

## Interesting Cases

# Somatostatin-receptor avidity of pancreatic neuroendocrine tumor thrombus in porto-caval venous systems on $^{99m}\text{Tc}$ -Octreotide and posttherapeutic $^{177}\text{Lu}$ -DOTA-TATE scans

### ABSTRACT

A 62-year-old woman with a history of abdominal pain presented with multiple hepatic lesions and dilatation of portal, splenic and superior mesenteric veins on the magnetic resonance imaging referred for a  $^{99m}\text{Tc}$ -octreotide scan. Accordingly, similar octreotide-avid lesions were found as well as an uptake in the epigastric region conforming to the anatomy of the portocaval venous system, compatible with a tumor thrombosis. Then, the patient underwent two cycles of therapy with  $^{177}\text{Lu}$ -DOTA-TATE, on that the same appearance was observed. The uptake in the tumor thrombus remained somewhat unchanged, but clinically, a significant improvement of the intractable ascites was achieved.

**Keyword:**  $^{177}\text{Lu}$ -DOTA-TATE,  $^{99m}\text{Tc}$ -Octreotide, pancreatic neuroendocrine tumor, somatostatin-receptor, tumor thrombosis

A 62-year-old woman with a history of abdominal pain, episodes of hypotension, and syncope presented for a  $^{99m}\text{Tc}$ -octreotide scan. On the ultrasonography (USG) performed before, there were multiple heterogeneous and hypoechoic masses in hepatic parenchyma and significant dilatation and intraluminal thrombosis of the portal and splenic veins. Doppler USG also showed intrathrombotic vascular components suggestive of tumor thrombosis. The patient then underwent a gadolinium-enhanced magnetic resonance imaging (MRI) of the abdomen which confirmed multiple hypointense lesions in the liver and portal, splenic and superior mesenteric venous dilatation with heterogenous enhancement [Figure 1]. After receiving an informed consent, whole-body  $^{99m}\text{Tc}$ -octreotide scan [Figure 2] was performed that demonstrated multiple octreotide-avid lesions in the liver as well as a less intense uptake in the epigastric region conforming to the anatomy of the portal and the splenic venous system as those found on the MRI. Afterward, the patient underwent a liver biopsy. Poorly differentiated neuroendocrine carcinoma of pancreatic origin was confirmed on histopathologic examination. The patient was on

Sandostatin LAR treatment for several months before being referred for a radiopeptide therapy with  $^{177}\text{Lu}$ -DOTA-TATE as a result of exacerbation of the symptoms and developing intractable ascites. On post-therapeutic whole-body scan one day following intravenous administration of 5550 MBq [150 mCi] of  $^{177}\text{Lu}$ -DOTA-TATE [Figure 3a], the same findings were

### MAHASTI AMOUI, REYHANE AHMADI<sup>1</sup>, MOHSEN QUTBI, ISA NESHANDAR ASLI

Department of Nuclear Medicine, School of Medicine, Shahid Beheshti University of Medical sciences, Tehran, <sup>1</sup>Department of Nuclear Medicine and Molecular Imaging, Farshchian Heart Center, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

**Address for correspondence:** Dr. Mohsen Qutbi, Department of Nuclear Medicine, Taleghani Hospital, Yaman Street, Velenjak, Tehran 1985711151, Iran.  
E-mail: mohsen.qutbi@gmail.com

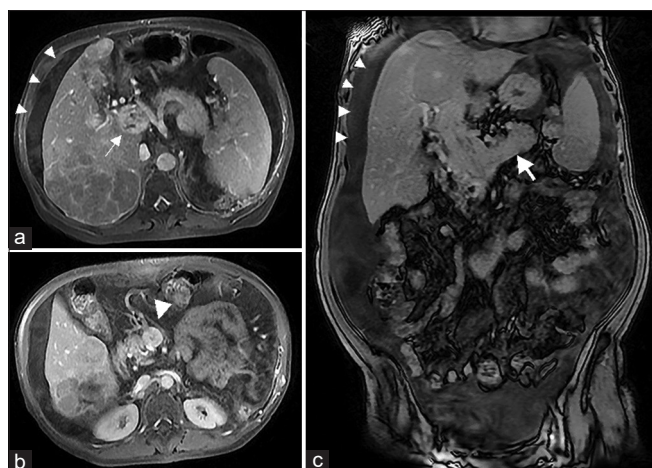
**Submitted:** 16-Mar-2021, **Revised:** 07-May-2021,  
**Accepted:** 24-May-2021, **Published:** 20-Aug-2021

