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Adrenal cryptococcosis in an immunosuppressed patient showing intensely increased metabolic activity on ^{18}F -FDG PET/CT

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Abstract

Disseminated cryptococcosis most commonly occurs in immunosuppressed patients and can rarely affect the adrenal glands. We report on a patient with biopsy proven bilateral adrenal cryptococcosis resulting in primary adrenal insufficiency, which was evaluated with whole-body PET/CT using ^{18}F -FDG. Both enlarged adrenal glands presented intensely increased ^{18}F -FDG activity in the periphery, while central necrotic regions were photopenic. Although diagnosis was established by adrenal-gland biopsy, ^{18}F -FDG PET/CT can significantly contribute to the assessment of disease activity and monitoring of treatment response. Furthermore, fungal infections should always be considered when encountering hypermetabolic adrenal masses, especially in the setting of immune-deficient patients.

Keywords

^{18}F -FDG PET/CT; adrenal cryptococcosis; primary adrenal insufficiency

A 41-year-old male with history of underlying idiopathic CD4 lymphocytopenia, negative HIV status and biopsy proven disseminated cryptococcal infection affecting meninges, lungs and bones presented with fatigue, weight loss, hypotension, somnolence, and progressive skin darkness. Biochemical work up revealed undetectable cortisol and greatly elevated ACTH (>2500 pg/ml with a normal range 0–46), while ACTH-stimulating test indicating primary adrenal insufficiency. The patient underwent imaging studies including whole-

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Conflict of interest:

The authors declare that they have no conflict of interest.

body ^{18}F -FDG-PET/CT scan without contrast and post-contrast chest/abdomen/pelvis CT and MRI scans. Contrast-enhanced CT scan of the adrenals showed bilateral non-enhancing enlarged (3.7cm for the right and 3.2cm for the left in length) and partially calcified adrenal glands (Fig 1A: axial post-contrast CT image of the adrenals; black arrows), with the right adrenal mass compressing the inferior vena cava (Fig 1A: yellow arrow). MRI-scan of the abdomen confirmed abnormally enlarged adrenal glands exhibiting low signal intensity on T2-weighted images (Fig 1B: coronal white arrows; left renal cyst: black arrow). Subsequently, ^{18}F -FDG PET/CT scan showed intensely increased ^{18}F -FDG uptake by the adrenal masses –SUVmax:12.4 and 11.1 for the right and left adrenal gland respectively- (Fig 1C: axial fused ^{18}F -FDG PET/CT image of the abdomen) with central photopenia representing necrotic regions (Fig 1D: coronal fused ^{18}F -FDG PET/CT image). Normal plasma metanephrines and norepinephrines and normal 24 hour urine catecholamines ruled out pheochromocytoma, while CT-guided percutaneous needle core biopsy of the right adrenal gland revealed fibrotic tissue with extensive necrosis containing numerous rounded fungal organisms. Hematoxylin and Eosin stained sections showed fungal elements in a necrotic background (Fig 1E: black arrows 600 $\times$), which are highlighted by GMS silver stain (Fig 1F: white arrows 600 $\times$) and mucicarmine (Fig 1G: black arrows 600 $\times$) consistent with cryptococcal infection.

Cryptococcosis is a severe and potentially fatal systemic fungal infection with a universal geographic distribution caused by encapsulated yeast of the genus *Cryptococcus* [1]. Inhalation of cryptococcal particles is the most common route of infection, while ingestion of the fungus or direct inoculation through the skin is less frequently encountered. Pulmonary and central nervous system cryptococcosis are the most common clinical manifestations of this fungal infection, while involvement of bones or adrenals rarely occurs [2].

Early diagnosis and efficient monitoring of disease activity can significantly contribute to optimal management of patients with fungal infections. Thus, modern hybrid imaging modalities (PET/CT, PET/MRI) which provide both functional and anatomical information, have high potential as valuable diagnostic tools in this clinical setting [3]. ^{18}F -FDG is a radiolabeled glucose analog suitable for PET imaging which allows whole-body characterization of metabolic activity. Sites of infection accumulate ^{18}F -FDG which is taken up by migratory inflammatory cells, microorganisms, and granulation tissue [3]. ^{18}F -FDG PET/CT is not diagnostic of a fungal infection like cryptococcosis, but can significantly contribute to assessing disease extent, treatment response or disease recurrence. In the presented case of adrenal cryptococcosis ^{18}F -FDG activity was intensely increased in the periphery of the adrenal masses, while central necrotic regions were photopenic. Since ^{18}F -FDG is a non-specific radiopharmaceutical, fungal infections should always be considered in the differential diagnosis of ^{18}F -FDG-avid adrenal masses especially in immuno-deficient patients as indicated by the presented data.

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