

Report of two cases of fluorodeoxyglucose positron emission tomography/computed tomography appearance of hibernoma: A rare benign tumor

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ABSTRACT False-positive findings are commonly seen in positron emission tomography computed tomography imaging. One of the most common false positive finding is uptake of fluorodeoxyglucose in brown adipose tissue. Herein, we report two cases with incidentally detected hibernomas—a brown fat containing tumor with metabolic activity.

Keywords: Benign, brown fat, fluorodeoxyglucose positron emission tomography/computed tomography, hibernoma

INTRODUCTION

Metabolically active hibernoma is a rare benign tumor originating from the brown fat. It has imaging findings similar to lipomatous tumors such as lipoma and liposarcoma. They present as soft tissue masses that are slow growing, painless and relatively mobile. The term “hibernoma” was coined in 1914, due to the resemblance of this tumor to the brown fat seen in hibernating animals. Hibernoma consists of adipocytes, which are multivacuolated similar to that seen in brown fat with few univacuolated cells similar to those seen in adipose tissue of adults and lipomas. Herein, we report two cases with incidentally detected hibernomas—a brown fat containing tumor with high metabolic activity. The knowledge of this hypermetabolic benign tumor will help us to avoid misinterpretations in positron emission tomography/computed tomography (PET/CT) reporting.

CASE REPORTS

Case 1

This was a case report of a 45-year-old lady, a case of the right

breast carcinoma with ipsilateral axillary nodal and liver metastases; underwent a PET/CT scan post-six cycles of chemotherapy. The scan revealed hypermetabolic right breast mass, metastatic right supraclavicular and axillary lymphadenopathy and liver metastases [Figure 1, maximum intensity projection (MIP)]. Apart from this a hypermetabolic (maxSUV 20.9), low-attenuating, well-defined mass lesion was noted in the left postero-lateral chest wall [Figure 1a-d]. This mass was relatively hyperdense to the surrounding subcutaneous fat. This mass had remained unchanged since the previous CT scan (pre-treatment), which was done 4 months ago. The imaging findings led to the diagnosis of a benign fat containing tumor – hibernoma. On a clinical follow-up, a year later after the PET/CT study this painless, soft swelling in the left postero-lateral chest wall remained unchanged confirming the benignity of this rare tumor.

Case 2

Here we describe a case of a 50-year-old male patient a diagnosed case of supraglottic cancer underwent a PET/CT scan to look for distant metastasis. He was clinically staged as T4N0M0. His PET/CT scan revealed a large hypermetabolic mass in the right supraglottis involving the right aryepiglottic fold, arytenoids, right true and false cord and eroding the thyroid cartilage. A hypermetabolic right retropharyngeal node was also noted. Apart from this, a hypermetabolic lesion was seen in the medial aspect of the right thigh [Figure 2, MIP]. The axial images revealed a hypermetabolic (maxSUV 32.6), well-circumscribed ovoid mass with mild and heterogeneous enhancement in the right gracilis muscle, in the medial right

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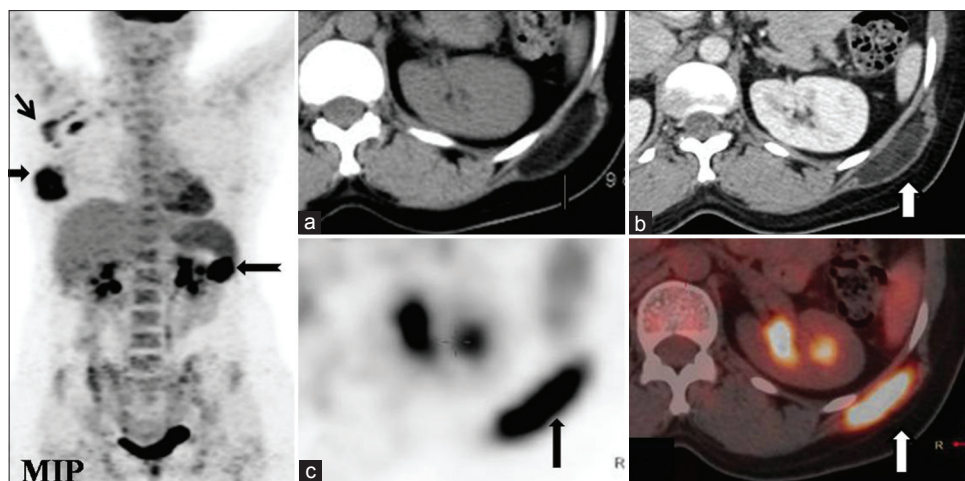


Figure 1: Fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) scan, maximum intensity projection image showing metabolically active right breast mass (block arrow), right axillary nodes (arrow) and in the left lower thorax-the hypermetabolic hibernoma (notched arrow). Unenhanced axial CT image (a) shows a low attenuating, well-defined mass lesion in the left postero-lateral chest wall (arrow). The contrast enhanced CT (b) shows mild homogenous enhancement. FDG PET (c) and fused images (d) show an intensely FDG avid mass

