New England PET Imaging System

Case of the Quarter—October 2011

FDG-PET/CT Staging and Restaging of Small-Cell Lung Cancer

Patient History

The patient is a 75-year-old woman with a 120-pack-year history of smoking and a history of type-2 diabetes, hypertension, and heart disease. In April 2011 the patient presented with headaches, difficulty swallowing, and swelling of the neck, face, and upper chest. A CT with contrast demonstrated a 6.0 x 4.7 x 5.5-cm right paramediastinal mass lobe, compressing and nearly occluding the superior vena cava (SVC). There was a 3.5 x 2.2-cm nodule in the immediately adjacent right upper lobe, in addition to right hilar, high paratracheal, and subcarinal lymphadenopathy. A 1.8-cm rounded hypodensity was seen in the inferior aspect of the spleen, thought to possibly represent metastatic disease. Transbronchial biopsy of the right upper lobe confirmed a diagnosis of small-cell carcinoma of the lung.

The patient received emergent radiation therapy for SVC syndrome, was placed on Decadron, and experienced some improvement in respiratory status and edema. Medical oncology then ordered a baseline PET/CT to have a better understanding of the extent of disease. The patient then underwent five cycles of chemotherapy before a restaging FDG-PET/CT was performed.

FDG-PET/CT Findings

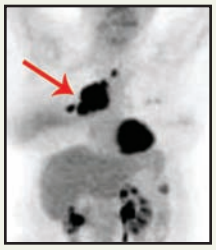
An FDG-PET/CT staging study was performed within a week of the biopsy-proven diagnosis of small-cell lung cancer. The FDG-PET/CT study showed intense abnormal FDG uptake in the right paramediastinal mass and in the adjacent right upper lobe nodule. The study also revealed high uptake in lymphadenopathy in the right paratracheal, subcarinal, and suprasternal notch regions.

The patient was seen by Medical Oncology in late June after three cycles of chemotherapy, showing improved respiratory state and excellent tolerance of systemic chemotherapy. It was determined that the patient would undergo an additional two cycles of chemotherapy and have a restaging FDG-PET/CT exam in late July.

The restaging FDG-PET/CT study revealed marked interval decrease in the size and intensity of uptake of the right paramediastinal mass. There was interval resolution of uptake in the superior mediastinal lymphadenopathy, and marked improvement in subcarinal and hilar FDG activity. Furthermore, the study showed interval resolution of previously identified splenic metastasis, and no evidence of metastatic disease in the abdomen or pelvis.

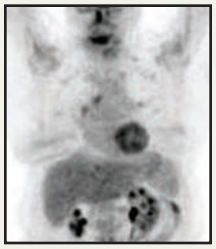
How Did FDG-PET/CT Help?

An initial FDG-PET/CT study was used as a baseline test to assess the extent of disease. Following radiation therapy and systemic chemotherapy, a restaging FDG-PET/CT study demonstrated a positive response to therapy. Based on these encouraging results, Medical Oncology called for a sixth and final cycle of systemic chemotherapy, and a follow-up FDG-PET/CT study.

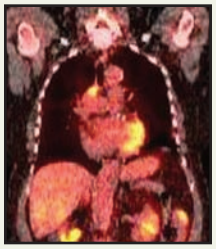


April 2011—initial staging PET view

April 2011—initial staging fused PET/CT view



July 2011—restaging PET view



July 2011—restaging fused PET/CT view

Discussion

In a study of staging of non-small-cell lung cancer, Lardinois et al[1] found that tumor staging was significantly more accurate with integrated PET/CT than with CT alone. Nodal staging was also significantly more accurate with integrated PET/CT than with PET alone. They conclude that integrated PET/CT improves the diagnostic accuracy of the staging of non-small-cell lung cancer.

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, June 19:348 (25):2500-7

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