

# Short-lived Middle Cerebral Artery Stenosis and Crime Atheroma

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## Abstract

**Purpose:** Even after comprehensive evaluations, the etiology of 25-39% ischemic stroke remains unknown, and such a stroke often labeled as cryptogenic. Herein, we report a young patient with “cryptogenic stroke” caused by an intracranial atheroma, which was only visible on high-resolution magnetic resonance imaging (HR-MRI).

**Case Report:** A 22-year-old male presented with acute right limb weakness. He was a smoker and had been in good health without hypertension, diabetes, hyperlipidemia or cardiac diseases. Diffusion-weighted imaging revealed ischemic lesions at left basal ganglia and left centrum semiovale. Magnetic resonance angiography (MRA) showed left middle cerebral artery (MCA) stenosis (>50%). Six days later, this stenosis disappeared on repeated MRA and digital subtraction angiography. HR-MRI suggested a superior-wall atheroma at the location where the stenosis previously existed. We hypothesize heavy thrombosis formation at the surface of atheroma may have caused a stenosis, while the subsequent spontaneous fibrinolysis may gradually eliminate this thrombosis and make the stenosis invisible.

**Conclusion:** Intracranial non-stenotic atheroma is a potential cause of a stroke. Our observation support HR-MRI as a tool for the etiology evaluation in young patients with cryptogenic stroke.

**Key Words:** youth stroke, intracranial atherosclerosis, high-resolution MRI, plaque, spontaneous recanalization

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## INTRODUCTION

Even after comprehensive evaluations, the etiology of 25-39% ischemic stroke remains unknown, and such a

stroke often labeled as cryptogenic<sup>(1)</sup>. Herein, we report a young patient with “cryptogenic stroke” caused by a crime intracranial atheroma, which was only visible on high-resolution magnetic resonance imaging (HR-MRI).

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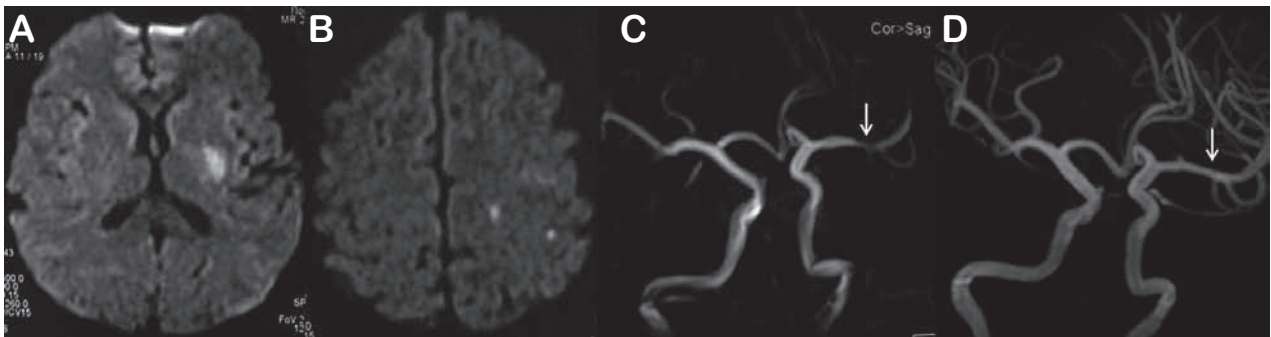
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## CASE REPORT

