Case Report

Comparision of F-18 FDG and C-11 Methionine PET/CT for demonstration of subependymal deposit in a treated case of glioblastoma multiforme

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ABSTRACT

A 10-year-boy post-operative, post-radiotherapy case of left temporal glioblastoma multiforme (GBM) was referred for F-18 Flurodeoxyglucose (FDG) Positron emission tomography/Computed Tomography (PET/CT) to rule out residual/recurrent disease 6 months following completion of therapy. The FDG scan 3 months following therapy had not shown evidence of viable residual or metastatic disease. The present scan showed a tiny focus of abnormal FDG accumulation in the region of the trigone of the left lateral ventricle which was best appreciated on the plain PET image. A correlative C-11 methionine study showed a well defined focus of abnormal tracer accumulation in the region of the left trigone. CECT and MRI done subsequently proved it to be a subependymal deposit. This case therefore demonstrates the possibility of subependymal deposits in GBM and the need for this possibility to be entertained during interpretation of the FDG study. It also highlights the advantage of labelled amino acids like C-11 methionine for clearly delineating subependymal deposits apart from the advantage for unequivocal interpretation of the PET study in recurrent brain tumors.

Keywords: C-11 methionine, F-18 FDG, GBM, subependymal deposit

INTRODUCTION

Both F-18 Fluorodeoxyglucose (FDG) and C-11 Methionine PET/CT studies were done in a treated case of glioblastoma multiforme who was sent for evaluation of recurrence. Apart from recurrence at the primary site a subependymal deposit was noted in the trigone of the lateral ventricle which was well demonstrated on the C-11 Methionine study as compared to the F-18 FDG study. This case therefore highlights the important role that C-11 Methionine can play for evaluating not only recurrence but also metastatic deposits which are a possibility in such high grade tumors.

CASE REPORT

A 10-year-boy post-operative, post-radiotherapy case of left temporal glioblastoma multiforme (GBM) was referred for F-18 Flurodeoxyglucose (FDG) Positron emission tomography/Computed Tomography (PET/CT) to rule out residual/recurrent disease 6 months following completion of therapy. The FDG scan 3 months following therapy had not shown evidence of viable residual or metastatic disease. 185 MBq of F-18 FDG was injected intravenously and the patient was rested for one hour followed by the PET/CT acquisition on a Discovery STE 16 camera (GE). Low dose CT was followed by 3D PET emission scan of the brain for 15 minutes. Images were reconstructed by 3D VUE algoritm (GE) and viewed on a Xeleris workstation (GE) using the volumetrix protocol. A tiny focus of abnormal FDG accumulation was noted in the region of the trigone of the left lateral ventricle which was best appreciated on the plain PET image [Figure 1-arrow].

A correlative C-11 methionine study was done the next day 20 minutes following intravenous injection of 740 MBq of the tracer. A 20 minutes static acquisition of the brain was followed by head CECT. A well-defined focus of abnormal tracer accumulation in the region of the left trigone [Figure 2-arrow] was well-appreciated on the MIP, plain PET and fused PET/CT methionine images. F-18 FDG has been used

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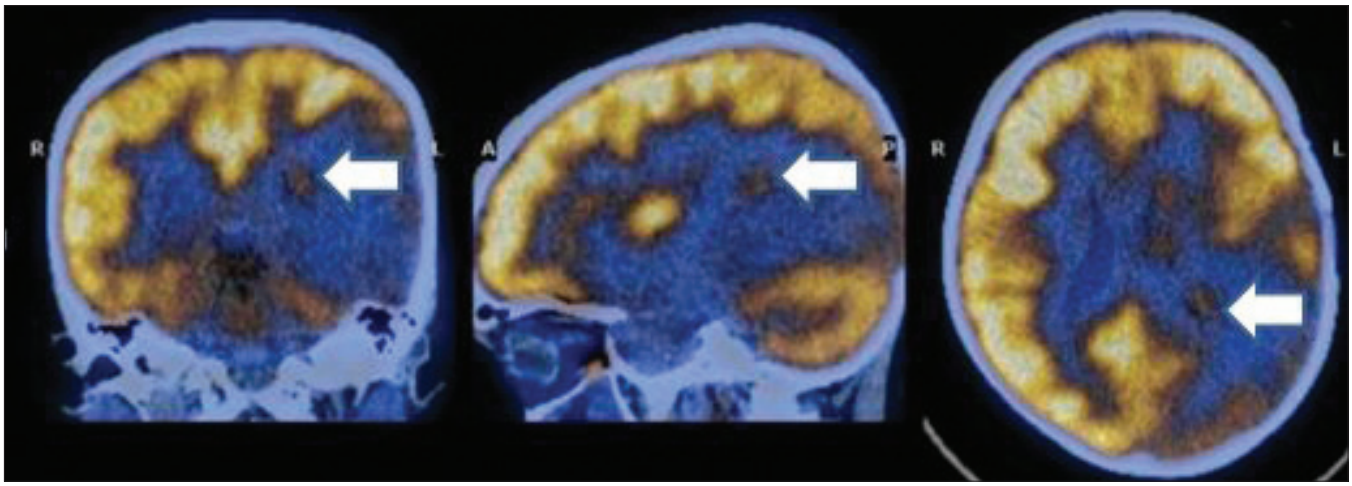

