

Intramedullary Spinal Cord Metastasis: A Rare and Devastating Complication of Cancer

—Two Case Reports—

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Abstract

Two cases of very rare intramedullary spinal cord metastasis from colon carcinoma and renal carcinoma were treated primarily by microsurgical excision. A 44-year-old female presented with colon carcinoma metastasis manifesting as complete neurological deficit. She had undergone colon resection 2 years previously for colon carcinoma. The tumor was excised by microsurgery with megadose steroid therapy but she remained paraplegic. A 43-year-old man presented with renal carcinoma metastasis manifesting as incomplete neurological deficits. He had undergone nephrectomy one year previously for renal carcinoma. The tumor was removed by microsurgery. He made a remarkable neurological recovery and became ambulatory after physical therapy.

Key words: spinal cord, intramedullary metastasis, cancer complication, paraplegia

Introduction

Cancer metastases commonly occur in the spinal structures, but pure intramedullary involvement in spinal cord is an unusual location for dissemination. Intramedullary involvement indicates the occurrence of remote dissemination and thus the terminal phase of cancer, so the patient is expected to have limited survival.^{7,11,15} Therefore, prognosis for this rare complication is unclear, especially in patients with early diagnosis based on incomplete neurological deficit.

Case Reports

Case 1: A 44-year-old female dentist had undergone colectomy and oophorectomy 2 years previously under a diagnosis of colon carcinoma. She was admitted to another hospital with complaints of headache and nausea in October 1999. Computed tomography (CT) confirmed two separate left parietal metastatic mass lesions. She underwent craniotomy and the lesions were totally excised. She complained of right leg numbness and cranial CT revealed only postoperative changes in the left parietal region in January 2000. Follow-up examina-

tion found bilateral lower extremity weakness. Thoracolumbar magnetic resonance (MR) imaging was planned, but acute paraplegia developed with anesthesia below the T-6 level, bilateral positive Babinski's sign, and incontinence during the one-day delay. MR imaging revealed no abnormalities except a barely visible syrinx cavity extending between T-2 and T-11. However, contrast enhancement demonstrated an intramedullary mass lesion of approximately 2 cm diameter at the T-6 level (Fig. 1). Urgent microsurgery was performed to excise the lesion. Megadose steroid therapy was given before surgery. Intraoperative examination found slight medullary swelling. The tumor was seen through the midline arachnoid opening and was removed with the surrounding gliosis tissue from the spinal cord. The patient did not improve after surgery and remained paraplegic even after physical therapy. Histological examination confirmed the diagnosis of adenocarcinoma metastasis (Fig. 2). After 14 months, the patient died of mediastinum metastasis of colon carcinoma.

Case 2: A 43-year-old male patient had undergone nephrectomy under a diagnosis of left renal carcinoma and received chemotherapy in June 1997. One year after the operation, he complained of low back pain, weakness of the lower extremities, and incontinence. Neurological examination revealed



Fig. 1 Case 1. T₁-weighted magnetic resonance image with gadolinium showing an intramedullary mass lesion at the T-6 level.



Fig. 3 Case 2. T₁-weighted magnetic resonance image with gadolinium showing an intramedullary mass lesion at the L-1 level (arrow).

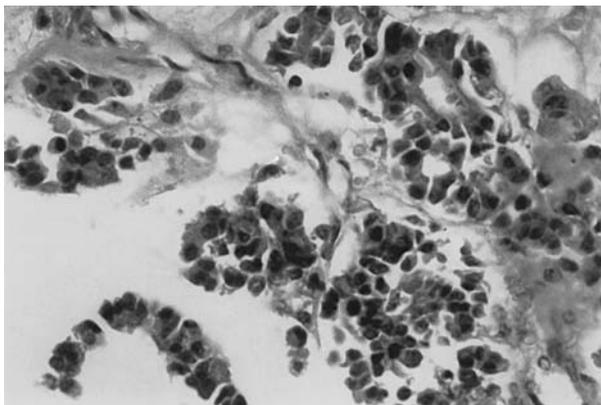


Fig. 2 Case 1. Photomicrograph showing the intramedullary metastasis from colon carcinoma at the edge of the glial tissue. HE stain, ×200.

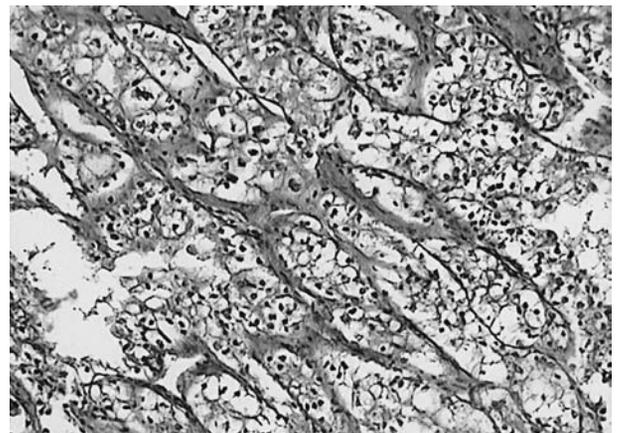


Fig. 4 Case 2. Photomicrograph showing the metastasis from renal cell carcinoma as adenoid structures formed by cells with large nucleus and wide transparent cytoplasm. HE stain, ×200.

