Case Report

Unilateral thalamic hypometabolism on FDG brain PET in patient with temporal lobe epilepsy

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ABSTRACT

Interictal Brain F-18 fluorodeoxyglucose (FDG) Positron Emission Tomography (PET) imaging has been widely used for localizing the focus of a seizure. Hypometabolism in the extratemporal cortex on FDG-PET study is an important finding to localize seizure focus, which might be seen as ipsilateral, contralateral or bilateral thalamus hypometabolism in epileptic patients. In this case report, it is aimed to show ipsilateral thalamus hypomethabolism on FDG PET brain study of a 24-year-old male patient with temporal lobe epilepsy.

Keywords: FDG PET, temporal lobe epilepsy, thalamus hypometabolism

INTRODUCTION

Positron emission tomography with Fluorine-18 fluorodeoxyglucose (F-18 FDG PET) has been widely used to examine epileptic patients. Interictal brain F18-FDG PET is a useful imaging technique for localizing the focus of a seizure. Temporal lobe hypometabolism is a characteristic finding for temporal lobe epilepsy (TLE) on FDG PET study. However, extratemporal hypometabolism can be seen and characteristics of the alteration of perfusion in the thalamus in epileptic patients have not been well-described. Thalamic hypometabolism has been observed in TLE.[1,2] Thalamus has diffuse connections throughout the brain and its role in seizure activity is likely to be complex, so thalamic hypometabolism in patients with TLE is documented.[3] It is believed that thalamus plays a role in regulating or gating seizure activity.[4] The prevalence of thalamic hypometabolism suggests a pathophysiologic role in initiating temporal lobe seizures. Ipsilateral or contralateral thalamic hypometabolism is a supplementary finding on PET scan in TLE patients and can aid epileptic foci.[5]

CASE REPORT

A 24-year-old male patient with a history of TLE was referred to our Nuclear Medicine department for FDG PET Brain imaging. For Brain PET study**,** patient was injected 336,7 MBq (9,1mCi) F-18 FDG and after waiting 45 minutes in a silent room, he was imaged using an integrated PET/CT camera, which was 10 minutes for routine imaging and consists of a 6-slice CT gantry integrated on a LSO based full ring PET scanner (Siemens Biograph 6, IL, Chicago, USA). Axial PET [Figure 1a], axial fusion [Figure 1c] and coronal fusion [Figure 1d] images showed hypometabolism in right thalamus [Figure 1; arrow]. In axial CT image, right thalamus can be seen in normal localization [Figure 1b]. Coronal PET image shows right temporal hypometabolism as a characteristic finding for TLE.

DISCUSSION

F-18 FDG PET brain study often used to help localize the seizure focus in epileptic patients. In most studies, F-18 FDG is given in the interictal state to find epileptogenic focus. Interictal FDG-PET depicts hypometabolism in the epileptogenic region in 60–90% of patients with TLE.[6] On FDG-PET, hypometabolism in the extratemporal cortex is not an uncommon finding in patients with TLE.F-18 FDG-PET studies in patients suffering from TLE have shown hypometabolism of the affected temporal lobe.[7,8] PET studies in patients with TLE investigating glucose utilization in the subcortical brain structures suggest a hypometabolism especially in the thalamus and caudate nucleus ipsilateral to the side of the epileptogenic focus. The mesial temporal lobe structures, i.e. amygdala and the hippocampus play a major role in the initiation of seizures in TLE.[9]

It is reported that thalamic hypometabolism may not be seen with TLE. Henry *et al* reported that 3 of their 27 patients had

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Quick Response Code:

Website: www.ijnm.in

DOI: 10.4103/0972-3919.90260

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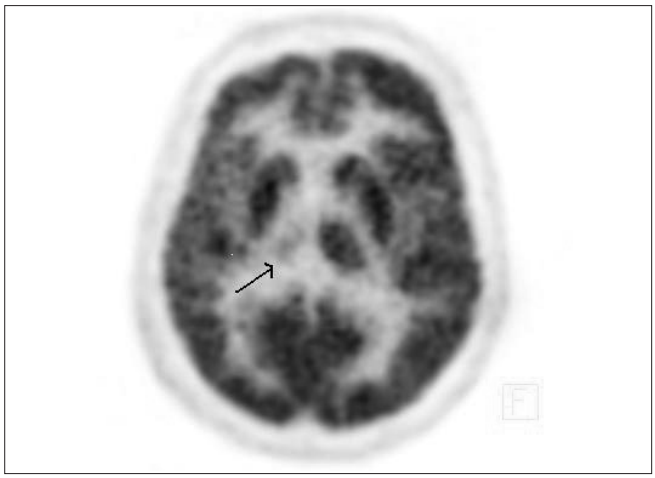

