

18F-Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography Finding in a Rare Case of Follicular Carcinoma of Thyroid with Rhabdoid Morphology

Abstract

Rhabdoid tumor commonly occurs in the kidney and has an aggressive clinical course with high mortality. Extrarenal rhabdoid tumours can involve a number of organs, but poorly differentiated follicular carcinoma with rhabdoid phenotype is an extremely rare clinical entity. The 18F-FDG PET feature of this thyroid malignancy is not available in the literature to the best of our knowledge. But, this feature has significant clinical relevance in management of such patients. We present such a case.

Keywords: 18F-Fluorodeoxyglucose positron emission tomography/computed tomography, follicular carcinoma, rhabdoid, thyroid

Introduction

The rhabdoid cell is a special type of cell characterized by the abundant cytoplasm with eosinophilic globular inclusions and eccentricity with vesicular nuclei.^[1]

Malignant rhabdoid tumor was first described in 1978 by Beckwith and Palmer.^[2] Rhabdoid tumor commonly occurs in the kidney and has an aggressive clinical course with high mortality.^[3] The central nervous system is the most frequent site of extrarenal rhabdoid tumor (ERRT).^[4] It was subsequently reported in various other extrarenal sites, including the stomach, colon, liver, bladder, uterus, ovary, and soft tissues. Very few cases of malignant ERRT (MERT) have been reported in the larynx, lung, and vulva.^[5-7]

Rhabdoid tumors of the thyroid gland are extremely rare. Poorly differentiated follicular carcinoma with rhabdoid phenotype reported so far in the literature, occurred in middle-aged women and followed an aggressive clinical course with fatal outcome.^[8] Rhabdoid tumors and anaplastic carcinomas of the thyroid exhibit similar clinical, morphologic, and immunohistochemical features. Both are rare thyroid tumors that occur in older patients; both invade extrathyroidal tissues

and surrounding structures; both give rise to cervical adenopathy and distant metastases; and both have very high mortality, with a mean survival of 6 months. Both tumors are wholly or partially composed of undifferentiated cells that may exhibit immunohistochemical or ultrastructural features of epithelial differentiation.^[9]

We report 18F-fluorodeoxyglucose positron emission tomography/computed tomography (18F-FDG PET/CT) features of such a case.

Case Report

A 58-year-old gentleman presented with hoarseness of voice for 1 month. He had a long-standing swelling on the right side of his neck for the past 30 years. However, a rapidly growing new swelling on the anterior neck started appearing on the left side in the recent past. Fibro-optic laryngoscopy showed a large globular bilobed mass over the left vocal cord arising from the left vestibular fold extending to the base of epiglottis, likely extension from external mass. Fine-needle aspiration cytology from the left lobe of thyroid was suggestive of malignant epithelial neoplasm. Specimens from the right lobe of thyroid showed benign follicular nodule. At this time, the patient had to undergo emergency tracheostomy for acute onset stridor.

**Jayanta Das,
Joydeep Ghosh¹,
Lateef Zameer²,
Soumendranath
Ray**

*Departments of Nuclear
Medicine and PET-CT, ¹Medical
Oncology and ²Oncopathology,
Tata Medical Center, Kolkata,
West Bengal, India*

Address for correspondence:

*Dr. Jayanta Das,
Department of Nuclear Medicine
and PET-CT, Tata Medical
Center, Kolkata - 700 160,
West Bengal, India.
E-mail: drjayantadas@yahoo.
co.in*

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Posttracheostomy 18F-FDG whole body PET-CT scan was performed. The scan showed a large solid-cystic mass lesion arising from the right lobe of thyroid gland with mildly increased FDG uptake in the solid component and peripheral part of the lesion. Intensely increased homogeneous FDG uptake was seen in another infiltrating mass lesion on the midline of the neck extending to the left side. This metabolically active mass lesion was not separable from isthmus of the thyroid, thyroid cartilage, and larynx. Infiltration to the supraglottic part of the larynx was noticed with near complete luminal obstruction. Tracheostomy tube was seen *in situ*. The scan also showed small soft-tissue parenchymal nodules in the middle lobe of the right lung and lingular segment of the left lung with minimally increased FDG avidity [Figure 1].

Ultrasonography (USG)-guided biopsy from the left-sided infiltrating neck mass showed poorly differentiated carcinoma with rhabdoid morphology. Section showed tumors composed of discohesive cords and nests of round tumor cells with rhabdoid morphology in a myxoid background. In immunohistochemistry, the tumor cells were heterogeneously positive for CK

