Contribution of [18F]FDG PET/CT in the detection of a penile metastasis from pulmonary squamous cell carcinoma

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Swiss Journal of Radiology and Nuclear Medicine - SJORANM GmbH - Rosenweg 3 - CH-6340 Baar - Switzerland

Abstract

Introduction: [18F]FDG PET/CT contributes to staging lung cancer by detecting common and unusual metastatic sites. Penile involvement is rare.
Case report: A 65-year-old man with pulmonary squamous cell carcinoma underwent staging [18F]FDG PET/CT. The examination showed the primary lung lesion, extensive nodal disease, adrenal and bone metastases, and an additional asymptomatic hypermetabolic focus in the corpus cavernosum, suspicious for penile metastasis. The adrenal and bone disease already established disseminated stage IV disease; the penile focus provided an additional site of suspected involvement.
Conclusion: This case illustrates whole-body assessment of disseminated lung cancer and recognition of an unusual, clinically silent lesion. The penile focus did not independently cause upstaging or establish the need for a palliative approach.

Keywords: Lung Neoplasms, Penile Neoplasms, Positron-Emission Tomography, Computed Tomography

*Corresponding author: Halima Batani - received: 18.02.2026 - peer reviewed, accepted and published: 12.05.2026

Introduction

Lung cancer is among the most frequently diagnosed cancers worldwide and remains the leading cause of cancer-related mortality [1]. Due to its generally aggressive nature, which can rapidly lead to metastatic spread, it is often diagnosed at an advanced stage, with stages III and IV accounting for nearly 80% of cases [2].

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Early detection of metastases is crucial for staging and treatment planning. Positron emission tomography combined with computed tomography using 18F-fluorodeoxyglucose ([18F]FDG PET/CT) is now an indispensable cornerstone in the management of lung cancers. In squamous cell carcinomas, which overexpress glucose transporters (GLUT-1) and exhibit high glucose avidity, [18F]FDG PET/CT demonstrates remarkable diagnostic performance, with high sensitivities confirmed by numerous studies. Compared with thoracic CT alone, [18F]FDG PET/CT allows the detection of occult metastases, refines staging, and significantly influences therapeutic management [3].

The most frequent extrathoracic metastatic sites in lung cancer include adrenal glands, liver, brain and bone [4]. Penile metastases are uncommon [5,6]. In their 2017 literature review, Guo et al. identified 39 published cases of penile metastasis from lung cancer and reported an additional case, bringing their total to 40 [7]. This is a historical literature count, not a current worldwide total.

Penile lesions can be asymptomatic and may be detected incidentally during staging examinations.

We report an imaging-suspected penile metastasis in a patient with pulmonary squamous cell carcinoma and disseminated disease.

Case report

This concerns a 65-year-old patient whose main oncological risk factor was chronic active smoking estimated at 75 pack-years. He sought medical attention due to the persistence of a chronic cough associated with chest pain. The computed tomography scan performed showed a pulmonary mass in the left lower lobe.

The diagnosis of lung carcinoma was established following bronchoscopy with biopsies prompted by the CT discovery of the left lower lobe mass. Histopathological examination concluded to a poorly differentiated carcinomatous proliferation of the non–small cell type. Complementary immunohistochemical analysis confirmed the squamous cell carcinoma subtype. Based on the initial imaging, the lesion was classified as cT4 due to close contact with the thoracic aorta.

An [18F]FDG PET/CT scan was performed as part of the initial staging work-up to verify mediastinal nodal status and to search for potential secondary localizations. The primary pulmonary lesion, located in the left lower lobe, appeared as a large tissue mass with irregular and spiculated margins. Its hypermetabolism was very intense, with a maximum standardized uptake value (SUVmax) measured at 18. This process encased the wall of the descending thoracic aorta, indicating T4 stage invasion (cT4). A metabolic tumor volume (MTV) of 55.3 cm^3 was reported for the primary lesion (Figure 1).

Regional nodal involvement was massive and extensive. The mediastinum showed a hypermetabolic confluent extension in places, involving nodal stations 2R, 3A, 4R, 4L,

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ISSN 2813-7221 · Swiss J. Radiol. Nucl. Med. 2026 30(1):20-26 · DOI 10.59667/sjoranm.v30i1.16

3P, 5, and 7. In addition, a conglomerate of hypermetabolic lymphadenopathies was noted at the left hilar level (Figure 2).

