

Triptan Is Effective for the Migraine with Aura-Like Headache Associated With Moyamoya Disease

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Abstract

We describe two cases of moyamoya disease associated with headache which had been diagnosed as migraine with aura meeting the International Headache Society criteria. Administration of triptan was clinically effective. Initial computed tomography and magnetic resonance imaging of the brain showed no abnormalities, which made the diagnosis of moyamoya disease difficult. We discuss the pathophysiological mechanism of migraine-like headache caused by moyamoya disease. Proper neuroradiological investigation such as MRA may become mandatory even in patients with typical symptom of MWA, because triptans have relative contraindication in patients with moyamoya disease.

Keywords: Moyamoya disease; Migraine-like headache; Triptan.

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Introduction

Moyamoya disease is a cerebrovascular disease of unknown etiology characterized by progressive narrowing and

occlusion of the intracranial portion of carotid and vertebral arteries on neuroimaging. The condition shows female preponderance with a male to female ratio of 1: 1.7. The incidence of moyamoya disease is high among Asians, especially Japanese and Koreans [1, 2]. Clinical onset of moyamoya disease often presents with variable non-specific symptoms such as transient ischemic attacks, strokes, headaches, and seizures. Headache is one of the common symptoms of moyamoya disease [3]. However, the headache due to moyamoya disease which clinically meets the International Headache Society (IHS) criteria [4] for the diagnosis of Migraine With Aura (MWA) is very rare. Only several patients with migraine-like headache have been reported recently [5-7].

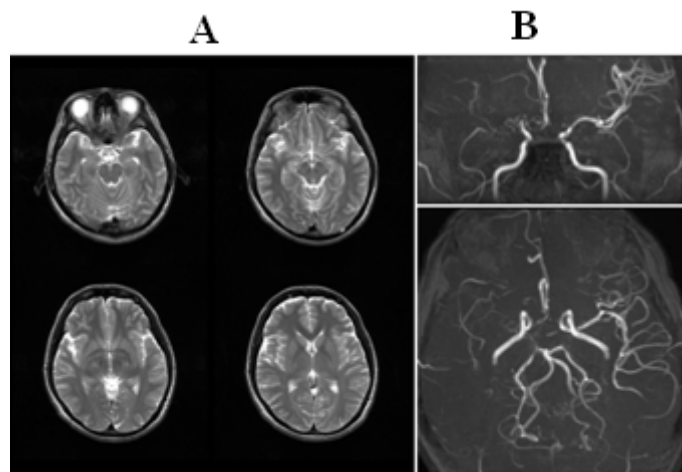
We describe here two cases of moyamoya disease with episodic headache which features were initially considered to meet the IHS criteria for the diagnosis of MWA, and administration of triptan was clinically effective.

Case reports

Case 1: A 32-year-old woman had a 14-year history of MWA. Usually headache was preceded by fortification spectrum. Headache was located mainly in the right side but sometime in the left side. She had no family history of migraine. The past history was uneventful. Neurological examination was normal. Computed Tomography (CT) of the brain was normal. She had been diagnosed as migraine with typical aura. Headache reacted

well to the treatment with eletriptan. Later examination by Magnetic Resonance Images (MRI) of the brain showed no abnormality (Figure 1A), but MR Angiography (MRA) showed severe right-side narrowing of the internal carotid artery in the supraclinoid portion and also showed extensive parenchymal vascular collaterals (Figure 1B). She was diagnosed as moyamoya disease, and according to the diagnostic criteria, the moyamoya was classified as adult type "probable" moyamoya [8]. However, the follow-up angiography demonstrated that the occlusive lesions became bilateral, satisfying the criteria for "definite" moyamoya disease [9].

