Meatal Anterior Inferior Cerebellar Artery Aneurysm with AICA-PICA Complex: Endovascular Coiling and Parent Artery Preservation

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Abstract

Secondary stroke prevention requires early initiation of antiplatelet; therefore, stroke mimics need to be ruled out particularly in circumstances when antiplatelet therapy can be of disastrous consequences. A 54-year-old female patient presented to the emergency department with symptoms of sudden-onset deviation of angle of mouth to the right side, left eye ptosis, and occipital headache for past 4-hour duration. Neurologic examination revealed right-sided gaze-dependent torsional nystagmus and left lower motor neuron facial weakness. An embolic posterior circulation stroke secondary to vertebral artery dissection was suspected. Diffusion-weighted imaging (DWI) did not show any acute infarcts, and careful review of susceptibility-weighted imaging (SWI) scans showed hemorrhage in the fourth ventricle. Subsequent digital subtraction angiography (DSA) was done, which showed left anterior inferior cerebellar artery (AICA) aneurysm involving its intrameatal segment with AICA-posterior inferior cerebellar artery (PICA) complex. Retrospective review of computed tomographic (CT) angiography images showed small aneurysm in the internal auditory meatus, which is difficult to discern secondary to adjacent bony structure and smaller size of the aneurysm. The patient underwent endovascular coiling of the aneurysm with preservation of the parent artery. Our experience concluded that these clinical features suggest remote subarachnoid hemorrhage secondary to the ruptured of AICA intrameatal segment aneurysm with left facial nerve paralysis and peripheral cochlear vestibular changes secondary to either compression (mechanical or pulsations of the aneurysm sac) or ischemia of vestibular apparatus. The neurointerventionist should consider the possibility of aneurysmal rupture, especially in cases of atypical location of hemorrhage and no signs of infarct on neuroimaging of posterior circulation stroke.

Keywords

- meatal AICA aneurysm
- AICA-PICA complex
- endovascular coiling

Introduction

Incidence of aneurysms of the anterior inferior cerebellar artery (AICA) is approximately 0.1 to 0.5% among all intracranial aneurysms.[1] Recent review has reported only 21 cases of meatal segment AICA aneurysm.[2] Clinical presentation of these aneurysms varies from asymptomatic, isolated cranial nerve paralysis (VII and VIII) and rupture with acute subarachnoid hemorrhage (SAH). Management of these aneurysms depends on their location, relevant anatomy, and clinical presentation. We report a case of peripheral facial and cochlear-labyrinth dysfunction secondary to a ruptured intrameatal AICA aneurysm managed with endovascular coiling and parent artery preservation. To our knowledge, this is the first reported case of meatal segment AICA aneurysm with AICA-posterior inferior cerebellar artery (PICA) complex treated using endovascular coiling and parent artery preservation.

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Case Description

A 54-year-old female patient presented to the emergency department with symptoms of sudden-onset deviation of angle of mouth to the right side, left eye ptosis, neck pain, and occipital headache for past 4-hour duration. On neurologic examination, she was found to have gait imbalance, right-sided gaze-dependent torsional nystagmus and left lower motor neuron facial weakness, and neck rigidity (►**Fig. 1**). An embolic posterior circulation stroke secondary to vertebral artery dissection was suspected. Stroke imaging protocol including computed tomographic (CT) angiography and magnetic resonance imaging (MRI) of the brain was done. Because there was clinical–imaging mismatch, detailed history revealed intermittent neck pain for 20 days, left-sided hearing loss, and vertigo for 9 days. Presence of contralateral gaze-dependent torsional nystagmus, left-sided hearing loss, and positive head thrust sign were the important clinical findings in our patient, which suggested peripheral etiology of vertigo rather than central. On careful review of the MRI scans, we found intraventricular hemorrhage involving the fourth ventricle without any changes of the acute infarct in posterior circulation (►**Fig. 2**). Diagnostic cerebral angiogram showed left AICA meatal segment aneurysm measuring 2 mm with AICA-PICA complex (►**Fig. 3**). Retrospective analysis of CT angiography showed small saccular aneurysm in the meatal segment of the left AICA. All the clinical findings were attributed to the remote SAH with left lower motor neuron facial nerve palsy and cochlear-vestibular apparatus ischemic changes. Endovascular coiling for the aneurysm was planned to prevent re-rupture of the aneurysm.

