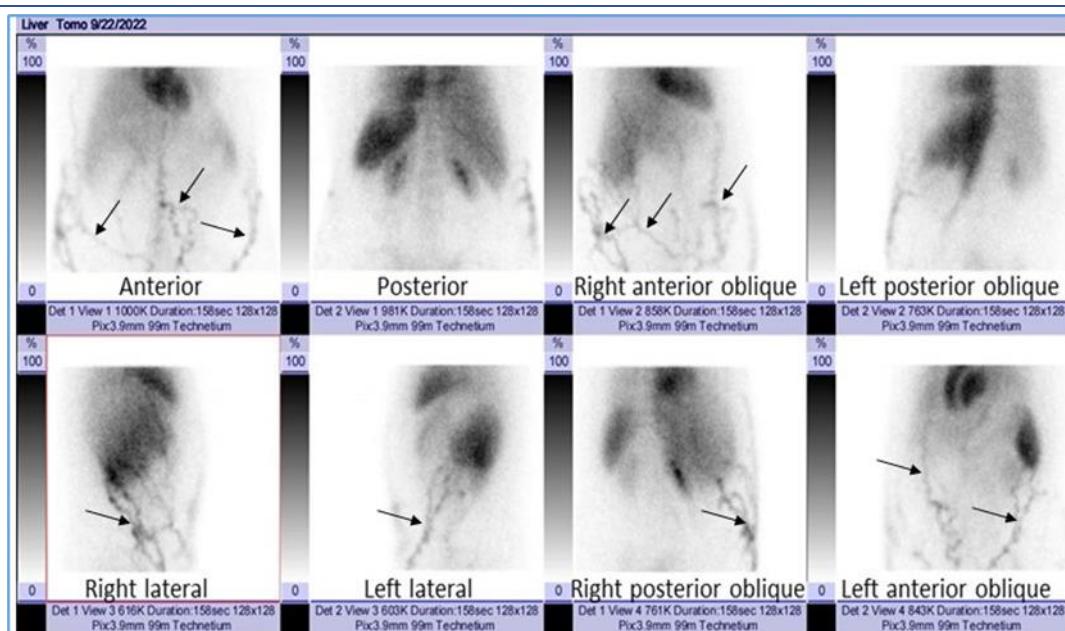
## INTRODUCTION

The inferior vena cava filter implantation is a therapeutic method used to prevent the progression and complications of venous thrombosis of the lower extremities. Obstruction of the filter of the inferior vena cava (IVCO) in the initial stages can be clinically unnoticed, and in case of suspicion of the existence of such an obstruction, it is recommended that the patient undergo medical imaging in order to determine the existence of the obstruction. A common method for detecting IVCO is MSCT. In this case report, we have shown that technetium-labeled red blood cell scintigraphy can indicate the presence of IVCO.

## CASE PRESENTATION

A 31 years old man was referred to blood pool scintigraphy of the liver with Tc-99m pyrophosphate labeled red blood cells ([<sup>99m</sup>Tc]Tc-PYP-RBC) [1] with suspicion of hemangioma in the right liver lobe made on ultrasound [2, 3]. Per anamnesis, the patient has the inferior vena cava filter that was implanted two years before the examination to prevent pulmonary thromboembolism caused by deep vein thrombosis of the legs. There were no clinical signs of inferior vena cava obstruction (IVCO) [4]. Scintigraphy was done by the standard protocol, where the labeling of red blood cells was done by the "in vivo" method according to the manufacturer's recommendation (Institute for

