Journal of Vascular and Interventional Neurology
Official journal of Zeenat Qureshi Stroke Research Center

Limb-Shaking Transient Ischemic Attack Associated with Focal Electroencephalography Slowing: Case Report

Antonio Siniscalchi, MD[1‡], **Luca Gallelli, MD, PhD**[2], **Giovanni Malferrari, MD**[3], and **Giovambattista De Sarro, MD**[2]

[1] *Department of Neuroscience, Neurology Division, "Annunziata" Hospital, Cosenza, Italy ‡ Regional delegate SINV*

[2] *Department of Experimental and Clinical Medicine, University Magna Grecia of Catanzaro, Clinical Pharmacology Operative Unit, Mater Domini University Hospital, Catanzaro, Italy*

[3] *Department of Neurology, Santa Maria Nuova Hospital, Reggio Emilia, Italy*

Abstract

Background: Limb shaking is a rare form of transient ischemic attack (TIA) that can easily be confused with focal motor seizures. **Case:** We report a case of a 61-year-old man with rhythmic jerky movements of his left limb, without loss of awareness, that have occurred about once per month for the past four months, precipitated by standing up and extending the neck. The electroencephalography test showed right temporal slow activity, without epileptiform features. No evidence of a noteworthy structural lesion was found on magnetic resonance imaging of the brain. Doppler ultrasound and magnetic resonance angiography of the neck disclosed an 80% stenosis of the right internal carotid artery. The patient underwent an endarterectomy of the right internal carotid artery and remained asymptomatic in the 12-month follow-up period.

Discussion: Both hypoperfusion and reduction of vasomotor reactivity to hypercapnia of corresponding cerebral territories, without the structural lesions of the brain, were observed in patients with limb-shaking syndrome (LSS). Electroencephalographic studies have failed to show epileptiform activity associated with LSS, although some patients have controlateral slow activity. In our patient, we observed a resolution of the attacks after endarterectomy of controlateral internal carotid artery, suggesting that a quick diagnosis of this form of TIA is important both to abolish the attacks and to reduce the risk of major stroke.

Keywords

Doppler ultrasound; EEG; Limb-shaking TIA

Introduction

Transient ischemic attacks (TIAs) typically present us with neurological deficits, such as loss of muscle power, sensation, or vision. Symptoms such as transitory movement disorders are not generally regarded to be a feature of cerebral ischaemic episodes. However, limb shaking is a rare form of TIA that can easily be confused with focal motor seizures (1). The diagnostic difficulty is not easy because cerebral ischemic damage represents the most common cause of epilepsy in the elderly (1). Yet, it is important to distinguish limb-shaking TIAs and focal seizures, because this form of TIA could be related to both severe carotid occlusive disease and high risk of stroke (1–3). Furthermore, a rapid diagnosis with surgical revascularization procedures in appropriate cases is able to reduce both attacks and major stroke (1). We report a case of patient being initially worked up as suspicion of focal epileptic seizure and then diagnosed to a high-grade stenosis of controlateral carotid artery, calling attention to the relevance of the diagnosis of this form of TIA.

Case report

A 61-year-old man with a medical history of moderate hypertension well-treated with Enalapril (20 mg/day)

Published June, 2012.

Corresponding author: Antonio Siniscalchi, MD, ClinicalSpecialist, Departement of Neuroscience, NeurologyDivision, Annunziata Hospital, Via F. Migliori, 1, 87100- Cosenza, Italy, Tel. 0039-0984-681351, Fax 0039-0984-21631Email: anto.siniscalchi@libero.it
*Siniscalchi and Gallelli share the authorship.

comes under our observation for rhythmic jerky movements of his left limb. These episodes, without loss of awareness, would occur at 4–5 Hz, each lasting for 1-2 mins, and taking place about once per month for the past four months, precipitated by standing up and extending the neck. The family history was negative.

There was no history of alcohol, drug abuse, or episodes of syncope. Neurological examination was normal and no orthostatic hypotension was documented. The electroencephalography (EEG) test showed right temporal slow activity, without epileptiform features. No evidence of a noteworthy structural lesion was found on magnetic resonance imaging (MRI) of the brain. Doppler ultrasound and magnetic resonance angiography (MRA) of the neck disclosed an 80% stenosis of the right internal carotid artery. In our patient, the focal slow activity in EEG, with normal structural imaging studies, probably related to resting regional cerebral hypoperfusion, prompted the diagnosis of low-flow TIA. The patient underwent an endarterectomy of the right internal carotid artery and remained asymptomatic in the 12-month follow-up period.

