Case Report

Fluorine-18 fluorodeoxyglucose positron emission tomography/computed tomography imaging in response monitoring of extra-pulmonary tuberculosis

Arpana Arbind, Maria D'souza, Abhinav Jaimini, Sanjeev Saw, Yachna Solanki, Rajnish Sharma

Division of PET Imaging, Molecular Imaging and Research Centre, Institute of Nuclear Medicine and Allied Sciences, New Delhi, India

ABSTRACT

Positron emission tomography/computed tomography (PET/CT) using 2-deoxy-2-(fluorine-18) fluoro-D-glucose (^{18}F-FDG) has become a standard diagnostic modality in oncological practice. F18-FDG PET/CT is sensitive in detecting malignancy; however, specificity is low in differentiating infections or inflammatory diseases from tumor. In the present case study, we report a patient with postoperative carcinoma of tongue presenting with cervical lymphadenopathy and fever. The PET/CT scan showed metabolically active generalized lymphadenopathy, and a possibility of lymphoma was suggested. Fine needle aspiration cytology showed the Ziehl–Neelsen staining to be strongly positive for acid-fast bacilli and first line of antitubercular drug was administrated. Six months later after the initiation of therapy, a follow-up PET/CT showed remarkable improvement of the disease status. This case study illustrates that tubercular infection can be a pitfall in F18-FDG PET/CT imaging. PET positive lesions do not always indicate malignancy, and histological confirmation of lesions with biopsy should always be performed. Once diagnosed to be tubercular, FDG PET/CT is a powerful imaging tool in monitoring the therapy.

Keywords: ^{18}Fluorine-fluoro-D-glucose, lymphoma, tuberculosis

INTRODUCTION

Cervical lymphadenopathy is the most common form of extra-pulmonary tuberculosis (EPTB), but it may also involve other lymph nodes throughout the body.[1] Due to vague clinical presentation or coexistence with malignant lesion, it is very difficult to distinguish EPTB from other benign inflammatory, infectious, or malignant lesions.[2-4] Now, fluorine-18 fluoro-D-glucose positron emission tomography/computed tomography (F18-FDG PET/CT) has been shown to be a promising imaging tool in infection and inflammatory conditions.[5,6] F18-FDG PET/CT is sensitive in detecting malignancy; however, specificity is low in differentiating the infections or inflammatory diseases from tumor.[7] Because of the similarities in the clinical and radiological presentations between TB and malignancy, diagnosis might get mislead or inconclusive.[8,9] A number of cases have been documented with increased FDG uptake in active TB mimicking the malignancy.[8-13] In such cases, often the diagnosis gets delayed due to the difficulty in getting the right tissue samples for the confirmation of diagnosis and also, because of the poor yield of conventional diagnostic methods. Biopsy or sometimes surgery is required to get tissue samples for diagnosis and for managing complications. In this case, FDG PET/CT scan was

Address for correspondence:
Dr. Rajnish Sharma, Room No: 101, First Floor, Division of Clinical PET, Molecular Imaging and Research Centre, Institute of Nuclear Medicine and Allied Sciences, Timarpur, New Delhi - 110 054, India.
E-mail: drrsms@rediffmail.com

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found to be very helpful in localizing the active sites of infections and to guide the fine needle aspiration cytology (FNAC) site. The disease usually responds to standard anti-tuberculosis drug treatment, so FDG PET/CT also helps in monitoring the response of the treatment given.

CASE REPORT

A 53-year-old asthmatic male with a previous history of carcinoma of tongue subjected to left hemiglossectomy with suprahyoidal neck dissection 10 years back, was presented with right cervical lymphadenopathy and fever. He was normotensive and euglycemic. He denied of any weight loss, night sweats, and cough. Sputum examination was negative for acid-fast bacilli (*Mycobacterium tuberculosis*). C-reactive protein was negative and ultrasonography of neck had showed multiple bilateral cervical lymphadenopathy. Suspecting it to be metastatic disease, a whole body F-18 FDG PET/CT was performed which showed metabolically active cervical, mediastinal, abdominal, pelvic, left inguinal and femoral lymph nodes [Figure 1]. Diffuse low-grade uptake noted in the region of soft palate, base of tongue, and valleculae was considered to be physiological. The pattern of increased FDG uptake is not typical for squamous carcinoma for head and neck metastasis and so it raised the possibility of lymphoma. FNAC showed the Ziehl–Neelsen staining to be strongly positive for acid-fast bacilli [Figure 2]. Tuberculin skin test was positive (15 mm induration after 48 h). The patient was started on first line antitubercular medication. Six months later after the initiation of therapy, a follow-up whole body F18-FDG PET/CT scan showed a significant resolution of previously FDG avid lymph nodes but for residual hypermetabolism at right cervical level I, right paratracheal and right axillary lymph nodes [Figure 3]. The maximum standardized uptake value (SUVmax) of different lymph nodes before and after therapy is depicted in Table 1.

