



Image Report

Convexity meningioma associated with noncontiguous dural arteriovenous fistula

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ABSTRACT

Background: Concomitant dural arteriovenous fistulas (DAVFs) and meningiomas have been rarely described. DAVFs can be either continuous or at a distant location from the meningioma, with different pathophysiologic mechanisms involved in each situation.

Case Description: We report the case of a 74-year-old woman presenting with left-sided hemiparesis secondary to a large right convexity meningioma, associated with a noncontiguous Borden 3 DAVF. Both lesions were treated surgically in the same setting. The patient improved after surgery, and postoperative imaging showed complete resection of the meningioma and absence of recurrence of the fistula at 4 years.

Conclusion: To the best of our knowledge, this is the first case of concomitant surgical treatment of a meningioma and noncontiguous DAVF.

Keywords: Dural arteriovenous fistula, DAVF, Meningioma, Vascular malformations

A 74-year-old woman presented with a 3 weeks history of tiredness associated with MRC grade 3/5 left-sided hemiparesis. Her medical history included ovarian and breast cancer 10 years before.

Magnetic resonance imaging (MRI) of the brain demonstrated a rather large extra-axial tumor causing mass effect and midline shift, with radiological characteristics suggestive of meningioma [Figure 1a and b]. The MRI did also demonstrate the presence of prominent and serpiginous vessels over the right frontal polar convexity not directly related to the meningioma and extending down to the cribriform fossa [Figure 1c and d]. A subsequent digital subtraction angiography (DSA) confirmed the presence of an anterior cranial fossa dural arteriovenous fistula (DAVF) [Figure 1d-g]. The DAVF was a Borden type 3 fistula located in the right anterior cranial fossa and supplied by right ethmoidal arteries from bilateral ophthalmic arteries, right distal internal maxillary artery, and hypertrophied right anterior meningeal artery. The DAVF drained through cortical veins into the super sagittal sinus and through superficial temporal veins into the vein of Trolard.

A right frontal craniotomy was carried out, and the dural based tumor excised; the tumor was fed by meningeal branches which were cauterized, and this significantly reduced the blood supply to the meningioma. Intracapsular debulking was then carried out with ultrasonic

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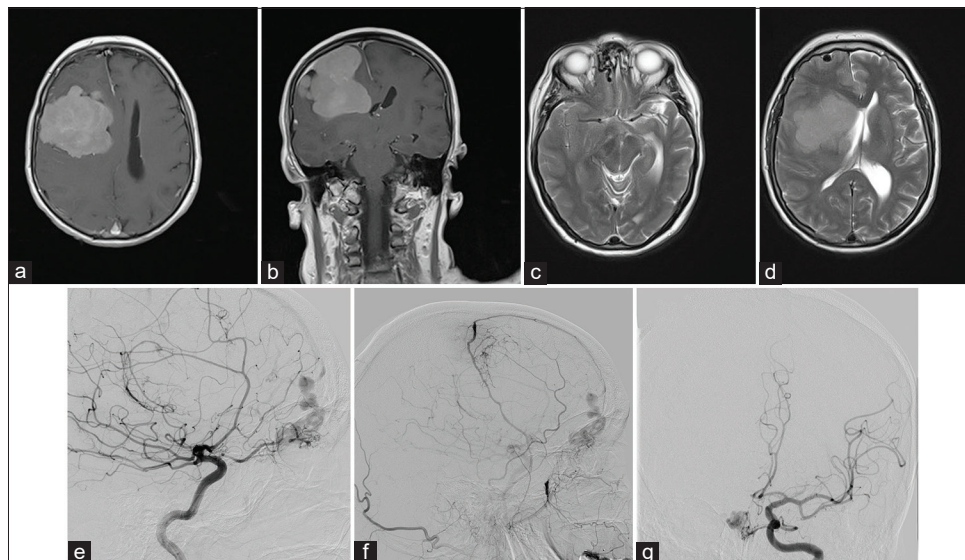


