Preoperative Onyx Embolization of Aggressive Vertebral Hemangiomas


*AJNR Am J Neuroradiol* 2008, 29 (6) 1095-1097
doi: https://doi.org/10.3174/ajnr.A1010
http://www.ajnr.org/content/29/6/1095

This information is current as of October 29, 2023.
Preoperative Onyx Embolization of Aggressive Vertebral Hemangiomas

SUMMARY: We report the first use of Onyx in the embolization of spinal tumors in 2 cases of aggressive vertebral hemangioma. In both cases, Onyx embolization provided effective preoperative tumor devascularization after the initial prolonged particulate embolization with Embospheres made little overall impact. Onyx enables a more rapid and visible embolization than particles and is less technically demanding than traditional liquid embolic agents, such as n-butyl cyanoacrylate.

Preoperative embolization of vascular spinal tumors minimizes perioperative hemorrhage and facilitates resection. Particulate agents, including Embosphere (BioSphere Medical, Rockland, Mass) and polyvinyl alcohol (PVA) are favored, because they penetrate the capillary bed beyond potential arteriolar anastomoses. A small number report successful use of polymerizing liquid agents, such as n-butyl cyano acrylate (n-BCA; Cordis Neurovascular, Miami Lakes, Fl), in embolizing head and neck neoplasms.3

Onyx (ev3, Irvine, Calif) is a novel, nonpolymerizing liquid agent, composed of ethylene-vinyl alcohol copolymer (EVOH) dissolved in dimethyl-sulfoxide (DMSO), which precipitates within vessels forming a spongy cast. Its unique properties enable gradual, controlled, longer, and more extensive embolizations compared with n-BCA. Already an established, Food and Drug Administration-approved treatment of central nervous system arteriovenous malformations, its efficacy in “off-label” vascular head and neck tumor embolization has been advocated.5

Preoperative embolization of spinal tumors, 2 aggressive vertebral hemangiomas, is described for the first time, highlighting its value after a lengthy particulate embolization makes a minimal impact.

Case Reports
A 41-year-old woman with 2 months of progressive bilateral lower-extremity weakness underwent CT and MR spine imaging revealing an avidly enhancing mass centered on the L2-vertebral body with paraspinal and epidural extension (Fig 1). After emergent decompressive laminectomy with 3500 mL of blood loss and histopathologic pathology was consistent with hemangioma, and Onyx was clearly visible on gross and microscopic inspection (Fig 5).

Discussion
Vertebral hemangiomas have a prevalence of approximately 10%6 and a predilection for young, female patients and the thoracic spine.7 Aggressive lesions causing significant bony expansion or extrasosseous extension are rare, may cause subacute neurologic impairment, and present a therapeutic challenge due to their vascularity and extent. Acosta et al8 described 16 cases, recommending combined preoperative embolization and surgical excision.
Fig 1. A, Noncontrast CT demonstrates mixed trabecular and lytic infiltration of the L2 vertebra by a soft tissue mass, expanding the right pedicle and extending into paravertebral soft tissues (arrows). B, Postgadolinium T1 fat-sat coronal demonstrates the avidly enhancing, lobulated mass (arrow-heads) with prominent flow voids. Note enhancement of the cauda equina below the level of compression (arrows).

Fig 2. A, Selective angiography of the left L2 lumbar artery shows prominent tumor vascularity. No spinal anastomoses were identified. Note inferior vena-cava filter and diagnostic catheter in situ (arrow). B, Post-EmboSphere-embolization angiography via the Prowler microcatheter (Cordis) (arrow-head) reveals persistent tumor enhancement. C, Note the guide catheter (arrow) after Onyx embolization, where the artery is occluded but the agent is largely restricted to the main artery (extending from arrowhead to arrow). D, Plain anterior/posterior radiograph shows distribution of the 4 Onyx embolizations. Note extension of Onyx from the proximal left L1 lumbar artery (arrowhead) inferior to L2 and then across the midline (arrows).

Fig 3. Immediate postembolization axial noncontrast CT (A) and coronal reformat (B) show penetration of Onyx through tumor vessels within the vertebral body.
Berkefeld et al. confirmed the efficacy of PVA embolization of hypervascular spinal tumors, finding a median perioperative blood loss of 1850 mL versus 4350 mL in controls. Hemostasis was not significantly improved if the feeder was simply coiled. However, safe particulate embolization requires large volumes and slow injection rates, resulting in lengthy injection and fluoroscopic times. Despite suspension in iodinated contrast, passage of radiolucent particles through small but dangerous collateral vessels may go unnoticed. Sedimentation and aggregation can obstruct catheters, necessitating larger caliber microcatheters. In addition, vessels embolized with particles, particularly PVA, may undergo recanalization.

Kim et al. described n-BCA embolization of vascular head, neck, and spine tumors. They recorded only 1 temporary embolic complication in a series of 35 patients. Although tumor penetration and infarction were documented, its efficacy in limiting blood loss was not control matched. n-BCA injections were fast, permanent, and well visualized but required technical expertise and risked catheter adhesion.

Reports of Onyx tumor embolization are limited. Gobin et al. used EVOH to embolize 14 head and neck tumors with only 2 temporary adverse events. Advantages over n-BCA included more controlled gradual injections, and they had no cases of catheter entrapment. In our first case, we allowed substantial Onyx reflux without difficulty.

Conclusion
Onyx can be used to safely embolize highly vascular tumors and has the advantages of good visibility, good control, and shorter injection times compared with particulate agents, such as Embospheres or PVA. Our cases add to the few descriptions of Onyx use in tumor embolization and are the first documented uses of Onyx in the treatment of spinal tumors. As the neuroendovascular community becomes more familiar with Onyx through its use in cerebral arteriovenous malformations, its application to other areas such as this should become more widespread.

References
7. Fox MW, Onofrio BM. The natural history and management of symptomatic and asymptomatic vertebral hemangiomas. J Neurosurg 1993;78:36–45