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Case Report

Early spontaneous occlusion of a vertebral artery dissecting aneurysm caused by subarachnoid hemorrhage: A case report☆,☆☆

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ABSTRACT

We report a case of vertebral artery dissecting aneurysm (VADA) that developed with subarachnoid hemorrhage and was found to be occluded based on subsequent digital subtraction angiography. Few reports have been published on ruptured VADA in which ipsilateral vertebral arteries are occluded. The proper management of this type of aneurysm is controversial. A 44-year-old woman developed a sudden onset headache. Computed tomography and three-dimensional computed tomography were immediately performed and showed subarachnoid hemorrhage and VADA distal to the right posterior inferior cerebellar artery bifurcation. We decided to treat the VADA immediately and performed digital subtraction angiography but found the VADA had spontaneously occluded. We performed coil embolization, including the aneurysm and the parent artery, with reference to the findings of three-dimensional computed tomography. On Day 16, recurrence was considered due to the finding of dilation of the distal end where the coil was embolized. An additional embolization was performed via the posterior communicating artery. No cases of endovascular treatment have been reported in VADA cases in which the rupture site is spontaneously occluded. In such cases, the treatment may be incomplete, so strict follow-up is required.

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Introduction

The frequency of rebleeding of a vertebral artery dissecting aneurysm (VADA) caused by subarachnoid hemorrhage (SAH) is very high [1]. Rebleeding often occurs within 24 hours of the initial onset, and the mortality rate is high in this situation, so early intervention to detect the source of bleeding is required [1,2]. If a dissecting aneurysm is found, it is treated, but there are cases in which only stenosis or occlusion is present, and the source of the bleeding is unknown [2]. In this case, we confirmed VADA by three-dimensional computed tomographic angiography (3D-CTA) at the first visit after developing the SAH. However, we could only determine the occluded parent artery by digital subtraction angiography (DSA) performed immediately after the 3D-CTA scan. We have searched for reports in which endovascular treatment was performed in cases with spontaneous occlusion, and since there have been no reports so far, we will include a review of the literature, including precautions.

Case report

A 45-year-old woman experienced sudden occipital pain the day before she came to the hospital. While shopping the next day, she again had sudden occipital pain and urinary incontinence, and she was taken to our hospital for emergency treatment. She reported no family history of a similar illness, and she had no such illness in the past. She had a Glasgow coma scale score of 14 points, blood pressure of 109/68 mmHg, and no paralytic symptoms [World Federation of Neurosurgical Societies Grade II]. A computed tomographic (CT) scan of the head was performed immediately after the visit and showed a thick SAH of Fisher group 3 (Fig. 1A). 3D-CTA showed an aneurysm (13.2×5.2 mm) with an irregular wall in the right vertebral artery (VA) after the bifurcation of the posterior inferior cerebellar artery (PICA). The VA distal to the aneurysm narrowed and continued to the basilar artery (BA) (Fig. 1B). Right vertebral angiography (VAG) showed that the right VA was occluded immediately after the PICA bifurcation (Fig. 2A). The aneurysm itself, which was considered the source of bleeding observed on the 3D-CTA scan, was not imaged. In addition, the PICA on the affected side was found to be anastomosed with the anterior inferior cerebellar artery (Fig. 2A). In the left VAG, the distal part of the right VA was partially imaged retrogradely (Fig. 2B).

We decided to perform internal trapping where the right VADA was present while referring to the 3D-CTA scan. A 7-Fr Roadmaster (Goodman, Aichi) was inserted into the right VA for embolization, and a 5-Fr Envoy (Johnson & Johnson, Miami, FL) was inserted into the left VA via the femoral artery for contrast. A microcatheter (Excelsior SL-10, Stryker, Kalamazoo, MI) was guided to the right VA aneurysm coaxially to a Traxcess (Terumo, Tokyo), and we performed internal trapping on the dilated portion. Since the origin at the wall of the PICA was also irregular, the proximal VA including the PICA origin was occluded. The coils used were HyperSoft3D 2×4(3), 1.5×3(2), 1×3(2), 1×2(6) (Terumo, Tokyo); and Axium Prime3D(ES) 1×2, Axium Helix 2×8, 2×6, Axium Prime 3D(ES) 3×4, 3×6, 2×4(4), 2.5×6(3), 2.5×4(2), 2×3(2), 1×1(2) (Medtronic, Minneapolis) (Fig. 3A).

