

## Case Report

# Fusiform Dilatation of the Outer Contour of a Dissected Anterior Cerebral Artery Revealed by Magnetic Resonance Cisternography in a Patient with Simultaneous Cerebral Infarction and Subarachnoid Hemorrhage

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A 46-year-old man presented with right hemiparesis. Cranial magnetic resonance (MR) imaging revealed both an acute cerebral infarction in the territory of the left anterior cerebral artery (ACA) and a thin subarachnoid hemorrhage in the left superior frontal sulcus. MR angiography revealed stenosis at the A<sub>2</sub> segment of the left ACA. MR cisternography was, therefore, performed on day 12 after admission using sagittal, 3-dimensional, heavily T<sub>2</sub>-weighted images. Fusiform dilatation of the outer contour was confirmed by MR cisternography at the region of narrowing identified by MR angiography. This case indicates that the combination of MR cisternography and angiography can be useful for detecting ACA dissection. **Key Words:** Anterior cerebral artery dissection—magnetic resonance cisternography—cerebral infarction—subarachnoid hemorrhage.

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## Introduction

Spontaneous anterior cerebral artery (ACA) dissection is rare, and spontaneous ACA dissection presenting as simultaneous cerebral infarction and subarachnoid hemorrhage (SAH) is even rarer.<sup>1-4</sup> Confirmation of ACA dissection by neuroimaging techniques such as cerebral angiography, magnetic resonance (MR) imaging, and MR angiography can be difficult. Morphological changes in the dissected artery on serial angiography are reliable indicators of dissection<sup>1,5</sup>; however, acute dissection is unable to be confirmed using only the initial angiography. More suggestive findings for dissections in the acute phase would be helpful in managing patients with suspected dissection. Here we describe a case of ACA dissection presenting with simultaneous cerebral

infarction and SAH in which we identified ACA dissection by MR cisternography.

