# Introduction

Glioblastoma is the most common primary brain tumor and has poor prognosis approximately 50 weeks. As multifocal gliomas are rarely diagnosed with incidence about 0.5 to 20% of all gliomas, multicentric glioblastoma is also an uncommon condition with the incidence about 2.3 to 9%. Unfortunately, multiple glioblastomas showed unfavorable prognosis, and its estimated median survival was 6 to 8 months. Multiple glioblastoma has problem of differential diagnosis with other pathologic conditions, and the treatment guideline is still controversial. There have been a few reports about the prognosis of multicentric glioblastoma after multimodal treatment. We describe our experience of one case of synchronous multicentric and multifocal glioblastoma.

# Case

A 50-year-old male patient presented with complex partial seizure. He had a medical history of complete remission state of Non-Hodgkin’s lymphoma (Grade III with diffuse transformation) two years ago. His neurologic examination revealed only partial conduction aphasia. A computed tomography (CT) showed contrast enhancing lesion on left temporal and right frontal lobe cortex with peripheral edema (Fig. 1).
A MRI demonstrated two separated masses on left temporal and occipital lobes. Another right frontal lesion was weakly enhanced than left temporal lesion (Fig. 2). To confirm the pathologic diagnosis, stereotactic biopsy was done on left temporal lesion (Fig. 3). We recommended resection with concomitant chemoradiation therapy (CCRTx). But patient’s care giver wanted to visit other hospital where the patient was diagnosed his lymphoma. So he was transferred to previous hospital and the temporal lobe tumor was resected partially. The pathologic diagnosis was glioblastoma with sarcomatous component. He was re-transferred to our hospital to complete CCRTx. A MRI was rechecked for right frontal lobe lesion and we planned to remove it to diagnose. The removal operation was done and the pathology was also compatible with glioblastoma (Fig. 3). Patient’s status was same after second operation and CCRTx with Temodal was started. Until performing adjuvant phase of 5th cycle, patient’s status showed no other evidence of progression. But during the 6th CCRTx cycle, he developed right hemiparesis and the follow-up MRI confirmed progression of tumor on left temporal lobe (Fig. 4). Reoperation on left temporal lesion was recommended but care giver gave up second operation, and he expired 54 weeks after diagnosis.

Discussion

Multiple gliomas are rare and poorly documented to date, incidence about 0.5 to 20% of all gliomas. Multifocal and multicentric glioblastoma are described in previous reports mingled with each other. Multicentric glioblastoma are those which have no macroscopic or microscopic connection. On the other hand, multifocal tumors are those with either gross or microscopic continuity along a preexisting pathway; along the commissural pathways, corpus callosum, fornix, or internal capsule; through cerebrospinal fluid; by metastasis of principal tumor mass. The incidences of true multicentric glioblastoma have been reported around 2.3 to 9%. In our case, left temporal two lesions were in the same hemisphere, so called multifocal, but the right frontal mass was truly disconnected from left side, so compatible to be called multicentric glioblastoma. Also these lesions were diagnosed without time interval which would be synchronous lesions.

The pathogenesis of multifocal or multicentric glioblastomas is still unclear. Willis hypothesized that multicentric tumors were through two-step process. After neoplastic transformation from a large area of brain parenchyma, various tumor proliferation rate draw separate lesions. Zulch suggested that the multicentric lesions are metastasis via unknown other pathway. Kyritsis et al reported that multifocal gliomas were noted more frequently with secondary malignancies or family history of other cancer. There have been extremely

![Fig. 1. Preoperative contrast enhanced brain computed tomography shows enhancing lesion on left temporal lobe with edema and on right frontal lobe.](image)

![Fig. 2. Preoperative gadolinium enhanced T1 weighted axial magnetic resonance images and T2 weighted axial magnetic resonance images show two separated lesions on left temporo-occipital lobe (A, B). And there was another lesion on right frontal lobe (C, D).](image)
A Case of Synchronous Multicentric and Multifocal Glioblastoma

There are no guidelines for the management of multifocal or multicentric glioblastoma. The multicentric lesions far apart from each other may be problematic to make decision of multiple craniotomies. Also multifocal glioblastoma makes us confuse whether whole brain radiation or local field radiation therapy will be effective and appropriate. Hassaneen et al. evaluated the multiple craniotomies in the management of multifocal and multicentric glioblastoma and found that aggressive resection of all lesions resulted in a survival duration comparable with that of only single craniotomy. And there was no evidence of recurrence or progression on right frontal resected tumor bed.

Fig. 3. The pathologic findings of tumor specimen retained from left temporal lobe with stereotactic biopsy (A, B) and right frontal lobe with craniotomy (C, D). Each microscopic pictures show field of hypercellularity with pleomorphic cells with macronuclei, vascular proliferation and necrosis (H & E staining, A, C: ×100, B, D: ×400).

Fig. 4. Postoperative gadolinium enhanced T1 weighted axial magnetic resonance images after 3 months (A, B). Gadolinium enhanced T1 weighted axial magnetic resonance images at the time of 6th cycle concomitant chemo-radiation therapy (C, D) shows increased size of previous partial resected glioblastoma on left temporo-occipital lobe with edema. There was no evidence of recurrence or progression on right frontal resected tumor bed.

rare reports about multicentric glioblastoma after other systemic primary cancers, such as prostate, lung, breast or colorectal cancers. But multicentric glioblastoma with systemic Non-Hodgkin’s lymphoma has been never reported, though a case of Turcot’s syndrome with lymphoma and glioblastoma was reported. And in our case, we could not find any multiple adenomatous colonic polyps which is one of diagnostic criteria for Turcot’s syndrome.

These multiple lesions may be confused when extracranial tumor coexists. In our case, the patient had the history of lymphoma 3 years ago, so the confirmative pathologic diagnosis of these multiple lesions was needed. Though MRI scan is a mainstay in diagnosing and planning the treatment for brain lesion, Jawahar et al. utilized fluorodeoxyglucose (FDG)-positron emission tomography (PET) scanning for detecting multicentric glioblastoma.

no increase in morbidity related to multiple craniotomies. In the review of radiation therapy for multiple or multicentric high-grade cerebral gliomas, by Federico et al., they suggested that non-diffuse and not extensive tumors would be treated utilizing conformal (or intensity-modulated) limited filed irradiation technique to protect cognitive impairment and frank dementia after whole brain radiation.

**Conclusion**

Although management modality of multicentric glioblastomas and the role of tumor resection remained still controversial, we experienced a case of synchronous multicentric and multifocal glioblastoma patient who showed 12 months of survival period after concomitant chemoradiation therapy with tumor resection through multiple craniotomies.

**References**