

LETTER TO THE EDITOR**TO THE EDITOR****Abolition of Hyperglycaemic Hemichorea and Recurrence after Medical Illness**

Keywords: Hyperglycaemic hemichorea, Recurrence, Voxel-based subtraction analysis

Choreoballism (CB) can develop as a complication of diabetes mellitus (DM). Although the recurrence of CB was reported, it was related to drug discontinuation or transient hyperglycaemia or was without evident provoking factors.¹ Herein, we report a case of hyperglycaemic CB that persisted for longer than a year, was resolved by cerebral infarction, and then returned after medical illness.

A 62-year-old woman with poorly controlled DM visited our department due to sudden-onset involuntary movements. Her neurological examination (NE) was normal, with the exception

of involuntary movements consisting of continuous, irregular, mixed choreic and ballistic movements involving the left face, arm and leg. At admission, her serum glucose was 195 mg/dl and her glycated haemoglobin (HbA1c) 16.2%. MRI showed hypointensities on T2-weighted image, hyperintensities on T1-weighted image and normal diffusion-weighted image in the right putamen (Figure 1A). ¹⁸F-fluorodeoxyglucose positron emission tomography (¹⁸F-FDG-PET) showed hypometabolism in the right putamen (Figure 1D).

Serum glucose was controlled (HbA1c < 7 %). Various drugs including haloperidol and tetrabenazine were ineffective for CB. She showed postural instability after anti-dopaminergic drugs including clozapine. The second MRI showed no new lesions. ¹⁸F-fluorinated N-3-fluoropropyl-2-beta-carboxymethoxy-3-beta-(4-iodophenyl) nortropine (¹⁸F-FPCIT) PET showed decreased uptake in the right putamen (Figure 1B). Levodopa was effective. Both clozapine and levodopa were tapered, leaving CB as the lone symptom.

