

Chest Wall Pain as the Presenting Symptom of Leptomeningeal Carcinomatosis

Kyoung Bo Sim, MD, Ki Yeun Nam, MD, Ho Jun Lee, MD, Jin-Woo Park, MD,
Gi Hyeong Ryu, MD, Jihea Chang, MD, Bum Sun Kwon, MD

Department of Physical Medicine and Rehabilitation, Dongguk University College of Medicine, Seoul, Korea

Leptomeningeal metastasis (LMM), also referred to as leptomeningeal carcinomatosis, results from diffuse infiltration of the leptomeninges by malignant cells originating from extra-meningeal primary tumors. It occurs in approximately 5%-10% of patients with solid tumor. Among solid tumors, the most common types leading to infiltration of the leptomeninges are breast cancer, lung cancer, and melanoma. Patients with LMM may present various signs and symptoms. Herein, we report a rare case with initial presentation of isolated chest wall pain. Computed tomography of the chest with contrast revealed a 2.5-cm nodule over the left upper lung. Biopsy confirmed the diagnosis of adenocarcinoma. Later, cerebrospinal fluid cytology exam also confirmed leptomeningeal seeding. It is rare for leptomeningeal carcinomatosis patients to present with chest wall pain. Therefore, a high index of suspicion is mandatory for accurate and prompt diagnosis.

Keywords Meningeal carcinomatosis, Neoplasm metastasis, Chest pain, Lung cancer, Leptomeningeal metastasis

INTRODUCTION

Leptomeningeal metastasis (LMM) results from infiltration of the leptomeninges, either diffusely or multifocally, by malignant cells originating from a primary tumor site [1]. Its incidence is increasing due to new, more effective diagnostic modalities and proper treatment of the primary cancer. However, the clinical consequences are still severe.

Patients with LMM exhibit a number of characteristic symptoms and signs. Brain involvement often causes mental changes, headaches, seizures, and gait disturbance. Weakness of the extremities, back pain, and radicular pain may occur in patients with spinal root involvement. The use of analgesics, from paracetamol to opioids, is effective in relieving uncontrolled pain. In addition, neuropathic pain often requires amitriptyline, clonazepam, or antiepileptic drugs. Focal irradiation of symptomatic sites also is often quite effective in relieving pain [2].

But, there have been few reports on meningeal carcinomatosis stemming from patients presenting initially with a sudden onset of chest pain.

CASE REPORT

Starting in October 2012, a 68-year-old man repeatedly came to our clinic complaining of right posterior chest

Received April 3, 2014; Accepted June 9, 2014

Corresponding author: Ki Yeun Nam

Department of Physical Medicine and Rehabilitation, Dongguk University College of Medicine, 27 Dongguk-ro, Ilsandong-gu, Goyang 410-773, Korea

Tel: +82-31-961-7487, Fax: +82-31-961-7488, E-mail: rusl98@hanmail.net

© This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Copyright © 2014 by Korean Academy of Rehabilitation Medicine



Fig. 1. Axial and coronal view of the chest computed tomography demonstrating a 2-cm sized irregular lobulation and well as an enhanced nodule at the left upper lobe.



Fig. 2. Sagittal view of the lumbar spinal magnetic resonance imaging with contrast showing multiple various sized spinal intradural extramedullary metastases.

wall pain. This continuous stabbing pain had no correlation with his breathing pattern. He was initially treated with oral medication (aceclofenac, thiocolchicoside) and a thermoelectric modality, but his condition did not improve. Adding further medication (tramadol) also provided little relief of his symptom. Due to his deteriorating health, the patient developed dyspnea. His basic hematologic exams (CBC, chemistry, ABGA) revealed values within the normal range, but he was diagnosed with lung cancer (non-small cell carcinoma, T1N0M0) due to a finding on the left upper lobe, opposite the site of chest wall pain (Fig. 1), when examined by computed tomography (CT). Whole body positron emission tomography (PET) and brain magnetic resonance imaging (MRI)

revealed no evidence of metastasis.

On November 2012, although a partial lobectomy was successfully performed and the cell type was confirmed as adenocarcinoma, the patient's chest wall pain persisted. As a result, a diagnostic sono-guided intercostal nerve block was administered at the site of pain, which improved the pain to some degree.

