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Case Report

Advantages of using a detachable-tip microcatheter and liquid embolic agents in the preoperative embolization of a recurrent cerebellar hemangioblastoma: A case report

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Abstract

Background: The preferred treatment for intracranial hemangioblastomas is surgical resection with or without preoperative embolization, however, embolization remains controversial due to risks such as distal tip entrapment, vascular injury during navigation, and embolic agent migration.

Case Description: A 54-year-old woman was admitted for surgical resection and preoperative embolization of a cerebellar hemangioblastoma. Although experience using Onyx with detachable and nondetachable tip microcatheters has been well reported in a variety of clinical circumstances, we describe the first case of a presurgical embolization of an intra-axial tumor using a second-generation detachable-tip microcatheter and a nonadhesive liquid embolic agent. Following the procedure, a nearly complete angiographic obliteration was achieved, as well as a successful subsequent surgical resection.

Conclusion: Preoperative embolization with detachable-tip microcatheters and liquid embolic agents should be taken into consideration when assessing patients with hemangioblastomas of the posterior fossa due to the reduced risks of cardiac arrest, hemorrhage, and death.

Key Words: Catheterization, hemangioblastoma, intracranial hemorrhage, therapeutic embolization

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INTRODUCTION

Hemangioblastomas are World Health Organization (WHO) grade I, highly vascularized mesenchymal tumors that represent approximately 2% of intracranial tumors and 10% of posterior fossa tumors.[4] The treatment of choice is surgical resection with or without preoperative embolization, depending on the tumor size and the local vascular anatomy.[7,11] However, traditional embolization remains controversial due to its risks such as distal catheter tip entrapment, vascular injury

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during navigation or catheter withdrawal, and embolic agent migration to the adjacent normal vasculature.[12] Although experience using Onyx embolization material with both detachable and nondetachable catheter tips has been well reported in a variety of clinical circumstances, we describe to the best of our knowledge the first case of a presurgical embolization of an intra-axial tumor (i.e., a recurrent cerebellar hemangioblastoma) that uses a second-generation detachable-tip microcatheter and a nonadhesive liquid embolic agent and achieves a nearly complete angiographic obliteration and successful subsequent surgical resection without complications. This case report was written following the CARE 2013 guidelines.[6]

CASE HISTORY

Case presentation

A 54-year-old woman with a history of a right cerebellar hemangioblastoma, who was surgically treated in 2005, presented 11 years later with a 2-week history of postural instability, vertigo, and left suboccipital headache. Brain magnetic resonance imaging (MRI) upon admittance revealed two brightly enhancing nodules with a medial cyst in the inferior surface of the right cerebellar hemisphere, which was consistent with recurrent disease [Figure 1]. No other significant medical history was provided, and the neurological evaluation was unremarkable. The patient was admitted to our institution for surgical resection and preoperative embolization.

Treatment

Using a Phillips Allura Xper FD 20 interventional X-ray system, a right transfemoral access was obtained, a 6-French introducer vascular sheath was placed and 4000 IU of unfractionated heparin (UFH) were administered.

A right vertebral diagnostic angiography showed a right AICA–PICA complex as the main feeder of the tumor [Figure 2]. Two main branches were identified as follows: a lateral branch that supplied only the tumor tissue and a medial branch that irrigated the lesion and the normal cerebellar parenchyma. In addition, the lesion had a large vein that arose from its central aspect and drained into the right superior petrosal sinus.

Then, a Neuron 6F 070 guiding catheter (Penumbra Inc., Alameda, CA, USA) was placed in the second segment of the right vertebral artery (V2). An Apollo™ microcatheter with a 15 mm detachable-tip (Medtronic, Minneapolis, MN, USA) was navigated over a Mirage™ 0.008 hydrophilic guidewire (Micro Therapeutics Inc., Irvine, CA, USA) allowing the superselective catheterization of the lateral branch of the AICA–PICA complex. Adequate position of the microcatheter was confirmed, without evidence of opacification of normal parenchymal vessels.

