Giant Peripheral Aneurysm of the Posterior Inferior Cerebellar Artery Treated with Excision and End-to-End Anastomosis

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A patient with a giant aneurysm arising from the tonsillomedullary segment of the posterior inferior cerebellar artery (PICA) presented with clinical and computed tomography findings suggestive of spontaneous cerebellar hemorrhage. Magnetic resonance imaging led to arteriography and the correct diagnosis. Lack of a clippable neck on the aneurysm and its location proximal to the choroidal point prompted treatment by excision of the aneurysm and end-to-end anastomosis of the PICA. No neurological deficit resulted from the procedure.

KEY WORDS: Posterior inferior cerebellar artery; Giant aneurysm; Magnetic resonance imaging

Aneurysms arising from the posterior inferior cerebellar artery (PICA) are uncommon, accounting for only 0.5%-3% of all intracerebral aneurysms [4,7,8,10-14]. Giant (>2.5 cm) aneurysms of the PICA are so rare that Drake's large series of giant aneurysms included no cases [3]. Only six giant aneurysms of any part of the PICA had been reported in the English literature as of a 1984 review, to which three recent cases from Japan have been added [5,9]. Most PICA aneurysms arise at the origin of the vessel from the vertebral artery. Peripheral PICA aneurysms, regardless of size, are also very rare; in a recent review, we found only 61 cases in the English literature [1]. We report the case of a patient with a giant peripheral aneurysm of the PICA whose clinical presentation and computed tomography (CT) scan suggested the diagnosis of a subacute cerebellar hemorrhage. Had it not been for the findings on magnetic resonance imaging (MRI), which

Address reprint requests to: Dr. Roberto C. Heros, Director of Cerebrovascular Surgery, Massachusetts General Hospital, Boston, Massachusetts 02114. led to arteriography and the correct diagnosis, the patient would have been treated conservatively and remained at risk from recurrent aneurysmal hemorrhage or enlargement.

Case Report

A 65-year-old Colombian man, otherwise well except for moderate hypertension treated with beta-blockers, awoke one morning with headache, nausea, dizziness, and ataxia. He noted particular difficulty with gait and collided with objects when trying to walk. The nausea and headache improved spontaneously but the dizziness and ataxia remained constant. A CT scan obtained in Colombia 2 months after the onset of symptoms demonstrated a large, central cerebellar, hyperdense lesion (Figure 1). There was minimal contrast enhancement at the edge of the lesion, which was interpreted as being a tumor or a hemorrhage within a tumor. Screening tests for metastatic disease, including chest x-ray, intravenous pyelography, and bone scan, were all negative. He was referred to the Massachusetts General Hospital (MGH) with a diagnosis of probable cerebellar tumor. Admission neurological examination at MGH found him alert and fluent in speech. Fine nystagmus was present on full right gaze, and the extraocular movements were otherwise normal. Lower cranial nerve function was intact. Strength was normal, but dysmetria and fine motor impairment were present, more in the right arm than the left. Significant truncal ataxia prevented him from being able to walk without a cane. The reflexes and plantar responses were normal.

Our initial diagnosis was spontaneous hypertensive cerebellar hemorrhage, but because the lesion continued to appear as a high density lesion on a CT scan done 2 months after onset of symptoms, we obtained a magnetic resonance image to rule out underlying pathology. This study demonstrated areas of strikingly inhomogeneous signal density, particularly on the T_2 weighted study, which were interpreted as being consistent with thrombosis or hemorrhage of different ages within the abnormal region (Figure 2). Suspicion of

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Figure 1. CT scan taken 2 months after the onset of symptoms, showing an irregular hyperdense region in the cerebellum (A), with enhancement after intravenous contrast material (B).

multiple hemorrhages led to angiography, which disclosed a small, bilobed, peripheral PICA aneurysm (Figure 3). We surmised that the aneurysm had bled on more than one occasion into the cerebellar parenchyma, thus accounting for the MRI findings.

Figure 2. T_2 -weighted magnetic resonance image of the posterior fossa, showing regions of variable density consistent with thrombosed blood of different ages.



Figure 3. Cerebral angiogram obtained after injection of the right vertebral artery, demonstrating a peripheral bilobed aneurysm of the PICA.



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The aneurysm was approached through a wide suboccipital craniectomy, with removal of the posterior arch of C-1. To our surprise we encountered a giant (3.2 cm) aneurysm between the cerebellar tonsils immediately upon opening the dura mater. The aneurysm projected upwards between the tonsils toward the fourth ventricle. It was mostly thrombosed, except for two regions of patency near the neck, which corresponded to the two "lobes" visualized on the angiogram (Figure 4). There was evidence of some parenchymal hemorrhage around the aneurysm, but most of the clot was intraaneurysmal. The PICA was followed proximally to the vertebral artery, revealing that the aneurysm arose on the tonsillomedullary segment, prior to the origin of important perforating vessels to the brain stem and deep cerebellar nuclei [3,6].

