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Case Report

Parent artery occlusion for ruptured dissecting aneurysm of anterior inferior cerebellar artery: Case report and literature review

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ABSTRACT

Subarachnoid hemorrhage (SAH) caused by a dissecting aneurysm of the anterior inferior cerebellar artery (AICA) is rare. Partial coil embolization of the AICA may be an effective treatment. A 65-year-old woman presented at the emergency room with headache and vomiting for the past five days, after contracting coronavirus disease (COVID)-19. Computed tomography (CT) revealed SAH and intraventricular hemorrhage, and the patient was diagnosed with a dissecting aneurysm of the AICA. The patient underwent endovascular surgery, and the AICA was partially occluded using coiling, with no subsequent hearing disturbance, cranial nerve palsy, or infarction. Ventriculoperitoneal shunt surgery was performed for hydrocephalus at 7 weeks after SAH. The patient was discharged from hospital with no neurological deficit. We reported a rare case of ruptured AICA dissecting aneurysm, which was treated by partial coil embolization without neurological deficit or infarction.

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Oclusión de la arteria principal para aneurisma disecante roto de la arteria cerebelosa anteroinferior: reporte de caso y revisión de la literatura

RESUMEN

La hemorragia subaracnoidea (HSA) causada por un aneurisma disecante de la arteria cerebelosa anteroinferior (AICA) es poco común. La embolización parcial con espirales (coils) de la AICA puede ser un tratamiento efectivo. Una mujer de 65 años se presentó en la sala de emergencias con cefalea y vómitos durante los últimos cinco días, después de haber contraído la enfermedad por coronavirus (COVID-19). La tomografía computarizada (TC) reveló

Palabras clave:

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HSA y hemorragia intraventricular, y se diagnosticó un aneurisma disecante de la AICA. La paciente fue sometida a cirugía endovascular, y la AICA fue parcialmente ocluida mediante espirales, sin que se observaran alteraciones auditivas, parálisis de nervios craneales ni infartos posteriores. A las 7 semanas después de la HSA se realizó una derivación ventriculoperitoneal para tratar la hidrocefalia. La paciente fue dada de alta del hospital sin déficit neurológico. Reportamos un caso raro de aneurisma disecante roto de la AICA tratado mediante embolización parcial con espirales, sin déficit neurológico ni infarto.

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Introduction

Saccular or fusiform aneurysms of the anterior inferior cerebellar artery (AICA) are rare aneurysms located most at the emergence of the AICA from the basilar artery.¹ Intracranial arterial dissection is also infrequent, with vertebral artery (VA) dissection being the most common type. Compared with saccular or fusiform AICA aneurysms and VA dissecting aneurysms, those of the AICA are rarer and are located in the a1 (anterior pontine) to a2 (lateral pontine) segments of the AICA. VA dissection presenting with subarachnoid hemorrhage (SAH) has a high mortality rate² and should be treated as soon as possible to prevent re-rupture. There are some reports of ruptured dissecting AICA aneurysms that were treated by occlusion of the parent artery.^{3–11} We report a case of a patient with a ruptured AICA dissecting aneurysm who was treated with partial coil embolization and had been infected with coronavirus disease (COVID)-19 prior to symptom onset. We also provide a literature review of patients with ruptured AICA dissection who were treated by occlusion of the AICA.

Case presentation

A 65-year-old woman presented at the emergency room with headache and vomiting that had persisted for the past five days. She had contracted COVID-19 10 days prior to the onset of these symptoms. Computed tomography (CT) revealed SAH in the cerebellomedullary and cerebellopontine cisterns, as well as intraventricular hemorrhage (IVH) in the fourth, third, and lateral ventricles (Fig. 1). Magnetic resonance imaging (MRI) and MR angiography showed a dissecting aneurysm in the a2 segment of the right AICA in the region of the SAH. Angiography performed prior to coiling revealed an intramural pooling in the dissecting AICA aneurysm (Fig. 2). Rupture of the dissecting AICA aneurysm was identified as the cause of the SAH and IVH.

The patient underwent endovascular surgery after the cerebral vasospasm period. On the 11th day after the onset of SAH, a dissecting AICA aneurysm was diagnosed. At that time, we considered the AICA too narrow to be treated using endovascular methods. The parent artery was partially occluded by coiling, the dissecting AICA aneurysm and the AICA was faintly visible after coiling (Fig. 2). There were no adverse events such as hearing disturbance, cranial nerve palsy, or cerebellar infarction. Due to a delay in diagnosis and a

gradual decrease in consciousness over several weeks caused by hydrocephalus, the patient required a longer hospital stay. The hydrocephalus resolved following ventriculoperitoneal (V-P) shunt surgery performed 7 weeks after the onset of SAH. The patient was discharged from our hospital 2 weeks after the shunt procedure, with no neurological deficit and no infarction (Fig. 3), achieving a modified Rankin Scale score of 0.

