IMAGING CORNER

Diachronous primary Neuroendocrine tumour of the mediastinum: Dual FDG and DOTA avidity on PET/CT

Nadia Nazir[1], Ayesha Zubair[2], Aamna Hassan[3], Kashif Saddique[4]
[1,4]Department of Radiology, [2,3]Department of Nuclear Medicine; Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan..
Correspondence: Aamna Hassan. e-mail: aamnah@skm.org.pk
ORCID ID. 0000-0003-0026-0729

Abstract
Primary neuroendocrine tumours (NETs) of the mediastinum are exceedingly rare, accounting for a small fraction of thoracic neoplasms. Their biological behaviour is heterogeneous, ranging from indolent to highly aggressive depending upon their histological grading. Dual-tracer PET/CT imaging with fluorodeoxyglucose (FDG) and gallium-68 DOTA-conjugated peptides provides complementary information, reflecting heterogeneity of tumour including both metabolic activity and somatostatin receptor expression.

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Discussion
A 51-year female known hypertensive with complaints of chest pain underwent CT which revealed anterior mediastinal mass, encasing the vessels. Biopsy confirmed Grade 1 neuroendocrine tumour (NET). On staging DOTA PET-CT (Figure 1 A, B, C, D) only a small part of the tumour was avid (Blue arrow). FDG PET-CT was performed to assess tumour heterogeneity, which showed uptake in a major component of the lesion which was non avid on DOTA PET-CT (Figure 1 E, F, G, H). Dysnchronous FDG and DOTA avidity suggest tumour heterogeneity, highlighting diachronous nature of the lesion and can change the treatment strategy.

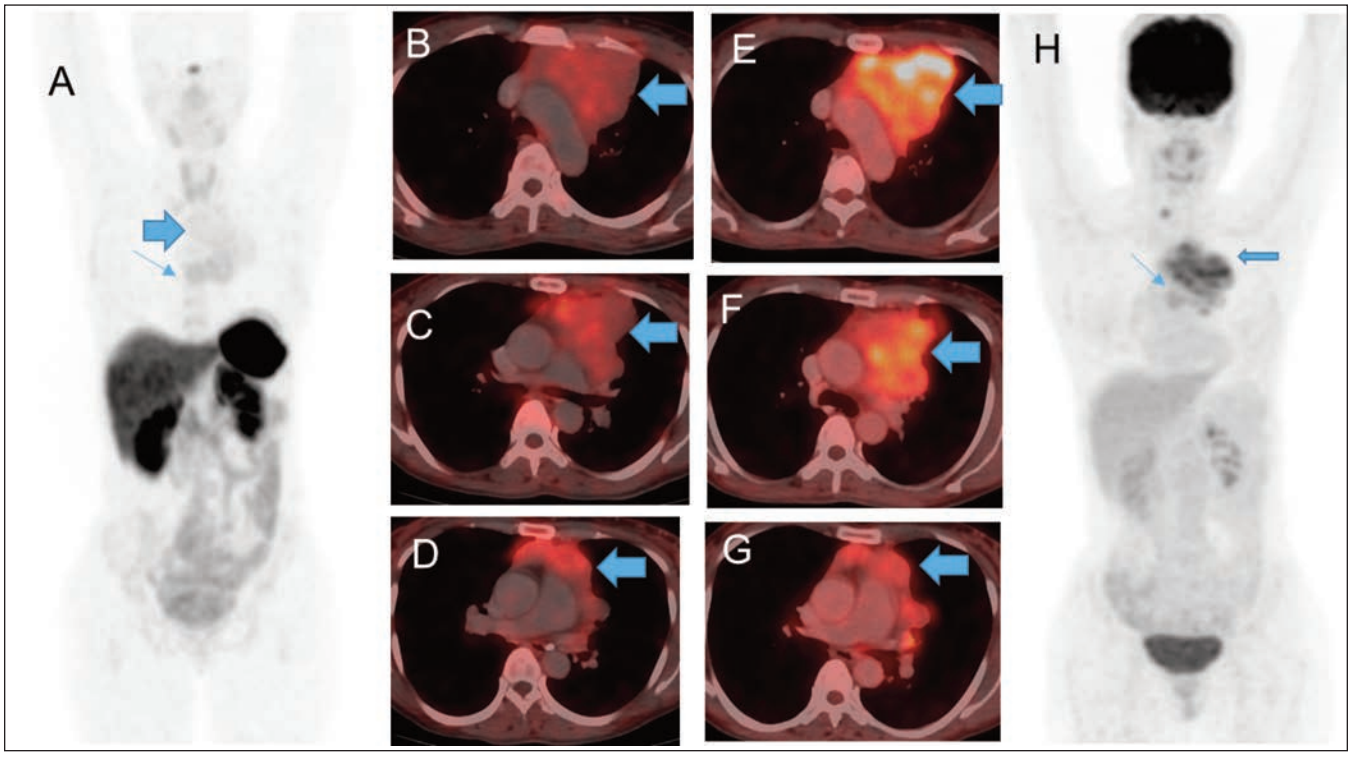

Figure-1: A-D MIP and fused axial images of Ga68 DOTANOC PET-CT show mild uptake in the anterior mediastinal mass (blue arrow). Figure E-H Fused axial and MIP images of FDG PET-CT show greater degree of FDG uptake in the anterior mediastinal mass (blue arrow). However, there is a small focus of this mass at the lower aspect which appears to be more avid on DOTA PET-CT (figure A and D) (blue thin arrow) when compared to FDG PET-CT (figure G and H) (blue thin arrow).

NET are a rare and heterogeneous group of malignancies arising from the secretory cells of the diffuse neuroendocrine system. PET-CT with somatostatin receptor analogues is recommended in low grade NET for staging and response assessment. Imaging with the glucose analogue [^{18}F] FDG is particularly useful in aggressive , poorly differentiated NET, such as well-differentiated NET Grade 3 characterized by a high Ki-67 index and typically low tumour Somatostatin receptor expression (SSR). FDG PET-CT is also indicated in NET cases where there are suspicious findings on conventional imaging (CT or MRI) and no SSR expression is observed on staging DOTA PET-CT, or in case of rapid progression despite earlier low-grade disease on pathology.

This case emphasizes the diagnostic and therapeutic relevance of dual-tracer PET-CT in mediastinal NETs. FDG avidity reflects tumour aggressiveness, while DOTA uptake identifies suitability for targetted radionuclide therapy. The dichronous presentation highlights the need for vigilant follow-up and multimodal imaging in mediastinal NETs.

References

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