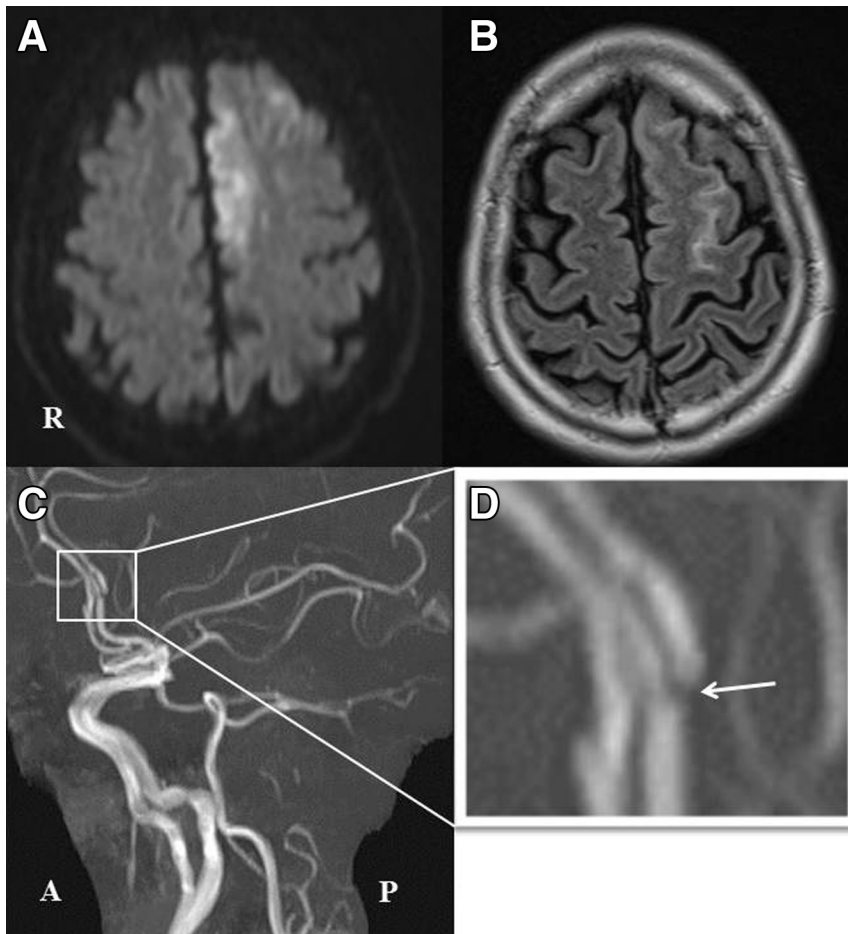
### Case Report

A 46-year-old man suddenly developed right hemiparesis on a sailboat and was admitted to our hospital. Neurologic examination on admission revealed word-finding difficulty and right hemiparesis. Cranial MR imaging revealed an acute cerebral infarction in the territory of the left ACA (Fig 1, A) and a thin SAH in the left superior frontal sulcus (Fig 1, B). MR angiography revealed stenosis at the A<sub>2</sub> segment of the left ACA (Fig 1, C,D). Three-dimensional (3D) computed tomographic angiography performed on day 5 after admission revealed segmental narrowing and dilatation at the A<sub>2</sub> segment of the left ACA (Fig 2, A,B), which is indicative of arterial dissection. Therefore, MR cisternography was performed using sagittal, 3D, heavily T<sub>2</sub>-weighted imaging with a fast spin-echo sequence on day 12 (Fig 2, C,D). Fusiform dilatation of the outer contour at the narrowing of the A<sub>2</sub> segment of the left ACA was subsequently confirmed (Fig 2, C). By panels B and C, it was indicated that the portion of inner stenosis was just outer dilatation. More

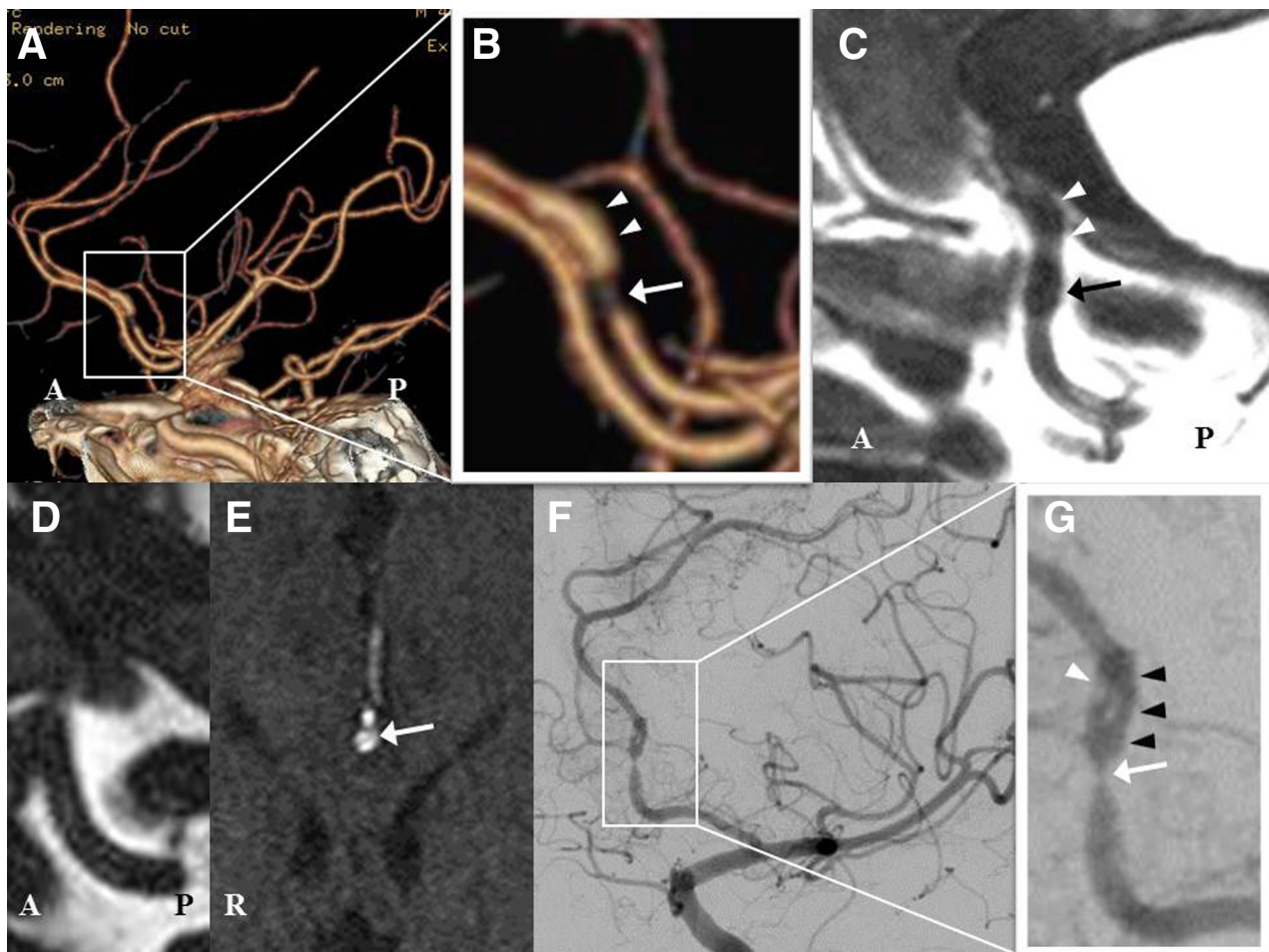
distally, both inner lumen and outer contour dilated. Axial MR angiography reveals the double lumen in the left ACA (Fig 2, E). A left oblique view of the digital subtraction angiogram on day 12 reveals dilatation with intimal flap distal to the narrowing of the A<sub>2</sub> segment of the left ACA (Fig 2, F,G). Based on these findings, a wrapping procedure of the aneurysm was considered. In this case, however, we did not carry out the procedure because the dilatation of the artery was mild and rupture was not concerned.

