Inferior Vena Cava Filter Thrombus: a Possible Cause of an Unanticipated Finding of ^{99m}Tc -labeled Red Blood Cell Scintigraphy

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Abstract ^{99m}Tc -labeled red blood cell scintigraphy, a sensitive and specific diagnostic test, is useful for patients suspected of suffering from active gastrointestinal bleeding. This study follows a case of a patient who was suspected of gastrointestinal bleeding after an inferior vena cava filter was inserted due to a deep vein thrombosis of the femoral vein. To evaluate an exact focus of bleeding, ^{99m}Tc -labeled red blood cell scintigraphy was executed. Herein, an unanticipated finding of ^{99m}Tc -labeled red blood cell scintigraphy probably due to a thrombus on the inferior vena cava filter is reported.

Keywords Deep vein thrombosis · Red blood cells · Scintigraphy · Gastrointestinal · Bleeding

In November 2014, an inferior vena cava (IVC) filter was inserted in a 64-year-old male because of deep vein thrombosis of the right common femoral vein. He was prescribed 2 mg to 5 mg warfarin to prevent thrombosis from developing. After 2 weeks of taking warfarin, he complained of hematochezia. His hemoglobin levels were 70–90 g/l; gastrointestinal (GI) bleeding was suspected, and warfarin treatment was ceased. Computed tomography (CT) angiography, capsule endoscopy, gastroscopy and colonoscopy were performed, but the tests

showed no specific areas of active bleeding. However, they did find ulcers in the cecal area. To identify the focus of the bleeding, ^{99m}Tc -labeled red blood cell (RBC) scintigraphy was executed, and a modified in vitro method was used for RBC labeling. Focal radioactivity appeared in the mid-abdomen area on the 50-min image, remained with no interval change for 4 h, then disappeared on the 21-h image (Fig. 1a). Since this was not a typical pattern of GI bleeding (initial focal activity, increasing activity with time and focus moving in a pattern corresponding to the lumen), GI bleeding could be ruled out [1]. The CT angiography performed 3 days earlier was reviewed retrospectively. The CT angiography showed that an IVC filter existed at the same location as where focal radioactivity appeared in the ^{99m}Tc -labeled RBC scintigraphy (Fig. 1b, c; empty arrows). The authors postulated that a thrombus developed after the injection of ^{99m}Tc -labeled RBC and was caught by the IVC filter because of warfarin management, which had been withdrawn 1 week before, and RBCs were considered to be involved in venous thrombi via passive trapping [2]. It is supposed that the thrombus, located in a lower extremity, rose to the inferior vena cava area after the 40-min image. A possible cause of the disappeared radioactivity on the 21-h image is the thrombus dropping down from the IVC filter after the 4-h image [3]. Consequently, physicians could not find the focus of the bleeding and suspected ulcers of the cecal area. After conservative management, including RBC transfusion, the patient's hemoglobin levels returned to normal. ^{99m}Tc -labeled RBC scintigraphy is a very useful method for detecting active GI bleeding; previous studies have reported the sensitivity and specificity of ^{99m}Tc -labeled RBC scintigraphy as 78.6–97 % and 70.4–100 %, respectively [4, 5]. However, other studies have reported potential pitfalls, unanticipated and false-positive results, but most of them could be excluded because of untypical patterns of radioactivity [1, 4–8]. The present study could also rule out the possibility of GI bleeding. To the best of

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Fig. 1 ^{99m}Tc -labeled red blood cell scintigraphy shows that focal radioactivity appeared in the mid abdomen area on the 50-minute image, remained with no interval change for 4 hours, then disappeared on the 21-hour image (**a**). Coronal and transaxial images of computed

tomography angiography demonstrate that an IVC filter existed at the same location where focal radioactivity appeared in the ^{99m}Tc -labeled RBC scintigraphy (**b, c**; empty arrows)

our knowledge, this image is the first report of an unanticipated finding on ^{99m}Tc -labeled RBC scintigraphy probably due to a thrombus of the IVC filter.

Conflict of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical Statement The study was approved by an institutional review board or equivalent and has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All subjects in the study gave written informed consent or the institutional review board waived the need to obtain informed consent.

References

1. Ziessman HA, O'Malley JP, Thrall JH, Fahey FH. Gastrointestinal system. In: Nuclear Medicine: The Requisites. Elsevier Saunders; 2013. pp. 288–321.
2. Aleman MM, Walton BL, Byrnes JR, Wolberg AS. Fibrinogen and red blood cells in venous thrombosis. *Thromb Res*. 2014;133:S38–40.
3. Ahmad I, Yeddula K, Wicky S, Kalva SP. Clinical sequelae of thrombus in an inferior vena cava filter. *Cardiovasc Intervent Radiol*. 2010;33:285–9.
4. Currie GM, Kiat H, Wheat JM. Scintigraphic evaluation of acute lower gastrointestinal hemorrhage: current status and future directions. *J Clin Gastroenterol*. 2011;45:92–9.
5. Chen PN, Brown RK. False positive GI bleed on Tc-99m RBC scintigraphy due to ileal varices. *J Radiol Case Rep*. 2012;6:23–8.
6. Hoseinzadeh S, Shafiei B, Salehian M, Neshandar Asli I, Ghodoosi I. Huge varicose inferior mesenteric vein: an unanticipated (^{99m}Tc -labeled red blood cell scintigraphy finding. *Nucl Med Mol Imaging*. 2010;44:217–22.
7. Karacalioglu O, Ilgan S, Arslan N, Ozguven M. Uterine doughnut in early proliferating phase: potential pitfall in gastrointestinal bleeding studies. *Ann Nucl Med*. 2003;17:685–7.
8. Cortes J, Alonso JJ, Ruiz-Oliva F, Alvarez S, Ormijana JS, Caton B, et al. Renal cell carcinoma detected on Tc-99m-labeled red blood cell imaging. *Clin Nucl Med*. 2003;28:920–2.