Figure: 1



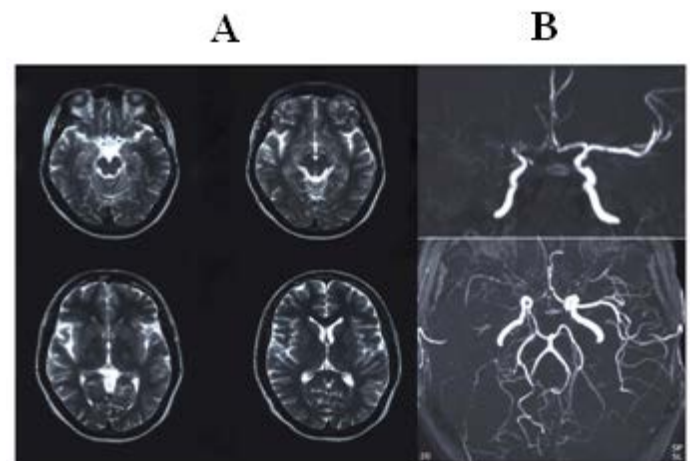
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Figure 1: Case 1. Although T2-weighted brain images showed normal brain, magnetic resonance angiography revealed stenosis with moyamoya vessels of the right middle carotid artery.

Case 2: A 30-year-old woman presented with a 2-months history of severe pulsating headache associated with nausea and which was aggravated by exercise and was preceded by scintillating scotoma. The headache occurred once every 2 weeks and lasted for 4 to 24 hours. She had past history of Migraine Without Aura (MOA) since the age of 7 years. The previous headaches were located on both sides of the head and fulfilled the IHS criteria. She had no family history of migraine. Neurological examination was normal. Brain CT was normal. She was diagnosed as migraine with aura. She received triptan

therapy. Zolmitriptan was effective for headache. MRI of the brain was normal (Figure 2A), but MRA showed multiple severe stenoses and occlusions in the supraclinoid portion of the right internal carotid artery (Figure 2B), consistent with the diagnosis of adult type "probable" moyamoya disease.

Figure: 2



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Figure 2: Case 2. Although T2-weighted brain image showed normal brain, magnetic resonance angiography revealed stenosis with moyamoya vessels of the right terminal portion of the internal carotid artery.

The investigational study was approved by the institutional review boards appropriate for each investigator and the two study participants gave written informed consent.

Discussion

Matsumoto [5] reported that MWA-like headache occurs in patients with moyamoya disease. His patient had an atypical attack of migraine. However, our two patients showed a clinical picture meeting the IHS criteria for MWA. Their headache attacks were well treated by triptan therapy. Initially there were no imaging studies suggesting the secondary headache. MWA is a well defined primary headache syndrome with a clinical picture that allows easy diagnosis in most cases. So called "secondary MWA" often displays a clinical picture closely resembling that of the idiopathic form, but response to triptan is

not known, or often considered contraindicated. Our cases showed a good response to triptan therapy.

Although the pathophysiological mechanism of migraine is still the subject of debate, several facts are commonly acknowledged: namely, that migraine is a complex neurovascular disorder in which both interrelated neuronal and vascular elements play an important pathophysiological role [10-13].

By activating the mechanism that induces intracranial oligemic state, moyamoya disease may possibly trigger pathological changes that induce migraine. Both cases had no trigger factors such as menstruation, stress or particular sensory stimuli. In addition, both of cases had no family history. Matsumoto [5] suggested that in the case of atypical attacks of migraine and /or absence of family history of migraine a detailed investigation should be performed to rule out underlying vascular disease such as vascular malformation and moyamoya disease. Both cases wanted to receive the MRI and MRA examination because of progression of headache severity. In the examination moyamoya disease was found incidentally. Battistella [7] reported that recurrent seven cases in 34 Italian patients with moyamoya disease showed migraine-like headaches as early clinical symptoms. In addition, Grindal [14] reported that headache was an important symptom which could be observed as the initial symptom (sentinel headache) in adult patients. However, not all patients with moyamoya disease present with headache. Female patients seem to present with headache more frequently. It is suggested that headache develops only in susceptible patients with moyamoya disease [5]. It has also been reported that an ischemic penumbra area, an area of reduced flow in non-infarcted tissue around ischemic infarcts, is likely to increase the risk of developing cortical spreading depression which is the likely phenomenon underlying migrainous aura [10]. Therefore, we think such a change of CerebroBlood Flow (CBF) based on moyamoya disease might have transformed MOA to MWA in case 2. Cucchiara and Detre [15] suggested that alterations in cerebral hemodynamics contribute to migraine susceptibility and ischemic complications of migraine.