### Discussion

We describe a rare case of spontaneous ACA dissection presenting with simultaneous cerebral infarction and SAH. A dissection between the internal elastica and the media mainly presents as an ischemic stroke accompanied by occlusion of the affected portion, and a subadventitial dissection between the media and the adventitia usually presents as hemorrhage. In this case, simultaneous occurrence of infarction and SAH represented both subintimal and subadventitial dissection. This indicates a more severe and deeper dissection that can potentially result in recurrent hemorrhagic or ischemic stroke.



**Figure 1.** (A) Diffusion-weighted magnetic resonance (MR) image reveals cerebral infarction in the territory of the left anterior cerebral artery (ACA); (B) fluid-attenuated inversion-recovery MR image reveals thin subarachnoid hemorrhage in the left superior frontal sulcus; (C and D) MR angiography reveals stenosis of the A<sub>2</sub> segment of the left ACA (arrow).



**Figure 2.** (A and B) Three-dimensional (3D) computed tomographic angiography reveals segmental narrowing (arrow) and dilatation (arrowheads) at the A<sub>2</sub> segment of the left ACA; (C) 3D MR cisternography reveals fusiform dilatation of the outer contour at the narrowing of the A<sub>2</sub> segment of the left ACA (arrow) (1600 ms repetition time, 235 ms echo time, 1 excitation, 20-cm field of view, 1.0-mm section thickness, and 256 × 256 matrix size) (arrow). By panels B and C, it was indicated that the portion of inner stenosis was just outer dilatation (arrows). More distally, both inner lumen and outer contour dilated (arrowheads); (D) 3D MR cisternography reveals normal diameter of the outer contour at the A<sub>2</sub> segment of the right ACA; (E) axial MR angiography reveals the double lumen in the left ACA (arrow); (F and G) a left oblique view of the digital subtraction angiogram reveals dilatation (black arrowheads) with intimal flap (white arrowhead) distal to the narrowing (arrow) of the A<sub>2</sub> segment of the left ACA.

Isolated ACA territory infarction is very rare, representing only 1.3% of all ischemic strokes, and angiographically proven ACA dissection is responsible for 43% of these.<sup>6</sup> ACA dissection is more difficult to identify than vertebrobasilar artery dissection because of narrower vessel calibers and curved features. Detection of double lumen or intimal flap at the affected artery is definitive but uncommon findings for dissection.<sup>1</sup> We applied thin-section 3D MR cisternography developed by Nagahata<sup>7</sup> to evaluate the vascular outer contour of the ACA. This technique can easily reveal the outer contour of the ACA without the influence of slow flow, turbulence, or thrombus in the inner lumen. In our case, fusiform dilatation of the outer contour at the A<sub>2</sub> segment reflects an intramural hematoma or a pseudolumen. We think that dilatation of the vascular outer contour at the affected artery on MR cisternography should be suggestive of arte-

rial dissection. Therefore, our results suggest that a combination of MR cisternography and MR angiography is useful for detecting ACA dissection and should be obtained before the interventional procedure.

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