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**Radiology**

# Skeletal Muscle Metastasis Revealing Pulmonary Carcinoma: A Rare Finding Not to be overlooked

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**Abstract** | **Case Report**

***Introduction*:** Skeletal muscle metastases (SMM) are an exceptional occurrence in oncology, often asymptomatic and discovered incidentally on imaging. Their presence is a marker of widely disseminated disease and influences staging and prognosis. ***Case Presentation*:** We report the case of a 66-year-old male patient with no significant medical history, who presented for lower back pain. Radiological workup revealed findings highly suggestive of a primary lung carcinoma with hepatic, multiple osseous, nodal metastases, and, notably, a secondary lesion within the right gluteus maximus muscle. This picture was consistent with widespread stage IV carcinomatosis. ***Conclusion*:** This case is a rare illustration of SMM. It underscores the necessity of a meticulous analysis of all anatomical structures on imaging studies, including the musculature, during the staging of cancer. The discovery of a SMM, although rare, is a major prognostic and therapeutic element that must be systematically sought.

**Keywords**: Skeletal muscle metastases, Lung carcinoma, Gluteus maximus, Metastasis, Stage IV, Imaging.



## INTRODUCTION

Lung cancer is frequently diagnosed at advanced stages due to its aggressive nature and propensity to metastasize. While common sites of spread include the liver, bones, and brain, metastasis to skeletal muscle is a rare occurrence, often discovered incidentally during imaging. These metastases are significant as they indicate widespread disease and may influence both prognosis and treatment strategy. This case report highlights the incidental finding of a skeletal muscle metastasis in a patient with advanced lung carcinoma, underscoring the importance of comprehensive radiological evaluation in oncology.

## CASE PRESENTATION

A 66-year-old male patient, with no significant past medical history (including no active smoking history), was referred for further investigation of diffuse bone lesions discovered incidentally. A contrast-enhanced computed tomography (CT) scan of the chest, abdomen, and pelvis was performed as a first-line investigation to identify a primary tumor.

**The examination revealed:**

- **A primary lung lesion:** A 54 mm mass in the right lower lobe with spiculated margins, air bronchograms, and traction bronchiectasis, highly evocative of bronchogenic carcinoma.

**Classic Metastatic Sites :**

- Right hilar and mediastinal lymphadenopathy.
- Moderate right-sided pleural effusion.
- Innumerable mixed lytic and sclerotic bone metastases involving the spine, pelvis, ribs, and girdles.
- Multiple hepatic metastases appearing as well-defined hypodense nodules.

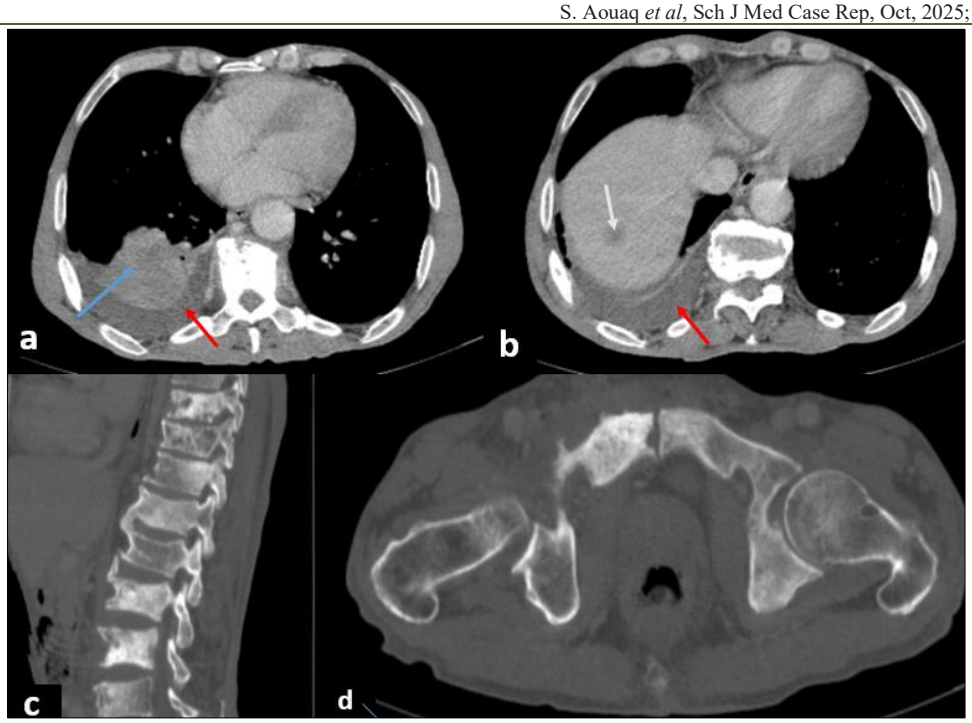


**Figure 1: CT imaging reveals a spiculated mass in the right lower lobe, consistent with a primary lung lesion (blue arrow). Findings at characteristic sites of metastatic involvement include a moderate right pleural effusion (red arrow), numerous mixed lytic and sclerotic bone metastases, and multiple well-defined hypodense liver metastases (white arrow)**

- **The notable finding (Finding of interest):** Beyond these common metastatic locations, careful analysis of the soft tissues revealed a nodular lesion with mild contrast enhancement located within the right gluteus maximus muscle. Its secondary tumor nature was confirmed given the context of widespread carcinomatosis, making this lesion a skeletal muscle metastasis (SMM).