Figure 1a: Axial PET image shows hypometabolism in right thalamus (arrow)

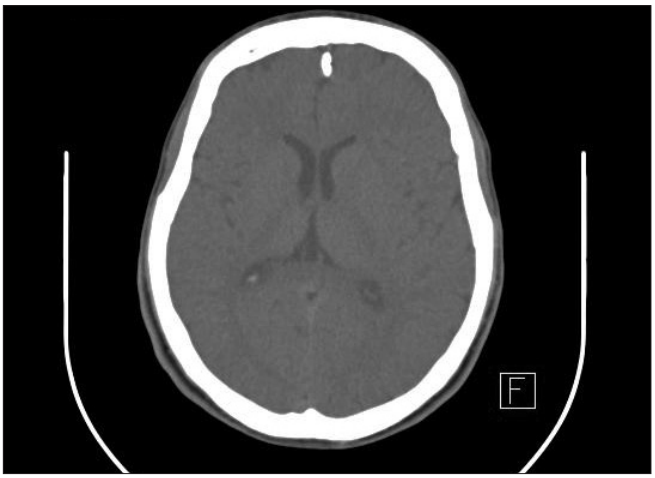

Figure 1b: In axial CT image, right thalamus can be seen in normal localization

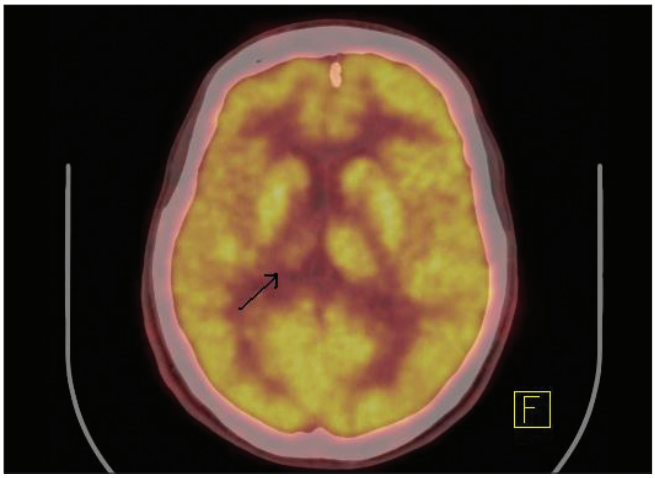

Figure 1c: Axial fusion image shows right thalamic hypometabolism (arrow)

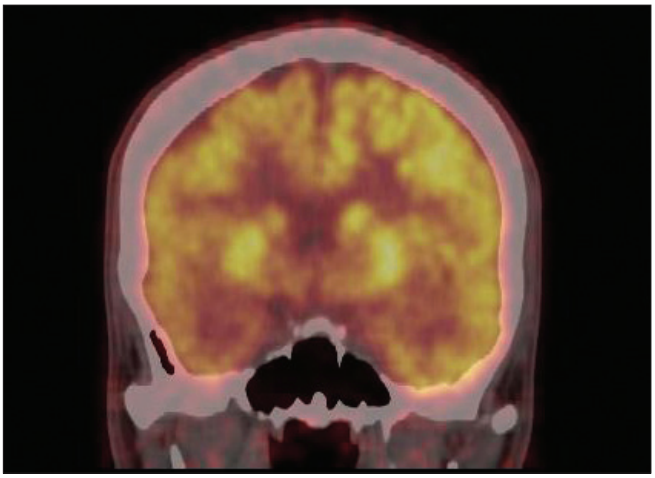

Figure 1d: Coronal fusion image shows right thalamic hypometabolism

thalamic hypometabolism in the absence of temporal lobe hypometabolism. They suggested that any of the anatomic patterns of interictal hypometabolism can occur in individual patients with TLE.[10]

Yune *et al* reported thalamic hypoperfusion ipsilateral to temporal hypoperfusion in 12 (26%) of 46 patients with TLE who underwent interictal brain single-photon emission computed tomography (SPECT). The observation that contralateral thalamic hypometabolism may be associated with a poor postoperative seizure outcome may have a physiologic explanation.[11]

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How to cite this article: Sager S, Asa S, Uslu L, Halac M. Unilateral thalamic hypometabolism on FDG brain PET in patient with temporal lobe epilepsy. Indian J Nucl Med 2011;26:94-5.

Source of Support: Nil. **Conflict of Interest:** None declared.