ISSN 1738-6217
J Kor Soc Ster Func Neurosurg 2018;14(2):39-41

CASE REPORT

Metastasis along the Ommaya Reservoir Cannula in a Large Cystic Metastatic Brain Tumor: A Case Report

Hyoung Gyu Jang, MD, Jung Soo Park, MD, PhD, Eun Jeong Koh, MD, PhD,
Jong Myong Lee, MD, Ha Young Choi, MD, PhD

Department of Neurosurgery and Research Institute of Clinical Medicine, Chonbuk National University-Biomedical Research Institute, Chonbuk National University Hospital, Jeonju, Korea

Although various treatment modalities have been introduced, the management of large cystic metastatic brain tumors is not clearly established. In some cases, stereotactic cyst aspiration followed by radiotherapy or radiosurgery improve patient quality of life. Ommaya reservoir placement is one useful treatment option for large or recurrent cyst-forming metastases that allows for reduction of tumor volume prior to radiosurgery. Although Ommaya reservoir placement is a relatively low risk procedure, some morbidity occurs rarely. In particular, metastasis along the Ommaya reservoir cannula in patients with metastatic brain tumors is extremely rare. We report a patient with a large, cystic, metastatic brain tumor that spread along the Ommaya reservoir cannula.

KEY WORDS: Ommaya reservoir · Brain metastasis · Gamma Knife surgery.

INTRODUCTION

To date, various treatment modalities, such as resection, stereotactic radiosurgery, whole brain radiation therapy and chemotherapy, have been used as effective treatments for brain metastases. However, brain metastases with large cystic components are challenging lesions to manage. Although large cystic metastatic brain tumors can be treated by surgery, radiosurgery, radiotherapy, stereotactic aspiration, Ommaya reservoir placement or chemotherapy, no single treatment has been shown to be fully effective. Thus, treatment involving a combination of modalities is used and may improve the quality of life for patients with large cystic brain metastases. Ommaya reservoir placement is a relatively safe and useful procedure for volume reduction and planning of further treatment options in large cystic brain metastases, but some complications may occur.

In our report we describe a case of dissemination of a cystic metastatic brain tumor along the Ommaya reservoir cannula.

Address for correspondence: Jung Soo Park, MD, PhD
Department of Neurosurgery and Research Institute of Clinical Medicine, Chonbuk National University-Biomedical Research Institute, Chonbuk National University Hospital, 20 Geonji-ro, Deokjin-gu, Jeonju 54907, Korea
Tel: +82-63-250-1870, Fax: +82-63-277-3273
E-mail: rollingstone12@hanmail.net

CASE REPORT

A 55-year-old female was brought to our emergency room following a one-week history of right side weakness. Three years prior she had a left total pneumonectomy for non-small cell lung cancer (adenocarcinoma). Upon neurological examination, she appeared grossly normal with a drowsy mental status. Hemiparesis (grade-IV) was noted on the right side. MRI scan showed a large peripheral rim-enhancing cystic lesion with perilesional edema, which was consistent with the diagnosis of a cystic brain metastasis (Fig. 1). Initially, we planned stereotactic radiosurgery, but the large cystic lesion was not suitable for this procedure. Thus, Ommaya reservoir placement was performed. Gamma knife surgery (GKS) was performed two days after Ommaya reservoir placement. The marginal dose was 20Gy, and the prescription isodose curve fully covered all enhanced lesions. She was discharged after two weeks without any neurological deficits. Six months after GKS, the patient developed right side weakness and confused mental status. Contrast-enhanced MRI revealed regrowth of the irradiated metastatic mass and a multifocal enhanced mass along the Ommaya reservoir cannula (Fig. 2). The recurred tumor and the Ommaya reservoir, including the new multifocal mass near the Ommaya cannula, were completely removed by open microsurgery (Fig. 3); however, the patient's right hemiparesis (grade IV) persisted. Eight months later she

died due to progression of primary lung cancer.

DISCUSSION

Metastatic brain tumors can be managed by many different treatment modalities including surgery, stereotactic radiosurgery, whole brain radiation therapy and chemotherapy. Although no standard therapy has been defined, GKS has recently been established as the mainstream procedure for management of metastatic brain tumors. GKS offers several advantages over other surgical resection methods. First of all, it can used to treat deep or surgically inaccessible lesions within adequate area. Moreover GKS allows for treatment of multiple metastatic lesions at the same time. Also, because GKS is less invasive than other treatment modalities, it can also be used for patients who are medically ineligible for general anesthesia and surgical resection.[3)8)] Generally, metastatic lesions larger than 3cm in diameter are considered poor candidates for GKS due to high risk of acute radiation effects.[5)]

Metastatic brain tumors are usually solid, but cyst formation in a metastasis may occur due to central necrosis