Finally, left VAG was also performed, and it was judged that sufficient occlusion had occurred (Fig. 3B). The postoperative course was uneventful, and the patient recovered to a modified Rankin Scale (mRS) score of 1. MRI was performed every 3-4 days, DSA was performed on Days 4 and 15, and strict follow-up was performed. DSA on Day 15 revealed a distal recurrence after internal trapping, and retreatment was decided on Day 16 (Fig. 4A).

For retreatment, a 7-Fr Roadmaster was inserted into the left VA, and a microballoon catheter (Scepter C 4×15-mm, Terumo, Tokyo) was guided to the lower BA coaxially to a CHIKAI 14 200 cm (Asahi Intec, Aichi). We attempted to determine if it was possible to lead from the left VA to the right VA beyond the VA union. However, since it was not possible, we finally changed to the retrograde approach from the internal carotid artery (ICA) to the BA via the posterior communicating artery (Pcom). A 7-Fr Roadmaster was inserted into the left ICA, and the ICA was imaged with the Scepter placed in the BA inflated, so that the posterior circulation was sufficiently imaged from Pcom (Fig. 4B). Tactics 130 cm (Technorat Corporation, Aichi) was inserted into the Pcom origin. A microcatheter (Neurodeo-10, Medicos Hirata, Osaka) was guided to the residual cavity of the VADA coaxially to a GT wire 0.012 inches double angle (Terumo, Tokyo) and Traccess. The coils used are as follows: Smart coil Wave ES 2×3, 2×4(2)(Penumbra Inc, Alameda, CA), HydroSoft3D 2×2(2), Axium Prime3D 2×3(4), and Axium Prime Helix 1.5×2,1×1. The remaining cavity was no longer visualized, and the procedure was completed (Fig. 4B).

The postoperative course was uneventful, and she was discharged from the hospital with an mRS score of 1.

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Discussion

The determining factor for a poor prognosis of ruptured VADA is rebleeding, and it has been reported that aggressive surgical treatment is required in the acute phase to prevent rebleeding [1]. However, despite the onset of SAH, the bleeding source may spontaneously occlude, and there is no consensus on the treatment when the bleeding source cannot be confirmed [2]. Cerebrovascular angiography findings may change early in VADA [3–5]. However, most cases of SAH have a bulge in the dissociated area, and VA is rarely obstructed [2]. In addition, it has been reported that recanalization can be obtained in 63% of cases where VA obstruction is caused by dissociation [4]. For treatment of VADA that develops due to bleeding and then becomes obstructed, either surgical treatment including endovascular treatment or medical treatment under strict control should be prioritized. Surgical treatment performed in cases wherein the lesion is occluded has the disadvantage that anatomical orientation is difficult.

On the other hand, when performing medical treatment, it is necessary to carry out strict follow-up while always consid-

