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T Tikkakoski, S Leinonen, T Siniluoto and J Koivukangas

Isolated Dissecting Aneurysm of the Left Posterior Inferior Cerebellar Artery: Endovascular Treatment with a Guglielmi Detachable Coil

Tapani Tikkakoski, Sami Leinonen, Topi Siniluoto, and John Koivukangas

Summary: An isolated progressive dissecting aneurysm of the left posterior inferior cerebellar artery (PICA) associated with a persistent trigeminal artery was successfully treated by endovascular occlusion of the proximal PICA with a Guglielmi detachable coil.

Index terms: Aneurysm, dissecting; Aneurysm, embolization; Arteries, cerebellar, posterior inferior; Interventional materials, coils

Dissecting aneurysms of the intracranial posterior circulation are unusual lesions that affect otherwise healthy young adults (1). We successfully treated a 34-year-old woman with a dissecting aneurysm of the left posterior inferior cerebellar artery (PICA) by endovascular occlusion of the PICA with a Guglielmi detachable coil (GDC).

Case Report

A 34-year-old woman had mild asthma but was otherwise healthy, until May 1995, when she presented with sudden severe headache, momentarily losing consciousness. On admission, Hunt and Hess grade II subarachnoid hemorrhage was diagnosed. Computed tomography (CT) showed blood in the fourth ventricle, suggesting an aneurysm in the PICA. Four-vessel cerebral digital subtraction angiography showed a 15 × 7 × 5-mm fusiform aneurysm of the left PICA (Fig 1A). In addition, a trigeminal artery from the right internal carotid artery supplied the superior cerebellar arteries and the left posterior cerebral artery via the basilar artery (Fig 1B). The fusiform nature of the aneurysm was confirmed by three-dimensional helical CT.

Initially, the patient was treated conservatively; but a control angiogram obtained 6 weeks later showed that the fusiform aneurysm had enlarged considerably, mainly longitudinally, consistent with a dissecting aneurysm (Fig 1C). The flow distal to the aneurysm was slow. Numerous collaterals were seen from the anterior inferior cerebellar artery to the brain stem.

Via the transfemoral route, a Fastracker-10 microcatheter (Target Therapeutics, Fremont, Calif) was advanced coaxially through a 6F guiding catheter to the proximal part of the left PICA. A GDC-10 (2 × 80 mm) was inserted into the proximal left PICA. The control angiogram obtained just after the insertion showed some flow distal to the coil. After 30 minutes, a second control angiogram showed no flow in the PICA distal to the coil and the patient had no immediate neurologic deficits. The coil was then detached (1.4 to 6.7 mV, 1 mA, 3.3 seconds). A third control angiogram confirmed occlusion of the proximal PICA. A day after the embolization, the patient had only mild trigeminal pain, which disappeared 2 days later. She had no permanent or late ischemic brain stem symptoms and she was discharged 1 week after the procedure. Her recovery was uneventful, and occlusion of the PICA was seen on a left vertebral angiogram obtained 6 months later (Fig 1D).