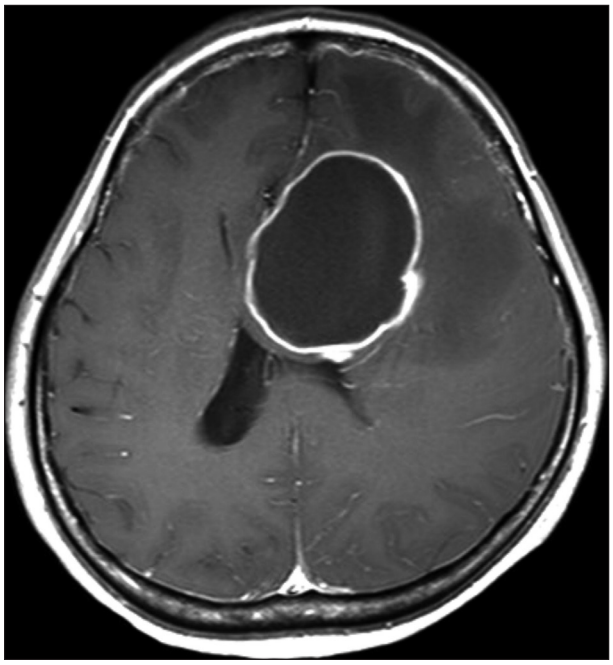

Fig. 1. Axial T1-weighted gadolinium-enhanced MRI demonstrating large rim-enhanced cystic tumor in the left frontal lobe.

Fig. 3. Post-operative computed tomography with contrast demonstrating complete removal state of metastatic tumor and Ommaya cannula.

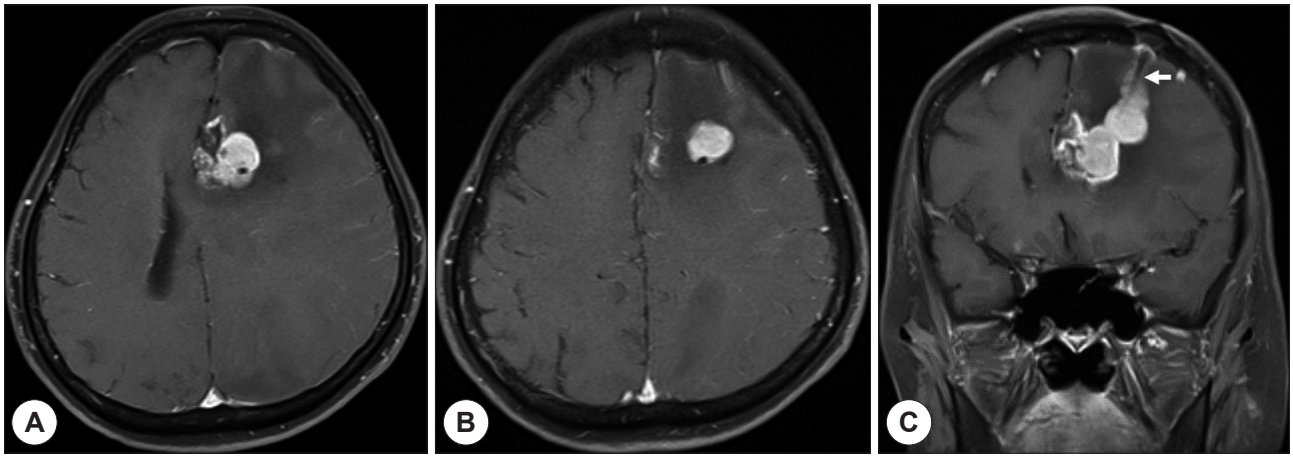

Fig. 2. Gadolinium-enhanced T1-weighted MRI scans 6 months after GKS. A : Axial scan in the plane of the large metastatic mass. B : Axial scan in a more cranial plane than A. C : Coronal scan showing metastatic lesions along Ommaya cannula (arrow).

Table 1. Summary of reported dissemination along stereotactic biopsy tract or Ommaya reservoir cannula

	Age/Sex	Pathology	Procedure	Path of dissemination
Marx, et al. (2001)	46/F	Metastatic brain tumor	Stereotactic biopsy	Biopsy tract
Ishii, et al. (2004)	2/M	Craniopharyngioma	Ommaya reservoir placement	Ommaya reservoir cannula*
Steinmetz, et al. (2001)	56/M	Glioblastoma	Stereotactic biopsy	Biopsy tract
Aichholzer, et al. (2001)	41/M	Glioblastoma	Stereotactic biopsy	Biopsy tract‡
Bleyer, et al. (1978)	21/M	Burkitt's lymphoma	Ommaya reservoir placement	Ommaya reservoir cannula†
Pierallini, et al. (1999)	60/M	Glioblastoma	Stereotactic biopsy	Biopsy tract
Richard, et al. (1998)	23/M	Anaplastic astrocytoma	Stereotactic biopsy	Biopsy tract
Buis, et al. (2012)	33/F	Gliomatosis cerebri	Stereotactic biopsy	Biopsy tract§
Kim, et al. (2003)	64/M	Anaplastic astrocytoma	Stereotactic biopsy	Biopsy tract
Bouillot-Eimer, et al. (2005)	60/F	Glioblastoma	Stereotactic biopsy	Biopsy tract§

