

Parent Artery Occlusion against Dissecting Aneurysm Involving the Proximal Anterior Inferior Cerebellar Artery: Case Report and Literature Review

Yoshimichi Sato,¹ Takatsugu Abe,² Yasuhiro Suzuki,¹ Masahito Katsuki,¹ Syoji Mashiyama,¹ and Teiji Tominaga²

Dissecting aneurysms of the anterior inferior cerebellar artery (AICA) are rare. Few reports suggested that coil embolization and parent artery occlusion (PAO) would be valuable treatment options against dissecting AICA aneurysms. We report a case of PAO against dissecting aneurysm involving the proximal AICA and discuss the therapeutics and literature review of this pathology. A 69-year-old woman was referred to our hospital, and neurological examination revealed a semicoma (Hunt and Hess grade IV). Brain computed tomography (CT) established the diagnosis of Fisher group 3 subarachnoid hemorrhage (SAH), CT angiography revealed an extravasation near the clivus, while digital subtraction angiography showed no signs of dissection. Conservative treatment was administered, and repeated angiography on day 13 showed a pseudoaneurysm and false lumen in the left proximal AICA. The patient was in poor health condition, and endovascular therapy (EVT) of the left AICA was performed to minimize invasion. The PAO was successful with no severe ischemic damage to the brainstem and cerebellum. However, the general condition gradually deteriorated, and the patient expired on day 24. Since open surgery for dissecting AICA aneurysm is technically challenging and revascularization procedure is often required, the rapidly developing EVT is a viable alternative. Although preservation of the proximal AICA is usually necessary, PAO without revascularization procedure was performed to avoid the high risk of regrowth and re-rupture of the dissecting aneurysm with respect to the patient's poor health condition. Hence, EVT is a viable option when microsurgery is contraindicated for treating dissecting AICA aneurysms.

Keywords: artery aneurysm, dissection, subarachnoid hemorrhage, parent artery occlusion

Introduction

Dissecting aneurysms of the anterior inferior cerebellar artery (AICA) are rare. Ikeda et al.¹ reported that dissecting aneurysm

¹Department of Neurosurgery, Iwaki City Medical Center, Iwaki, Fukushima, Japan

²Department of Neurosurgery, Tohoku University Graduate School of Medicine, Sendai, Miyagi, Japan

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of the distal AICA is extremely rare with an incidence of 0.03%–0.5% of all intracranial aneurysms.¹ In dissecting AICA aneurysm, clipping is technically challenging, and wrapping or trapping with revascularization procedure is often required. High complication rates of open surgery for saccular AICA aneurysm have been reported owing to the complexity of these lesions.²

On the other hand, treatment of the posterior circulation aneurysms has undergone significant changes with the development of endovascular therapy (EVT) options. Few reports suggested that coil embolization and parent artery occlusion (PAO) would be valuable treatment options against dissecting AICA aneurysms.^{3–6} However, the records of incidence and therapeutics of the dissecting AICA aneurysms in literature are rare.^{7–9}

In this article, we report a case of dissecting AICA aneurysm treated with PAO, and discuss the therapeutics and literature review of this pathology.

Case Presentation

A 69-year-old female complaining of a sudden headache was referred to our hospital. The neurological examination on admission revealed that the patient was in a semicoma (Hunt and Hess grade IV). Brain computed tomography (CT) established the diagnosis of Fisher group 3 subarachnoid hemorrhage (SAH) mainly in the prepontine cistern and posterior fossa (Fig. 1A). CT angiography revealed a right middle cerebral artery bifurcation aneurysm and extravasation near the clivus (Figs. 1B and 1C). We suspected dissection of the vertebral artery or the basilar artery as the bleeding source. However, digital subtraction angiography (DSA) showed no signs of dissection (Figs. 2A and 2B). Since no apparent cause of the SAH was found, the patient was treated conservatively. Repeated angiography on day 13 showed pseudoaneurysm and a false lumen in the left proximal AICA (Fig. 2C). We thought to treat with direct surgical trapping or endovascular occlusion. However, the patient was in poor health condition. Therefore, we chose to perform endovascular occlusion to minimize invasion and prevent rebleeding. The right posterior inferior cerebellar artery (PICA) and the left superior cerebellar artery (SCA) were well developed; hence, favorable leptomeningeal anastomosis was expected. Under both general anesthesia and heparinization, ASAHI FUBUKI 5F guiding sheath (Asahi Intecc, Nagoya, Aichi, Japan) was placed into the left vertebral artery via the right femoral artery. ASAHI FUBUKI 4.2F guide catheter (Asahi Intecc) was inserted to the basilar artery, next the Marathon

