Iatrogenic dural arteriovenous fistula after surgical resection of a ruptured brain arteriovenous malformation

Sir,
Iatrogenic dural arteriovenous fistulas (DAVFs) have been reported after cranial surgery, including burr holes and craniotomies, although in very limited number of cases.[1] Intracranial hemorrhage is the most common presentation of brain arteriovenous malformations (AVMs), and microsurgical resection is one of the mainstays of therapy for these uncommon and challenging cerebrovascular lesions.[2] However, an iatrogenic DAVF after AVM resection has not been previously described. We report
a unique case of a patient who developed an iatrogenic DAVF several months following craniotomy for resection of an acutely ruptured AVM.

A 26-year-old male presented with headache and left-sided weakness. Brain computed tomography (CT) showed a large right frontal intracerebral hemorrhage (ICH) with intraventricular extension [Figure 1a]. CT angiography (CTA) showed an ill-defined AVM nidus supplied by a medial frontal branch of the anterior cerebral artery, with superficial venous drainage into the superior sagittal sinus and deep venous drainage into the thalamostriate vein, which was consistent with a ruptured Spetzler-Martin Grade II AVM. We emergently performed a craniotomy for ICH evacuation, AVM resection, and external ventricular drain placement. Postoperative cerebral angiography showed no evidence of residual arteriovenous shunting [Figure 1b and c]. The patient had an uncomplicated hospital course and made a complete postoperative neurological recovery.

The patient subsequently presented 5 months after AVM resection with a new-onset seizure. Brain CTA showed mildly prominent frontal lobe vessels. Further characterization with cerebral angiography, performed 9 months after AVM resection, showed a Borden Type III DAVF supplied by a frontal branch of the middle meningeal artery, with venous drainage directly into a medial frontal cortical vein through a diffuse network of vessels underneath the prior craniotomy [Figure 2a and b]. The DAVF was embolized from a transarterial approach using precipitating hydrophobic injectable liquid. The patient had a seizure after the embolization procedure, without any accompanying radiologic evidence of complications. At 3 months clinical follow-up, the patient’s seizures were controlled with anticonvulsant therapy, and he had returned to work (modified Rankin scale of 1). Postembolization angiography, performed 6 months after the procedure, showed durable occlusion of the DAVF [Figure 2c and d].

Ruptured AVMs are generally treated on a semi-elective basis.\[3\] Specifically, the acute hemorrhage is allowed to resolve in order to facilitate angiographic delineation of the nidus and surgical dissection or radiosurgical targeting. However, in the case of a life-threatening ICH, emergent surgical intervention may be necessary. To the best of our knowledge, this case represents the first report of an iatrogenic DAVF after a craniotomy for AVM resection. Although the occurrence of iatrogenic DAVFs in surgically treated AVM patients is exceedingly rare, it emphasizes the necessity of rigorous, long-term angiographic, clinical follow-up of AVM patients. An investigation for residual or recurrent arteriovenous shunting may be warranted in AVM patients who develop de novo seizures in a delayed fashion after complete nidal obliteration.\[4,5\]
Letters to the Editor

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There are no conflicts of interest.

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