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Case Report

Minimally invasive treatment strategy for partially thrombosed anterior inferior cerebellar artery aneurysm: A case report

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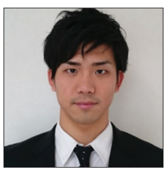

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ABSTRACT

Background: Partially thrombosed anterior inferior cerebellar artery (AICA) aneurysms are extremely rare; thus, no established therapeutic approach exists.

Case Description: We report a large, partially thrombosed AICA aneurysm and discuss its therapeutic nuances. The aneurysm was asymptomatic; therefore, we aimed to treat it through a minimally invasive procedure. The aneurysm was of fusiform type and the proximal neck of the aneurysm was positioned at midline in front of the brainstem. To approach the neck, posterior transpetrosal approach is recommended. However, this approach can be invasive; thus, we performed distal clipping of the aneurysm using transcondylar fossa approach with occipital artery-AICA bypass to avoid ischemia of the AICA territory. Although the size of the aneurysm initially increased, it subsequently decreased.

Conclusion: This is a rare case report describing the long-term clinical course after distal clipping in detail. We showed that traditional microsurgical techniques can be applied to treat patients with new, minimally invasive treatment strategies.

Keywords: Anterior inferior cerebellar artery, Distal clipping, Flow alteration, Partially thrombosed aneurysm

INTRODUCTION

Anterior inferior cerebellar artery (AICA) aneurysms are uncommon, accounting for <1% of all intracranial aneurysms. Proximal AICA aneurysms are even rarer.[11] Partially thrombosed aneurysms have a high rupture risk and rapid growth, leading to mass effect.[1] No established therapeutic approach for AICA aneurysms exists.

For a better understanding of this rare clinical entity, we present our report on a large, partially thrombosed AICA aneurysm and discuss the therapeutic nuances.

CASE DESCRIPTION

A 68-year-old woman presented with dizziness and headache. She had no neurological deficits, such as paralysis or sensory disturbances. Magnetic resonance imaging (MRI) revealed a 9 mm, unruptured, thrombosed aneurysm anterior to the brainstem [Figure 1a]. Since the patient was asymptomatic, she was followed up on an outpatient basis. However, MRI at age 70 revealed increased aneurysm size (14 mm) and brainstem mass effect [Figures 1b and c]. Three-dimensional digital subtraction angiography revealed a right proximal AICA aneurysm [Figure 1d]. The AICA supplied the cerebellar hemisphere and did not anastomose with the posterior inferior cerebellar artery. Due to increased risk of rupture and mass effect, we decided to perform surgical intervention. Endovascular treatment was excluded because the aneurysm was of fusiform type. Parent artery occlusion posed a risk of cerebral infarction. Posterior transpetrosal approach was needed to perform complete trapping of the aneurysm. However, the approach could be too invasive to perform for asymptomatic patients. We decided to perform distal clipping of the aneurysm to combine its blind end with the occipital artery (OA)-AICA bypass to avoid cerebral infarction. Transcondylar fossa approach was selected because it is minimally invasive and makes reaching the distal end of the aneurysm and AICA easier. We did not approach the anterior brainstem. The distal AICA arose from the aneurysm body [Figure 1d]; therefore, we clipped the AICA just distal to the aneurysm after the OA-AICA bypass [Figures 2a-f]. We aimed to make the aneurysm thrombosed. Postoperative MRI demonstrated sporadic, asymptomatic cerebellar infarctions [Figure 3]. Indocyanine green video angiography showing the adequate flow of the bypass [Figure 2d]. However, the bypass patency was not clear on MRI after the treatment. We

