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SIMULTANEOUS SURGICAL RESECTIONS OF TWO DISTANT METASTATIC MALIGNANT MELANOMA LESIONS — CASE REPORT —

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ABSTRACT

A 41-year-old woman presented with disturbance of consciousness, right hemiparesis, and symptoms of Gerstmann syndrome. She had a history of malignant melanoma resections of an ear mole and her right neck lymph nodes and parotid gland, with subsequent chemotherapy and radiotherapy. Computed tomography showed two large lesions in the right frontal and left parietal lobes surrounded by severe brain edema. Magnetic resonance images revealed that the two lesions were strongly enhanced with cystic change, and a small round lesion was located in the left head of the caudate nucleus. (18F*)* fluoro-2-deoxyglucose positron emission tomography showed high accumulation in both lesions, and no sign of metastatic lesions except within the brain. The two lesions were large, causing increased intracranial pressure. Simultaneous surgical resections were performed using two approaches. The patient's neurological symptoms were greatly improved after surgery, and her Karnofsky Performance Status improved from 20% to 90%. She was discharged to her home almost completely free of neurological deficits. Although, simultaneous one-stage tumor resections for multiple metastatic brain tumors do not extend the survival period, they improve the quality of the patient's limited remaining life, and may be a treatment choice for young patients with well-controlled systemic disease.

Key Words: Malignant melanoma, Multiple, Simultaneous, Surgical resection, Metastatic

INTRODUCTION

Malignant melanoma is the third most common cause of central nervous system metastasis.[1)] The prognosis of patients with malignant melanoma brain metastases is very poor. The median survival rate reported for surgically treated patients with brain metastases from melanoma ranges from 5 to 22 months.[2-5)] The most significant factor influencing the survival of patients with brain metastases is the number of their cerebral metastases.[5-8)] Surgical treatment of multiple brain metastases is only considered a palliative solution for improving the quality of life. However, recently the performance of multiple resections of brain metastases from melanoma has led to a reconsideration of the surgery's benefits.[2)]

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We report one case of multiple brain metastases from malignant melanoma with two large lesions located in the right frontal and left parietal lobes. This is a case report of simultaneous one-stage resections of distant lesions with two approaches for multiple metastatic malignant melanoma lesions.

CASE REPORT

A 41-year-old woman had a mole in her right ear that grew noticeably, and swelling was detected in her right neck lymph nodes. Aspiration biopsy cytology of the neck lymph node was performed, and malignant melanoma was diagnosed. She underwent an operative resection