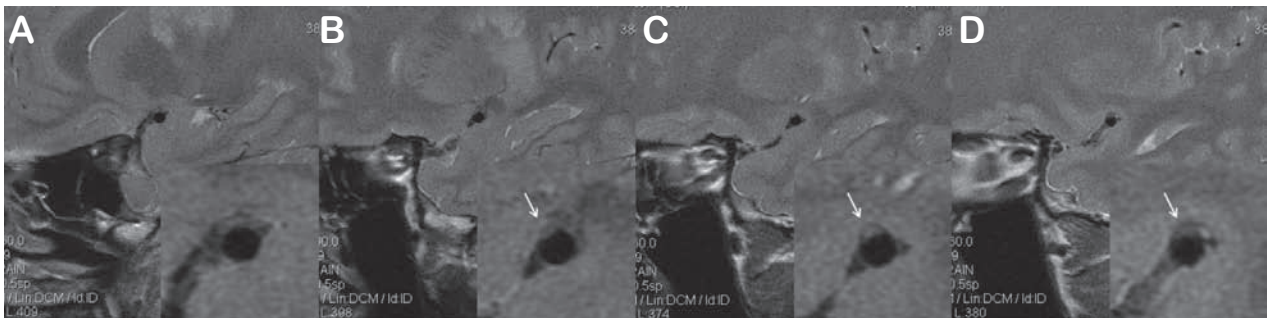
A 22 year-old male presented with right limb weakness. He was a smoker and was in good health without hypertension, diabetes, hyperlipidemia or cardiac diseases. Two days before admission, he experienced two episodes of transient right limb weakness at home each lasting for 1-2 minutes. There wasn't any headache or neck pain. One day later, the right limb weakness recurred and persisted. He was sent to a local hospital. The results of cranial CT scan, electrocardiogram (ECG), and routine blood tests were normal. On diffusion-weighted imaging, high-intensity signals indicating acute ischemia were seen at left basal ganglia and left centrum semiovale. Magnetic resonance angiography (MRA) showed a left middle cerebral artery (MCA) stenosis (>50%). Aspirin of 100mg per day was given. On neurological examination, the

National Institute of Health Stroke Scale was 8. Carotid duplex ultrasound revealed normal carotid intima-media thickness at the bifurcations of bilateral carotid arteries. A 24-hour ECG Holter monitoring did not show any evidence of cardiac arrhythmia. Serum glucose, lipids, homocysteine, ANA, ANCA, and APTT were all within normal range. Transcranial Doppler with agitated saline contrast did not reveal the presence of cardiac right to left shunts.

MRA was repeated 7 days after the onset. To our surprise, the left MCA stenosis disappeared, which was further confirmed by subsequent digital subtraction angiography. FSE-T2WI sequence of high-resolution MRI was performed and obtained with the following parameters: TR/TE = 3000/50 ms; FOV, 13 cm × 13 cm; matrix size, 256×256; slice thickness, 2mm; slice gap, 0.5mm; 4 signal averages, echo train length (ETL).



**Figure 1.** A, B and C (one day from stroke onset): There are high signals at left basilar ganglia area (A) and left semiovale centrum (B) on diffusion-weighted images. A stenosis of left middle cerebral artery (MCA) is revealed on magnetic resonance angiography (arrow, C). D (seven days from stroke onset): The left MCA stenosis disappears (arrow).



**Figure 2.** High-resolution MRI T2-weighted images of left middle cerebral artery (MCA). A: the proximal reference lumen. B, C and D: On consecutive images of mid-distal segments of MCA, an eccentric plaque is revealed at the superior wall (arrows in magnified images).

An eccentric superior-wall thickening of left MCA was revealed. This finding was interpreted as an atheroma<sup>(2,3)</sup>, the location of which was consistent with the MCA stenosis previously observed on the first MRA. Clopidogrel 75mg per day and atorvastatin 20mg per day were given. The patient recovered gradually. Three months after the onset, the patient could live independently with a Rankin score of 0. No cerebral ischemic event recurred.

## DISCUSSION

The clinical presentations and investigation findings of our patient were consistent with the diagnosis of cryptogenic stroke and all the common causes of stroke in young patients include arterial dissection, patent foramen ovale, cardiac diseases, and arteritis were excluded<sup>4</sup>. A MCA stenosis existed on the day after stroke onset, but disappeared 6 days later. Although the “whole life” of this short-lived MCA stenosis wasn’t monitored by HR-MRI, an eccentric superior-wall atheroma, was detected at the location where the stenosis had ever existed. We believe this atheroma was the “culpable lesion”. Similar phenomenon has been reported in coronary and carotid atherosclerosis<sup>(5,6)</sup>. Heavy thrombosis formation at the surface of the atheroma may occupy the space of lumen and lead to detectable stenosis. The extension of thrombosis may occlude penetrating branches causing infarctions at basal ganglia area, while the shedding emboli may dislodge distally causing subcortical lesions. With the ensuing spontaneous fibrinolysis, this stenosis originated from thrombosis-formation can be gradually eliminated.

The case suggests that intracranial atheroma is a potential cause of a stroke, even with the absence of lumen stenosis. Our observation support HR-MRI as a tool for the evaluations in young patients with cryptogenic stroke<sup>1</sup>.

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