Six weeks after the operation, the patient had an abrupt onset of left side lower back pain and left lower extremity weakness. On physical exam, his deep tendon reflex was normal, but the straight leg raise test on his left leg was positive. The patient was examined with a non-contrast whole spine MRI, bone scan, brain MRI, and electromyography (EMG), but no definite lesions were found to explain his symptoms. We steadily performed symptom management, including medication (pregabalin) and a sono-guided caudal block, but the effects were minimal and the cause of his symptoms was still unclear. Three weeks later, his motor weakness was aggravated and he began to experience difficulty voiding. EMG was performed again, and it showed bilateral L5-S1 radiculopathy. Therefore, the patient underwent another lumbar spine MRI, this time with contrast, which showed prominent multiple granules in the spinal cord (Fig. 2). A lumbar puncture was carried out and cerebrospinal fluid (CSF) cytology confirmed the LMM diagnosis. No definite metastasis was found on either the brain MRI or the abdominal CT. Thus, he underwent palliative radiation therapy and intrathecal chemotherapy, which resulted in transient improvement of his urinary symptom, pain, and weakness.

In March 2013, the patient reported left side hearing loss occurred, and it was confirmed as an isolated in-

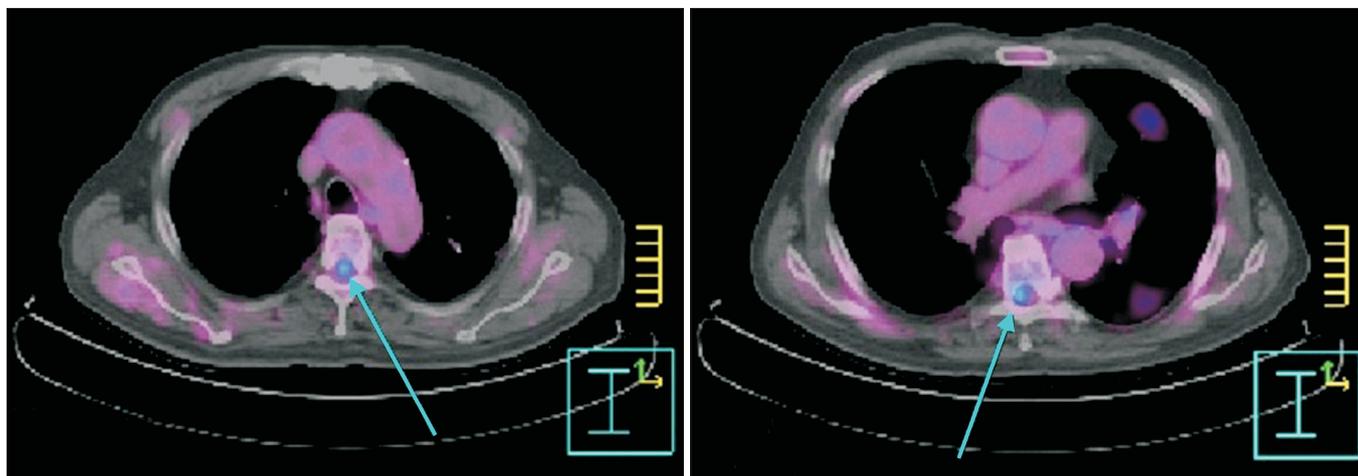


Fig. 3. Multiple focal hypermetabolic nodules are observed in the spinal space at the thoracic level.

ternal auditory canal metastasis by MRI with contrast. One month later, aggravated cervical and thoracic spinal seeding was found on a follow-up whole body PET-CT scan (Fig. 3).

Although the patient was treated with recurrent palliative radiation therapy and intrathecal chemotherapy at that point; unfortunately, he died on July 2013 when his pneumonia reoccurred.

DISCUSSION

LMM was first described by Eberth [3] in 1870 and the incidence in patients with solid tumors has recently been found to range from 4% to 15%. Although any cancer can seed in the leptomeninges, the main culprits are breast and lung cancers, head and neck cancers, melanoma and gastric cancer [2]. It is reported that approximately, 10%–25% of patients with lung cancer, 5%–15% of all patients with breast cancer, and 15%–25% of patients with melanoma will develop LMM [4].

