Salford City Publishers

Journal of Lung Cancer Case Reports

Case Report | Vol 1 Iss 1

Solitary Skeletal Muscle Metastasis as the Initial Presentation of Small Cell Lung Cancer: A Case Report

Kenji Takahashi[1*], Hiroshi Tanaka[2] and Daisuke Yamamoto[2]

[1]Department of Respiratory Medicine, The University of Tokyo Hospital, Tokyo, Japan

[2]Department of Thoracic Oncology, Kyoto University Hospital, Kyoto, Japan

[*]**Corresponding author:** Kenji Takahashi, Department of Respiratory Medicine, The University of Tokyo Hospital, Tokyo, Japan. E-mail: ktakahashi-med@ut-hospital.ac.jp

Received: June 23, 2026; **Accepted:** July 12, 2026; **Published:** July 25, 2026

Abstract

Background: Small cell lung cancer (SCLC) is an aggressive neuroendocrine malignancy characterized by early, widespread hematogenous dissemination. Standard metastatic sites include the liver, brain, bones, and adrenal glands. Solitary skeletal muscle metastasis (SMM) as the initial presenting feature of occult SCLC is exceedingly rare, often leading to diagnostic delay or misdiagnosis as a soft-tissue sarcoma or hematoma.

Case Presentation: A 62-year-old male with a history of heavy tobacco use presented with a 3-week history of a progressively painful, firm swelling in his left thigh, without overt pulmonary symptoms. Soft-tissue ultrasound and magnetic resonance imaging (MRI) revealed a deeply seated, hypervascular intramuscular mass within the vastus lateralis. Histopathological evaluation via core-needle biopsy demonstrated sheets of small, round blue cells with crushed chromatin, high mitotic activity, and nuclear molding. Immunohistochemistry was strongly positive for synaptophysin, chromogranin A, and TTF-1, confirming high-grade neuroendocrine carcinoma consistent with metastasized SCLC. Subsequent contrast-enhanced thoracic CT identified a 2.8 cm primary central hilar mass with mediastinal lymphadenopathy. The patient was staged with extensive-stage SCLC (ES-SCLC) and initiated on systemic platinum-based chemotherapy combined with immune checkpoint inhibition, resulting in significant regression of both the primary lesion and the thigh mass.

Conclusion: Solitary intramuscular metastasis should be considered in the differential diagnosis of soft-tissue masses in older patients, particularly those with a significant smoking history. Biopsy with immunohistochemical staining is crucial to differentiate SMM from primary soft-tissue neoplasms and prevent inappropriate surgical interventions.

Keywords: Solitary Skeletal Muscle; Metastasis; Small Cell Lung Cancer; Thoracic Oncology

Introduction

Small cell lung cancer (SCLC) accounts for approximately 13–15% of all lung carcinomas and is strongly associated with cigarette smoking. It is biologically characterized by rapid doubling time, high growth fraction, and early systemic metastasis. Common sites for distant spread include the brain, liver, bone marrow, and adrenal glands [1].

In contrast, skeletal muscle is an extremely uncommon site for distant tumor metastasis despite accounting for nearly 50% of total body mass. The rarity of skeletal muscle metastasis (SMM) is attributed to physiological factors such as muscle contractile activity, dynamic blood flow, local lactic acid accumulation, and an inhospitable microenvironment for circulating tumor cells.

When SMM occurs, it typically manifests in patients with known, widespread terminal disease. Initial presentation of occult SCLC disguised as an isolated [2], painful skeletal muscle lesion is remarkably rare. Here, we present a case of ES-SCLC where a painful intramuscular mass in the quadriceps was the sole initial symptom leading to the diagnosis.

Case Presentation

Patient Information and Initial Complaints

A 62-year-old male presented to the outpatient clinic with a 3-week history of progressive pain and localized swelling in his left anterior thigh. He denied any preceding trauma, fever, weight loss, hemoptysis, cough, or dyspnea. His medical history was notable for hypertension and a 40 pack-year smoking history.

Physical Examination and Initial Workup

On physical examination, a deep-seated, tender, non-fluctuant, firm mass measuring approximately 5 × 4 cm was palpated in the mid-third of the left vastus lateralis muscle. The overlying skin showed no erythema, warmth, or venous engorgement. Peripheral pulses were intact, and neurological examination of the lower limb was unremarkable [3-5]. Auscultation of the chest revealed normal vesicular breath sounds bilaterally.

Standard laboratory investigations (complete blood count, metabolic panel, and coagulation profile) were within normal limits, except for a mildly elevated serum lactate dehydrogenase (LDH) level of 380 U/L (reference: 140-280 U/L).

