Case Report

Adrenal Oncocytoma: An Incidental Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography Findings with Magnetic Resonance Imaging Correlation

Abstract

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 represents a patient with papillary thyroid carcinoma and known lung metastasis for which she was followed up with whole-body fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) postradioactive iodine therapy. During the follow-up, she had developed an adrenal mass lesion seen by FDG PET/CT and further characterized by magnetic resonance imaging (MRI). This case demonstrates 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.

Keywords: *Adrenal oncocytoma, fluorodeoxyglucose, magnetic resonance imaging, positron emission tomography/computed tomography*

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Introduction

The improvement of imaging technique has led to an increase in the incidentally discovered adrenal lesions. Characterization of such lesions has become a necessity and an increasingly common management scenario for endocrinologists and urologists. Functional imaging technique usually complement the rule of structural imaging with CT and MRI in reaching a sensible conclusion about most of these lesions as it will be illustrated in the case report.

Case Report

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

She had developed lung metastases from thyroid origin for which she was followed up with whole-body fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) postradioactive iodine therapy.

A follow-up whole-body FDG PET/CT scan revealed a well-defined left adrenal mass lesion that had mild FDG uptake with a mean standardized uptake value (SUV) higher than both the liver and background SUV [Figure 1], which has been further characterized by a dedicated magnetic resonance imaging (MRI) of the abdomen [Figure 2a-l] showing a 3.4 cm × 3 cm, well-defined, fairly homogenous lesion anterosuperior to the left kidney, which demonstrates slightly low T2 signal intensity to the adjacent renal cortex on half-Fourier single-shot technique (a), T2 fat-saturated images (b), increased signal on diffusion images (c), and low signal on apparent diffusion coefficient map images (d), compatible with diffusion restriction. It has 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.

It demonstrates arterial hyperenhancement (h) and washes out on subsequent postcontrast images (i-j) splaying the left adrenal gland limbs (arrows, k-l), consistent with an adrenal origin. Overall findings are highly suspicious for a neoplastic adrenal

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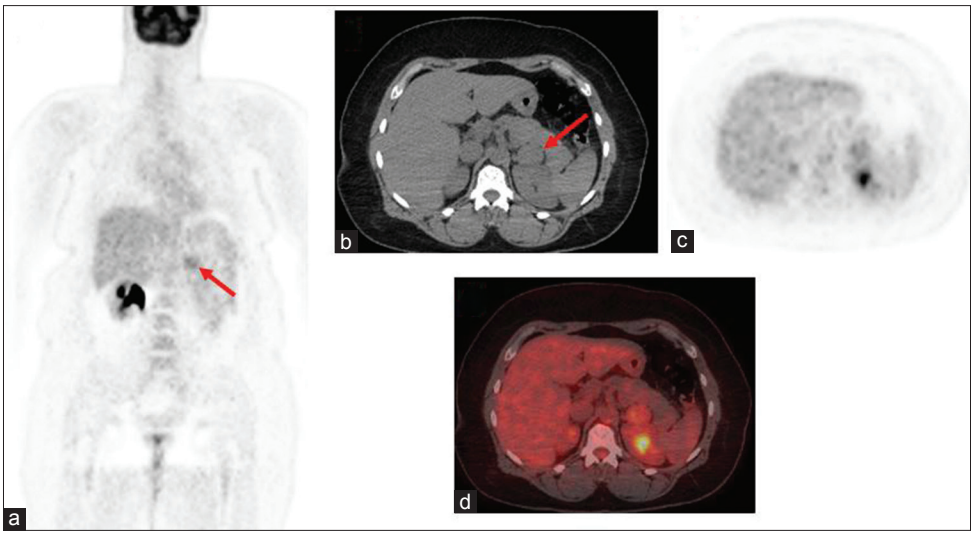

Figure 1: Coronal whole-body ^{18}fluorodeoxyglucose positron emission tomography computed tomography (a), axial computed tomography (b), axial positron emission tomography (c), and fused axial positron emission tomography/computed tomography (d) showing an well-defined 3.4-cm mass lesion (red arrow) involving the left adrenal region that has an standardized uptake value average of 1.7 with an average hounsfield unit of 37; its standardized uptake value average is slightly higher than the liver standardized uptake value average which is 1.2 that would be in favor of neoplastic process rather than benign adrenal adenoma