* : Dissemination from cyst of craniophryngioma to ectopic brain parenchyma, † : Dissemination from meninges to brain parenchyme, ‡ : Epidural seeding, § : Subcutaneous seeding

or intratumoral hemorrhage.[6] These cyst-containing brain lesions are challenging to manage. Surgical resection of the malignant thin cyst wall without parenchymal injury is technically difficult, and, in most cases, the volume of these metastases, including the cyst wall, exceeds the size limits for GKS. Also, because the cystic component of the metastatic lesion is unresponsive to radiation, the therapeutic effect of GKS is reduced.[2] Thus, the management of these large cystic brain metastases has not been clearly established. Radiosurgery after cystic component reduction is one proposed treatment option.[2]

Stereotactic cyst aspiration has been used in cystic brain metastases in order to decrease the volume of the cystic component.[2][4-6] Ommaya reservoir placement is often used for cystic fluid aspiration prior to radiosurgery. Moreover, it allows for repeated cyst aspiration, which is useful for treating repeated fluid accumulation in the cystic component, as observed in our case.[1][4][10]

Although Ommaya reservoir placement is relatively safe and effective for cystic component drainage, complications related to this procedure such as intracystic hemorrhage, infection, tumor dissemination, and new neurological deficits due to brain parenchymal injury have been reported.[1][4][7][9][10] Even though there are several previous reports of dissemination or seeding of tumor cells along the stereotactic biopsy tract, to our knowledge, there are only two reported cases of dissemination along an Ommaya reservoir cannula (Table 1). This is a rare case report of dissemination along an Ommaya cannula of metastatic cystic brain tumor.

In conclusion stereotactic cyst aspiration through an Ommaya reservoir in large, cystic, metastatic brain tumors can effectively reduce tumor volume and allows for GKS after a suitable tumor size is attained. If the cystic component is sufficiently removed and reaccumulation is not noted, removal of the Ommaya reservoir and cannula is worth considering.

REFERENCES

1. Bleyer WA, Pizzo PA, Spence AM, Platt WD, Benjamin DR, Kolins CJ, et al: *The Ommaya reservoir: newly recognized complications and recommendations for insertion and use. Cancer 41:2431-2437, 1978*
2. Franzin A, Vimercati A, Picozzi P, Serra C, Snider S, Gioia L, et al: *Stereotactic drainage and Gamma Knife radiosurgery of cystic brain metastasis. J Neurosurg 109:259-267, 2008*
3. Gerosa M, Nicolato A, Foroni R, Zanotti B, Tomazzoli L, Miscusi M, et al: *Gamma knife radiosurgery for brain metastases: a primary therapeutic option. J Neurosurg 97:515-524, 2002*
4. Higuchi F, Kawamoto S, Abe Y, Kim P, Ueki K: *Effectiveness of a 1-day aspiration plus Gamma Knife surgery procedure for metastatic brain tumor with a cystic component. J Neurosurg 117 Suppl: 17-22, 2012*
5. Linskey ME, Andrews DW, Asher AL, Burri SH, Kondziolka D, Robinson PD, et al: *The role of stereotactic radiosurgery in the management of patients with newly diagnosed brain metastases: a systematic review and evidence-based clinical practice guideline. J Neurooncol 96:45-68, 2010*
6. Niranjan A, Witham T, Kondziolka D, Lunsford LD: *The role of stereotactic cyst aspiration for glial and metastatic brain tumors. Can J Neurol Sci 27:229-235, 2000*
7. Park WH, Jang IS, Kim CJ, Kwon DH: *Gamma knife radiosurgery after stereotactic aspiration for large cystic brain metastases. J Korean Neurosurg Soc 46:360-364, 2009*
8. Patchell RA, Tibbs PA, Walsh JW, Dempsey RJ, Maruyama Y, Kryscio RJ, et al: *A randomized trial of surgery in the treatment of single metastases to the brain. N Engl J Med 322:494-500, 1990*
9. Rogers LR, Barnett G: *Percutaneous aspiration of brain tumor cysts via the Ommaya reservoir system. Neurology 41:279-282, 1991*
10. Yamanaka Y, Shuto T, Kato Y, Okada T, Inomori S, Fujino H, et al: *Ommaya reservoir placement followed by Gamma Knife surgery for large cystic metastatic brain tumors. J Neurosurg 105 Suppl: 79-81, 2006*