



Case Report

Successful stent-assisted coil embolization for a recurrent distal posterior inferior cerebellar artery aneurysm: A case presentation

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ABSTRACT

Background: Distal posterior inferior cerebellar artery (PICA) aneurysms are exceedingly rare intracranial aneurysms. In the acute phase of rupture, interventions commonly involve parent artery occlusion through endovascular treatment or direct trapping surgery. There is no consensus on the best treatment of chronic ruptured or unruptured aneurysms, and stent-assisted coil embolization has not yet been reported in the chronic phase of rupture.

Case Description: We present a case of a 46-year-old female with a recurrent distal PICA aneurysm at 18 months following the initial treatment for subarachnoid hemorrhage and was treated by stent-assisted coil embolization with Neuroform Atlas (Stryker, USA), with a favorable outcome.

Conclusion: Distal PICA aneurysms occur at the apical curvature, where primitive arterial anastomoses existed during development, pointing to the potential vulnerability of the vessel wall at these sites. Stent-assisted coil embolization has shown effectiveness in preserving the parent artery for chronic ruptured and unruptured distal PICA aneurysms. Nonetheless, the narrowness and tortuosity of the PICA present obstacles to treatment. In our case, the procedure was feasible utilizing the Neuroform Atlas (Stryker, USA) with the Transcell approach. A thorough grasp of the characteristics of stents and their application is pivotal for achieving effective treatment outcomes.

Keywords: Endovascular treatment, Peripheral aneurysm, Posterior inferior cerebellar artery aneurysm, Stent-assisted coil embolization

INTRODUCTION

Aneurysms originating from the distal posterior inferior cerebellar artery (PICA) are exceedingly uncommon, and the intricate positioning and tortuosity of the PICA present challenges in the utilization of stent-assisted coil (SAC) embolization. Previously, only three instances have been documented, confined to two case series reports.^[1,10] Herein, we describe a case presentation involving SAC, culminating in a favorable clinical outcome.

CASE REPORT

A 46-year-old female presented with a recurrent aneurysm located telelotosillar segment of PICA at 18 months following the initial coiling procedure for subarachnoid hemorrhage [Figure 1a]. The aneurysm displayed a neck measuring 4.1 mm, with the parent artery, the PICA,

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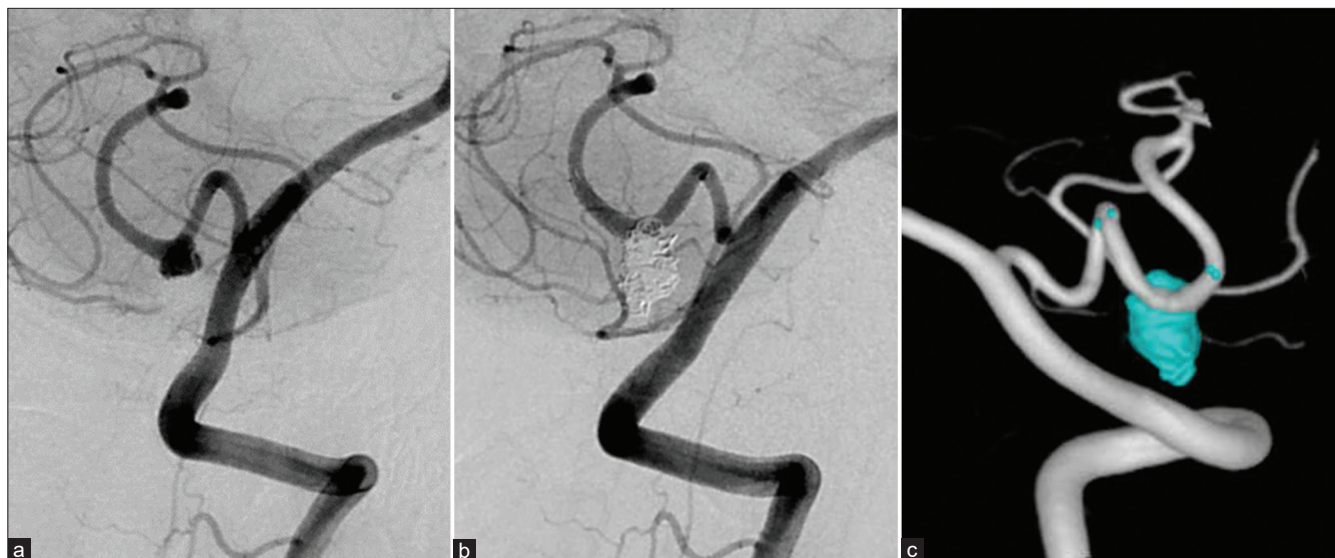


