

## Dissecting Aneurysm of the Anterior Cerebral Artery : Report of Two Cases

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Anterior cerebral artery(ACA) dissecting aneurysms are extremely rare and optimal treatment remains unclear. The majority of cases manifest as cerebral infarction or as intracranial bleeding. The authors report two cases of ACA dissecting aneurysm, one with a large partially thrombosed gradually growing aneurysm and one with a cerebral infarction in the ACA territory. The patient with a large aneurysm was treated by trapping the aneurysm, and the patient with infarction by conservative management. We report on two cases of dissecting aneurysm of the ACA and include a review of pertinent literature.

**KEY WORDS :** Anterior cerebral artery · Dissecting aneurysm · Infarction.

### Introduction

Dissecting aneurysms of the intracranial carotid system are relatively rare compared with those of the vertebrobasilar system<sup>1,2)</sup>. Dissecting aneurysms of the intracranial carotid system usually occur in the internal carotid or middle cerebral arteries. Moreover, dissecting aneurysms of the anterior cerebral artery(ACA) are extremely rare, and their associated clinical features remain unclear<sup>1)</sup>. The majority of cases manifest as cerebral infarction or intracranial bleeding. However, the optimal forms of treatment for dissecting aneurysms of the ACA remain controversial.

Here, we describe two cases of dissecting aneurysms of the ACA, one manifesting as a large partially thrombosed fusiform aneurysm and the other as a hemorrhagic infarction.

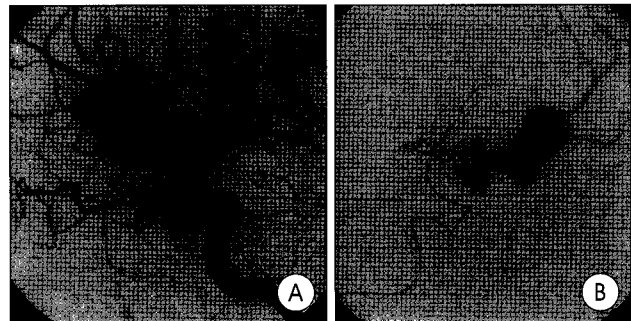
### Case Report

#### Case 1

A 36-year-old female complained of a progressive headache over a period of 3 years. Brain magnetic resonance imaging (MRI) revealed a large partially thrombosed aneurysm near the anterior communicating artery. She refused treatment for personal reasons. Three years later, she revisited our institute for a recently aggravated headache. A neurological examination showed no significant neurological abnormalities. She had no medical history of head trauma, infection, vasculo-

pathy, or hypertension. Cerebral angiography and brain MRI showed a partially thrombosed fusiform aneurysm in the right A2 segment (Fig. 1A), which had increased slightly in the size since the previous MRI, but which showed no evidence of infarct or hemorrhage. As a part of the preparation for an aneurysm trapping operation, we performed a balloon occlusion test. Super-selected ipsilateral A1 angiography revealed a right proximal A2 fusiform aneurysm just distal of short stenotic A2 segment (Fig. 1B).

Surgery was performed through the right pterional approach because of a jet flow in the aneurysm, which meant a high possibility of aneurysmal rupture. The right gyrus rectus was removed to expose the aneurysm site. The A2 dissecting aneurysm showed an angiographic appearance resembling a



**Fig. 1.** Case 1. A : Cerebral angiogram showing a partially thrombosed fusiform aneurysm of the A2 segment. B : Ipsilateral A1 angiogram showing a right proximal A2 fusiform aneurysm in a just distal location of short stenotic A2 segment.

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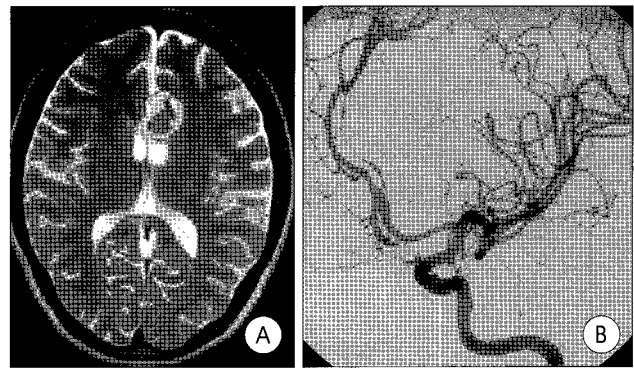
**Fig. 2.** Case 1. After temporary clipping between the proximal and distal portion in aneurysm, the wall of A2 aneurysm is opened. The intimal flap of aneurysm is identified.

fusiform aneurysm of right A2, the intimal flap of the aneurysm was identified intraoperatively, thus confirm a diagnosis of dissecting aneurysm (Fig. 2). During temporary clipping between the proximal and distal portions in aneurysm, Doppler monitoring confirmed back flow of the collateral circulation in distal A2. After observing blood gushing on declamping distal clamped A2, we trapped the aneurysm. She immediately recovered her preoperative state without any neurological deficit. However, on the second postoperative day, her consciousness level reduced after blood pressure fluctuation. Right frontal lobectomy was performed for infarction in the ACA territory. The patient gradually recovered and was discharged with mild hemiparesis after the lobectomy, but recovered completely from the hemiparesis one year postoperatively.

### Case 2

A 39-year-old female presented with acute onset headache, dizziness, and right hemiparesis, which had occurred 10 days before admission. She had no medical history of head trauma, infection, or hypertension, but was a heavy smoker. She was alert and oriented, but had a mild memory dysfunction. A neurological examination showed right hemiparesis, which was more prominent in the arm. Brain MRI revealed a sub-acute hemorrhagic infarct in the left cingulate gyrus, genu, and in the body of the corpus callosum (Fig. 3A). Cerebral angiography showed the intimal flap and segmental severe stenosis in A2 of the left ACA. And cerebral angiography showed contrast media filling to a false lumen in A2 of the left ACA. The diagnosis was of a dissecting aneurysm of left A2 (Fig. 3B). Because she almost fully recovered one day after angiography, she was treated by observation and followed up.

