Cerebral Vasospasm and Ischemic Stroke Associated with Chronic Sumatriptan Use for Migraine Headache: A Case Report and Literature Review

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Abstract

Migraine is a common neurovascular disease that is often treated with sumatriptans. Although they are rare, several cases of ischemic stroke associated with chronic use of triptans have been reported; however, detailed imaging findings were not presented in these previous reports. Here, we report a case of 68 years old man using sumatriptan chronically for migraine treatment with ischemic stroke and unusual finding of reversible cerebral vasoconstriction, presenting detailed imaging findings. We also discuss the etiology of stroke and reversible cerebral vasoconstriction, and the effect of sumatriptans and migraine on the occurrence of ischemic stroke.

Keywords: Triptan; Migraine; Stroke; Reversible cerebral vasoconstriction; Neurology

Introduction

Migraine is a neurovascular disease characterized by recurrent attacks of moderate to severe headaches that last for 4 to 72 hours. It is often treated with sumatriptan, which are serotonin 5-hydroxytryptamine 1B/1D-receptor agonists [1]. Several cases of stroke have been associated with the chronic use of sumatriptan [2,3]. A cohort study of 12,339 patients using sumatriptan reported three cases of coronary artery disorder and six cases of stroke [4]. However, Robert et al., [5] reported that strokes directly associated with sumatriptan use are rare and of insidious onset, while detailed imaging findings have not been previously presented. Here, we report the case of a healthy man with a long migraine history, chronically using sumatriptan, who experienced an acute-onset ischemic stroke, and present detailed imaging findings that show reversible vasoconstriction.

Case Presentation

A 68-year-old man visited our institute with a 2-day history of acute-onset headache, difficulty walking, and blurry vision. He had a significant medical history of migraine headache, and had been taking more than 100 mg of sumatriptan every day, several times in a day, for more than 20 years. Common cardiovascular risk factors such as hypertension, diabetes mellitus, and hyperlipidemia were absent. There is no smoking history. Family history was positive for migraine headache, but negative for other cerebrovascular diseases. Transthoracic echocardiography and Electrocardiography (ECG) included Holter ECG monitoring did not indicate the existence of cardiac embolic sources such as atrial fibrillation or atrial-ventricular shunt. Blood examinations, including coagulation and vasculitis tests such as Protein S or C, and Antithrombin-3 were within normal limits. Neurological examination revealed right homonymous lower quadrantanopia. Brain Magnetic Resonance Image (MRI) revealed patchy high signal intensity areas in the left thalamus and posterior lobe on Diffusion-Weighted Images (DWI), and in the left thalamus on Fluid-Attenuation Inversion Recovery (FLAIR) images (Figure 1-1). Magnetic Resonance Angiography (MRA) revealed left Middle Cerebral Artery (MCA) occlusion and Posterior Cerebral Artery (PCA) stenosis (Figure 1-2). Computed tomography (CT) perfusion imaging revealed prolongation of mean transit time in the left parieto-occipital region (Figure 2). On admission, sumatriptan was stopped, and dual antiplatelet therapy and volume hydration were initiated. The patient’s symptoms gradually improved, and he was discharged on day 14 after admission without any further neurological deficits. Follow-up MRI performed 3 months after symptom onset showed no recurrence or new onset of stroke (Figure 3-1). MRA showed improvement of the left
PCA stenosis and near resolution of anterograde flow in the left PCA (Figure 3-2). The patient had abstained from sumatriptan use since the stroke occurred. The symptoms of difficulty walking and blurry vision had completely disappeared without any recurrence or new onset of neurological deficits after 10 months from the onset.

Discussion

Possible cause of stroke

The images acquired in the present case indicated diffuse hypoperfusion in left parieto-occipital region due to corresponding arterial disruption. High signal intensity areas on DWI were located in the posterior circulation region, indicating that the stroke has occurred due to PCA hypoperfusion. The fact that the left anterior temporal artery has supplied widely in the left hemisphere covered with MCA area indicated that the left MCA occlusion was likely a chronic change and unrelated to the occurrence of the stroke. This diffuse hypoperfusion due to corresponding arterial disruption could be related chronic use of sumatriptan or migraine headache. Another possibility is that this stroke could be an embolic stroke; the follow-up MRA showed P1 Stenosis still after 3 months. This finding also suggests recanalization after post occlusion by emboli. However, several tests on admission revealed there are no source and cause of emboli.

Sumatriptan effects and stroke occurrence

Sumatriptan has been reported to cause cerebral arterial vasoconstriction, which could have contributed to the diffuse cerebral artery disruption in this case [6].

Relationships between migraine headache and stroke

Ischemic stroke is believed to be caused not only by sumatriptan use, but also by migraine headache itself. Migraine has been proposed as a risk factor for ischemic stroke, in addition to traditional risk factors such as atherosclerosis and atrial fibrillation [7]. Spector et al., [8] reported that, migraine may increase ischemic stroke risk via increased concentrations and activity of vascular procoagulant factors such as endothelin 1, von Willebrand factor, prothrombin factor 1,2, homocysteine, and antiphospholipid antibody.

Possible causes of stroke: sumatriptans or migraine?

There are two likely causes of stroke in patients taking sumatriptan for migraine. One is the chronic use of sumatriptan, and the other is the migraine itself. Albieri et al., [9] reported that, although the overall risk for stroke in migraineurs in their study was increased, only Relative Risk (RR) 1.07, it was increased RR 1.7, and the incidence of stroke in the sumatriptan-using population subset was not negligible (1.36 per 1000 per year). This indicates that sumatriptan use could increase the risk of stroke. Since sumatriptan can cause severe vasoconstriction, chronic sumatriptan use can accelerate cerebral arterial disruption.

A finding of reversible cerebral vasoconstriction in this case

In the present case, cerebral vasoconstriction was reversed after termination of sumatriptan use. There were no significant changes in left MCA occlusion, but left PCA stenosis resolved significantly. To the best of our knowledge, this is an unusual case that showed possible reversible cerebral vasoconstriction in a patient using a sumatriptan chronically for migraine headache. Although the phenomenon of reversible cerebral vasoconstriction has been previously reported, no cases of reversible cerebral vasoconstriction related to migraine or sumatriptan use have been reported, as far as we could search. The detailed mechanism of reversible cerebral vasoconstriction is unclear [10]. However, it could be related to the vasoconstrictive effect of sumatriptan because our patient showed neurological improvement and resolution of imaging findings after terminating sumatriptan use.
This indicates that stroke caused by sumatriptan could be resolved by terminating sumatriptan use.

**Conclusion**

We presented a case of acute-onset ischemic stroke in a 68-year-old man using a sumatriptan chronically for migraine with unusual finding of reversible cerebral vasoconstriction. Although the mechanism underlying this association remains unclear, the sumatriptan-induced vasoconstriction can be resolved by terminating use of the precipitating drug.

**References**