Technical Consideration

We did bilateral groin puncture with long sheath in the left subclavian artery. For anatomical considerations, it was decided to approach the left AICA from the left vertebral artery using guiding catheter (Distal access catheter; Concentric Medical). Using Headway microcatheter (Microvention/Terumo) and Synchro micro wire (Stryker Neurovascular), left AICA access was attempted. Because there was sharp angulation of the origin of the left AICA from proximal basilar artery, repeated attempts were failed for stable microcatheter positioning near the aneurysm neck. Using 6×9 mm Eclipse balloon (Balt Extrusion) placed in the distal basilar artery through right vertebral artery approach, more stable and distal position of the microcatheter was achieved. Meatal AICA aneurysm was catheterized using the microcatheter tip torque using micro-wire. Once in stable position, aneurysm was coil embolized using detachable coils. Post-procedure angiography showed stable occlusion of the aneurysm with normal flow in the left anterior inferior cerebellar artery (►**Fig. 3**).

Post-procedure, the patient had stable recovery over the period of next 1-week period. She was managed with vestibular physiotherapy and supportive medication for her symptoms.

Discussion

The AICA origin generally is from the lower third of the basilar artery and courses at the cerebellopontine (CP) angle region.[3] Near the VII–VIII nerve complex, the AICA divides into two major branches: rostrolateral and caudomedial. The rostrolateral branch traverses along with nerve complex and gives the labyrinthine artery. The caudomedial branch courses close to pons, with few perforators to it and distal termination into cerebellar branches.[2] Therefore, based on the course, AICA has four segments: anterior pontine, lateral pontine, flocculopeduncular, and cortical segments. The lateral pontine segment contains premeatal, meatal, and postmeatal portions. AICA meatal aneurysms are subdivided into three types: type I (proximal to the meatus, 56%), type II (partial location in the meatus, 30%), and type III (totally into the meatus, 14%). Our case showed type III meatal segment AICA aneurysm.

Clinical features of these groups of meatal aneurysm varies from SAH (50%), SAH with cranial nerve involvement (30%), and isolated involvement of cranial nerve involvement.[2] Our patient had predominant dysfunction of

Fig. 1 Patient presented with clinical signs of left lower motor neuron facial nerve palsy with deviation of angel of mouth **(A)** and left eye ptosis **(B)**.