Discussion

Dissecting aneurysms of the intracranial posterior circulation are rare (2, 3). Berger and Wilson (1) reported six of their own cases and found 36 additional cases in the literature. Only three of these dissecting aneurysms were located in the PICA, and these patients died 5 to 14 days after their initial symptoms. The reported symptoms in those three patients included suspected aneurysmal rupture and coma in one and abrupt coma in two (1). In a recent study by Hosoya et al (4), seven of 16 patients with Wallenberg syndrome had a definitive vertebral artery dissection and only one patient with a suspected vertebral artery dissection had pathologic involvement of the PICA at angiography (4). Our patient had an isolated dissecting PICA aneurysm with no visible connection to the vertebral artery.
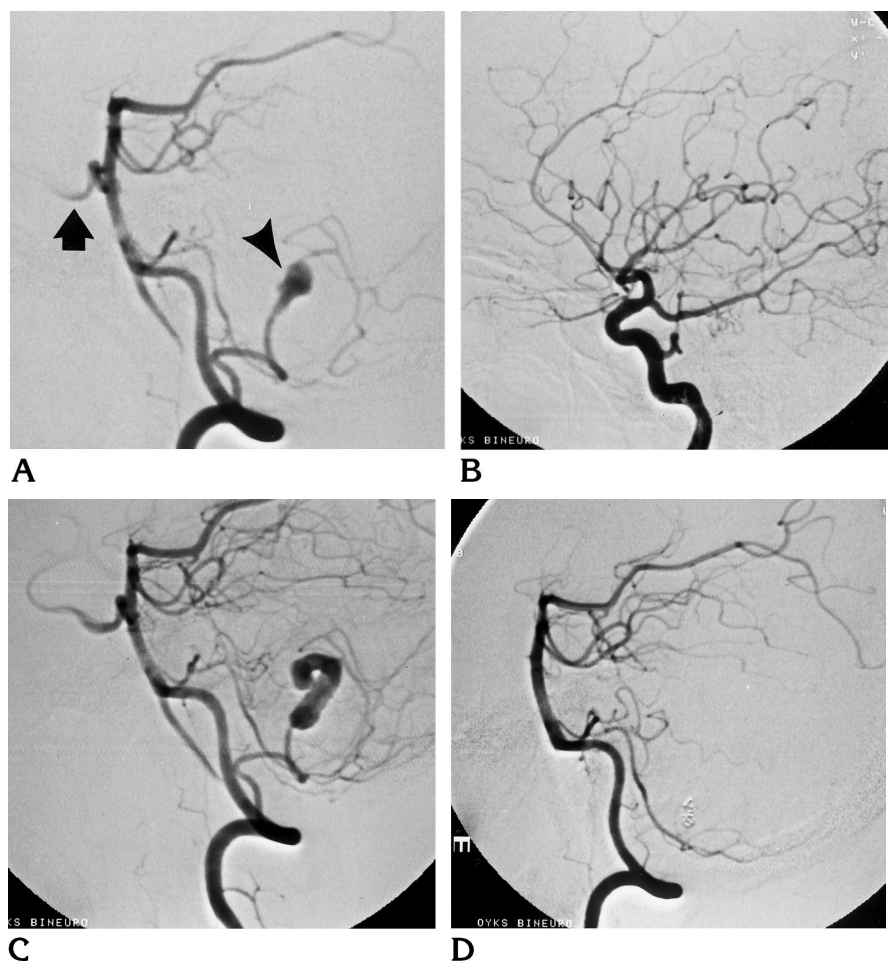
A

B

C

D

Fig 1. A 34-year-old woman with isolated dissecting aneurysm of the PICA.

A, Lateral projection of the original left vertebral angiogram shows a 15 × 7 × 5-mm fusiform PICA aneurysm (*arrowhead*). Some contrast material fills the persistent trigeminal artery (*arrow*).

B, Right carotid angiogram shows filling of the right posterior cerebral artery and the trigeminal artery supplying the superior cerebellar arteries and the left posterior cerebral artery via the basilar artery.

C, Lateral left vertebral angiogram 6 weeks later shows that the PICA aneurysm was considerably enlarged (36 × 7 × 7 mm). The progressive changes are consistent with a dissecting aneurysm.

D, Lateral vertebral angiogram 6 months later shows the PICA is occluded.

In nearly all intracranial arterial dissections, the intramural hematoma forms between the internal elastic lamina and the media layers. Rarely, as probably in our case, the dissection involves the adventitia and may rupture to the subarachnoid space. The intracranial arteries lack an external elastic membrane and have a thinner adventitia, fewer elastic fibers in the media, and, generally, a thicker internal elastic lamina than do the extracranial arteries (1). Angiographic features of intracranial dissecting aneurysms may include a narrow tapered lumen, a double lumen with both true and false lumen, occlusion, or, as in our case, a change in the luminal configuration over several weeks (1).

Persistent trigeminal artery is estimated to be present in 0.1% to 0.6% of cases in large angiographic series; its clinicopathologic significance has not been clarified. Most cases have been found incidentally by angiographic exploration of subarachnoid hemorrhage, oculomotor palsy, brain tumors, head injury, or vertebral or brain stem ischemia or infarction (5). We have not found previous reports on the possible association of trigeminal artery and dissecting PICA aneurysm. Probably it is an incidental finding.

The optimal treatment of intracranial dissections and dissecting aneurysms is not yet known (6, 7). Kitanaka et al (6) concluded that unruptured intracranial vertebral artery dissections without subarachnoid hemorrhage can be treated nonsurgically, with careful angiographic follow-up monitoring. Recently, Halbach et al (7) described 16 patients with vertebral artery dissecting aneurysms or pseudoaneurysms (nine with subarachnoid hemorrhage) who were treated with endovascular occlusion of the parent artery. Surgical occlusion of the parent vessel was considered in our patient, but we elected to attempt controlled occlusion of the PICA with the GDC technique instead. Our patient had no neurologic symptoms or signs during the 30 minutes preceding GDC detachment. Temporary balloon test occlusion (7) combined with

nuclear single-photon emission CT was not considered in this context. This case further stresses the need for adequate radiologist–neurosurgeon interaction during interventional studies.