Figure 1: Coronal, Saggital and Transaxial fused F-18 FDG PET/CT images

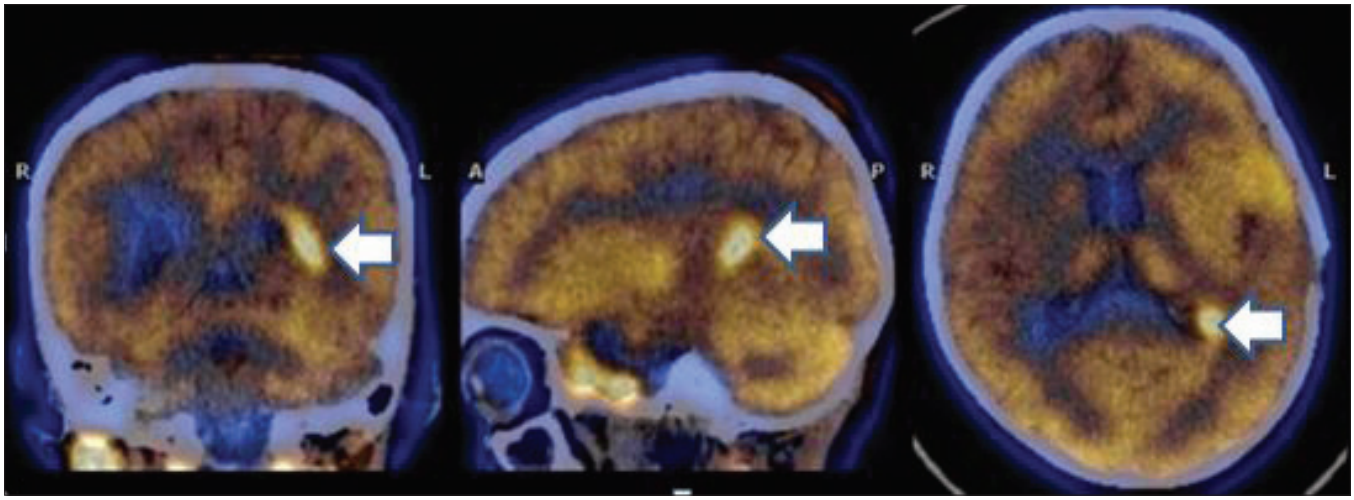

Figure 2: Coronal, Saggital and Transaxial fused C-11 Methionine PET/CT images

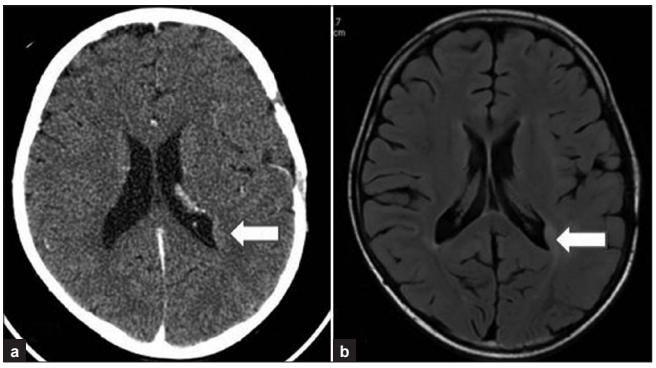

Figure 3: (a) Axial CECT done subsequently showing the mildly enhancing subependymal nodule and (b) axial flair MR sequence showing the hyperintense subependymal nodule in the trigone of the left lateral ventricle

for evaluation of brain tumors.[1,2] It is actively transported across the BBB into the cell where it is phosphorylated. F-18 FDG uptake can vary greatly but uptake is high in high grade tumors and their metastases. However, because of the high rate of physiologic glucose metabolism in normal brain tissue the detectability of lesions is restricted. Amino acid PET tracers like C-11 methionine in contrast have high uptake in tumor tissue and low uptake in the normal brain, thus giving better lesion to background ratios.[3,4] They are transported into the cell via carrier mediated transport processes and transport is upregulated following malignant transformation.[5] In this case because the subependymal deposit was away from the grey matter it could be visualised on F-18 FDG PET, however this deposit was clearly delineated on the C-11 methionine study and correlated well with the CECT and MRI findings [Figure 3]. GBM is the most aggressive type of brain tumor and has a very poor prognosis. The tumor may extend into the meninges or ventricular wall and malignant cells carried in CSF may spread to the spinal cord or cause meningeal gliomatosis. Though various studies in literature have compared F-18 FDG with C-11 methionine for evaluation of gliomas and recurrent brain tumors.[6-8] Their comparison in metastases such as this subependymal deposit has not been reported. The possibility of subependymal metastases should be kept in mind while reporting the F-18 FDG brain study in GBM and these deposits can be well delineated with amino acid tracer such as C-11 Methionine study.

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