

Contralateral Interhemispheric Transfalcine Approach for Medial Frontoparietal Arteriovenous Malformations: A Cadaveric Surgical Simulation Study

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Introduction

Medial frontoparietal arteriovenous malformations (AVMs) are challenging entities usually treated through an ipsilateral interhemispheric approach (IIA). The contralateral interhemispheric transfalcine approach (CITA) has been proposed to treat deep midline lesions. Though never objectively compared, reports have highlighted the potential benefits of CITA: gravity enhanced dissection and retraction, wider working angle, ergonomics and more efficient lighting (1). This cadaveric surgical simulation study aimed to compare both the aforementioned approaches for resection of medial frontoparietal AVMs

Methods

The CITA and IIA was performed in 5 heads (10 specimens). Two AVM models were created mimicking the most common features of AVMs in this location. Surgical feasibility variables were independently assessed for each model and approach using a neuronavigation system. Surgical window, target exposure, angle of attack and surgical freedom using 4 points (superior aspect of the AVM, draining vein in the AVM, ipsi and contralateral anterior cerebral arteries (ACA)) were evaluated and then compared using student's t-test. Statistical significance was assumed for a p-value<0.05

Conclusions

Deep midline AVMs are more easily accessed through a CITA approach. Superficial midline AVMs might not benefit from the advantages of a CITA and should be exposed through an IIA to avoid endangering both hemispheres. Further clinical randomized analysis comparing both approaches should be conducted to confirm the results of this cadaveric study

Results

The CITA and IIA were similar in terms of surgical window, target exposure and surgical freedom in the superior aspect of the AVM ($p > 0.05$). The CITA offered significant advantages ($p < 0.05$) to access the depth of the interhemispheric fissure: 77% wider angle of attack for the inferior aspect of the AVM and greater surgical freedom for the draining vein (54%), ipsilateral (98%) and contralateral ACA(117%). These results were consistent for both AVM models



Figure 1. Cadaveric Dissection depicting the Contralateral Interhemispheric Transfalcine Approach

Learning Objectives

1. To identify the different approaches that can be used to resect medial frontoparietal AVMs
2. To understand the advantages of using CITA over IIA for the resection of medial frontoparietal AVMs

References

1. Hafez A, Raygor KP, Lawton MT. Contralateral Anterior Interhemispheric Approach to Medial Frontal Arteriovenous Malformations: Surgical Technique and Results. *Operative Neurosurgery*. 2017;13(4).