Neurology Asia 2024; 29(4) : 1163 – 1166

CASE REPORTS

Bilateral vertebral artery dissection aneurysm involving the anterior spinal artery: A challenge in management

Yuxi Wu

Department of Neurosurgery, People's Hospital of Dongxihu District, Wuhan, Hubei, China

Abstract

Bilateral vertebral artery dissection aneurysm (VADA) is a rare intracranial aneurysm with complex structures near the posterior cranial fossa, making surgical treatment difficult. The management strategy for ruptured interlayers is still controversial, and the protection of collateral circulation during surgery is an important consideration. We report here a case of bilateral VADA with subarachnoid hemorrhage involving the anterior spinal artery, which was successfully treated through a strategy of unilateral VADA stent assisted coil embolization and a second-phase contralateral surgery.

Keywords: Vertebral artery dissection aneurysm, bilateral; anterior spinal artery, subarachnoid hemorrhage, endovascular treatment

INTRODUCTION

Bilateral vertebral artery dissection aneurysm (VADA) is a relatively rare and unique intracranial aneurysm. Approximately 80% to 90% of brain dissecting aneurysms are vertebral basilar artery dissecting aneurysms, with approximately 3/4 to 4/5 occurring in the V4 segment of the vertebral artery. The emergency management of a bilateral aortic dissection hemorrhage is controversial. Endovascular therapy is an option, but there is no consensus on the specific intervention methods and timing.

CASE REPORT

A 52-year-old male patient was admitted to the hospital due to a sudden headache that lasted for one hour. The patient was conscious and had a stiff neck, with a Glasgow Coma Scale (GCS) score of 15 and a Hunt-Hess grade of 2 on admission, subarachnoid hemorrhage (SAH) was diagnosed based on a computed tomography (CT) scan of the head. A head and neck computed tomography angiography (CTA) examination later revealed a bilateral vertebral artery V4 segment dissecting aneurysm (Figure 1). To further understand the shape, size, and surgical treatment of the aneurysm in detail, cerebral angiography was performed. A vertebral artery dissection of approximately 15.2mm * 5.2mm was observed in the V4 segment of the right vertebral artery, which showed stenosis and irregular enlargement (Figure 2A-B, G). The anterior spinal artery emanated from this segment and was relatively bulky. There is an 8.2mm * 7.8mm dissecting aneurysm in the V4 segment of the left vertebral artery, and the responsible aneurysm for the SAH cannot be determined (Figure 2C-D, H). There is a high possibility of bleeding on the left side during the surgery. To protect the anterior spinal artery, priority is given to performing left vertebral artery stent implantation assisted with spring coil embolization during surgery, followed by a second phase of right surgery (Figure 2E-F). Postoperatively the patient recovered well without any residual neurological dysfunction.

DISCUSSION

According to reports, the incidence of spindle-shaped aneurysms is less than 0.1%, including VADA.[1] These aneurysms can also be observed on the basilar artery and its branches, including the posterior cerebral artery and posterior inferior cerebellar artery. Because of its routing features, the vertebral artery can be separated into intracranial and extracranial sections. Intracranial

Address correspondence to: Yuxi Wu, Department of Neurosurgery, People's Hospital of Dongxihu District, Wuhan, Hubei 430040, China. Email: wuyuxi97@163.com

