A Case of Cerebral Metastasis from Malignant Fibrous Histiocytoma

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Abstract

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This is a rare case of cerebral metastasis from malignant fibrous histiocytoma (MFH) of the soft tissue. A 62-year-old man underwent craniotomy for resection of multiple intracerebral masses under the impression of metastatic brain tumor with unknown primary site. Preoperative investigation failed to detect any extracranial lesion. At six months after the operation and whole brain radiotherapy, right shoulder mass was detected to grow and excised. Specimen from the brain and shoulder lesions revealed identical pathological findings of malignant fibrous histiocytoma except existence of glial fibrillary acidic protein (GFAP)-positive cells only in brain lesions. Palliative radiotherapy was performed for subsequently developing metastatic lesions in skeletal system. At twelve months after initial diagnosis recurrent lesion at right shoulder was detected and chemotherapy is given.

This case is unique because metastatic brain lesion from MFH is rare and also cerebral metastasis as an initial manifestation of MFH has not been reported before. Another important finding is that there was expression of GFAP only in brain lesions but not in extracranial primary site lesion. Although the presence of GFAP-positive cells is thought as one of characteristic histological findings of primary intracranial MFH, our observation supports the hypothesis that GFAP-positive cells in primary intracranial MFH may be nonneoplastic astrocytes secondarily involved by MFH.

KEY WORDS Malignant fibrous histiocytoma (MFH) • Cerebral metastasis • Glial fibrillary acidic protein (GFAP).

Introduction

Malignant Fibrous Histiocytoma (MFH) is the most common type of adult soft tissue sarcoma occurring mainly in fifth decade of life, most frequently in the extremities. Histologically MFH is defined as a malignant tumor with a pleomorphic spindle-celled structure, but devoid of any specific pattern of histological differentiation. The incidence of cerebral metastasis in MFH is very low compared with that in other cancers. It was reported that among the patients with multi-organ metastases from MFH only 3% of the patients had cerebral lesions. Synchronous metastatic lesions are diagnosed occasionally, however, presentation of metastatic lesions before documentation of primary site is very rare and was observed only in one case from the series of 200 patients with MFH. Cerebral metastasis as an initial manifestation of MFH has not been reported before.

The authors present a case of cerebral metastasis from MFH. In this case metastatic brain lesions were diagnosed before the presence of detectable extracranial primary les-
ion. In addition to the unique mode of onset, there was a difference in the expression of GFAP according to the location of the lesions. It is known that existence of GFAP-positive cells is one of the histological characteristics of primary intracranial MFH but not in extracranial MFH\(^9\)\(^{14}\). Differential expression of GFAP according to the location in our case supports the hypothesis that GFAP-positive cells in primary intracranial MFH are nonneoplastic astrocytes secondarily involved by MFH.

**Case Report**

A 62-year-old man was transferred to our hospital complaining headache and weakness of his left side of body. He exhibited slight weakness in left side of body (motor grade IV+) and left homonymous visual field defect. Brain MRI scans revealed multiple mass lesions in right temporo-occipital lobe, right frontal lobe and right cerebellum. These tumors showed high signal intensity on T2-weighted images and strong enhancement on gadolinium-enhanced T1-weighted images (Fig. 1). Under the impression of metastatic brain tumor systemic investigation for primary site was performed. Preoperative studies including chest CT, abdominal sonography, Tc-99m MDP bone scan and gastroduodenoscopy did not reveal any pathologic lesion outside the brain. Chemical and hematological profiles including several tumor markers did not show abnormality either. Craniotomy was performed and three lesions in right temporo-parieto-occipital area were removed. The gross finding in operative field was not different from common metastatic tumors with relatively harder consistency than that of brain and well demarcated tumor border. On histological examination, the tumors were composed of pleomorphic round cells with abundant eosinophilic cytoplasm (Fig. 2 left). Some cells had cytoplasmic processes that were reactive for GFAP (Fig. 2 right). Though the radiological finding was very unusual for primary brain tumor the diagnosis of glioblastoma was given by pathologist based on the immunoreactivity of the tumor cells.

