NEURYSMS of the distal segment of the AICA are rare. Patients with these aneurysms may present acutely with SAH or with symptoms of a mass lesion in the CPA, including hearing loss, vertigo, tinnitus, facial weakness, diplopia, ataxia, or altered facial sensation. In this paper we describe four patients with distal AICA aneurysms that were managed at a single institution. Two patients presented with SAH, and two were evaluated for hearing loss, vertigo, and gait instability. The aneurysms were demonstrated in each case on MR imaging and/or cerebral angiography. In one patient with VHL syndrome, the aneurysm arose from the feeding artery (the AICA) to a large posterior fossa hemangioblastoma.

All patients underwent suboccipital retromastoid craniectomy for exploration of their lesions. One aneurysm was clipped and two were trapped and resected (one during tumor resection). The fourth aneurysm could not be repaired during surgery performed at another hospital, and it was obliterated by coil embolization of the distal AICA segment at our institution. All patients made excellent neurological recoveries. The clinical and neuroimaging features of these unusual lesions are summarized, and the management issues facing the treating neurosurgeon and endovascular interventionist are discussed.

Distal anterior inferior cerebellar artery aneurysms

Report of four cases

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Aneurysms of the distal anterior inferior cerebellar artery (AICA) are rare; fewer than 100 cases have been reported. The authors detail their experience with four cases and present endovascular as well as microsurgical management options. The medical records and neuroimaging studies obtained in four patients who were treated at a single institution were reviewed. Clinical presentations, neuroimaging and intraoperative findings, and clinical outcomes were analyzed.

There were three men and one woman; their mean age was 43 years. Two patients presented with acute subarachnoid hemorrhage (SAH), and two presented with ataxia and vertigo (one with tinnitus, the other with hearing loss). Angiographic studies demonstrated aneurysms of the distal segment of the AICA. In one patient with von Hippel–Lindau syndrome and multiple cerebellar hemangioblastomas, a feeding artery aneurysm was found on a distal branch of the AICA. Three of the patients underwent successful surgical obliteration of their aneurysms, one by clipping, one by trapping, and one by resection along with the tumor. The fourth patient underwent coil embolization of the distal AICA and the aneurysm. All patients made an excellent neurological recovery.

Patients with aneurysms in this location may present with typical features of an acute SAH or with symptoms referable to the cerebellopontine angle. Evaluation with computerized tomography, magnetic resonance (MR) imaging, MR angiography, and digital subtraction angiography should be performed. For lesions distal to branches coursing to the brainstem, trapping and aneurysm resection are viable options that do not require bypass. Endovascular obliteration is also a reasonable option, although the possibility of retrograde thrombosis of the AICA is a concern.

KEY WORDS • aneurysm • anterior inferior cerebellar artery • subarachnoid hemorrhage • cerebral angiography • coil embolization

Abbreviations used in this paper: AICA = anterior inferior cerebellar artery; CPA = cerebellopontine angle; CT = computerized tomography; MR = magnetic resonance; SAH = subarachnoid hemorrhage; VHL = von Hippel–Lindau.
Case Reports

Case 1

This 44-year-old man was evaluated for sensorineural hearing loss and episodes of vertigo. A right CPA lesion was noted on MR imaging and the patient was admitted for resection of a presumed tumor. At surgery, a 10-mm, partially thrombosed distal AICA aneurysm was seen anterior to the seventh and eighth cranial nerves, where it was causing posterior displacement of the complex. The aneurysm was trapped and excised. Postoperatively, the patient was neurologically intact except for further decrement in ipsilateral hearing function.

Case 2

This 37-year-old woman presented in a comatose state following subarachnoid and intraventricular hemorrhage. She improved neurologically after undergoing a ventriculostomy. Results of the initial cerebral arteriographic study were negative. She had a residual left-sided sixth nerve palsy and subsequently developed a delayed left-sided seventh nerve paresis. Repeated angiography demonstrated a 7-mm aneurysm in the midsegment of the left AICA. The patient underwent surgical exploration at another hospital, where it was determined that the aneurysm could not be clipped. After she was transferred to our institution, MR images (Fig. 1) demonstrated a ring-enhancing mass adjacent to the left pons. A third angiogram (Fig. 2 left) demonstrated the aneurysm and revealed diminished blood flow through the AICA. Coil embolization of the distal AICA segment resulted in complete obliteration of the aneurysm (Fig. 2 center and right). The patient recovered full neurological function.

Case 3

This 37-year-old man experienced a sudden severe headache and was found to have suffered an SAH. He was initially confused and experienced decreased hearing on the left side. Cerebral angiograms (Fig. 3) demonstrated a 3-mm aneurysm arising from the distal loop of the left AICA. At surgery the aneurysm was seen at the inferior aspect of the seventh–eighth cranial nerve complex at the internal auditory meatus, and it was obliterated with a small angled clip (Fig. 4). Postoperative angiograms demonstrated no residual aneurysm, and the patient made an uneventful recovery.

