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TECHNICAL NOTE

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Matas test revisited: carotid compression for embolization of high-flow pediatric pial arteriovenous fistulas

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OBJECTIVE Cerebral pial arteriovenous fistula (AVF) is a rare vascular malformation and may cause hemorrhage and neurological deficit. The presence of high-flow shunts constitutes a challenge when performing the endovascular technique, due to risk of distal embolization. The authors report a simple maneuver, adapted from the Matas test, that was successfully applied to treat a child with two pial AVFs.

METHODS An 8-year-old boy presented with headache and vomiting due to two single-channel high-flow intracerebral pial AVFs. He was treated with an endovascular approach using brief, gentle compression of the ipsilateral cervical carotid artery. The temporary flow arrest ensured proper placement of the first coil, allowing definitive obliteration of the shunt.

RESULTS There were no complications with the procedure, and the patient recovered uneventfully. Throughout the 9-month follow-up, the patient experienced a stable neurological condition, with both fistulas occluded and improvement of local circulation.

CONCLUSIONS This easy-to-perform maneuver allows precise positioning of embolic material into high-flow shunts to facilitate treatment of pial AVF.

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KEYWORDS arteriovenous fistula; cerebrovascular disorders; child; endovascular procedures; intracranial arteriovenous malformations; therapeutic embolization; surgical technique; vascular disorders

Intracranial pial arteriovenous fistulas (AVFs) are direct communications between artery and vein, without interposition of a capillary bed, usually presenting as large venous varices.[1] They differ from arteriovenous malformations by the absence of a nidus, and from dural AVFs in that they do not lie within the dural leaflets.[1] Treatment is usually required due to the high risk of neurological deficits and hemorrhage, leading to a mortality rate of 63%.[2] When endovascular embolization is indicated, the combination of high flow with large efferent venous diameter may cause migration of the first coil into the venous portion, preventing AVF occlusion and resulting in embolic complications or massive hemorrhage.[3] In addition, adverse outcomes of endovascular treatment of pial AVF can reach up to 43%;[4] thus, several strategies have been described to improve the results. We report a simple adjuvant maneuver to temporarily arrest the flow and facilitate precise coil positioning.

Methods

An 8-year-old boy was admitted to the hospital with a record of progressive chronic headache and acute onset of vomiting and drowsiness, a Glasgow Coma Scale score of 14, recovering consciousness after hydration. CT and MRI showed ventricular dilatation and a flow void in sylvian and interhemispheric fissures. MR angiography evidenced bilateral ectatic vessels and dilatation of the vein of Galen (Fig. 1). A digital subtraction angiography study was performed under general anesthesia, and showed two direct high-flow AVFs, with afferent vessels from the right middle cerebral artery (MCA) and left anterior cerebral artery (ACA). The former fistula was promptly treated via an endovascular approach; embolization was performed through a microcatheter (Vasco 10; Balt) that was placed into a 5-Fr guiding catheter (Guider Softip; Boston Scientific Corp.) to insert detachable platinum coils (Barricade;

ABBREVIATIONS ACA = anterior cerebral artery; AVF = arteriovenous fistula; EVOH = ethylene vinyl alcohol copolymer; MCA = middle cerebral artery.
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