Dysregulation of CBF may allow relative ischemia to develop in the setting of increased metabolic demand related to neuronal hyperexcitability and may trigger cortical spreading depression and predispose individuals with migraine to ischemic lesions and stroke.

It may be suggested that pathophysiology of moyamoya disease may play a role in the syndrome mimicking MWA and it may be a trigger for the cerebral hemodynamics which contribute to migraine susceptibility and ischemic complications of migraine. Triptan has vasoconstrictive effect. Although only several patients with moyamoya disease has migraine-like headache, from this point of view triptans administration should be avoided in patient with moyamoya disease.

Since MWA is not a rare entity, however, proper neuroradiological investigation such as MRA is mandatory even in typical symptom of MWA, because triptans have relative contraindication in patients with moyamoya disease.

References

1. Bruno A, Adams HP Jr, Biller G, Resai K, Cornell S, et al. (1988) Cerebral infarction due to moyamoya disease in young adults. *Stroke* 19: 826- 833.
2. Suzuki J, Takaku A (1969) Cerebrovascular moyamoya disease: Disease showing abnormal netlike vessels in base of brain. *Arch Neurol* 20: 288- 299.
3. Seol HJ, Wang KC, Kim SK, Hwang YS, Kim KJ, et al. (2005) Headache in pediatric moyamoya disease: review of 204 consecutive cases. *J Neurosurg* 103: 439- 442.
4. The International Classification of Headache Disorders, 3rd edition (beta version). *Cephalalgia* 2013 33: 629- 808.
5. Park-Matsumoto YC, Tazawa T, Shimizu J (1999) Migraine with aura-like headache associated with moyamoya disease. *Acta Neurol Scand* 100: 119- 121.
6. Hosain SA, Hughes JT, Forem SL, Wisoff J, Fish I (1994) Use of a calcium channel blocker (nicardipine HCl) in the treatment of childhood moyamoya disease. *J Child Neurol* 9: 378- 380.

7. Battistella PA, Carollo C (1997) Clinical and neuroradiological findings of moyamoya disease in Italy. *Clin Neurol Neurosurg* 99: 54- 57.
8. Yonekawa Y, Handa H, Okuno T. Moyamoya disease: diagnosis, treatment and recent achievement. In: Barnett HJM, Stein BM, Mohr JP, Yatsu FM, eds. *Stroke*. Vol.1 New York: Churchill Livingstone 1986: 805-829.
9. Wanifuchi H, Takeshita M, Aoki N, Kawamata T, Shiokawa K, et al. (1996) Adult moyamoya disease progressing from unilateral to bilateral involvement. *Neurol Med Chir* 36: 87-90.
10. Olesen J, Friberg L, Olsen TS, Andersen AR, Lassen NA, et al. (1993) Ischaemia-induced (symptomatic) migraine attacks may be more frequent than migraine-induced ischaemic insults. *Brain* 116: 187-202.
11. Monteiro JM, Rosas MJ, Correia AP, Vaz AR (1993) Migraine and intracranial vascular malformations. *Headache* 33: 563- 565.
12. Reuter U, Chiarugi A, Bolay H, Moskowitz MA (2002) Nuclear factor-kappaB as a molecular target for migraine therapy. *Ann Neurol* 51: 507- 516.
13. Cannas A, Solla P, Mascia MM, Floris GL, Tacconi P, et al. (2006) Medulloblastoma induces unusual headache with clinical picture of basilar-type migraine complicated by ischaemic infarcts. *Cephalalgia* 26: 1238- 1241.
14. Grindal AB, Toole JF (1974) Headache and transient ischemic attacks. *Stroke* 5: 603- 606.
15. Cucchiara B, Detre J (2008) Migraine and circle of Willis anomalies. *Med Hypotheses* 70: 860- 865.