Giant aneurysm of distal posterior inferior cerebellar artery: a case report and review of the literature

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Abstract

Introduction: Aneurysms in the vertebrobasilar system are rare and in the distal segment of the posterior inferior cerebellar artery they are even less frequent. Giant aneurysms are also rare in the posterior cranial fossa. Giant aneurysms of the distal posterior inferior cerebellar artery generally can have mainly compressive effects on the adjacent structures and they can be mistaken for tumors.

Case presentation: We report the case of a 74-year-old Italian woman who presented with a complaint of dizziness. Her dizziness was found to be a result of aneurysmal dilatation arising from the distal segment of the right posterior inferior cerebellar artery. A mid-line suboccipital craniotomy was performed, and the aneurysm was clipped without post-operative deficits and with improvement in the patient’s dizziness. In our present report, we also review the literature and discuss our case with regard to the clinical and radiological features and surgical procedure performed.

Conclusion: To the best of our knowledge, few cases of this type of aneurysm have been described in the literature. Our patient had a good outcome after surgical treatment.

Keywords: Clipping, Distal posteroinferior cerebellar artery, Giant aneurysm

Introduction

Aneurysms of the vertebrobasilar system account for 5% to 10% of all intracranial aneurysms, and, at the level of the distal posterior inferior cerebellar artery, they are rare, comprising less than 0.5% to 3% [1-3]. They are referred to as giant aneurysms when they exceed 2.5cm in size. Giant aneurysms of the posterior inferior cerebellar artery (PICA) are very rarely found in the vertebrobasilar system. Half of all giant aneurysms are thrombosed, but complete obliteration of the aneurysmal sac is uncommon [4-6].

Case presentation

A 74-year-old Italian woman presented to our institution with complaints of severe headache and dizziness. Her neurological examination showed nuchal rigidity (Glasgow Coma Scale score 15 of 15 and Hunt and Hess grade 2) with gait ataxia. Magnetic resonance imaging (MRI) revealed a 2.8cm mass in the right cerebellar hemisphere with high signal intensity on T1-weighted images and low signal intensity on T2-weighted images, which were both associated with a peripheral signal void rim and not with peri-lesional edema. A magnetic resonance angiogram revealed aneurysmal dilatation arising from the distal segment of the right PICA and oriented medially with low signal intensity of flow only in part of the lumen and no signs of subarachnoid hemorrhage (SAH) (Figure 1). After endovascular coiling for vasospasm failed, we performed a mid-line suboccipital craniotomy with the patient under general anesthesia. Upon opening the cisterna magna, the cerebellar tonsils and the tonsillar loop of the PICA were exposed. The aneurysmal sac, originating from a loop at the telovelotonsillar segment, was identified and the proximal and distal portions of the parent artery were exposed and clipped for temporary occlusion with two YASARGIL clips (Aesculap, Center Valley, PA, USA). The aneurysm dome was isolated from the surrounding tissue, and, after an incision of the thick wall was made, an intra-aneurysmal thrombus was shaved with the ultrasonic aspirator. The neck of the aneurysm

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(2.48mm) was identified and clipped. Intra-operative Doppler ultrasonography was used to check preservation of blood flow in the distal PICA. The patient's post-operative course was uneventful with neurological improvement, except for a transient admission to the intensive care unit (ICU). A post-operative computed tomography scan (CT) scan showed no hemorrhage or ischemia in the posterior fossa (Figure 2).

