



Adrenal Oncocytoma: An Incidental FDG PET/CT Finding with MRI Correlation

Khalid Alsugair, Mamdoh Al Obaidy, Mohammed Al Qahtani, Amr Maged El Saadany and Moheï Abouzied*

Department of Radiology, King Faisal Specialist Hospital and Research Center, Saudi Arabia

Abstract

As a good percentage of adrenal masses in patients with known malignancy may be benign; thus, noninvasive characterization is important in preventing unnecessary biopsy.

This case report represent how known papillary thyroid carcinoma with known metastases has developed lung metastases from thyroid origin for which she was followed up with whole body FDG PET/CT post radioactive iodine therapy.

This case shows the potential importance of combining the molecular characterization by FDG PET/CT with the data derived from MRI in narrowing the differential diagnosis of an adrenal mass and suggesting the next diagnostic step in reaching the definitive diagnosis.

Case Summary

A 45-year-old female with a previous history of papillary thyroid carcinoma post total thyroidectomy and radioactive iodine ablation therapy.

She has developed lung metastases from thyroid origin for which she was followed up with whole body FDG PET/CT post radioactive iodine therapy.

A follow up whole body FDG PET/CT scan revealed a well-defined left adrenal mass lesion that has mild FDG uptake (Figure 1), that has been further characterized by a dedicated MRI of the abdomen (Figure 2) showing a left adrenal mass measuring an approximately 3.2 cm. Subsequently; the patient has underwent open left adrenalectomy.

Four centimeter left adrenal mass was resected for which the histopathology was consistent with oncocytic adrenocortical neoplasm that was confined to the adrenal gland without vascular invasion and with free surgical margin.

Discussion

Oncocyticneoplasms are benign neoplasms that have been predominantly described in organs such as the kidney, thyroid, ovaries, lungs, salivary glands and pituitary glands [1].

However, oncocytic adrenal cortical neoplasm is considered very rare, with only around 50 cases reported in English literature [2].

Nonetheless, with the advancement of imaging techniques, recent literature has demonstrated an increase in its detection by up to 5% [3]. Most of these “adrenal incidentalomas” are benign and nonfunctioning, discovered without its relation to the patients underlying symptoms. Although extremely rare, there have been both malignant cases reported and functioning tumors reported such those [3] associated with Cushing’s Syndrome [1,4].

Most adrenal oncocytomas have been reported between the ages 27 to 72 with female predisposition to male [5,6]. Grossly, these tumors are described as well circumscribed round encapsulated masses with areas of hemorrhage and cystic formation. Histologically, their cytoplasm are highly granular and eosinophilic due to the abundancy of mitochondria [7].

In our patient clinical scenario, metastases to the adrenal gland are considered one of the top differential diagnostic possibilities. The most common primary sites are the lung, breast, skin or integument (melanoma), kidney, thyroid gland, and colon. Most metastases are clinically silent. Up to 50% of adrenal masses in patients with known malignancy may be benign [8]; thus, noninvasive characterization is important in preventing unnecessary biopsy.

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*Correspondence:

Moheï Abouzied, Department of Radiology, King Faisal Specialist Hospital and Research Center, Riyadh, 11211, Saudi Arabia;
E-mail: moheï.abouzied@gmail.com

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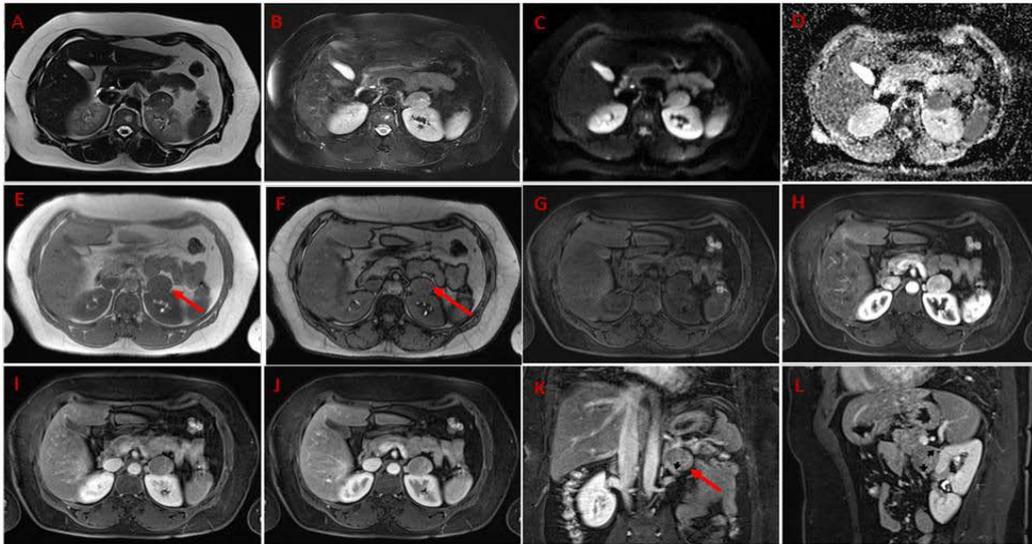


