

Pheochromocytoma: Positive on ¹³¹I-MIBG Single-Photon Emission Computed Tomography-Computed Tomography and Negative on ⁶⁸Ga DOTANOC Positron Emission Tomography-Computed Tomography

Abstract

Pheochromocytomas are tumors arising from sympathetic lineage-derived cells in adrenal medulla, and ⁶⁸Ga DOTANOC positron emission tomography-computed tomography (PET-CT) has been found to be superior than ¹³¹I MIBG single-photon emission computed tomography-computed tomography (SPECT-CT) for initial localization/diagnosis of the adrenal lesion. We discuss the ⁶⁸Ga DOTANOC PET-CT and ¹³¹I MIBG SPECT-CT findings of a 24-year-old male who presented with clinical and biochemical findings suspicious of pheochromocytoma.

Keywords: DOTANOC, MIBG, pheochromocytoma, positron emission tomography, single-photon emission computed tomography

A 24-year-old male presented with chief complaints of headache and palpitations for the past 4 months. On clinical suspicion of pheochromocytoma, he was advised ⁶⁸Ga DOTANOC positron emission tomography-computed tomography (PET-CT) which revealed a 1.5 cm × 1.5 cm nodule in the body of right adrenal gland on CT images [Figure 1b solid white arrow] showing no somatostatin receptor expression on PET [Figure 1a and d]. However, his biochemical parameters such as urinary metanephrines, normetanephrines, plasma adrenaline, noradrenaline were 73 µg/24 h, 397.5 µg/24 h, 49.3 pg/ml, and 246 pg/ml, respectively, which prompted the endocrinologist for further evaluation. Subsequently, a ¹³¹I MIBG single-photon emission computed tomography-computed tomography (SPECT-CT) was done which showed intense MIBG concentration in the same lesion in the body of right adrenal on SPECT-CT images [Figure 1f solid red arrow] but not on planar images [Figure 1c and e]. The patient underwent right adrenalectomy, and the histopathology was diagnostic of pheochromocytoma. As pheochromocytoma and paragangliomas express high somatostatin expression ⁶⁸Ga DOTA conjugated peptides that target somatostatin

receptors are currently the first-line modality of choice for initial diagnosis of pheochromocytomas and paragangliomas owing to its superior lesion detection rate over other functional imaging modalities.^[1-5] Other functional imaging tools that are used for detection of pheochromocytomas include ^{123/131}I-MIBG scintigraphy, ¹⁸F-Fluorodopa, and ¹⁸F-FDG PET-CT. As per the meta-analysis by Han *et al.*, the pooled detection rate of ⁶⁸Ga-DOTA-conjugated peptides PET was significantly higher than that of ¹⁸F-FDOPA PET (80% [95% confidence interval (CI) 69%–88%], *P* = 0.0003), ¹⁸F-FDG PET (74% [95% CI 46%–91%], *P* < 0.0001), or ^{123/131}I-MIBG scintigraphy (38% [95% CI 20%–59%], *P* < 0.0001).^[6] The peculiarity of our case lies in the fact that despite superior lesion detection rate of DOTA conjugated peptides PET, ⁶⁸Ga DOTANOC PET-CT does not show any tracer accumulation in the right adrenal body lesion that is visualized on CT but shows MIBG concentration despite it being a comparatively inferior functional modality. As no such case in the literature regarding such behavior of any adrenal lesion suspicious of pheochromocytoma has been reported, the authors advocate the diligent use of ^{123/131}I-MIBG scintigraphy with SPECT CT in the work-up of cases of

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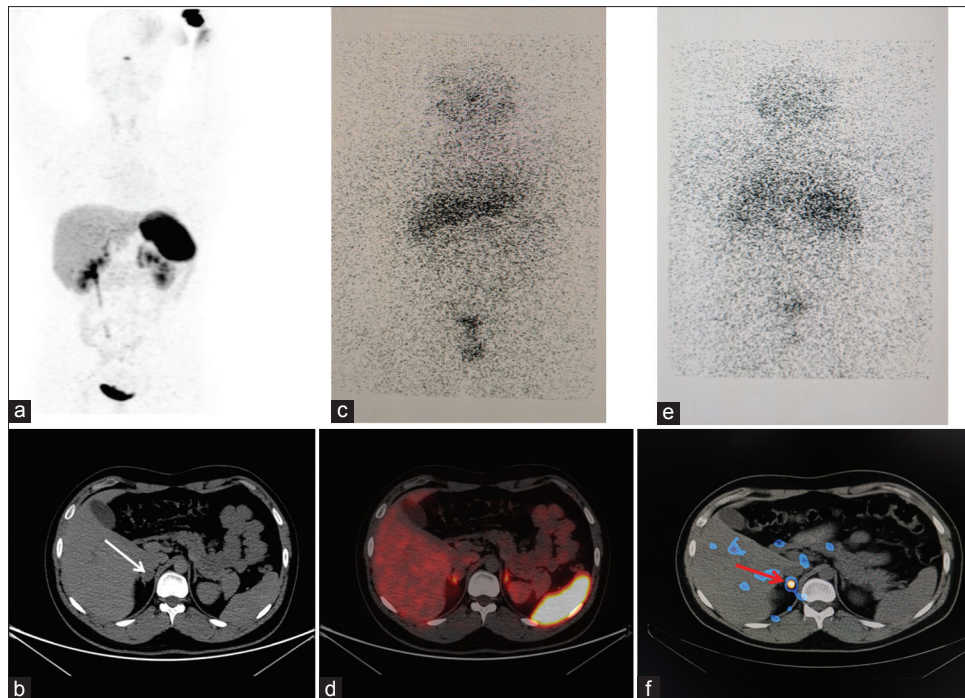


Figure 1: (a) Maximum intensity projection images of ⁶⁸Ga DOTANOC positron emission tomography-computed tomography showing no abnormality. (b) Transaxial computed tomography scan showing nodule in the body of right adrenal (solid white arrow). (c) Planar image of the ¹³¹I-MIBG (anterior view) showing no pathological foci of radiotracer uptake. (d) Fused transaxial ⁶⁸Ga DOTANOC positron emission tomography-computed tomography image showing no somatostatin receptor expression in the right adrenal body nodule. (e) Normal planar image of the ¹³¹I-MIBG (posterior view). (f) Fused transaxial ¹³¹I-MIBG single photon emission computed tomography-computed tomography image showing MIBG accumulation in the right adrenal body nodule

pheochromocytoma with strong clinical suspicion even if ⁶⁸Ga-DOTANOC PET-CT results are negative.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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