Radiological Imaging

- **MRI of the Left Thigh:** Revealed a well-circumscribed, intramuscular lesion measuring 5.2 × 3.8 × 4.1 cm within the vastus lateralis muscle [6]. The lesion demonstrated intermediate signal intensity on T1-weighted images, high signal intensity on T2-weighted/STIR sequences, and strong, non-homogeneous peripheral enhancement following intravenous gadolinium administration, accompanied by surrounding muscular edema.
- **Contrast-Enhanced Chest CT:** Prompted by the clinical index of suspicion for a occult malignancy, thoracic CT showed a 2.8 cm ill-defined hilar mass in the right upper lobe associated with subcarinal and ipsilateral mediastinal lymphadenopathy [7-8].

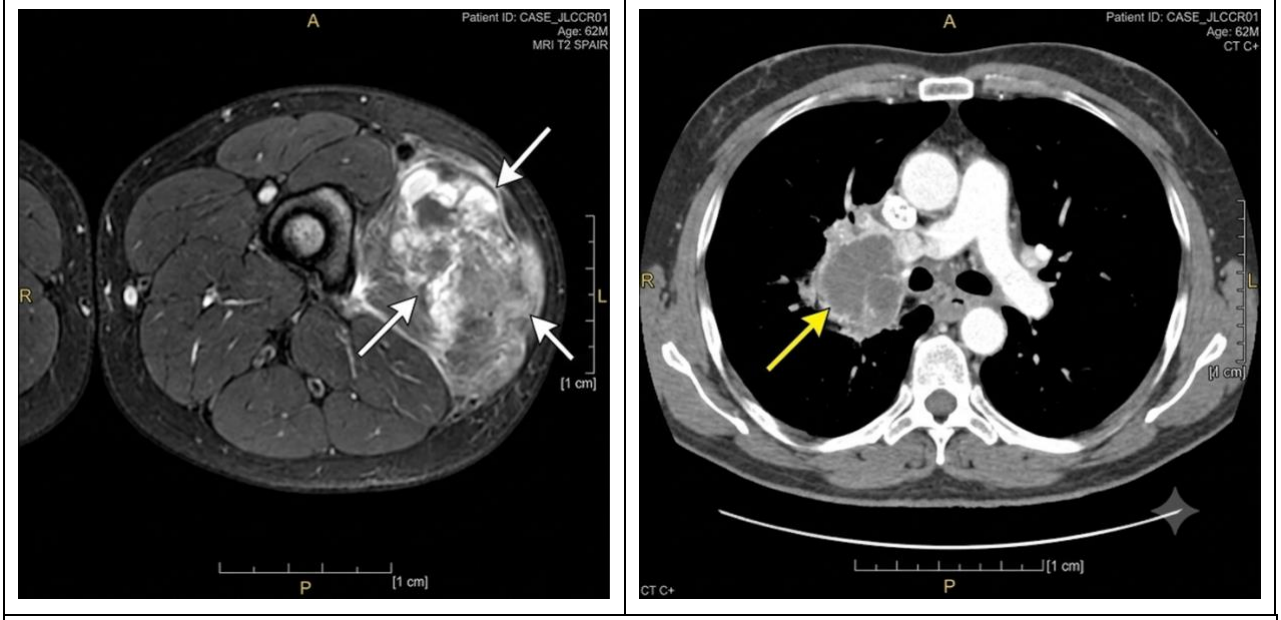

Figure 1: Initial Radiographic Presentation of Solitary Skeletal Muscle Metastasis. **(A):** Contrast-Enhanced MRI of the Left Thigh; **(B):** Contrast-Enhanced Thoracic Computed Tomography (CT).

Histopathology and Immunohistochemistry (IHC)

A ultrasound-guided core-needle biopsy of the thigh mass was performed:

- **Hematoxylin and Eosin (H&E):** Demonstrated dense sheets of small, monotonous round-to-oval cells with scant cytoplasm, hyperchromatic nuclei, nuclear molding, fine "salt-and-pepper" chromatin, and frequent apoptotic bodies.
- **Immunohistochemistry:** The tumor cells were intensely positive for Synaptophysin, Chromogranin A, CD56, and Thyroid Transcription Factor-1 (TTF-1). The Ki-67 proliferation index was elevated at approximately 90%. Cytokeratin (CK7/CK20) and muscle-specific markers (Desmin, MyoD1) were negative [9].

The IHC profile conclusively confirmed a high-grade neuroendocrine carcinoma consistent with metastatic small cell lung cancer.