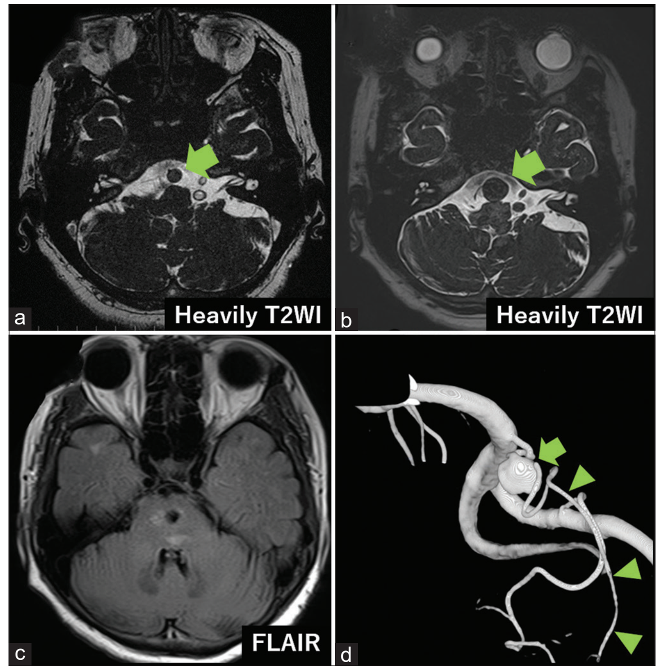

Figure 1: Imaging findings before and after the treatment. (a) Magnetic resonance (MR) image showing the aneurysm (9 mm, arrow) anterior to the brainstem when the patient was 68 years old, (b) MR image showing enlarged aneurysm (14 mm) when the patient was 70 years old (arrow), (c) MR image showing brainstem mass effect due to the aneurysm, (d) three-dimensional digital subtraction angiography showing a right proximal anterior inferior cerebellar artery (AICA) aneurysm (arrow) and the distal AICA (arrowheads) appearing from the aneurysm body.

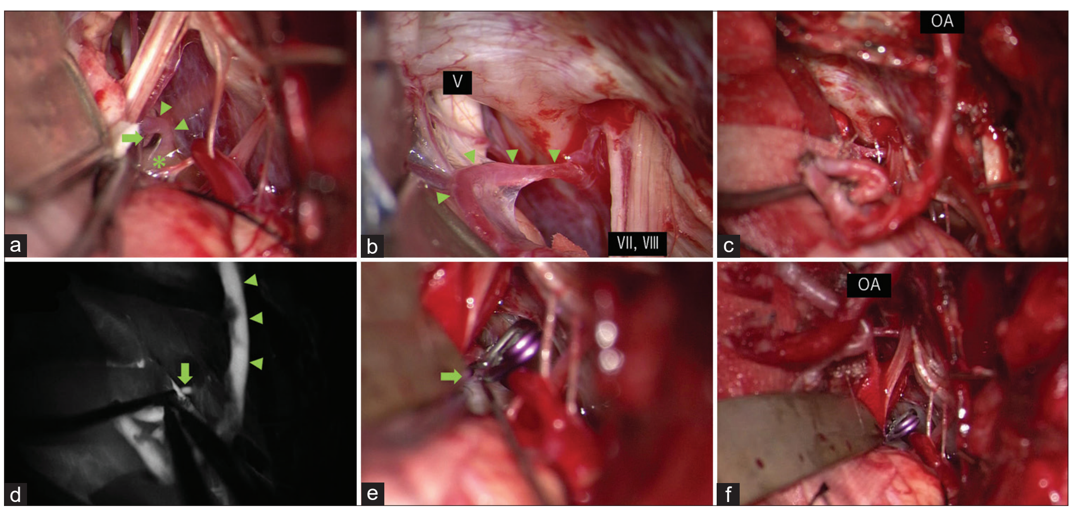

Figure 2: Intraoperative findings. (a) Intraoperative photograph showing a right proximal anterior inferior cerebellar artery (AICA) aneurysm (asterisk), the distal AICA (arrowheads) appearing from the aneurysm body, and the branch vessel (arrow) appearing from AICA, (b) intraoperative photograph showing a distal part of the AICA (arrowheads) suitable for bypass, (c) intraoperative photograph showing occipital artery AICA bypass, (d) indocyanine green video angiography showing the adequate flow of the bypass. Retrograde filling of AICA was observed (arrow), (e) intraoperative photograph showing clipping of the AICA just distal to the aneurysm. Small branch from AICA was preserved (arrow), (f) intraoperative photograph showing the panoramic view of the surgical field after the bypass and the clipping.