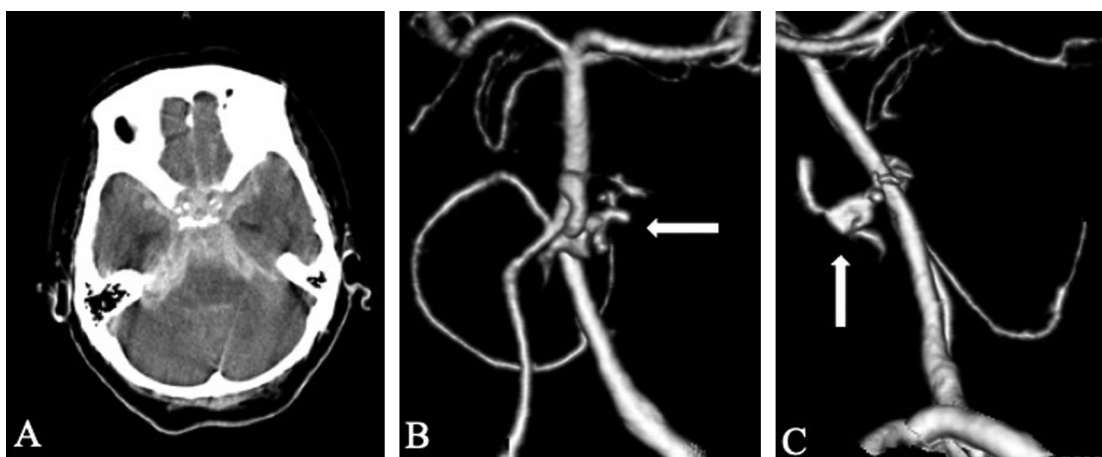


Fig. 1 Computed tomography scanning on admission (A). Computed tomography angiography on admission shows extravasation (arrow) near the clivus (B and C).

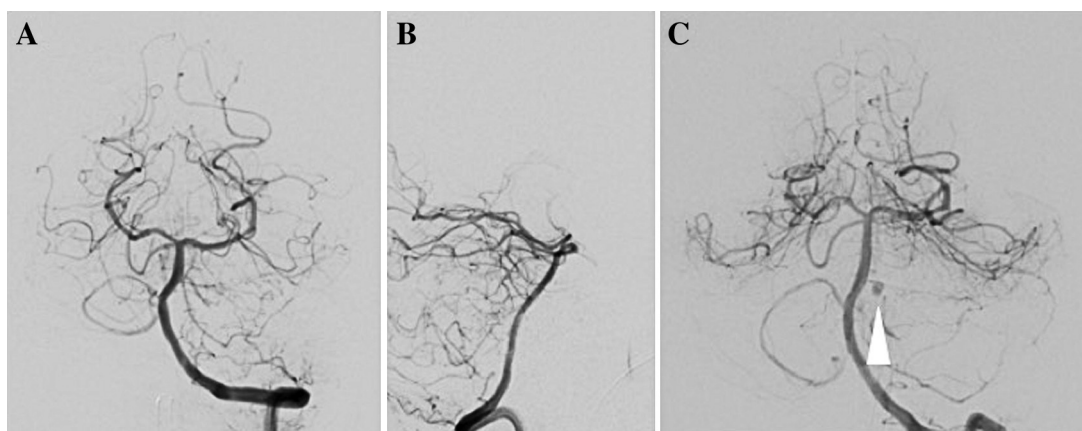


Fig. 2 Left vertebral angiograms on admission: anteroposterior (A) and lateral views (B). Left vertebral angiograms on day 13 showing a pseudoaneurysm (arrowhead) in the left proximal AICA: anteroposterior view (C).

microcatheter (Medtronic, Minneapolis, MN, USA) was advanced into the left AICA. The left AICA was completely occluded using 1 × 10 mm and 1 × 10 mm Barricade complex coils (Blockade Medical, Irvine, CA, USA) (Fig. 3). New neurological symptoms did not appear postoperatively, and no severe ischemic damage in the brainstem and cerebellum were observed on CT on day 16 (Fig. 4). Although general care was continued, the patient's condition gradually deteriorated, and she died of pneumonia on day 24.

Discussion

Isolated dissection of the AICA is rare. However, they are being diagnosed with increasing frequency due to continued improvements in imaging techniques, especially magnetic resonance imaging (MRI) and DSA.¹⁰ Dissecting aneurysms of the AICA can present either as a SAH or vessel occlusion, but the former is more common than the latter in the arterial dissection of posterior circulation.¹¹

The treatment of posterior circulation aneurysms has undergone significant changes with the evolution of EVT

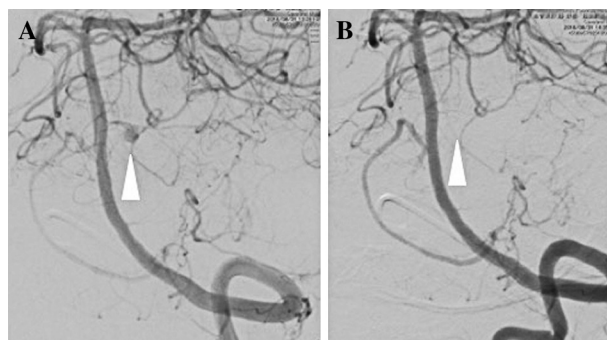


Fig. 3 Preoperative (A) and postoperative (B) left vertebral angiograms of the parent artery occlusion show complete occlusion of the anterior inferior cerebellar artery (arrowhead), occluded using Barricade complex coils.

