

## Meningioma Embolization with Onyx Prior to Open Resection: A Safe Adjunct Treatment

Le (Lucy) He MD; Travis Ryan Ladner; Brandon J. Davis MD PhD; Nikita Lakomkin; Adetimilehin (Timmy) Ariyo; J D. Mocco

MD

Department of Neurosurgery, Vanderbilt University Medical Center, Nashville, TN

### Introduction

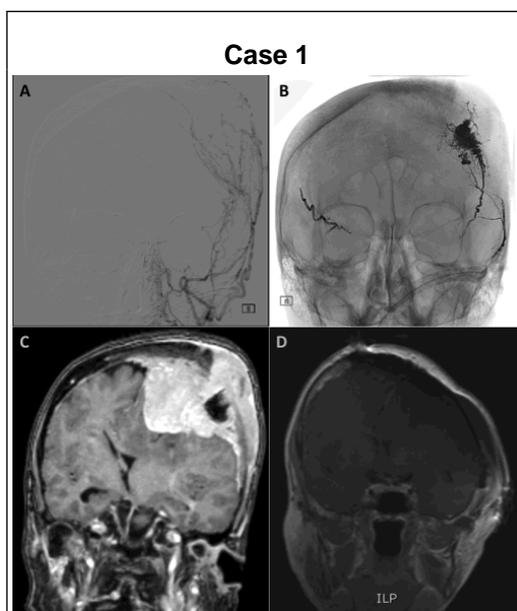
Meningiomas are benign, durally based cranial tumors. En bloc resection can be curative, although for very large tumors or those in the skull base, gross total resection can be difficult and bloody. Embolization prior to surgery has been previously described as an adjunct treatment for these tumors. However, controversy persists regarding the safety of pre-operative embolization especially given arterial supply to these tumors can occur from the internal carotid artery (ICA) or external carotid artery (ECA). Here we present our institutional experience with pre-resection embolization of meningiomas.

### Methods

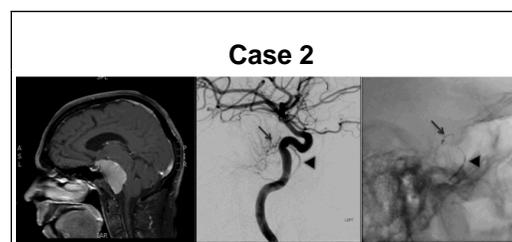
Retrospective review of cranial tumor embolization cases from 2012 to 2014 found 12 patients who underwent pre-resection embolization. All were performed by a single neuro-interventionalist.

### Learning Objectives

1) In experienced hands, embolization of even ICA feeders to meningiomas is a safe adjunct treatment to facilitate gross total resection during open surgery and minimize blood loss.



66 yo female presented with aphasia, cognitive decline, ataxia, found to have massive left frontoparietal meningioma with osseous invasion (C). Angiogram showed primary feeders from the left meningeal artery and superficial temporal artery (A) and also feeders from the right middle meningeal artery and superficial temporal artery. Small feeders from the right internal carotid were identified but deemed too small for embolization. Patient underwent successful embolization with Onyx of the left posterior branch and bilateral anterior branch of the middle meningeal artery (B). The patient underwent successful Simpson Grade II resection the following day requiring craniectomy, mobilization of temporalis flap and titanium mesh cranioplasty (D). There were no embolization related complications. At two month follow up, the patient's flap was well healed and was neurologically intact on exam.



56 yo male initially diagnosed with left petroclival meningioma two years prior, with progressive brainstem compression symptoms and left CN VI palsy (left). The patient underwent preoperative embolization which demonstrated significant feeders from the left meningohypophyseal trunk (arrow) and dural feeder from the left petrous ICA (arrowhead) (center), there was also significant tumor blush from the dural branches of the left ascending pharyngeal artery in the ECA. For the left ICA feeders, vessel shutdown with aneurysm coils was under taken (right) and Onyx embolization of the distal dural feeder from the left ascending pharyngeal artery (not shown). Three days post-embolization, patient underwent successful planned tumor debulking with a combined middle and posterior fossa approach with ENT. The patient had no embolization related complications, he continues with stable left CN VI palsy.

### Results

The mean age of patients was 56.5 years (39-75 years), 58% were female, 17% patients had WHO grade II tumors, 33% were located in the posterior fossa, and 66% underwent embolization of pedicles from the ICA. All cases used Onyx liquid embolic, 42% cases also using adjuvant aneurysm coils, 66% achieved complete embolization as seen on follow up angiography. All patients underwent open surgical resection within three days of embolization. The mean hematocrit change from pre to post-resection was 20% (range 0-33%), mean length of stay was 6 days, and no patients required follow up radiation. No patients had any direct complications from the embolization procedure.

### Conclusions

Our case series indicates that in experienced hands, pre-resection embolization of meningiomas does not pose increased risk to the patient. Over half of our cases required embolization of tumor pedicles from the ICA directly and no patients suffered neurologic sequelae during embolization resulting from thromboembolic event or secondary to unintended Onyx penetration.

### References

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2. Shah AH, Patel N, Raper DMS, Bregy A, Ashour R, Elhamady MS, et al.: The role of preoperative embolization for intracranial meningiomas. *J Neurosurg* 119:364-372, 2013