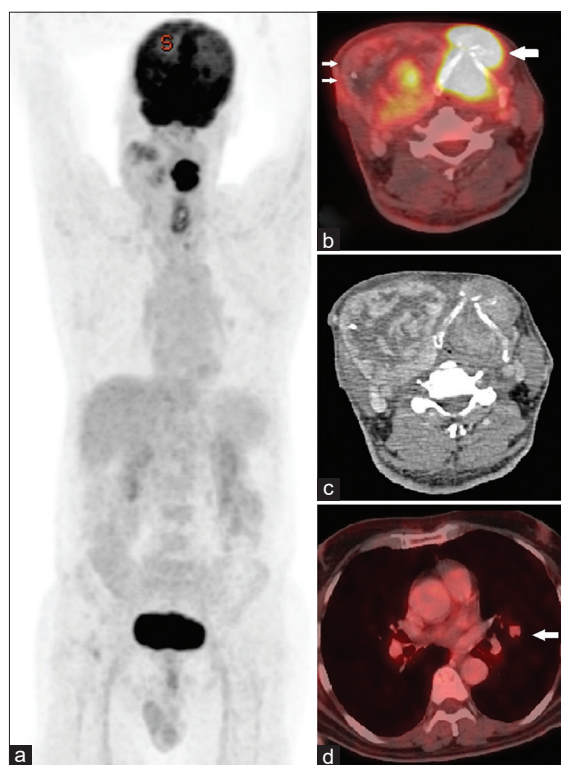


Figure 1: (a) Maximum intensity projection image - increased fluorodeoxyglucose avidity in the midline of the neck. (b) Fused axial image - markedly increased metabolic activity in left-sided mass lesion (large single arrow). Another large solid-cystic mass lesion arising from the right lobe of the thyroid gland with mildly increased fluorodeoxyglucose uptake (small double arrow). (c) Axial computed tomography scan of the neck - left-sided mass lesion is not separable from the isthmus of the thyroid, thyroid cartilage, and obstructing the supraglottic larynx. (d) Small soft-tissue parenchymal nodules in the lingular segment of the left lung with minimally increased metabolic activity

(AE1/AE3), CK8/18, and epithelial membrane antigen and negative for TTF1, p63, and myogenin. PAX8 was equivocal [Figure 2]. Biopsy from the right thyroid mass showed thyroid follicles of varying sizes and stromal hyalinization. No definite evidence of malignancy was seen. CT-guided biopsy from the parenchymal nodule in the left lung revealed metastatic follicular carcinoma of thyroid origin. In view of radiological evidence of thyroid nodules in both lobes and metastatic thyroid follicular carcinoma in the lung, the present biopsy most probably represents a high-grade transformation in a thyroid primary.

The patient was administered palliative combination chemotherapy with Cisplatin, Endoxan, and Doxorubicin (CAP regimen). The follow-up PET-CT scan after three cycles of chemotherapy showed partial metabolic and anatomical response of rhabdoid tumor of the left side of the neck. The benign adenomatous right thyroid nodule showed no significant change in the appearance [Figure 3]. The lung nodules showed partial response as well.

Discussion

Since the first positive report of FDG-PET in thyroid cancer, in 1987, a number of specific potential uses of PET have been considered in thyroidology.^[10] The most common indications for 18F-FDG PET/CT scan in thyroid carcinoma are the elevated thyroglobulin levels, but negative I-131 whole body scan and neck USG.^[11]

High-FDG activity on PET/CT scan is associated with a poorly differentiated follicular cell which has lost the ability to concentrate radioactive iodine and progressively enhance glucose metabolism due to the high cellular metabolic activity; in this way, PET/CT became a powerful diagnostic method of investigation for undifferentiated lesions.^[11] As per the existing literature, ERRTs demonstrate intense FDG uptake at the primary and metastatic sites. There are only few reported cases of low-grade FDG uptake in ERRTs in children.^[12]

To the best of our knowledge, there is no description of 18F-FDG PET feature of rhabdoid differentiation of follicular carcinoma of thyroid in the existing literature. In our case, the feature of intensely increased

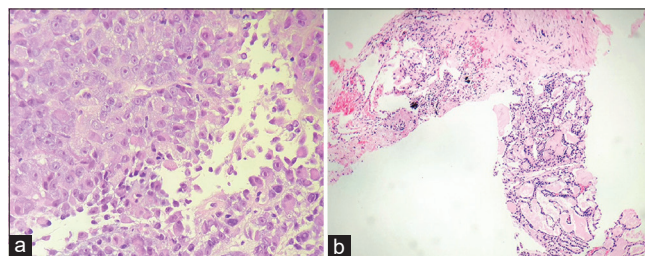


Figure 2: (a) Neck mass biopsy - H and E \times 40 - Poorly differentiated carcinoma with rhabdoid cells. (b) Lung biopsy - H and E \times 20 Metastatic follicular carcinoma of thyroid

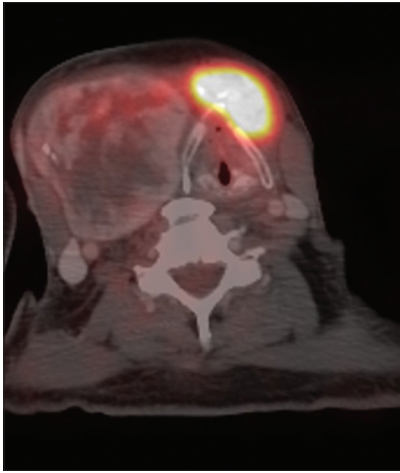


Figure 3: Axial section of follow-up positron emission tomography/computed tomography scan shows the partial regression of the metabolically active thyroid mass. The benign lesion in the right lobe of thyroid remains unchanged

homogeneous FDG avidity of thyroid nodule resembles FDG PET features of MERT of other organs. It also suggests the loss of follicular differentiation of thyroid cancer. Features such as rapidly growing large tumor and scan features of extrathyroid extension and distance metastasis as seen in PET/CT scan in our case indicate aggressive nature of disease which is suggestive of rhabdoid/anaplastic transformation of follicular carcinoma of thyroid. This imaging information has significant clinical relevance as the metastatic thyroid cancer with high-grade transformation needs systemic chemotherapy for effective palliative care.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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