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Intramedullary Spinal Cord Metastases and Radiation Therapy: A Case Report

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Introduction

Intramedullary spinal cord metastases (ISCM) are a clinically rare, although devastating, complication of disseminated cancer. These lesions have been reported to originate from many types of solid tumors, although primary lung carcinoma, particularly small cell, is the most common etiology. These metastases, which can occur anywhere along the spinal cord, often represent the end-stage of the disease process with limited survival outcomes.

Patients with ISCM may develop a variety of neurological deficits with treatment goals aimed at palliation. Different modalities of treatment have been found to preserve or restore ambulation and neurological function. The options for therapeutic intervention include surgical, chemotherapeutic, and radiation therapy. We describe a case of ISCM in a patient with disseminated small cell lung cancer with magnetic resonance imaging that illustrates a complete tumor response to radiation therapy

Case Report

In December of 2006, a 63 year-old male presented with extensive stage small cell lung carcinoma. Upon initial presentation, this patient had a very large, left pulmonary mass, mediastinal lymphadenopathy, multiple hepatic lesions, and several osseous lesions. Due to the extent of his disease, the patient was referred to medical oncology and treated with chemotherapy. A PET scan on July of 2007 revealed radiographic resolution of his malignancy following his chemotherapy. On October 3rd of 2007, after presenting with dizziness, it was found he had metastasis to his cerebellar vermis. These metastases were treated with 30 Gy of whole brain radiation therapy and his vertigo significantly improved. A follow-up brain MRI showed a complete response to treatment with no residual metastases found.

In December of 2007, the patient presented with bilateral shoulder and neck pain. The pain started in his right shoulder radiating to his mid neck and then to his left shoulder. The pain had been intermittent, but intense, over the previous few weeks and progressed to right arm numbness. There was no associated muscle weakness in his upper or lower extremities bilaterally. The patient displayed some mild right hand intrinsic weakness; deep tendon reflexes were found to be slightly increased in his lower extremities versus his upper extremities. An open MRI with and without IV contrast of the cervical spine was performed. A contrast enhancing mass within the cervical spinal cord was noted and reported as an ependymoma, due to the infrequency of intraparenchymal metastasis. To get better definition of the lesion, a repeat closed high-resolution MRI of the cervical, thoracic, and lumbar spine was performed. The cervical contrast enhancing lesion was found to be three separate intramedullary multifocal with measured total length of 4.5 cm (Figure 1A). There were no other lesions in the spinal cord. The presence of three distinct lesions in the setting of metastatic disease was consistent with multiple intraparenchymal metastatic disease rather than a primary intramedullary neoplasm (ependymoma).

The patient's disease was in remission and 30 Gy of cervical spine radiation was administered. The patient reported that his symptoms of pain and numbness resolved completely with the radiation therapy.

A follow-up MRI demonstrated a complete response and no evidence of the ISCM lesion (Figure 1B).

Discussion

Although rarely reported, ISCM have been found in 0.9% to 2.1% of cancer patients by autopsy, suggesting that thousands of patients are afflicted yearly¹. Primary lung carcinoma is the most common etiology and reported to occur in up to fifty percent of cases of ISCM². In one retrospective



Figure 1A

Cervical MRI, prior to 30 Gy radiotherapy

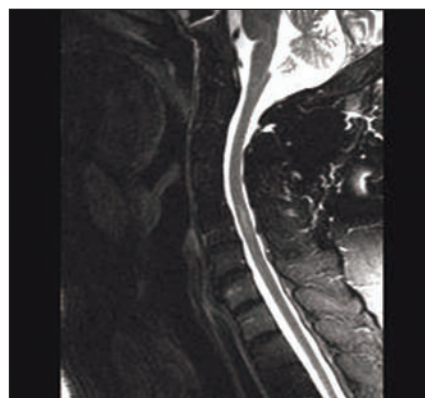


Figure 1B

Cervical MRI, post radiotherapy

study, small cell lung cancer was the most common primary tumor in patients with ISCM, accounting for 63% of patients with primary lung cancer and 30% of all patients studied². However, other solid tumors, including breast, kidney, colorectal, cervical, and ovarian cancers have also been reported^{3,4,5}.

A variety of neurological disorders characterizes the presenting symptoms of ISCM clinically. Schiff and O'Neill reported sensory alteration (42.5%), pain (30%), and weakness (30%) as the most common initial symptoms².

The symptoms of gait unsteadiness, urinary incontinence, and Brown-Sequard syndrome have also been described^{2,6}.

Diagnosis of ISCM usually requires magnetic resonance imaging (MRI) or computerized tomography (CT), because plane films and myelography are normal in 75% and 58% of cases⁷. In addition, cerebral spinal fluid (CSF) analysis is often non-diagnostic with the most common abnormal finding of elevated protein in only 20% of cases⁸. Computerized tomography scanning has been found to be diagnostic in few patients, which is demonstrated by increased density in the area of the ISCM lesions. However, magnetic resonance imaging (MRI) has greater sensitivity and specificity⁷. MRI T2-weighted images show alterations in signal intensity based on tissue type and demonstrate accurate differentiation between normal tissue of the spinal cord and tumor⁷. Gadolinium is a helpful adjunct to the T2-weighted imaging as it reveals the enhancing central lesion in typical ISCM⁷. In a study of 30 patients, there was only one false-negative MRI study, and 23 of 25 patients receiving gadolinium demonstrated contrast enhancement of ISCM lesions on MRI².

Treatment is generally palliative, as the median survival ranges from 3.9 to 5 months^{2,9,10}. Schiff and O'Neill found that patients with breast cancer as their primary tumor had the greatest median survival, which still was only 13 months.

Patients with other primary cancers including lung carcinoma had a median survival of 3 months. As with our patient, surgery is often contraindicated at the time of presentation, making the less invasive modalities of chemotherapy and radiation therapy the mainstays of treatment^{2,5,11}. Radiation therapy has been shown to improve or prevent deterioration of neurological status. In Conill et al., they reported improvement of neurological symptoms in 83% of patients with a mean duration of 17.2 days. And Schiff and O'Neill reported preservation of ambulation in 91% of patients at their latest follow-up.

Conclusions

This case illustrates a rare complication of systemic small cell lung cancer. The ISCM lesion showed a rare complete response to radiation therapy, which was evidenced by magnetic resonance imaging and outlines the importance of radiation therapy in the treatment algorithm of these patients.

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