Utility of Adrenal Cortical Scintigraphy with ^{131}I-6-β-Methyl-Norcholesterol in a Case of Mismatch Between Morphological and Functional PET Imaging

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Abstract: We present a clinical case showing the role of adrenal cortical scintigraphy with ^{131}I-6-β-Methyl-Norcholesterol in a patient with an incidental adrenal cortical mass presenting mismatch between morphological, functional, and PET imaging.

Keywords: Adrenal cortex • Computed tomography • ^{131}I-6-β-methyl-Norcholesterol • Incidentalomas • Scintigraphy

Introduction

The rate of finding unexpected adrenal masses, so-called "incidentalomas," has been rising because of increased use of CT, MRI, and ultrasound to study symptoms potentially originating from the abdomen.[1] Incidental adrenal masses are identified in approximately 5% of abdominal CT scans[2] and in up to 8.7% of autopsies.[3]

In patients without a known malignancy, most of these masses represent adrenal adenomas.[4] Here we describe a case of an adrenal cortical mass showing volumetric increase at CT imaging, low ^{18}F-FDG uptake at PET/CT, and a positive result at adrenal scintigraphy with ^{131}I-6-β-Methyl-Norcholesterol (NCL-6-I).

Figure 1

Case Report

A 77 year-old man was admitted to our hospital for the presence of abdominal pain. He had arterial hypertension, family history of cancer, and negative oncological laboratoristic markers (CEA, α-FP, Ca19-9, TPS). An abdominal ultrasound showed an ipoechoic mass in the left adrenal lodge with regular boundaries confirmed by a contrast enhanced (c.e.) computed tomography (CT) (diameter of 3.5 cm). After five months a non c.e. CT revealed an incremental diameter (4.2 cm vs 3.5 cm), which was suspicious for a malignant adrenal mass (Fig.1). ^{18}F-FDG PET/CT performed one month later showed low tracer uptake (SUV max 2.1) in the adrenocortical mass (Fig.2). Biochemical evaluation (aldosterone, cortisol, testosterone, androstenedione, DHEA-S, and renin) showed only an increment of plasmatic renin, both orthostatic and supine dosage [57.5 pg/ml (normal value 1.8-33.0 pg/ml) and 25.8 pg/ml (normal value 1.3-16.0 pg/ml), respectively]. On the basis of CT and PET/CT findings, an NCL-6-I adrenal scintigraphy was performed. The NCL-6-I scan showed left adrenal gland increase tracer uptake with faint controlateral uptake indicating a left adrenocortical adenoma (Fig.3).

Discussion

The diagnostic algorithm to be adopted in patients with incidentalomas is still somewhat controversial in the literature. However, once those lesions with an obvious radiological diagnosis (e.g. simple cyst, myelolipoma) are excluded, the diagnostic approach to incidentalomas should comprise the following steps: (1) obtain an accurate clinical and biochemical profile to be certain of the functional

status of the lesion, and (2) make a differential diagnosis of benign versus malignant.[5][6][7]

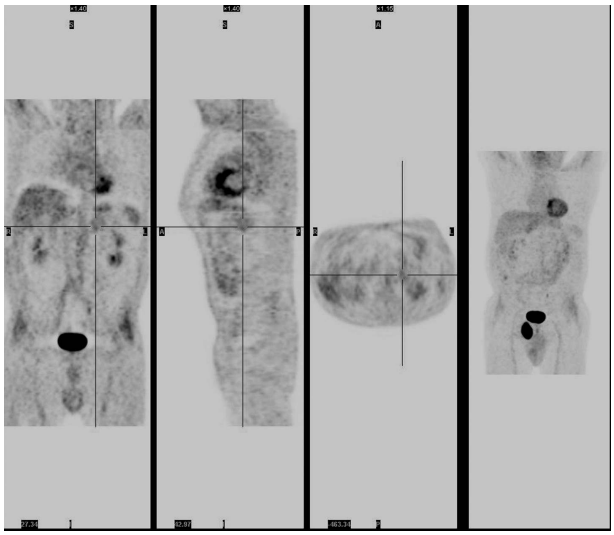

Figure 2

Because adrenal adenomas are relatively common (2%-to-9%) in the general population, an incidental detection of such lesions poses a diagnostic challenge, particularly in patients with a previous clinical history of malignancy.[3][8][9][11] Among high-resolution anatomic imaging techniques, CT is used as the first-line diagnostic modality for screening and determining the nature of the adrenal lesions, and MRI is often performed to further characterize indeterminate masses seen on CT. Serial CT imaging has been used, since lesions showing a progressive growth are more likely to be malignant.[6][12] Recently, ^{18}F-FDG PET has also shown great potential in differentiating malignant from benign adrenal lesions in patients with proven malignancy, or in patients with incidentally detected adrenal tumors on CT or MRI studies.[13][14][15] However, even with increasing experience in the evaluation of adrenal lesions using ^{18}F-FDG PET, it is not fully understood why some adenomas show increased tracer uptake and some do not. It has been suggested that the functional state of an adenoma is a factor determining the intensity of uptake, with ^{18}F-FDG uptake being increased in functioning adrenal masses.[16]

Adrenocortical radiocholesterol scintigraphy has been shown to be the most accurate non-invasive imaging technique in differentiating benign cortical adenomas from space-occupying or destructive adrenal lesions.[5][17][18] Maurea et al. reported a positive predictive value of 89% and a negative predictive value of 100% in ruling out malignancy of the adrenal mass using NCL-6-I imaging.[10] An English language Medline search from January 1996 to April 2008 produced few papers on the incremental value of adrenal scintigraphy with NCL-6-I.

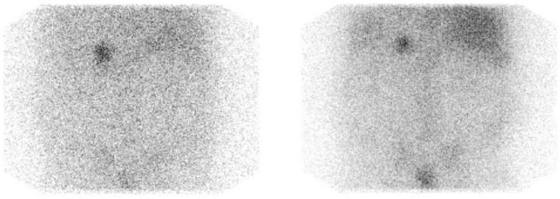

Figure 3

The clinical case reported here confirms that adrenal cortical scintigraphy with ^{131}I-6-β-methyl-Norcholesterol may play a role in the diagnostic algorithm of incidentalomas when the diagnostic work-up shows a mismatch between morphological (increasing in volumetric pattern) and functional PET data (low FDG uptake).

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