

Preoperative embolization of cervical spine tumors: technique and outcomes from a single center

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Introduction

To describe our experience with pre-operative angiography and embolization of cervical spine tumors. Pre-operative angiography of 40 cervical spine primary and metastatic tumors was performed in 36 patients. The goal of embolization was to reduce tumor opacification in an effort to reduce intra-operative blood loss and surgical morbidity.

Methods

Retrospective review of angiograms and peri-procedural charts was conducted for 40 procedures performed between April 2002-December 2010. Embolization was undertaken in 21 cases. Vascularity was graded from 0 (same as normal adjacent vertebral body) to 3 (severe tumor blush with arteriovenous shunting). Embolization criteria included significant tumor vascularity, ability to achieve stable microcatheter position without reflux into carotid/vertebral arteries, and absence of a spinal cord artery arising from tumor feeder. Vertebral artery occlusion criteria included significant tumor vascularity, risk of reflux into vertebral artery despite selective tumor feeder catheterization, tumor involvement of vertebral artery resulting in high likelihood of vessel sacrifice during surgery, and robust collateral flow during balloon test occlusion.

Results

Most common pathology was renal cell carcinoma (35%), followed by thyroid carcinoma (15%) with respective vascularity scores of 2.23 and 1.83. The most common tumor feeders were vertebral artery branches (67.7%), ascending cervical artery (35.3%), and deep cervical artery (35.3%). Complete/near-complete embolization of targeted tumor feeders was achieved in 85.7%. Vertebral artery occlusion was performed in 23.8% of embolizations. A spinal cord artery feeder was identified in 32.5%. Embolization of one or more feeders was not undertaken because of minimal tumor opacification (15 cases), inability to achieve stable catheter position without risk of cerebral embolization (10 cases), and presence of spinal cord artery (2 cases). There were no new post-procedure neurologic deficits.

Conclusions

Preoperative angiography and embolization cervical and cervico-thoracic spine tumors is safe when performed at a high-volume center that adheres to a rigorous protocol and criteria for embolization.

Learning Objectives

Participants should be able to 1) describe vascular anatomy/supply of hypervascular cervical spine tumors, 2) describe the risks associated with embolization of cervical spine tumors, 3)describe the techniques for safe embolization of cervical spine tumors.

References

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Figure 1A

DSA of L vertebral art. (AP view) demonstrates an intensely vascular RCC metastasis at C4-5 with marked AV shunting. The art. of cervical enlargement (arrow) is noted to arise from the vertebral art. with prominent filling of the anterior spinal art. (arrowhead) visualized.

Figure 1B

The L deep cervical art. (Lat view) supplies the mass. An anastomosis (arrow) between a distal branch of the L deep cervical art. and the L vertebral art. (arrowhead) is noted.

Figure 1C

To prevent inadvertent cerebral embolization, a coil mass was deployed in the distal L deep cervical art. PVA particles were then safely injected into the L deep cervical art. tumor feeders.

Figure 1D

Post-embolization DSA of the L vertebral art. (AP view) demonstrates occlusion of the vessel after deployment of coils and detachable balloons. PVA particles were delivered into small, tortuous vertebral art. tumor feeders from a proximal position in the vertebral art. Particles were delivered distal to the origin of the art. of cervical enlargement (arrow) to avoid spinal cord ischemia. Filling of the anterior spinal art. (arrowhead) remains robust after embolization of tumor feeders.