Figure 1: A: Axial T2 Half-Fourier Acquisition Single-shot Turbo spin Echo (HASTE), B: Axial fat-saturated T2 Fast Spin Echo (FSE), C: Axial diffusion, D: Apparent diffusion coefficient (ADC) map, Axial E: in- and F: Out-of-phase T1 Gradient Echo (GRE), Axial G: pre- and post-contrast 3D-GRE fat-saturated T1-weighted images during the H: arterial, I: portal venous, and J: delayed phases, K: Coronal, and L: Sagittal post-contrast 3D-GRE fat-saturated T1-weighted images. There is a 3.4 × 3 cm well-defined, fairly-homogenous, round lesion located anterosuperior to the left kidney; which demonstrates slightly low T2 signal intensity to the adjacent renal cortex on HASTE (A) T2 fat-saturated images (B). It demonstrates increased signal on diffusion images (C) and low signal on ADC map images (D), compatible with diffusion restriction. The lesion demonstrates iso signal intensity to the adjacent renal cortex on the in-phase T1-weighted images (E), without drop of signal on the opposed-phase images (F), excluding the presence of intracellular fat. The lesion demonstrates arterial hyperenhancement (H) and washes out on subsequent post-contrast images (I-J). The lesion is playing the left adrenal gland limbs (arrows, K-L), consistent with an adrenal origin. The overall imaging findings are highly suspicious for a neoplastic adrenal lesion.

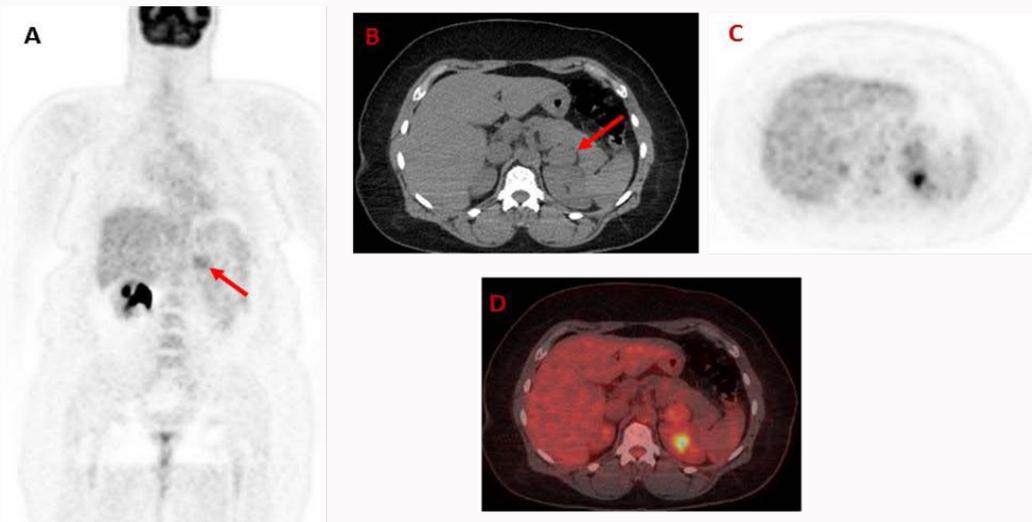


Figure 2: Coronal whole body ^{18}F -FDG PET CT (A), axial CT (B), axial PET (C), and fused axial PET/CT is showing an well-defined 3.4 cm mass lesion (red arrow) involving the left adrenal region that has an $\text{SUV}_{\text{average}}$ of 1.7 with an average HU of 37; its $\text{SUV}_{\text{average}}$ is slightly higher than the liver $\text{SUV}_{\text{average}}$ which is 1.2; that would be in favor of neoplastic process rather than benign adrenal adenoma.

FDG PET–CT can help to differentiate benign from malignant adrenal lesions than is ^{18}F -FDG PET alone with an average diagnostic sensitivities of 93% to 100%, specificities of 90% to 96%, and accuracies of 92% to 96% [9-12].

Metabolic and structural features that are in favor of malignancy in our cases include; history of thyroid carcinoma with known lung metastases, an interval increase in size of this lesion over one and half year, HU that is more than 10 and FDG uptake that is more than the liver and background uptake.

Such findings have been further supported by MRI by excluding

fat rich adenoma based on the non-drop of signal on the opposed-phase-1-weighted images [13].

Conclusion

Clinical history, structural imaging (CT, MRI) complemented by the metabolic features of the adrenal lesion was helpful in favoring the malignant potential of such adrenal mass that triggered the surgical intervention. Adrenal oncocytic neoplasm even though is a rare tumor but it should be considered in the differential diagnosis of a well-defined adrenal mass.

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