Date of Submission: 26 June 2024; Date of Acceptance: 29 June 2024

https://doi.org/10.54029/2024tss

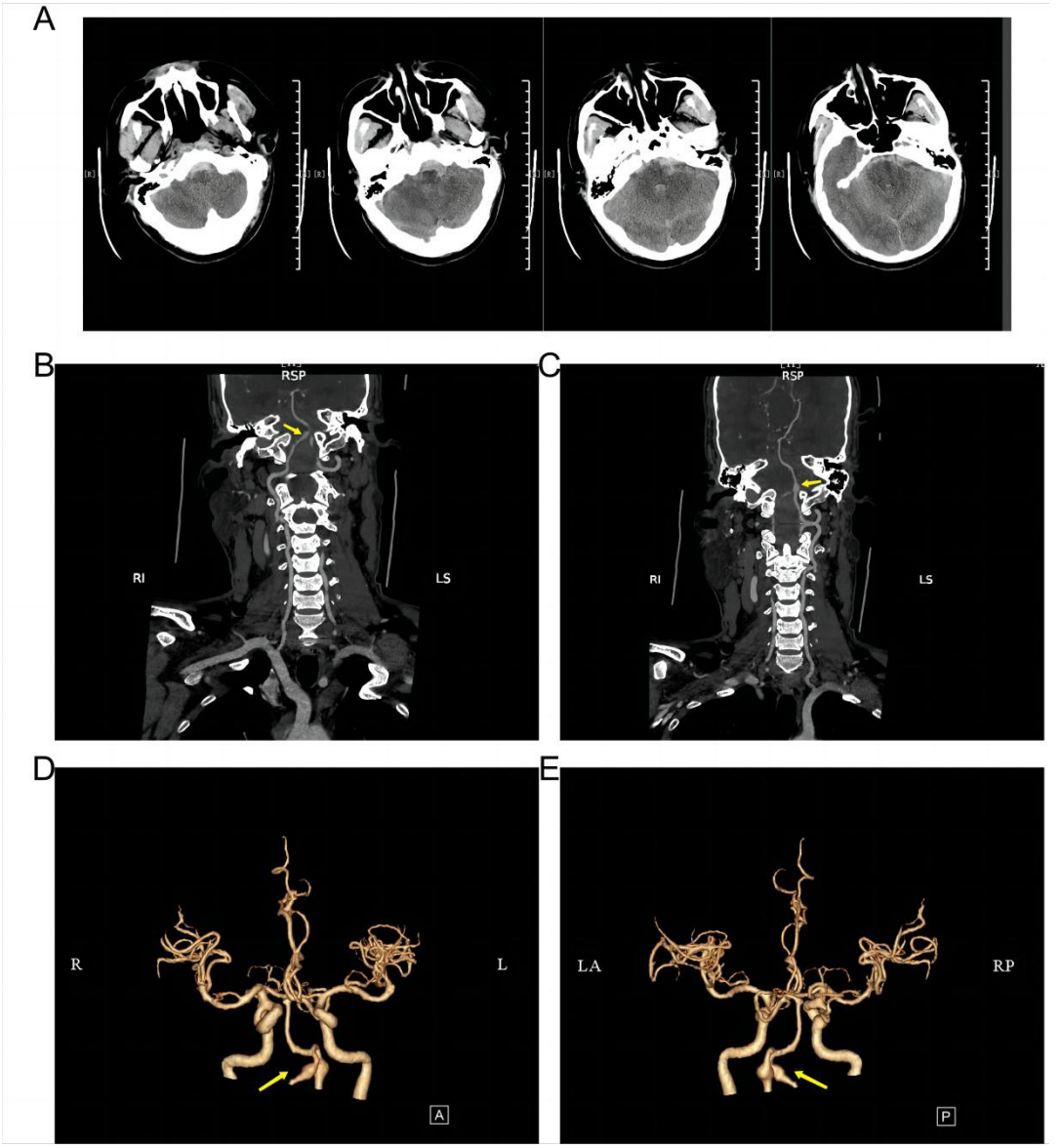

Figure 1. Preoperative CTA imaging. (A) Plain CT scan image of the head. (B-C) Coronal CTA images of the head and neck. (D-E) CTA reconstruction pictures of the head.

blood vessels have a thin outer membrane and an intermediate membrane with fewer elastic fibers.[1] There is insufficient support from the surrounding tissues and inadequate development of the outer elastic membrane.[2] In vertebral artery dissection aneurysms, intracranial dissection aneurysms often cause SAH, while extracranial dissection aneurysms often manifest as brainstem or cerebellar ischemia.

VADA is prone to rebleeding and is unstable when combined with SAH. Rebleeding may occur as a result of the hemodynamic stress on the vascular wall. According to previous reports, the rebleed rate of untreated patients is as high as 71.4%, and the mortality rate of the rebleed patients is 46.7%.[3] In order to stop any further bleeding, therapeutic interventions should be started as soon as possible. The clipping surgery of VADA requires consideration of blood supply compensation, usually accompanied by bypass surgery.[4] And there are reports that capturing a ruptured VADA can increase the hemodynamic stress on the contralateral VADA, leading to its expansion and rupture.[4] Endovascular treatment (EVT) can lower hemodynamic pressure and provide a healing-friendly atmosphere.[2] However,

