Ethmoidal dural arteriovenous fistula

Ethmoidal dural arteriovenous fistulas (AVFs) are rare intracranial lesions.\(^1\)\(^2\).

Dural AVFs occur in the anterior ethmoidal region with an incidence of about 5%\(^3\)\(^4\)\(^5\).

Frequently they receive arterial blood supply from ethmoidal branches of the ophthalmic artery. The anterior ethmoidal artery usually passes through the orbitocranial canal and flows into the dura mater of the anterior cranial fossa. This canal also contains some veins connecting to the dural venous plexus and ophthalmic veins.\(^6\)

As there is no dural sinus in the anterior cranial fossa, these types of fistulas often drain directly into the frontal cortical veins. However, on extremely rare occasions, venous drainage is directly into the ophthalmic vein.\(^7\)

**Diagnosis**

Angiography of the ethmoidal dural AVF typically shows that the fistula is supplied by the anterior ethmoidal arteries or falcine branches of the ophthalmic artery. As there is no dural sinus around the anterior cranial fossa, venous drainage generally flows directly through the intracranial cortical veins, which ultimately drains into the superior sagittal sinus, inferior sagittal sinus or cavernous sinus.\(^8\)

Contrast-enhanced CT with 3D construction is very useful.\(^9\)

**Outcome**

Dural arteriovenous malformations in the anterior cranial fossa are rare and are especially prone to haemorrhage.\(^10\)

Reported hemorrhage rates have ranged from 62 to 91%, and an aggressive clinical course is more likely than a benign clinical course.

Ethmoidal dural arteriovenous fistulas (DAVFs) have a near-universal association with cortical venous drainage and a malignant clinical course.

**Treatment**

Endovascular treatment options are often limited due to the high frequency of ophthalmic artery ethmoidal supply.

A 64-year-old gentleman presented with syncope and was found to have a right ethmoidal DAVF. Rather than the traditional bicoronal craniotomy, an endoscope-assisted mini-pterional approach for clip ligation is demonstrated. The mini-pterional craniotomy allows a minimally invasive approach to ethmoidal DAVF via a lateral trajectory. The endoscope can help achieve full visualization in the narrow corridor. The video can be found here: [https://youtu.be/ZroXp-T35DI](https://youtu.be/ZroXp-T35DI)\(^11\)
Deshmukh et al., describe the first case of a patient with bilateral ethmoidal dural AVFs.

A 50-year-old man presented with posterior fossa subarachnoid hemorrhage and cerebellar intraparenchymal hemorrhage. Angiography revealed a tentorial AVF and a complex anterior ethmoidal dural AVF.

The tentorial AVF was treated with preoperative embolization and surgical obliteration. On follow-up angiography, the ethmoidal dural AVF was not considered amenable to embolization. A right modified orbitozygomatic approach was performed and the right-sided fistula was interrupted. Intraoperative angiography revealed obliteration of the right-sided fistula, but a persistent fistula on the left. Further surgical exploration revealed this contralateral anterior ethmoidal dural AVF, which was clip ligated. No residual fistula was noted on intraoperative angiography.

Anterior ethmoidal dural AVFs may occur bilaterally. Given their complex angiographic appearance, their presence bilaterally may not be readily apparent on preoperative angiography. Intraoperative angiography is crucial to identify a contralateral fistula and to verify that ligation has been curative

10) Wicks RT, Zhao X, Hardesty DA, Liebelt BD, Nakaji P. Mini-pterional approach for clip ligation of