

*Case Report*

# A rare case of recurrent headache during exercise due to severe intracranial atherosclerotic stenosis

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Intracranial atherosclerotic stenosis (ICAS) can cause ischemic stroke, up to 30-50% stroke in Asian population. However, recurrent exercise-induced headache due to ICAS has not been reported. We present a case of a patient 60-year-old male suffering from recurrent headache during exercise due to severe ICAS. The headache occurred after 5 minutes of running, appeared shortly after every running, and resolved at rest. Head magnetic resonance angiography showed moderate bilateral stenosis at middle cerebral artery (MCA), and cerebral catheter angiography confirmed 70% stenosis of the left MCA and 20% stenosis of the right MCA, with robust antegrade flow and good collaterals which explained why there was no neurological deficit. After treated with best medical therapy, including dual antiplatelet, statin therapy, and risk factor modification, for 90 days, he was capable of running for 20 min without headache.

**Keywords:** Exercise headache, ICAS, Secondary headache, Red flags, Best medical therapy**INTRODUCTION**

Intracranial atherosclerosis stenosis (ICAS) of large intracranial arteries accounts for 6–50% of all ischemic strokes worldwide.<sup>[1-5]</sup> A recent study reported a more frequent occurrence of the anterior circulation in Chinese population with ICAS, with the most common location at middle cerebral artery (MCA).<sup>[3]</sup> ICAS events are associated with advanced age, diabetes, hypertension, and dyslipidemia.<sup>[6]</sup>

Secondary headaches are very important to consider as they are sometimes serious and can be life-threatening. Headache in this case was sudden with onset after 50 years. There was a change in the pattern in which the patient, who had previously exercised regularly for five years without headaches, experienced headaches after doing sports activities.<sup>[7,8]</sup>

**CASE REPORT**

A 60-year-old man presented to the neurology clinic with complaint of headache for two months before, worsening in the past one month. It occurred after 5 min of running for a distance of 500 m, with a Numeric Rating Scale (NRS) 7. It appeared shortly after every running and was improved

with rest. There was no history of the previous headaches or complaints of other neurological deficits. He had a history of hypertension, dyslipidemia, and diabetes mellitus type 2.

Magnetic resonance imaging of the head [Figure 1] did not reveal any signs of stroke. Cerebral catheter angiography [Figure 2] revealed 70% stenosis of the M1 of the left MCA, 30% stenosis of the left supraclinoid internal carotid artery, and 20% stenosis of the M1 of the right MCA, and stenosis of the anterior inferior cerebellar artery with good antegrade flow and good collateral. This explains how the patient did not suffer from stroke manifestations.

**DISCUSSION**

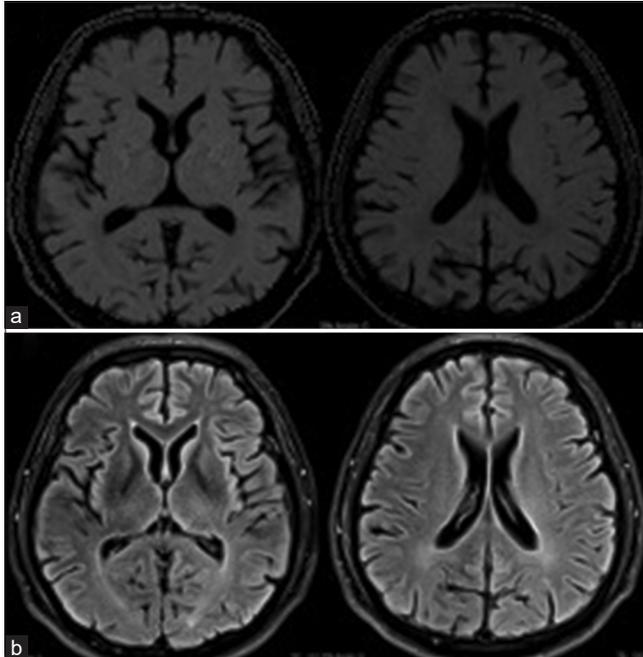
A longitudinal and cohort study reports that mild-to-moderate symptomatic ICAS was an independent risk factor for the future ischemic stroke in a healthy population.<sup>[6]</sup> Symptomatic ICAS patients with >70% luminal stenosis of large intracranial arteries increased the risk of stroke by 20% at one year and poorly collaterals reflect distal perfusion status.<sup>[2,9]</sup>

Case reports of headaches that occur after sports activities have not been reported and the mechanism of headache in ICAS still needs more investigation. Recent studies report

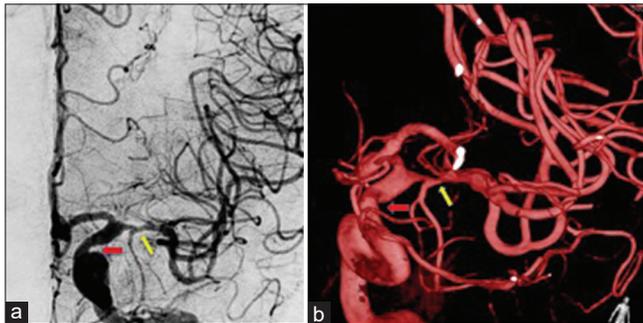
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**Figure 1:** Magnetic resonance imaging of the head, with diffusion-weighted imaging (a) and fluid attenuated inversion recovery (b) sequence, showing no lesion of stroke.



**Figure 2:** Results of cerebral catheter angiography (a) and three-dimensional reconstruction (b) showing 70% stenosis of the M1 segment of the left middle cerebral artery (yellow arrow), 30% stenosis of the left supraclinoid ICA (red arrow).

that the annual risk of stroke in asymptomatic patients with at least 50% stenosis of large intracranial arteries is <10%.<sup>[10]</sup>

Intensive medical therapy including antiplatelet therapy, aggressive control of cardiovascular risk factors, and lifestyle modification, remains the standard of care in patients with ICAS.<sup>[4,11]</sup> The use of short-term combination aspirin and clopidogrel is effective in reducing the risk of stroke recurrence in patients with ICAS.<sup>[1]</sup>

After the patient received intensive medical therapy including dual antiplatelet for 90 days, control of hypertension and dyslipidemia, moderate exercise, and low fat and low salt diet, there were improvements from laboratory results of vascular

risk factors and also clinically in which patients could run for 20 min over 800 m with NRS 1.

However, patients with high-grade symptomatic ICAS still have a substantial risk of recurrent TIA and stroke even after receiving intensive medical therapy.<sup>[12]</sup> Angioplasty may be used for severe ICAS in patients with recurrent ischemic attacks and on medical therapy.<sup>[13-15]</sup> Endovascular therapy could lessen the risk of perioperative complications and offer superior benefits for symptomatic ICAS patients with strict patient selection, selection of the type of percutaneous transluminal angioplasty and stenting, and operator experience.<sup>[9,11]</sup>

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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