

Differential Diagnosis of Focal Onset Seizure Limb-shaking Transient Ischemic Attaks

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Abstract

Limb-shaking transient ischemic attack (TIA); is an uncontrolled rhythmic or dysrhythmic, temporary, and generally coarse tremor movement of the upper or lower extremities. Since Miller Fisher's first report of limb-shaking TIA associated with internal carotid artery (ICA) stenosis in 1962, this condition has been described regularly. These are characterized by brief, arrhythmic, jagged, or jerky movements of the extremities and are generally misdiagnosed as focal seizures or movement disorders. TIA is usually correlated with negative neurological symptoms; thus, the diagnosis of TIA is typically not considered in patients presenting with episodic abnormal movement disorder. We presented three cases, one of these cases was one with ICA stenosis who benefits from revascularization treatment (internal carotid artery stenting), the second case with ICA stenosis and who does not benefit from revascularization treatment (carotid endarterectomy operation), and the last patient without ICA stenosis. The common feature of all three patients was hypotension. These patients are not as rare as thought, and the etiology of cerebral hypoperfusion should be urgently evaluated.

Keywords: Focal-onset-seizure, seizure-mimics, trans-ischemic attacks

INTRODUCTION

Limb-shaking transient ischemic attacks (TIAs) involve uncontrolled rhythmic or dysrhythmic, temporary, and generally coarse tremor movement of the upper or lower extremities.^{1,2} TIAs typically occur with focal neurological deficits, such as reduced sensation, vision loss, or loss of muscle strength, and uncontrolled movement is not normally considered a feature of TIAs. Limb-shaking TIAs, which are frequently mistaken for focal motor seizures, represent a rare form of TIA that causes diagnostic difficulty.^{1,3-7} It is vital to correctly diagnose limb-shaking TIAs because they are a sign of serious internal carotid artery (ICA) stenosis, and patients are at high risk of stroke.⁶⁻⁹ Here, we present three patients with limb-shaking TIAs in light of the literature.

CASE PRESENTATIONS

Case 1

A 79-year-old male patient was examined in the neurology outpatient clinic due to clonic jerks in his left hand. From the patient's anamnesis, it was learned that this symptom had been present for 10 days and had become more frequent in the last 3 days, occurring every day and generally lasting about 10 minutes. During the neurological examination, the patient was conscious and demonstrated full orientation to the person at times. His cranial nerves were intact, his muscle strength was normal, and there were clonic jerks in his left upper extremity. The patient was taking amlodipine (10 mg/day) for hypertension. The patient's blood pressure was 100/60 mmHg. Emergency cranial computed tomography (CT) results were normal with no acute changes. His blood biochemistry and haemogram results were normal, as were his electroencephalography (EEG) results (Figure 1).

The patient was admitted to the neurology ward for further examination and treatment. His course of amlodipine was stopped. During clinical observation, the patient developed weakness in his right upper extremity. Diffusion magnetic resonance imaging (MRI) was performed, and the results showed that acute infarct areas exhibited diffusion restriction in the right precentral and postcentral gyri. In addition, cranial and neck CT angiography revealed critical stenosis in the right ICA. A course of acetylsalicylic acid (300 mg/day) and clopidogrel (75 mg/day) was initiated, and the patient underwent ICA stenting.