Follow-up three-dimensional computed tomography (3D-CT) 1 month after the ictus showed no change of stenosis in



**Fig. 3.** Case 2. A : Brain magnetic resonance image showing sub-acute hemorrhagic infarcts in the left cingulate gyrus, genu, and body of the corpus callosum. B : Cerebral angiogram showing the intimal flap, segmental severe stenosis in the A2 of the left anterior cerebral artery (ACA), and contrast media filling to a false lumen in A2 of the left ACA.

the A2 of the left ACA, and the patient showed no headache, dizziness or right hemiparesis.

### Discussion

Dissecting aneurysms of the ACA are very rare. Mori et al reviewed 27 cases from 1967 to 2002 and described the manifestations of dissecting aneurysm of the ACA<sup>11</sup>. According to this report, 17 cases (63%) manifested as cerebral infarction and 10 cases (37%) as intracranial bleeding (including intracranial hemorrhage associated with infarction)<sup>11</sup>. Masahito et al reported 55% and 44%, respectively<sup>9</sup>. These reports show that this disease frequently occurs in middle-aged (4th decade) males<sup>4,11</sup>. Excessive intimal fibro-elastic thickening was identified in a middle-aged male who suffered from a dissecting aneurysm of the middle cerebral artery, and it was suggested that dissecting aneurysm of the ACA might be due to sex hormones<sup>8</sup>. Our two patients were both young women, one of which was a heavy smoker.

Dissecting aneurysm of the ACA manifesting as an infarction causes characteristic symptoms of headache and hemiparesis<sup>5</sup>. Headache is a common symptom of intracranial dissecting aneurysm, and is believed to result from blood vessel tearing<sup>10</sup>. Patients with a ruptured dissecting aneurysm of the ACA showed the same symptoms as patients with a ruptured saccular aneurysm (i.e., headache and vomiting), but some also had hemiparesis<sup>11</sup>. These clinical presentations also suggest the presence of a dissecting aneurysm in the ACA.

Dissecting aneurysms of the ACA manifesting as an infarction are usually located in the A2, whereas ruptured ACA dissecting aneurysm are more widely distributed in the A1-A4 portion<sup>4,11</sup>. Characteristic angiographic findings of dissecting aneurysm are a double lumen (false and true lumen), a pearl and string sign, string sign (tapered narrowing), pooling of

contrast media, a wavy ribbon-like (ripple) sign and rosette sign<sup>13</sup>. ACA dissection manifesting as an infarction shows those angiographical finding more frequently than that with bleeding<sup>11</sup>. The plane of the dissection is generally believed to be subadventitial in the case of bleeding and subintimal in the case of infarction. Thus, the angiographic diagnosis of a dissection with bleeding is less clear than for infarction<sup>2,3</sup>. Serial angiography is helpful for a diagnosis of dissecting aneurysm of the ACA, especially in cases of bleeding<sup>8</sup>. In our case 1, 3-dimensional angiography after superselection of the ipsilateral A1 was diagnostically helpful as it showed the typical pear and string sign. In our case 2 with infarction, cerebral angiography showed the intimal flap of the dissecting aneurysm.

The treatment of a dissecting aneurysm of the ACA remains controversial. Outcomes are good for patients with infarction treated conservatively. This type of clinical course and a good prognosis have been confirmed by the studies of ACA dissection with infarction<sup>4,11</sup>, and by studies of vertebrobasilar artery dissection with infarction<sup>6,7,12</sup>. Most patient with infarction improved clinically, despite angiographic findings of incomplete healing<sup>11</sup>. However, surgical treatment should be considered if a dissection is found to progress or if clinical deterioration occurs<sup>14</sup>.

Outcomes are relatively poor for patients with bleeding, especially in those treated conservatively<sup>4,11</sup>. So, in cases of ACA dissection with bleeding, surgical treatment such as wrapping or trapping is needed. In addition to this, Kitanaka et al suggested that persistent aneurismal dilatation in serial follow-up angiograms of unruptured intracranial vertebral artery dissection might indicate destruction of the elastica or lamina muscularis and an increased risk of bleeding<sup>7</sup>. In such cases, surgical treatment may be necessary. In our case 1, the aneurysm had persisted for 3 years and slightly grew in volume, and we performed trapping surgery to prevent aneurismal rupture.

## Conclusion

Dissecting aneurysms of the ACA can cause cerebral infarction or intracranial hemorrhage. Conservative treatment is recommended for patients presenting with infarction, and surgical treatment, such as wrapping or trapping surgery, should be considered for patients with bleeding or an ectatic component. Long-term follow up is necessary in all cases.

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## Commentary

The authors beautifully described two cases of anterior cerebral artery dissecting aneurysms with literature review. Dissecting aneurysms of the ACA are extremely rare and present more frequently with ischemic symptoms than supraclinoid ICA and MCA aneurysms which have bleeding episodes more<sup>1</sup>.

As the authors mentioned, although the modality of treatment should be selected according to presenting symptoms (ischemia vs hemorrhage), it is more important whether the dissection and clinical symptom is progressive.

The reported number of cases of dissecting aneurysm of anterior cerebral artery is very small and natural history of this lesion is not clear, so we have to share one's techniques and results with other specialists to accumulate the clinical data and to establish evidence-based strategies for managing those lesions.

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