

Case Report

DaT Scan “Abnormality” in Hyperglycemic-Hemichorea

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Abstract

Background: Hyperglycemic-hemichorea is a well-established clinical entity which leads to signal changes on brain MRI. We are reporting a case of hyperglycemic-hemichorea where the DaT scan showed reduced uptake bilaterally.

Case Report: A 57-year-old female was seen in the clinic for hemichorea due to hyperglycemia. Her brain magnetic resonance imaging (MRI) showed increased T1 signal intensity in bilateral lenticular nuclei and the DaT scan showed reduced uptake on both sides.

Discussion: This case highlights the importance of performing a DaT scan in the correct clinical context, as an abnormality on brain MRI can lead to false-positive DaT scan results.

Keywords: DaT scan, basal ganglia, hyperglycemia, hemichorea, hemiballism

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Introduction

Hemichorea-Hemiballism (HCHB) is a well-known complication of hyperglycemia which can also be seen with new-onset diabetes.¹ The prognosis of this condition is variable with improvement, disappearance, and persistence of chorea reported in the literature.¹ The pathophysiology of this disorder is poorly understood and T1 hyperintensity on brain MRI contralateral to the side of chorea is a well-known imaging finding.² The purpose of this case is to discuss the abnormality on DaT scan in a case of HCHB and utilization of DaT scan in the correct clinical context.

Case report

A 57-year-old woman with a past medical history of poorly controlled diabetes mellitus type 2 developed numbness and spontaneous abnormal movements of the left upper extremity 1 week after a fall on her left shoulder. Her blood glucose at that time was noted to be over 500 mg/dL. Her physical examination showed left hemichorea and the absence of hypokinesia (video 1). Magnetic resonance imaging (MRI) head without contrast demonstrated increased T1 signal intensity in the lenticular

nucleus on both sides (Figure 1). Her final diagnosis was hyperglycemic-hemichorea, and amantadine was prescribed.

The phenomenology of the movement was considered to be tremor at an outside center so a DaT scan was requested. DaT scan single-photon emission computerized tomography (SPECT) was completed with [123I] FP-CIT, which demonstrated absent uptake in the bilateral putamen and moderately diminished uptake in the right caudate head as noted in Figure 2. She was diagnosed with parkinsonism and referred to the movement disorders center for further evaluation.

Discussion

We present a case that demonstrates the importance of utilizing the DaT scan imaging technique in the correct context. The phenomenology of this patient’s movement disorder was consistent with chorea because it was not rhythmic in contrast to tremor and was flowing in nature.³ It must be emphasized that the diagnosis of parkinsonism relies on clinical features such as bradykinesia, rigidity, etc., and approach to a patient with an abnormal movement disorder relies on good clinical examination.⁴ DaT scan utilizes radiotracers such as

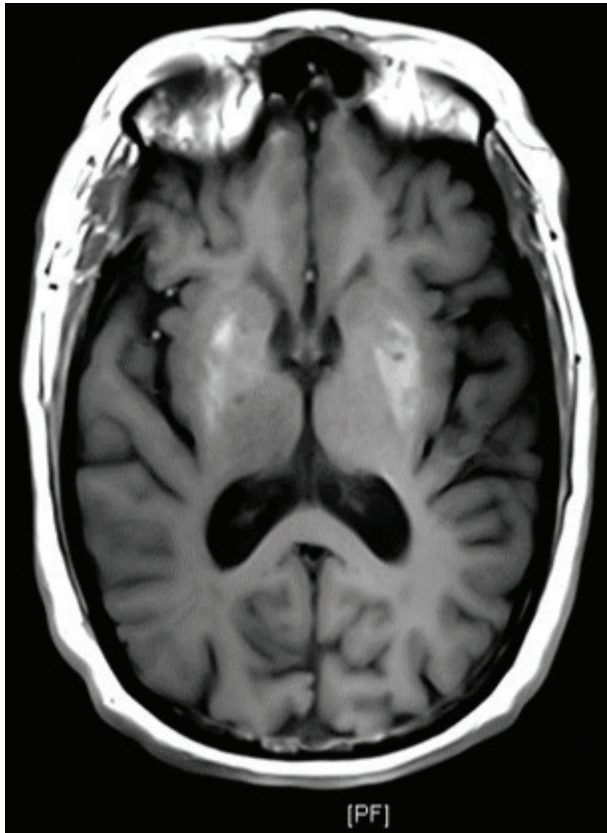


Figure 1. MRI Brain. Axial T1 Image Shows Hyperintensity in the Bilateral Basal Ganglia.



