Comparing Angiographic and Histologic Penetrance after Preoperative Tumor Embolization with Onyx: Is There a Way to Predict Intraoperative Blood Loss?

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Introduction

- Preoperative tumor embolization with Onyx is safe and effective
- Current measures of procedural success may not reflect surgical outcomes
- Objective: Compare angiographic and histologic Onyx penetration and assess its efficacy in preoperative embolism for tumors of the head, neck, and spine.

Methods

- Retrospectively cohort study of preoperative Onyx embolization for treatment of head, neck, and spine tumors from 2009-2011.
- Primary outcome: Onyx efficacy, as indicated by intraoperative blood loss and length of surgery.
- Primary predictors of efficacy: Angiographic and histologic penetrance of Onyx, as well as percent tumor devascularization
- Additional clinical information: Patient demographics, as well as characteristics of the embolization procedure and surgical resection.

Results

Table 1: Clinical Summary of 22 Patients with Head, Neck, and Spine Tumors

Age (years)	
Median	16.9
Range	3.2- 77.8
Sex*	
Male	15 (68)
Female	7 (32)
Tumor Location*	
Head & Neck	
Choroid Plexus Papilloma	1 (4.5)
Hemangioblastoma	1 (4.5)
Hemangiopericytoma	1 (4.5)
Juvenile Nasal Angiofibroma	9 (41)
Lobular Capillary Hemangioma	1 (4.5)
Meningioma	2 (9)
Nasopharyngeal Angioma	1 (4.5)
Nasopharyngeal Squamous Cell Carcinoma	1 (4.5)
Spine	
Multiple Myeloma	1 (4.5)
Osteosarcoma	1 (4.5)
Plasma Cell Myeloma	1 (4.5)
Renal Cell Carcinoma	2 (9)

*Data presented as count (%)

- Good angiographic penetration in 41% of tumors.
- Central histologic penetration in 59% of tumors.
- Mean devascularization 85.3% (SD 12.6%).
- No correlation beteween angiographic or histologic penetration and devascularization.

Results

Table 2: Evaluation of Onyx Penetration Based on Angiographic and Histologic Analysis

Angiographic Penetration	Histologic Penetration	Number of Cases (%)
Good	Central	6 (27)
Good	Peripheral	2 (9)
Good	None	1 (4.5)
Poor	Central	7 (32)
Poor	Peripheral	5 (23)
Poor	None	1 (4.5

Table 3: Surgical Outcomes in 22 Cases of Tumor Resection after Preoperative Onyx Embolization

Length of Surgery (minutes) (median, range)	241 (73-722)
Estimated Blood Loss (mL) (median, range)	725 (150-4500)

- Neither angiographic, nor histologic Onyx penetration predicted blood loss (p=0.38, p=0.32 respectively) or surgical length (p=0.62, 0.90, respectively).
- Devascularization was not associated with blood loss (p=0.62), but it was a negative predictor of surgical length (p=0.013).

Conclusions

- Preoperative Onyx embolization of head, neck, and spine tumors is capable of achieving deep tumor penetration, even when not visualized on angiography.
- Lack of association between angiographic and histologic penetration questions the use of angiographic determination of efficacy as ultimate arbiter of procedural success