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Case Report

Flow Diversion Treatment of a Dissecting Aneurysm of the Posterior Inferior Cerebellar Artery (PICA)

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Abstract

Background: Intracranial dissecting aneurysms are uncommon conditions and those involving the posterior inferior cerebellar artery (PICA) are particularly rare. Historically, therapeutic strategies relied on parent vessel occlusion. Only in recent years, the introduction of flow diverters (FDs) expanded treatment possibilities, allowing for aneurysm exclusion even in small-caliber vessels while preserving arterial patency.

Case Presentation: A patient in his 50s presented with acute headache secondary to subarachnoid haemorrhage caused by a dissecting aneurysm of the posterior inferior cerebellar artery (PICA). Angiography confirmed a fusiform dissecting aneurysm at the PICA origin from the dominant left vertebral artery. The aneurysm was successfully treated with two hydrophilic-coated flow diverter stents (Phenox p48 HPC), achieving vessel reconstruction and preservation of PICA patency. Dual antiplatelet therapy was administered to mitigate thrombogenic risk. Follow-up imaging demonstrated progressive aneurysm exclusion and complete vessel healing without complications.

Conclusions: Flow diversion is a feasible and safe treatment option for ruptured dissecting PICA aneurysms. This approach provides an effective alternative to vessel sacrifice while reducing the risk of brainstem infarction and Wallenberg syndrome.

Keywords: *Interventional Neuroradiology, Posterior Inferior Cerebellar Artery (PICA), Intracranial aneurysm, Flow Diverter, Subarachnoid Hemorrhage (SAH)*

Introduction

Intracranial dissecting aneurysms are uncommon conditions, and among them, dissecting aneurysms of the posterior inferior cerebellar artery (PICA) are rare. The most common clinical presentation is subarachnoid hemorrhage (SAH), though ischemia or infarction may also occur.[1] Until recently, treatments primarily involved arterial occlusion, but it has only been in recent years that flow diverters (FD) have made it possible to exclude the aneurysm, even in small caliber vessels, while preserving vessel patency.[2,3]

This case report describes the treatment of a dissecting aneurysm at the origin of the PICA using two flow diverters.

Case Presentation

A patient in his 50s, with a history of dilated hypokinetic cardiomyopathy, presented to the emergency department with acute headache. A brain CT scan showed SAH (Figure 1A) and the CT-angio (CTA) revealed a fusiform dissecting aneurysm involving the origin of the PICA emerging from the dominant left vertebral artery (Figure 1B, 1C).

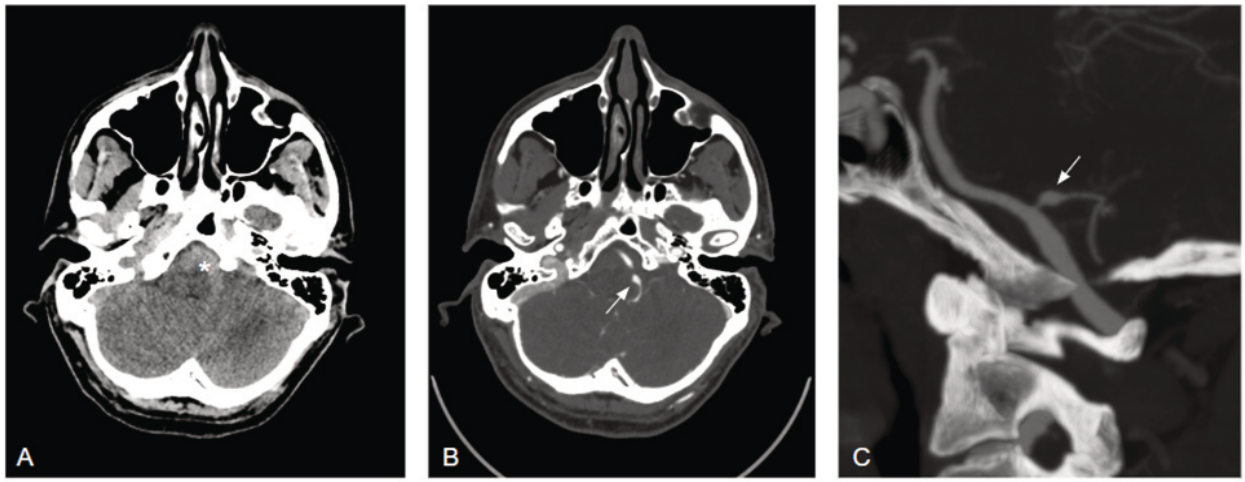

Figure 1. (A) Brain CT scan at patient presentation showing subarachnoid hemorrhage (SAH) (*), (B) CTA demonstrating a dissecting fusiform aneurysm of the left posterior inferior cerebellar artery (PICA) as the cause of bleeding (arrow), (C) CTA with MIP reconstruction illustrating the location and morphology of the aneurysm (arrow).

