Journal of Clinical and Translational Endocrinology: Case Reports 2 (2016) 10–14

Contents lists available at ScienceDirect

Journal of Clinical and Translational Endocrinology: Case Reports

journal homepage: www.elsevier.com/locate/jecr

Incidental hypermetabolic PET positive lesions in thyroid and pituitary glands in a patient with lung cancer: A case of two uncommon findings in a single patient

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ARTICLE INFO

Article history:
Received 19 April 2016
Accepted 7 June 2016

ABSTRACT

A 60-year-old man who was recently diagnosed with lung adenocarcinoma underwent 18F-FDG positron emission tomography/computed tomography (FDG PET/CT) scan for staging. The FDG PET/CT scan showed incidental hypermetabolic uptake in the pituitary gland and focal hypermetabolic activity in the left thyroid lobe. Histopathologic evaluation revealed these to be a non-functioning pituitary adenoma and papillary thyroid cancer, respectively. Incidental hypermetabolic uptake in the pituitary and thyroid glands on FDG PET/CT scan are uncommon. It is important to determine their etiologies as this may lead in some cases to incorrect staging of the primary cancer and, therefore, inappropriate clinical management. In this case report we will discuss the clinical presentation and the imaging findings of this patient and review the related literature.

Introduction

Positron emission tomography/computed tomography (PET/CT) scan is commonly used to stage different types of malignancies. However, incidental FDG PET/CT scan lesions can be found in up to 12% of patients [1] and work up of these incidental findings may lead to a change in the clinical management of the primary cancer. Incidental hypermetabolic thyroid nodules on PET scan are uncommon with reported rates ranging from 0.8–4.9% [2–9]. Incidental hypermetabolic PET lesions in the pituitary gland are even rarer, with a reported incidence of 0.07–0.8% [10,11]. We present a case of a patient presenting with lung cancer found to have both of these rare incidental findings in the thyroid and pituitary glands. Both findings represented two different primary pathologies in addition to the primary malignancy.

Case report

A 60-year-old man with no past medical history presented to the emergency department with hypertensive urgency directly after his initial visit with his new primary care physician. Chest X ray was suspicious for aortic dissection. Computed tomography (CT) scan ruled out aortic dissection; however, it revealed a spiculated 1.4 cm nodule in the left lung lobe. Subsequent CT guided biopsy identified the presence of adenocarcinoma.

The patient then underwent FDG PET/CT scan which showed a hypermetabolic left upper lobe pulmonary nodule without other lung lesions or lymphadenopathy. However, a hypermetabolic sellar mass and a left thyroid lobe mass were also seen (Figure 1). The maximum standardized uptake value (SUV) of the foci in the pituitary and thyroid glands were 16.6 and 13.5 respectively and these lesions are shown in Figures 2 and 3 respectively. A brain MRI done thereafter showed a large heterogeneous enhancing expansile sellar and suprasellar mass abutting and displacing the optic chiasm and adjacent structures (Figure 4). Thyroid ultrasound showed a 1.5 cm heterogeneous left nodule with ill-defined borders (Figure 5). Pituitary hormones levels were unremarkable except for a slightly elevated IGF-1 twice at 236 and 277 ng/ml (Reference range 81–225, Table 1). Fine needle aspiration biopsy (FNAB) of the left thyroid mass showed papillary thyroid carcinoma (Figure 6A). The patient then underwent sublabial resection of the pituitary mass and immunohistochemical stains indicated that this was a non-functioning adenoma (Figure 7). Subsequently, he underwent total thyroidectomy for papillary thyroid carcinoma (Figure 6B).

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http://dx.doi.org/10.1016/j.jecr.2016.06.001

Figure 1. Multiple hypermetabolic foci on PET scan (indicated by arrows).

Discussion

Incidental FDG PET positive lesions can be encountered in the process of staging patients with cancer at a rate of about 4.1–12% [1,12–14]. Chopra et al. [13] reported that 9.2% of patients with suspected or known lung cancer had incidental FDG PET/CT scan finding and that 1.2% were malignant. Ishimori et al. [14] reported unexpected primary malignant tumors in 1.2% of patients with cancer undergoing PET scan.