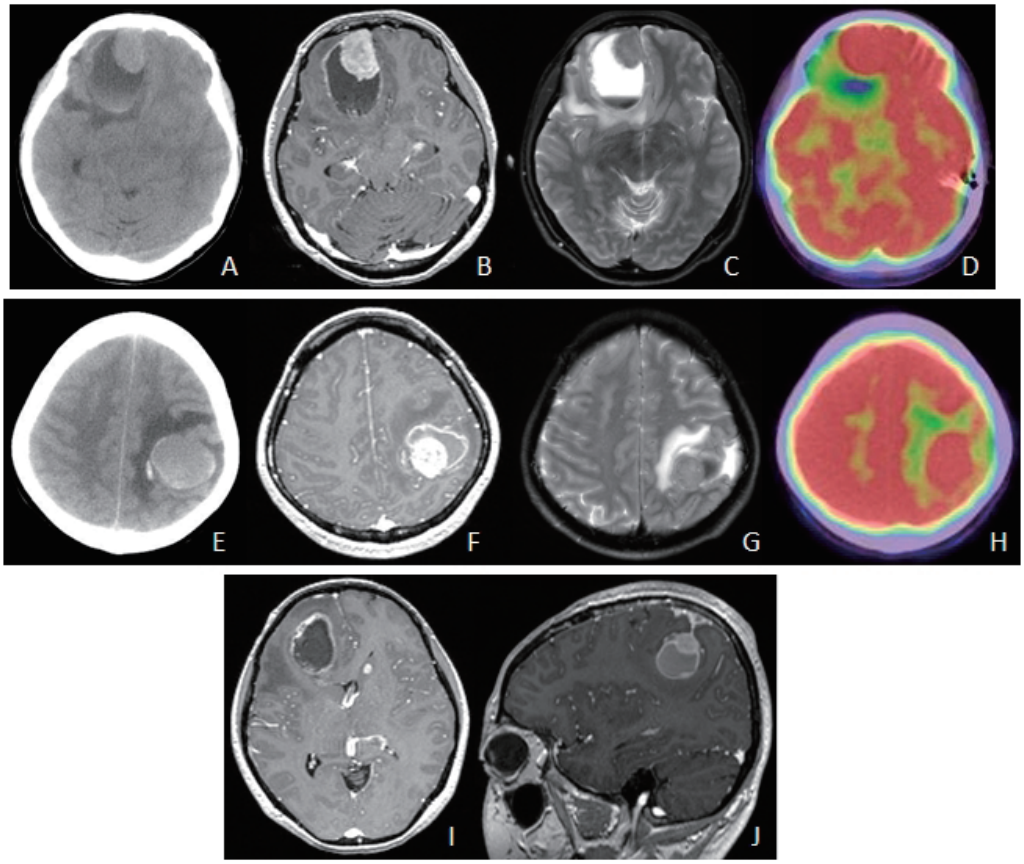

Fig. 1 A, E: Computed tomography images reveal right frontal and left parietal mass lesions.
B, C, F, G: Magnetic resonance (MR) images show right frontal and left parietal mass lesions as strongly enhanced on T1-weighted image with gadolinium (B, F), and peripheral edema on the T2-weighted image (C, G).
D, H: (18F) fluoro-2-deoxyglucose positron emission tomography images show high accumulations in right frontal and left parietal lesions.
I, J: Axial (I) and sagittal (J) of T1-weighted images with gadolinium revealed an enhanced, small mass lesion in the left head of the caudate nucleus (I), and enhanced subarachnoid space surrounding the left parietal lesion (J).

of the ear lesion, right neck lymph nodes and parotid gland with subsequent chemotherapy and radiotherapy. She later presented with headache and multiple brain metastases were detected. Her level of consciousness had deteriorated, and she was transferred to our hospital 6 months after being diagnosed with malignant melanoma. On admission, her Glasgow Coma Scale score was 11 (E2V3M6), and she had a right hemiparesis. Additionally, symptoms of Gerstmann syndrome such as finger agnosias, right-left disorientation, acalculia and agraphia were noted.

Computed tomography showed two large lesions in the right frontal lobe and left parietal lobe surrounded with severe brain edema (Fig. 1A, E). Magnetic resonance (MR) images revealed that the two lesions were strongly enhanced with cystic change (Fig. 1B, C, F, G), and a small round lesion was present in the left head of the caudate nucleus (Fig. 1I). The subarachnoid space surrounding the left parietal lesion was also enhanced (Fig. 1J). (18F) fluoro-2-deoxyglucose positron emission tomography ((18F) FDG PET) exhibited high levels of accumulation in the two large lesions (Fig. 1D, H), but revealed no signs of metastatic lesions except in the brain. Cerebral angiography showed mild tumor staining in the two lesions.

Surgical resections of the two lesions were performed to relieve high intracranial pressure. First, the patient was placed in a prone position. A left parietal craniotomy and a parietal

