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Safety and Efficacy of Preoperative Tumor Embolization of Cranial Hemangioblastomas

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Introduction

- Cranial hemangioblastomas are highly vascular lesions that often require surgical resection
- Preoperative embolization has been proposed to minimize blood loss and improve surgical outcomes
- The safety and efficacy of preoperative hemangioblastoma embolization, however, has not been clearly defined

Methods

- Retrospectively reviewed clinical database of confirmed cranial hemangioblastoma cases at the University of Washington and the Barrow Neurologic Institute (1999-2014)
- Fifty-four cranial hemangioblastomas were encountered
- Embolized (*n=24*) and non-embolized (*n=30*)
- Radiographic, clinical features and surgical data were recorded
- Statistics: Fishers exact test and ANOVA (Significance p<*0.05*)

Results

Table 1. Clinical, Radiographic and embolic agents in patients

	Non-embolized (n=30)	Embolized (n=24)	p	PVA (n=9)	Onyx (n=5)	n-BCA (n=9)	Onyx/n-BCA (n=1)
Age (median)	47.5	45.7					
Sex	M21 F9	M20 F4	0.53	M8 F1	M3 F2	M9 F0	M1 F1
Tumor size (cm)	3.5	3.6	0.824	3.6	4.1	3.29	3.2
Tumor location							
4th ventricle	1(3)	5(20.8)	0.022	1	2	2	0
Cerebellum	22(73)	13(54)		5	2	5	1
Other	7	6		3	1	2	0
VHL n (%)	9(30)	6(25)	0.76	3(33)	1(20)	2(22)	0
Hydrocephalus n(%)	9(30)	8(61)	*0.014	6(67)	3(75)	N/A	N/A

*significant

Table 2. Impact of embolization on surgery

	Non-embolized (n=30)	Embolized (n=24)	p	PVA (n=9)	Onyx (n=5)	n-BCA (n=9)	Onyx/n-BCA (n=1)
Time prior to surgery (days)	N/A	1.36	1	1.6	1.4	1.3	0.2
Blood loss (cc)	348	540	*0.001	443	400	683	600
Blood transfusion requirement (units)	0.15	0.21	0.9	0.14	0	0.44	0
Operation length (hours)	8.4	11.2	0.08	10.4	12.75	N/A	N/A

*significant

Table 3. Complications from embolization

Age (sex)	Location	Size (cm)	Agent	Complications	Long-term neurological outcome
21 (M)	Right cerebellum	2.5	PVA	Intraparenchymal and subdural hematoma	Persistent vegetative state
26 (M)	4th ventricle	4.3	PVA	Intratumoral hemorrhage	No deficit
63 (M)	Right cerebellum	4	PVA	Intratumoral hemorrhage	No deficit
46 (M)	4th ventricle	2.6	Onyx	Left cerebellar and inferior cerebellar peduncle infarcts	Vertigo, right-sided ataxia
40 (F)	Pre-medullary cistern	1.2	Onyx	Medullary infaret	CN X palsy, right-sided hemiparesis
49 (M)	Foramen Magnum	4	n-BCA	Cerebellar infarcts	Left hemiparesis

Table 4. Reports of complications from pre-operative embolization of intracranial hemangioblastomas

Conclusions

- Procedure complication rate of 25%, with 16% of patients having long term deficits
- Pre-operative embolization did not significantly affect OR time, blood loss/transfusion, extent of resection.
- Higher blood losses associated with embolized tumors, however, no difference in transfusion rates
- *n-BCA* was associated with lowest complication rate (11% vs. *PVA* 33%, *Onyx* 40%)
- Pre- operative embolization of hemangioblastoma should be done with caution given relatively high complication rates
- Complications may be minimized by using liquid embolization agents such as *n-BCA*
- Future studies will evaluate the impact of embolization on operative outcomes

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