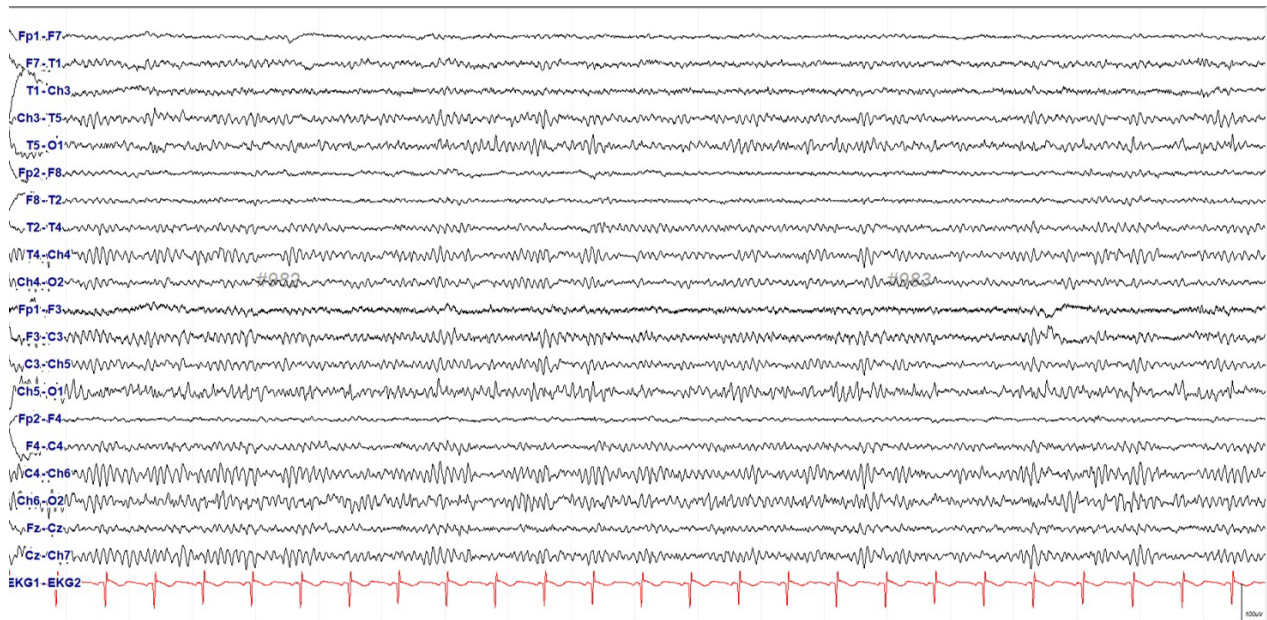


Figure 1. EEG of case 1 showing normal EEG: Electroencephalography

The patient's involuntary movements regressed. During the neurological examination at discharge, the patient was conscious, oriented, and cooperative. His left nasolabial groove was blurred, and his left upper extremity exhibited plegia. During the 3-month neurology outpatient clinic follow-up, the patient regained muscle strength, and the neurological examination findings were normal.

Case 2

A 61-year-old male patient who complained of jerks in his left hand was examined. These clonic jerks started for 10 days and have become more frequent in the last 3 days, occurring every day and generally lasting about 1 minute. The symptoms were triggered by standing up. During the neurological examination, the patient was conscious and had full orientation to the person at times. His cranial nerves were intact, his muscle strength was normal, and clonic pulsations were detected in the left upper and lower extremities. The patient's medical history indicated that he had been diagnosed with hypertension and was taking amlodipine (10 mg/day) and valsartan (320 mg/day). The patient's blood pressure was 100/60 mmHg. Emergency cranial CT results were normal. The EEG results were normal. The patient was hospitalized for further examination and treatment. Diagnostic cerebral angiography showed an occluded right ICA and a critical stenotic left ICA was critical stenotic (Figure 2). The patient underwent carotid

