

Case 2: 59 yr-old man with hypermetabolic area in the left inferior lung lobe

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Clinical presentation

59-yr old man with hypermetabolic area (SUV_{max} 15.8, June 18, 2008) in the left inferior lung lobe, corresponding to a mass detected on chest x-ray (confirmed by CT of the chest).

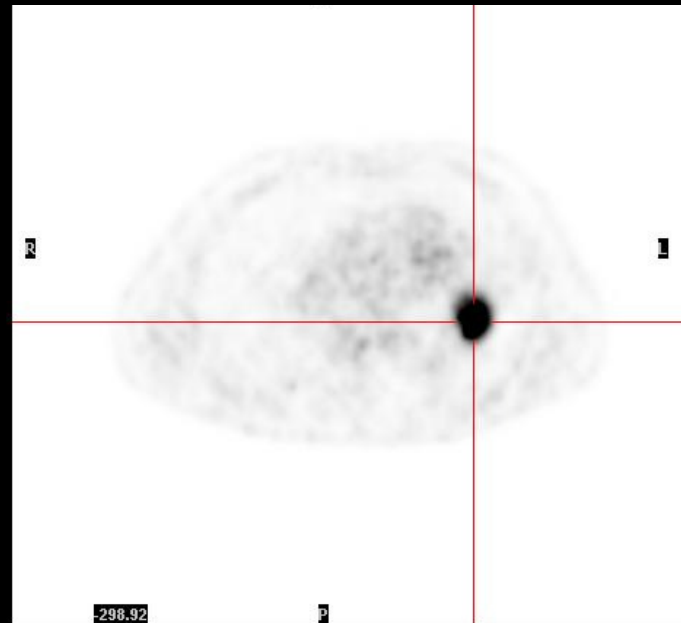
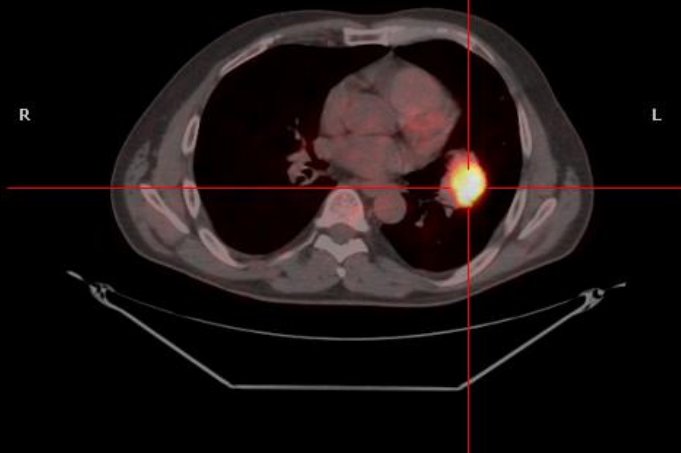


-298.92

P
CT Transaxials

A

x1.10



-298.92

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PET Transaxials



Rationale for examination

- The rationale for reporting this case is based on the well-known high tumor-to-background ratio seen when imaging with [^{18}F]FDG-PET/CT, and on the potential use of a hand-held high-energy gamma probe to localize tumors intra-operatively better than during external imaging.

Parameters of the PET procedure

The patient received an additional i.v. injection of 7 mCi [^{18}F]FDG 2.5 hr before radioguided surgery (on June 19, 2008).

Intraoperative findings (γ -counting with electronically-collimated probe)

At surgery, the high-energy gamma probe was used to measure counts per second at the known tumor site demonstrated by the diagnostic [^{18}F]FDG-PET/CT, as well as from the adjacent normal tissue.

- Counts
- Lesion in-vivo (left inferior lung lobe): 4700 cps
- Lesion ex-vivo: 2300 cps
- Collateral lung parenchyma (lingula) in-vivo: 1500 cps
- Background: 500/600 cps
- Coronal lymph node in-vivo: 1230 cps (ex-vivo 500 cps)
- Additional coronal lymph node: 500 cps
- Hilar lymph node: 600/1200 cps
- Pulmonary vein: 500/600 cps
- Healthy tissue: 200 cps

Interpretation

- Tumor-to-background ratio was about 7.8.
- Collateral lung parenchyma (lingula)-to-background count ratio was about 4.6.
- Collateral lung parenchyma-to-background count ratio was about 1.1.
- Mediastinal lymph node lesion-to-background count ratio was about 1.1.

On the basis of these intra-operative data, the surgeon decided to perform an “atypical” lobectomy of left inferior lung lobe + inferior lingula segment.

Definitive histology

Moderately differentiated, mixed-type broncho-alveolar and solid adenocarcinoma (Grade 2).

Non-infiltrated margins of resection.

Collateral lung parenchyma with emphysema.

13 out of 13 hilar-mediastinal lymph nodes with reactive hyperplasia and anthracosis.

Stage: pT2(G2),N0,Mx

Discussion

This case shows the efficacy of a high-energy gamma probe (electronically-collimated) in its ability to:

- intra-operatively detect [18]FDG-avid lung cancer;
- detect the difference in radioactivity accumulation in tumor and in adjacent normal tissue (thus guiding the surgeon to optimal resection of the margins);
- perform intra-operative staging (detecting the presence/absence of occult lymph node metastases).

References

Radioguided Surgery – A Comprehensive Team Approach.
Mariani G, Giuliano AE, Strauss HW, eds New York:
Springer, 2008.