Case 4

This 53-year-old man with VHL syndrome presented with a several-week history of tinnitus on the right side and gait instability. He had undergone multiple previous posterior fossa procedures for hemangioblastomas, and MR im-

Fig. 2. Case 2. Cerebral angiograms. Left: Left vertebral artery (VA) injection, anteroposterior (AP) view, demonstrating filling of aneurysm lumen originating from the left AICA. Center: Selective injection of left AICA filling the aneurysm and distal portion of AICA. Right: Postembolization injection demonstrating no filling of the aneurysm lumen.

Fig. 3. Case 3. Cerebral angiograms (left VA injection, AP view) demonstrating the small aneurysm (arrow) in the distal AICA.
aging demonstrated a massive recurrence in the right cerebellar hemisphere (Fig. 5 left). Preoperative angiography revealed a 3-mm aneurysm in the AICA that was supplying the hypervascular tumor (Fig. 5 center and right). The tumor was embolized preoperatively, and at surgery the aneurysm was trapped and resected along with the tumor. Postoperatively, the patient returned to his premorbid neurological baseline status, with mild truncal ataxia.

**Discussion**

Aneurysms of the distal segment of the AICA are exceedingly rare; of the major arteries of the posterior fossa, the AICA is the least likely to harbor an aneurysm. In Locksley’s review of the first cooperative aneurysm study, only two cases of AICA aneurysms were found among 7933 lesions. Schwartz reported the first surgically treated case of an AICA aneurysm in 1948. His patient presented with symptoms and signs suggestive of a lesion of the CPA, that is, tinnitus, hearing loss, facial weakness, gait instability, and dysmetria. Kravenbuhl and Yasargil were the first to diagnose a distal AICA aneurysm by using angiography. Drake, et al., reported four cases of distal AICA aneurysms in feeding arteries to posterior fossa arteriovenous malformations; two of the cases involved multiple aneurysms. Similar rare cases have also been reported. Highly vascular tumors such as hemangioblastomas may rarely have an associated aneurysm in the feeding artery, as in our Case 4. Even more exceptional are the few aneurysms reported in the medial branch of the AICA or distal to the meatal loop that are not in the CPA.

Patients with distal AICA aneurysms may present with symptoms and signs of a typical SAH, with sudden severe headache, meningismus, nausea, vomiting, photophobia, and/or sudden coma. More localizing presentations are often seen, however, as in many previously reported cases and in all four of our patients. The typical CPA syndrome may be seen in larger aneurysms with mass effect rather than hemorrhage—that is, tinnitus, hearing loss, vertigo, facial paresis, gait ataxia, dysmetria, diplopia, and/or facial sensory disturbance. Lower cranial nerve palsies may even be seen. These large aneurysms, particularly when partly thrombosed, may be mistaken for acoustic neuromas or other CPA tumors, as in our first case. Advanced imaging with multiple MR sequences should raise the suspicion of a vascular lesion in most cases. The fact that there were several patients with warning symptoms in the CPA region who subsequently presented with SAH should serve to remind clinicians to maintain a high index of suspicion. Thorough evaluation of these lesions with neuroimaging should include CT scanning (in cases of acute hemorrhage), MR imaging, MR angiography, and digital subtraction angiography if a vascular lesion is suspected. Repeated digital subtraction angiography with special views and/or CT angiography may be helpful in selected cases as well.

Microsurgical intervention for either clip ligation or trap-
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...ping with resection has been the procedure of choice. With the refinement of coil embolization procedures, however, there is now a reasonable option of coil occlusion of the distal AICA segment that includes the aneurysm. If the aneurysm is situated on the segment of the AICA that is distal to any branches coursing to the brainstem, distal occlusion may be performed with no neurologically sequela. There is the theoretical possibility of retrograde thrombosis of the vessel, however, which could result in a devastating brainstem infarct. Ipsilateral hearing loss is a risk associated with either microsurgical repair or embozization. Aneurysm trapping and resection with either end-to-end vessel repair or bypass could be considered, but it would be a difficult technical exercise in this location with a vessel segment of this diameter. Several procedures for management of these distal AICA aneurysms have been described. This is the first series that includes all current forms of management, with successful outcomes. (Aneurysm wrapping or coating is not considered a satisfactory treatment and was not used in this series.) It is difficult to create guidelines for management based on so few cases. Our general approach is to select microsurgical intervention as a first choice, depending on the aneurysm’s location, size, and configuration, as well as the patient’s overall clinical condition. Currently, only microsurgical intervention has the potential to permanently obliterate these distal AICA aneurysms while preserving the parent artery. Future endovascular options may include coil embolization of the aneurysm itself with preservation of the parent artery, and possibly intravascular stent placement.

Conclusions

Distal AICA aneurysms are rare and patients with these lesions may present with symptoms and signs of a CPA mass lesion, an acute SAH, or a combination of these findings. The clinician must maintain a high index of suspicion, and should investigate using CT scanning, MR imaging, MR angiography, and contrast angiography. Both microsurgical repair and endovascular procedures are viable options for intervention.

References


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