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

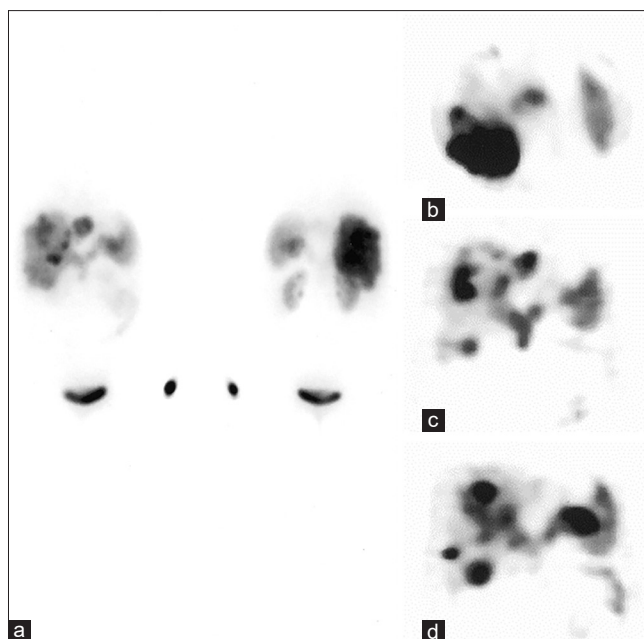
**How to cite this article:** Amoui M, Ahmadi R, Qutbi M, Asli IN. Somatostatin-receptor avidity of pancreatic neuroendocrine tumor thrombus in porto-caval venous systems on  $^{99m}\text{Tc}$ -Octreotide and posttherapeutic  $^{177}\text{Lu}$ -DOTA-TATE scans. *World J Nucl Med* 2021;20:324-6.

Access this article online	
<b>Website:</b> www.wjnm.org	<b>Quick Response Code</b> 
<b>DOI:</b> 10.4103/wjnm.wjnm_35_21	



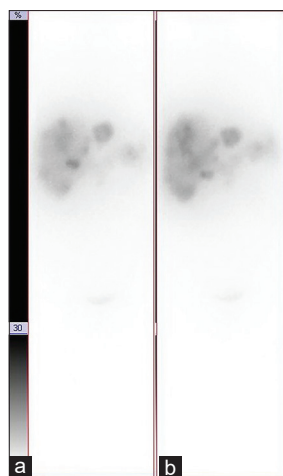
**Figure 1:** Transverse (a and b) and coronal (c) slices of a gadolinium-enhanced magnetic resonance image show hepatic lesions, ascites (small arrowheads) and dilatation of the portal (small arrow), superior mesenteric (large arrowhead) and splenic (large arrow) veins as well as intraluminal tumor thrombosis

observed as those on the  $^{99m}\text{Tc}$ -octreotide scan. The patient received another dose of  $^{177}\text{Lu}$ -DOTA-TATE therapy 6 months later [Figure 3b]. The ascites improved remarkably by clinical assessment thereafter, but other lesions remained unchanged. Neuroendocrine tumors of pancreatic origin are among the tumors with a predilection for involvement of the portal and caval venous systems through the direct intraluminal extension of malignant tumoral cells. This mechanism is other than the predisposition toward the hypercoagulable state, i.e. venous thrombosis, induced by cancer. The former seems to be prognostically less favorable, because of predictably less response to anticoagulation therapy.<sup>[1-3]</sup> Unfortunately, since the uptake can be attributed to radiotracer accumulation either in the activated leukocytes trapped in the clot or



