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Transarterial Balloon-Assisted Embolization of a Superior Cerebellar Artery Pial Arteriovenous Fistula: A Case Report and Review of Literature

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Abstract

Background: Intracranial pial arteriovenous fistulas (pial AVFs) are rare, high-flow vascular malformations. We report a case of a complex pial AVF arising from the right superior cerebellar artery treated successfully with balloon-assisted coil and dual-liquid embolization.

Observations: A 33-year-old female presented with progressive symptoms of venous hypertension involving the posterior fossa and cervicomedullary junction. Angiography showed a high-flow SCA-derived pial AVF with venous ectasia. She underwent transarterial embolization using coils, Menox-34, and NBCA under balloon control, achieving complete cure.

Lessons: Balloon-assisted dual-agent embolization offers a safe and effective treatment modality for complex high-flow pial AVFs.

Introduction

Intracranial pial arteriovenous fistulas (AVFs) are rare lesions consisting of a direct communication between a pial artery and a draining vein without an intervening nidus. They account for <5% of intracranial vascular malformations[1,2]. Posterior fossa pial AVFs, especially those arising from the superior cerebellar artery, are exceedingly uncommon and may present with venous hypertension, mass effect, or hemorrhage[3,4]. Endovascular therapy is now the preferred modality for cure when anatomy is favorable[5].

Illustrative Case

A 33-year-old female presented with occipital headache, left side facial pain – sudden sharp shooting mimicking trigeminal neuralgia, difficulty in chewing and articulation,

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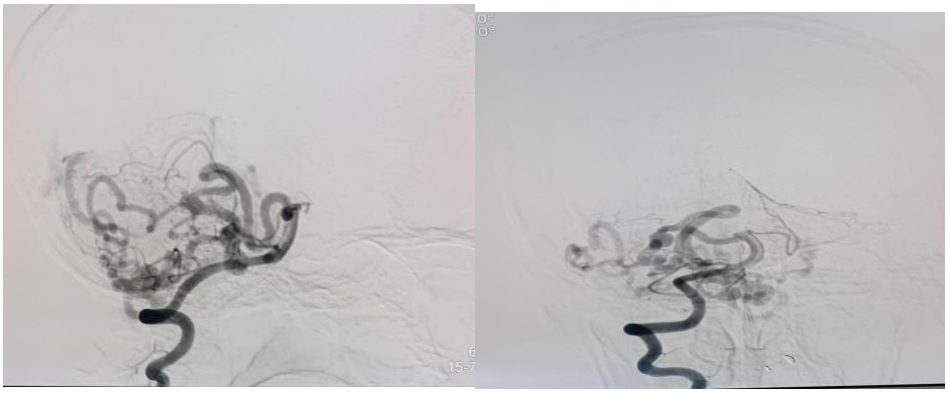
and neck pain. MRI revealed extensive venous engorgement involving the cerebellum, medulla, and upper cervical cord. DSA confirmed a high-flow single-hole pial AVF arising from the right superior cerebellar artery with multiple venous aneurysms and arterialized channels.

Pre-embolisation DSA images lateral(R), anterio-posterior(L)



Pre-embolization DSA images lateral(R), antero-posterior(L)

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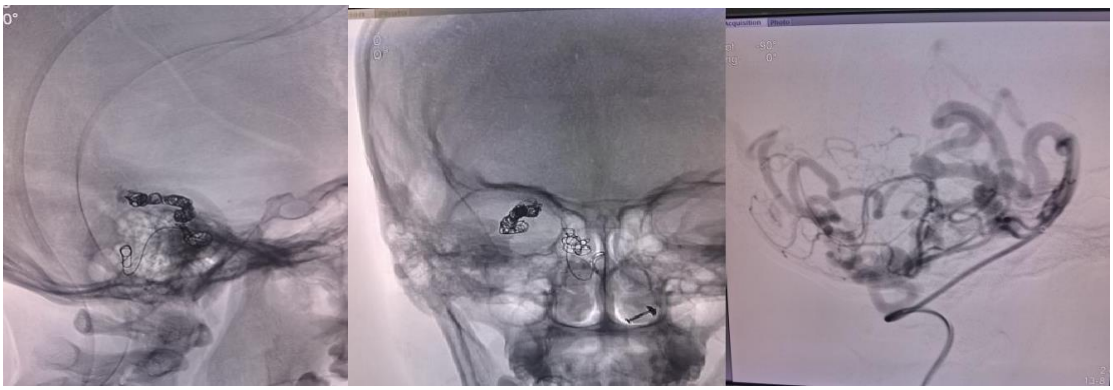
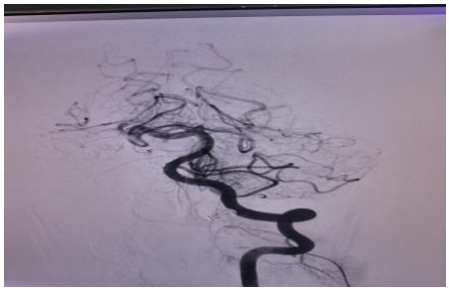
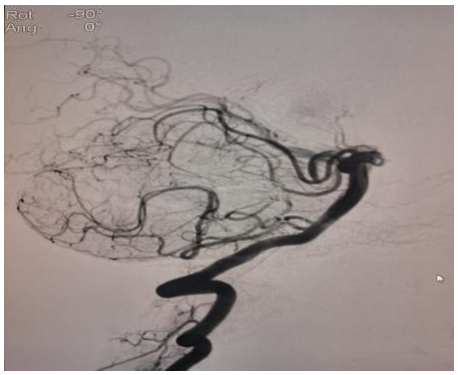


(A) Lateral view (B) Antero-posterior view (C) 3D lateral view

Intraoperative images of embolization



post embolization DSA image antero-posterior view



post embolization DSA image lateral view

Right femoral access was obtained. A balloon-assisted embolization strategy was used. The venous aneurysms and fistulous channel were packed with coils, followed by sequential embolization with Menox-34 and 50% NBCA-lipiodol mixture. Final angiographic runs showed complete obliteration of the fistula with preservation of normal SCA flow. The patient recovered uneventfully.

Discussion

Pial AVFs represent <5% of intracranial vascular malformations and carry a risk of venous hypertension and hemorrhage due to high-flow shunting[1,2]. Endovascular

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management focuses on complete disconnection of the fistulous point, which has become increasingly feasible with modern liquid embolics and balloon assistance[3]. Balloon-assisted delivery provides flow control, enabling safe deposition of NBCA or EVOH-based agents, reducing the risk of distal embolic migration[4,5]. The combined use of coils, EVOH (Menox), and NBCA—as in our case—has been shown to provide durable cure in complex high-flow lesions[4,5].

Conclusion

Balloon-assisted dual-agent embolization offers a safe and effective means of treating complex high-flow pial AVFs, consistent with prior reports[3–5]. Balloon-assisted dual-agent embolization represents a powerful technique for treating complex high-flow pial AVFs. This case demonstrates successful cure of an SCA-origin fistula with excellent clinical outcome.

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