



Video Abstract

# Vein of Galen arteriovenous malformation: Unedited microneurosurgery

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Received : 08 February 19

Accepted : 08 May 19

Published : 25 June 19

DOI

10.25259/SNI-110-2019

Quick Response Code:



## ABSTRACT

**Background:** Vein of Galen arteriovenous malformations (VGAVMs) are vascular malformations of the pineal region between a persistent embryological median prosencephalic vein of Markowski and the arterial choroidal system by a direct (mural type) or indirect (choroidal type) communication. Angiographic evaluation of VGAVMs usually describes a limbic arch between the anterior and posterior cerebral arteries throughout a pericallosal artery, and the classic "ε" shape configuration of the thalamostriate veins drainage into a subtemporal or a lateral mesencephalic vein due to the underdevelopment of the straight sinus, sigmoid sinus, and jugular bulbs. Moreover, falcine dural channels join the pouch of the malformation with the posterior third of the superior sagittal sinus and less frequently with the cavernous sinus, inferior petrosal sinus, and facial veins. At present, endovascular therapy is the standard management for these lesions. However, under failure of endovascular procedures such in this case, microsurgical management of VGAVMs under an experienced neurosurgical team might be paramount.

**Case Description:** The patient with a choroidal type VGAVM and multiple failed endovascular procedures underwent sitting praying position and midline supracerebellar infratentorial approach. Strong retraction with stitches and proper hemostasis of a highly vascular dura was achieved after transverse sinus-based opening. Accurate microsurgical dissection between the superior cerebellar surface and the tentorium allowed a supracerebellar approach over the vermis and along the midline recognizing the venous pouch of the VGAVM instead of the absent straight sinus. Water dissection allowed us to differentiate the cleavage plane between the VGAVM and surrounding structures maintaining an impeccable surgical field as well. Under high microscopic magnification, arterial feeders of the malformation coming from the posterior cerebral artery were recognized. Intraoperative angiography and reevaluation of the preoperative imaging helped us to confirm a safety approach before coagulation and cut those vascular feeders. Throughout an open-close and short bursts bipolar coagulation techniques preventing attachment of conventional bipolar tips within the vascular structure and without permanent use of water irrigation, the vessels were carefully dissected, coagulated, and sectioned. Along with our experience, we believe that this standard coagulation technique applied in all vascular malformation surgeries is safe and effective. A remaining small plexiform malformation associated with the vein of Galen malformation was coagulated and isolated. A new intraoperative angiography determined complete microsurgical occlusion of the VGAVM. Careful homeostasis based on electrocoagulation and surgical was achieved. Finally, we performed a microsurgical wound closure as a conventional technique in Helsinki neurosurgery.

**Conclusion:** This unedited video offers all detailed aspects that a neurosurgeon as the senior author JH considers essential when performing an efficient and safe surgery for a VGAVM.

**Videolink:** <http://surgicalneurologyint.com/videogallery/vein-of-galen-avm>.

**Keywords:** Microneurosurgery, Pineal region, Sitting position, Unedited microsurgical video, Vein of Galen malformation

**How to cite this article:** Choque-Velasquez J, Hernesniemi J. Vein of Galen arteriovenous malformation: Unedited microneurosurgery. Surg Neurol Int 2019;10:113.

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