

# ***Kissing Aneurysms of the Posterior Inferior Cerebellar Artery Treated by Anchor Coil Technique and Stenting from the Contralateral Side: A Case Report***

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## **Abstract**

**Kissing aneurysms refer to the condition in which two cerebral aneurysms with separate necks are in contact with each other. At present, there is scarce information on kissing aneurysms occurring near the vertebral artery (VA)-posterior inferior cerebellar artery (PICA). We report the first case of VA-PICA and nonbranched PICA kissing aneurysms, which were successfully treated with contralateral stenting after the anchor coil technique using two microcatheters. A 64-year-old woman was diagnosed with a left VA-PICA aneurysm (5.5 mm) and an adjacent small PICA aneurysm (2.5 mm) with the aneurysmal walls in close contact. For stenting, microcatheters were navigated to the PICA from the contralateral side, and framing coils for the anchor were placed into each aneurysm from the ipsilateral side. Next, a Neuroform Atlas stent was deployed from the PICA to the distal side of the VA, and coiling was completed using the jailing technique. The patient had a good postoperative course, and a left vertebral angiogram revealed complete occlusion of both aneurysms after 6 months. Adequate surgical planning and application of an appropriate stent-assisted coil embolization technique contributed to the success of the procedure in this rare case.**

Keywords: aneurysm, kissing aneurysms, posterior inferior cerebellar artery aneurysm, stent-assisted coil, contralateral approach

## **Introduction**

Kissing aneurysm is a clinical condition referring to two cerebral aneurysms that have separate necks but are in contact with each other;<sup>1)</sup> it is also relatively rare, accounting for less than 1% of all cerebral aneurysms.<sup>2)</sup> There are many sites in the anterior circulation. Thus far, there have only been few reports on kissing aneurysms near the vertebral artery-posterior inferior cerebellar artery (VA-PICA).<sup>3)</sup> In some cases, VA-PICA aneurysms are so complex that it is difficult to gain easy access through open surgery, and reports of endovascular treatment have been increasing in recent years.<sup>4)</sup> However, it may be difficult to treat VA-PICA aneurysms endovascularly if the neck is wide or the branches are at a steep angle from the VA.<sup>5-8)</sup> Herein, we describe the first case of VA-PICA and nonbranched PICA

kissing aneurysms that were successfully treated with contralateral stenting after the anchor coil technique from the ipsilateral side.

