

Preoperative embolization of skull base meningioma

[Skull base meningiomas](#) are technically challenging tumors to treat because of their deep vascular supply that can preclude early devascularization during resection. [Preoperative embolization](#) of these arterial feeders is thought to decrease blood loss and facilitate resection; however, given the complex and varied anatomy of these skull base lesions, preoperative embolization is not without risk. It is essential for both endovascular and skull base neurosurgeons to understand these risks in light of the potential benefits ¹⁾.

Case series

A study aimed to evaluate the efficacy of tumor embolization using [Embosphere®](#) microspheres for skull base meningiomas and analyze post-embolization plain computed tomography (CT) and magnetic resonance imaging (MRI) scans to identify findings that could potentially predict treatment response.

Methods: Between April 2014 and April 2020, 80 patients with skull base meningiomas presenting at our medical center underwent embolization with Embosphere® microspheres. The effects of tumor embolization were evaluated through a comparison of post-embolization plain CT and contrast-enhanced MRI.

Results: A total of 143 vessels (102/108 external carotid artery branches; 41/65 internal carotid artery branches) from 80 skull base meningiomas were embolized with Embosphere® microspheres. Microspheres 100-300 µm in size were used in two cases, microspheres 300-500 µm in size were used in 12 cases, and microspheres 500-700 µm in size were used in 66 cases. Post-embolization contrast-enhanced MRI showed reductions in enhancing lesions within the tumor in 55/80 cases. Post-embolization plain CT scans showed high-density lesions within the tumor in 41/55 cases. Thus, reductions in enhancing lesions on post-embolization contrast-enhanced MRI were statistically significantly associated with the presence of high-density lesions on post-embolization plain CT ($P<0.001$). Embolization-related neurological complications occurred in three cases.

Conclusions: Embosphere® microspheres are user-friendly and effective [embolization agents](#) for skull base meningiomas. Post-embolization contrast-enhanced MRI and plain CT findings may be useful for evaluating the effects of tumor embolization ²⁾.

Skull base meningiomas that were treated with preoperative embolization were evaluated in 20 patients. The occluded arteries, embolic materials, treatment time, excision rate, neurologic manifestations, and complications were analyzed. The embolic material was 80% liquid, 30% coils, and 15% particles. The surgery was normally completed within 3 to 5 hours. Blood loss was normally approximately 250 mL, excluding four patients having the following conditions: malignant meningioma, a large tumor located on the medial side of the sphenoidal ridge, the petroclival tumor, and infiltrated tumor into the sigmoid sinus. The mean excision rate was 90%, achieving a Simpson grade III, but 10% were graded as Simpson grade IV. No permanent complications due to the preoperative embolization occurred. No neurologic symptoms occurred after excision. Current

cerebral endovascular treatment is sophisticated, and the complication rate has markedly decreased. Although it was impossible to compare directly with or without operative embolization, preoperative embolization should be actively used as part of the treatment for this benign tumor, with better understanding of dangerous anastomosis ³⁾.

Preoperative embolization appeared to be very useful in large tumors with pure or predominant external carotid artery supply (convexity meningiomas), in [skull base meningiomas](#), and in middle fossa and paracavernous meningiomas. It was also useful in falx and parasagittal meningiomas receiving blood supply from the opposite side and in posterior fossa meningiomas. CT low densities demonstrated after embolization did not always correlate with necrosis on microscopic examination, and large areas of infarction could be found despite normal CT. Embolic material was found on pathologic examination in 10%-30% of cases; fresh or recent ischemic and/or hemorrhagic necrosis consistent with technically successful embolization was demonstrated in 40%-60% of cases. With careful technique complications are rare ⁴⁾.

1)

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