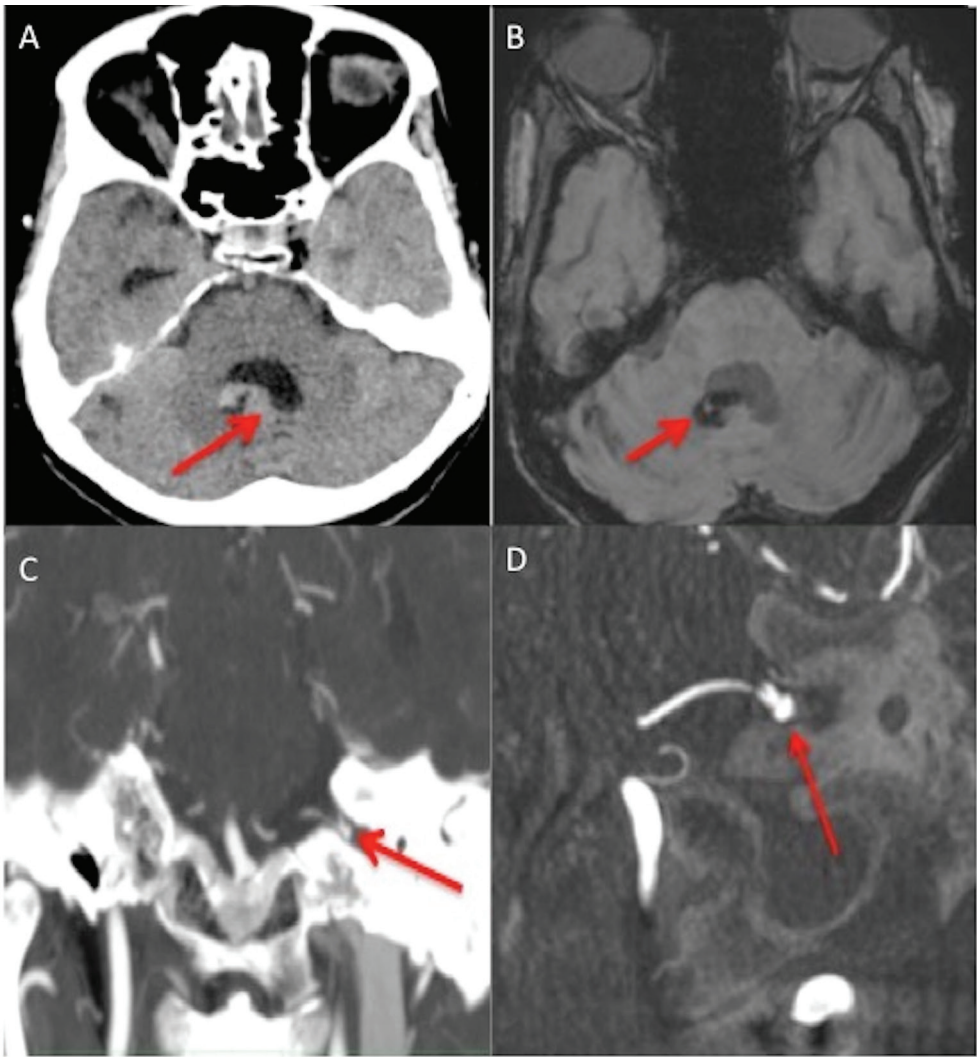

Fig. 2 Plain computed tomography (CT) of brain showing dependent isodensity inside fourth ventricle (arrow in **A**). SWI image showing blooming inside the fourth ventricle suggestive of hemorrhage (arrow in **B**). Coronal reconstruction of the CT angiogram image showing left-sided small meatal segment aneurysm with adjacent bony structures, which makes its detection difficult (arrow in **C**). Dyna CT MIP image with curved reconstruction showing location and morphology of aneurysm in relation to the IAC (arrow in **D**).

unilateral cranial nerves (VII and VII), with imaging evidence of intraventricular hemorrhage suggestive of the recent rupture of the aneurysm.

Management of meatal segment AICA aneurysms is still unclear secondary to rare incidence. If the aneurysm is located on the segment of the AICA that is distal to any branches coursing to the brainstem, distal occlusion may be performed without neurologic complications.[4] However, that carries the risk of retrograde thrombosis, which can result in a devastating brainstem infarct. Hence parent artery preservation is vital whenever possible. Surgical approaches in terms of trapping with bypass are available but with risk of injury to the adjacent cranial nerves and posterior fossa structures.[5] Small morphologic space makes surgical exposure critical with high complications.[1] Technical advances in endovascular procedures can make these treatment options as first-line treatment. Even though acute angulation of origin and tortuous anatomy can lead to difficult catheterization, we used balloon-assisted catheterization of the vessel for stable microcatheter position near the neck of the aneurysm. Our case, the distal AICA aneurysm, was treated with endosaccular coil embolization, because it was a saccular aneurysm with a definite neck rather than a dissecting aneurysm.

Other options such as parent artery occlusion or trapping were considered a relatively unsafe as our patient had AICA-PICA complex with PICA territory supplied from the distal AICA caudomedial branches. Parent artery occlusion would have resulted in significant ischemic complications. Our patient had good clinical recovery and got discharged.

Conclusion

Owing to rare incidence of meatal segment AICA aneurysms, these are often missed during the evaluation of posterior circulation clinical symptoms. Atypical location of the hemorrhage and lower motor cranial nerve dysfunction should alert the possibility of these aneurysms. Careful clinical history