Figure 1: A 74-year-old patient presented with left-sided weakness. Postcontrast T1-weighted magnetic resonance images (a and b) showed a large right convexity meningioma. Signal voids were also noted in the right anterior cranial fossa, without direct continuity with the meningioma (c and d). DSA showed a right anterior cranial fossa dural arteriovenous fistula (DAVF) (e-g) supplied by right ethmoidal arteries from bilateral ophthalmic arteries, right distal internal maxillary artery, and hypertrophied right anterior meningeal artery. The DAVF drained into the super sagittal sinus and vein of Trolard.

aspirator without significant blood loss. The tumor was then gently dissected from the surrounding brain following the arachnoid plane and resected en bloc. Following the removal of the meningioma, due to the natural brain relaxation, a subfrontal approach was possible without any additional brain retraction [Figure 2a]. The arterialized and ecstatic vein appeared to correspond to the DAVF as judged on angiography. The vein and its feeders were coagulated and transected, achieving complete obliteration of the fistula [Figure 2b].

The histology of the dural-based tumor was confirmed to be consistent with a WHO Grade I meningothelial meningioma.

After surgery, the patient gradually improved, and at 12 months, the patient was neurologically intact and back to her daily activities.

Postoperative MRI confirmed complete excision of the meningioma, and a DSA obtained showed complete obliteration of the fistula [Figure 3].

On clinical and radiological follow-up at 4 years, the patient had not experienced any recurrences.

To the best of our knowledge, this is the first case of concomitant excision of a meningioma and obliteration of an associated noncontiguous DAVF.

Concomitant DAVFs and meningiomas have been previously described, and indeed, DAVFs can be either continuous or at a distant location from the meningioma,

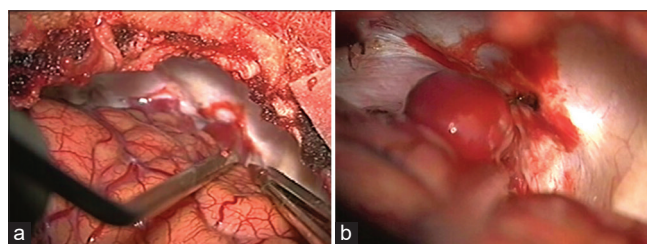


Figure 2: Intraoperative images showing a prefrontal approach to the DAVF (a) and an ecstatic draining vein related to the dural arteriovenous fistula (b).

with different pathophysiologic mechanisms involved in each situation.^[1-3]

In cases where DAVFs and meningiomas are contiguous or nearby, if the fistula drains into a dural sinus occluded by the meningioma, the fistula may form as a consequence of venous hypertension. Instead, if meningiomas and DAVFs are noncontiguous, venous hypertension may occur as a result of occlusion of dural venous structures secondary to the edema of global cerebral venous hypertension due to meningioma hypervascularity or be secondary to meningioma-induced hypercoagulable state causing dural venous thrombosis.^[3]

In our case, we postulate that both the edema and the hypervascularity of the meningioma have perhaps played a role in the formation of the DAVF.

The copresence of meningioma and DAVF poses some treatment challenges. In principle, the symptomatic

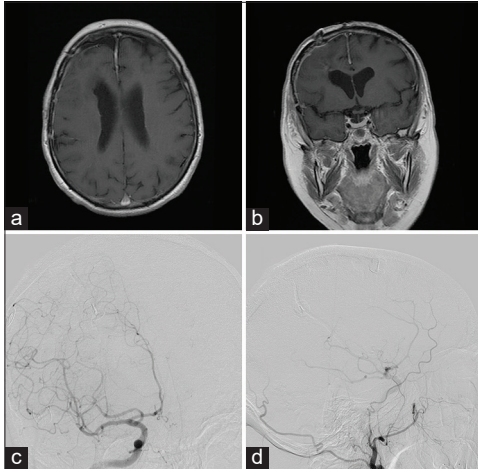


Figure 3: Postoperatively, the patient improved neurologically. Postcontrast magnetic resonance imaging showed complete resection of the meningioma (a and b) and DSA complete obliteration of the dural arteriovenous fistula (c and d).

lesion should be treated first.^[3] If the DAVF interferes with the surgical approach for meningioma resection, the DAVF should be treated first. Simultaneous treatment of meningioma and DAVF can be considered if the DAVF can be safely approached, like in our case. On the other hand, if the DAVF is distant from the tumor, the treatment of the DAVF should be carried out independently.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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