Angiography and selective microcatheter embolization of a falcine meningioma supplied by the artery of Davidoff and Schechter

Case report

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Angiographic demonstration of the meningeal branch of the posterior cerebral artery, or the artery of Davidoff and Schechter, is extremely rare. The authors describe a case of successful selective catheterization and embolization of a pathologically enlarged artery of Davidoff and Schechter, permitting successful preoperative devascularization of a large falcine meningioma. (DOI: 10.3171/2010.4.JNS10218)

Key Words • meningioma • catheter angiogram • embolization • artery of Davidoff and Schechter

The meningeal branch of the PCA, known as the artery of Davidoff and Schechter, is an inconsistent finding in cadaveric prosections and is not normally demonstrated on catheter angiograms. It participates in the arterial supply to the falx cerebri and tentorial dura and can become too enlarged to be angiographically visible when involved in the supply of vascular malformations or tumors arising in that region. To our knowledge, this is the first reported case of successful superselective catheterization and embolization of a pathologically enlarged artery of Davidoff and Schechter, permitting successful preoperative devascularization of a large parasagittal meningioma.

Case Report

History and Examination. This 57-year-old man was admitted with a progressive 2-year history of gait disturbance with dragging of his left foot and worsening short-term memory problems over the preceding 6 months. Two weeks prior to admission, his vision rapidly deteriorated. On admission, papilledema and pyramidal weakness in the left lower limb were evident on physical examination. Magnetic resonance imaging of the brain demonstrated a large, avidly enhancing, extraaxial parasagittal mass that extended inferiorly along the falx toward the falcotentorial junction (Fig. 1). Preoperative catheter angiography confirmed a large hypervascular tumor with evidence of superior sagittal sinus obstruction. Numerous dural feeding arteries were visualized, with a major supply arising from a hypertrophied meningeal branch of the ambient segment of the left PCA (Figs. 2 and 3). A relatively small pial supply from the terminal branches of both the left and right middle cerebral and anterior cerebral arteries was also apparent.

Treatment. Distal selective catheterization of the enlarged meningeal branch of the PCA was achieved using

Abbreviation used in this paper: PCA = posterior cerebral artery.
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Fig. 1. Axial (left) and coronal (right) Gd-enhanced T1-weighted MR images demonstrating the parafalcine meningioma involving the superior sagittal dural venous sinus.

Fig. 2. Left vertebral artery catheter angiograms, Towne’s (A) and lateral (B) arterial phase projections, demonstrating an additional artery—the artery of Davidoff and Schechter—arising from the proximal left PCA in the left ambient cistern, ascending vertically along the falx on reaching the midline (white arrows). Lateral projection in a late parenchymal phase (C) revealing a sizeable “tumoral blush” in a large, inferior component of the lesion.

a microcatheter, and embolization with Glubran (Aspide Medical) was performed (Fig. 4). Subsequent angiography demonstrated an excellent outcome, with no residual perfusion of the tumor via the treated vessel (Fig. 5). Further dural arterial branches arising from the left and right middle meningeal, right occipital, and right superficial temporal arteries were also embolized to further devascularize the tumor. The patient awoke from the procedure without neurological deficit.

An uncomplicated resection was subsequently performed without significant intraoperative blood loss.

Posttreatment Course. Histological analysis confirmed a meningioma (WHO Grade I), and the patient remained well at 18 months after the procedure, with no evidence of residual or recurrent tumor on follow-up imaging.

Discussion

Preoperative embolization of intracranial meningiomas may facilitate surgical removal by reducing tumor vascularity and intraoperative blood loss. Complications are rare provided that a meticulous technique is utilized, and the procedure has proved particularly useful for large tumors with a pure or predominant external carotid artery supply. The middle meningeal artery usually supplies parasagittal meningiomas, and a bilateral supply is common. The very large tumor in the case described also extended inferiorly toward the free margin of the falx and the falcotentorial junction. Meningiomas in these locations are often supplied by multiple arteries, and a comprehensive angiographic study is essential to delineate the potentially complex arterial supply. Knowledge of the vascular anatomy is important for planning effective endovascular treatment.

Part of the normal supply to the falx cerebri arises from the distal branches of the PCA, either choroidal or cortical. Visualization of these vessels on catheter angiography has no pathological significance and is dependent on the hemodynamic balance between the anterior cerebral artery (via pericallosal branches), anterior ethmoidal artery, and middle meningeal artery supply to the falx. However, the extremely small meningeal branch of the PCA—also known as the artery of Davidoff and Schechter—is only evident on angiography when it’s pathologically enlarged. It was first described in a study of cadaveric specimens by Wollschlaeger and Wollschlaeger, who named it in honor of their mentors. Arising from the peduncular or ambient portion of the PCA (usually on the left), it courses around the midbrain inferior to the tentorium, parallel and medial to the PCA. At the midline it makes a sharp angulated turn superiorly to pierce and supply the medial part of the tentorium and the posterior portion of the falx cerebri. Two divisions of the artery have been described: an anterior branch piercing the tentorium and extending along the falx cerebri in an anterior and superior direction, and a posterior division extending superiorly, forming an approximately 45° angle with the anterior division. In addition to its principle dural branches, the artery may also provide some collateral supply to the superior vermis and inferior colliculi.

The meningeal artery of the PCA is not always iden-
A very small number of reports identify the meningeal branch of the PCA on angiography in the context of vascular tumors and vascular malformations involving the falcotentorial junction. Even with an increased caliber, the meningeal branch can be difficult to see due to superimposition with other PCA branches. Indeed, in the early cases described by Weinstein et al., the origin and proximal segment of the artery were not visualized with certainty for this reason.

The case outlined here elegantly demonstrates anato-

![Fig. 3. Lateral superselective microcatheter angiogram (left) and 3D rotational microcatheter angiogram (right) demonstrating the characteristic course of the meningeal branch of the PCA and abnormal tumor vasculature.](image)

![Fig. 4. Lateral digital subtraction image of embolic agent within the distal meningeal branch of the left PCA and tumor vessels.](image)

![Fig. 5. Postprocedure left vertebral artery catheter angiogram, lateral arterial (left) and lateral parenchymal phase (right) projections, showing occlusion of the meningeal branch of the PCA. The “tumoral blush” is no longer visible.](image)
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my that is very rarely seen on catheter angiography. To our knowledge, there have been no reported cases of selective microcatheter embolization of this artery for the purposes of treating an associated hypervascular lesion such as the parafalcine meningioma described here.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author contributions to the study and manuscript preparation include the following. Conception and design: Davagnanam, Brew. Acquisition of data: Hart, Chandrashekar. Analysis and interpretation of data: Brew. Drafting the article: Hart, Chandrashekar, Brew. Critically revising the article: Davagnanam, Hart. Reviewed final version of the manuscript and approved it for submission: all authors.

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