Lung Cancer: Practical Application of Imaging In Determining Resectability

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62 year old man with a superior sulcus tumor. Which of the following precludes surgical resection in this patient:

- A. Extension of tumor into the intervertebral foramen
- B. Vertebral body involvement
- C. Invasion of the brachial plexus
- D. Invasion of the subclavian artery
- E. Invasion of the rib
Superior Sulcus Tumor
Superior Sulcus Tumor
Superior Sulcus Tumor
NSCLC

TNM Staging

- T4

  Satellite nodule/s in ipsilateral non-tumor lobe

  Invasion of vertebral body, heart, trachea, esophagus and mediastinum
T4 NSCLC Invading Left Atrium (LA) and Greater Vessels

- 105 patients NSCLC T4N0-2M0
- 79 men, 26 women, 36-75 years (median, 59)
- Tumor invading LA n=25, SVC n=23, PA n=57
- Complete resection possible in 73%
- 5 year survival 49% complete resection, 18% incomplete
- N status significant influence on overall 5 year survival (62% N0, 51% N1, 12% N2)

NSCLC Staging

Nodal (N) Status

- **N0**: No regional nodal metastasis
- **N1**: Metastasis to ipsilateral hilar nodes
- **N2**: Metastasis to ipsilateral mediastinal and/or subcarinal nodes
- **N3**: Metastasis to contralateral hilar, mediastinal or supraclavicular nodes
NSCLC Staging

Nodal (N) Status

- Detection of metastasis by CT based on size

- CT: estimated sensitivity 57%, specificity 82%

NSCLC FDG-PET

Nodal (N) Status

• “Test Performance Of PET And CT For Mediastinal Staging In Patients With Non-small-cell Lung Cancer”
  Gould et al., Ann Int Med 2003;139:879-892

• “The Size Of Mediastinal Lymph Nodes And Its Relation With Metastatic Involvement: A Meta-analysis”
  de Langen et al., European J of Cardiothorac Surg 2006;29:26-29
NSCLC FDG-PET

Nodal (N) Status

• **PET Negative**
  - Normal-sized nodes: posttest probability 6%
  - Enlarged nodes: posttest probability 24%

• **PET Positive**
  - Normal-sized nodes: posttest probability 63%
  - Enlarged nodes: posttest probability 93%

Revised Staging IASLC

• **M1a**
  Malignant pleural or pericardial effusion
  Malignant pleural nodule
  Nodule in contralateral lung

• **M1b**
  Distant metastasis

Adrenal M1 $\rightarrow$ M1b
Adrenal M1 → M1b
Evaluation of Adrenals in NSCLC

- 21 studies, 1391 lesions (824 benign, 567 malignant)
- Qualitative visual analysis 841 (14 reports), quantitative SUV 824 (13 reports), SUR 562 (8 reports)
- Mean sensitivity 0.97, specificity 0.91
- Lung cancer (5 reports) sensitivity 0.94, specificity 0.82
- Visual analysis best characterization of malignant adrenal lesions but no significant difference to SUV, SUR

- Adrenal masses can be characterized by FDG-PET, subsequent imaging usually unnecessary

Bone M1b
NSCLC FDG-PET

PLUS Trial

- 188 with potentially resectable NSCLC
- Randomized to CW (96) or CW + PET (92)
- 78/96 CW underwent thoracotomy
- 60/92 CW + PET underwent thoracotomy

NSCLC FDG-PET

PLUS Trial

- CW (n=78)
  - 39 (50%) non-futile
  - 39 (50%) futile

- CW + PET (n=60)
  - 41 (68%) non-futile
  - 19 (31%) futile

NSCLC FDG-PET

PLUS Trial

- Addition of PET to CW prevented futile surgery in 1 of 5 patients

183 patients with stage I-II NSCLC

Randomly assigned CW (92) or CW + PET (91)

90/92 CW underwent thoracotomy

87/91 CW + PET underwent thoracotomy

Viney, RC et al. Randomized controlled trial of the role of PET in the management of stage I and II NSCLC. J Clin Oncol 2004;22:2357-2362
NSCLC FDG-PET

PET in Stage I-II Management

• PET upstaged 15 patients
  Stage IIIa (n=11)
  Stage IIIb (n=2)
  Distant metastases (n=2)

• PET improves appropriate stage specific management

• PET does not significantly reduce thoracotomy

Viney, RC et al. Randomized controlled trial of the role of PET in the management of stage I and II NSCLC. J Clin Oncol 2004;22:2357-2362