



Breast Cancer Detected as an Incidental Finding on 18F-FDG PET/CT

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Abstract

The 18F-FDG PET/CT provide an accurate staging and post-therapeutic surveillance of cancer. In the process of detecting high metabolic malignancy, this combined functional and anatomic imaging modality may demonstrate unexpected remote metastases or incidental additional primary cancers. Incidental 18F-FDG-avid lesions in the breast are rare on PET/CT but, when present, are associated with high risk of malignancy. As a result, it is important to thoroughly investigate these lesions using other imaging modalities and ultimately to sample tissue when clinically or radiographically indicated. We report a case of 68-year-old lady, with known Large B cell non-Hodgkin's Lymphoma, who presented with PET/CT incidental findings of a breast cancer.

Introduction

The 18F-Fluorodeoxyglucose (FDG) Positron Emission Tomography with Computed Tomography (PET/CT) is extensively used in the initial staging, evaluation of the therapeutic response, and detection of recurrent disease [1-3]. However, with the wide increasing use of FDG PET/CT, sites of increased tracer uptake have been occasionally discovered in unexpected locations, which may not correlate with the patient's clinical history or the expected spread of the primary malignancy. Most incidental malignant lesions are located in the lung, colon, thyroid, and breast. The prevalence rate of incidental primary malignancies diagnosed by FDG PET/CT is reportedly 1.0% to 1.8% [4-6]. Breast incidentalomas with focal increased FDG uptake on PET/CT were found in 0.36% to 1.12% of patients and healthy subjects in multiple studies [7-13]. Previous reports have indicated that focal breast incidentalomas found on FDG PET/CT have variable malignancy rates (27.3% to 83.3%), and additional imaging modalities such as Ultrasound (US) and Computed Tomography (CT) have been described as clinically useful.

In this case report, we present a 68-year-old woman with known Large B cell non-Hodgkin's lymphoma, who presented with PET/CT findings of a breast mass and diseased axillary lymph node. Needle biopsy of the mass and lymph node confirmed a diagnosis of infiltrating ductal carcinoma of the breast with nodal metastases.

Case Presentation

A 68-year-old woman with a history of Large B cell non-Hodgkin's Lymphoma, referred to Nuclear Medicine at our institution for post therapy evaluation of her disease. A whole body PET/CT scan with intravenous injection of 7.8 mCi of 18F-Fluorodeoxyglucose (FDG) was performed at a rate of 5 min/bed. An intensely hypermetabolic focus (SUVmax of 11.4) was incidentally found in the lower lateral quadrant of the breast, which corresponded to a 17 mm soft-tissue lesion found on the concurrent non-diagnostic low dose CT scan (Figure 1). An additional multiple regional axillary as well as intramammary FDG avid lymphadenopathy were also detected, involving a deep axillary FDG lymph node (SUVmax of 6), in the left axillary (SUVmax of 9.7) and in the left internal mammary with (SUVmax of 7.7). Otherwise, PET and CT were normal (Figure 2). The patient stated that no palpable mass was detected during a routine clinical examination. Bilateral Mammogram and ultrasound of the left breast were performed two days after the PET/CT revealed highly suspicious irregular left breast mass, with enlarged and distorted left axillary lymph nodes (Figure 3). A fine needle aspiration of the breast mass was performed. Histological analysis of the breast mass showed at infiltrating ductal carcinoma.

Discussion

In women undergoing 18F-FDG PET/CT for non-breast malignancy, the incidence of unexpected increased 18F-FDG uptake within the breast ranged from 0.82% to 6.3% and malignancy

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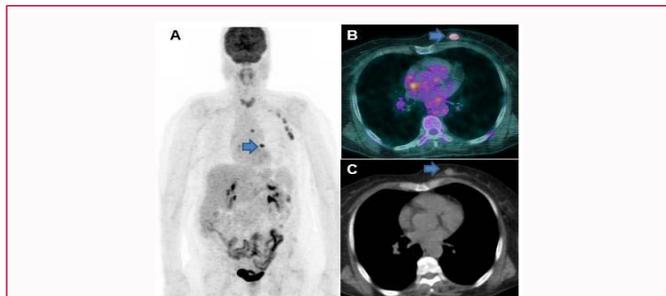


Figure 1: The 18F-FDG PET/CT scans showing an intensely hypermetabolic focus (arrows, SUVmax of 7.7) in the lower lateral quadrant of the breast, corresponding to the primary tumor: A) maximum intensity projection PET. B) Fused PET/CT image. C) CT image.

