Role of EBUS in Mediastinal Staging

Controversies in the Utilization of New Technology

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Mediastinal Staging

- Non-invasive staging (Imaging)
  - CT, PET, PET-CT, MRI

- Invasive staging (Tissue)
  - Surgical biopsy (Med, VATS)
  - Needle biopsy (EBUS-TBNA, EUS-FNA, TTNA)
EBUS-TBNA

- Access to all LN stations accessible by Med as well as N1 nodes
- A minimally invasive modality which can be performed under LA
- Performed in over 1300 centres
Convex Probe EBUS (CP-EBUS)

Outer Diameter: 6.7mm
Scanning Range: 50 degrees
Instrument Channel: 2.2mm
Optics: 35 degrees forward oblique
Convex Probe EBUS (CP-EBUS)
EBUS-TBNA Procedure
Cell blocks often contain a “mini-core” of tumour.

Can be used for multiple immunohistochemical stains.

Can provide prognostic information *
(cell-cycle proteins, EGFR mutation).

* Nakajima et al. Chest 2007
Mohammed et al. Thorax 2008
LN assessable
2, 4, 7, 10, 11, 12, 8, 9

LN not assessable
5, 6
RLL Squamous cell ca
Systematic LN Sampling

EBUS-TBNA N0 ⇒ cT2N0M0 stage IB ⇒ pT2N0M0 stage IB
EBUS-TBNA - Yield

- EBUS-TBNA: 924 cases from 1689 LN sites
- Lung cancer staging  n=657
- Diagnostic yield (LN staging) 94.7 %
- Diagnostic yield in EBUS-TBNA assessable lymph node station 98.2 %
- Non-diagnostic cases n=28 (3%)
- False negative cases n=35 (5.3%)
EBUS-TBNA – False negatives

Seen in 35/657 Lung cancer cases
Only 12 true false negative cases
EBUS-TBNA Systematic Review

- 11 studies (n=1299)
- Sensitivity = 0.93 (95%CI, 0.91-0.94), Specificity = 1.00 (95%CI, 0.99-1.00)
- Study sensitivity not related to prevalence of LN metastasis

Gu et al. Eur J Cancer 2009
EBUS vs Mediastinoscopy
### Superior Mediastinal Nodes

1. Highest Mediastinal
2. Upper Paratracheal
3. Pre-vascular and Retrotreacheal
4. Lower Paratracheal (including Azygos Nodes)

### Aortic Nodes

5. Subaortic (A-P window)
6. Para-aortic (ascending aorta or phrenic)

### Inferior Mediastinal Nodes

7. Subcarinal
8. Paraesophageal (below carina)
9. Pulmonary Ligament

### \( N_1 \) Nodes

10. Hilar
11. Interlobar
12. Lobar
13. Segmental
14. Subsegmental

*Hwangbo et al. Respirology 2009*
## Restaging - Mediastinoscopy

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<th>n</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Accuracy</th>
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<tr>
<td>Stamatis et al</td>
<td>165</td>
<td>74 %</td>
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<td>Schil et al</td>
<td>27</td>
<td>73 %</td>
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<td>85 %</td>
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<td>Mateau et al</td>
<td>12</td>
<td>70 %</td>
<td>100 %</td>
<td>80 %</td>
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Restaging - EBUS

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<th>PPV</th>
<th>NPV</th>
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<tbody>
<tr>
<td>EBUS-TBNA</td>
<td>76%</td>
<td>100 %</td>
<td>100 %</td>
<td>20 %</td>
<td>77%</td>
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124 patients met inclusion criteria following chemotherapy

- 58 stable disease
  - 17 EBUS negative
    - Thoracotomy 3 negative
    - Thoracotomy 14 positive
  - 41 EBUS positive
    - Thoracotomy 41 positive

- 66 partial response
  - 18 EBUS negative
    - Thoracotomy 4 negative
    - Thoracotomy 14 positive
  - 48 EBUS positive
    - Thoracotomy 48 positive

Herth, Yasufuku et al. The role of EBUS-TBNA for restaging the mediastinum in Lung ca. JCO 2008
Risk - Mediastinoscopy

- GA required for mediastinoscopy

- Hammoud (WU) 1999 - 2137 pts
  - 0.05% mortality
  - 0.6% morbidity (bleeding, RLN injury)

- Lemaire (Duke) 2006 – 2145 pts
  - 0.05% mortality
  - 0.6% recurrent nerve injury
Risk - EBUS

- No reported mortality

- Gu et al. *Eur J Cancer* 2009 - 1299 pts (11 studies)
  - Systematic review of EBUS-TBNA for lung ca staging
  - 0.07% morbidity (pneumothorax)

- Varela-Lema et al. *Eur Respir J* 2009 – 1627 pts (15 studies)
  - Systematic review of EBUS-TBNA for lung ca staging
  - No complications
  - Only three studies reported agitation, cough and presence of blood at puncture site
Direct Comparison
EBUS vs Mediastinoscopy

- Comparison of EBUS-TBNA and med for LN staging of Pts with enlarged mediastinal LN
- Prospective, crossover trial with surgical lymph node dissection used as the accepted standard
- N=66, prevalence of malignancy 89%
- Overall diagnostic yield in per LN analysis
  EBUS-TBNA 91% vs Med 78% (p=0.007)
- Disagreement in the yield for station #7 (24%; p=0.011).
- Per patient analysis of LN staging
  EBUS-TBNA 93% vs Med 82% (p=0.083)

*J Thorac Oncol. 2008; 3: 577-582*
EBUS vs Mediastinoscopy

Controlled prospective comparison of EBUS-TBNA and Med
All pts potential candidates for surgical resection
No significant differences between EBUS-TBNA (91.8%) and Med (93.9%) in the diagnostic yield for LN staging in NSCLC

Yasufuku et al. WTSA 2007 abstract
EBUS vs Mediastinoscopy

- Reach >
- Overall yield =
- FN rate >
- Risk >
- Cost >
- Restaging =

EBUS

Med
Advantages of EBUS over Med

- Outpatient setting under local anesthesia
- Absence of neck scar
- Access to N1 nodes
- Less risk of morbidity
- Less healthcare costs
- Potential to streamline thoracic surgical capacity
- Avoids unnecessary surgery in pts with infiltrating mediastinal disease
Conclusion

- EBUS-TBNA is less invasive, more safer and as accurate as surgical staging in patients with discrete node enlargement.

- EBUS-TBNA may be considered the first line procedure for pts with NSCLC with radiologic evidence of mediastinal adenopathy.

- In pts with surgically resectable lung cancer, there remains a role for mediastinoscopy to exclude metastases in non-enlarged LNs.
Who We Are