Since the report of Guglielmi et al (8), saccular aneurysms have been successfully treated with GDCs (9, 10). Vertebrobasilar aneurysms associated with fenestrations and aneurysms associated with moyamoya disease have also been successfully treated with GDCs (11, 12). Other reported indications for GDC treatment include intracavernous internal carotid aneurysms, dural and traumatic caroticocavernous high-flow fistulas, and vertebrovertebral fistulas (10, 13). Since 1991, 27 patients with saccular aneurysms have been treated with GDCs at our institution. Advantages of the GDC technique are the predictability and controllability of the coils before detachment. Coils are now available in several sizes.

Saccular PICA aneurysms have only occasionally been treated with GDCs (9, 14). A review of the literature suggests that vertebral artery dissections and pseudoaneurysms have been successfully treated with balloon occlusion (seven patients), balloons and coils (three patients), and coils alone (six patients) (7). We found no report describing the treatment of isolated dissecting PICA aneurysms with GDCs. We were encouraged to try this previously unreported treatment after a few weeks' delay by the progressive behavior and poor prognosis associated with dissecting PICA aneurysms (1). We monitored our patient for half an hour before detaching the coil; after the embolization procedure, she had only mild trigeminal pain. Numerous collaterals from the anterior inferior cerebellar artery, not present on the first arteriogram, had developed to protect her from brain stem infarction. Permanent occlusion of the PICA was confirmed at 6-month control an-giography. Because of the high rate of rehemorrhage, ruptured dissecting aneurysms should be treated as soon as possible (7).

References

1. Berger MS, Wilson CB. Intracranial dissecting aneurysms of the posterior circulation. *J Neurosurg* 1984;61:882–894
2. Manz HJ, Luessenhop AJ. Dissecting aneurysm of intracranial vertebral artery. *J Neurol* 1983;230:25–35
3. Mokri B, Houser OW, Sandok BA, Piepgras DG. Spontaneous dissections of the vertebral arteries. *Neurology* 1988;38:880–885
4. Hosoya T, Watanabe N, Yamaguchi K, Kubota H, Onodera Y. Intracranial vertebral artery dissection in Wallenberg syndrome. *AJNR Am J Neuroradiol* 1994;15:1161–1165
5. Okada Y, Nishida M, Yamane K, Kagawa R. Bilateral persistent trigeminal arteries presenting with brain-stem infarction. *Neuroradiology* 1992;34:283–286
6. Kitanaka C, Tanaki J-I, Kuwahara M, Teraoka A, Sasaki T, Takakura K. Nonsurgical treatment of unruptured intracranial vertebral artery dissection with serial follow-up angiography. *J Neurosurg* 1994;80:667–674
7. Halbach VV, Higashida RT, Dowd CF, et al. Endovascular treatment of vertebral artery dissections and pseudoaneurysms. *J Neurosurg* 1993:79:183–191
8. Guglielmi G, Vinuela F, Sepetka I, Macellari V. Electrothrombosis of saccular aneurysms via endovascular approach, 1: electrochemical basis, technique, and experimental results. *J Neurosurg* 1991;75:1–7
9. Guglielmi G, Vinuela F, Dion J, et al. Endovascular treatment of posterior circulation aneurysms by electrothrombosis using electrically detachable coils. *J Neurosurg* 1992;77:515–524
10. Vinuela F, Duckwiler G, Guglielmi G. Electrolytically detachable microcoils. *AJNR Am J Neuroradiol* 1993;14:337–339
11. Graves VB, Strother CM, Weir B, Duff TA. Vertebrobasilar junction aneurysms associated with fenestration: treatment with Guglielmi detachable coils. *AJNR Am J Neuroradiol* 1996;17:35–40
12. Massoud TF, Guglielmi G, Vinuela F, Duckwiler GR. Saccular aneurysms in Moyamoya disease: endovascular treatment using electrically detachable coils. *Surg Neurol* 1994;41:462–467
13. Sadato A, Taki W, Nishi S, Yamashita K, Kikuchi H, Ikada Y. Treatment of a spontaneous carotid cavernous fistula using a electrodetachable microcoil. *AJNR Am J Neuroradiol* 1992;14:334–336
14. Gurian JH, Martin NA, King WA, Duckwiler GR, Guglielmi G, Vinuela F. Neurosurgical management of cerebral aneurysms following unsuccessful or incomplete endovascular embolization. *J Neurosurg* 1995:83:843–855