Orbitofrontal Arteriovenous Malformation

Medial orbitofrontal area arteriovenous malformations (AVMs) are located in the noneloquent cortex and typically drain superficially into Sylvian veins or the superior sagittal sinus, making them favorable for surgical treatment. However, while typically supplied by pial/cortical branches of the anterior cerebral artery (ACA), they can incorporate the recurrent artery of Heubner and other ACA perforators on their way to the anterior perforated substance located just posterior. We present a case of a 30-year-old female admitted with sudden collapse and intraventricular hemorrhage from a ruptured medial orbitofrontal area AVM. She was admitted to the intensive care unit and an external ventricular drain was placed to treat acute hydrocephalus. Catheter angiography demonstrated an AVM located just anteromedial to the termination of the internal carotid artery with a compact nidus and an associated intranidal flow aneurysm. Arterial supply originated from the orbitofrontal artery off the ACA, with medial lenticulostriates seen coursing past the nidus. Additional supply from the recurrent artery of Heubner could not be excluded. However, a hypodensity in the inferior frontal lobe seen on the presentation computed tomography scan was suggestive of a prior orbitofrontal infarct and thus cortical, rather than perforator, supply. In our practice, treatment of ruptured AVMs is dictated by the patients' clinical recovery and associated high-risk features (e.g., flow aneurysms). In this case, despite the presence of a flow aneurysm, treatment was delayed 18 days due to slow neurologic recovery and family preference. The patient remained in the intensive care unit under close neurologic observation. She was extubated on day 10, and the external ventricular drain was removed on day 12 after confirming resolution of intraventricular hemorrhage. Preoperatively the patient recovered to a Glasgow Coma Scale score of 15. Risks of treatment were discussed, and informed consent was obtained. The patient was treated using a standard pterional craniotomy. We describe the anatomic location of the lesion in the medial orbitofrontal area, the relationship to the olfactory tract and olfactory stria. We demonstrate olfactory tract dissection from its arachnoid cistern between the orbitofrontal lobe and gyrus rectus in order to access the lesion. Indocyanine green angiography is used to help surgical dissection and for quality control at the end of the procedure. We do not perform intraoperative angiography routinely; however, it can be a useful adjunct in deep and/or eloquent locations, which are difficult to image using videoangiography. Nevertheless, in the absence of intraoperative angiography close dissection directly over the nidus on the eloquent side ensures preservation of functional brain. We describe the microsurgical techniques of surgical treatment of AVMs, in particular the “cone” dissection technique of the AVM in order to allow identification of all feeding vessels and tracing “en passant” vessels from proximal to distal, as well as the use of intraoperative videoangiography to elucidate the nidus morphology and immediate postoperative quality control (Video 1, available at https://drive.google.com/file/d/1lXuLg84MwyMek1_Z1f1n7qssLThimvdx/view?usp=sharing) [1)].

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Budohoski KP, Tajsic T, Barone DG, Guilfoyle M, Santarius T, Kirollos RW, Trivedi RA. Surgical Resection of an Arteriovenous Malformation of the Orbital Surface of the Frontal Lobe with Olfactory Tract Preservation: 2-Dimensional Operative Video. World Neurosurg. 2022 Feb;158:156-157. doi: 10.1016/j.wneu.2021.11.031. Epub 2021 Nov 17. PMID: 34798340.