Effect of Location on Success in Pre-Operative Meningioma Embolization

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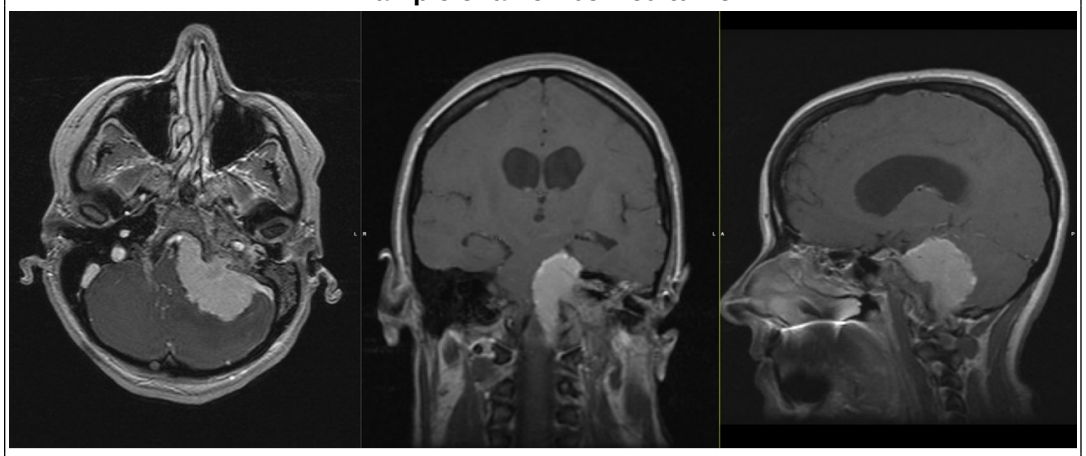
Introduction

Pre-operative embolization of meningioma and hemangiopericytoma continues to be debated. Endovascular technology continues to evolve and ethylene vinyl alcohol (EVOH or Onyx® Medtronic) has been approved for embolization of arteriovenous malformations for over a decade, and has been used off-label for brain tumor embolization. Although associations between tumor locations and feeding vessels have been described, the effect on embolization success has not be assessed.[1] This study compared the degree of embolization and complication rate for meningiomas and hemangiopericytomas in different locations.

Example of an embolized tumor



Axial, coronal, and sagittal contrast-enhanced MRI of a meningioma before embolization. This is a woman in the 5th decade of life with lip and tongue numbness and chronic left hearing loss presenting with a 50x41 mm tumor.

Methods

Review of our endovascular database identified 74 consecutive meningiomas and hemangiopericytomas that underwent pre-operative embolization with Onyx from 2007 to 2017. Degree of embolization was assessed using 1) angiographic blush and 2) gadolinium enhancement on MRI between 12 and 24 hours of embolization.

Results

These tumors occurred in 46 (62%) females with a median age of 57 (IQR 47-66) years. The median tumor diameter was 50 (44-62) mm. Tumor location included the convexity (20, 27%), the falx (15, 20%), the tentorium (18, 24%), and the skull base (21, 28%).

Angiography underestimated residual vascular supply in 57% of cases . Based on MRI evaluation, tumors on the tentorium, falx, or convexity (53 cases) were more effectively devascularized than tumors of the skull base (21 cases) (55% (26-88%) vs. 20% (10-20%); p=0.02). In these tumors, the middle meningeal artery was the first pedicle embolized in 90% of cases, 67% of tumors of the skull base (p=0.03). The complication rate was not statistically different (8% vs. 14%, p=0.4).

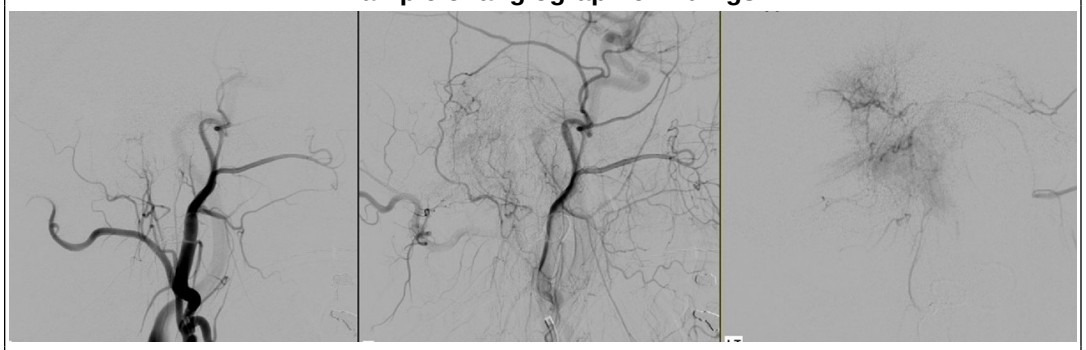
Conclusions

Embolization with EVOH is more effective and not more risky in tumors based on the tentorium, falx, or convexity compared to tumors based on the anterior cranial fossa floor, sphenoid ridge, or petrous face. The middle meningeal artery was an effective pedicle to deliver embolysate with high devascularization success and low complication rate.

References

1 Waldron JS, Sughrue ME, Hetts SW, et al. Embolization of Skull Base Meningiomas and Feeding Vessels Arising From the Internal Carotid Circulation. Neurosurgery 2011;68:162–9. doi:10.1227/NEU.0b013e3181fe2de9

Example of angiographic findings



This demonstrates occipital, ascending pharyngeal, STA, MMA, iMax, and facial arterial supply to the tumor.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) describe the success rate of tumor embolization with EVOH in the skull base