The microcatheter was flushed with 5 mL of normal saline and 0.3 mL of dimethyl sulfoxide (DMSO), and, under fluoroscopic visualization, 0.8 mL of Onyx-18® (Medtronic, Minneapolis, MN, USA) were administered to embolize the main lateral branch, achieving an obliteration of 70% of the tumor vascular blush. Then, under road map guidance and permanent fluoroscopic visualization, controlled traction of the microcatheter was exerted in two periods, allowing for a brief interval of tension release between each period, until the 15 mm-tip was successfully detached without complications. The microcatheter extraction was performed carefully and slowly to prevent heart rates below 45 beats per minute.

Subsequent angiographic runs did not reveal any unexpected vascular occlusions or dissections. After the vascular sheath removal, there was no evidence of inguinal hematoma or peripheral pulse abnormalities.

The patient underwent a successful complete surgical resection the following day. Pathology demonstrated a recurrent hemangioblastoma with embolization-induced ischemic changes [Figure 3]. The patient was discharged without any neurological deficits 4 days later.

Outcome and follow-up

During the follow-up, the patient remained symptom-free for more than a year without MRI findings of recurrent disease [Figure 4].

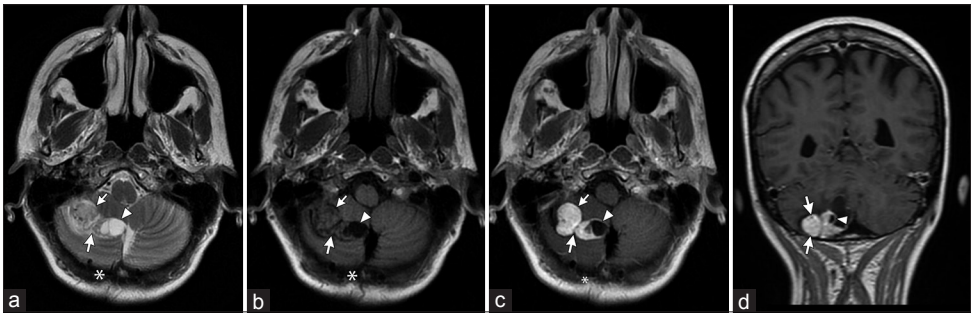

Figure 1: Preoperative brain MRI sequences. (a) T2-weighted axial; (b) T1-weighted axial without contrast; (c) T1-weighted axial with contrast; (d) T1-weighted coronal with contrast. Images show a bilobular well-defined homogeneous solid mass (arrows) with a medial cystic component (arrowheads) involving the inferior and medial aspects of the right cerebellar hemisphere, consistent with recurrent disease. Adjacent postsurgical changes (asterisks) are also observed

DISCUSSION

Complete resection of cerebellar hemangioblastomas can be difficult owing to the location, mass effect, and tumor vascularity. Intractable intraoperative hemorrhage with high rates of morbidity and mortality has been reported.[1] The objectives of preoperative embolization of hemangioblastomas are to increase the chance of a complete resection, decrease surgical bleeding, and reduce the intraoperative time.[10] However, despite concerns regarding inadvertent nontarget embolization, venous obstruction, tumor rupture, and intracranial hemorrhage with severe neurological complications,[8,12] in our experience, preoperative embolization has been beneficial.

