

## Outflow Occlusion with Occipital Artery–Posterior Inferior Cerebellar Artery Bypass for Growing Vertebral Artery Fusiform Aneurysm with Ischemic Onset: A Case Report

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Surgical treatments should be considered for vertebral artery fusiform aneurysms, which become symptomatic due to cerebral ischemia or mass effect. Ischemic complication is one of the major problems after surgical or endovascular trapping, which is associated with unfavorable outcomes. The authors present a case with growing vertebral artery (VA) fusiform aneurysm with ischemic onset successfully treated with outflow occlusion with occipital artery–posterior inferior cerebellar artery (OA-PICA) bypass. A 50-year-old woman presented with left PICA territory infarction. Left vertebral angiography (VAG) showed occlusion of the left VA at the proximal V4 segment. Right VAG revealed that the distal part of the left V4 segment with fusiform aneurysmal dilatation was reconstituted through vertebrobasilar junction, and the left PICA was the outlet of the blood flow from the fusiform aneurysm. Although the patient was treated conservatively, enlargement of the left VA fusiform aneurysm was observed 8 months after the initial presentation. Considering the potential risks for future stroke or bleeding, we performed clip occlusion of the origin of the left PICA, which could achieve outflow occlusion of the fusiform aneurysm with preservation of the perforators arising around the aneurysm. We created OA-PICA anastomosis for revascularization of the distal PICA. The postoperative course was uneventful, and the postoperative right VAG revealed occlusion of the fusiform aneurysm. Outflow occlusion instead of trapping is an effective surgical option for VA fusiform aneurysm to achieve obliterate the aneurysm with preservation of the perforator at the blind end. **Key Words:** Vertebral artery—fusiform aneurysm—outflow occlusion—bypass surgery—ischemic onset.

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Fusiform cerebral aneurysms are relatively uncommon lesions compared with saccular aneurysms. The management of unruptured fusiform cerebral aneurysms is controversial because their natural history is still

undetermined.<sup>1</sup> Both surgical and endovascular therapy for fusiform aneurysms are often challenging and are accompanied by a definite risk, which must outweigh the natural course of the disease. However, surgical

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treatments should be considered for fusiform aneurysm showing neurologic symptoms caused by cerebral ischemia or mass effect.<sup>1</sup> Here, we report a case with growing vertebral artery (VA) fusiform aneurysm with ischemic onset successfully treated with outflow occlusion with occipital artery–posterior inferior cerebellar artery (OA-PICA) bypass.

## Case Report

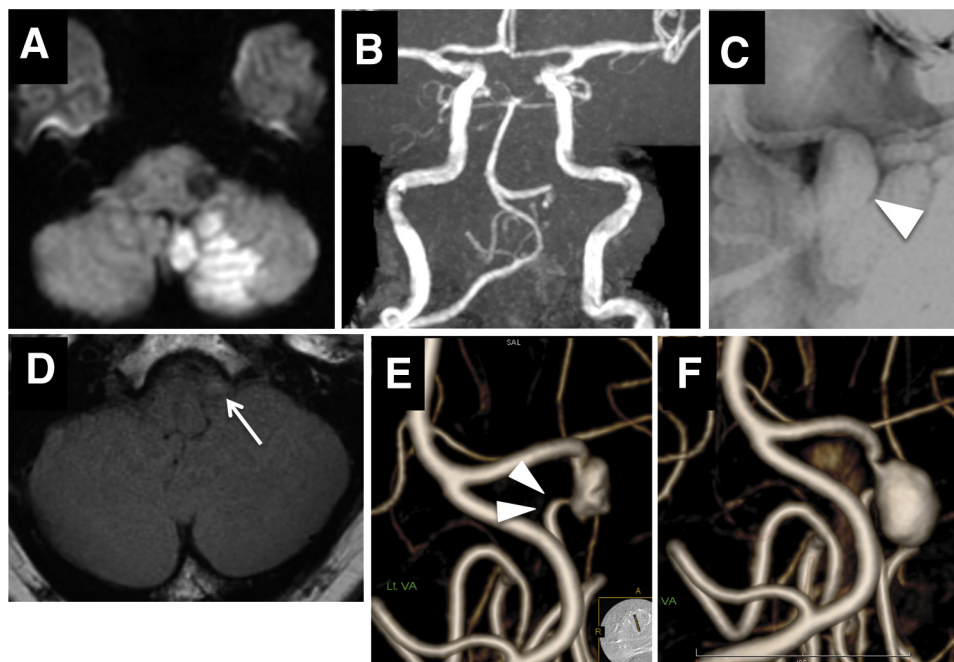
### History and Examinations

This 50-year-old woman admitted to our hospital with complaints of sudden onset of dizziness. A magnetic resonance imaging (MRI) showed left posterior inferior cerebellar artery (PICA) territory infarction (Fig 1, A). Magnetic resonance angiography and basi-parallel anatomic scanning (BPAS)-MRI showed occlusion of the left VA with dilation of the outer wall of the V4 segment (Fig 1, B,C). Intramural hematoma with luminal thrombus was detected by T1-weighted imaging (Fig 1, D). Left vertebral angiography (VAG) showed occlusion of the left VA at the proximal V4 segment (not shown). Right VAG revealed that the distal part of the left V4 segment with fusiform aneurysmal dilatation was reconstituted through vertebrobasilar junction, and the left PICA was the outlet of the blood flow from the fusiform aneurysm (Fig 1, E). Based on the radiologic findings stated previously, we diagnosed this patient as ischemic-onset left VA fusiform aneurysm, which involved the origin of the

PICA. The patient was treated conservatively and discharged from our hospital without any neurologic deficits. However, the appearance of the left VA fusiform aneurysm changed over the next 8 months without any clinical sign. MRI studies showed no recurrence of the left cerebellar infarction (not shown). Magnetic resonance angiography and BPAS-MRI showed that the left VA remained occluded and that the external diameter of the fusiform aneurysm remained unchanged, respectively (not shown). However, the appearance of the fusiform aneurysm enlarged in the right VAG (Fig 1, F). Considering the potential risks for future stroke or bleeding, we decided to perform open surgery.

### Operation

Antiplatelet agent was administered for 2 days before surgery. The patient was placed in the park-bench position. The OA was harvested after a reverse-C incision. Then, the left suboccipital craniotomy was performed. After dural opening, the left VA was identified as it pierces the dura. Next, the left VA was followed from proximal to distal manner, and the fusiform aneurysm and the outlet of the left PICA were identified (Fig 2, A). Vasa vasorum was developed on the surface of the fusiform aneurysm. Lateral medullary arteries arose from the aneurysm, which suggested the risk for postoperative medullary infarction after trapping of the aneurysm (Fig 2, B). Thus, we decided to perform clip occlusion of



**Figure 1.** (A) Diffusion-weighted imaging on admission showing left cerebellar infarction; (B) magnetic resonance angiography showed occlusion of the left vertebral artery; (C) basi-parallel anatomic scanning showing fusiform dilation of the left vertebral artery (arrowhead); (D) T1-weighted imaging showing intramural hematoma in the left vertebral artery fusiform aneurysm (arrow); (E) right vertebral artery angiogram showing left vertebral artery fusiform aneurysm with the outlet to posterior inferior cerebellar artery (double arrowhead); and (F) right vertebral artery angiogram 8 month after the onset showing enlargement of the aneurysm.

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