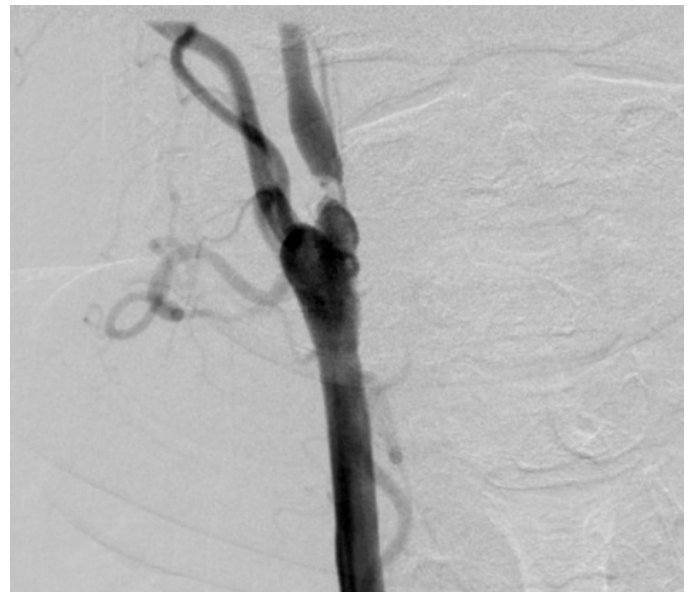


Figure 2. Diagnostic cerebral angiography showing near-complete occlusion of the left internal carotid artery bifurcation

endarterectomy. However, the patient's involuntary movements did not regress after carotid endarterectomy, and he was subsequently admitted to the non-invasive video-EEG monitoring unit. The background EEG activity showed waves in the alpha band of 9-10 Hz and 35-40 μ V located parieto-occipally, and waves in the beta band of 16-18 Hz and 5-10 μ V located frontocentrally. No ictal activity was detected during video-EEG. Normal sleep patterns were observed. The 5-6 Hz and 40-45 μ V theta waves occasionally produced sparse and scattered localization. The patient had clonic jerks in his left upper and lower extremities while being admitted to the video-EEG monitoring unit, and a diagnosis of limb-shaking TIA was considered. The course of amlodipine and valsartan was stopped. The patient's symptoms subsided 21 days after carotid

MAIN POINTS

- Limb-shaking transient ischemic attack; is an uncontrolled rhythmic or dysrhythmic, temporary, and generally coarse tremor movement of the upper or lower extremities.
- These are characterized by brief, arrhythmic, jagged, or jerky movements of the extremities and are generally misdiagnosed as focal seizures or movement disorders.
- The common feature of all three patients was hypotension and internal carotid artery stenosis. These patients are not as rare as thought, and the etiology of cerebral hypoperfusion should be urgently evaluated.

endarterectomy. During the 3-month neurology outpatient clinic follow-up, the patient's symptoms did not recur, and the patient had a good clinical outcome.

Case 3

A 77-year-old female patient presented with clonic jerks in her right arm that had been present for the last year and were triggered by sudden postural changes, such as standing or sitting up from a bed. From his medical history, it was learned that he had chronic renal failure and received hemodialysis three times a week. His examination results revealed findings consistent with chronic renal anemia. As the patient's anemia advanced, his symptoms increased; however, they regressed with erythrocyte suspension replacement. Although the patient underwent extensive testing to identify the etiology of his anemia, it could not be determined, and the diagnosis of chronic anemia was confirmed. Widespread chronic ischemic lesions were identified via cranial MRI. Acute infarction was not detected. A plan was developed to conduct vascular evaluation, and the nephrology service was consulted; however, it was deemed inappropriate to perform a contrast examination due to the patient's high creatinine level. The carotid vertebral Doppler, intracranial magnetic resonance angiography, and EEG results were normal. Postural changes and momentary hypotensive attacks triggered the patient's symptoms. The cardiology service was consulted to address both anemia and hypotensive attacks, and the patient's antihypertensive treatment regimen was changed.

The patient's symptoms have regressed as his hypotension and anemia have been controlled. However, when the anemia intensifies and the patient changes his posture, the symptoms occur intermittently, although for a shorter period (Table 1).

DISCUSSION

Since Fisher¹⁰ first reported in 1962 that limb-shaking TIAs are related to ICA stenosis, this condition has been regularly diagnosed. It is characterized by brief, arrhythmic, jagged, or jerky movement of the extremities and is generally misdiagnosed as focal seizures or movement disorders. TIAs are typically correlated with negative neurological symptoms. Thus, the diagnosis of TIA is not usually considered in patients presenting with episodic abnormal movement disorders.^{1,4} However, these attacks can be distinguished from seizures by the absence of aura, incontinence and unconsciousness; there are also other important clinical differences, such as the absence of a Jacksonian spread.