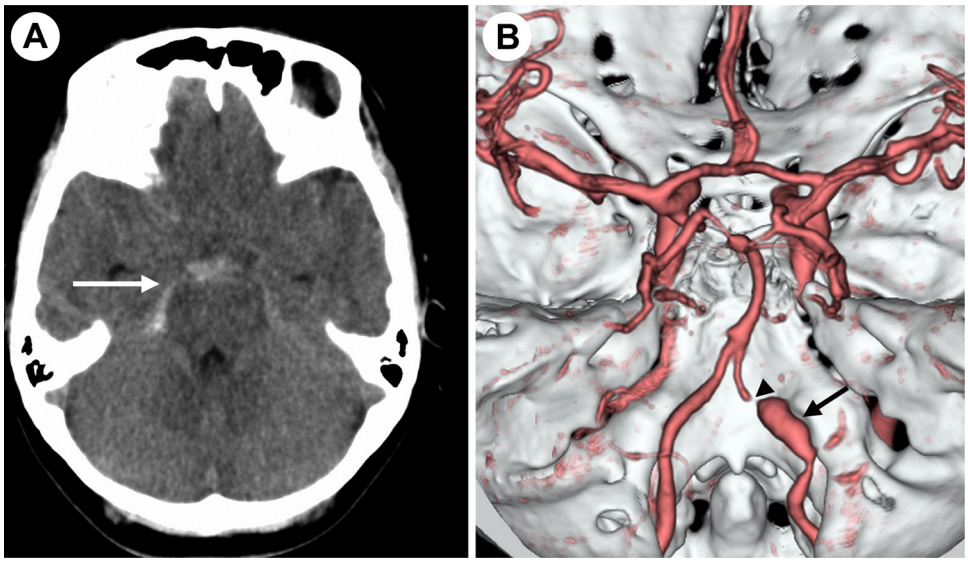

Fig. 1 – Computed tomographic (CT) scan and 3-dimensional computed tomographic angiography (3D-CTA) performed at the time of the visit to our hospital. A: CT scan showed a slightly thickened subarachnoid hemorrhage, mainly in the right cistern around the brainstem (white arrow). B: 3D-CTA scan showed fusiform dilation in the vertebral artery (VA) distal to the right posterior inferior cerebellar artery (PICA) bifurcation (black arrow). The right VA distal to the fusiform dilatation showed stenosis (black arrowhead).

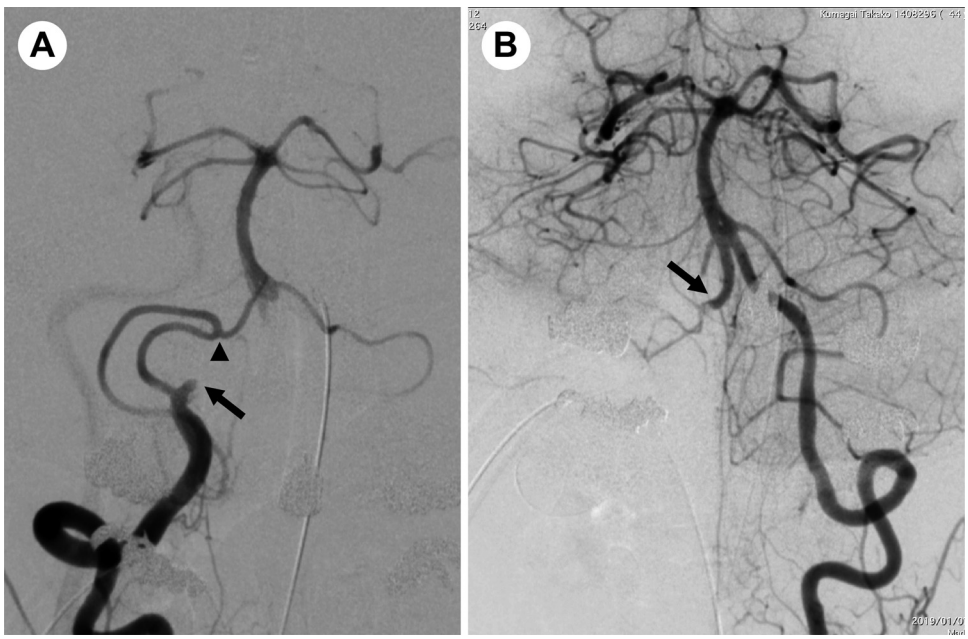

Fig. 2 – Digital subtraction angiography (DSA) performed at the time of first treatment. A: Right vertebral angiography (VAG) showed that the right VA was occluded immediately after the right PICA bifurcation, but fusiform dilatation was not observed (black arrow). The right PICA was found to have anastomosed with the right anterior inferior cerebellar artery (black arrowhead). B: In the left VAG, the distal part of the right VA was retrogradely imaged (black arrow).

ering the possibility of rebleeding, as the prognosis in the case of rebleeding is poor [1,2]. In this case, the bleeding site was confirmed by 3D-CTA performed immediately after the visit. However, the obstruction was found by cerebrovascular angiography at the time of treatment. Considering the findings of 3D-CTA, VADA was apparent as the source of bleeding; hence, internal trapping was performed with reference to the 3D-CTA scan. Nevertheless, recurrence occurred 2 weeks later, and retreatment was performed. It is possible that the dissected portion was not imaged at the time of the initial treatment, so that the distal part of the aneurysm was insufficiently confirmed, and the embolization was insufficient. Considering the possibility of recurrence, we performed strict follow-up with MRI even after the initial treatment [2]. As a result, recurrence was