The informed consent was obtained from the patient.

Discussion

To date, there are reports of 12 patients with ruptured AICA dissecting aneurysm, including our case, who have been treated by AICA occlusion.^{3–11} Endovascular occlusion was performed in 11 of these patients and surgical trapping in 1 patient¹⁰ (Table 1). Of the types of intracranial arterial dissection, VA dissection is the most common. Treatment of a ruptured AICA dissecting aneurysm should be instituted as soon as possible after diagnosis, as for a VA dissection.² Our patient underwent endovascular surgery after the cerebral vasospasm period.

Based on the outcomes reported in previous studies (Table 1), endovascular or surgical AICA occlusion can be recommended based on well-accepted reported results for ruptured dissecting AICA aneurysm. Other than a patient for which no details were recorded (case 6) and a patient who died (case 11), the remaining 10 patients survived. In case 11, the result of the treatment for SAH was good, and the cause of death was pneumonia. Parent artery occlusion has been reported as an acceptable treatment for saccular and fusiform ruptured AICA aneurysms,⁵ although AICA occlusion carries some neurological risk. In patients with posterior cerebral artery (PCA) aneurysms, partial coiling of the aneurysm and PCA has been reported as a useful treatment without adverse events, eventually followed by complete occlusion and the development of collateral flow.¹² Similarly, in our case of a ruptured dissecting AICA aneurysm, partial coil occlusion appeared to be an effective emergency measure to prevent rebleeding without causing complications. While this approach may be comparable to strategies used for PCA aneurysms, further evidence is needed to evaluate its general applicability.

Our patient had contracted COVID-19 10 days prior to the onset of symptoms of SAH. It is known that severe acute respiratory syndrome coronavirus 2 binds to angiotensin-converting enzyme II receptors and disrupts endothelial

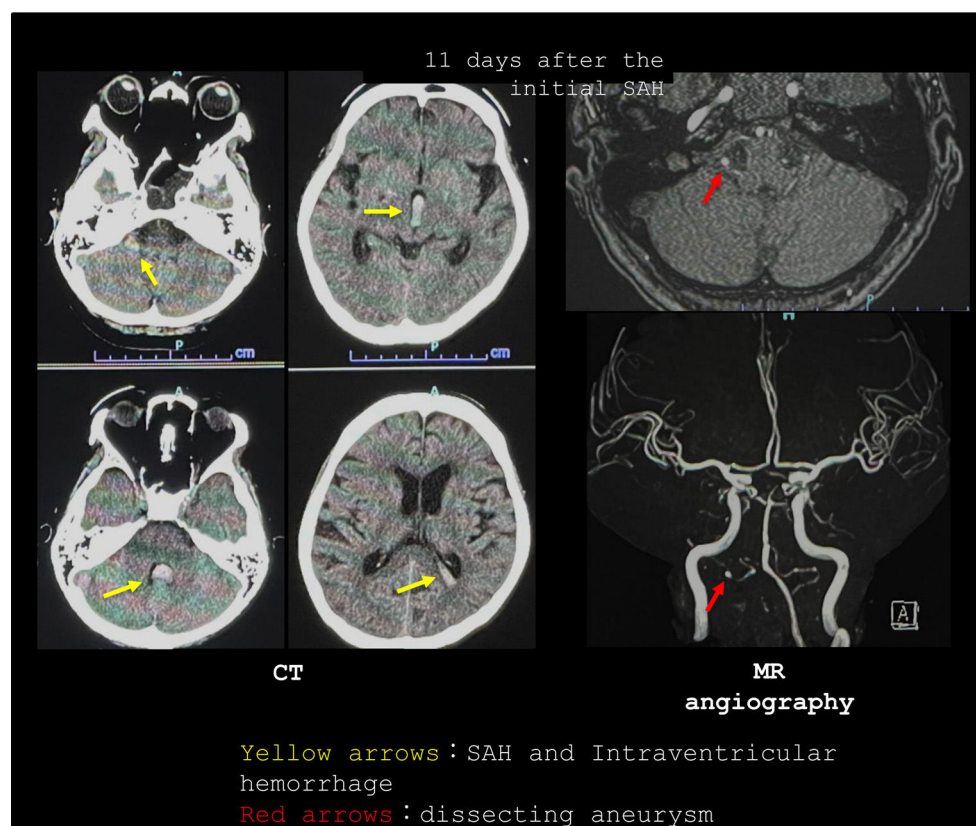


Fig. 1 – Pre-operative diagnostic imaging. CT shows subarachnoid hemorrhage and intraventricular hemorrhage. MR angiography and source axial images acquired 11 days after the initial SAH show a pearl and string sign, indicating a dissecting aneurysm. CT: computed tomography, MR: magnetic resonance, SAH: subarachnoid hemorrhage.