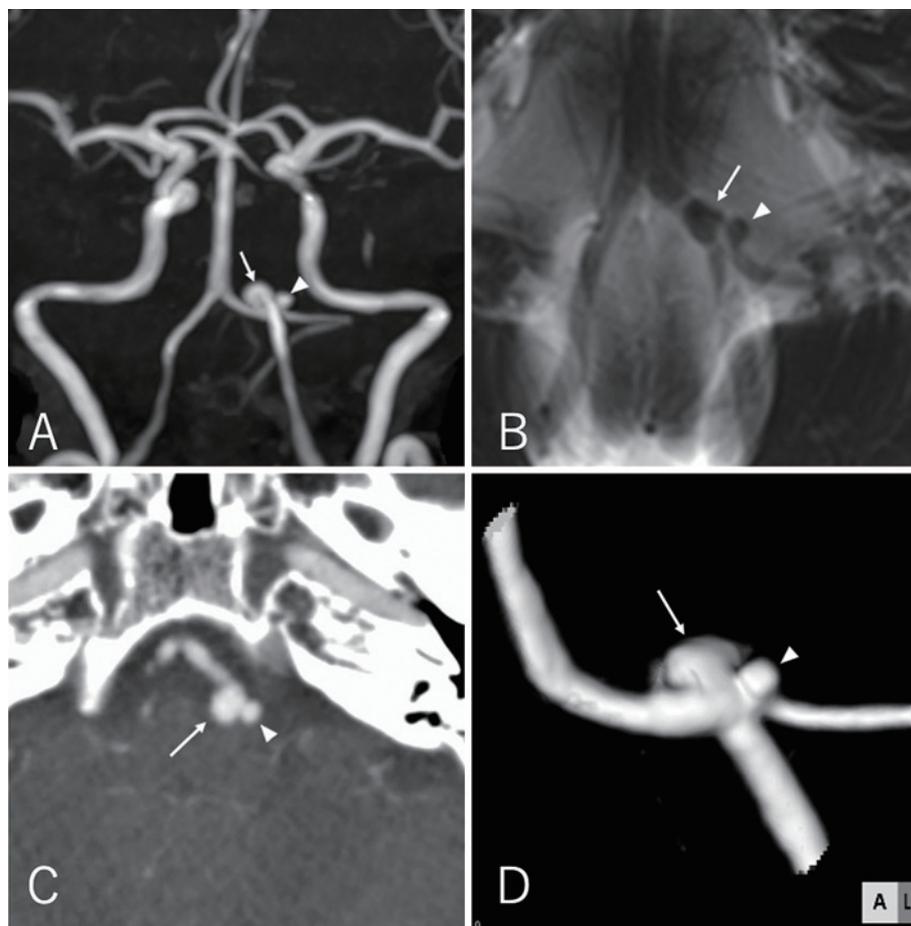
## **Case Report**

A 64-year-old man with a medical history of hypertension was referred to our institution with a left VA aneurysm after screening for a minor cerebral infarction. Magnetic resonance angiography revealed a two-humped cerebral aneurysm in the left VA-PICA portion (Fig. 1A), and basi-parallel anatomical scanning magnetic resonance imaging revealed two cerebral aneurysms in contact with a separate neck (Fig. 1B). The original image of computed tomography angiography confirmed the contact (Fig. 1C). Three-dimensional rotational angiography of digital sub-

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**Fig. 1** Preoperative findings.

(A) Magnetic resonance angiography showing two-hump-like (white arrow, white arrowhead) cerebral aneurysm at the left vertebral artery (VA)–posterior inferior cerebral artery (PICA) bifurcation. (B) Basi-parallel anatomical scanning magnetic resonance imaging and (C) computed tomography angiography showing that the two cerebral aneurysms are in contact, and kissing aneurysms (white arrow, white arrowhead) are suspected. (D) Digital subtraction angiography (left vertebral angiography) and three-dimensional rotational angiography showing a saccular aneurysm (white arrow) with a maximum diameter of approximately 5.5 mm on the left VA-PICA bifurcation and another aneurysm with a maximum diameter of approximately 2.5 mm on the non-branched PICA, which are in contact with each other.

traction angiography (DSA; left vertebral angiography) revealed a saccular aneurysm with a maximum diameter of approximately 5.5 mm on the left VA-PICA and a saccular aneurysm with a maximum diameter of approximately 2.5 mm on the nonbranched PICA (Fig. 1D).

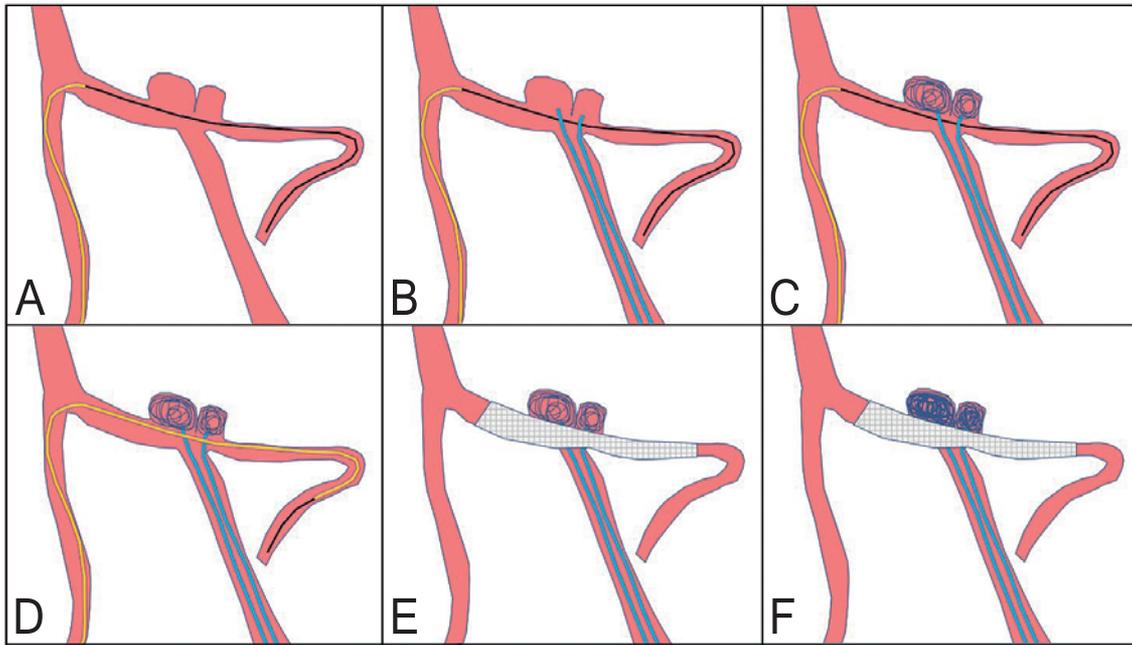
#### Treatment strategy

In the present case of kissing aneurysms, a stent was required because one aneurysm had a maximum diameter of 5 mm or more, and both aneurysms had a dome/neck ratio of less than 2. In addition, because the PICA bifurcation was steep with respect to the VA, the stent had to be delivered from the contralateral side. One of the kissing aneurysms was small, and it was considered difficult to guide a microcatheter for the coil after guiding a microcatheter for stenting. In addition, there was a risk that a microcatheter for the coil would deviate from the cerebral

aneurysm when the stent was placed. Therefore, first, only a microguidewire was guided to the PICA from the contralateral side, and microcatheters were inserted into each cerebral aneurysm, the coil was inserted into each cerebral aneurysm to serve as an anchor (anchor coil technique), and then the microcatheter for stenting was guided to the PICA (Fig. 2).