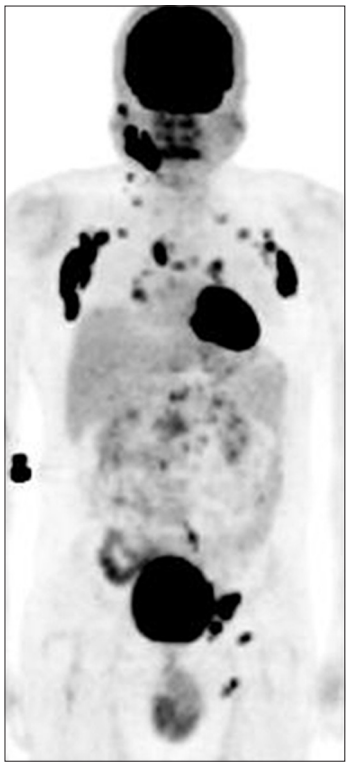

Figure 1: Maximum intensity projection fluoro-D-glucose positron emission tomography/computed tomography image demonstrated multifocal fluoro-D-glucose avid generalized lymphadenopathy (maximum standardized uptake value 13.8) with the pattern of hypermetabolic lesions mimicking lymphoma

DISCUSSION

The diagnosis of EPTB is sometimes very difficult, generally because of nonspecific symptoms, atypical clinical and radiological

Table 1: Maximum SUVmax for EPTB lesions pre- and post-anti-tubercular treatment

EPTB lesions (lymph nodes)	Maximum SUVmax pre anti-tubercular treatment	Maximum SUVmax post anti-tubercular treatment
Right preauricular	3.2	0.6
Right intrapulmonary	12.3	0.52
Right cervical level I	6.5	4.1
Right cervical level II	2.5	1.6
Right cervical level III	2.5	1.7
Right and left supraclavicular	2.5, 2.2	0.43, 0.29
Right paratracheal	8.1	4.7
Precarinal	3.8	1.1
Subcarinal	2.3	0.94
Aortopulmonary	2.4	0.77
Left and right hilar	5.1,4.6	1.1, 0.64
Intrapulmonary	3.2	1.5
Left and right axillary	13.8, 12.7	1.3, 4.2
Peripancreatic	4.2	1.2
Para aortic	2.8	1.2
Paracaval	2.6	0.77
Mesenteric	2.3	1.1
Left common iliac	5.1	0.79
Left internal iliac	3.7	0.84
Left external iliac	9.5	0.51
Left inguinal	10.2	0.63
Left femoral	5.4	0.64

SUVmax: Maximum standardized uptake value, EPTB: Extra-pulmonary tuberculosis

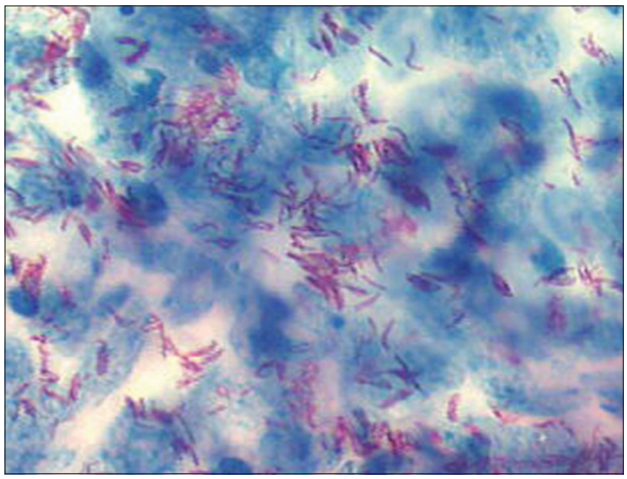

Figure 2: Lymph node fine needle aspiration cytology showing Ziehl–Neelsen staining, strongly positive for acid-fast bacilli

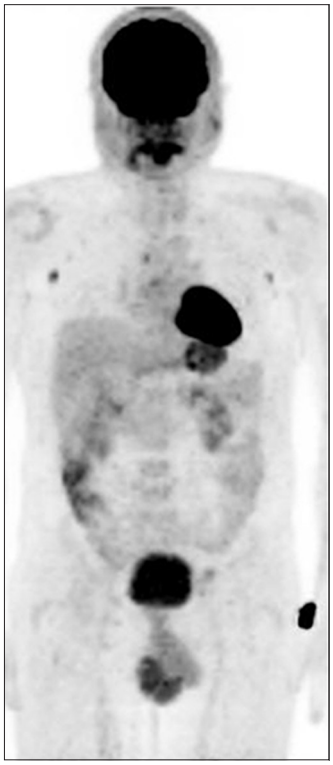

Figure 3: Maximum intensity projection fluoro-D-glucose positron emission tomography/computed tomography showing remarkable improvement of disease after 6 months of anti-tubercular treatment, with residual hypermetabolism noted at right cervical level I, right paratracheal, and right axillary lymph nodes after the treatment

findings, inconclusive conventional TB laboratory tests, or lack of right tissue sample for biopsy.

The role of ^{18}F-FDG PET/CT is well established in oncological imaging but higher uptake of FDG is not only specific to cancerous cells but also indicates the presence of active infections or inflammatory cells.[5] The reason behind the high uptake of FDG in active infections or inflammatory cells is due to the higher rate of glycolysis.[14] In general, FDG avid generalized lymphadenopathy suggests lymphoma but it may be due to several other benign etiologies including tuberculosis and sarcoidosis.[8-15] The present case report shows, how the FDG avid generalized EPTB lesion scans mimic lymphoma. However, once confirmed to be tubercular on tissue biopsy, FDG PET/CT can be a potential tool for monitoring the therapeutic response of treatment. In the present case study, a remarkable decrease in SUVmax value has been noted in previously FDG avid lesion suggesting good response to the treatment.

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Conflicts of interest

There are no conflicts of interest.

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