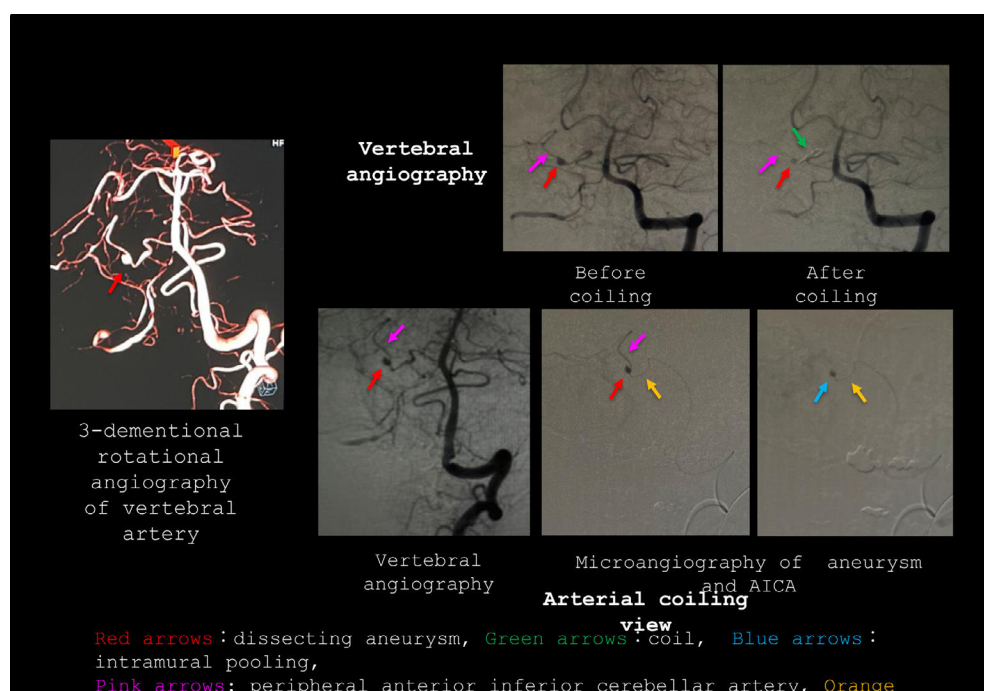


Fig. 2 – Angiography during endovascular surgery. Three-dimensional rotational angiography shows a pearl and string sign. Before coiling, an intramural pooling sign in the dissecting AICA aneurysm was observed on microangiography of the aneurysm and AICA, after the peripheral AICA had become undetectable. After coiling, the dissecting AICA aneurysm and the AICA were faintly visible due to preserved anterograde flow. AICA: anterior inferior cerebellar artery.

