Interesting images

An unusual case of thymic carcinoid causing Cushing’s syndrome due to ectopic ACTH secretion detected by $^{18}$F-FDG PET/CT

Un caso inusual de carciñoide tímico atípico que causa síndrome de Cushing debido a la secreción ectópica de acth identificado con $^{18}$F-FDG PET/TC

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A 44-year-old female patient presented symptoms and laboratory data consistent with a Cushing’s syndrome. Endocrine investigations and negative pituitary imaging were suggestive of ectopic ACTH secretion. Therefore, the patient underwent fluorine-18-fluorodeoxyglucose positron emission tomography/computed tomography ($^{18}$F-FDG PET/CT) and somatostatin receptor scintigraphy (SRS) searching for the cause of ectopic ACTH secretion.

Before $^{18}$F-FDG injection, the patient had fasted for at least 6 h; at the time of the radiopharmaceutical injection she presented glucose blood levels corresponding to 90 mg/dL. Images were acquired one hour after intravenous injection of 270 MBq of $^{18}$F-FDG according to the body mass index.

$^{18}$F-FDG PET/CT showed a focal area of increased radiopharmaceutical uptake in the anterior mediastinal region corresponding to a 2 cm nodule (Fig. 1). No other areas of abnormal increased $^{18}$F-FDG uptake were detected in the rest of the body. Additionally, SRS did not show lesions with increased expression of somatostatin receptors.

Based on the $^{18}$F-FDG PET/CT finding, the patient underwent biopsy of the mediastinal nodule. Histological examination showed the presence of atypical cells suggestive of a thymic neoplasm. At immunohistochemistry neoplastic cells were positive for chromogranin A and ACTH with low expression of somatostatin receptors, whereas the proliferative index (Ki67) was about 20%. A final histological diagnosis of atypical thymic carcinoid was performed. The patient underwent thymectomy and the postoperative course was favorable with clinical and biochemical remission of Cushing’s syndrome.

Ectopic ACTH syndrome is a diagnostic challenge because it is often indistinguishable from Cushing’s disease. The role of $^{18}$F-FDG PET/CT in localization of tumors causing ectopic ACTH secretion is still controversial. Previous case reports demonstrated the usefulness of $^{18}$F-FDG PET only in detecting thymic carcinoids causing ectopic ACTH secretion. In our case hybrid $^{18}$F-FDG PET/CT demonstrated an atypical thymic carcinoid. The $^{18}$F-FDG uptake of this rare neuroendocrine tumor is likely justified by the high proliferative index reported by the histological examination. On the other hand, the low expression of somatostatin receptors by this tumor may explain the negative SRS.

Prospective studies including both $^{18}$F-FDG and somatostatin receptor PET/CT in patients with ectopic ACTH Cushing’s syndrome are needed in order to better address the usefulness of these nuclear medicine techniques in detecting tumors causing ectopic ACTH secretion.

Fig. 1. Whole-body maximum intensity projection (MIP) $^{18}$F-FDG-PET image (A) which was performed in a patient with Cushing’s syndrome to detect a possible tumor secreting ACTH showed an area of increased radiopharmaceutical uptake in the mediastinum (arrow). PET (B) and fused PET/CT (C) images in axial projection showed increased $^{18}$F-FDG uptake (maximal standardized uptake value: 5.1) corresponding to a 2 cm nodule located in the anterior mediastinum (arrows). Histology demonstrated the presence of an atypical thymic carcinoid.
References