In cases of TIA, EEG results are always normal, and anticonvulsants are ineffective. The clinical features of limb-shaking TIAs are as follows: rhythmic or arrhythmic involuntary hyperkinesia that unilaterally affects the hand, arm, leg, or limb; preservation of facial muscles; and greater prominence of upper extremities. An almost universal sign of limb-shaking TIA is the occurrence of symptoms after the patient performs action that theoretically provokes cerebral blood hypoperfusion, such as standing up. There is usually a short delay of a few seconds between standing up and the onset of symptoms.¹¹ Although EEG-based studies have shown that some patients have a contralateral slow background activity, limb shaking is not associated with TIA.¹² In the first and second cases presented in this paper, critical stenosis was detected in the ICA contralateral to the side of the involuntary movements; however, in the second case, the symptoms did not regress after ICA revascularisation. Although it is known that ischemic stroke is a heterogeneous group of diseases involving many complex mechanisms,¹³ it is unknown how cerebral hypoperfusion causes symptoms such as clonic jerks in extremities.

One possibility is that cerebral hypoperfusion affects subcortical motor pathways. Small-vessel disease and normal carotid angiography have also been reported as causes of limb-shaking TIAs.¹² In all three of our cases, the neurological examination results were normal and the modified Rankin scale score was zero during the third month of neurology outpatient clinic follow-up. Unfortunately, the prognosis can be poor for patients with limb-shaking TIA because they have a high risk of stroke. Therefore, it is important to diagnose and treat limb-shaking TIA. Managing low-flow TIAs involves maintaining or improving cerebral blood flow while carefully controlling blood pressure and revascularization. In many cases, symptoms regression has been reported after increasing blood pressure.²⁻¹⁰ In the second case, although ICA revascularisation was achieved, the limb-shaking TIA symptoms did not regress. However, after the patient's antihypertensive medications were stopped and his blood pressure increased and regulated, his symptoms were resolved.

CONCLUSION

In summary, limb-shaking TIA is a rare form of TIA that must be distinguished and differentiated from conditions such as focal motor seizures. Diagnosis is often accompanied by ICA occlusion, and timely treatment not only eliminates attacks in patients but also reduces the risk of stroke. Limb-shaking TIAs are not as rare as

Table 1. Clinical, radiological and demographic features of patients with limb-shaking trans ischemic attacks

	Case 1	Case 2	Case 3
Age	79	61	77
Sex	Male	Male	Female
Cranial MRI	Normal	Normal	Chronic ischemic lesions, no acute infarction
Cause of limb-shaking transient ischemic attack	ICA stenosis, hypotension	ICA stenosis, hypotension	Anemia of chronic disease, hypotension
Ipsilateral internal carotid artery	Near-occlusion	Near-occlusion	Normal
Contralateral internal carotid artery	Normal	Ocluded	Normal
Routine EEG	Normal	Normal	Normal
Video EEG monitoring	-	Normal	-
Clinical outcome	Good clinical outcome	Good clinical outcome	Good clinical outcome

EEG: Electroencephalography, MRI: Magnetic resonance imaging, ICA: Internal carotid artery

once thought, and patients with these conditions should be urgently evaluated for the etiology of cerebral hypoperfusion.

Ethics

Informed Consent: Consent form was filled out by all participants.

Authorship Contributions

Surgical and Medical Practices: B.H., Concept: Y.D., M.B., Design: A.B.D., E.A.D., Data Collection or Processing: Y.D., A.B.D., E.A.D., Analysis or Interpretation: B.H., Literature Search: Y.D., E.A.D., M.B., Writing: Y.D., E.A.D., M.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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