Overcoming Diagnostic Limitations: A Case of Metastatic Renal Cell Carcinoma with Negative PET CT Findings

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Abstract

Clear cell Renal cell carcinoma is the most common solid tumor of the kidneys. Fluorodeoxyglucose positron emission tomography/computed tomography (PET/CT) imaging is limited in RCC due to the physiological excretion of FDG by the kidneys, which can obscure renal lesions. However, PET/CT has been shown to be reliable for detecting metastatic lesions in other regions. 74-year-old male, post left nephrectomy for renal cell carcinoma, presented with new bilateral pulmonary nodules on CT imaging. PET/CT scan showed no increased FDG uptake in the lung nodules (largest1.3cm). Despite this, given the high clinical suspicion for metastasis, a CT-guided biopsy of the left lower lung lobe was performed, revealing clear-cell carcinoma consistent with metastases from RCC. After chemotherapy, follow-up CT scans showed improvement in nodules. Despite negative PET, high clinical suspicion, driven by the patient's history and CT, led to timely diagnosis and treatment. This underscores the importance of clinical in oncologic management.

Keywords: Renal Cell Carcinoma, Fluorodeoxyglucose Positron Emission Tomography.

Introduction

Renal cell carcinoma (RCC) is the most common solid tumor of the kidneys, accounting for 3% of all malignancies and representing the seventh leading cause of cancer. The clear-cell subtype is the most common histological variant. The application of fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) imaging is limited in RCC due to the physiological excretion of FDG by the kidneys, which can obscure renal lesions. However, PET/CT has been shown to be reliable for detecting metastatic lesions in other regions.[1,2]

Case Report

A 74-year-old male, post left nephrectomy for stage pT3a Nx cM0 renal cell carcinoma, presented with new bilateral pulmonary nodules on follow-up CT imaging. The patient had no symptoms or significant physical or laboratory findings, and a PET/CT scan showed no increased FDG uptake in the lung nodules. Despite this, given the high clinical suspicion for metastasis, a CT-guided biopsy of the left lower lung lobe was performed, revealing clear-cell carcinoma consistent with metastases from RCC.

The patient was initially treated with pembrolizumab and axitinib, but due to side effects, axitinib was discontinued, and lenvatinib was added. The patient completed two years of immunotherapy, with follow-up CT scans showing continued improvement and stable sub-centimeter nodules.

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Submitted: 22nd August, 2024 **Received:** 19th September, 2024
Accepted: 29th September, 2024 **Published:** 08th October, 2024

How to Cite This Article: Gulec AE, Sajja N, Ali MM, Sayyed A. Overcoming Diagnostic Limitations: A Case of Metastatic Renal Cell Carcinoma with Negative PET CT Findings. J Case Rep Med Stud Train. 2024;1(2):25-26

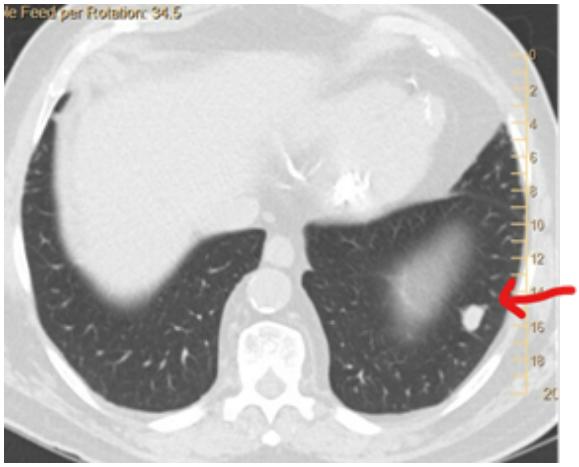

Figure 1: CT Chest Imaging Performed 3 Months after Left Nephrectomy, Highlighting the Largest Nodule in the Left Lower Lung (LLL).

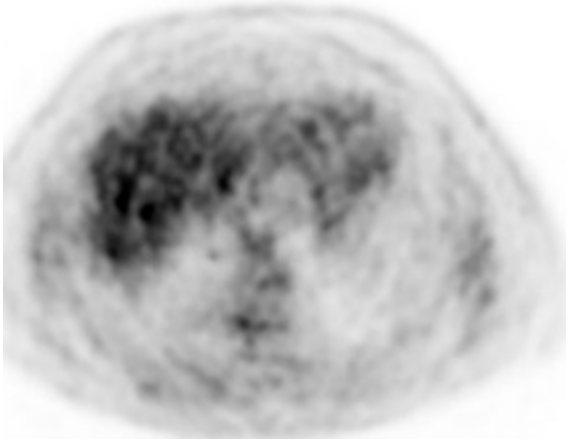

Figure 2: Negative PET/CT Scan at the Same Level.

Figure 3: Follow-up Imaging of the Left Lower Lung Nodule at the 2-year Mark, Showing Stability and Continued Improvement.

Discussion

This case highlights the limitations of relying solely on FDG PET/CT in diagnosing metastatic renal cell carcinoma, especially in the setting of negative PET findings. FDG PET's reduced sensitivity in RCC is well-documented due to FDG excretion by the kidneys, which can obscure both primary and metastatic lesions. [1,2] Despite negative PET results, high clinical suspicion, driven by the patient's history and CT findings, led to timely diagnosis and treatment. This underscores the importance of clinical judgment and individualized patient care in oncologic management.

Additionally, this case reflects the evolving landscape of RCC treatment with immune checkpoint inhibitors (e.g., pembrolizumab) and tyrosine kinase inhibitors (e.g., axitinib, lenvatinib), demonstrating the potential for long-term control of metastatic disease.

Conclusion

This case demonstrates the value of clinical judgment in decision-making, particularly when diagnostic tests yield inconclusive results. Early biopsy and subsequent treatment resulted in a favorable outcome, emphasizing the need to consider the broader clinical picture when managing complex oncological cases.

Acknowledgement

None.

Conflicts of Interest

None.

Legend

None.

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