#### Endovascular treatment

A microcatheter (Excelsior SL-10, Stryker, Fremont, CA, USA) was guided from the right VA to the left VA through the vertebrobasilar junction (VBJ) (Fig. 3A), and only a microguidewire (Synchro2 soft, Stryker) was guided to the left PICA (Fig. 3B). Next, microcatheters (Excelsior SL-10 ×2) were guided to each cerebral aneurysm, and a detachable coil was individually inserted (Fig. 3C). Subsequently, a microcatheter for stenting was guided to the left PICA, and a



**Fig. 2 Treatment method schema.**

(A) A microcatheter for stenting is guided toward the left VA through the vertebrobasilar junction, and a microguidewire is guided to the PICA. (B) Two microcatheters are inserted into each aneurysm. (C) One coil is inserted into each cerebral aneurysm (anchor coil technique). (D) A microcatheter for stenting is inserted into the PICA. (E) The stent is placed. (F) An additional coil is inserted.

stent (Neuroform Atlas 3.0 × 21 mm, Stryker) was placed from the left PICA to the distal side of the left VA. Finally, six and three detachable coils were inserted into each cerebral aneurysm (Fig. 3D), and the procedure was completed with mild dome filling (Fig. 3E). Complete occlusion was confirmed by DSA 6 months later (Fig. 3F). The patient’s consent was obtained from the case report.

### Discussion

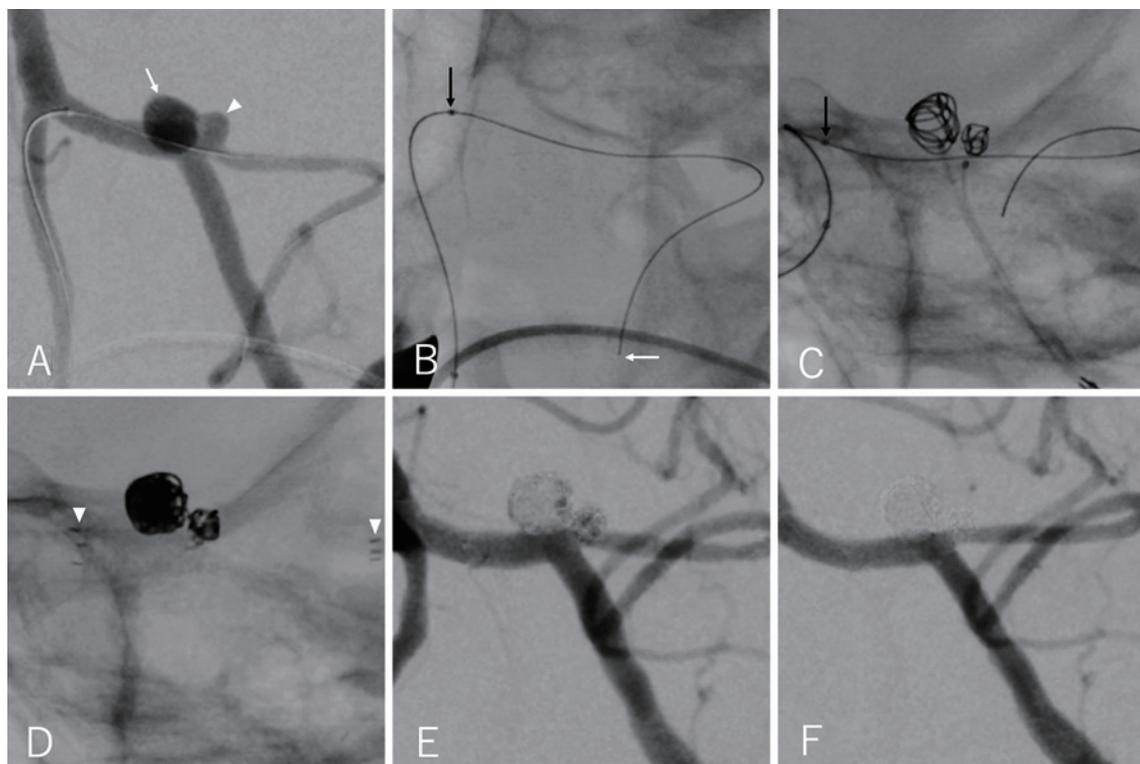
Kissing aneurysms are a relatively rare cerebral aneurysm. It was reported by Jefferson in 1978,<sup>1</sup> and the frequency is approximately 0.2%.<sup>2</sup> According to reports of 32 cases, 22 (61.1%) were internal carotid arteries, 7 (19.4%) were anterior communicating arteries, and only 1 (2.8%) was in the vicinity of VA-PICA.<sup>3</sup> No previous reports of endovascular treatment for VA-PICA kissing aneurysms are available in the literature.