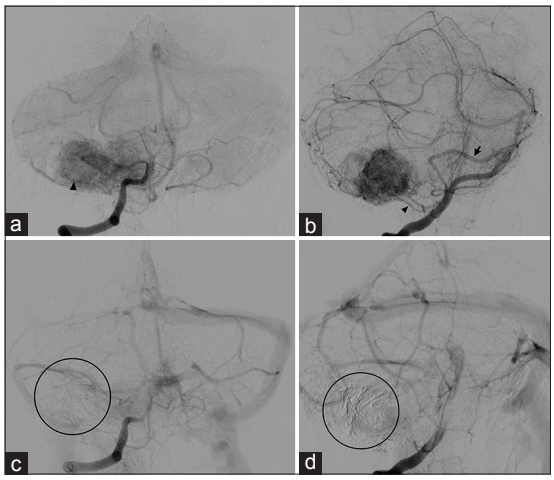

Figure 2: Diagnostic and postembolization angiograms. (a and b) AP and lateral views show a bilobular hypervascular mass with delineation of the cystic medial hypovascular component. The lateral main branch (arrowhead) of the right AICA-PICA complex (arrow) supplies the mass, as described in the text. (c and d) AP and lateral views show evidence of obliteration of approximately 70% of the lesion with a minimal residual filling of its medial component. The Onyx cast is visualized (circle)

Endovascular embolization can be performed with coils, particles, or liquid embolic agents. Coils can occlude large feeders and provide a more controllable embolization, however, they lack the ability to reach deep into the tumor vascular bed. Particles such as Gelfoam, polyvinyl alcohol (PVA), and Embospheres provide the advantage of better tumor vessel occlusion; however, they carry a high risk of inadvertent nontarget embolization, permanent neurologic deterioration as reported by Montano *et al*.,[8] worsening of hydrocephalus as reported by Eskridge *et al*.,[5] and mortality as reported by Cornelius *et al*.[2] Currently, liquid embolics, such as N-butyl-cyanoacrylate (NBCA) and Onyx, are the most commonly used agents due to excellent combination of durability, penetration, and tumor devascularization. Onyx has been preferred over NBCA because of its nonadhesive properties, which decreases the risk of gluing the microcatheter in place; it also allows longer injection times with more reflux control while increasing the predictability and penetration of the capillary bed.[3,12]

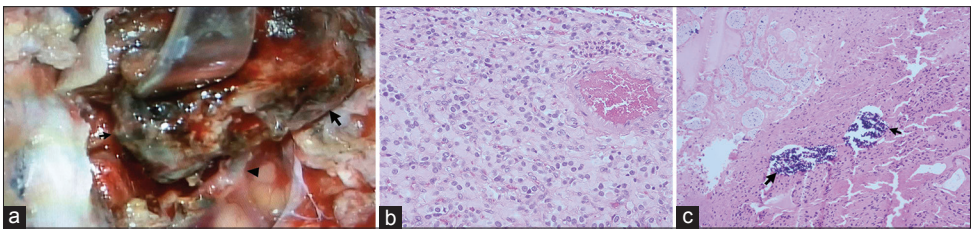

Figure 3: Intraoperative findings and microphotographs of hematoxylin-eosin-stained slides of the specimen. (a) The devascularized tumor (arrows) is held by a spatula, exposing a vessel containing embolization material (arrowheads). Normal cerebellar parenchyma can be observed on the inferior left corner of the picture. (b) The abundance of monomorphic stromal cells with pale and vacuolated cytoplasm is consistent with a recurrent hemangioblastoma (40×). (c) Onyx (arrows) can be observed within a vascular lumen, along with surrounding ischemic-induced pathological changes (10×)

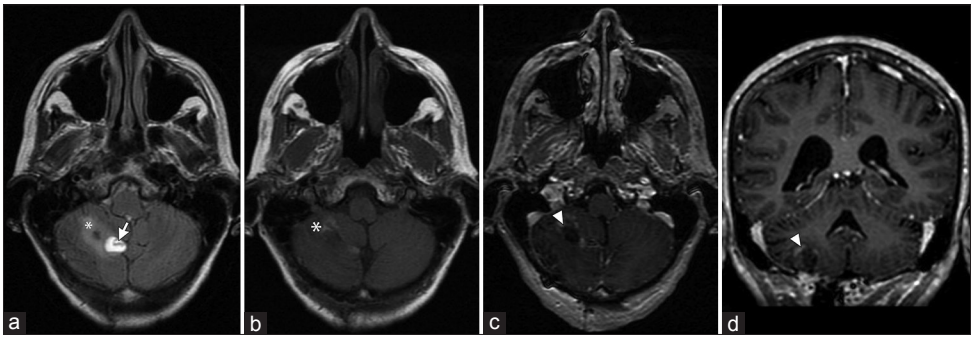

Figure 4: Postoperative brain MRI sequences (13 days later). (a) T2-weighted FLAIR axial; (b) T1-weighted axial without contrast; (c) T1-weighted axial with contrast; (d) T1-weighted coronal with contrast. Images show a small hematoma (arrow) in the medial aspect of the surgical cavity, mild residual edema (asterisk) and minimal linear postsurgical enhancement (arrowhead) without evidence of a residual lesion

