

Bone metastasis from a neuroendocrine tumor detected by 99m-technetium-hydrazinonicotinyl-Tyr3-octreotide single-photon emission computed tomography/computed tomography

Sir,

Neuroendocrine tumors (NETs) are neoplasms originating from the neural crest and consequently can be localized in different organs. According to Rufini *et al.*,^[1] the presence of neuroamine uptake mechanisms and/or peptide receptors on the cell membrane of these tumors is the basis of the clinical use of specific radiolabeled ligands, both for imaging and therapy. Technetium-99m (Tc-99m)-ethylenediamine-N, N'-diacetic acid (EDDA)-hydrazinonicotinyl-Tyr3-octreotide (HYNIC-TOC) is a radiopharmaceutical indicated for the diagnosis of tumors overexpressing somatostatin receptors^[2] (sstr2) (especially subtype 2, sstr2), which can be imaged with this radiolabeled ligand.^[2] HYNIC-TOC single-photon emission computed tomography/computed tomography (SPECT/CT) improve interpretation and allow precise localization of lesions.^[3] We report a case of HYNIC-TOC SPECT/CT useful in detecting bone metastasis near urinary bladder activity.

A 58-year-old male with biopsy proven hepatic metastases from NET was sent for localizing primary lesion and any other sites of metastasis. Whole body planar scintigraphy was performed after intravenous injection of 20 mCi (740 Mbq) of Tc-99m-HYNIC-TOC showed photopenic area in the necrotic liver metastasis and also there were two focal uptakes noted in the upper part of right thigh and other below the bladder [Figure 1]. SPECT/CT of the upper thigh including pelvis was performed, which showed a sclerotic lesion in the neck of right femur and additional lesion noted just below the bladder was localized to sclerotic lesion in left pubis [Figures 2 and 3].

Sstr2 scintigraphy with In-111-octreotide has been one of the standard procedures for imaging NETs.^[4] The limitations of this technique are due to the use of In-111 as the radiolabeler with its limited availability, high cost, medium gamma energy leading to suboptimal image resolution and relatively high radiation burden to the patient.^[5] 111In-diethylene triamine pentaacetic acid (DTPA)-octreotide SPECT/CT demonstrates that image fusion is clearly superior to SPECT alone, allowing precise localization of lesions and reducing false-positive results.^[6] Guggenberg *et al.*,^[7] proved that the high specific tumor uptake, rapid blood clearance and predominantly renal excretion as well as improved

image quality, lower radiation dose for the patient and daily availability, make Tc-99m-EDDA-HYNIC-TOC a promising candidate for an alternative to 111In-DTPA-octreotide for NET imaging. Although planar and SPECT/CT scans in NETs are reported, increased resolution of SPECT and addition of CT is confirmatory for bone metastasis.

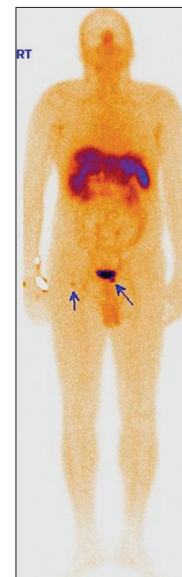


Figure 1: Whole body technetium-99m-hydrazinonicotinyl-Tyr3-octreotide images showing two focal uptakes, one in the right thigh and other just below bladder (arrows). Furthermore photopenic area noted in the liver lesion suggestive of necrosis

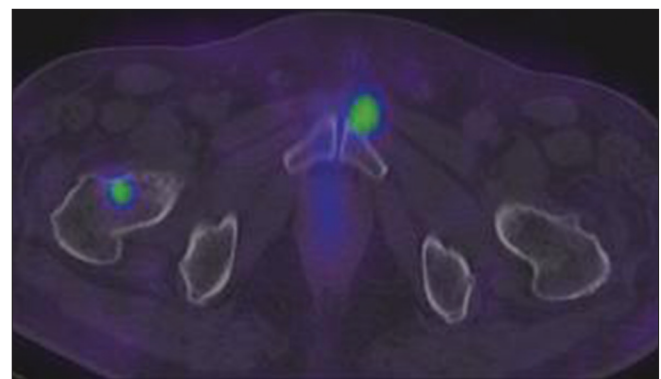


Figure 2: Axial fused single-photon emission computed tomography/computed tomography showing uptake in the neck of right femur and left pubis