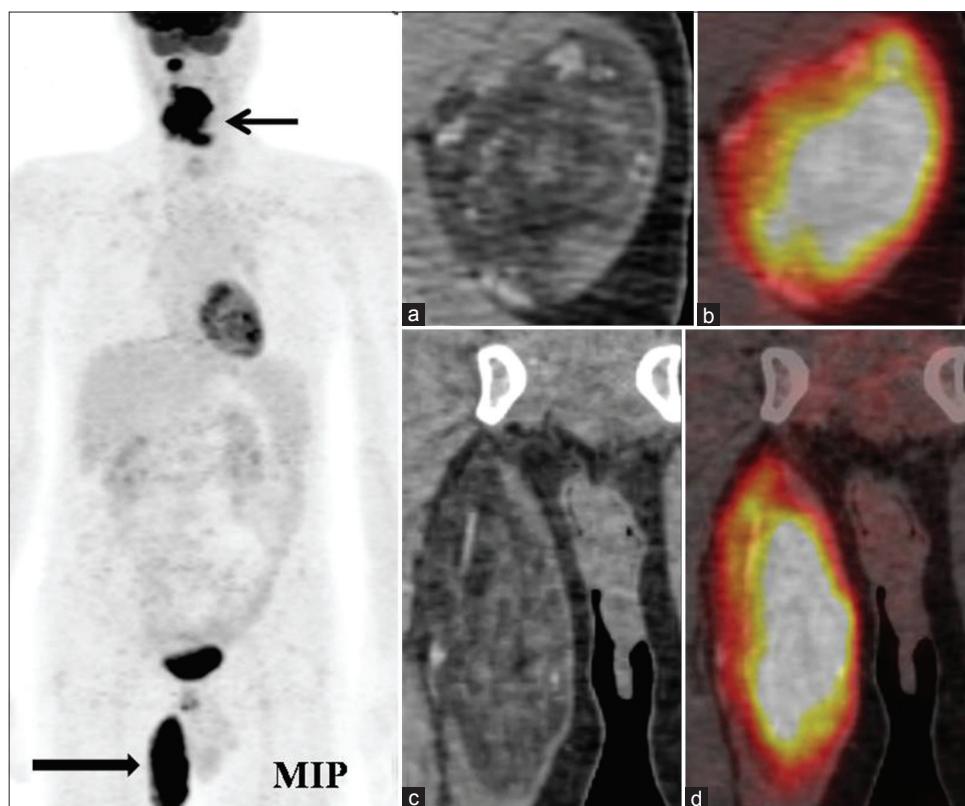


Figure 2: The maximum intensity projection image shows the hypermetabolic primary mass in the right neck (arrow); and another hypermetabolic lesion in the medial aspect of upper right thigh (block arrow). Axial enhanced computed tomography (CT) image (a) reveals a well circumscribed mass with heterogeneous enhancement in right gracilis muscle. Intensely fluorodeoxyglucose avid mass is seen in the fused image (b) similar findings in the coronal CT (c) and fused (d) images

thigh. The mass was predominantly of fat density (a little higher than subcutaneous fat) and showed prominent branching vessels within [Figure 2a-d]. On the clinical examination a painless, mobile mass was felt in the right medial thigh and the patient gave a history of this being present since many years (20 years). These findings and the history led to the diagnosis of a benign lipomatous tumor (hibernoma).

DISCUSSION

Hibernomas are usually seen in vestiges, where brown adipose tissue is found in fetuses and infants, such as neck, axilla, periscapular and interscapular area, thorax and retroperitoneum.^[1,2] As age advances the amount of brown fat in the body decreases. Gery in 1914 coined the term “hibernoma” due to its similarity

to the brown fat of hibernating animals.^[3] It is commonly seen in 3rd and 4th decades of life.^[4]

The function of brown fat is to generate heat in response to exposure to cold and ingestion of food known as non-shivering thermogenesis and diet thermogenesis respectively^[5] as the function of brown fat is to produce heat, it contains a large number of mitochondria and is highly metabolic; thus high fluorodeoxyglucose (FDG) avidity. Few studies have also shown that brown fat can have variable FDG uptake related to the ambient temperature^[6] the incidence of FDG uptake in brown fat increases in the cooler winter months^[7] and can be reduced by controlling the environmental temperature during the uptake phase of FDG^[8] and also by pre-dosing the patient with the beta-blocker prior to FDG injection^[9].

The characteristic imaging finding on CT and magnetic resonance imaging is a well-defined intramuscular, intermuscular, subcutaneous or retroperitoneal lesion,^[1] which on unenhanced CT shows mild to moderately hyperdense lesion compared to the subcutaneous fat with either homogenous or heterogenous contrast enhancement pattern.^[10]

The differentials on imaging are benign condition like lipoma and malignant tumor like liposarcoma. Lipomas are homogenous fat containing masses with no enhancement and few internal septa, whereas liposarcomas have thick, nodular septa and prominent areas of enhancement.^[11] Few case reports have shown intense FDG accumulation in hibernomas.^[12-15] This feature is not typically seen with either a lipoma or a well-differentiated liposarcoma; as this is due to the increased vascularity and increased cellular activity with increased glucose turn over as seen in hibernomas.^[1,15] These typically do not undergo malignant transformation and complete surgical resection is the treatment.^[1] These imaging features help us to narrow the differential diagnosis and adequately plan the treatment.

We, nuclear medicine physicians should be aware of this rare hypermetabolic benign tumor to avoid misinterpretations in PET/CT reporting.

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