Primary Intramedullary Spinal Cord Germinoma
—Case Report—

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Abstract
A 21-year-old woman presented with an intramedullary spinal cord germinoma and a history of gait disturbance and elimination disorder. Magnetic resonance (MR) imaging demonstrated two isolated lesions, one located within the medulla between T9 and T11, and another at the cauda equina (L2 to L3 levels). After partial reduction of the intramedullary mass, histological findings revealed that the tumor was typical germinoma. Further MR imaging revealed no evidence of intracranial germinoma. Combined chemotherapy (carboplatin and etoposide) and whole spine radiation were performed. Follow-up MR imaging showed that the enhanced mass at the L2–L3 levels had disappeared. No recurrence of the tumor has been detected 3 years after the operation, and no dissemination into the cranial area was detected. Cisplatin and etoposide chemotherapy combined with radiotherapy is recommended for primary spinal germinoma, and is effective for inhibition of both tumor dissemination and recurrence.

Key words: spinal cord, germinoma, surgery, chemotherapy, radiation

Introduction

Germ cell tumors account for 1–3% of intracranial neoplasms and are associated with spinal metastases in 10–20% of cases of intracranial germinoma. Conversely, primary intramedullary spinal cord germinomas are rarely reported, but many of the reported cases occur in Asian patients. Spinal germinomas are difficult to identify based on the neuroimaging findings because of the similarity with spinal astrocytomas and ependymomas. However, correct diagnosis is important, because patients with germinomas can be treated with chemotherapy and radiotherapy, in contrast to patients with astrocytomas. We report a rare case of primary spinal germinoma which occurred in two separate localized areas without intracranial lesion.

Case Report

A 21-year-old female came to our institution with a gait disturbance and elimination disorder. She had suffered from intermittent lower back pain, constipation, and urinary urgency for one year. Neurological examination revealed right leg numbness and bilateral paresthesia. Magnetic resonance (MR) imaging on admission demonstrated the mass as two parts: a fusiform, heterogeneously enhanced, intramedullary mass at the T9–T11 levels, and a rod-shaped, slightly enhanced mass in the cauda equina at the L2–L3 levels (Fig. 1). Right hemilaminectomy was performed between T8 and T11, with subtotal removal of the T9–T11 level mass. The tumor appeared after midline myelotomy, was slightly solid, and had well-defined borders, unlike astrocytoma (Fig. 2). Histological examination revealed that the tumor was typi-
Intraoperative photograph after right hemilaminectomy between T8 and T11 showing midline myelotomy exposed the slightly solid tumor with well-defined borders (arrow).

Photomicrographs demonstrating typical germinoma (left: hematoxylin and eosin stain, ×400), and positive immunohistochemical staining for placental alkaline phosphatase (right: ×400).

Follow-up T2-weighted (left) and T1-weighted with gadolinium (right) magnetic resonance images obtained 3 months after treatment showing the intraspinal mass was reduced and the tumor in the cauda equina had completely disappeared.

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gonadotropin was below 0.1 mIU/ml. Contrary to our expectations, further MR imaging revealed no evidence of intracranial germinoma. The diagnosis was primary spinal germinoma.

Chemotherapy was administered concurrently with local spine radiation (25.2 Gy) after three cycles of carboplatin and etoposide. Follow-up MR imaging obtained 3 months after treatment revealed that the enhanced tumor at the L2–L3 levels had vanished, and the mass effect at the T9–T11 levels was also vanished (Fig. 4). No tumor recurrence or any disseminating intracranial lesions have been identified over the past 3 years.

Discussion

Primary intramedullary spinal cord germinomas are rare, with only 15 previously reported cases. Primary spinal germinomas are often located at the lower thoracic levels, and spread to three or four vertebral levels. Germ cell tumors can be cured by chemotherapy and radiotherapy, in contrast to astrocytomas which require radical surgery. The MR imaging findings of spinal germinoma are similar to spinal astrocytoma, appearing as hypointense or isointense mass on T1-weighted imaging, and hyperintense mass on T2-weighted imaging, with moderate enhancement by gadolinium-diethylenetriamine penta-acetic acid. Therefore, spinal germ cell tumors are difficult to distinguish from spinal astrocytomas based on the neuroimaging findings. In our case, MR imaging identified another lesion in the cauda equina. Although dissemination is rare in low grade astrocytoma in the spinal cord, high grade spinal gliomas or germinomas sometimes disseminate aggressively to other spinal or intracranial levels. Therefore, search of the whole spine and cranium for disseminated tumors or lesions, and exclusion of the presence of cysts is useful in diagnosis. Furthermore, MR imaging of previous cases indicates that spinal germinomas may be characterized by swollen spinal cords in the anteroposterior direction on T2-weighted imaging.

In our case, combined chemotherapy using three cycles of carboplatin and etoposide was performed with whole spine radiation (24.5 Gy per 14 fractions), the same protocol used for pure intracranial germinomas. Although vincristine, bleomycin, or methotrexate have been used for spinal germinoma, the combination of carboplatin, etoposide, or ifosfamide has usually been administered in more recent cases. Intraspinal germinomas have immunohistochemical similarities to intracranial germinomas, including expression of PLAP and c-kit. Therefore, primary spinal germinomas are also cured by carboplatin and etoposide combined with local radiotherapy, similar to pure intracranial germinomas, which are classified as tumors with good prognosis. Previous treatments with either radiotherapy or chemotherapy have resulted in relatively high recurrence or dissemination rates, so we expected that combination therapy would effective for multiple intraspinal lesions. In our case, follow-up MR imaging obtained 3 months after the combined treatment revealed that the enhanced tumors had vanished.
at both levels. Follow-up intracranial and whole spinal MR imaging have not detected any disseminations or recurrences in 3 years. Therefore, combination therapy is recommended for spinal germinomas.

The present rare case of primary spinal germinoma disseminated into the cauda equina. Cisplatin and etoposide chemotherapy combined with radiotherapy is recommended for primary spinal germinoma, and is effective for inhibition of both tumor dissemination and recurrence.

References


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