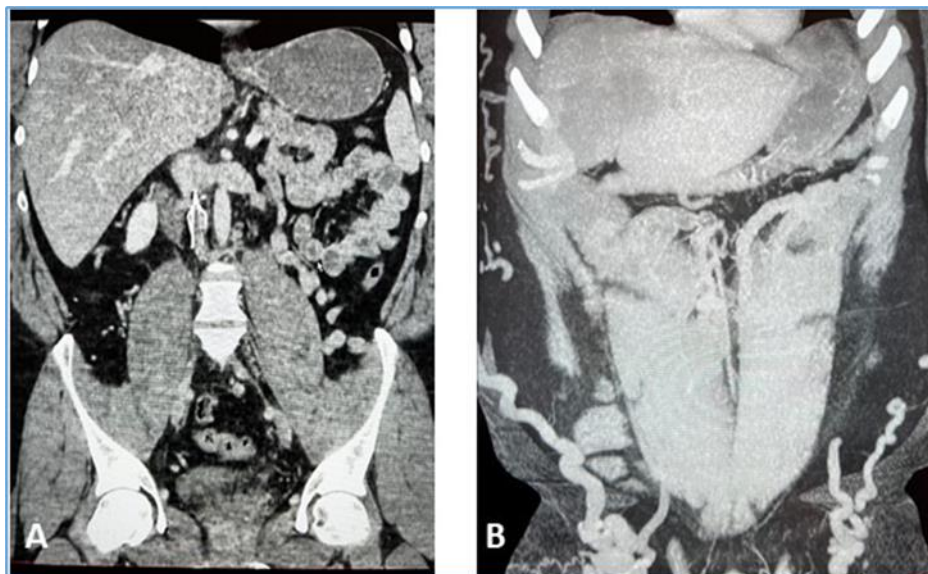
Nuclear Sciences - Vinča, Belgrade, Serbia) with the intravenous application of stannous (Sn) pyrophosphate 15 minutes before the intravenous application of 370 MBq <sup>99m</sup>Tc. Radiotracer was applied to the patient who was positioned in the supine position with gamma camera detectors (Dual-detector gamma camera E-CAM Siemens). Angioscintigrams were performed in dynamic mode with two-second frames lasting two minutes in anterior projection immediately after application of <sup>99m</sup>Tc with matrix size of 64x64 pixels. Early targeted scintigrams over the abdomen were performed immediately after angioscintigrams in anterior, posterior, left, and right anterior oblique and left and right posterior oblique projections. Late targeted scintigrams were performed 2 hours after technetium application in the same projections. Early and late targeted scintigrams were performed in matrix size of 128x128 pixels with the predefined acquisition of 10000000 counts per view. There were no signs of the existence of hemangioma in the liver [5, 6], but intensive uptake of [<sup>99m</sup>Tc]Tc-PYP-RBC was observed in the venous system of the abdomen. Static scintigrams were done in standard projections by guidelines for blood pool scintigraphy of the liver [7]. Deep veins of the abdomen on scintigrams in all projections were with enlarged diameter and tortuous (Figure 1). The scintigraphy findings raised suspicion of inferior vena cava obstruction [8].



**Figure 1.** Scintigraphy of the liver with <sup>99m</sup>Tc pyrophosphate red blood cells ([<sup>99m</sup>Tc]Tc-PYP-RBC) Intense uptake of [<sup>99m</sup>Tc]Tc-PYP-RBC was observed in the venous system of the abdomen (arrows). The veins of the abdomen on scintigrams in all done projections were enlarged in diameter and tortuous. The scintigraphy raised suspicion of an obstructed vena cava filter

Because of high suspicion of the existence of IVCO, the patient was referred to computerized

tomography where the signs of obstruction of the vena cava filter were confirmed [9] (Figure 2).



**Figure 2.** Computerized tomography with the signs of obstructed vena cava filter. A. Coronal reconstruction on CT with inferior vena cava filter on-site shows partial thrombosis of the filter. B. Coronal reconstruction with the existence of collateral abdominal veins

## DISCUSSION

Clinical signs of IVCO usually are seen after the elevation of the inferior vena cava pressure gradient above 5 mm Hg that can be caused by different reasons such as increased resistance to the passage of blood flow through the vena cava and increased splanchnic blood flow secondary to vasodilatation within the splanchnic vascular bed. In the case of this particular patient, the reason for the occurrence of hemodynamic pathological processes was the obstruction of the implanted vena cava filter [10]. The main clinical signs such as caput medusa, splenomegaly, or edema of the legs were not present at the time of the evaluation of the patient. There was only US suspicion of the existence of hemangioma of the right lobe of the liver.

Scintigraphy with  $^{99m}\text{Tc}$ -PYP-RBC revealed the existence of tortuous and dilated abdomen veins which raised the suspicion of IVCO. According to anamnestic data of implanted vena cava filter, scintigraphy findings implied obstruction of it [11]. Computerized tomography confirmed the existence of the obstruction of the implanted vena cava filter and after that, the patient was referred to a surgical procedure as the therapeutic method of choice.

## CONCLUSION

In the case of the mentioned patient, scintigraphy with labeled red blood cells accidentally showed signs of a hemodynamic disorder in the blood basin

of the inferior vena cava and thus raised the suspicion of obstruction of the implanted filter of the inferior vena cava. After this finding, the patient was sent for further examination where the suspicion of IVCO was proven, which enabled the application of the appropriate therapeutic procedure.

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