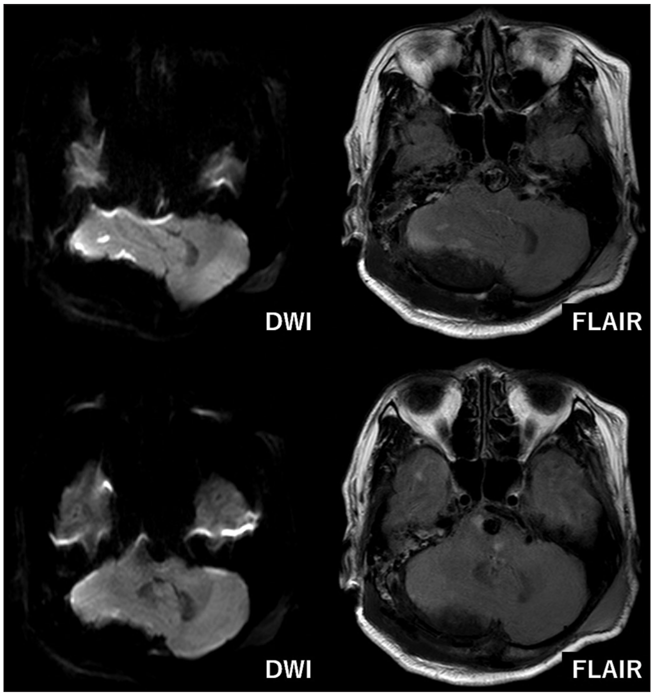

Figure 3: Postoperative magnetic resonance image showing sporadic cerebellar infarctions.

considered the possibility that the bypass was not depicted due to an artifact or that the bypass was thrombosed due to lack of demand. The patient was discharged with a modified Rankin scale score of 1. Six months postoperatively, the aneurysm growth slowed down; however, its size was 15 mm, and the brainstem mass effect persisted [Figures 4a and b]. Therefore, we considered secondary treatments, such as parent artery occlusion with endovascular technique. However, the aneurysm size decreased without additive treatments. Twelve months postoperatively, the aneurysm size was 12 mm, and the brainstem mass effect disappeared [Figures 4c and d]. Thirty-three months after surgery, the aneurysm had shrunk, and the patsient had no neurological deficits [Figures 4e and f].

DISCUSSION

No established therapeutic approach for AICA aneurysms exists. Therefore, we have summarized existing literature on proximal AICA aneurysm treatment. Lv *et al*. found that all premeatal AICA aneurysms were surgically treated by trapping.[9] Hou *et al*. found that 68.75% of patients who underwent endovascular parent artery occlusion had no neurological deficits.[6] AICA occlusion is known to carry the risk of brainstem and cerebellar infarction. OA-AICA bypass and trapping can mitigate this risk.[2] However, in aneurysms with proximal origins, brainstem ischemia can occur during dissection of the perforators.[3] With the development of endovascular treatment, aneurysm occlusion can be performed without the occlusion of important branch vessels.[10] However, coil embolization for large or giant aneurysms may exert additional brainstem mass effects.[3] Moreover, Iihara *et al*. reported a thrombosed aneurysm with continued growth after complete endovascular occlusion and trapping.[7] Internal trapping by endovascular treatment cannot occlude the vasa vasorum and can cause neovascularization around the treatment area.

Our patient had an unruptured, partially thrombosed, large, proximal AICA aneurysm. We were concerned about the intolerance to AICA occlusion and planned OA-AICA bypass. Since our patient was asymptomatic, we chose distal clipping, a less invasive treatment, aiming to stop growth by complete aneurysm thrombosis. This might be the second reported case of a proximal AICA aneurysm treated with distal clipping and bypass. Our report is a rare one that describes the postoperative long-term clinical course in detail. If the patient's condition worsened, we would have considered secondary treatment by parent artery occlusion or trapping; fortunately, there was good progress without these treatments. We identified three reasons for the decreased aneurysm size. First, we could protect the very small arterial branches, which are difficult to visualize through angiography, during microscopic surgery. Actually, we could detect a small branch from the AICA and preserved the branch by just distal clipping of the aneurysm. Second, the vasa vasorum was treated by occluding all vessel wall layers during clipping. Third, intra-aneurysmal flow reduction promotes aneurysm thrombosis and shrinkage.[5] However, our technique has some limitations. Gradual perforating branch occlusion may occur due to stagnant AICA stump thrombosis.[8] In addition, residual blood flow from proximal AICA to the aneurysm, leading to aneurysm growth, and aneurysm thrombosis may cause mass effect.[4] Our patient had sporadic cerebellar infarction and a temporary increase in aneurysm size. We obtained the desired results with careful follow-up.

Although the availability of new endovascular devices is an important advance, traditional microsurgical techniques can be applied to provide patients with new, minimally invasive treatment strategies.

CONCLUSION

We report a large, partially thrombosed AICA aneurysm. The aneurysm size decreased after distal clipping of aneurysm with OA-AICA bypass. We hope this report will guide clinicians in the treatment of these rare aneurysms.

