

Fusiform Vertebral Artery Aneurysms Involving the PICA Origin and Associated with the Sole Angiographic Anterior Spinal Artery: a Review of 3 Cases and a Proposed Treatment Paradigm

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Learning Objectives

- To understand the challenges posed by aneurysms of PICA origin with a single ASA
- To understand possible treatment paradigms based on location of PICA aneurysm in conjunction with ASA

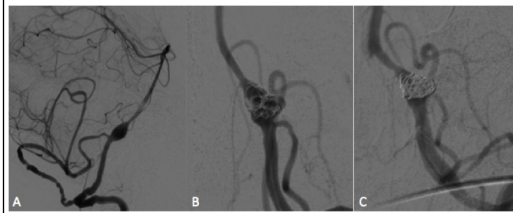
Introduction

Fusiform aneurysms of the vertebral artery involving the posterior inferior cerebellar artery (PICA) origin in conjunction with a single anterior spinal artery (ASA) pose a unique challenge to treatment. We propose a treatment paradigm in such cases, depending on the proximity of the aneurysm to the ASA.

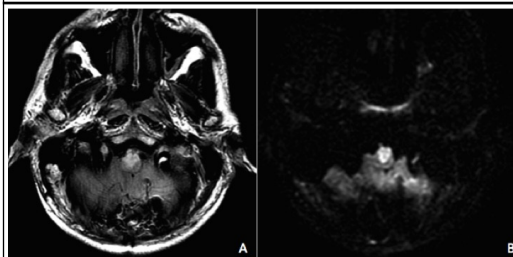
Methods

Three cases from our institution are presented. Patient 1 underwent vertebral to PICA bypass followed by aneurysm coiling without vessel sacrifice. The aneurysm expanded to involve the ASA origin, and underwent endovascular occlusion. Patient 2 underwent a PICA-PICA bypass followed by endovascular sacrifice of the aneurysm in which the ASA was removed from aneurysm. Patient 3 underwent a PICA-PICA bypass followed by endovascular sacrifice with the aneurysm also removed from ASA.

Patient 1



[A] Post PICA-PICA bypass. [B] Aneurysm expansion lead to endovascular coiling as opposed to vessel sacrifice. [C] Aneurysm expansion with less resultant mass effect, less flow through the ASA



ASA distribution stroke.

Patient 2

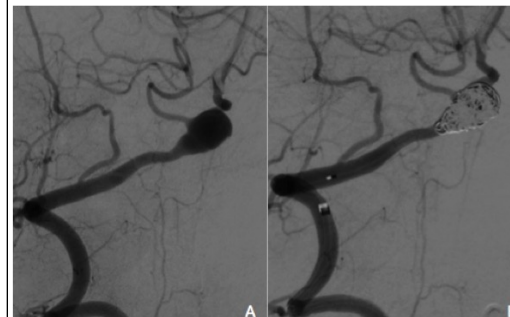


[A] Post PICA-PICA bypass prior to endovascular vessel sacrifice. [B] Vessel sacrifice. The ASA is removed from the aneurysm.

Results

We present two cases in which the aneurysm is immediately adjacent to ASA, and one case in which the aneurysm involves ASA. All patients had a single filling ASA on angiography prior to intervention. In the two cases in which the aneurysm is removed from ASA (Patients 1&2), revascularization with vessel sacrifice was successful with good neurologic outcome. In the event the aneurysm involves the ASA origin (Patient 3), revascularization followed by coiling was unsuccessful; the aneurysm grew requiring endovascular occlusion and subsequent medullary infarct.

Patient 3



[A]. Status post PICA-PICA bypass in which the aneurysm is removed from the ASA. [B] Post vessel sacrifice.

Conclusions

Vertebral artery aneurysms at the PICA origin associated with a single ASA present a unique challenge to treatment. In cases in which the ASA is removed from the aneurysm, we advocate for revascularization followed by endovascular sacrifice. Aneurysms in which the ASA is associated should undergo flow diversion or primary clip reconstruction to minimize the risk of losing the ASA. Finally, aneurysms immediately adjacent to ASA should undergo revascularization and open trapping to maintain patency of ASA, as the lack of control with endovascular embolization risks ASA occlusion.

References

1. Dabus G, Lin E, Linfante I. Endovascular treatment of fusiform intracranial vertebral artery aneurysms using reconstructive techniques. *J Neurointerv Surg.* 2014 Oct;6(8):589-94
2. Lehto H, Niemelä M, Kivisaari R, et al. Intracranial Vertebral Artery Aneurysms: Clinical Features and Outcome of 190 Patients. *World Neurosurg.* 2015 Aug;84(2):380-9.
3. Awad AJ, Mascitelli JR, Haroun RR, et al. Endovascular management of fusiform aneurysms in the posterior circulation: the era of flow diversion. *Neurosurg Focus.* 2017 Jun;42(6):E14.
4. Balik V, Yamada Y, Talari S, et al. Surgical treatment of unruptured dissecting intracranial aneurysms of vertebral - posterior inferior cerebellar artery region and review of the literature. *J Neurosurg Sci.* 2016 Apr 28.