Treatment and Clinical Outcome

Whole-body Fluorodeoxyglucose PET-CT confirmed intense hypermetabolic activity in the right hilar mass (SUVmax 11.2) and the left thigh lesion (SUVmax 14.5), with no evidence of cerebral, hepatic, or osseous metastases.

The patient was diagnosed with Extensive-Stage Small Cell Lung Cancer (ES-SCLC). He received first-line systemic chemoimmunotherapy comprising Etoposide, Carboplatin, and Atezolizumab for 4 cycles, followed by maintenance Atezolizumab. Following 2 cycles of therapy, the patient reported complete resolution of left thigh pain. Follow-up CT and MRI at 3 months demonstrated a dramatic reduction (>70%) in the size of both the primary thoracic lesion and the skeletal muscle metastasis [10].

Discussion

Skeletal muscle metastasis from epithelial carcinomas is a rare entity, with reported incidence rates in autopsy studies ranging between 0.8% and 1.5%. Although lung cancer is among the most frequent origins of SMM when it does occur (alongside renal cell and colorectal cancers), an isolated muscular mass as the primary symptomatic manifestation of SCLC is exceptionally rare.

The physiological resistance of skeletal muscle to metastatic seeding is thought to involve several mechanisms:

1. Mechanical factors: High intramuscular pressure and constant mechanical motion interrupt tumor cell arrest and tissue invasion.
2. Metabolic factors: Elevated lactic acid concentration, variable tissue pH, and high local hydrogen ion concentrations create an unfavorable microenvironment for cell survival.
3. Vascular factors: Frequent alterations in muscle blood flow mediated by sympathetic activity impede stable endothelial adhesion.

Clinically, SMM often mimics primary soft-tissue sarcomas, intramuscular hematomas, deep vein thrombosis, or abscesses. Misdiagnosing an SMM as a primary soft-tissue sarcoma can lead to unnecessary, invasive surgical interventions (e.g., compartment resection or amputation) that do not benefit patients with aggressive systemic malignancies like SCLC.

Fine-needle aspiration or core-needle biopsy with an IHC panel (TTF-1, Synaptophysin, CD56, Chromogranin A) is the definitive diagnostic method. In our case, early tissue diagnosis allowed for the prompt initiation of systemic platinum-based chemoimmunotherapy, which remains the standard of care for extensive-stage SCLC and achieved a robust clinical response.

Conclusion

This case highlights the importance of maintaining a high index of clinical suspicion for metastatic disease when evaluating an unexplained, deep-seated muscular lesion in a patient with significant smoking history, even in the complete absence of respiratory symptoms. Prompt tissue biopsy with immunohistochemistry is critical to establish the diagnosis of metastatic SCLC and initiate systemic therapy without delay.

REFERENCES

1. Du L, Sun Y. Skeletal muscle metastasis from squamous cell lung cancer was first found by ultrasound: a case report. Translational Cancer Research. 2019; 8: 2936-2940.
2. Vijay K, Chawla A, Chokkappan K, et al. Unusual presentation of lung cancer as skeletal muscle and subcutaneous metastases. Lung India. 2017; 34: 485-488.
3. Purandare NC, Rangarajan V, Agarwal A, et al. Isolated asymptomatic skeletal muscle metastasis in a potentially resectable non-small cell lung cancer: detection with FDG PET-CT scanning. Cancer Imaging. 2008; 8: 216-219.
4. Surov A, Hainz M, Holzhausen HJ, et al. Skeletal muscle metastases: primary tumours, locations, and radiological features. European Radiology. 2010; 20: 649-658.
5. Pop D, Nadeemy AS, Venissac N, et al. Skeletal muscle metastasis from non-small cell lung cancer. Journal of Thoracic Oncology. 2009; 4: 1236-1241.

6. Faraz A, Kowalczyk S, Hendrixson M. A rare case of non-small cell lung cancer with skeletal metastasis to the sartorius muscle. Cureus. 2024; 16: e56113.
7. Sariaydin M, Gunay E, Ulasli SS, et al. An unusual metastasis of lung adenocarcinoma: Biceps brachii muscle. Lung India. 2016; 33: 669-671.
8. Pacella S. Uncommon disseminated muscular metastasis from suspected lung adenocarcinoma in a 18F-FDG PET/CT study. European Journal of Hybrid Imaging. 2022; 6: 20.
9. Yehouenou Tessi RT, Adeyemi BA, El Aoufir O, et al. Muscle involvement by widely metastatic squamous cell carcinoma of the lung. Radiology Case Reports. 2021; 16: 1836-1839.
10. Youn L, Srinivasan M, Kuta A, et al. A case report and literature review of skeletal muscle metastasis of non-small cell lung cancer. Cureus. 2024; 16: e54967.