**Figure 2:** Whole-body (a), tomographic slices (b-d) of the  $^{99m}\text{Tc}$ -octreotide scan demonstrate multiple octreotide-avid lesion in the liver as well as uptake matching the anatomy of portal and splenic venous system

malignant tumoral cells, octreotide-based scans seem not to be able to reliably differentiate the two conditions, but CT and MRI are more useful by demonstrating different enhancing patterns.<sup>[4,5]</sup> The octreotide avidity of tumor thrombus has been shown in previous reports on  $^{68}\text{Ga}$ -DOTA-TATE/NOC positron emission tomography scans,<sup>[6-9]</sup> but the response to  $^{177}\text{Lu}$ -DOTA-TATE therapy is yet to be investigated. Currently, the effective therapeutic method is surgical resection of the thrombus to alleviate the unpleasant symptoms.<sup>[10]</sup> In our case, because of the patient's refusal, surgical thrombectomy



**Figure 3:** Posttherapeutic  $^{177}\text{Lu}$ -DOTA-TATE scans of first (a) and second (b) cycles of therapy shows similar finding as those observed on  $^{99\text{mTc}}$ -octreotide scan

was not performed, but despite octreotide avidity of the thrombus, two cycles of  $^{177}\text{Lu}$ -DOTA-TATE therapy were not remarkably effective. However, a considerable clinical improvement in ascites has been observed, and therefore, this achievement, i.e. symptom alleviation, can be of notable importance. Taken together, further investigations are required to assess the effectiveness of radiopeptide therapy in resolving tumor thrombus from neuroendocrine tumors.

#### Financial support and sponsorship

Nil.

#### Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Kawakami H, Kuwatani M, Hirano S, Kondo S, Nakanishi Y, Itoh T, *et al.* Pancreatic endocrine tumors with intraductal growth into the main pancreatic duct and tumor thrombus within the portal vein: A case report and review of the literature. *Intern Med* 2007;46:273-7.
2. De Robertis R, Paiella S, Cardobi N, Landoni L, Tinazzi Martini P, Ortolani S, *et al.* Tumor thrombosis: A peculiar finding associated with pancreatic neuroendocrine neoplasms. A pictorial essay. *Abdom Radiol (NY)* 2018;43:613-9.
3. Rodriguez RA, Overton H, Morris KT. Pancreatic neuroendocrine tumor with splenic vein tumor thrombus: A case report. *Int J Surg Case Rep* 2014;5:1271-4.
4. Cuevas C, Raske M, Bush WH, Takayama T, Maki JH, Kolokythas O, *et al.* Imaging primary and secondary tumor thrombus of the inferior vena cava: Multi-detector computed tomography and magnetic resonance imaging. *Curr Probl Diagn Radiol* 2006;35:90-101.
5. Didier D, Racle A, Etievent JP, Weill F. Tumor thrombus of the inferior vena cava secondary to malignant abdominal neoplasms: US and CT evaluation. *Radiology* 1987;162:83-9.
6. Sainz-Esteban A, Prasad V, Baum RP. Interesting image. Pancreatic neuroendocrine tumor with involvement of the inferior mesenteric vein diagnosed by Ga-68 DOTA-TATE PET/CT. *Clin Nucl Med* 2010;35:40-1.
7. Naswa N, Kumar R, Bal C, Malhotra A. Vascular thrombosis as a cause of abdominal pain in a patient with neuroendocrine carcinoma of pancreas: Findings on (68) Ga-DOTANOC PET/CT. *Indian J Nucl Med* 2012;27:35-7.
8. Nguyen BD. Pancreatic neuroendocrine tumor with portal vein tumor thrombus: PET demonstration. *Clin Nucl Med* 2005;30:628-9.
9. Lim TC, Tan EH, Zaheer S. Use of Ga-68 DOTATATE PET/CT to confirm portal vein tumor thrombosis in a patient with pancreatic neuroendocrine tumor. *Clin Nucl Med* 2011;36:498-9.
10. Prakash L, Lee JE, Yao J, Bhosale P, Balachandran A, Wang H, *et al.* Role and operative technique of portal venous tumor thrombectomy in patients with pancreatic neuroendocrine tumors. *J Gastrointest Surg* 2015;19:2011-8.