Alternatively, detachable-tip microcatheters have been used for arteriovenous malformation (AVM) embolization. The Apollo microcatheter is a second-generation single-lumen end-hole catheter with a 15-mm, 30-mm, or 50-mm detachable-tip. These microcatheters are NBCA and Onyx compatible and have the advantage of allowing longer injection times than conventional microcatheters, which is particularly useful when using NBCA. A true circumferential occlusion can be achieved with Onyx, permitting the filling of a larger amount of angioarchitecture. However, its most important advantage is a better and less traumatic catheter withdrawal, which decreases the risk of retention and artery rupture.

Since the first report of the use of detachable-tip microcatheters in 2008 by Ozturk *et al*.,[9] they have mostly been used for the management of vascular malformations such as AVMs, dural fistulae, and extra-axial tumors (i.e., meningiomas). They have not been used, as in this case report, for intra-axial tumor embolization, particularly in the posterior fossa. The previously described advantages also remain true for these kind of lesions, where an acute hemorrhage due to arterial rupture could be fatal and a controlled and less forceful microcatheter pulling may result in a lower risk of artery rupture, bradycardia, cardiac arrest, and death.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Abo-Al Hassan A, Ismail M, Panda SM. Pre-operative endovascular embolization of a cerebellar haemangioblastoma. A case report. Med Princ Pract 2006;15:459-62.
2. 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 2007;106:994-8.
3. Dabus G, Pryor J, Spilberg G, Samaniego EA, Nogueira RG. Embolization of intra-axial hypervascular tumors with Onyx: Report of three cases. J Neurointerv Surg 2013;5:177-80.
4. Ding D, Starke RM, Evans AJ, Liu KC. Direct transcranial puncture for Onyx embolization of a cerebellar hemangioblastoma. J Clin Neurosci 2014;21:1040-3.
5. Eskridge JM, McAuliffe W, Harris B, Kim DK, Scott J, Winn HR. Preoperative endovascular embolization of craniospinal hemangioblastomas. AJNR Am J Neuroradiol 1996;17:525-31.
6. Gagnier JJ, Kienle G, Altman DG, Moher D, Sox H, Riley D, *et al*. The CARE Guidelines: Consensus-based Clinical Case Reporting Guideline Development. Glob Adv Health Med 2013;2:38-43.
7. Liu AH, Peng TM, Wu Z, Xiao XR, Jiang CH, Wu ZX, *et al*. Clinical effectiveness of preoperative embolization for cerebellar hemangioblastoma. Asian Pac J Cancer Prev 2013;14:5179-83.
8. Montano N, Doglietto F, Pedicelli A, Albanese A, Lauretti L, Pallini R, *et al*. Embolization of hemangioblastomas. J Neurosurg 2008;108:1063-4; author reply 1064-5.
9. Ozturk MH, Unal H, Dinc H. Embolization of an AVM with acrylic glue through a new microcatheter with detachable tip: An amazing experience. Neuroradiology 2008;50:903-4.
10. 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) 2012;52:878-84.
11. Seong Eom K, Won Kim D, Sung Choi S, Ha Choi K, Young Kim T. Preoperative embolization of a cerebellar haemangioblastoma using Onyx: Case report and literature review. Neurol Neurochir Pol 2011;45:292-6.
12. Shin GW, Jeong HW, Seo JH, Kim ST, Choo HJ, Lee SJ. Preoperative embolization of cerebellar hemangioblastoma with onyx: Report of three cases. Neurointervention 2014;9:45-9.