

# Isolated gluteus maximus muscle metastasis as an initial presentation and primary asymptomatic nonsmall cell lung cancer detected using fluorine-18 fluorodeoxyglucose positron emission tomography-computed tomography imaging

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## ABSTRACT

Isolated skeletal muscle metastasis in nonsmall cell lung cancer (NSCLC) is a rare event particularly when it is detected at initial staging. Our case report describes the whole body imaging with fluorine-18 fluorodeoxyglucose positron emission tomography-computed tomography detecting asymptomatic primary NSCLC causing the solitary symptomatic metastasis to the gluteus maximus muscle. Patient underwent systemic chemotherapy.

**Key words:** Fluorine-18 fluorodeoxyglucose positron emission tomography-computed tomography, gluteus muscle metastases, nonsmall cell lung cancer

## INTRODUCTION

Lung cancer is one of the leading causes of cancer deaths and despite advances in diagnosis and treatment, the overall 5-year survival remains dismal at 14% for all stages.<sup>[1]</sup> Distant metastases in lung cancer commonly involve the adrenal glands, liver, bones, and brain.<sup>[2]</sup> Since the extent of disease decides the treatment options, radiological imaging plays an important role in staging evaluation. Positron

emission tomography (PET) imaging with fluorine-18 (F-18) fluorodeoxyglucose (FDG) is now being increasingly used for characterizing lung nodules, for initial staging, restaging, treatment planning, and assessing response to treatment in lung cancer.<sup>[3]</sup> We report an asymptomatic primary nonsmall cell lung cancer (NSCLC) causing the solitary symptomatic metastasis to the gluteus maximus muscle detected with FDG PET-computed tomography (CT).

## CASE REPORT

A 55-year-old man with swelling and pain in the right gluteal region. On clinical examination, he has palpable swelling in the right gluteal region. Ultrasonography (USG) was performed to evaluate the gluteal lesion followed by guided fine-needle aspiration cytology (FNAC) which showed carcinoma. A contrast-enhanced whole body F-18 FDG PET-CT scan was performed for detecting

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unknown primary [Figure 1a] revealed hypermetabolic 3.1 cm × 2.6 cm × 3.8 cm sized lobulated mass in the left upper lobe that did not involve the chest wall or the mediastinal structures with standardized uptake value (SUV) of 16 [Figure 1b and c]. No mediastinal lymph nodes are noted. Focal increased FDG uptake was also seen in the mass lesion in the right gluteus maximus muscle (SUV 12.0) with heterogeneous peripheral enhancement and necrosis extending into subcutaneous plane [Figure 1d and e]. There were no other areas of increased FDG uptake. In view of skeletal muscle metastasis, the patient was upstaged (Stage IV) and the intent of the treatment changed from potentially curative surgery to palliative systemic chemotherapy.

## DISCUSSION

Lung cancer is one of the leading causes of cancer death in both men and women worldwide. Most patients present at an advanced stage and hence despite developments in diagnosis and treatment the mortality remains high. Distant metastases of lung cancer commonly involve the adrenal glands, bone, and brain. Contrast-enhanced CT scan of the thorax (including the adrenals) along with a radionuclide bone scan and brain imaging (with CT or magnetic resonance imaging) was considered as optimal staging work up prior to the advent of PET scanning. Metastases

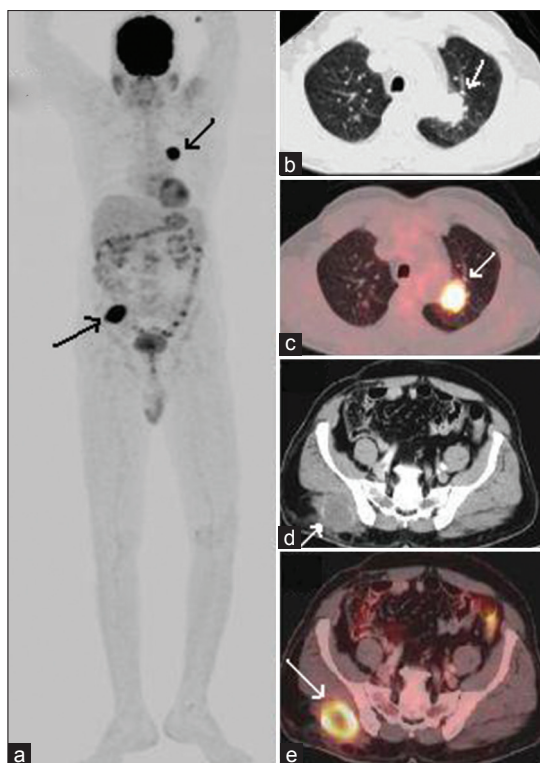
to skeletal muscle from primary lung cancer is a rare event with very few reports described in the literature.<sup>[4-6]</sup> Various physiological factors like tissue blood flow, pressure, and metabolism have been cited as the possible reasons why metastases to skeletal muscle are rare. According to some studies, the presence of proteases and certain inhibitors in muscle tissue are responsible for blocking tumor invasion and growth.<sup>[7,8]</sup>

It has been shown that FDG PET-CT is an excellent imaging modality for metastatic evaluation with the exclusion of the brain. It can detect occult metastases in about 10–20% of cases of NSCLC.<sup>[9-11]</sup> In a study of 167 patients of NSCLC (Stages III), FDG PET-CT detected unsuspected distant metastases in a high proportion of patients who were otherwise candidates for potentially curative treatment.<sup>[12]</sup> However, of the 32 cases of distant metastases in the study, there were no cases of skeletal muscle metastasis, emphasizing the rarity of the event. Most of the cases of skeletal muscle metastases described in the literature presented with clinical symptoms of pain and swelling at the affected site. Our patient also had symptoms related to the site of skeletal muscle metastasis. Although focal FDG uptake in the deeper subcutaneous tissue of the gluteal region is not uncommonly observed, as a result, of injection site inflammation, the intense nature of the uptake and its deep location in the muscle were suspicious enough to warrant further evaluation. A USG-guided FNAC confirmed the metastatic nature of the gluteal lesion. Detection of solitary extrapulmonary FDG uptake in patients with recently diagnosed lung cancer, should be critically analyzed as nearly half of these lesions may represent a malignant etiology.<sup>[13]</sup> The increasing use of PET-CT as a whole body staging tool for various cancers has recently led to several reports describing unsuspected distant metastases at unusual locations. Unusual metastases of lung cancer to muscles that were detected by PET-CT have been reported.<sup>[14,15]</sup>

There is no consensus on the optimal treatment strategy for skeletal muscle metastases and although the options could include radiotherapy, chemotherapy, or excision, the outcome remains poor. Although radical treatment of the primary and the solitary metastatic lesion could have been considered as a treatment option, our patient was offered palliative chemotherapy in view of the systemic nature of the disease.

## CONCLUSION

Skeletal muscle metastasis from any site of malignant neoplasia is a rare occurrence, and the initial presentation with distant soft tissue metastasis is even more uncommon. Our case represents a rare manifestation of NSCLC



**Figure 1:** Whole body fluorodeoxyglucose-positron emission tomography/computed tomography (PET/CT) maximum intensity projection image. (a) Axial CT (b) axial fused PET/CT (c) an intense uptake in the primary mass lesion in the left lung upper lobe (d) axial CT and (e) axial fused PET/CT showing lesion in the right gluteus maximus muscle (arrows)

metastatic to gluteus muscle in the absence of any osseous involvement. Thus, FDG PET-CT due to its whole body screening ability, can unmask primary site and unusual metastatic sites at initial presentation and can help in reducing inappropriate surgeries in these patients.

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