Discussion

The PICA is the greatest of the branches of the vertebral artery and is the causative vessel for aneurysms in the posterior fossa, which cause cerebral infarction and cranial nerve compression in many patients. The PICA is formed by six segments and two loops. The telovelotonsillar and cortical segments are its distal parts. The bifurcation of the basilar artery and the origin of the PICA are the most common sites from which giant aneurysms arise in the vertebrobasilar system. Other locations within the posterior cranial fossa are much less common. Computed tomography reveals giant aneurysms as oval-shaped lesions with surrounding edema and, frequently, calcification. Contrast enhancement is strictly dependent on intra-aneurysmal thrombosis, but it may not be sufficient to confirm the diagnosis of the nature of the lesion, because it cannot differentiate these lesions from tumors. MRI can demonstrate a well-defined mass, with peripheral signal void rim and no contrast-enhancing components. Angiography is the most important diagnostic modality for revealing the true nature of the lesion, especially when there are no signs or symptoms of subarachnoid bleeding [5-7]. This exam should scan the presence of a contralateral PICA, the collateral circulatory pattern and the dominance, that are important radiological parameters, while deciding the choice of treatment. Multiple aneurysms can develop in the PICA [1]; they can be accompanied...
by arteriovenous malformations in rare cases; and they
have low incidence of bleeding [2,3]. Giant intracranial
aneurysms can be distinguished when completely throm-
bosed. They may escape angiographic identification when
not thrombosed or partially thrombosed, which are the
most common types [4-6]. The symptoms of ruptured
PICA aneurysms are similar to those of subarachnoid
hemorrhage Most patients who have unruptured PICA
aneurysms present with compressive syndrome because
these malformations usually appear clinically as space-
occupying lesions and may occasionally be mistaken for
tumors [4,7]. Early aneurysm treatment is necessary in
patients presenting with SAH because rebleeding rates
may be as high as 78%. The ideal treatment of a saccular
lesion is clipping or endovascular obliteration of the
aneurysm neck with preservation of the lumen. Giant
aneurysms of the distal PICA are rare: to the best of
our knowledge, only 14 cases of a total of 17 surgically
treated patients have been reported [1-14]. Surgical
treatment of these aneurysms has yielded good results
[1,5,8,9,11,13], with clinical improvement, and only one
patient died after surgery [14] (Table 1). The surgical
approach for PICA aneurysms depends on the site of
occurrence. For distal PICA aneurysms, suboccipital
craniotomy is preferred. A different surgical option must
be considered, however, when a dissection is performed,
when the neck cannot be clipped without occlusion of
the parent vessel or when small arteries arising from
this segment pass through the brainstem. Trapping and
excision of the aneurysm, as well as arterial reconstruction,
performed by direct end-to-end anastomosis or insertion
of an interposed arterial graft are possible treatment
options [2,3,8,9,13,14]. An ultrasonic aspirator should be
used for debulking of thrombosed or partially thrombosed
aneurysms. Intra-operative fluoroangiography and Doppler
ultrasongraphy can be very useful modalities for visu-
alizing exclusion of the aneurysm from the circulation.
Mortality can be related more to vasospasm as a result
of subarachnoid hemorrhage rather than to technical
aspects of surgery [1,2,4,6,15]. Endovascular treatment
of distal PICA aneurysms with parent vessel occlusion
may be an option. It has a complication rate as high as
13% due to the extremely variable and tortuous course
of the PICA [7,9].

Conclusions
Giant aneurysms of the distal PICA are very rare and
often present together with posterior fossa syndrome.
On the basis of reports in the literature, we conclude
that, for these aneurysms, the surgical option of direct
clipping should be considered the first-line treatment.
This option allows definitive obliteration of the aneurysm
and possible removal of space-occupying lesions, especially
in cases of thrombosed aneurysms. Endovascular treatment
involves significant risks of neurological deficit due to the
extreme variability and tortuosity of the PICA.

Consent
Written informed consent was obtained from the patient
for publication of this case report and any accompanying
images. A copy of the written consent is available for
review by the Editor-in-Chief of this journal.

Table 1 Reports of giant aneurysms of distal posterior inferior cerebellar artery*

| Reports             | Number of cases | Age/sex       | Presenting symptoms | Treatments                      | Outcomes     |
|---------------------|-----------------|---------------|---------------------|--------------------------------|--------------|
| Hooeok et al., 1963 [14] | 1               | 50/F          | PFS                 | Trapping                       | Death        |
| Miller and Newton, 1978 [7] | 1               | 61/F          | PFS                 | NR                             | NR           |
| Yoshii et al., 1979 [5]  | 1               | 72/F          | PFS                 | Clipping                       | Good         |
| Egashira et al., 1979 [6] | 1               | NR            | PFS                 | Clipping                       | NR           |
| Osenbach et al., 1986 [10] | 1              | NR            | Ocular bobbing      | Clipping                       | NR           |
| Batjer, 1986 [9]      | 2               | NR            | Hemorrhage          | Trapping in both cases         | Good         |
| Kusuno et al., 1986 [8] | 3               | 37 to 66/2 M, 1 F | NR                  | Proximal ligation              | Good         |
| Dernbach et al., 1988 [1] | 1               | 47/M          | Asymptomatic        | Clipping                       | Good         |
| Osenbach, 1989 [11]   | 1               | 11 months/M   | PFS                 | Clipping                       | Good         |
| Richmond and Schmidt, 1993 [12] | 1            | 67/M          | FMS                 | Clipping                       | Good         |
| Yamada et al, 1996 [13] | 1              | 69/F          | Ataxia              | Clipping + anastomosis (SO)    | Good         |
| Drake and Peerless, 1997 [3] | 1             | 70/F          | NR                  | Trapping                       | Excellent     |
| Lewis et al., 1997 [2]  | 1               | 52/M          | Headache            | Clipping + anastomosis (SO)    | Good         |
| Lim et al., 2008 [4]   | 1               | 64/F          | Headache, hemiparesis | Clipping(SO)                   | Good         |
| Present case          | 1               | 74/F          | Headache            | Clipping(SO)                   | Good         |

*FMS, Foramen magnum syndrome; NR, Not reported; PFS, Posterior fossa syndrome; SO, Suboccipital craniectomy.
Abbreviations
CT: Computed tomography; MRI: Magnetic resonance imaging; PICA: Posterior inferior cerebellar artery; SAH: Subarachnoid hemorrhage.

Competing interests
The authors declare that they have no competing interests.

Authors’ contributions
All authors analyzed and interpreted the patient data and contributed to the writing of the manuscript. All authors read and approved the final manuscript.

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