



## **Neurovascular Service: Dural Arteriovenous Fistula**

Dural arteriovenous fistulas (DAVF) are abnormal connections of the arteries to veins in the covering tissues around the brain. Normally, the high-pressure arteries branch into smaller vessels until the capillaries supply the tissues with oxygen and nutrients. Blood then flows into veins, which are of low pressure and high capacitance. When there is a short circuit of this system, the high flow arteries overwhelm the veins inside the head or spine. Patients may present with symptoms such as headache, pulsatile tinnitus, cranial nerve deficit, seizure, intracranial bleeding, hydrocephalus, neurologic decline or stroke-like symptoms.

Detection of DAVF is often accomplished by MRI/MRA. Cognard and Borden have categorized these lesions according to angiographic anatomy and physiology. Different subtypes have a graduated risk profile and those with retrograde flow into the cortical veins are at significant risk for intracranial bleeding. Treatment for these patients is recommended and this can often be accomplished by endovascular means.

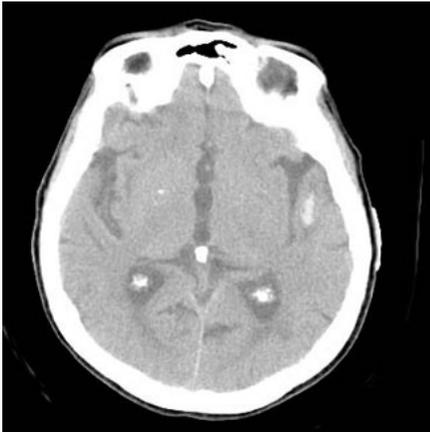
Embolization of a DAVF is performed under general anesthesia. A sheath is placed in the femoral artery in the groin, and a catheter is passed through this into the aorta and eventually into the carotid and vertebral arteries supplying the head and neck. Angiography is performed with contrast and x-rays to obtain a map of the arteries and veins. The abnormal connection of the arteries and veins are identified. A microcatheter is positioned in the fistula site. Materials may be used to block these connections such as coils, PVA particles, gelfoam, or liquid agents such as N-BCA or ONYX (ethylene vinyl alcohol). A final angiogram is done to identify the changes after treatment. Some of these lesions need to be treated by blocking off the venous side of the A-V fistula. This is accomplished using a catheter system through the venous system also accessed in the groin. Patients treated electively may spend 1-2 days in the hospital while patients who have had intracranial hemorrhage as a presenting symptom may spend a week in the hospital. Some patients with complicated lesions may require multiple stages of treatment. A small number of patients may require additional therapy to disconnect the abnormal A-V fistula including surgery or radiosurgery. Patients are followed in clinic and angiography or MRI/MRA to insure that these lesions remain closed.

**Interventional Neuroradiology Program, Neurovascular Service**

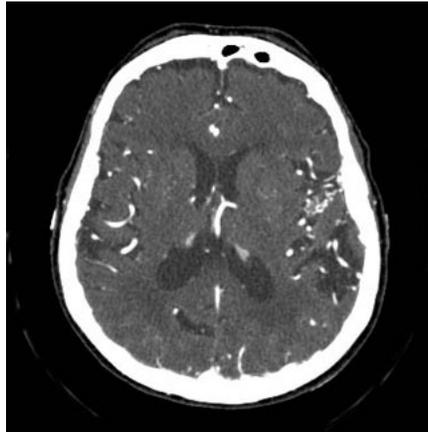
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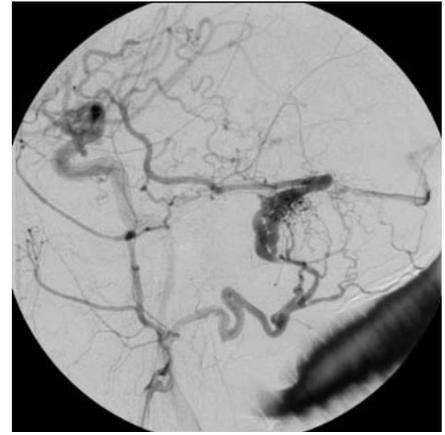
**Email:** [info@mgh-interventional-neurorad.org](mailto:info@mgh-interventional-neurorad.org)



Initial CT scan shows a left temporal lobe hemorrhage.



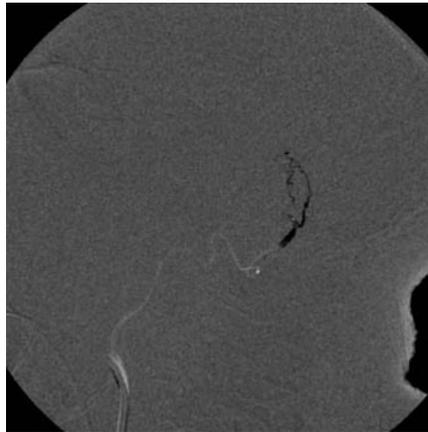
Contrast enhanced CT shows abnormal tangle of vessels in the left Sylvian fissure.



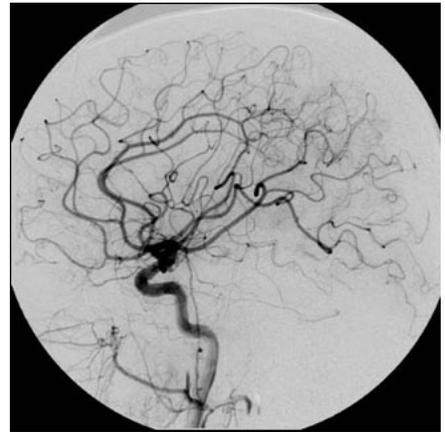
Lateral view of the left common carotid angiogram shows a dural arteriovenous fistula largely supplied from the left occipital artery with retrograde flow into the vein of Labbe.



The microcatheter angiogram further defines the feeding branches of the left occipital artery.



Cast from deposition of liquid embolization material is shown.



Final left carotid angiogram following embolization of the left occipital and middle meningeal arteries shows near complete closure of the AV fistulae. There is a tentorial branch supplying the lesion from the left internal carotid artery.

*The Neurovascular Service at Massachusetts General Hospital provides a multidisciplinary approach to patient care that combines neurosurgery, neurology and interventional neuroradiology. Based in the Department of Radiology, the Neurovascular Service's Interventional Neuroradiology Program uses minimally invasive procedures to treat a range of neurovascular disease and spinal disorders. For more information, visit [www.mgh-interventional-neurorad.org](http://www.mgh-interventional-neurorad.org)*

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