Figure 1: (a) Digital subtraction angiography performed 18 months post initial operation revealed the recurrence of an aneurysm situated at the telovelotonsillar segment of the posterior inferior cerebellar artery. (b) Subsequent to the reoperation, digital subtraction angiography evidenced the complete occlusion of the aneurysm, concurrently affirming the preservation of the posterior inferior cerebellar artery. (c) A three-dimensional digital subtraction angiography, conducted 6 months postoperation, disclosed the absence of any recurrence.

having a diameter of 2.0 mm proximal and 1.9 mm distal to the aneurysm. The patient had no specific medical history, with a documented allergy to shrimp and crab and a history of smoking. Aspirin and clopidogrel were initiated two weeks before the procedure.

Endovascular treatment using stent-assisted coil embolization was performed under general anesthesia. A 5 Fr FUBUKI Dilator kit (ASAHI intecc, Japan) was inserted into the right vertebral artery. An Excelsior SL-10 microcatheter (Stryker, USA) was inserted into the PICA and advanced distal to the aneurysm, which was navigated by a CHIKAI Black 14 micro guidewire (Asahi intecc, Japan). A Neuroform Atlas 3.0 mm * 15mm (Stryker, USA) was deployed to cover the aneurysmal neck from the Excelsior SL-10 microcatheter. The Excelsior SL-10 on the CHIKAI Black 14 was navigated into the aneurysm through the Neuroform Atlas. The aneurysm was occluded with four coils without any periprocedural complications, and the patency of the PICA was preserved [Figure 1b]. Following treatment, dual-antiplatelet therapy (DAPT) with aspirin and clopidogrel was sustained. Follow-up digital subtraction angiography 6 months after treatment showed no evidence of recurrence, leading to the termination of clopidogrel [Figure 1c]. Subsequently, single-antiplatelet therapy with aspirin was maintained, and at the 12-month postoperative assessment through magnetic resonance imaging, the absence of aneurysm recurrence or PICA stenosis was confirmed, prompting discontinuation of aspirin as well.

DISCUSSION

The incidence of distal PICA aneurysms is much rarer than that of the proximal segment, constituting <30% of all PICA

aneurysms, accounting for 0.5–1.7% of all intracranial aneurysms.^[5,8] PICA is classified into five distinct segments. Aneurysms can manifest in any of these segments, with the highest incidence observed in the telovelotonsillar segment, constituting 37% of cases.^[8] Notably, distal PICA aneurysms commonly arise at the apical curvature. A primitive anastomosis of arteries marks the tortuous points, regressed during the embryonic developmental phase of PICA. The potential fragility of the vessel wall in this region is postulated as the etiological factor for aneurysm formation or dissection.^[3]

A previous study has indicated a lack of significant difference in outcomes between parent artery occlusion (PAO) and selective coil embolization for acutely ruptured aneurysms.^[2] However, no existing reports have undertaken a comparative analysis between PAO and selective coil embolization specifically for chronically ruptured or unruptured aneurysms. Given the recurrent nature of this case, the optimal therapeutic approach was deemed to be PAO. While it is rational to assess the feasibility of PAO through a preliminary balloon occlusion test, the challenge of accurately guiding the balloon catheter to the aneurysm impeded this evaluation. Consequently, PAO was deemed impractical. Flow diverter implantation for peripheral aneurysms is currently not permitted in our country. Therefore, it was concluded that utilizing a stent was imperative to mitigate the risk of recurrence while preserving the patency of the PICA. In the context of SAC, the challenges involved the straightening of the mother vessel through stenting and the inability to use the Jail technique for vessels of small caliber. However, these challenges were effectively addressed through the utilization of the Neuroform Atlas stent, distinguished