To avoid sacrificing the artery, proximal and distal temporary clips were placed, and the bulk of the aneurysm was excised. Aneurysmorrhaphy was performed on the remaining cuff after removal of all thrombus. On releasing the temporary clips, however, there was no flow through the lumen. We attributed this to probable injury to the intima at the orifices of entrance and exit during aneurysmorrhaphy. To restore flow, the clips were reapplied, and the cuff of the aneurysm was excised. The artery was then anastomosed in an end-to-end fashion. Back and front anchoring stitches of 10-0 nylon were placed, and then the anastomosis was completed with four or five interrupted sutures on each side. Robust pulsatile flow was evident on releasing the clips.

Postoperatively the patient noted improvement in gait and there was no new deficit. He left the hospital on the fourth postoperative day. In view of the clinical improvement and cost considerations, we did not feel that postoperative angiography was indicated.

Discussion

This patient's clinical presentation with abrupt development of ataxia, dizziness, and headache was typical for a spontaneous cerebellar hemorrhage. The symptoms did not progress over the 2-month period prior to his transfer to our hospital. To rule out underlying pathology, such as a tumor which had bled, we obtained a magnetic resonance image. This study suggested blood clot and/or hemorrhage of different ages. Without this MRI finding we would not have proceeded with arteriography or surgery, in view of the stability of the patient's symptoms. However, given evidence of probable multiple hemorrhages (which turned out to be a combination of thrombus within the giant aneurysm and a small surrounding parenchymal hemorrhage), arteriography was warranted. Thus, MRI significantly altered diagnostic and therapeutic considerations in this case.

Given the operative findings, available surgical options included (1) clipping the neck of the aneurysm, (2) ligating the PICA proximal to the aneurysm, and (3) performing aneurysmorrhaphy to remove the bulk of the lesion and preserve PICA flow. The first and generally preferable option was not technically feasible because of the lack of a definable neck, resulting from the fusiform base of the aneurysm, and the large amount of mural thrombus. Ligation of the PICA can be safely used for more distally located aneurysms but is potentially dangerous with aneurysms located proximal to the choroidal point because important branches to the brain stem and deep cerebellar nuclei are located before this point [1,4,6].

In this case, aneurysmorrhaphy was attempted, but it was technically unsatisfactory. This prompted us to proceed with aneursymal resection and end-to-end anastomosis, a maneuver previously used by Dolenc [2] to treat a patient with a fusiform aneurysm of the PICA. Because of the lack of postoperative angiography, we cannot claim postoperative patency of the anastomosis, in spite of its apparent normal flow at the conclusion of the operation.

Conclusion

Giant peripheral PICA aneurysms can present as cerebellar parenchymal lesions. MRI can be an important diagnostic aid and should be considered in cases of apparent spontaneous cerebellar hemorrhage with unusual clinical or CT features. Aneurysmal resection with end-to-end anastomosis of the PICA is a surgical option to be considered in cases of peripheral giant PICA aneurysms.

References

- 1. Beyerl DB, Heros RC. Multiple peripheral aneurysms of the posterior inferior cerebellar artery. Neurosurgery 1986;19: 285-9.
- 2. Dolenc V. End-to-end suture of the posterior inferior cerebellar artery after the excision of a large aneurysm: case report. Neuro-surgery 1982;11:690-3.
- 3. Drake CG. Giant intracranial aneurysms: experience with surgical treatment in 174 patients. Clin Neurosurg 1979;26:12–95.
- Hudgins RJ, Day AL, Quisling RG, Rhoton AL Jr, Sypert GW, Garcia-Bengochea F. Aneurysms of the posterior inferior cerebellar artery. A clinical and anatomical analysis. J Neurosurg 1983;58:381-7.
- 5. Kusuno K, Yoshida Y, Shibata N, Hayashi T. Three cases of giant aneurysm of the distal posterior inferior cerebellar artery. No Shinkei Geka 1986;14:345-50.
- Lister JR, Rhoton AL, Matsushima T, Peace DA. Microsurgical anatomy of the posterior inferior cerebellar artery. Neurosurgery 1982;10:170-99.
- Locksley HB. Report on the cooperative study of intracranial aneurysms and subarachnoid hemorrhage: section V, part I. Natural history of subarachnoid hemorrhage, intracranial aneurysms and arteriovenous malformations. Based on 6368 cases in the cooperative study. J Neurosurg 1966;25:219-39.
- 8. Logue V. Posterior fossa aneurysms. Clin Neurosurg 1963;11:183-207.
- 9. Massey CE, El-Gammal T, Brooks BS. Giant posterior inferior cerebellar artery aneurysm with dysphagia. Surg Neurol 1984;22:467-71.
- 10. McDonald CA, Korn M. Intracranial aneurysms. Arch Neurol Psychiatry 1939;42:298-328.
- 11. Nishizaki T, Tamaki N, Nishida Y, Fujita K, Matsumoto S. Aneurysms of the distal posterior inferior cerebellar artery: experience with three cases and review of the literature. Neurosurgery 1985;16:829-32.
- 12. Pasqualin A, Pian RD, Scienza R, Licata C. Posterior inferior cerebellar artery aneurysm in the fourth ventricle: acute surgical treatment. Surg Neurol 1981;16:448-51.
- 13. Suzuki J, ed. Cerebral aneurysms-experiences with 1000 directly operated cases. Tokyo: Neuron, 1979:8-24.
- Yamamoto I, Tsugane R, Ohya M, Sato O, Ogura K, Hara M. Peripheral aneurysms of the posterior inferior cerebellar artery. Neurosurgery 1984;15:839-45.