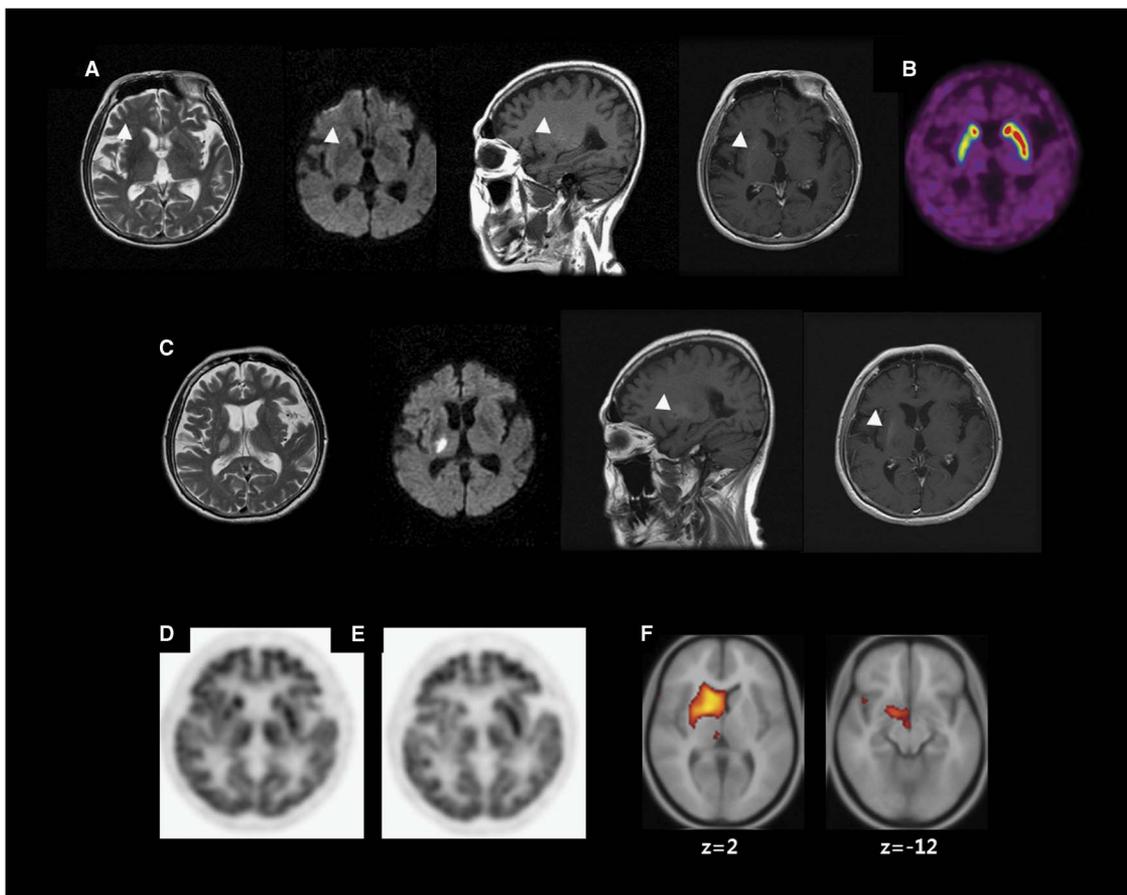


Figure 1: Neuroimaging. (A) Brain MRI at the first presentation of hemichorea shows low signal intensity on T2-weighted image (T2WI), high signal intensity (HSI) on T1-weighted image (T1WI) without (sagittal) or with (axial) gadolinium enhancement and diffusion weighted image (DWI) (arrow heads). (B) ¹⁸F-fluorinated N-3-fluoropropyl-2-beta-carboxymethoxy-3-beta-(4-iodophenyl) nortropine (¹⁸F-FPCIT) positron emission tomography (PET) shows decreased ¹⁸F-FPCIT uptake in the right putamen. (C) The third MRI shows acute infarction in the right thalamus on T2WI and DWI. T1WI without (sagittal) or with (axial) gadolinium enhancement shows persistent HSI in the right putamen (arrow heads). (D) ¹⁸F-fluorodeoxyglucose (¹⁸F-FDG) PET shows hypometabolism in the right putamen. (E) A follow-up ¹⁸F-FDG-PET shows hypometabolism in the right caudate nucleus (CN), putamen and thalamus (54 months after the initial ¹⁸F-FDG-PET). (F) Voxel-based subtraction analysis of ¹⁸F-FDG-PET shows decreased metabolism of the right CN, putamen, subthalamic area and thalamus in the follow-up scan.

She had been followed up for persistent CB for 15 months until sudden-onset left hemiparesis developed. The third MRI showed an acute infarction in the right thalamus (Th) and corona radiata (CR; Figure 1C). NE showed left hemiparesis without sensory deficit. After she recovered from hemiparesis, she remained free of CB.

Three years later, she was hospitalized for coronary heart disease and an appendectomy (HbA1c < 7.5%). The hemichorea returned during hospitalization without any suspected drugs. Choreic movements of her left hand were temporarily mixed with dystonia in the early follow-up but became purely choreic later. No new lesion was demonstrated on the fourth MRI. ¹⁸F-FDG-PET was repeated and compared with the previous using voxel-based subtraction analysis, demonstrating decreased metabolism in the right subthalamic nucleus (STN), caudate nucleus (CN), putamen and Th (Figure 1E–F).

Because of multiple morbidities and mildly severe hemichorea, only clonazepam was added. Her hemichorea persisted for longer than a year.

The patient's CB was present for 15 months before an infarction and persisted after recurrence. The protracted clinical course was not related to DM control. Delayed introduction of DRB and an extended lesion were suggested as risk factors for persistent CB, but were not applicable to our case.²

Because dystonic movement was mixed with chorea in the early phase of the recurrence, post-stroke dystonia or pseudo-athetosis related to the thalamic infarction is to be considered. Interestingly, the involuntary movements became purely choreic afterwards. The phenotypic transition could be a result of repositioning the role of Th upon recurrence.