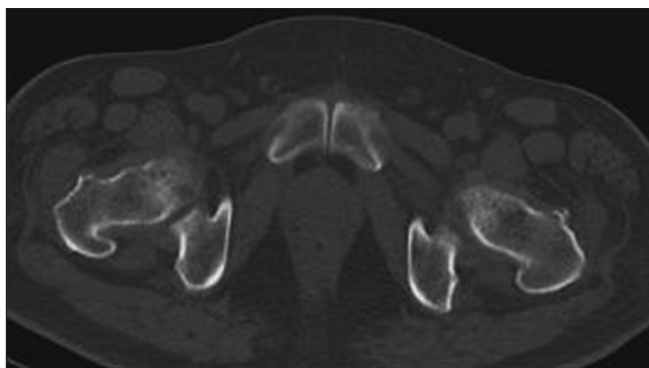


Figure 3: Axial computed tomography showing minimal sclerosis in the right femur and left pubis

**Koramadai Karuppusamy Kamaleshwaran,
Paul Vannan Subramanian¹,
Sudhakar Natarajan¹,
Vyshak Mohanan, Ajit Sugunan Shinto**

Departments of Nuclear Medicine and PET/CT and
¹Oncology, Comprehensive Cancer Care Centre,
Kovai Medical Centre and Hospital Limited,
Coimbatore, Tamil Nadu, India

Address for correspondence:

Dr. Koramadai Karuppusamy Kamaleshwaran,
Department of Nuclear Medicine,
PET/CT and Radionuclide Therapy,
Comprehensive Cancer Care Centre,
Kovai Medical Centre and Hospital Limited,
Coimbatore - 641 014, Tamil Nadu, India.
E-mail: dr.kamaleshwar@gmail.com

REFERENCES

1. Rufini V, Calcagni ML, Baum RP. Imaging of neuroendocrine tumors. *Semin Nucl Med* 2006;36:228-47.
2. Decristoforo C, Mather SJ, Cholewinski W, Donnemiller E, Riccabona G, Moncayo R. ^{99m}Tc-EDDA/HYNIC-TOC: A new ^{99m}Tc-labelled radiopharmaceutical for imaging somatostatin receptor-positive tumours; first clinical results and intra-patient comparison with ¹¹¹In-labelled octreotide derivatives. *Eur J Nucl Med* 2000;27:1318-25.
3. Gabriel M, Hausler F, Bale R, Moncayo R, Decristoforo C, Kovacs P, *et al.* Image fusion analysis of (^{99m}Tc-HYNIC-Tyr (3)-octreotide SPECT and diagnostic CT using an immobilisation device with external markers in patients with endocrine tumours. *Eur J Nucl Med Mol Imaging* 2005;32:1440-51.
4. Krenning EP, Kwekkeboom DJ, Bakker WH, Breeman WA, Kooij PP, Oei HY, *et al.* Somatostatin receptor scintigraphy with [¹¹¹In-DTPA-D-Phe1]- and [¹²³I-Tyr3]-octreotide: The Rotterdam experience with more than 1000 patients. *Eur J Nucl Med* 1993;20:716-31.
5. Decristoforo C, Melendez-Alafort L, Sosabowski JK, Mather SJ. ^{99m}Tc-HYNIC-[Tyr3]-octreotide for imaging somatostatin-receptor-positive tumors: Preclinical evaluation and comparison with ¹¹¹In-octreotide. *J Nucl Med* 2000;41:1114-9.
6. Castaldi P, Rufini V, Treglia G, Bruno I, Perotti G, Stifano G, *et al.* Impact of ¹¹¹In-DTPA-octreotide SPECT/CT fusion images in the management of neuroendocrine tumours. *Radiol Med* 2008;113:1056-67.
7. Guggenberg EV, Mikolajczak R, Janota B, Riccabona G, Decristoforo C. Radiopharmaceutical development of a freeze-dried kit formulation for the preparation of [^{99m}Tc-EDDA-HYNIC-D-Phe1, Tyr3]-octreotide, a somatostatin analog for tumor diagnosis. *J Pharm Sci* 2004;93:2497-506.

Access this article online

Quick Response Code:



Website:
www.ijnm.in

DOI:
10.4103/0972-3919.119520