by its low-profile and open-cell design. A previous study examining the impact of parent vessel straightening in SAC for anterior communicating artery aneurysms revealed that among the Neuroform Atlas, LVIS Jr. (Micro Vention, USA), Enterprise 2 (Cerenovous, USA), and Neuroform EZ (Stryker, USA), the Neuroform Atlas demonstrated the least angular change and straightening following implantation.^[4] Furthermore, the Neuroform Atlas exhibits the largest cell areas among these stents,^[7] thus facilitating the Transcell technique. Prior literature has demonstrated the efficacy of the Neuroform Atlas for unruptured cerebral aneurysms with a parent artery diameter of <2 mm, and it proves beneficial for SAC in peripheral vessels^[9], as evidenced in this case. Conventionally, deployment of the Neuroform Atlas stent in anterior circulation, excluding the internal carotid artery and posterior circulation, DAPT is prescribed for a period of up to 3 months, followed by single-antiplatelet therapy lasting 3–6 months.^[6] However, a consensus regarding the optimal duration of antiplatelet therapy subsequent to the stenting of peripheral arteries remains elusive. In this case, the stent was deployed in the distal segment of the PICA, with a diameter of <2 mm. Consequently, a regimen comprising 6 months of DAPT, followed by 6 months of single-antiplatelet therapy, was opted.

While a total of three stent-coil cases for distal PICA aneurysms have been reported through two case series studies focusing on acute ruptured aneurysms, this is the first report detailing SAC of a chronic ruptured distal PICA aneurysm.

CONCLUSION

Stent-assisted coil embolization is a reasonable treatment for distal PICA aneurysms when attempting to preserve the PICA and more experiences are expected to be accumulated in the future.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

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

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Anil G, Sein L, Nga V, Teo K, Chou N, Yeo TT. Dissecting distal cerebellar artery aneurysms: Options beyond a parent vessel sacrifice. *Neurosurg Rev* 2020;43:771-80.
2. Chen X, Sun Z, Shi L, Xu L, Yu J, Fang B, *et al.* Endovascular management of ruptured distal posterior inferior cerebellar artery aneurysms A retrospective cohort study. *Medicine (United States)* 2018;97:e13300.
3. Fujiwara K, Ito J, Kanayama S. Multiple aneurysms of the PICA communicating artery : A case report. *No Shinkei Geka* 1999;27:177-82.
4. Funakoshi Y, Imamura H, Tani S, Adachi H, Fukumitsu R, Sunohara T, *et al.* Effect of straightening the parent vessels in stent-assisted coil embolization for anterior communicating artery aneurysms. *World Neurosurg* 2019;126:e410-6.
5. Horiuchi T, Tanaka Y, Hongo K, Nitta J, Kusano Y, Kobayashi S. Characteristics of distal posteroinferior cerebellar artery aneurysms. *Neurosurgery* 2003;53:589-95; discussion 595-6.
6. Hou K, Yu J. Application of the neuroform atlas stent in intracranial aneurysms: Current status. *Front Neurol* 2022;13:829143.
7. Iwakami T, Fujii N, Son J. Comparison of the physical characteristics of support stents for cerebral aneurysm embolization. *J Neuroendovasc Ther* 2021;15:778-86.
8. Lewis SB, Chang DJ, Peace DA, Lafrentz PJ, Day AL. Distal posterior inferior cerebellar artery aneurysms: Clinical features and management. *J Neurosurg* 2002;97:756-66.
9. Ozaki T, Fujinaka T, Kidani T, Nishimoto K, Yamazaki H, Sawada H, *et al.* Coil embolization of unruptured cerebral aneurysms using stents in small arteries less than 2 mm in diameter. *Neurosurgery* 2022;90:538-46.
10. Shin H, Lee S, Koh J. Endovascular treatment of ruptured distal posterior inferior cerebellar artery aneurysm. report of two exemplary cases and retrospective analysis of 11 cases. *J Neurol Surg A Cent Eur Neurosurg* 2014;75:343-9.

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