Incidental FDG PET/CT positivity in the pituitary is very rare with an incidence rate of approximately 0.07–0.8% [10,11]. The etiology of this varies and there are several reports of incidental PET lesions correlating with pituitary adenomas and pituitary metastases [15–20]. Jeong et al. [10] reviewed the files of more than 40,000patients who underwent whole body FDG PET/CT for assessment of known or suspected malignancy excluding patients with prior history of pituitary tumors. There were only 30 patients who had focal increased FDG uptake in the pituitary gland (0.073%) [10]. In that study [10] histological diagnosis was obtained from 3 patients revealing 2 growth hormone producing adenomas and 1 non-functioning adenoma and there were no evidence of metastases to pituitary in any of these patients in follow up. Hyun et al. [11] evaluated more than 13,000patients who underwent FDG/PET/CT scan and found incidental pituitary uptake in 107 patients (0.8%). Twenty nine out of these 107 patients were determined to have a pathological uptake with etiologies being macroadenoma (21 patients), microadenoma (5 patients) and malignancy (3 patients) [11]. Both studies showed a correlation between pathological uptake and size of adenoma and the SUV value [10,11]. The patient in our case had a macroadenoma with an uptake in the pituitary that had an SUV value of 16.6. This is comparable to the data of Jeong et al. [10]. Hyun et al. [11] showed an overall SUV value of 11.5 ± 8.4 and 10.9 ± 7 respectively in pa-

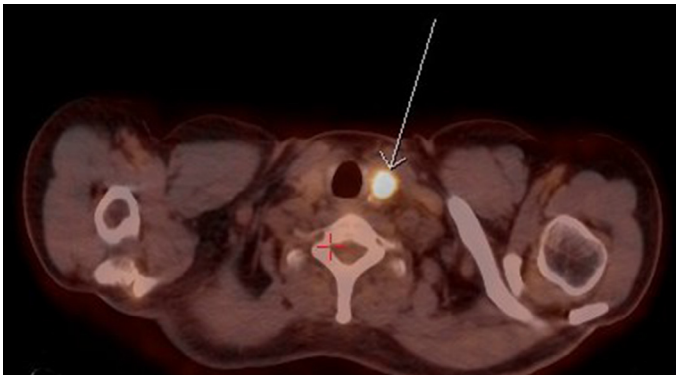

Figure 3. Hypermetabolic focus on PET scan in left thyroid lobe.

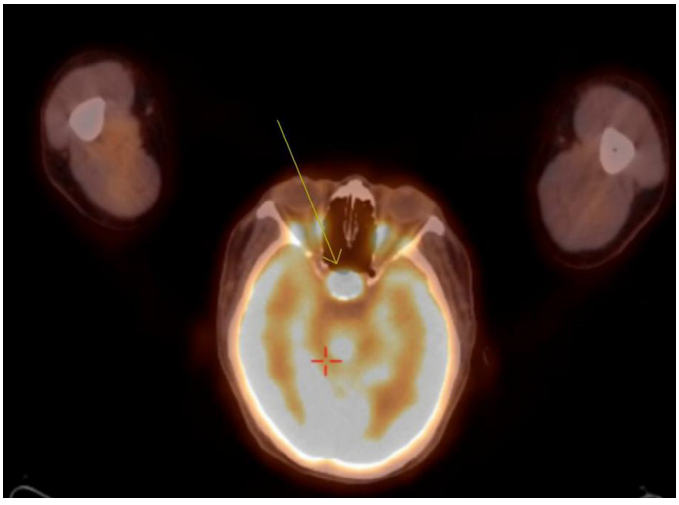

Figure 2. Hypermetabolic focus on PET scan in pituitary gland.

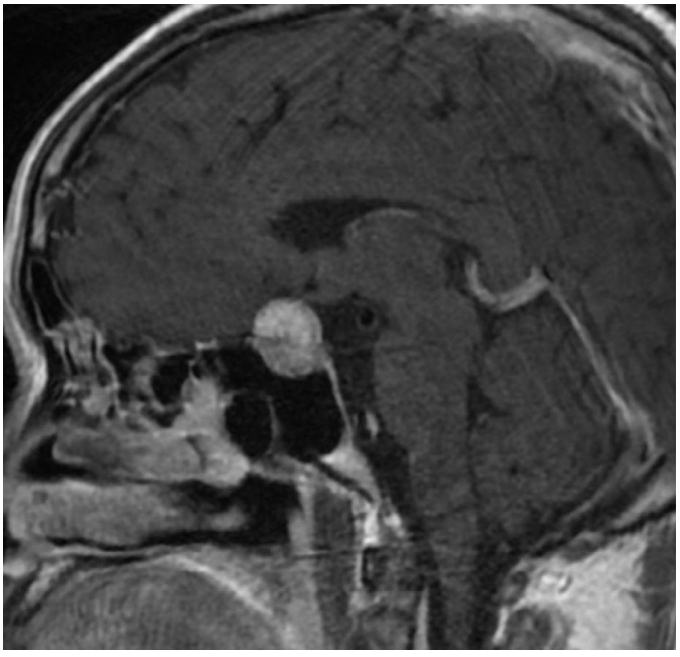

Figure 4. MRI of brain showing large pituitary mass.