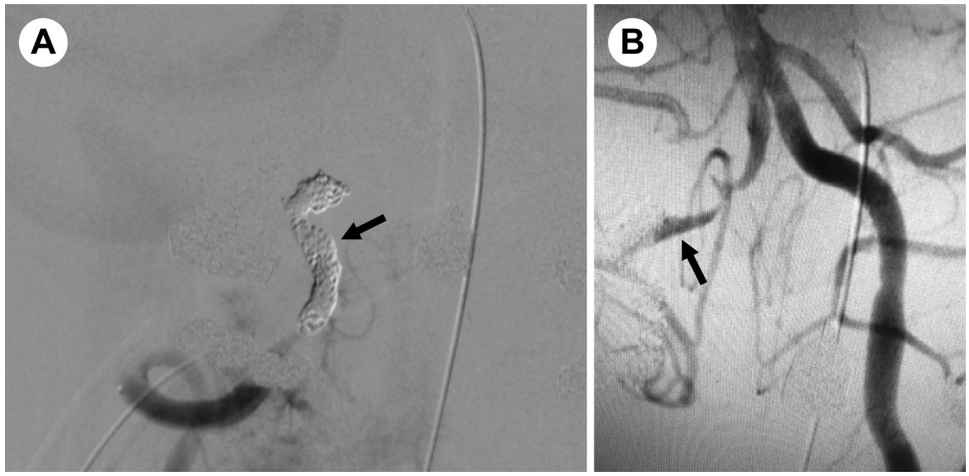

Fig. 3 – DSA performed at the end of initial endovascular treatment. A: Internal trapping of the right VA, including the right PICA origin, was performed on the fusiform dilatation confirmed by 3D-CTA (black arrow). B: Left VAG showed the distal part of the right VA, which underwent internal trapping (black arrow).

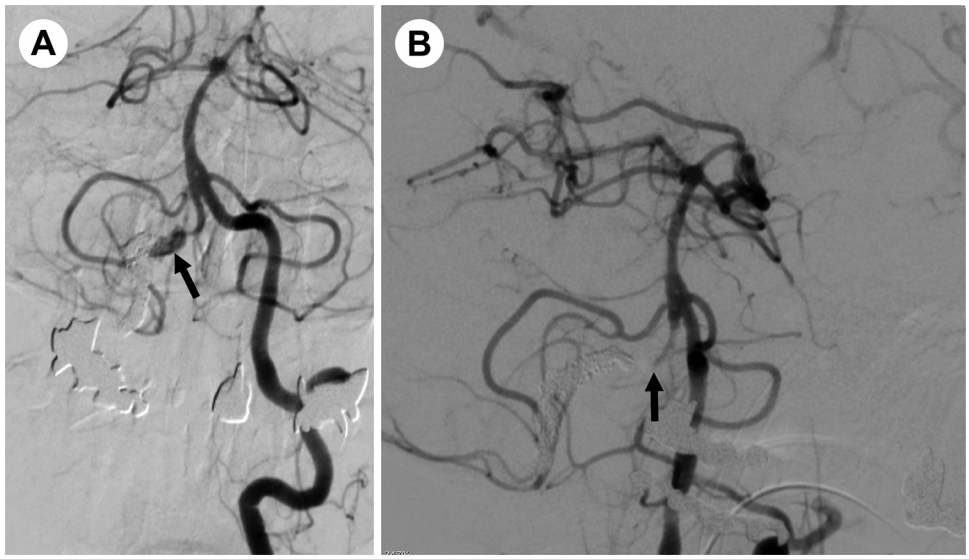

Fig. 4 – DSA performed at the time of the second treatment. A: Left VAG showed the recurrent lesion in the distal part of the right VA with internal trapping (black arrow). B: An additional coil embolization was performed on the residual lesion, after which the lesion was no longer visible (black arrow).

observed distal to the dissection cavity about 2 weeks later. Regarding retreatment, the approach from the ipsilateral VA becomes difficult when the proximal part is occluded. Therefore, the preferred approach is from the contralateral VA via the VA union or from the anterior circulation via the Pcom [6,7]. In this example, the approach via the VA union was difficult, so the approach via Pcom was finally selected. At that time, some ingenuity was required in the imaging method and device selection for guiding the catheter.

Conclusion

We experienced a case of dissecting vertebral aneurysm that developed with SAH and was obstructed at the time of endovascular therapy. When endovascular treatment is performed for an occluded VADA, the treatment may be inadequate, and it is necessary to carefully consider the possibility of subsequent recurrence and to conduct follow-ups closely.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Ethical approval

The following arrangements exist at the facility to which we belong. Ethical review is not always required for case reports in academic societies or journals for specific subjects. However, we pay attention to the protection of personal information.

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