Postoperatively he received 50 Gy of whole brain irradiation over 5 weeks. At 6 months after craniotomy, he complained of low back pain and newly developing right shoulder mass. MRI scan of shoulder revealed 8.6X3.8X5cm sized soft tissue mass which is broadly abutting to posterior aspect of scapula (Fig. 3). MRI scan of lumbar spine also showed multifocal lesions in right L1 body and L4, L5, and S1 spinous processes suggesting metastatic lesions. Operation was performed for excision of right infraspinatus area mass. The tumor had soft consistency with...
adhesion to surrounding tissues including scapula. On histologic examination, the tumor was composed of pleomorphic round to spindle cells with eosinophilic cytoplasms compatible with high grade sarcoma. There were abundant atypical mitoses. Histological findings of the shoulder mass was completely similar to those of the brain lesions except lack of immunoreactivity for GFAP. Tumor cells were positive for α1-antitrypsin and negative for S-100 protein and muscle markers (Fig. 4). Based on the pathologic findings, the shoulder mass was diagnosed as MFH. Bone scans after intravenous administration of Tc-99m MDP 25mCi revealed active bone lesions in the left seventh and eighth costovertebral junction, right seventh costochondral junction and hip joint. Finally the pathologic diagnosis was revised to malignant fibrous histiocytoma of shoulder with multiple metastases to brain and skeletal system. Palliative radiotherapy of 30 Gy was given to the vertebral lesions on T12 through L2 level. At 2 months later he complained of pain on the right lower chest area and back. There was palpable bony protrusion on the back at T8 level. Plain T-spine radiography showed compression fracture of the body of T8 vertebra. Bone scans demonstrated new lesion in the T8 spine and aggravation of left femoral head lesion compared to previous study. Also there were focal increased uptake in the L2, L4-5 vertebra and right iliac crest suggesting development of new lesions. Another session of palliative irradiation was done on T7 through T9 vertebra and left femur. At 12 months after the onset of initial symptoms recurrent lesion at right shoulder developed and he is undergoing chemotherapy. So far there is no evidence of recurrence in the brain.

Discussion

MFHs develop at average 58 years of age, with males outnumbering females 3 to 1 (11,20). The majority of lesions are located in the extremities, retroperitoneal space, or trunk, with under 1% being found in the chest wall, thigh or buttock (11). MFH is fully malignant sarcoma with two-year survival of 60%, recurrence rate of 44% and metastatic rate of 42% (19). Lung is the most common site of metastasis (19), and cerebral metastasis in MFH is a rare event. In a report from the analysis of 200 patients with MFH cerebral metastasis were diagnosed in only 2 cases (19). Recently it was reported that the rate of metastases to the brain in MFH was increasing due to development of diagnostic technique and improved survival by chemotherapeutic agents which can control extracranial lesions but not intracerebral lesions because of blood brain barrier (5,23). However, it is very unusual that metastatic brain lesions present as an initial manifestation in MFH (19). In our case metastatic brain lesions were diagnosed initially and a primary lesion could...
be identified 6 months later and the authors could not find a similar case in the literature.

Though neuroradiological findings strongly suggested cerebral metastasis a pathologist could not make a diagnosis of MFH for the brain lesions. Pathologic diagnosis for the cerebral lesions as glioblastoma was given initially because pleomorphic appearance of tumor cells was not unusual for glioblastoma and was less likely to be a finding in other common primary and metastatic tumors. Additionally presence of GFAP-positive cells within the tumor made the diagnosis of glial tumor more likely. However, the clinical course of the patient and histological similarity of the brain lesion to the extracranial lesion finally established to make a correct diagnosis of MFH. Though expression of GFAP is unusual for metastatic brain tumors the shedding to make a correct diagnosis of MFH. Though expression of GFAP is unusual for metastatic brain tumors the presence of GFAP-positive cells are not the primary property of MFH but the secondary phenomenon hypothesis that presence of GFAP-positive cells are not the cause it is known that GFAP-positive cells exist in primary diagnosis of metastasis from MFH cannot be excluded because it is known that GFAP-positive cells exist in primary intracranial MFH14). Typically they are not present in extracranial MFH and it was suggested that GFAP-positive cells in MFH may be nonneoplastic astrocyte secondarily involved by MFH considering low index of proliferative potential914). In our case expression of GFAP was identified only in the brain lesion too. This finding supports the hypothesis that presence of GFAP-positive cells are not the primary property of MFH but the secondary phenomenon provoked by MFH in the brain914).

In conclusion, this case shows a rare example of intracerebral metastasis as an initial manifestation of MFH, limitation of diagnostic specificity of GFAP as a glial tumor marker and possibility of expression of GFAP as a secondary phenomenon in MFH.

References

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