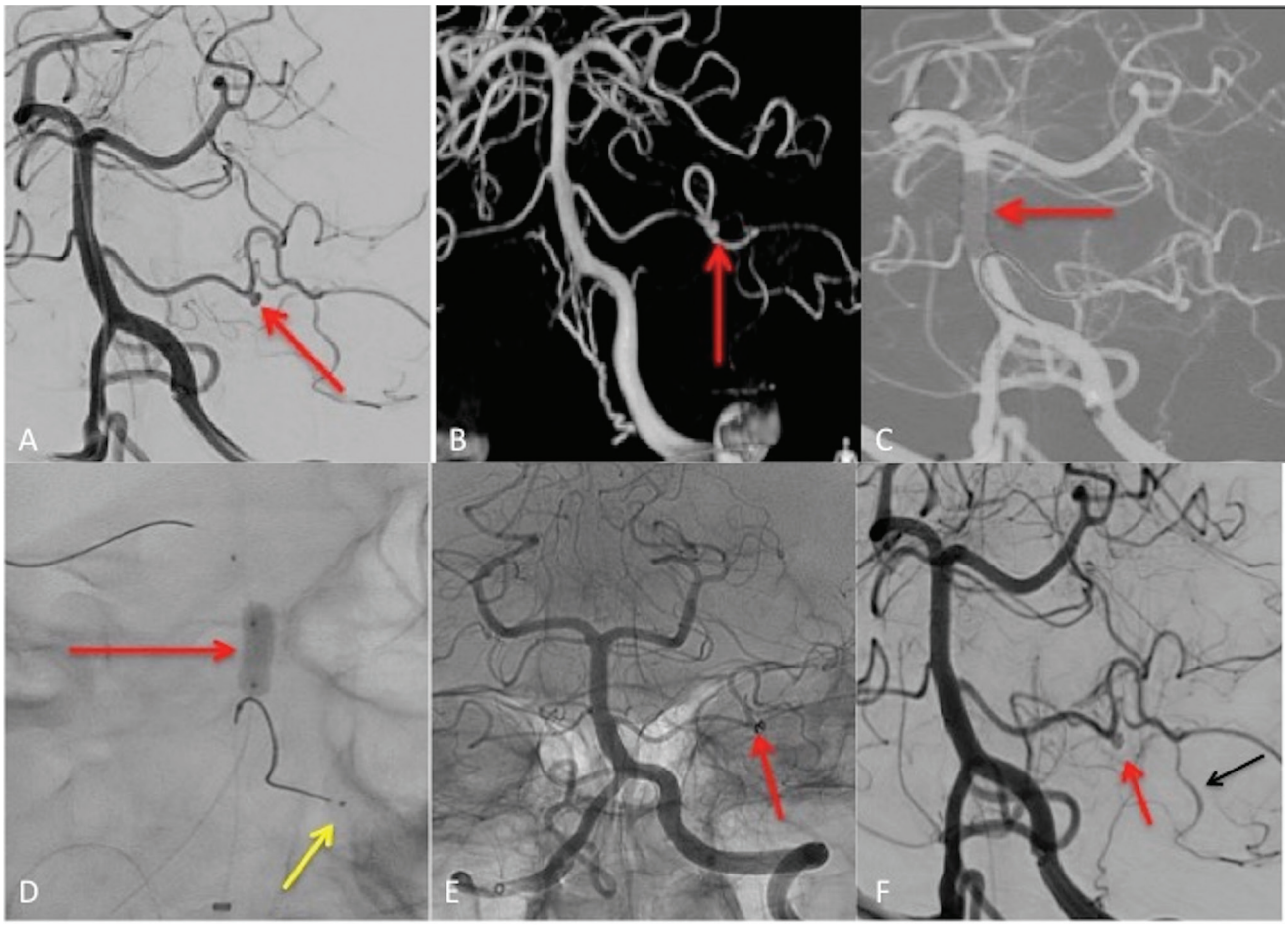

Fig. 3 DSA of vertebral angiogram showing left AICA aneurysm (arrow in **A**). Three-dimensional (3D) surface shaded display image showing the morphology of the aneurysm with AICA-PICA complex (arrow in B). Roadmap image showing balloon (placed in midbasilar segment distal to AICA origin) assisted catheterization of the left AICA (arrow in **C**). Microcatheter position (yellow arrow in **D**) and balloon are shown in native DSA image (red arrow in **D**). Native angiogram post-coil embolization showing occluded aneurysm with preservation of parent artery (arrow in **E**). DSA image post-coil embolization showing preservation of AICA-PICA complex (black arrow in **F**).

and imaging evaluation can help in diagnosis and localization of these aneurysms. Both endovascular coil embolization or parent artery occlusion and surgical management including trapping with or without bypass are the possible therapeutic options. Endovascular coil embolization has better safety profile and good clinical outcome as compared with the surgical management, especially in cases with AICA-PICA complex variant anatomy.

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Presentation at a Meeting
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Conflict of Interest
None.

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