In case of non-small cell lung cancer (NSCLC) like our patient, the incidence is rare compared to small cell lung cancer. According to the Guidelines of the National Comprehensive Cancer Network, PET-CT and brain MRI (especially in patients whose cancer stage are II or more) must be performed in patients with NSCLC. If any suspicious lesion is found, further evaluation should be conducted. In our case, the PET-CT and brain MRI showed no evidence of a metastatic lesion, so we did not consider a gadolinium-enhanced MRI.

LMM is a devastating complication that is associated

with a median survival of 4–6 weeks. According to a study of Palma et al. [5], the time from diagnosis of the primary tumor to the diagnosis of LMM is the most important prognostic value. For this reason, a high degree of suspicion is necessary for accurate and prompt diagnosis. Therefore, we emphasize the importance of investigating musculoskeletal pain, especially trunk pain, in cancer patients, as it may have a strong correlation with LMM.

The confirmation of malignant cells in the CSF is the key diagnostic feature of LMM. Unfortunately, initial false negative cytology may occur in about half of the patients with pathologically proven LMM [6]. Repeated sampling enhances the diagnostic yield if the initial cytology is negative. Olson et al. [7] reported that over 90% of their 50 patients with meningeal carcinomatosis required two or more lumbar punctures, and that 37 of 50 had positive cytology after repeated punctures.

Imaging studies, including myelography, CT, and MRI, can aid prompt diagnosis. Of these, gadolinium-enhanced MRI is the most helpful exam.

In our case, many studies like the non-contrasted whole spine MRI, PET-CT, bone scan, and brain MRI showed no definite metastatic lesions, but the contrast MRI, CSF analysis, and cytology were not performed at the time when neurological symptoms developed.

Micro-metastases are usually not found during the initial presentation of the disease, but after a long time or even postmortem [8].

Similarly, in our study, detection of the spinal metastatic lesion was hard and took a long time due to its tiny size, which induced false negative results in several initial

evaluations. Several months after the initial onset of the symptoms, thoracic spinal seeding was detected after a new whole body PET-CT.

In conclusion, as LMM has various clinical findings, if patients with a history of malignancy complain of atypical musculoskeletal symptoms, the disorder should be taken into consideration. When it is suspicious, contrast imaging studies as well as CSF cytology should properly be performed. Early diagnosis and management will result in positive effects on patients' long-term prognoses.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Grossman SA, Krabak MJ. Leptomeningeal carcinomatosis. *Cancer Treat Rev* 1999;25:103-19.
2. Taillibert S, Laigle-Donadey F, Chodkiewicz C, Sanson M, Hoang-Xuan K, Delattre JY. Leptomeningeal metastases from solid malignancy: a review. *J Neurooncol* 2005;75:85-99.
3. Eberth CJ. Zur Entwicklung des Epithelioms (Cholesteatom) der Pia und der Lunge. *Arch Pathol Anat Physiol Klin Med* 1869;49:51-63.
4. O'Meara WP, Borkar SA, Stambuk HE, Lymberis SC. Leptomeningeal metastasis. *Curr Probl Cancer* 2007;31:367-424.
5. Palma JA, Fernandez-Torron R, Esteve-Belloch P, Fontes-Villalba A, Hernandez A, Fernandez-Hidalgo O, et al. Leptomeningeal carcinomatosis: prognostic value of clinical, cerebrospinal fluid, and neuroimaging features. *Clin Neurol Neurosurg* 2013;115:19-25.
6. Glass JP, Melamed M, Chernik NL, Posner JB. Malignant cells in cerebrospinal fluid (CSF): the meaning of a positive CSF cytology. *Neurology* 1979;29:1369-75.
7. Olson ME, Chernik NL, Posner JB. Infiltration of the leptomeninges by systemic cancer: a clinical and pathologic study. *Arch Neurol* 1974;30:122-37.
8. Potti A, Abdel-Raheem M, Levitt R, Schell DA, Mehdi SA. Intramedullary spinal cord metastases (ISCM) and non-small cell lung carcinoma (NSCLC): clinical patterns, diagnosis and therapeutic considerations. *Lung Cancer* 2001;31:319-23.