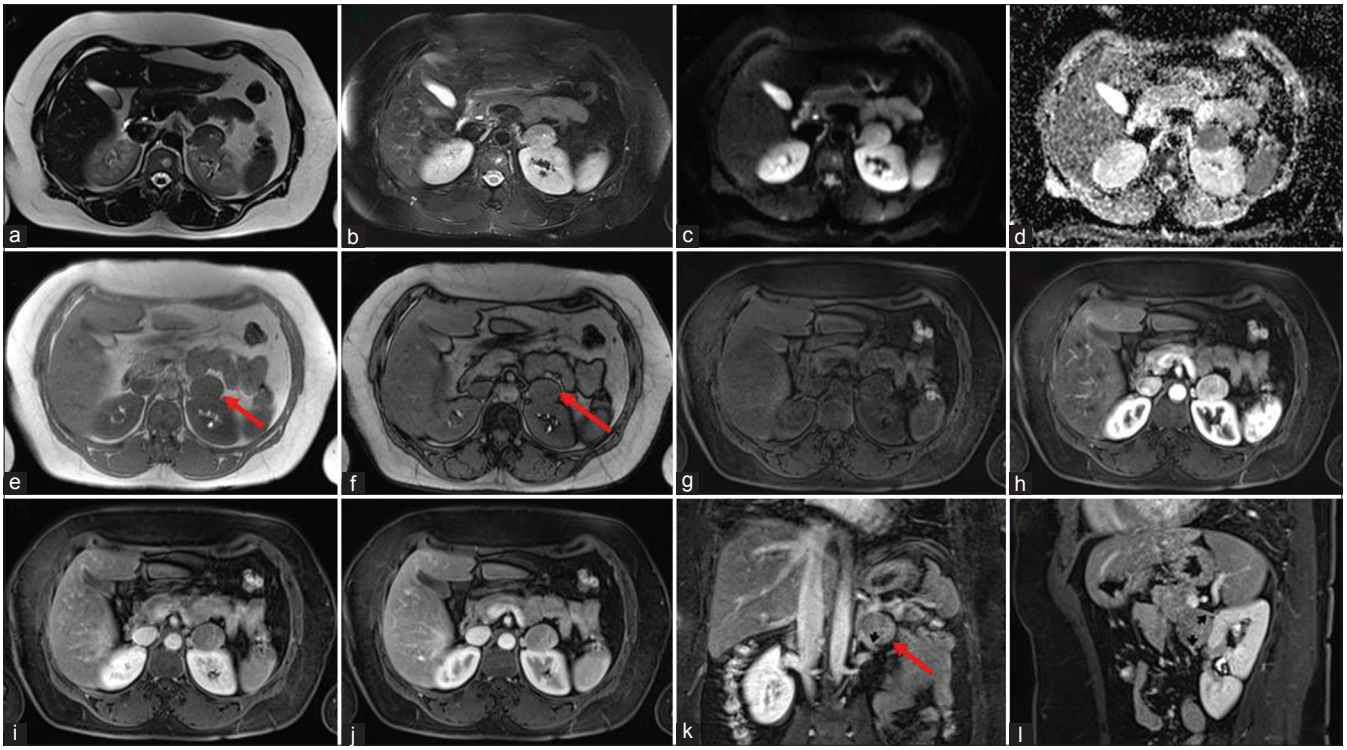

Figure 2: (a) Axial T2 half-Fourier acquisition single-shot turbo spin echo, (b) axial fat-saturated T2 fast spin echo, (c) axial diffusion, (d) apparent diffusion coefficient map, axial (e) in- and (f) out-of-phase T1 gradient echo, axial (g) pre- and postcontrast three-dimensional-gradient echo fat-saturated T1-weighted images during the (h) arterial, (i) portal venous, and (j) delayed phases, (k) coronal, and (l) sagittal postcontrast three-dimensional-gradient echo fat-saturated T1-weighted images

lesion. Subsequently, the patient underwent open left adrenalectomy.

Five-centimeter of the left adrenal mass was resected for which the histopathology was consistent with oncocytic adrenocortical neoplasm of borderline category of uncertain malignant potential according to Lin–Weiss–Bisceglia system for the assessment of malignant potential in oncocytic adrenocortical tumors; this lesion was confined to the adrenal gland without vascular invasion and with free surgical margin.

Discussion

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

However, oncocytic adrenal cortical neoplasms are considered very rare, with only around fifty cases reported in English literature.[2]

Nonetheless, with the advancement of imaging techniques, recent literatures have 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 patient's underlying symptoms. Although extremely rare, malignant and functioning tumor cases have been reported simultaneously associated with Cushing's syndrome.[1,3,4]

Most adrenal oncocytomas have been reported between the ages of 27 and 72 years 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 is highly granular and eosinophilic due to the abundance of mitochondria.[7]

In our patient's clinical scenario, metastasis to the adrenal gland is 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.

Nearly 50% of adrenal masses incidentally detected in patients with cancer harbor metastases; most of them are silent, putting these patients at higher risk. Therefore, the characterization of these masses in this subset of patients is considered vital for noninvasive staging of the tumor, selection of the treatment regimen, and prediction of the prognosis.[8-10]

FDG PET–CT can help to differentiate benign from malignant adrenal lesions with average diagnostic sensitivities of 93%–100%, specificities of 90%–96%, and accuracies of 92%–96%.[10-14] Qualitative (visual) PET analysis has the best combined test sensitivity and specificity for PET characterization of malignant adrenal masses.[10]

Therefore, relying solely on the metabolic features and the patient's clinical history would favor the malignant potential of such lesion. However, MRI findings have supported further such hypothesis by excluding fat-rich adenoma based on the nondrop of signal on the opposed-phase-1-weighted images[15] and that contributed to an increase in the specificity of PET findings since benign adenoma might have shown the same metabolic features on the FDG study.

Conclusion

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

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Conflicts of interest

There are no conflicts of interest.

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