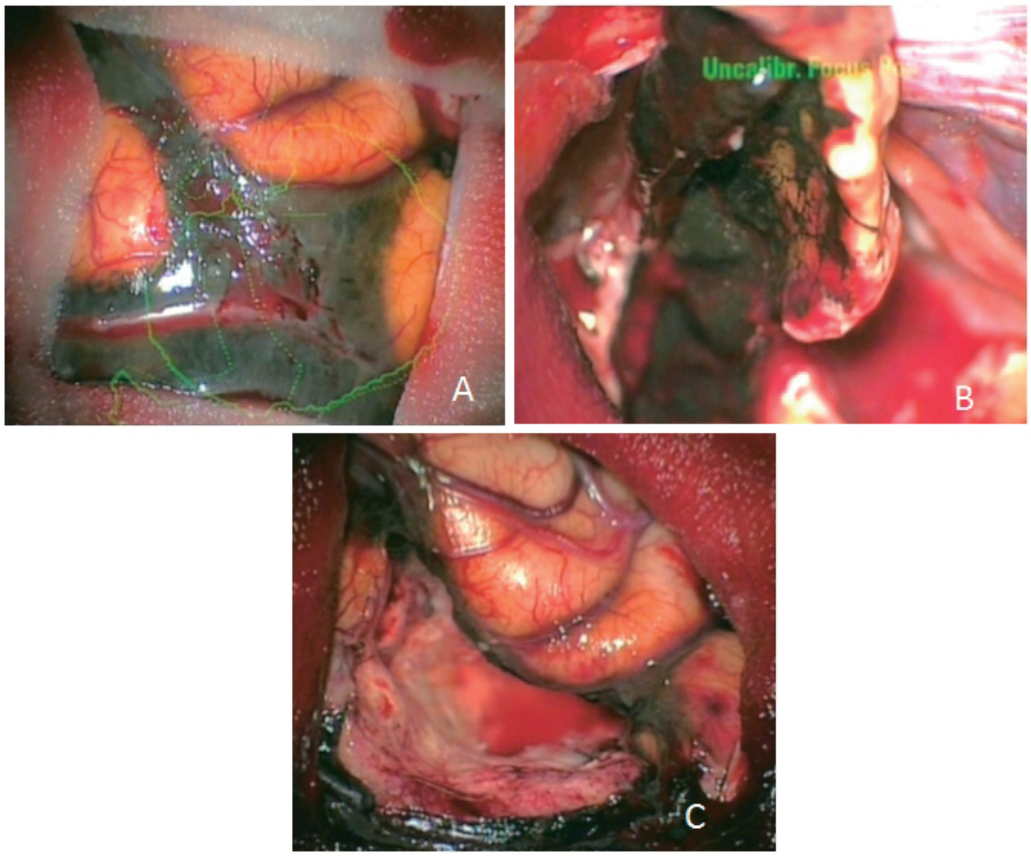

Fig. 2 A, B, C: Intraoperative microscopic views show the black malignant melanoma tissues spread in subarachnoid space (A), the border with normal brain was not clear (B), and tumor tissues of subarachnoid space were residual (C).

lesion resection were performed. The patient was then turned to a supine position under general anesthesia, after which a right frontal craniotomy and a frontal lesion resection were performed. Both frontal and parietal lesions consisted of soft and fragile black tissues. The black malignant melanoma tissues had invaded the subarachnoid space (Fig. 2A). The border between the tissues and normal brain could not be distinguished (Fig. 2B). Both lesions were resected, but the malignant melanoma tissues in the subarachnoid space were residual (Fig. 2C). Histological examinations showed typical numerous pleomorphic and hyperchromatic cells, which confirmed the diagnosis of metastatic malignant melanoma.

The patient's neurological symptoms improved dramatically following the surgery. Her consciousness disturbance, right hemiparesis and symptoms of Gerstmann syndrome could no longer be seen. Her Karnofsky Performance Status improved from 20% to 90%. She was discharged to her home 10 days after the operation, almost completely free of neurological deficits. Following surgery, the patient received a course of whole brain radiation therapy consisting of 30 Gy in 10 fractions, and chemotherapy at another hospital. Then she presented with pain in her extremities, but there were no signs of bone metastases detected by FDG-PET and bone scintigraphy. MR images showed a mild enlargement of the left head of the caudate nucleus lesion, but no signs of problems around previous surgical resections (Fig. 3A, B, C). Spinal MR images revealed a small mass lesion attached to the spinal dura mater at the atlas level (Fig. 3D, E, F). The patient