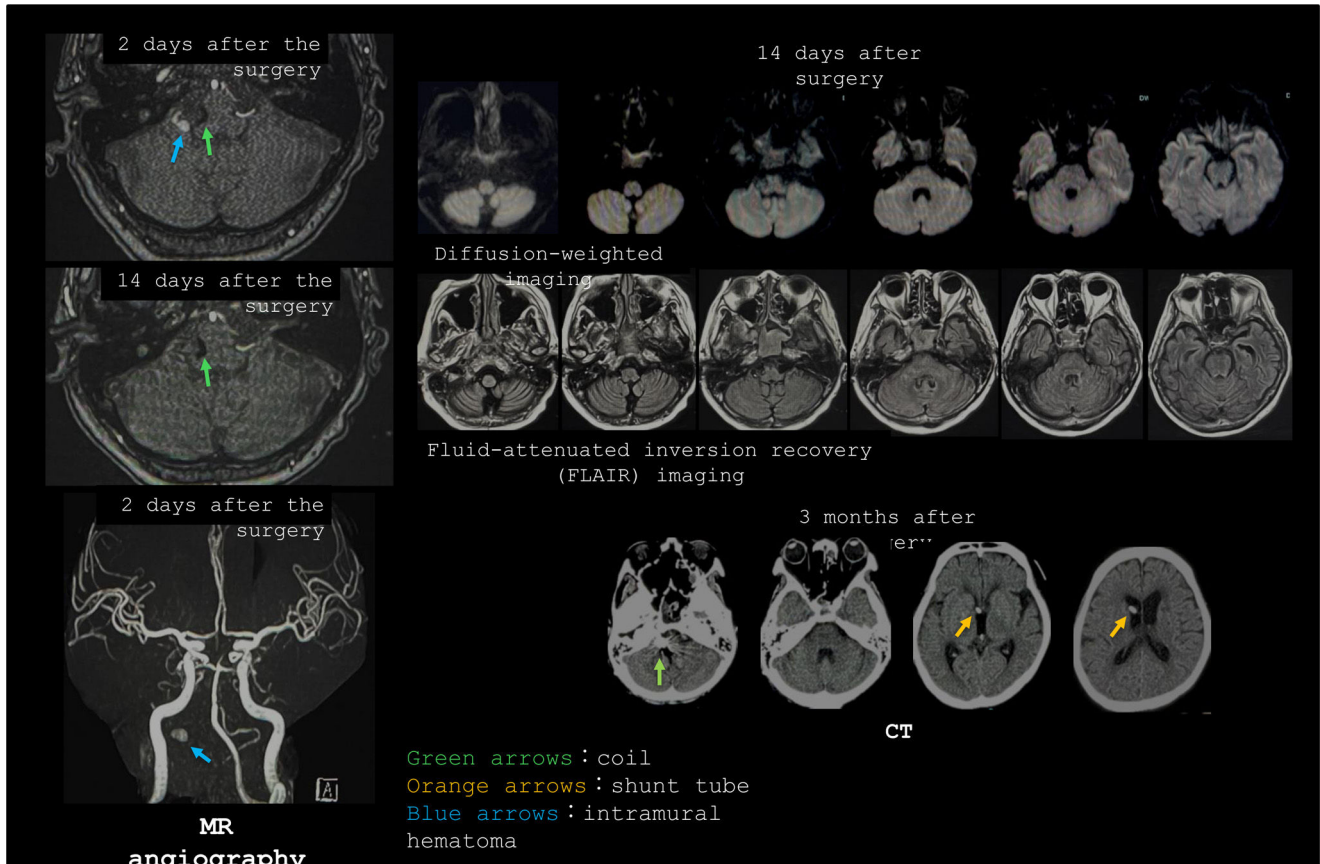


Fig. 3 – Post-operative imaging. MR angiography shows no evidence of the dissecting AICA aneurysm or the AICA itself. CT: computed tomography, MR: magnetic resonance.

Table 1 – Ruptured AICA dissecting aneurysm treated by AICA occlusion.										
Number of case	Year	Author	Age(year) /sex	Hemorrhage	Aneurysm location	AICA occlusion		Outcome	Post-operative CI	
						Treatment	Method or material			
1	2002	Matsuyama T, et al.	39/F	SAH	VA and a1	Endovascular	Coiling	No deficit	No	
2	2006	Choi CH, et al.	20/M	SAH, IVH	a2	Endovascular	Coiling	No deficit	No recording	
3	2007	Kang HS, et al	41/M	SAH, IVH	a2	Endovascular	Coiling	No deficit	Cerebellar infarction	
4	2008	Kocak A, et al	40/F	SAH, IVH	a2	Endovascular	NBCA glue	No deficit	Cerebellar infarction	
5	2009	Takeuchi M, et al	63/F	SAH, IVH	a2	Surgical	Surgical trapping	No deficit	No	
6	2010	Andrade G, et al	47/F	SAH	Distal	Endovascular	Cyanoacrylate and lipiodol	No recording	No recording	
7			16/F	SAH, IVH	Distal	Endovascular	Cyanoacrylate and lipiodol	Almost complete recovery	No recording	
8			29/M	SAH	Distal	Endovascular	Cyanoacrylate and lipiodol	Almost complete recovery	No recording	
9	2015	Takemoto Y, et al	54/F	SAH	a2	Endovascular	Coiling	No deficit	Cerebellar infarction	
10	2019	Hou K, et al	38/M	SAH, IVH	a1-2	Endovascular	Coiling	No deficit	No	
11	2020	Sato Y, et al	69/F	SAH	a1	Endovascular	Coiling	Dead (Pneumonia)	No	
12	2024	Present case	65/F	SAH, IVH	a2	Endovascular	Coiling	No deficit	No	

AICA: anterior inferior cerebellar artery, CI: cerebral infarction, IVH: intraventricular hemorrhage, NBCA: n-butyl-2-cyanoacrylate, SAH: sub-arachnoid hemorrhage.

function, leading to endothelial inflammation and subsequent arterial dissection.¹³ In addition, several previous case reports have suggested a link between vertebral artery dissection and COVID-19.^{13,14} Therefore, it may be possible that COVID-19 infection triggered the AICA dissection, although the details of this case are unknown.

Conclusion

We reported a rare case of ruptured AICA dissecting aneurysm that was treated by partial coil occlusion of AICA without neurological deficit or infarction. Although the mechanism of AICA dissection is unknown, COVID-19 may increase susceptibility.

Informed consent

The patient has consented to the submission of this case report to the journal.

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Conflict of interest

All authors declare that there is no conflict of interest.

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