A few cases with essential tremor have been reduced by structural lesions interrupting the corticospinal tract or cerebellar connection.³ One case of hyperglycaemic CB resolved due to an infarction that affected the CR and putamen.⁴ In the present case, the infarction affected the CR and Th, a key BG loop structure that activates the cortex. The thalamic lesion hampered activation of the cerebral cortex, which played a critical role in terminating her CB in addition to CR infarction.

PET subtraction analysis revealed hypometabolism in the CN and STN. Focal lesions in either the CN or STN have been shown to result in secondary CB. Thus, the recurrence of her hemichorea could be related to STN or CN dysfunction, which could dominate over the beneficial effect of pre-existing Th infarction on her CB. Previously, we suggested that a faulty network for CB had formed during the first episode as a pathologic basis for recurrence in a patient with hypoglycaemic CB.⁵ Similarly, an aberrant network could have been generated during the initial episode under the influence of the putaminal lesion. This network might have been further modified by an additional thalamic lesion, which was evidenced by a temporary combination of chorea and dystonia. Although the direct mechanism of hypometabolism in the CN and STN was uncertain, this network might consist of structural lesions in the putamen and thalamus and metabolic derangement of the CN and STN. The pathologic network might have been submerged, until it may be relinquished in association with multiple factors such as unstable circulation and surgery.⁵ The relationship between this hypothetical network and the prolongation of CB remains to be studied.

An abnormal dopamine transporter scan was once reported in a patient without parkinsonism.⁶ In this case, as ¹⁸F-FPCIT-PET

was normal in the left putamen, her postural instability recovered, and no other parkinsonian symptoms and signs were observed during follow-up, and she was not suffering from ongoing de novo parkinsonism. However, striatal dopamine deficiency might be a risk factor for her vulnerability to clozapine.

This case captures uncommon features of hyperglycaemic CB, such as repeated prolongation of clinical course and recurrence. To our knowledge, this is the first case of CB resolution by Th infarction. In addition, recurrence related to STN and CN hypometabolism is also unprecedented, providing insight into CB pathophysiology.

DISCLOSURES

The authors hereby declare that they have no conflicts of interest to disclose.

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SUPPLEMENTARY MATERIAL

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REFERENCES

- Oh SH, Lee KY, Im JH, Lee MS. Chorea associated with non-ketotic hyperglycemia and hyperintensity basal ganglia lesion on T1-weighted brain MRI study: a meta-analysis of 53 cases including four present cases. *J Neurol Sci.* 2002;200:57-62.
- Su CS, Chang YY, Liu KT, Lan MY, Liu JS. Risk factors for prolonged hemichorea-hemiballism caused by hyperglycemia. *Parkinsonism Relat Disord.* 2012;18:96-8. Epub ahead of print Jul 7, 2011.
- Hallett M. Tremor: pathophysiology. *Parkinsonism Relat Disord.* 2014;20(Suppl 1):S118-22.
- Kim YD, Cho HJ, Song IU, Chung SW. Complete disappearance of hemichorea-hemiballism due to hyperglycemia following acute ischemic stroke. *Eur Neurol.* 2011;66:339-42. Epub ahead of print Nov 15.
- Lee D, Lee D, Ahn TB, Hong IK, Kim DY. Recurrent hemichorea after a hypoglycemic episode. *Parkinsonism Relat Disord.* 2014;20:676-7. Epub ahead of print Mar 15.
- Belcastro V, Pierguidi L, Tambasco N, Sironi L, Sacco L, Corso A, et al. Decreased contralateral putamen [I]FP-CIT SPECT uptake in hyperglycemic hemichorea-hemiballismus. *Eur Neurol.* 2011;65:307-8. Epub ahead of print May 13.