Electromagnetic Navigational Bronchoscopy

Duke Minimally Invasive Surgery Course
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Thomas A. D’Amico MD
Gary Hock Professor of Surgery
Chief Thoracic Surgery, Chief Medical Officer
Duke Cancer Institute
Disclosures

Consultant for Scanlan

No conflicts related to this presentation
Which of the following have better results?

1. Incising the pulmonary ligament for upper lobectomy
2. Reinflating the lung with the stapler on the bronchus prior to firing
3. Using suction on chest tubes after lobectomy
4. Adjuvant chemotherapy for T2N0 NSCLC (T size 3.3cm)?
NCDB: pathologic stage T2N0M0 NSCLC classified into 4 groups based on tumor size:
- 3.1-3.9 cm, 4-4.9 cm, 5-5.9 cm, and 6-7 cm
- 25,267 patients, 4996 (19.7%) who received adjuvant chemotherapy

Adjuvant chemotherapy associated with improved median and 5-year survival vs observation for all tumor size groups
• Tumors <4 cm adjuvant chemotherapy was associated with improved median and 5-year overall survival in univariate and multivariable analysis (p< 0.001)

• Propensity-matched score (p < 0.0001)

Median survival 101.6 vs 78.9 months
5-year survival 68% vs 60%
Kaplan-Meier analysis for propensity score-matched patients with NSCLC 3.1-3.9cm
Comparison of Suction Versus Nonsuction Drainage After Lung Resections: A Prospective Randomized Trial

- Prospective, randomized trial, 254 patients
- On the day of surgery, suction drainage at –20 cm H2O was used
- POD#1: patients randomized in the ratio of 1:1.
- Group A: continued with suction drainage
- Group B: waterseal drainage
Comparison of Suction Versus Nonsuction Drainage After Lung Resections: A Prospective Randomized Trial

<table>
<thead>
<tr>
<th></th>
<th>Suction</th>
<th>Water Seal</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage</td>
<td>1098.8 mL</td>
<td>814.4 mL</td>
<td>0.0014</td>
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<tr>
<td>CT duration</td>
<td>5.61 days</td>
<td>4.49 days</td>
<td>0.0014</td>
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<tr>
<td>Prolonged AL</td>
<td>5.55%</td>
<td>0.7%</td>
<td>0.032</td>
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Comparison of Suction Versus Nonsuction Drainage After Lung Resections: A Prospective Randomized Trial

Suction
Water Seal

<table>
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<tr>
<th>days</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tr>
<td>A</td>
<td>80</td>
<td>71</td>
<td>47</td>
<td>28</td>
<td>21</td>
<td>15</td>
<td>10</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>B</td>
<td>84</td>
<td>61</td>
<td>34</td>
<td>19</td>
<td>14</td>
<td>10</td>
<td>7</td>
<td>3</td>
<td>1</td>
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</table>
Technical Advances

- CT-Guided Navigational bronchoscopy
- Energy source vessel control
- Improved instrumentation
- 3-D visualization systems
- Uniportal lobectomy
- Non-intubated thoracic surgery
- Simulation
Electromagnetic Navigational Bronchoscopy

- Electromagnetically navigated bronchoscopy based on registration of CT scans & bronchoscopy
- Displays multi-dimensional views during navigation: axial, coronal, sagittal, local
- Guides the placement of the tip of the guided catheter within 3mm of the target
- Goal: facilitate biopsy (needle, core, brush, forceps), tattoo, or fiducial placement
CT-Guided Navigational Bronchoscopy

- Fluoroscopy is limited
  - 2-dimensional
  - Small lesions are difficult to visualize
  - Ground glass opacities are impossible to visualize
- CT-Guided ENB may improve success rate and may be employed in the future for ablation
CT propeller

Anesthesia Ventilator

CT compatible bed

CT “Garage”
ENB

1. Lung cancer diagnosis

2. Marking small lesions for resection

3. Ablation
85 year old man with 1cm nodule
Case

- 68 year old man with a mixed GGO
- CT-guided biopsy negative
- Anatomically unsuitable for segmentectomy
- High-risk surgical candidate to proceed with lobectomy without a diagnosis
Emprint™ Ablation System with Thermosphere™ Technology

- Microwave tissue ablation technology
- Thermal control: minimizes uncontrolled thermal factors that contribute to a passive ablation zone
- Field control: delivers a precise, scalable spherical field
- Wavelength control: prevents wavelength elongation as tissue becomes desiccated or charred and its properties change during ablation
Thoracoscopic Lobectomy: The Future

• CT screening: Higher proportion of early stage patients, which should all be thoracoscopic
• Some patients may elect for resection; others may choose ablation
• Thoracic surgeons should be able to diagnose, stage, resect, ablate lung cancer
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