PET/CT revealed a hypermetabolic left adrenal lesion and hypermetabolic lytic bone lesions in the second right rib and left femur (Figure 2). An additional, asymptomatic hypermetabolic nodular focus (SUVmax 6.5) in the corpus cavernosum was suspicious for penile metastasis (Figure 3).

The adrenal and bone metastases already established disseminated stage IV disease. Using the ninth edition TNM classification, the reported findings correspond to cT4 cN3 cM1c2, stage IVB [11]. The additional penile focus did not independently alter the M category or stage group.

Discussion

Penile metastases from lung cancer are exceptionally rare and generally indicate advanced systemic disease, associated with a poor prognosis [8]. Despite the rich vascularization and lymphatic network of the penis, metastatic involvement remains uncommon, and its pathophysiology is still not fully understood [10]. Among the proposed mechanisms, retrograde venous dissemination through communication between the pelvic venous plexuses and the dorsal vein of the penis is considered the most plausible route [10].

In the present case, the penile lesion was asymptomatic and incidentally detected during a whole-body [18F]FDG PET/CT performed for initial staging. This finding highlights the unique advantage of PET/CT in providing whole-body evaluation in a single examination, allowing the identification of unexpected metastatic sites that may be overlooked by conventional imaging or routine clinical examination.

Previous case reports and reviews illustrate the detection of penile lesions with [18F]FDG PET/CT [7,10]. In this patient, the penile focus was an incidental imaging finding within an already disseminated disease pattern. Its recognition added information about disease distribution rather than providing the sole evidence of distant spread.

The management relevance of the examination arose from the overall burden of metastatic disease. Adrenal and bone involvement already supported a systemic, predominantly palliative strategy. Detection of the penile focus did not itself upstage the disease or independently change treatment intent.

In the absence of histopathological confirmation, the diagnosis of penile metastasis in this case was based on imaging features, metabolic activity, and the presence of

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ISSN 2813-7221 · Swiss J. Radiol. Nucl. Med. 2026 30(1):20-26 · DOI 10.59667/sjoranm.v30i1.16

widespread metastatic disease. In this clinical context, biopsy was not deemed necessary, as it would not have altered management and could have exposed the patient to unnecessary risks.

This case highlights an important point for nuclear medicine physicians and radiologists: unusual hypermetabolic foci identified on PET/CT, even in asymptomatic and unexpected anatomical regions, should be carefully evaluated and not overlooked. Awareness of rare metastatic patterns is essential to ensure accurate staging and appropriate therapeutic decision-making.

In summary, [18F]FDG PET/CT plays a crucial role in the comprehensive staging of lung cancer by enabling the detection of both common and rare metastatic sites. Its ability to identify clinically occult lesions can significantly influence patient management and underscores its value as a whole-body imaging modality in oncology.

Conclusions

[18F]FDG PET/CT demonstrated disseminated pulmonary squamous cell carcinoma, including adrenal and bone metastases and an additional clinically silent penile focus suspicious for metastasis. Awareness of such unusual sites improves the completeness of disease assessment. In this case, the penile focus added information about metastatic distribution; the stage IV classification and palliative treatment intent were supported by the wider metastatic disease.

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Batani Halima: Conceptualization, Investigation, Data curation, Writing – original draft

Bensimimou Hafsa: Methodology, Supervision, Writing – review & editing

Gbadamassi Abdel Amide: Formal analysis, Visualization

Adjal Akram: Investigation - Writing

Nato Cosme Boutros: Writing – Review

Ouassafrar Zakaria: Visualization, Review

Amal Guensi: Supervision, Project administration, Validation

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ISSN 2813-7221 · Swiss J. Radiol. Nucl. Med. 2026 30(1):20-26 · DOI 10.59667/sjoranm.v30i1.16

