Successful Resection of Stage IV Non-small Cell Lung Cancer with Muscle Metastasis as the Initial Manifestation: A Case Report

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Here, we report a rare case of a 39-year-old male who presented with left forearm pain and swelling as the initial manifestation of non-small cell lung cancer (NSCLC). The patient underwent chemoradiotherapy followed by surgical resection of the primary lesion as a salvage treatment. Four years and 7 months after his first presentation, the patient is alive with no symptoms of recurrence or metastasis. Although the optimal treatment for skeletal muscle metastasis from NSCLC has not been determined, aggressive treatment for the primary and the solitary metastatic lesion could be considered as a potentially successful treatment option.

Keywords: skeletal muscle metastasis, non-small cell lung cancer, surgical treatment

Introduction

Lung cancer is one of the leading causes of cancer deaths worldwide. Most patients present at an advanced stage; hence, despite developments in diagnosis and treatment, mortality remains high. Distant metastases of lung cancer commonly involve the liver, adrenal glands, bone, and brain. On the other hand, skeletal muscle metastases from lung cancer are exceedingly rare and even more rare when are they the only clinical manifestation of disease. In most cases, muscle metastases become apparent after the primary lung lesion has been diagnosed and the tumor has already metastasized through the lymphatic system or blood to other sites. Here, we describe a case of skeletal muscle metastasis from non-small cell lung cancer (NSCLC) as the initial clinical manifestation.

Case Report

A 39-year-old male with a 19-year history of heavy smoking (Brinkman Index = 1154) presented to orthopedics with ongoing left arm pain and swelling that had started the previous month. A painful mass was palpable in his left forearm. His general condition was satisfactory, and routine blood chemical tests showed no abnormalities. Magnetic resonance imaging (MRI) showed a mass of about 4 cm involving the extensor muscles of the forearm. Therefore, the intramuscular lesion was suggested to be a malignant tumor, such as a soft tissue sarcoma. CT-guided needle biopsy of the forearm mass was performed, and immunohistochemical examinations showed positivity of CK7 epithelial keratin and EMA and negativity of CK20, Vimentin, and S-100 protein. From the morphological features and immunohistochemical analysis of the specimens, the diagnosis of metastatic adenocarcinoma of the lung was strongly suggested. [18F] fluorodeoxyglucose (FDG) positron emission tomography (PET)-CT detected increased uptake not only in the mass of the left forearm but also in the irregular, nodular shadow of the right upper lobe. Gastrointestinal...
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Fig. 1  T2-weighted MRI with sagittal image shows high intensity mass within the left forearm muscle.

Fig. 2  Microscopic findings show poorly differentiated adenocarcinoma in the muscular metastatic lesion (A) and in the primary pulmonary lesion (B); Original magnification, ×100, H-E (A), ×50, H-E (B).

Fig. 3  
A: Increased uptake in the left forearm muscle (maximum standardized uptake value (SUV) = 6.8) and in the pulmonary nodule of the right upper lobe (maximum SUV = 3.5) in FDG-PET at first presentation.
B: CT shows an irregular nodule measuring 1.9 × 1.0 cm in the right upper lobe.
C: Post-operative FDG-PET shows no abnormal uptake in any part of the body.
and colorectal endoscopies were performed, but no signs of any malignancy were observed. A transbronchial lung biopsy (TBLB) of the lesion was performed, and a histological analysis was consistent with a primary lung adenocarcinoma. The patient underwent radiation therapy to the metastatic lesion with 60 Gy in 30 fractions and concurrently received six cycles of systemic chemotherapy consisting of carboplatin (AUC = 6) and tegafur–gimeracil–oteracil potassium (120 mg/day). After chemoradiotherapy, a CT scan revealed a remarkable reduction of the tumor at the primary site and the muscle metastasis. At 31 months after the first presentation, only a primary pulmonary lesion was observed to become re-enlarged, but there were no signs of recurrence of a skeletal muscle metastasis or any other new lesions, including hilar and mediastinal lymphnodes. Because the standard operation to resect NCSLC is considered to be a salvage treatment, the patient was referred to our department in Gunma University Hospital for surgical resection of the tumor.

Written informed consent concerning the operation was obtained from the patient before surgery. A right upper lobectomy with lymphnode dissection (ND2a) was performed without any problems. The patient had an uneventful recovery and was discharged on postoperative day 6. The surgical specimen was a 1.5 × 1.5 × 1.1-cm solid tumor, and its cut surface was white in color. Microscopically, tumor cells containing enlarged nuclei were abundant, forming gland-like or acinar structures or solid alveolar patterns (Fig. 2B). Immunohistochemical examinations showed positivity of CK7 and negativity of CK20 with quite a similar pattern to that of the skeletal muscular tumor in the left forearm. The definitive histopathological diagnosis was a mixed subtype (acinar, solid type) adenocarcinoma of the lung with lymphatic and vascular involvement (Ly+, V+) but without lymphnode metastasis (N0). No mutations of the epidermal growth-factor receptor (EGFR) gene were detected.

The patient has been monitored for an additional 24 months as an outpatient without any symptoms of recurrence or metastases (Fig. 3C). In fact, he is now in a disease-free status after 4 years and 7 months from his first presentation with stage IV NSCLC.

Discussion

Despite being highly vascular, metastases to skeletal muscle from primary lung cancer are extremely rare events, and very few are reported in the literature.2–4) This in itself is quite remarkable because muscular mass accounts for approximately 50% of total body weight.

There are several theories explaining muscle resistance of metastatic disease. Various mechanical factors, such as tissue blood flow, pressure, and muscle contraction, as well as various metabolic factors, such as pH, lactic acid production, and toxic-free radical oxygen, have been cited as the possible reasons that metastases to skeletal muscle are rare.3,5–9) None of these reasons alone can explain the full mechanism; however, a combination of them may do so.

The most frequent presentation of muscular metastasis is pain with or without swelling.3) Diagnosis of this condition, even with radiologic imaging, is often tricky because it can be confused with an abscess or a soft tissue tumor, highlighting the value of histological diagnosis. Although solitary muscle metastases are extremely rare, the combination of a muscle mass with a solitary lung mass should be given careful consideration, as it could indicate a lung cancer metastasizing to the muscle.

There is no consensus on the optimal treatment strategy for skeletal muscle metastases from NSCLC, and, although the options could include radiotherapy, chemotherapy, or surgical excision, the outcome remains poor. The prognosis of patients with muscle metastasis from NSCLC is obscure; most patients die in less than a year from diagnosis and a median survival time is only 6 months.10) Although the role of local treatment in overall patient survival is difficult to define, the patient in this report has survived for 4 years and 7 months and has remained disease-free. In conclusion, aggressive multimodality therapy for the patient of NSCLC with a solitary muscle metastasis could be considered as a potentially successful treatment option.

References

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