

High-resolution Magnetic Resonance Imaging of Symptomatic Middle Cerebral Artery Dissection

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Dissection of the middle cerebral artery (MCA) is less frequent compared with dissection of vessels in the vertebrobasilar system or dissection of the carotid artery. High-resolution cross-sectional magnetic resonance imaging (HRMRI) has emerged as a potential technique for atherosclerotic plaque imaging in MCA. We enrolled 3 patients with MCA dissection on whom HRMRI was performed for evaluation of MCA stenosis. Two patients had an embolic infarction in the MCA territory and focal dissection. One patient had a massive infarction in the MCA territory and long-segment dissection of the MCA. On HRMRI, our objectives had an intimal flap with patency of the lumen and 1 had extensive hemorrhaging in the false lumen. **Key Words:** Dissection—magnetic resonance imaging—middle cerebral artery—stroke—high resolution MRI.

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Introduction

Dissection of the middle cerebral artery (MCA) is an uncommon cause of stroke and is less frequent compared with dissection of vessels in the vertebrobasilar system or dissection of the carotid artery.¹⁻³ Most dissections of the anterior circulation are associated with cerebral ischemia³ and result in complete stroke because of arterial stenosis or occlusion.^{4,5} Only a few series of intracranial arterial dissection, particularly in the anterior circulation, have

been reported.^{4,5} But, with advances in noninvasive angiographic diagnostic procedures, this type of dissection is being increasingly recognized. Magnetic resonance imaging (MRI) is also considered a useful diagnostic tool as axial MRI has detected intramural hematoma in some cases of intracranial artery dissection.¹ Recently, high-resolution cross-sectional MRI (HRMRI) has emerged as a potentially useful technique for atherosclerotic plaque imaging in the MCA.^{6,7} Here we report 3 cases of spontaneous MCA dissection with an intimal flap identified by HRMRI and discuss the clinical outcome of these patients.

Case Reports

The radiographical data of 3 patients with MCA dissection are shown in Table 1.

Case 1

A 46-year-old woman with a history of hypertension who had been taking an angiotensin receptor antagonist for 5 years presented to the emergency department with left-sided hemiparesis. On admission, her initial blood pressure was 156/98 mm Hg. The patient did not have

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Table 1. Imaging characteristics and outcomes of the 3 patients with MCA dissection

No.	Extent of lesions	High-resolution MRI of MCA				Angiographic findings
		Intimal flap	Eccentric thickening	Double lumen	Hemorrhage in false lumen	
1	Extensive	+	+	+	+	
2	Focal	+	–	+	–	Focal dissection
3	Focal	3	+	+	+	String sign, double lumen

Abbreviations: MCA, middle cerebral artery; MRI, magnetic resonance imaging.

any history of trauma, smoking, diabetes, or cardiovascular disease. The patient visited our institution within 2 hours of the onset of stroke symptoms and had serious neurological symptoms as indicated by a National Institutes of Health Stroke Scale (NIHSS) score of 14. Initial computed tomography scanning revealed a hypodense area in the right MCA territory without hemorrhage. Brain MRI was performed for confirmation of cerebral ischemia. Diffusion-weighted imaging (DWI) showed a massive infarction in the right MCA territory, and perfusion MRI detected a large mismatched area in the right MCA territory. MR angiography provided no visualization of the distal MCA (Fig 1, A). We performed HRMRI for evaluation of the MCA lesion. The imaging sequences for HRMRI were T1 and T2, proton-density, and 3-dimensional magnetization-prepared rapid acquisition gradient-echo (MPRAGE). The black blood technique with pre-regional saturation pulses of 80 mm thickness to saturate incoming arterial flow was used for all scans. The longitudinal coverage of each artery was 21 mm (14 slices with 1.5-mm slice thickness) for all scans. The all scan time was 20-25 minutes. The T2 and proton-density sequences showed the presence of an intimal flap in the MCA (Fig 1, B), and MPRAGE and T1 images showed an intraluminal hemorrhage extending into the false lumen (Fig 1, C). We diagnosed the patient with an extensive MCA dissection with intraluminal hemorrhaging into the false lumen. The patient was treated with antiplatelet and anticoagulant agents. She had an NIHSS score of 5 after 3 months.

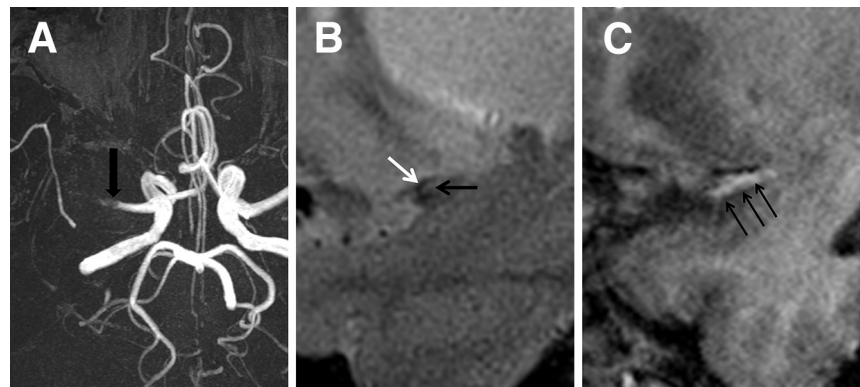
Case 2

A 42-year-old man was admitted to the emergency department with right-sided numbness and mild aphasia. The patient had a 10-year history of diabetes. On admission, his initial blood pressure was 160/100 mm Hg. The patient did not have any history of trauma or smoking. The patient displayed serious neurological symptoms as defined by an NIHSS score of 6. DWI showed a multifocal infarction in the left MCA territory and basal ganglia, and perfusion MRI detected a large mismatched area in the left MCA territory. MR angiography revealed severe stenosis of the midportion of the left MCA. HRMRI showed an intimal flap with a tapered pseudolumen and no evidence of hemorrhage (Fig 2). Therefore, we diagnosed the patient with left MCA dissection causing multifocal cerebral infarctions in the corresponding territories. The patient displayed neurological improvements after treatment with antiplatelet and anticoagulant agents (NIHSS score after 3 months = 2).

Case 3

A 60-year-old man with a 10-year history of hypertension was admitted to the emergency department with right-side weakness and headache. On admission, his initial blood pressure was 160/100 mm Hg. The patient did not have any history of trauma or smoking, and his initial NIHSS score was 4. DWI did not show a small multifocal infarction in the left MCA territory. MR angiography revealed stenosis with an intimal flap and tapered

Figure 1. Case 1: A 46-year-old woman with right MCA dissection. (A) Magnetic resonance angiography shows occlusion of the right M1. (B) Proton-density HRMRI shows the intimal flap (black arrow) and small true lumen (white arrow). (C) Magnetization-prepared rapid acquisition gradient-echo imaging shows high signal intensity in the false lumen of MCA dissection (arrows). Note the hemorrhage in the false lumen. Abbreviations: HRMRI, high-resolution cross-sectional magnetic resonance imaging; MCA, middle cerebral artery.



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