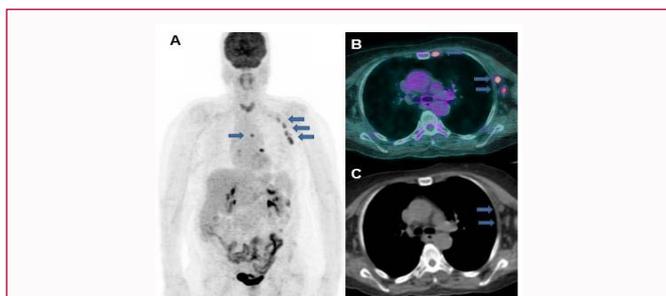


Figure 2: The 18F-FDG PET/CT scans showing an intensely hypermetabolic foci involving the deep axillary FDG lymph node (SUVmax of 6), the left axillary (SUVmax of 9.7) and the left internal mammary with (SUVmax of 7.7): A) maximum intensity projection PET. B) Fused PET/CT image. C) CT image.

was detected in more than 50% (range, 55.6% to 88.3%) of these incidental hypermetabolic breast lesions [4,14,15]. The malignant lesions included mostly invasive ductal carcinoma, invasive lobular carcinoma, recurrent non-Hodgkin lymphoma, and malignant melanoma [4,14,15]. The benign lesions included fibroadenomas, granulomatous mastitis, florid epitheliosis, fibromatosis, fibrosis, a fatty tissue lesion, and normal breast tissue with and without ductal hyperplasia [4,14,15]. Litmanovich et al. [15] retrospectively reviewed 4038 women who were examined by whole-body PET/CT for known or suspected malignancy. Thirty-three women with FDG-avid focus in the breast tissue, and 30 of those patients had follow-up data available for review. Seventeen hot lesions (57%) were malignant. Litmanovich et al. [15] found that the mean lean body mass maximum standard uptake value for malignant and benign breast lesions was (3.13 ± 2.25) SD and 1.85 ± 1.18 , respectively ($p=0.054$).

Incidental 18F-FDG-avid lesions in the breast have a high incidence of malignancy and as a result, need to have appropriate investigation. Beatty et al. [4] reviewed a prospectively acquired database of patients with a known malignancy that underwent 18F-FDG-PET/CT for staging or serial imaging. Of the 3814 scans, 272 patients had findings worrisome for a second primary malignancy, 133 of whom underwent invasive follow-up. Of these 133 patients, a second primary malignancy was diagnosed in 31% and metastatic disease from the primary malignancy in 23%. According to Beatty et al. [4] workup should be determined by clinical judgment and the extent of the primary tumor. Beatty et al. [4] recommend that if the primary malign disease is advanced, one should consider observation of the incidental finding because the invasive workup in pursuit of a diagnosis may result in inexcusable complications and provide little clinical benefit. Incidental hypermetabolic breast lesions can be

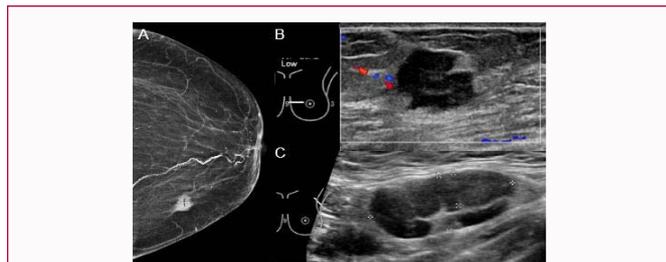


Figure 3: A) The bilateral mammography showed an irregular dense mass lesion seen in the left breast lower inner quadrant measuring 1.7 cm x 1.5 cm. No suspicious micro calcifications or parenchymal distortion. B) The ultrasound of the left breast showed an irregular partially defined hypoechoic mass seen in the left breast at 9 o'clock position with no architectural distortion or posterior acoustic shadowing measuring around 1.4 cm x 1 cm, corresponding to the mammographic findings. C) The ultrasound showed also an enlarged and distorted lymph nodes seen in the left axilla.

evaluated with physical examination, mammography, ultrasound, or breast MRI. Breast MRI is very helpful in confirming breast cancer in cases in which findings on mammography or ultrasound are inconclusive but 18F-FDG PET/CT is focally abnormal. However, little current published data support the use of breast MRI in this circumstance [16,17].

Conclusion

Incidental 18F-FDG-avid lesions in the breast are rare on 18F-FDG PET/CT but, when present, are associated with high risk of malignancy. Therefore, it is important to thoroughly investigate these lesions using other imaging modalities.

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