



Pre-operative embolization of spinal tumors, an Institutional Experience

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Introduction

The goal of pre-operative embolization of spinal tumors is to improve surgical outcomes by diminishing the vascular flow of the tumor. It is expected that this reduces intra-operative blood loss and operative time. However, there is a paucity of literature evaluating its safety and efficacy. We report our institutional experience with spinal tumor embolization.

Methods

A retrospective analysis of available clinical charts and angiograms between 2001-2012 were reviewed. Historical patient angiograms were used to calculate percentage of embolization achieved, and relevant clinical and operative data were collected and analyzed.

Results

45 patients (32 males and 13 females) underwent spinal angiograms for evaluation of a spinal tumor between 2001-2012. Thirty-seven patients underwent pre-operative spinal tumor embolization (24 metastatic and 13 primary lesions), 8 patients underwent spinal angiogram with no evidence of significant tumor blush. The most common spinal lesion was metastatic renal cell (n=18) followed by metastatic follicular cell of the thyroid (n=3). There was one complication due to endovascular embolization which did not require surgical intervention. The average estimated blood loss (EBL) during surgery of embolized lesions was 1946 ml (100-7000 ml) and 2.54 units (range 0-9) of blood transfusions were required, the average operative time was 330 minutes (range 164 to 841 min). Following embolization, tumor blush was reduced by 83% on average (cervical 80.0%, thoracic 78.9% and sacral 82.8%). Lesions which achieved 90% or greater embolization were associated with reduced EBL compared to lesions which were not (1391 vs 2296 ml p=0.05). Tumors involving multiple spinal levels were not associated with significantly more EBL compared to tumors involving one spinal level (1947.22 vs 1683.33 ml p=.995). A two stage anterior/posterior surgical approach was associated with a statistically significant increase in EBL when compared to posterior/lateral and transpedicular approaches (3775 vs 1658 vs 1742 ml p=.03).

Test (Embolization Group)	Measure	Significance
At least 90% Embolization vs Lesions with less than 90% reduction in tumor Blush	EBL: 1391 vs 2296 ml	0.05
	OR Time: 289 vs 348 min	0.24
	# of Transfusions: 1.94 vs 2.77 (units)	0.38
Adjuvent Coil Embolization vs No Coil embolization	EBL: 1644 vs 2050 ml	0.33
	OR Time: 365 vs 316 ml	0.38
	# of Transfusions: 2.67 vs 2.5	0.87
Lesions Involving Single Level vs Multiple	EBL: 1947.22 vs 1683.33 ml	1.00
	OR Time: 370 vs 301 min	0.23
	# of Transfusions: 1.94 vs 3.11	0.18

T-test comparison demonstrating the effect of degree of embolization, use of coils, and # of vertebral bodies with tumor invasion on EBL, OR time, and # of transfusions amongst embolized spinal tumors.

ANOVA(Embolized group)				
	Anterior + Middle (n=14)	Middle + Posterior (n=8)	Anterior + Middle + Posterior (n=13)	Sig (p)
EBL (ml)	1786	1688	2276	0.61
Surgery Time (min)	324	300	354	0.72
# of Transfusions (units)	2.21	2.13	3.15	0.57
	Transpedicular (n=19)	Anterioer/Lateral (n=4)	Posterior/Lateral (n=12)	Sig (p)
EBL (ml)	1742	3775	1658	0.03
Surgery Time (min)	288	415	379	0.14
# of Transfusions (units)	2.37	3.75	2.42	0.62
	Decompressive Laminectomy (n=17)	Corpectomy (n=16)	Partial Corpectomy (n=2)	Sig (p)
EBL (ml)	1771	2188	1500	0.68
Surgery Time (min)	279	387	365	0.11
# of Transfusions (units)	2.41	2.75	2	0.89

ANOVA analysis comparing the effect of spinal column involvement, surgical approach, and the procedure performed on EBL, surgery time, and # of transfusions needed amongst embolized spinal tumors.

Learning Objectives

- Understand the epidemiology of spinal column metastasis.
- Understand the potential complication associated with spinal tumor embolization.
- Understand the factors that may influence the degree of embolization including tumor type, and anatomical location.

Conclusions

Pre-operative spinal tumor embolization is safe and likely effective in reducing intra-operative blood loss during tumor resection. Importantly, obtaining at least 90% reduction in tumor blush following embolization can significantly affect operative blood loss. We recommend planning for embolization prior to resection of expected highly vascular lesions of the spinal column such as renal cell carcinoma, thyroid metastasis, hemangioma, and other vascular lesions.

References

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