



Safety and Efficacy of Preoperative Embolization of Intracranial Hemangioblastomas

Chibawanye I Ene MD PhD; David S. Xu MD; Ryan Patrick Morton MD; Michael Robert Levitt MD; Louis J. Kim MD; Steve W. Chang MD

Introduction

Intracranial hemangioblastomas are highly vascular tumors that account for 1-2% of all central nervous system tumors.They occur either sporadically or in association with von Hippel-Lindau (VHL) disease and are commonly located in the posterior fossa. Preoperative embolization has been proposed to limit the often significant intraoperative blood loss. Previous reports have found conflicting evidence of the safety and efficacy of preoperative embolization of hemangioblastomas, with some reporting good outcomes3 and others reporting serious complications. We reviewed the safety and efficacy of preoperative embolization of surgically resected intracranial hemangioblastomas at two high-volume neurosurgical referral centers and compared these outcomes to a control group of non-embolized patients, with a focus on the safety profile of different embolic agents.

Methods

A retrospective review of all surgically resected intracranial hemangioblastomas treated with preoperative embolization between 1999 and 2014 at two high-volume centers was performed. A second cohort of patients treated without preoperative embolization was also reviewed. Clinical and radiographic criteria, including von Hippel-Lindau status, MRI tumor characteristics, embolization-related complications, degree of angiographic devascularization, intraoperative blood loss, transfusion requirements and operative time were analyzed.

Results

Fifty-four total patients underwent surgical in this series, with twenty-four receiving preoperative embolization followed by surgical resection, and thirty patients receiving surgical resection alone. Embolization was associated with slightly greater intraoperative blood loss, but did not affect transfusion requirements. Embolization-related neurological complications were seen in six patients (25%), including three hemorrhages and three infarctions with permanent neurologic deficits were seen in 15%. Complications were associated with embolization using polyvinyl alcohol particles, Onyx copolymer and n-BCA. There were, however, a significantly higher rate of hemorrhage associated with particle based embolization compared liquid based embolization (p=0.042)

Conclusions

Preoperative embolization of intracranial hemangioblastomas should be performed with caution given the potential for neurological complications. The choice of embolization agent may affect complication rates.

Learning Objectives

1. Safety profile of particle agents may be different from liquid agents
2. Recognize and manage the complications associated with pre-operative embolization of hemangioblastoma

References

- 1.Cornelius JF, Saint-Maurice JP, Bresson D, George B, Houdart E: Hemorrhage after particle embolization of hemangioblastomas: comparison of outcomes in spinal and cerebellar lesions. J Neurosurg 106:994-998, 2007
- 2.Ding D, Starke RM, Evans AJ, Liu KC: Direct transcranial puncture for Onyx embolization of a cerebellar hemangioblastoma. J Clin Neurosci 21:1040-1043, 2014
- 3.Horvathy DB, Hauck EF, Ogilvy CS, Hopkins LN, Levy EI, Siddiqui AH: Complete preoperative embolization of hemangioblastoma vessels with Onyx 18. J Clin Neurosci 18:401-403, 2011
- 4.Lonser RR, Butman JA, Huntoon K, Asthagiri AR, Wu T, Bakhtian KD, et al: Prospective natural history study of central nervous system hemangioblastomas in von Hippel-Lindau disease. J Neurosurg 120:1055-1062, 2014
- 5.Munyon C, Chowdhry SA, Cohen ML, Bambakidis NC, Hsu DP: N-butyl 2-cyanoacrylate (n-BCA) embolization of a cerebellar hemangioblastoma. J Neurointerv Surg 3:386-389, 2011
- 6.Murai Y, Kominami S, Yoshida Y, Mizunari T, Adachi K, Koketsu K, et al: Preoperative liquid embolization of cerebeller hemangioblastomas using N-butyl cyanoacrylate. Neuroradiology 54:981-988, 2012
- 7.Sakamoto N, Ishikawa E, Nakai Y, Akutsu H, Yamamoto T, Nakai K, et al: Preoperative endovascular embolization for hemangioblastoma in the posterior fossa. Neurol Med Chir (Tokyo) 52:878-884, 2012
- 8.Shin GW, Jeong HW, Seo JH, Kim ST, Choo HJ, Lee SJ: Preoperative embolization of cerebellar hemangioblastoma with onyx: report of three cases. Neurointervention 9:45-49, 2014