options. EVT eliminates many of the common surgical risks, making it a safe choice.¹² The recommended management for dissecting AICA aneurysm is direct surgical

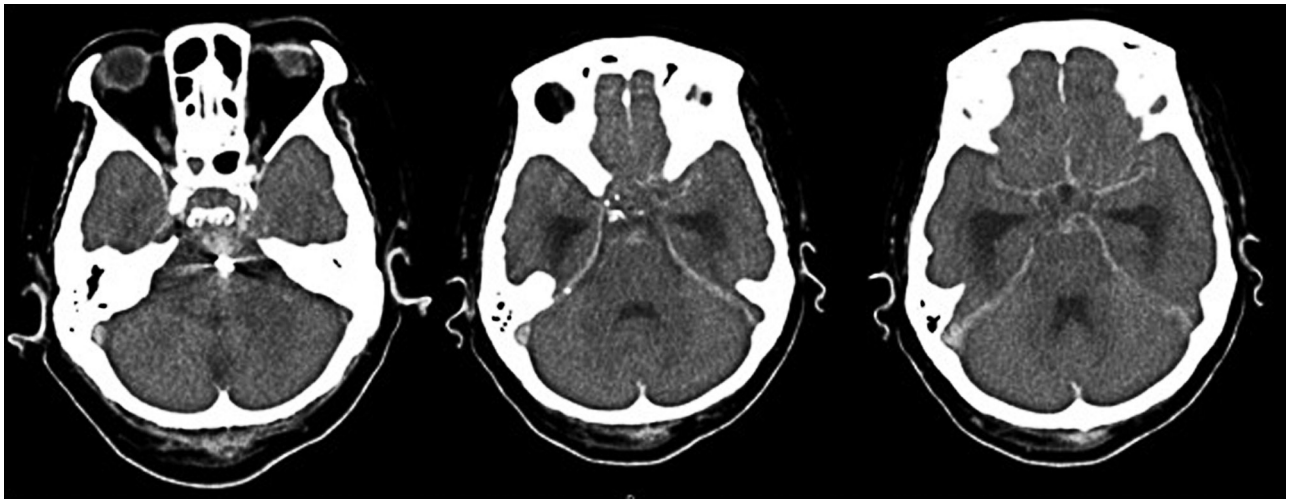


Fig. 4 Computed tomography scan on day 16 shows no sign of severe ischemic damage in the brainstem and cerebellum.

trapping or endovascular occlusion, because of the high risk of regrowth and rebleeding.¹³⁾ Surgical trapping or endovascular occlusion of the posterior circulation is usually safer because the collateral flow is more abundant than that of the anterior circulation.⁹⁾

The AICA usually have anastomoses with the ipsilateral SCA and PICA. Rarely, a solitary PICA supply both cerebellar hemispheres.¹⁴⁾ Therefore, in this case, not only the left SCA but also the developed right PICA may have had collateral circulation to the left AICA. Furthermore, subarcuate artery rising from the AICA has anastomosis with the petrosal branch of middle meningeal artery, mastoid branch of occipital artery, and stylomastoid artery.

The distal flow of the AICA is dependent only on the anastomosis after occlusion, and a severe ischemic complication may occur.^{4,15)} The method of testing the safety of the PAO is by performing a super-selective balloon test occlusion: Inserting a microcatheter to the SCA or PICA and occlude the basilar artery at the origin of AICA using a balloon. However, it is difficult to capture changes of neurological symptoms in high-grade SAH during the test. Therefore, the risk of PAO was difficult to predict in this patient. If the SCA or PICA are unusually small and the AICA is large, the collateral flow is likely to be reduced. In such cases, there is a risk of severe ischemic damage, and the revascularization procedure would be recommended.

In our case, the patient was elderly and in poor health condition. Since the microsurgical option was contraindicated, EVT was the alternative to avoid rebleeding and surgical stress. No ischemic complications were observed on CT due to the sacrifice of the AICA. However, if the MRI scan was completed, small brainstem infarction may have been confirmed. Furthermore, there is a possibility that neurological symptoms such as hearing loss have not been confirmed since the general condition was poor.^{16,17)} When the collateral flow is poor, revascularization should be performed before the sacrifice of the AICA to prevent severe ischemic damage if microsurgery is tolerable.

Conclusion

Dissecting AICA aneurysms are a rare lesion with a high propensity of rebleeding.^{13,18)} We performed occlusion of the parent artery without revascularization to avoid rebleeding. New neurological symptoms did not appear postoperatively because of the establishment of leptomeningeal anastomosis. In patients with poor health conditions, open surgery could be too invasive. PAO without revascularization can be considered to save the patient's life. However, this cannot be generalized because no case with similar conditions have been described in literature. Therefore, we can conclude that these aneurysms remain a therapeutic challenge for neurosurgeons.

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Conflicts of Interest Disclosure

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Corresponding author:

Yasuhiro Suzuki, MD, PhD, Department of Neurosurgery, Iwaki City Medical Center, 16 Kuzehara, Uchigomimayamachi, Iwaki, Fukushima 973-855, Japan.

✉ yasuihiro@nsg.med.tohoku.ac.jp