The VA-PICA aneurysm has a deep surgical field during craniotomy and is close to the lower cranial nerves, brain stem, and perforating branches related to the brain stem. There is a certain risk in open surgery.<sup>4,6,8-10</sup> Kissing aneurysms may carry a risk of rupture due to the adhesion of each aneurysm. Open surgery for VA-PICA kissing aneurysms carries both risk factors. Matsumoto et al. reported a clipping case for VA-PICA kissing aneurysms and stated that two cerebral aneurysms were adhered to the fibrous and required careful dissection.<sup>11</sup>

VA-PICA aneurysms have a relatively wide neck, and there are cases wherein it is difficult to perform simple coil embolization.<sup>7,8</sup> Therefore, it is necessary to consider an adjunctive technique even if it is not kissing aneurysms, as seen in our case. Kim et al. reported that 59.7% of the cases required an adjunctive technique.<sup>3</sup> In our case, the neck of the kissing aneurysms was broad, and the height of each aneurysm was low, allowing for the possibility of microcatheter deviation during stenting. To prevent microcatheter deviation during the stenting, the anchor coil technique was employed.

With regard to the stenting, if the bifurcation angle of the PICA is acute, then the guidance of a microcatheter for stenting from the ipsilateral side is difficult. In addition, there are cases wherein it is difficult to approach from the ipsilateral side due to hypoplasia and tortuosity of the ipsilateral VA.<sup>12</sup> In recent years, the usefulness of treatment through the VBJ has been reported.<sup>6,8,12-14</sup> In particular, stent placement in a VA-PICA aneurysm through the VBJ has been reported as a useful method.<sup>4-10,12,14-18</sup> Considering the angle of the VBJ and meandering of the PICA, microcatheters for stenting are required to be easy to guide.

In stent-assisted coil embolization for VA-PICA aneurysms, it is imperative to consider that the vessel diameter of the PICA is small and that there is a difference between the vessel diameters of the VA and PICA. The vessel diameter of the PICA was approximately 1.3-2.2 mm. There-



**Fig. 3** Intraoperative/postoperative images (working angle).

(A) Kissing aneurysms (white arrow, white arrowhead) are found at the left vertebral artery (VA)–posterior inferior cerebral artery (PICA) bifurcation. (B) A microcatheter for stenting (black arrow) is guided toward the left VA through the vertebrobasilar junction, and a microguidewire is guided to the PICA (white arrow). (C) A coil is inserted into each cerebral aneurysm, leaving a microcatheter for stenting (black arrow) in the left VA. (D) The stent is placed (white arrowhead), and an additional coil is inserted. (E) Left VA angiography just after embolization. (F) Left VA angiography after 6 months.

fore, there is a risk of thromboembolic complications due to stent placement, and it is necessary to consider the type of stent to be used.<sup>6)</sup> Three types of neck-bridge stents are mainly used for aneurysms: Neuroform Atlas (Stryker), Enterprise 2 (Cerenovus, Irvine, CA, USA), and LVIS/LVIS Jr (MicroVention TERUMO, Tustin, CA, USA).<sup>19)</sup> Therefore, it is desirable to fully understand the advantages and disadvantages of each method before its use. The reasons for choosing Neuroform Atlas for this case are as follows: 1) it can be guided by a 1.7-French microcatheter and the risk of induction to the PICA is low; 2) it has an open cell structure and easily fits the different sizes of vessels; 3) it has a track record of placement in small-diameter vessels; 4) low risk of thrombosis and vascular stenosis after placement compared with stents with a braided structure; 5) easy positioning with less shortening; and 6) it can be placed with a simple unsheath.<sup>20)</sup> Similar reports have already been published, and this treatment approach is expected to be useful in the future.<sup>10,18)</sup>

In summary, we encountered the first case of kissing aneurysms consisting of a VA-PICA aneurysm and a PICA aneurysm, in which a stent was placed from the contralateral side after coil embolization using two microcatheters for each aneurysm from the ipsilateral side, and good out-

comes were achieved. Treatment may require ingenuity owing to the shape of the kissing aneurysms and steep bifurcation angle of the PICA. It is important to select the appropriate treatment method and device for each case.

### Conflicts of Interest Disclosure

All authors report no conflicts of interest concerning this article.

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