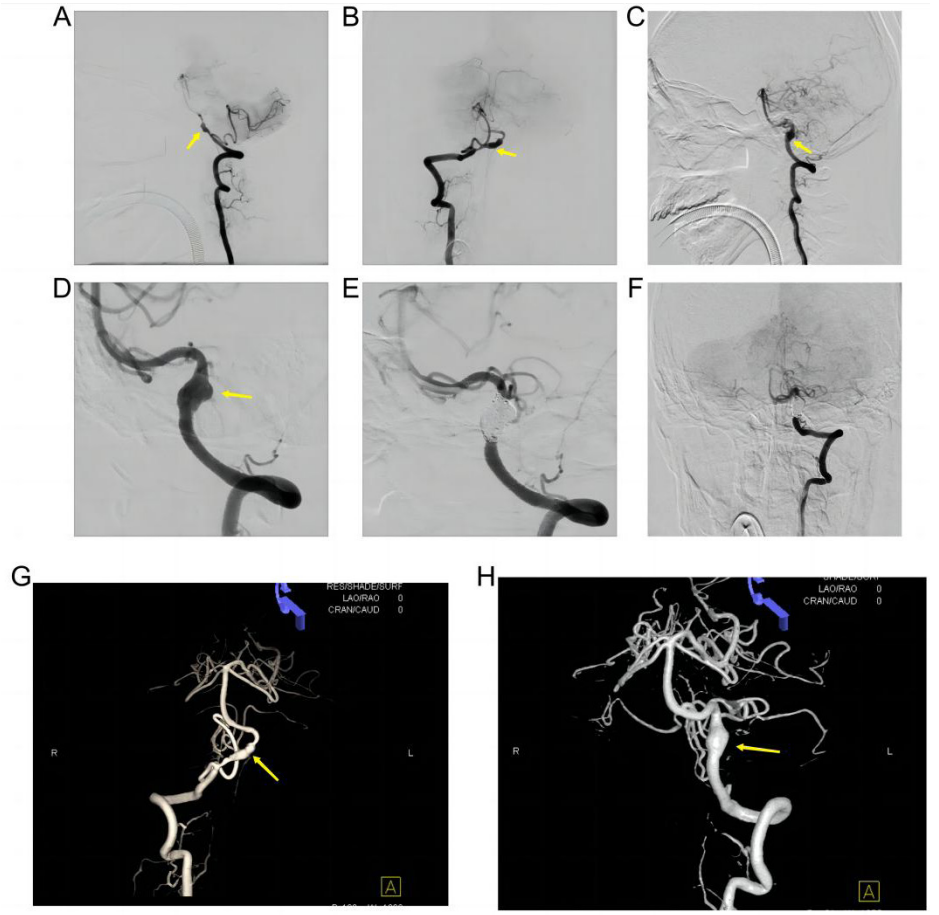

Figure 2. Surgical imaging of cerebral angiography. (A-B) Right vertebral artery DSA angiography. (C-D) Left vertebral artery DSA angiography. (E–F) Stent-assisted spring coil embolization following angiography of a left vertebral artery dissection. (G–H) reconstruction using DSA imaging.

some retrospective studies on intravascular embolization have shown a high incidence of postoperative spinal cord infarction (30%–47%).[3]

We report here a case of bilateral VADA that was successfully treated with unilateral VADA stent-assisted coil embolization and secondary surgery. There is controversy over the management strategy of SAH's bilateral VADA. Here, stent-assisted coil embolization is one of the most effective surgical options for treating bilateral VADA.[2,5] There is uncertainty in determining the bleeding side, especially in cases of minor bleeding. In cases where the bleeding site is unclear, simultaneous treatment on both sides is required. At the same time, if it is impossible to determine the other side of the bleeding, reconstructive EVT should be performed on both sides as much as possible.[3] For patients with a clear bleeding side, it is necessary to determine whether the bleeding side is the dominant vertebral artery so as to adopt different treatment strategy.[2] The decision for bilateral vertebral artery EVT plans usually takes into account the function of important branches of the vertebral artery, and embolization of these branches may lead to catastrophic consequences.[5] In this case, preservation of the anterior spinal artery was considered, and only unilateral interventional embolization was performed. There were reports that it is feasible to treat dissecting aneurysms two weeks after rupture.[2,5] For ruptured bilateral vertebral artery dissection aneurysms without a compressive effect, staged or elective surgery may be more advantageous for patients. As mentioned above, bilateral VADA is an extremely rare condition. Therefore, more reports of cases for cumulative experience would be helpful.

In conclusion, the surgical strategy for bilateral VADA with SAH is controversial. The precise treatment should be carefully considered after a thorough analysis of the patient's clinical symptoms, imaging features, posterior circulation, and contralateral vessel compensation.

DISCLOSURE

Ethics: Informed consent was obtained from the patient for the publication.

Financial support: None

Conflict of interest: None

REFERENCES

1. Ouyang F, Li J, Zeng H, *et al*. Unilateral upper cervical posterior spinal cord infarction caused by spontaneous bilateral vertebral artery dissection. *Neurology* 2022; 99(11):473-4. doi: 10.1212/WNL.0000000000201062.
2. Ishikawa T, Yamaguchi K, Anami H, *et al*. Stent-assisted coil embolisation for bilateral vertebral artery dissecting aneurysms presenting with subarachnoid haemorrhage. *Neuroradiol J* 2016; 29(6):473-8. doi: 10.1177/1971400916666559.
3. Cherian J, Madaelil TP, Tong F, *et al*. Combined reconstructive and deconstructive endovascular approach for bilateral vertebral artery dissection with subarachnoid hemorrhage. *Neurosurg Focus* 2019; 46(Suppl 1):V13. doi: 10.3171/2019.1.FocusVid.18483.
4. Yokoyama T, Nomura S, Ishiguro T, *et al*. A case of bilateral vertebral artery dissection treated by bilateral surgical occlusion and low-flow bypass. *Surg Neurol Int* 2024; 15:121. doi: 10.25259/SNI_125_2024
5. Saito N, Kamiyama H, Takizawa K, *et al*. Management strategy for bilateral complex vertebral artery aneurysms. *Neurosurg Rev* 2016; 39(2):289-96. doi: 10.1007/s10143-015-0686-3.