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Transcranial approach for venous embolization of dural arteriove-nous fistula

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Keywords
dural arteriovenous fistulas (DAVF), transvenous embolization, interdisciplinary approach, venous transcranial approach

Abstract

Transvenous embolization emerges as a viable intervention for addressing intracranial dural arteriovenous fistulas (DAVF). Accessibility to the fistulous site via the internal jugular vein (IJV) may be impeded by associated dural sinus apoplexy or thrombosis, prompting the development of a transcranial approach for venous embolization in such scenarios. The presented case details the utilization of a transcranial approach for venous embolization of DAVF. This method allows unobstructed entry to DAVFs situated on superficial dural sinuses that lie beyond the reach of the IJVs. The efficacy of this approach parallels that of the conventional retrograde venous methodology. The precise location and appropriate extent of the craniectomy play pivotal roles in ensuring the success of this technique.

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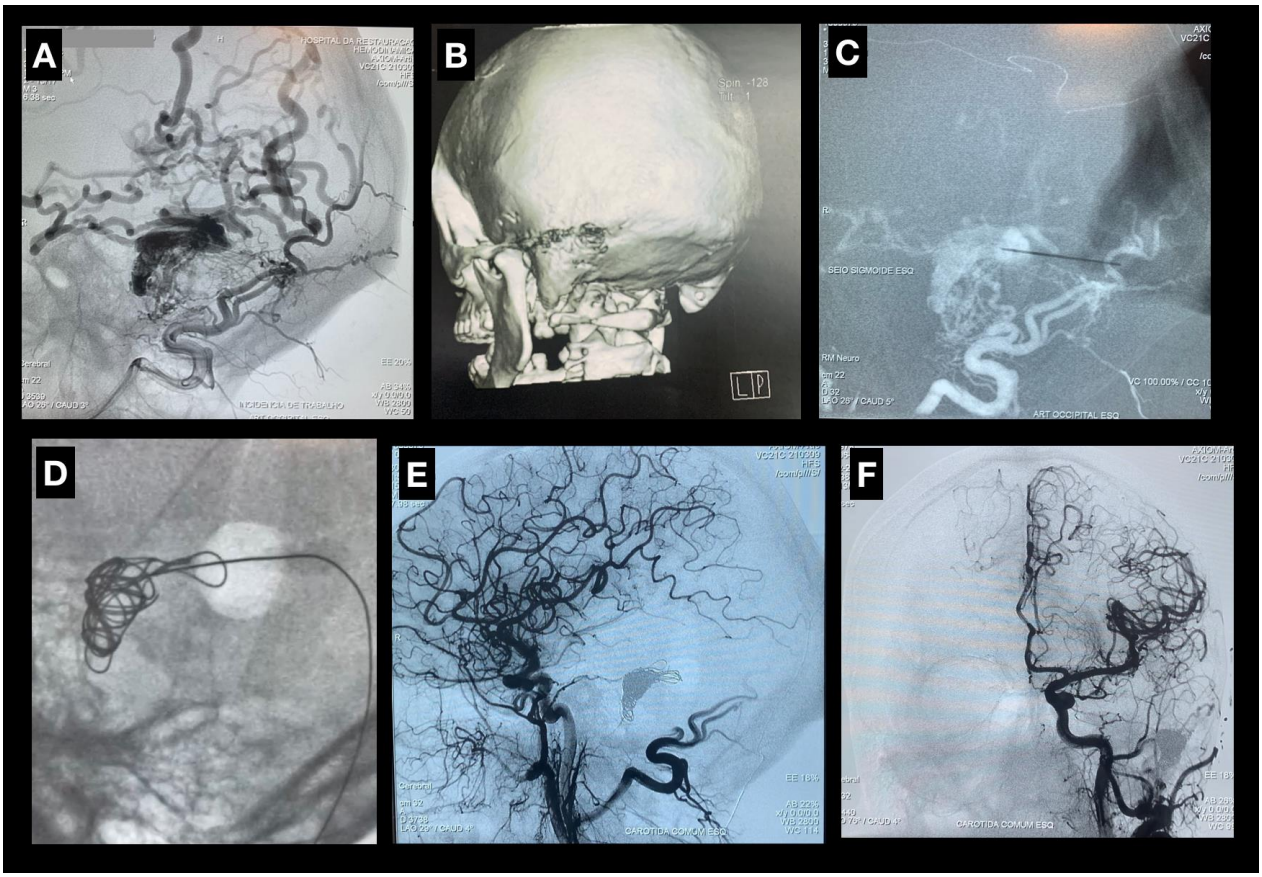
Introduction

Dural arteriovenous fistulas (DAVFs) denote aberrant communications within the dural layers, linking meningeal arteries with dural and/or venous sinuses and subarachnoid veins. They constitute 10 to 15% of all cerebral arteriovenous malformations. While numerous DAVFs remain asymptomatic and may not necessitate intervention, the presence of cortical venous reflux, intracranial hemorrhage, elevated intracranial pressure, and intolerable symptoms serve as primary indications for treatment.

A comprehensive understanding of the natural history of DAVFs is of paramount importance in guiding decision-making and managing

these lesions, including consideration of associated stenoses in the endovascular treatment access routes. With continuous advancements in endovascular technologies, the majority of DAVFs can be effectively addressed through transarterial or transvenous embolization. Cases resistant to complete endovascular resolution may require adjunctive surgery or radiotherapy.

Moreover, challenges may arise when dealing with compromised venous routes due to thrombosed sinus venosus, and arterial access may pose a certain level of difficulty. In such instances, alternative access routes present themselves as formidable challenges for minimally invasive procedures.



Objective

Report an unusual fistula embolization technique dural arteriovenous by venous transcranial approach.

Case report

A patient in their 40s presented with a history of worsening headache and dizziness. DSA disclosed DAVF involving the left transverse-sigmoid sinus transition, supplied by multiple feeders from the left external carotid branches (occipital, superficial temporal, middle meningeal and posterior auricular arteries). The transverse-sigmoid junction was cloistered by distal transverse and proximal sigmoid sinus occlusion, leading to a prominent retrograde drainage into infratentorial engorged veins (Figure 1A). With DSA pinpointing, a small guided craniectomy was performed (Figure 1B). After that, transcranial direct puncture of the transverse-sigmoid junction under high-quality road-mapping guidance was performed (Figure 1C). A 18 G Jelco was used as a sheath for a 2.6F microcatheter insertion, packing the sinus with seven detachable coils (Figure 1D). The final angiography showed complete obliteration of the lesion (Figure 1E and 1F). The patient woke up in postoperative and was completely asymptomatic after one week.

In this scenario, when a dural arteriovenous fistula (DAVF) involves a sinus proximal to the skin, a viable and efficacious solution entails accessing the

sinus through a direct puncture facilitated by a carefully planned craniectomy. Houdart et al. have documented their experience employing a curative transcranial approach for venous embolization of DAVFs in ten patients, nine of whom had previously undergone unsuccessful interventions, with coils being the predominantly utilized embolic agent. Our preference is to conduct the embolization procedure in the neuroangiographic suite, leveraging superior angiographic equipment and a more extensive array of endovascular tools, thereby instilling greater confidence in the intervention.

Conclusions

The endovascular approach stands as the gold standard for treating dural arteriovenous fistulas (DAVFs). It is crucial to underscore that the transcranial venous access represents an unconventional method for embolizing dural fistulas. Nevertheless, it should be regarded as a noteworthy alternative, particularly in cases involving dural fistulas with entrapped sinuses. The precise localization and optimal extent of the craniectomy are indispensable factors for the successful execution of this technique.

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