Video 1. Chorea in the Left Upper and Left Lower Extremity. There is no evidence of parkinsonism on examination.

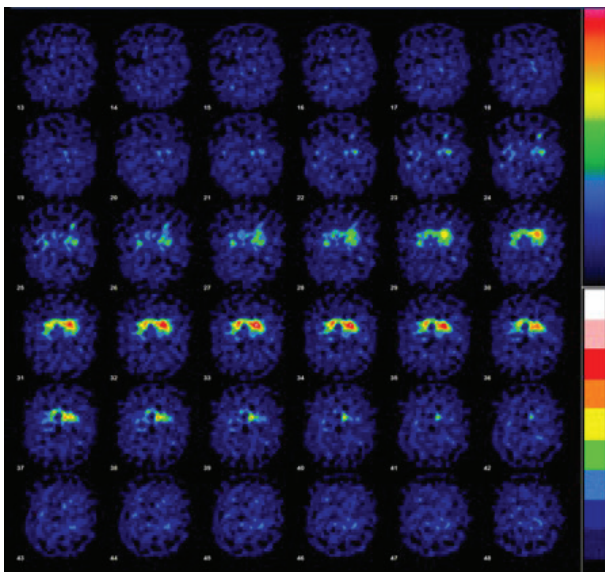


Figure 2. DaT Scan. DaT SPECT with [123I] FP-CIT Shows Absent Uptake in the Bilateral Putamen and Moderately Diminished Uptake in the Right Caudate Head.

β -CIT [123I-CIT (2 β -carbomethoxy-3 β -(4-iodophenyl) tropane)], 123I-ioflupane [123I-N- ω -fluoropropyl- β CIT] (abbreviated 123I-FP-CIT), or 99mTc-TRODAT [2-[[[2-[[[3-(4-chlorophenyl)-8-methyl-8-azabicyclo[3.2.1]oct-2-yl]methyl](2-mercaptoethyl)amino]ethyl]-amino]ethanethiolato-(3-)-N₂,N₂',S₂,S₂']oxo-[1R-(exo-exo)] that bind dopamine transporter (DAT) on the pre-synaptic dopaminergic nerve terminals.^{5,6} 123I-FP-CIT is the most commonly used radiotracer due to the shorter interval between administration and imaging, and lack of competitive inhibition from dopamine allowing the patient to continue taking levodopa therapy.⁶ DaT concentration is a marker for dopamine terminal integrity, hence decreased radiotracer uptake is consistent with degeneration of dopaminergic projections from the substantia nigra and correlates with high specificity for parkinsonism.⁷ DaT scan is only approved to differentiate essential tremor (ET) from other neurodegenerative disorders (<https://www>.

accessdata.fda.gov/drugsatfda_docs/label/2011/022454Orig1s000Lbl.pdf [accessed: October 6, 2019]). The pattern of dopaminergic cell loss seen in parkinsonian syndromes follows a rostral-caudal gradient typically starting with the putamen first and later involving the caudate.⁶ However, when MRI signal abnormalities are present in the basal ganglia, DaT scan results must be interpreted with caution.⁸ Some reported cases in the literature^{9–13} attribute parkinsonism due to abnormal DaT scan despite abnormality on structural imaging. It is therefore imperative that the results of DaT scan are interpreted in the context of structural imaging findings. An abnormality on structural imaging always gives false-positive results on Positron Emission Tomography (PET) or SPECT imaging as seen with stroke, gliosis, etc.¹⁴ The lesions involving the basal ganglia can lead to either a hypokinetic or hyperkinetic movement disorder depending on the involved pathway. Hence, a patient with a structural abnormality in the basal ganglia can have a hyperkinetic movement disorder despite an abnormal DaT scan. F-18 labeled deoxyglucose (FDG)-PET scan in patients with hyperglycemic-hemichorea has shown reduced metabolism in the basal ganglia contralateral to the side of chorea.¹⁵ There is a possible failure of metabolism in the affected basal ganglia or transient ischemia leading to swollen astrocytes (due to injury) and abnormality on brain MRI.¹⁵ The most likely explanation for an abnormal DaT scan in our case is the structural change seen on brain MRI (swollen astrocytes).^{16,17} Another case of hyperglycemic HCHB with an abnormal DaT scan on the side of abnormal brain MRI has been reported but this represents a false-positive finding in the wake of structural abnormality on brain MRI.¹⁸

In our case, DaT scan results indicative of a parkinsonian uptake pattern only contributed to diagnostic confusion since the patient did not have exam findings suggestive of parkinsonism and had T1 signal abnormality on MRI brain corresponding to decreased radiotracer uptake.

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