Discussion

Carotid stenosis is not a relevant clinical finding in most instances of movement disorders, so paroxysmal hyperkinesias do not constitute an exception. Moreover, clinicians usually relate transient focal clonic jerks in patients with cerebrovascular disease to symptomatic epilepsy. Nevertheless, since Miller--Fisher's first description of temporary limb-shaking syndrome (LSS), associated with contralateral carotid stenosis (1), this diagnosis has been regularly reported over the years. The exact mechanism of the limb movements is unclear. The fact that the episodes occurring in patients with severe carotid occlusive disease (1) are often precipitated by standing up (1) and improve after revascularisation procedures (1) strongly suggests that they are due to transient focal haemodynamic failure. Why this should produce limb shaking is uncertain. It can be explained by the "hypoperfusion theory," in which carotid stenosis and orthostatism lead to decreased cerebral blood flow in critical watershed territories. In an assessment of 51 patients with infarcts in watershed cerebral territories, 12% were found to experience focal limb shaking (1). In his physiological studies, Tatemichi et al used xenon-133 to detect regional decreases of cerebral blood flow and found significant hypoperfusion of the right dorsofrontal and upper rolandic regions contralateral to the shaking limb in a 63-year-old patient (2). In a clinical study, using transcranial Doppler, the authors showed a reduction of vasomotor reactivity to hypercapnia in all hemispheres opposite the involuntary limb movements in five patients (1). Later, in another study, positron emission tomography (PET) scan imaging revealed acetozolamide induced hypoperfusion of corresponding cerebral territories in a patient with LSS, further suggesting hemodynamic failure as the cause of TIAs with limb shaking (1).

In our patient the attacks have persisted for four months without the development of cerebral infarction and the diagnosis of low-flow TIA was made. Recently, Persoon et al showed that limb-shaking transient ischaemic attacks in patients with an internal carotid artery occlusion can be recognized by their short duration (less than 5 min) (3). According to our observation, in our patient, these rhythmic jerky limb movements also last 1 to 2 mins.

Electroencephalographic studies have failed to show the epileptiform activity associated with LSS, although some patients have controlateral slow activity (1,4). Induction of repetitive involuntary movements in nine electroencephalographically monitored patients rendered abnormal findings in two: one had diffuse delta slowing and the other temporal delta slowing (3). A focal delta EEG slowing with normal structural imaging studies was described in four older patients with limb-shaking TIA (5). In our patient, without the structural lesions to the brain's MRI, the EEG showed a focal slow activity. These patients with limb-shaking TIA are at high risk of suffering a stroke (1), and recognizing episodic limb shaking as potential TIAs is therefore important. The management of low-flow TIAs focuses on maintaining or improving cerebral blood flow by careful control of blood pressure and surgical revascularization. In several cases, an improvement of symptoms has been reported after raising blood pressure (1) and after surgical revascularization, like endarterectomy (1). In the presence of concomitant cardiac and renal disease, this may be harmful. In such cases, more aggressive treatment of hypertensions is possible after surgical revascularization, which is also effective in abolishing the attacks (1).

In our patient after endarterectomy of the controlateral right internal carotid artery for high-grade stenosis, we observed a resolution of the attacks in the 12-month follow-up period.

Conclusion

In summary, limb shaking is a rather uncommon form of TIA that should be recognized and differentiated from conditions like focal motor seizures, also in the presence

of positive EEG. Moreover, a quick diagnosis is important both to abolish the attacks and reduce the risk of major stroke.

References

1) Saad Ali; Khan, Muhib Alam; Khealani, Bhojo. Limb-shaking transient ischemic attacks: case report and review of literature. *BMC Neurology* 2006;6:5.

2) Tatemichi TK, Young WL, Prohovnik I, Gitelman DR, Correll JW, Mohr JP. Perfusion insufficiency in limb-shaking transient ischemic attacks. *Stroke* 1990;21:341.

3) Persoon S, Kappelle LJ, Klijn CJ. Limb-shaking transient ischaemic attacks in patients with internal carotid artery occlusion: a case-control study. *Brain* 2010;133:915–22.

4) Bogousslavsky J, Regli F. Unilateral watershed cerebral infarcts. *Neurology* 1986;36:373–7.

5) Bearden S, Uthman B. Cerebral hemodynamic compromise associated with limb shaking TIA and focal EEG slowing. *Am J ElectroneurodiagnosicTechnol* 2009 Sep;49(3):225–43.

Journal of Vascular and Interventional Neurology