2/5 paraparesis of the lower extremities, bilateral positive clonus and Babinski's signs, and increased deep tendon reflexes. Lumbar spinal MR imaging showed an intramedullary mass lesion measuring 0.5 × 0.5 cm at the L-1 level appearing as hypoin-

tense on T₁-weighted image and hyperintense on T₂-weighted image, with contrast enhancement (Fig. 3). The demarcation line between the tumor and neural tissue could easily distinguished during surgery and the lesion was excised totally by microsurgery. Histological examination confirmed the diagnosis of renal cell carcinoma metastasis (Fig. 4). The patient showed remarkable neurological recovery and became ambulatory after physical therapy. Nevertheless, he died of systemic organ metastasis of cancer 6 months later.

Discussion

Intramedullary spinal cord metastasis accounts for 3% to 5% of cases of myelopathy in cancer patients.^{7,13)} MR imaging has increased the rate of detection, so the true incidence is probably higher. Prospective examination of the entire neuraxis at necropsy in 1066 patients with disseminated cancer found 200 cases of intraparenchymal central nervous system metastases (18.8%), of which 171 cases had multiple sites of central nervous system involvement.²⁾ Lung cancer was found to be the most common source of intramedullary spinal cord metastasis, accounting for 64% of the reported cases, followed by breast cancer with 11%, melanoma 5%, renal cell cancer 4%, colorectal cancer 3%, and lymphoma 3%, and the primary tumor remained unidentified in 5% of cases.^{4,7,11,14-16,24)}

Non-neoplastic lesions such as radiation myelopathy, demyelinating plaques, and paraneoplastic necrotizing myelopathy can be difficult to differentiate from intramedullary spinal cord metastasis.²²⁾ Once an intramedullary lesion has been excluded by the appropriate imaging studies, the differential diagnosis of intramedullary spinal cord metastasis in a patient with known cancer includes paraneoplastic myelopathy and coincident nutritional, demyelinating, inflammatory, or vascular myelopathy.²²⁾ Myelography and CT myelography generally give negative findings, especially in patients with small lesions which do not alter the contour of the spinal cord.^{17,21,26)} MR imaging with contrast medium may be the most reliable diagnostic procedure for patients with intramedullary spinal cord metastasis.^{9,17,23,26)} However, MR imaging without contrast enhancement may not visualize the lesions as in our Case 1.

Patients with systemic cancer tend to develop metastases, so complaints of neurological deficits, even minimal hypesthesia, must be evaluated with regard to the involvement of central nervous system. The symptoms are weakness, sensory deficits, pain, and urinary incontinence in the order of

frequency.^{6,10,23,25)} None of these features can reliably differentiate intramedullary spinal cord metastasis from malignant extramedullary spinal cord compression, but the duration of symptoms is generally shorter in the case of intramedullary spinal cord metastasis. However, markedly asymmetric dysfunction of the spinal cord mimicking Brown-Séquard's syndrome has been previously reported in about 30-40% of all patients, but is exceptional in patients with epidural spinal cord compression.^{6,18,20,23)} Hemicord spinal dysfunction occurs in 1% to 8% of patients with epidural spinal cord compression.^{1,10,25)} Asymmetric cord compression is not pathognomonic but raises the suspicion of intramedullary spinal cord metastasis, so MR imaging with gadolinium should be performed.

Intramedullary metastasis is rarely the only site of central nervous system involvement. Brain metastasis may be identified concurrently or previously in most patients, as in our Case 1.^{13,15,19)} Brain metastasis is found in 50% to 59% of patients.^{6,11)} Although multiple pathogenetic mechanisms have been suggested for intramedullary metastasis, hematogenous dissemination is believed to account for the majority of cases.^{12,20)}

Treatment modalities for intramedullary spinal cord metastasis vary from dexamethasone and radiotherapy to retain the ambulatory status of patients, to microsurgical resection or both.^{3,5,8,11,27,28)} Neurological recovery may not occur, especially if the initial defect is severe, whatever treatment modalities are performed.^{14,29)} Our Case 2 with renal carcinoma metastasis had incomplete neurological deficit at admittance showed good recovery and became ambulant. However, our Case 1 was paraplegic before the operation and did not change after the tumor resection. Both patients also received dexamethasone therapy but not radiotherapy.

Microsurgical resection of intramedullary spinal cord metastasis presents some difficulties such as locating the tumor during the surgery, but dissection of the tumor from the neural tissue is relatively easy as compared to other primary medullary tumors. We believe that early surgery combined with dexamethasone therapy will provide the optimum recovery in patients with intramedullary spinal cord metastasis.

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