



Preoperative embolization of lesions in the posterior fossa - analysis of 41 patient from a single-center case series

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Abstract

Objective: To evaluate the feasibility and safety of performing preoperative endovascular embolization of extra-axial tumors in the posterior fossa.

Introduction

Preoperative endovascular embolization has been increasingly used as a facilitating adjunct to surgical treatment of meningiomas and extra axial lesions. Embolization of lesions in the posterior fossa can pose unique challenges. Pattern of feeding vessels, efficacy in pathologies other than meningioma, and rates and timing of symptomatic or life threatening tumor and brain swelling remains uncharacterized.

Table 1. Patient demographics and surgical outcomes.

	Angiography (14)	Embolization (27)
Male (Female)	6 (8)	5 (22)
Age ±	55.3 ± 13.5	54.1 ± 13.7
Hospital LOS ±	19.1 ± 20.4	12.7 ± 9.2
Recurrence	3	5
Post-procedural complication	1	3
Post-operative complication	0	1
Gross total resection*	3	16 (p=0.0212)

Methods and Materials

The electronic medical records were retroactively reviewed for patients who underwent endovascular embolization prior to open surgical resection of a posterior fossa lesion between January 2015 - June 2024 at a single urban tertiary hospital. Demographic, clinical, imaging and perioperative data were collected. We used an angiographic devascularization grading scale, previously published by our group: grade 0 for no embolization, 1 for partial (<50%) embolization, 2 for near-complete (50-99%) embolization, 3 for complete external carotid artery (ECA) embolization, and 4 for complete embolization with no residual external or internal or posterior supply.

Table 2. Tumor and feeder characteristics on pre-procedural MRI and angiography.

	Angiography (14)	Embolization (27)	Total (41)
Pathology			
Meningioma grade I	4	15	19
Meningioma grade II	3	3	6
Vestibular schwannoma	4	2	6
Hemangioblastoma	1	2	3
Paraganglioma	0	3	3
Others	2	2	4
Location			
Tentorial	0	5	5
Cerebellar-pontine angle	4	7	11
Petroclival	5	4	9
Foramen magnum	0	2	3
Jugular fossa	2	3	5
Cerebellar	3	6	9
Feeders			
Middle meningeal	2	7	9
Occipital	1	11	12
Other external carotid branches	0	3	3
Meningo-hypophyseal trunk	2	3	5
Inferolateral trunk	1	3	4
Vertebral	2	8	10
PICA	1	3	4
AICA	2	4	6
SCA	2	2	4
None	4	0	4

Results

41 consecutive patients were included. 14 patients underwent preoperative angiography with intention to treat, but did not receive embolization due to lacking suitable or safe feeders. For the 27 patients who received embolization, there were 18 meningiomas (15 World Health Organization grade I, 3 grade II), 3 paragangliomas, 2 hemangioblastomas, 2 vestibular schwannomas, and 2 others. In terms of lesion location, 7 were in the cerebellopontine angle, 6 cerebellar convexity, 5 tentorial, 3 jugular fossa, and 2 foramen magnum. The most commonly embolized feeders were the occipital artery (11), other external carotid branches (7), and the middle meningeal artery (7). 48% (13) of embolizations used coils, 40% (11) used Onyx, and 14% (4) used particles. 22% (6) achieved grade 4 devascularization, 11% (4) for grade 3, 52% (14) for grade 2, and 11% (3) for grade 1. Comparing patients who received only angiography and who received embolization, there were no differences in length of stay, rates of post-procedural and post-operative complications. No patients had concerns for symptomatic elevated intracranial pressure from tumor swelling or peritumoral edema. The patients who received embolization were more likely to achieve gross total resection (p=0.0212).

Table 3. Embolization characteristics.

	Embolized tumor (27)
Devascularization degree	
4	6
3	4
2	14
1	3
Embolized feeders	
Middle meningeal	7
Occipital	11
Other external carotid branches	7
Meningo-hypophyseal trunk	1
Inferolateral trunk	2
Vertebral	3
PICA	2
AICA	1
SCA	0
Other	0
Embolization material	
Coils	13
Onyx	11
Particles (PHIL)	4
Glue	1

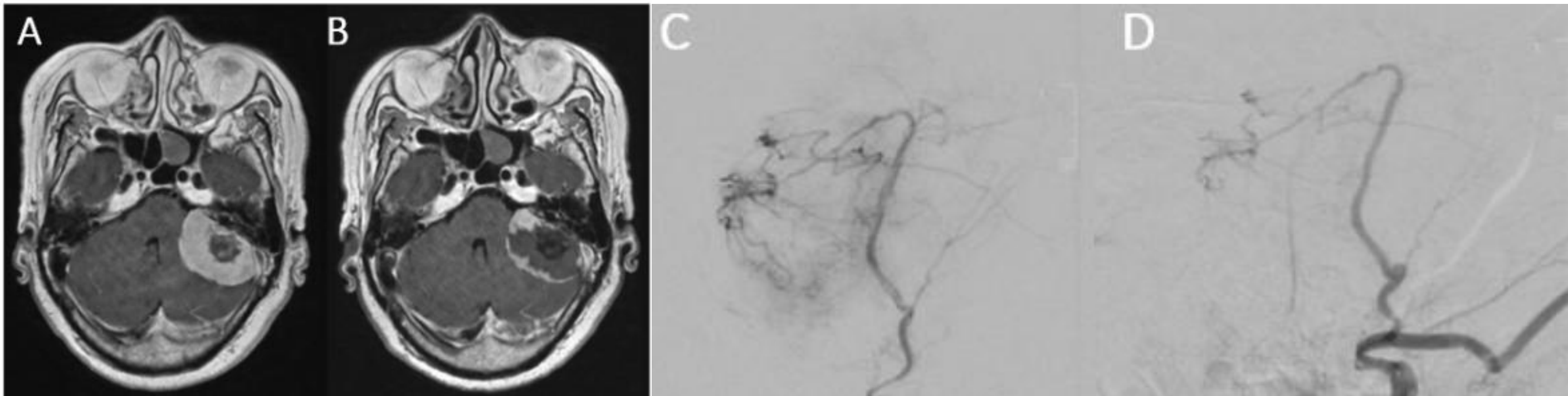


Figure 1. An example patient who received embolization. **A.** Pre-embolization MRI, showing a large enhancing lesion in the left cerebellopontine angle. **B.** Post-embolization MRI, demonstrating significant reduction in enhancement of the tumor. **C.** Angiographic injection of the occipital artery, illustrating tumor blush. **D.** Angiographic view post Onyx embolization, demonstrating significant reduction in tumor blush.

Conclusions

Preoperative embolization in posterior fossa lesions appears to be safe, and may facilitate more complete tumor resection. The distribution of specific arterial feeders differed significantly among different tumor locations and pathological types. We will be evaluating its direct effects on the lesion and surrounding brain in subsequent studies with volumetric analyses of pre- and post-embolization MRIs, and conduct subgroup analyses between different pathological and location groupings.

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References

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