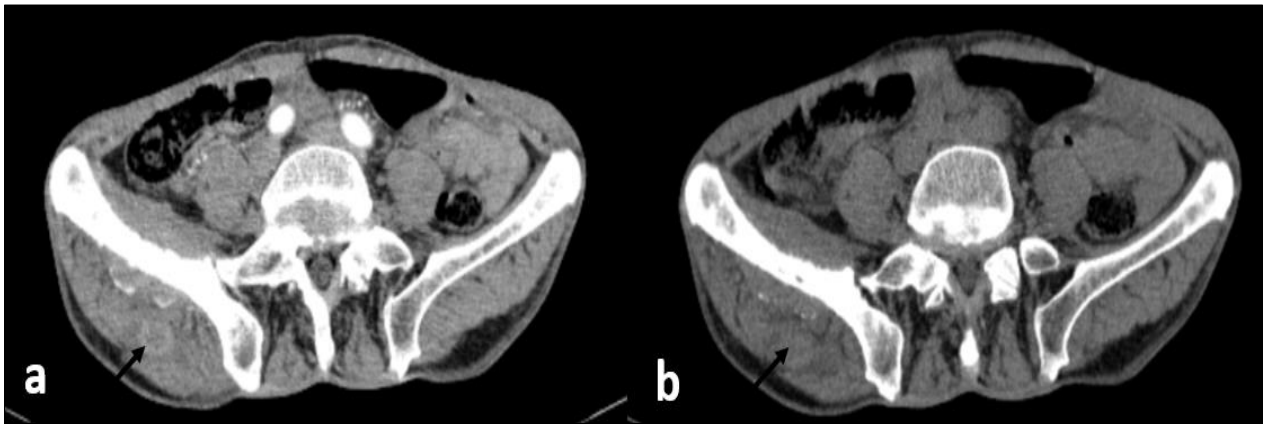


**Figure 2: Axial contrast-enhanced CT scan demonstrating a nodular lesion with mild contrast enhancement located within the right gluteus maximus muscle (black arrows)**

The final diagnosis was primary lung carcinoma with synchronous hepatic, osseous, nodal, pleural, and muscular metastases (Stage IV according to the TNM classification). The presence of this SMM was an additional element confirming the extensive dissemination of the disease. A biopsy of the pulmonary lesion was scheduled for histological confirmation. Written informed consent was obtained from the patient for the publication of this case report.

## DISCUSSION

This case is instructive in several ways. It illustrates the classic presentation of lung cancer revealed by its metastases, but it primarily highlights the exceptional nature of the muscular localization.

**1. Rarity of Skeletal Muscle Metastases (SMM):**

SMM are uncommon, with an incidence reported in the literature estimated between 0.5% and

16% in autopsy series, but they are far less frequently identified on clinical imaging [1]. Their rarity is often attributed to the muscular microenvironment (variable blood flow, lactic acid metabolism, contractile ability), which is considered unfavorable for the implantation of cancer cells [2].

**2. Clinical Significance:**

The discovery of a SMM, even if isolated, should primarily suggest a lung, renal, or colorectal primary tumor [3]. Its presence is a marker of widely disseminated and aggressive disease [4], which was perfectly correlated in our observation by the multi-visceral involvement. It confirms Stage IV disease and directly impacts the prognosis, which is already poor.

**3. Importance of Imaging:**

This case underscores the critical role of comprehensive imaging analysis. The initial CT protocol, performed with intravenous contrast in portal venous phase (≈70-second delay), was pivotal. The chest component, reconstructed with both standard and high-resolution lung algorithms, meticulously characterized the spiculated primary mass with air bronchograms. The abdominal protocol, with its soft tissue reconstruction, revealed the subtle hypodense hepatic nodules and, crucially, the minimally enhancing lesion within the gluteus maximus. This finding exemplifies how easy it is to overlook non-standard metastatic sites during routine review. A focal muscular lesion, especially one with mild enhancement and ill-defined margins in an oncological context, must raise immediate suspicion for metastasis [5]. The CT findings provided a roadmap for further investigation.

**4. Role of PET-CT and Advanced Imaging:**

In such a scenario, an [18F]-FDG PET-CT scan is the logical subsequent investigation. It is highly sensitive for detecting occult metastases and would be instrumental in assessing the metabolic activity of the known lesions [6]. The primary lung mass, lymph nodes, and bone lesions would be expected to demonstrate high FDG avidity. The key question would be the avidity of the gluteal lesion; significant FDG uptake would confirm its metastatic nature beyond any doubt and could reveal other subclinical muscle deposits. Furthermore, PET-CT is invaluable for guiding biopsy. The most FDG-avid lesion—be it the primary mass, an accessible node, or even the gluteal metastasis itself—becomes the preferred target for percutaneous image-guided biopsy to obtain a pathological diagnosis and material for molecular testing.

**Take-Home Message**

Our observation adds to the rare documented cases of SMM of pulmonary origin [3-7]. It serves as a crucial reminder: in cancer staging, no anatomical structure should be neglected. The identification of a SMM, although rare, is a capital element for staging, prognosis, and therapeutic management, which will almost always be systemic at this stage [4].

## CONCLUSION

We have described a case of metastatic pulmonary carcinoma with a skeletal muscle metastasis in the gluteal muscle. This observation allows us to highlight the exceptional character of this localization and its significant clinical implications. It emphasizes the pivotal role of exhaustive imaging and careful analysis for accurate staging, which is an indispensable condition for therapeutic orientation and prognostic counseling.

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