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Case Report

Tentorial dural arteriovenous fistula of the medial tentorial artery

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ABSTRACT

The medial tentorial artery arises from the meningohypophyseal trunk, a branch of the cavernous internal carotid artery, and it is poorly visualized on angiography in the absence of pathologically increased blood flow. We present the case of a 38-year-old man with intraventricular hemorrhage from a tentorial dural arteriovenous fistula (DAVF) singularly supplied by a robust medial tentorial artery. Tentorial DAVFs comprise a rare but high-risk subset of DAVFs. The diagnosis was suggested by computed tomography and magnetic resonance imaging findings and confirmed with digital subtraction angiography.

Introduction

The angiographic appearance of the medial tentorial artery (MTA), also called the marginal tentorial artery, was first described by Bernasconi and Cassinari [1] in the setting of tentorial meningiomas. The MTA is a branch of the meningohypophyseal trunk (MHT), which in turn arises from the cavernous segment of the internal carotid artery. The MTA runs along the tentorium and may supply tumors and vascular lesions in the vicinity [2]. We present a case of intraventricular hemorrhage caused by a tentorial dural arteriovenous fistula (DAVF) supplied by the MTA.

Case report

A 38-year-old man with an unremarkable medical history presented with acute onset of headache, nausea, and vomiting. On physical examination, the patient was alert and oriented and without focal motor weaknesses or sensory deficits. Initial head computed tomography revealed panventricular hemorrhage (Fig. 1). Subsequent brain magnetic resonance imaging showed left cerebellopontine angle, peripontine, and perimedullary flow voids (Fig. 2). There was no abnormal intraparenchymal signal in the brainstem.

The patient was admitted to the neurosurgical service and started on levetiracetam (Keppra, Smyrna, GA, USA), and a cerebral angiogram was performed on the day of admission. Arterial access was established with a right common femoral artery 5F sheath, and the carotid and vertebral systems were selectively catheterized using a Terumo 0.035-angled Glidewire and 5F-angled taper Glidecath combination.

Early arterial phase digital subtraction angiography (DSA) images of the left internal carotid artery (ICA) showed a dilated MTA supplying an arteriovenous fistula (Fig. 3). In the venous phase, DSA images showed drainage through

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Fig. 1 – Axial noncontrast head computed tomography shows intraventricular hemorrhage within the lateral ventricles. Hemorrhage is also present in the third and fourth ventricles (not shown).

engorged left cerebellopontine angle varices and peripontine and perimedullary venous plexi (Fig. 4) which corresponded to flow voids demonstrated on magnetic resonance imaging (Fig. 2). The patient's intraventricular hemorrhage was attributed to a tentorial DAVF supplied by the left MTA. Selective catheterization of the left external carotid and vertebral arteries revealed no contribution to the DAVF. Similarly,

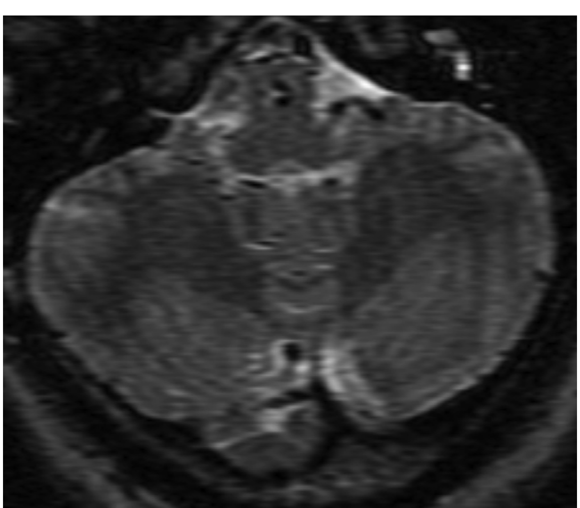

Fig. 2 – Axial T2-weighted brain magnetic resonance imaging shows multiple perimedullary and left cerebellopontine angle serpiginous flow voids.

Fig. 3 – Early arterial phase DSA of the left ICA demonstrates a DAVF supplied by a dilated MTA.

DSA images of the right carotid and vertebral systems were normal.

During the hospital course, the patient's headache and nausea resolved, and he never developed neurologic deficits. Endovascular embolization was planned following discussion with the neurosurgery service; however, the patient left

Fig. 4 – Venous phase DSA of the left ICA demonstrates a DAVF drained by left cerebellopontine angle varices and peripontine and perimedullary venous plexi.

against medical advice before intervention. He was counseled regarding the risks of recurrent intracranial hemorrhage, neurologic deterioration, and death, and he was advised to return if symptoms returned.

Discussion

Arising from the proximal cavernous ICA, the MHT prototypically trifurcates into the MTA, inferior hypophyseal artery, and dorsal meningeal artery. The MTA constitutes the terminal branch of the MHT and travels along the tentorium just lateral to the tentorial incisure. In approximately 3% of cadaveric specimens, the MTA arises directly from the cavernous ICA. On conventional angiography, the MTA is poorly visualized in the absence of pathology. Under circumstances of increased blood flow, the vessel becomes more prominent, and pathology should be suspected if the MTA reaches a distance longer than 40 mm [2,3]. Since it was first described in the setting of tentorial meningiomas, the MTA has been implicated in other pathologies including DAVF, moyamoya disease, cerebellar hemangioblastomas, gliomas, and trigeminal and acoustic neuromas [4]. In our patient, the MTA singularly supplied a tentorial DAVF.

While most intracranial DAVFs are idiopathic, they are theorized to be acquired lesions either due to the opening of physiologic arteriovenous connections within the dura or the sequelae of arterial dilatation with subsequent loss of autoregulation [5]. Among intracranial DAVFs, tentorial DAVFs constitute less than 4% [6]. Common presentations include intracranial hemorrhage, urinary incontinence, paresis, and sensory loss affecting the extremities [7,8]. Compared with DAVFs in other locations, tentorial DAVFs are more prone to hemorrhage due to venous hypertension caused by retrograde leptomeningeal venous drainage [9]. Neurologic deficits may also result from brainstem and cervical spine edema caused by perimesencephalic, pontine, and spinal venous drainage [4,8]. In addition to branches of the MHT, other common arterial feeders of tentorial DAVFs include the middle meningeal and occipital arteries arising from the external carotid artery and the posterior meningeal artery arising from the vertebral artery [6]. In our patient, selective catheterization of the external carotid and vertebral arteries revealed no contributing branches.

The objective of endovascular and surgical intervention for tentorial DAVFs is cessation of flow in the draining veins [4,8,9]. Over the last decade, endovascular therapy has proven effective in achieving complete occlusion in the majority of lesions such that surgery is necessary in a minority of cases [5]. Embolization may be performed as single or staged treatments [6]. Microcatheter selection of the MTA permits the delivery of glue, particles, and coils. Successful embolization may be facilitated by temporarily deploying a balloon within the ICA just distal to the MHT to prevent reflux of embolic material into the ICA and to stabilize the microcatheter [7]. If occlusion of the draining veins is not achieved using a transarterial approach, a transvenous approach may be attempted [6]. Surgical ligation is indicated for DAVFs which have failed endovascular therapy or are unlikely to be amenable to an endovascular approach [5].

Conclusions

Lesions arising from the tentorium cerebelli or in the vicinity may derive arterial blood supply from the MTA. Tentorial DAVFs represent one such pathology and are prone to hemorrhagic complications. Knowledge of the anatomy and angiographic appearance of the MTA facilitates diagnosis as well as endovascular and surgical planning.

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