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CASE REPORT

Metachronous brain and intramedullary spinal cord metastases from nonsmall-cell lung cancer: A case report

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Abstract A 44-year-old man had a brain tumor secondary to lung adenocarcinoma and underwent craniectomy to remove the brain tumor. After postoperative whole-brain radiation therapy, he underwent pneumonectomy followed by chemotherapy, mediastinal radiotherapy, and target therapy for lung cancer. Thirty-six months after the initial brain surgery, he suffered from neck pain and right upper limb numbness that rapidly progressed to upper extremity weakness and paralysis in 2 months. Magnetic resonance imaging demonstrated an intramedullary spinal cord lesion at the C4 level. Laminectomy and gross intramedullary tumor removal were performed. The patient's neurological function improved after the operation. Nevertheless, 4 months after the intramedullary tumor removal, he began to show multiple metastases. Unfortunately, the patient died from respiratory failure 8 months after diagnosis with intramedullary spinal cord metastasis. In this case, early diagnosis and aggressive surgical treatment combined with postoperative radiotherapy and chemotherapy might have provided this patient with a prolonged survival and better quality of life.

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Introduction

Lung cancer is a common and fatal malignancy [1]. Metastases to the central nervous system such as the brain and meninges are often seen in patients with primary lung cancer [2]. However, intramedullary spinal cord metastasis (ISCM) from lung cancer is relatively rare compared with other system malignancies. Among cases of metastasis to the central nervous system (CNS), the frequency of ISCM is 4.2—8.5% in published autopsy reports [3—5].

The clinical features of ISCM have been described as a rapidly progressive neurological deficit [6]. Therefore, prognosis of ISCM is poor [7]. In a cohort study, individuals with brain metastases show a median survival time of 2.7 months after first admission with brain metastases. For lung cancer patients with brain metastasis, the survival time is even shorter. On average, these patients survive 2.5 months after their first admission with brain metastases [8].

Involvement of other sites within the CNS has been shown to be common in patients with ISCM. In Schiff and O'Neill's report, 32.5% of patients with ISCM had a history of brain metastasis preceding the diagnosis of ISCM [9]. The published medical literature rarely shows a good long-term survival in patients with primary lung cancer and brain metastasis. Moreover, the prognosis of patients with primary lung cancer and brain metastasis deteriorating to ISCM is worse.

In this report, we present a patient with metachronous brain and ISCM from lung cancer.

Case report

A 44-year-old man was transferred to the neurosurgery department due to a 2-week history of headache, dizziness, and left leg numbness. He had a one-pack-a-day history of smoking lasting more than 20 years. His Karnofsky Performance Status (KPS) was 90%, without any adverse prognostic factors such as weight loss or laboratory abnormalities.

His preoperative chest X-ray film showed no definite diagnostic anomaly (Fig. 1A). Brain magnetic resonance imaging (MRI) found a heterogeneous nodule in the right postcentral gyrus (Fig. 2A). The cerebral lesion was completely surgically removed (Fig. 2B). Pathology revealed a metastatic adenocarcinoma, and immunohistochemical studies showed positivity for both TTF-1 and CK 7 (Fig. 3A—C), suggesting a pulmonary origin. Whole-brain radiation therapy (WBRT), consisting of a total dose of 3400 cGy in 200-cGy daily fractions, was administered postoperatively.

Chest computed tomography (CT) was performed and revealed metastatic disease in the middle mediastinum (see Fig. 1B). An endobronchial lesion was found on bronchoscopy, and the biopsy demonstrated bronchogenic adenocarcinoma. Left pneumonectomy was performed after WBRT. Pathology revealed a moderately differentiated, lung adenocarcinoma (pT2N1M1) (Fig. 3D).

After lung surgery, the patient's KPS remained at 90%. He underwent five courses of chemotherapy with paclitaxel and cisplatin. Subsequently, positron emission tomography found multiple intense foci of fludeoxyglucose-avid lesions in the mediastinal lymph nodes and left posterior cervical lymph nodes. As a metastatic lesion was highly suspected, radiotherapy with a total dose of 5220 cGy for a mediastinal metastasis was performed. In addition, the patient continued chemotherapy with two courses of paclitaxel alone, one course of intravenous vinorelbine, and six courses of pemetrexed. In addition, he had target therapy with gefitnib for 2 months.

Three years after the initial brain surgery, the patient began to suffer from neck soreness followed by right upper limb numbness. Two months later, these neurological symptoms rapidly progressed to upper extremity weakness and paralysis. At that time, his KPS was 60%. The cervical spine MRI showed an intramedullary tumor at C4 level (Fig. 4A). Therefore, he underwent C3—C5 laminectomy with gross removal of the C4 intramedullary tumor. The surgical pathology revealed a metastatic adenocarcinoma

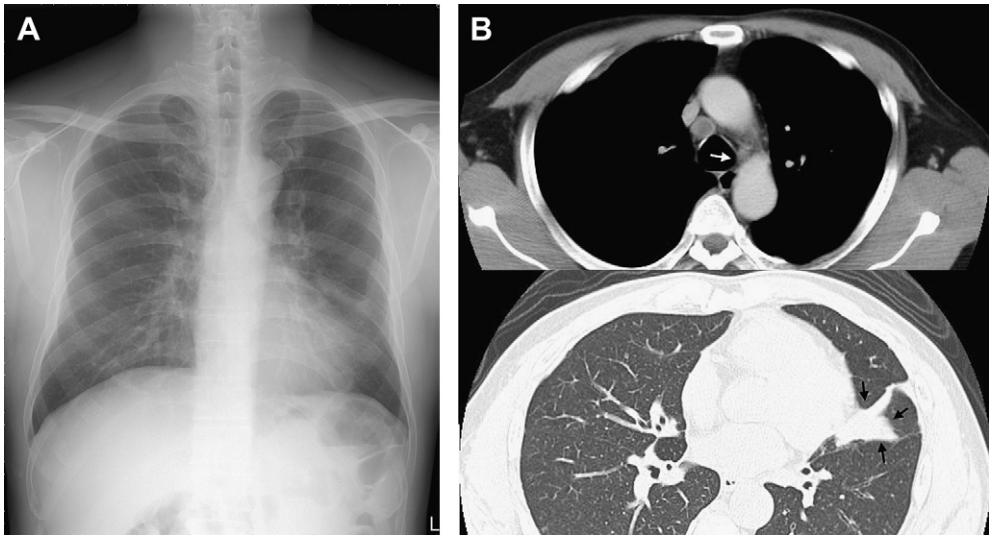

Figure 1. **(A)** Chest plain film showing no definite diagnostic anomaly. **(B)** A chest computed tomography scan shows metastatic disease in the middle mediastinum (white arrow) with partial atelectasis of the left lingular lobe (black arrows).