Figures

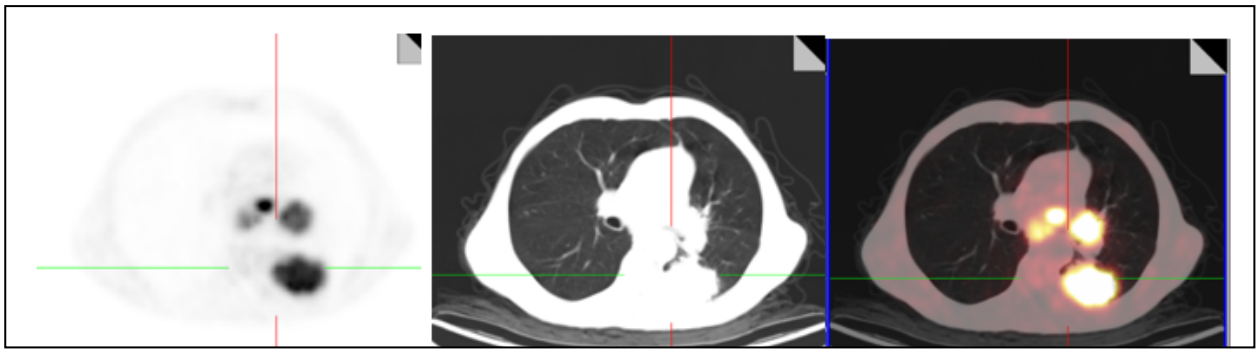


Figure 1: Pulmonary lesion of the left lower lobe

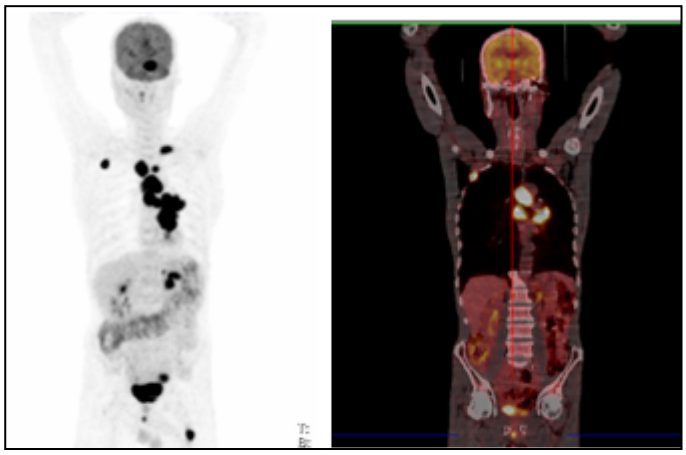


Figure 2: Lymph node, adrenal, and bone involvement

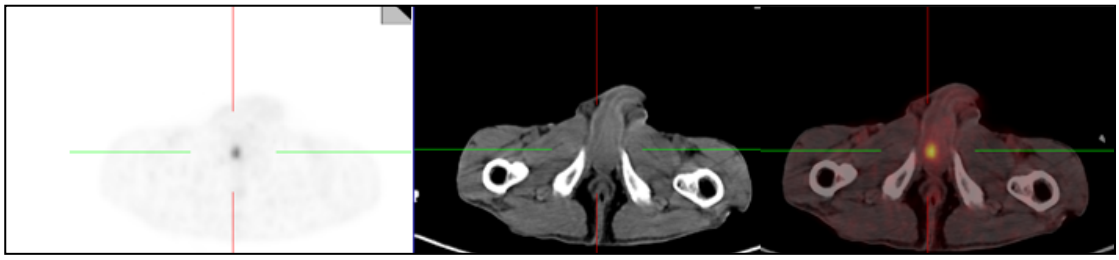


Figure 3: Hypermetabolic penile nodular focus suspicious for metastasis

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ISSN 2813-7221 · Swiss J. Radiol. Nucl. Med. 2026 30(1):20-26 · DOI 10.59667/sjoranm.v30i1.16

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ISSN 2813-7221 · Swiss J. Radiol. Nucl. Med. 2026 30(1):20-26 · DOI 10.59667/sjoranm.v30i1.16

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Declarations
Consent for publication: The author clarifies that written informed consent was obtained and the anonymity of the patient was ensured. This study submitted to Swiss J. Rad. Nucl. Med. has been conducted in accordance with the Declaration of Helsinki and according to requirements of all applicable local and international standards. All authors contributed to the conception and design of the manuscript, participated in drafting and revising the content critically for important intellectual input, and approved the final version for publication. Each author agrees to be accountable for all aspects of the work, ensuring its accuracy and integrity.

Competing interests: None.

Funding: No funding was required for this study.

Conflict of interest:

The authors declare that there were no conflicts of interest within the meaning of the recommendations of the International Committee of Medical Journal Editors when the article was written.

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