After neuroradiological and neurosurgical multidisciplinary discussion, in accordance with AHA/ASA 2023 guidelines, an endovascular approach was chosen. Furthermore, in order to preserve vascular patency, the use of flow diverter was selected as a first option instead of direct vessel occlusion [4]. Endovascular treatment was performed using bilateral femoral artery access. Digital Subtraction Angiography (DSA) confirmed the dissecting aneurysm involving the anterior medullary segment of the left PICA. A 0,021" microcatheter was navigated besides the dissected segment and then used to deploy two flow diverter stents (Phenox p48 HPC 2 x 15 mm and 2 x 12 mm) to cover the aneurysm. Before stent implantation 500 mg of acetylsalicylic acid ev was administered and cangrelor infusion (30 mcg/kg bolus followed by 1 mcg/kg/min in infusion) was started. Angiographic controls confirmed stents correct positioning, with blood flow redirected in the parent vessel, without signs of intrastent thrombosis nor distal embolization. Cone-beam CT confirmed no increase in hemorrhage while hydrocephalus was unchanged compared to the previous CT scan. As cangrelor infusion finished, a loading dose of 300 mg of clopidogrel was administered. The day after the procedure double antiplatelet therapy was started (acetylsalicylic acid 100 mg + clopidogrel 75 mg daily).

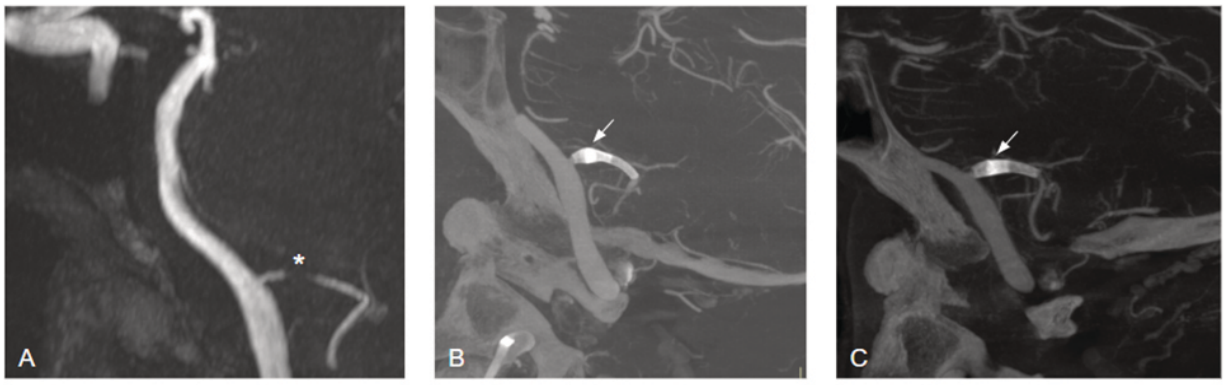

Figure 2. (A) MRA follow-up at 3 months after treatment disclosing vessel flow in the PICA with artifact caused by the two FD (*), (B) VasoCT after FD implantation and (C) VasoCT at 6 months of follow-up demonstrating vessel patency and progressive resolution of the dissecting aneurysm. Higher density indicates the overlap area between the two FD (arrow).

During the following 10 days, CT showed progressive SAH reabsorption, without hydrocephalus. Ten days after treatment a control DSA documented vessel patency, reduction of the focal aneurysm dilatation and normal circulation times. Three-month follow-up magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) demonstrated no signal alterations in the brainstem or cerebellum, with preserved vessel patency and reduction of the proximal PICA dissecting dilatation. There was a slight reduction in the vessel caliber near the origin of the PICA, indicating the need for continued dual antiplatelet therapy until the next angiographic control (Figure 2). Six months later a DSA disclosed PICA reconstruction without intimal hyperplasia nor fish mouthing, so clopidogrel was stopped and ASA maintained (Figure 3).

