

Case of the Quarter—January 2011

FDG-PET/CT for Diagnosis and Staging of Lung Cancer

Patient History

This patient is a 56-year-old man who presented with symptoms of fatigue, left shoulder pain, left lower posterior chest pain, and cough. The patient has a 40 pack-year smoking history. A chest X-ray showed a right upper lobe nodule. CT of the chest revealed a 2.5-cm spiculated nodule in the right upper lobe of the lung, as well as multiple scattered lytic lesions throughout the ribs and spine, suspicious for metastatic disease. With these results, medical oncology called for a “rapid staging evaluation” to include PET/CT and MRI of the brain.

PET/CT Findings

FDG-PET/CT revealed abnormal FDG uptake in the 2.5-cm right upper lobe nodule consistent with a primary lung cancer (Figure 1). There was also bilateral hilar, mediastinal, supraclavicular, and left axillary FDG-avid lymphadenopathy. The PET study also revealed multiple FDG-avid bony metastases, including the right mandibular condyle, multiple ribs and vertebral bodies, scapula, pelvis, and femora. There was also bilateral adrenal gland uptake, likely representing metastatic disease (Figure 2).

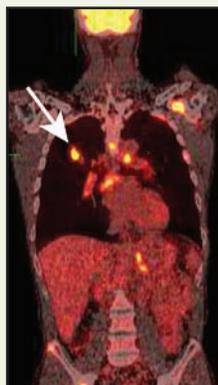


Figure 1. PET/CT fusion study showing primary lung cancer in right upper lobe of the lung.

metastatic lung cancer. The patient then began a course of chemotherapy.

Discussion

PET/CT played a significant role in this case in confirming a primary malignant tumor within the lung as well as providing accurate initial staging leading to prompt initiation of radiation therapy and chemotherapy. FDG-PET/CT provided a rapid way to detect extra-thoracic metastatic disease that was not evident on the initial chest CT. One

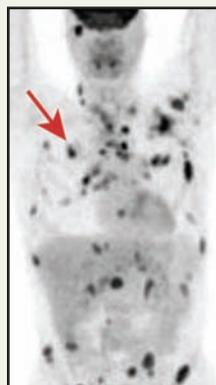


Figure 2. PET study showing widespread metastatic disease and lymphadenopathy.

known limitation of FDG-PET/CT is that it is not as sensitive as MRI for detection of brain metastases.

The value of PET/CT for staging of non-small-cell lung cancer (NSCLC) has been recognized for some time (Lardinois, D., et al)¹. A recent article by Aukema et al² focuses upon the increasing value of PET/CT for diagnosis of NSCLC as well. The authors describe the use of PET/CT in a “fast track” outpatient setting used to differentiate pulmonary pathology in patients referred with pulmonary symptoms

and/or abnormal chest X-ray. PET/CT demonstrated a high sensitivity (97%) for diagnosing malignancy, including primary lung cancer, in patients referred to this “fast track” setting for evaluation. Ultimately, PET/CT played an important role in rapid diagnosis and timely treatment for this cohort of patients.

Follow-Up

A CT-guided core biopsy of a left iliac bone lesion was performed shortly after the PET/CT, revealing a mucin-producing adenocarcinoma, consistent with metastatic lung cancer. An MRI of the brain revealed a 9-mm punctate, acute infarct of the right parietal lobe, which may represent an early metastasis that resulted in focal infarction. The MRI also showed likely metastasis to the right mandibular condyle seen previously on PET/CT.

Based on the results of PET/CT and other studies, the patient began palliative radiation treatment for Stage IV

1. Lardinois, D., et al. “Staging of non-small-cell lung cancer with integrated positron emission tomography and computed tomography.” *New England Journal of Medicine*, 2003; 348: 2500-2507.

2. Aukema, Tjeerd S., et al. “Evaluation of 18F-FDG PET-CT for Differentiation of Pulmonary Pathology in an Approach of Outpatient Fast Track Assessment.” *Journal of Thoracic Oncology*, Volume 4, No. 10, October 2009, pp.1226-1230.