Ethics approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

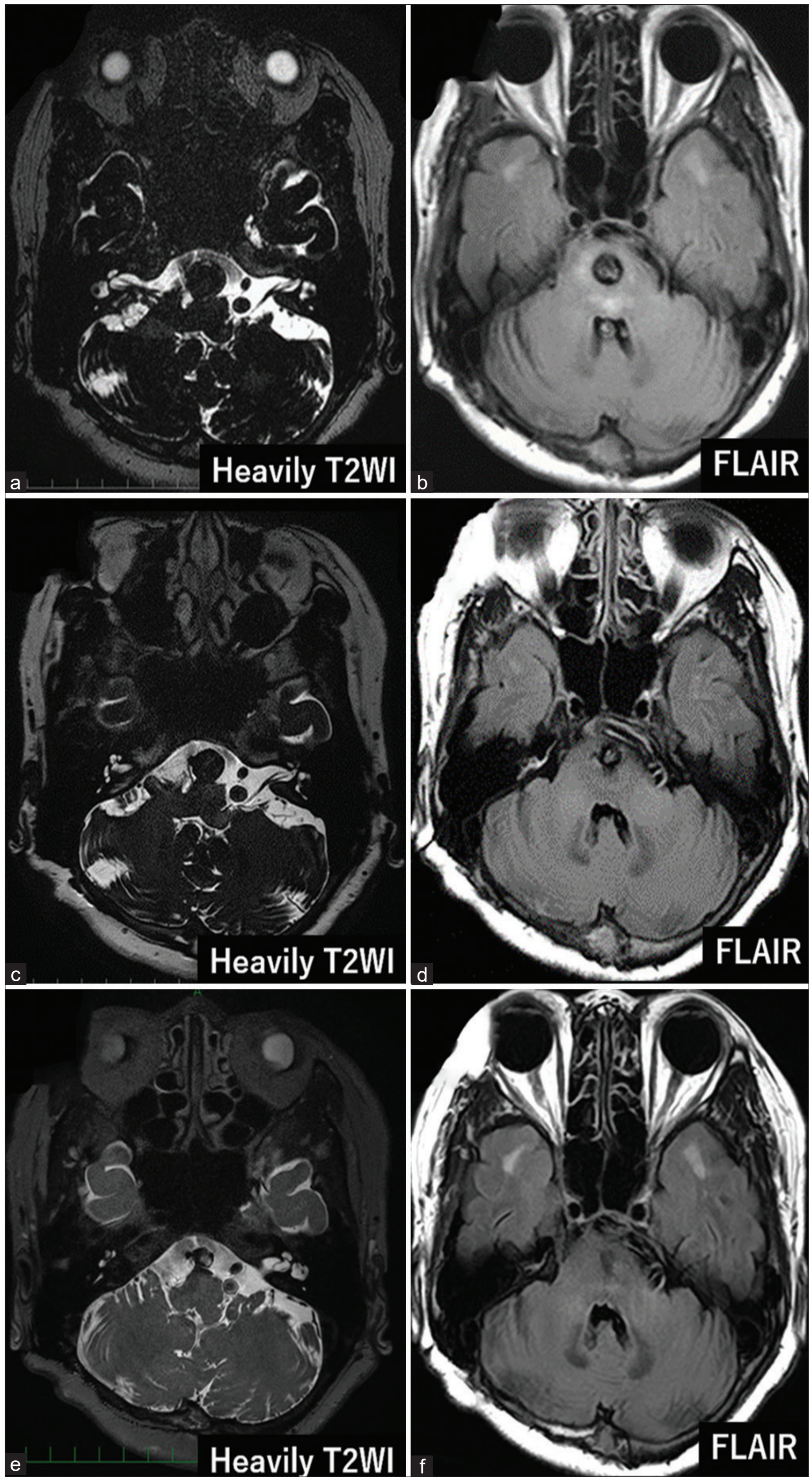

Figure 4: Imaging findings long after the treatment. (a) Magnetic resonance (MR) image at 6 months postoperatively showing increased aneurysm size (15 mm), (b) MR image at 12 months postoperatively showing decreased aneurysm size (12 mm), (c) MR image at 33 months postoperatively showing further decreased aneurysm size (10 mm), (d) MR image at 6 months postoperatively showing persisting brainstem mass effect, (e) MR image at 12 months postoperatively showing no brainstem mass effect, (f) MR image at 33 months postoperatively showing no brainstem mass effect.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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