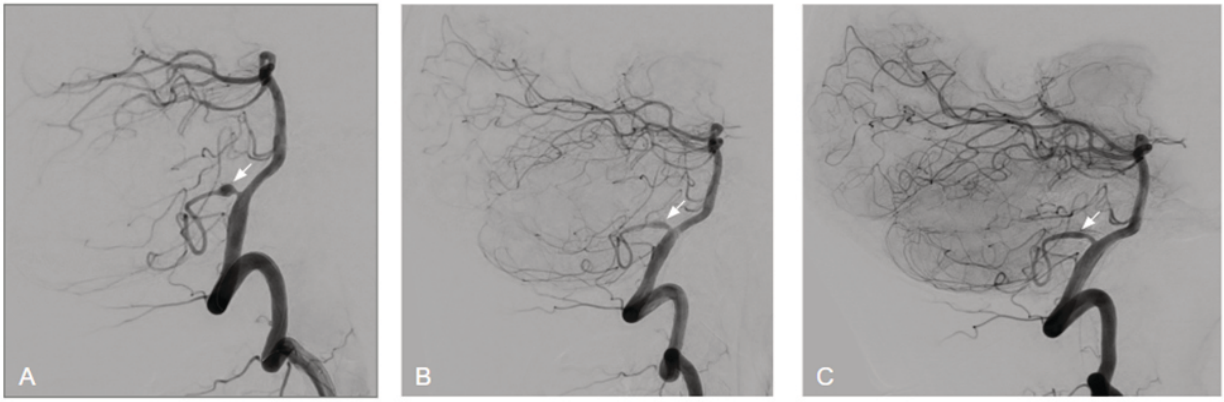

Figure 3. Brain DSA before the treatment (A), ten days after the positioning of two flow diverter stents to cover the dissecting aneurysm (B) and six months after the treatment (C) confirming PICA reconstruction with progressive recover of physiological vessel diameter (arrows) without complications.

Discussion

PICA aneurysms are a rare condition, accounting for 0.5-3% of intracranial aneurysms, with dissecting aneurysms being even rarer, representing 0.5-0.7%, with an associated rebleeding risk of 24%.[5] Dissections occur by the rupture of intima with subsequent blood collection in the subintimal space determining luminal narrowing and, when severe, ischemia. A false lumen may reconnect with the true lumen and when the dissection extends through the media and elastica into the subadventitial space it leads to a "dissecting aneurysm" while in case blood ruptures through the adventitia a SAH occur. Depending on the sequence of events patients may present with ischemic, hemorrhagic, or combined condition.[6] The treatment of PICA aneurysms is not standardized, ranging from conservative management to vessel sacrifice. For distal aneurysm, surgical bypass has also been reported. Endovascular options include simple or assisted coiling or parent vessel occlusion (PVO).[2] Direct PICA reconstruction with FD is more challenging, due to the small size of the artery and the site of the dissection (proximal versus distal). Since the availability of small diameter FD, a limited but increasing number of successful cases has been reported, supporting the safety and efficacy of the procedure and showing progressive aneurysm occlusion during follow-up.[2,7–9] Given the rarity of these aneurysms, the number of described cases remains small, and the population of treated patients is limited even within multicentre studies on treatment devices.[10] In this case, due to the small vessel diameter, an hydrophilic coated FD was used, together with dual antiplatelet therapy to reduce thrombogenicity. Given the aneurysm's close proximity to the origin of the PICA and the limited length of the proximal landing zone, two stents were deployed. This approach was chosen to reconstruct both the affected artery and the proximal landing zone itself while avoiding involvement of the vertebral artery. Further, two stents increase metal coverage, thus providing enhanced aneurysm protection. This approach made it possible to preserve the artery, improving upon the traditional vascular occlusion technique, which, in the case of the PICA, could lead to significant neurological outcomes such as Wallenberg syndrome.[6]

Conclusion

The present case highlights the feasibility and safety of reconstructing a ruptured dissecting fusiform aneurysm of the proximal PICA using flow diverter stents, avoiding vessel sacrifice and reducing the neurological risks typically associated with parent vessel occlusion, including Wallenberg syndrome. This report further supports the role of flow diversion as a viable and effective treatment option for ruptured PICA dissecting aneurysms, offering durable vascular remodelling and a maintained patency at a six months follow-up.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgement

None

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