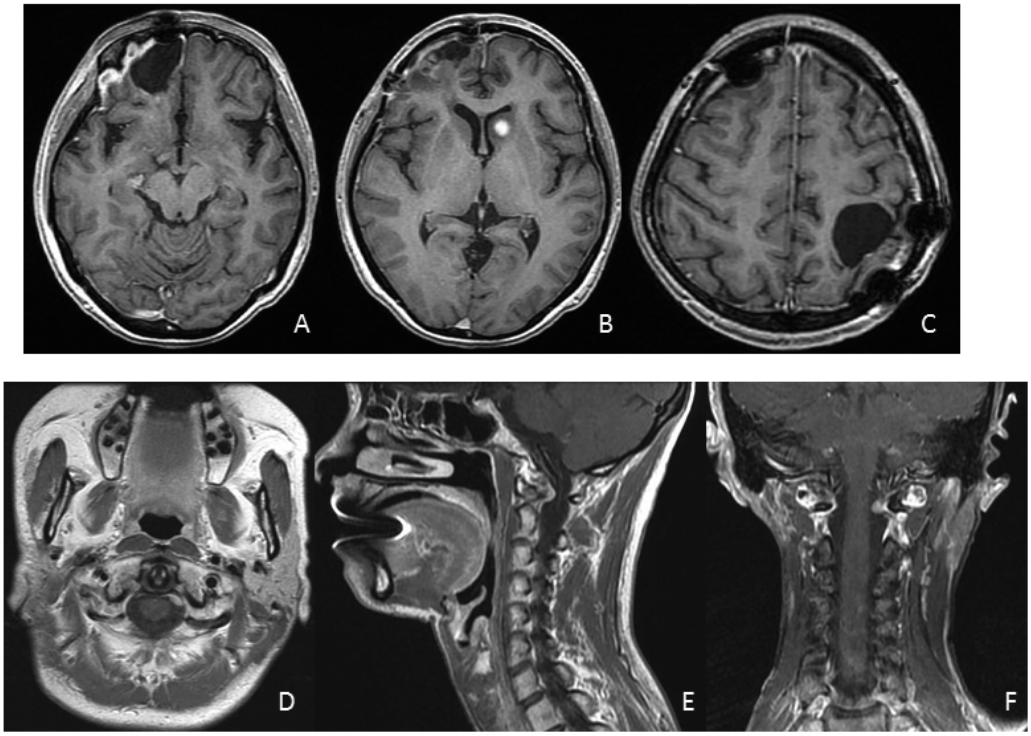

Fig. 3 A-C: MR T1-weighted images with gadolinium show mild enlargement of the left head of the caudate nucleus lesion 3 months after the operation (A), but not presenting recurrence as mass lesions at left frontal and right parietal lesions (B, C).
D-F: Spinal MR T1-weighted images with gadolinium revealed a small mass lesion attached to spinal dura mater at the atlas level with no signs of spinal cord compression 3 months after operation.

presented with a generalized seizure and was again admitted to a nearby hospital. Eventually, she was able to spend time with her family for 3 months at home. Her clinical symptoms gradually deteriorated, and she died 4 months after the operation. No autopsy was performed.

DISCUSSION

Melanomas are the third most common source of intracranial metastases after breast and lung carcinomas.[9,10] The incidence of central nervous system (CNS) metastases in patients with melanomas ranges from 10% to 40% in clinical studies.[6,11] CNS metastasis is the most worrisome feature of malignant melanoma, leading directly to death in the majority of patients.[6,12] A standard treatment for patients with metastatic malignant melanoma has not been established. The prognosis for patients with malignant melanoma brain metastasis is poor, with a median survival time ranging between 2 to 10 months.[13-15,17,18] It is noteworthy that only 10% of patients survive more than 1 year after diagnosis.[19]

An important factor strongly influencing the therapeutic response of patients is the number of metastases.[5-8] Age, sex, and the time interval from the primary malignant melanoma manifestation to the cerebral metastasis seem not to affect the clinical outcome.[5] The intracranial secondary spread of malignant melanoma is frequently multiple.[4,8] Prospective randomized trials have demonstrated the benefit of surgery for the treatment of a single metastasis in the brain.[20] Surgical therapy is ordinarily used for the majority of patients with a single metastatic lesion,[21] but only a few selected patients with multiple metastases in the brain are treated surgically.[2] Recently, Konstadoulakis *et al*. reported that the median survival time of surgical resection for multiple brain metastases was 8 months.[2] They concluded that performing multiple resections of brain metastases from melanoma is considered a radical approach, especially in young patients with well-controlled systemic disease. The main aim of a simultaneous one-stage resection for multiple metastatic lesions is limited improvement in the quality of the patient's limited remaining life, so the indications are extremely limited. The two preconditions are that the patients are young and have well-controlled systemic disease, and that dramatic improvements of neurological symptoms may be expected following the resections.

The surgical options for managing two intracranial lesions are influenced by the presence of another intracranial tumor. When two lesions are contiguous, they may usually be removed using a single approach, but when they are distant from each other, the surgical approach depends upon the type of lesions.[22] When one tumor is malignant and the other is benign, the malignant tumor must be removed first. A second craniotomy may be performed at least 10 to 12 months later, when the benign tumor is large enough and/or symptomatic, or shows a tendency to grow. When the two lesions are malignant, large, or symptomatic tumors, both lesions may require early resection. In such cases, there is no consensus as to the best surgical management.

In the present case, the patient presented with two large distant symptomatic metastatic lesions. Therefore, we selected simultaneous one-stage tumor resection with a left parietal craniotomy and a right frontal craniotomy, and found no adverse events associated with the simultaneous one-stage operation. The one-stage operation using two approaches has several risks. The patient's surgical position must be changed under general anesthesia, and the operation time is longer, and more invasive. Nevertheless, the significant reduction of intracranial pressure obtained by surgery may produce immediate and dramatic improvements of the patient's neurological symptoms. The conventional treatment for multiple metastatic brain tumors is radiotherapy.[23] The superiority surgical treatment has over radiotherapy for managing multiple metastatic brain tumors is an immediate reduction in intracranial pressure. While our patient's survival period was not extended,

her symptomatic improvements enabled her to return home and spend time with her family. Because it improves the quality of the patient's limited remaining life, simultaneous one-stage tumor resection using two approaches is a viable option for the surgical management of multiple metastatic brain tumors, especially in young patients with well-controlled systemic disease.

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