Tailoring Thoracic Surgery to the Individual Elderly Patient

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Lung Cancer Statistics: United States

- 177,000 new cases each year
- Peak incidence in ages 60 - 70 years
- 27,394 men and 17,510 women ≥ 75 years will die each year
- 70% chance a lung nodule in a 70 year-old smoker is a cancer

Age Is A Risk Factor For Death After Thoracotomy

Lung Cancer Study Group (LCSG) data on open lobectomy or less:

\[
\begin{align*}
27 / 368 & \quad (7.3 \%) \quad \geq 70 \text{ years} \\
3 / 27 & \quad (11 \%) \quad \geq 80 \text{ years}
\end{align*}
\]

Ginsberg, et al, JTCVS, 1983

Pulmonary Function in the Elderly

- Respiratory muscle atrophy
- Reduction in force-generating capacity of residual muscle
- Ossification of costal cartilage
- Changed mechanics of breathing
For the Elderly Patient with a Lung Nodule:

- Don’t look, don’t tell
- Tell, but don’t do anything
- Tell, and work-up

Physician Willingness to Disclose a Diagnosis of Cancer

1961
Survey of 219 US doctors
90% would NOT disclose
Oken, JAMA, 1961

1979
Survey of 264 US doctors
90% WOULD disclose
Novack, JAMA, 1979

Elderly Patients WANT to know if Cancer is Diagnosis

- Survey of 270 patients ≥ 65 years old
- 88% want as much information as possible
- 1% undecided
- 11% preferred not to know information
  - 28% if limited ambulation
  - 7% if walked independent

Ajaj, BMJ 2001

Minimally – Invasive Surgical Revolution

- Laparoscopy 1980s
- Thoracoscopy and VATS early 1990s
- Optics, cameras, instruments, new surgical paradigms

AVERAGE YEARS OF LIFE REMAINING

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-70</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>70-75</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>75-80</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>80-85</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>≥ 85</td>
<td>5</td>
<td>6</td>
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</table>
VATS Incisions Preserve Muscle Function in the Elderly

- Limited Incisions
- Avoid rib fractures
- Less drain tubes
- Preserved pulmonary function
- Less narcotic
- Less confusion, quicker return home

VATS in the Elderly

Materials and Methods I

- Institution: Brigham and Women’s Hospital
- July 1991 to June 1994
- 896 Thoracoscopic and VATS cases
- 307/896 cases performed in pts older than 65 yr.

Comparison of Operative Mortality

LCSG:
Open Lobectomy or less
27 / 368 (7.3%) ≥ 70 years
3 / 27 (11%) ≥ 80 years

Brigham VATS:
Lobectomy or segmentectomy 0 / 32
Lesser resections 1 / 156

Thoracoscopy Reduces Risk

- Overall mortality < 1%
- 2% mortality if FEV-1 < 1 liter
- 10% mortality if Karnofsky scale < 8 (unable to carry on normal activity)

VATS resection for stage I lung cancer in the elderly

<table>
<thead>
<tr>
<th>Authors (pub. Year)</th>
<th># pts</th>
<th>Mean age</th>
<th>Technique</th>
<th>Morb (%)</th>
<th>Death %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shennib (1993)</td>
<td>30</td>
<td>71 yrs</td>
<td>Wedge Excision</td>
<td>23</td>
<td>3</td>
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<tr>
<td>McKenna (1994)</td>
<td>9</td>
<td>81 yrs</td>
<td>Major</td>
<td>22</td>
<td>0</td>
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<tr>
<td>Roviaro (1995)</td>
<td>13</td>
<td>70 yrs</td>
<td>Wedge</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yim (1996)</td>
<td>22</td>
<td>78 yrs</td>
<td>Minor/Major</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Jaklitsch (1996)</td>
<td>296*</td>
<td>65-90 yrs</td>
<td>Minor/Major</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Asamura (1997)</td>
<td>8</td>
<td>81 yrs</td>
<td>Lobectomy</td>
<td>28</td>
<td>0</td>
</tr>
</tbody>
</table>

*Benign lesions included

Postoperative Confusion

- 13 - 19% for elderly patients having open non-cardiac thoracic surgery @ BWH
- 2.6% for elderly patients having VATS non-cardiac thoracic surgery @ BWH

Less physiologic stress
Less narcotics
Quicker return to home environment
Locally Ablative Therapies

- Is pneumonectomy or lobectomy the standard of care of the elderly patient

Segmentectomy
Thoracoscopic Wedge
Radio-frequency ablation or cryotherapy

Match Surgical Resection to the Patient Constitution

- Preserved function
- Impaired
- Seriously impaired
- Invalid

Elderly Stage I NSCLC
Surgical Resections at BWH

- 1134 SPNs wedged at BWH (1989-98)
- 563 were proven NSCLC
- 98 were ≥ 75 yrs (elderly), 465 were <75 yrs
- Surgeon’s choice to proceed with anatomic lung resection or treat with wedge alone

Survival for Elderly NSCLC Patients

BWH Experience

1) Elderly patients (>75 yrs) are more likely to receive a wedge resection as definitive surgical therapy for Stage I NSCLC than younger patients at BWH, irrespective of performance status or comorbid lung disease.

2) Long-term survival in the elderly patients selected for surgical treatment of Stage I NSCLC appears to not be affected by surgeon’s choice of wedge versus lobectomy.
**Subcentimeter Non-Small Cell Lung Cancer**

- 40 primary NSCLC < 1cm at BWH (1990-98)
- 9 anatomic resections (lobe or segment)
- 8 wedge resections with node sampling
- 23 wedge resections without node sampling
- 34 adeno, 5 SCC, 1 undifferentiated

**Survival of Subcentimeter NSCLC nodules**

- No perioperative mortality
- 88% five year survival
- Type of resection did not influence survival

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**Landreneau & Sugarbaker Results**

- 219 consecutive patients
  - Open Wedge Resection: 42
  - Video-assisted Wedge Resection: 60
  - Lobectomy: 117

**Landreneau & Sugarbaker Results**

- Identical survival at one year
- Local recurrence and 5-yr survival, respectively:
  - Open Wedge Resection: 24% and 58%
  - Video-assisted Wedge Resection: 16% and 65%
  - Lobectomy: 9% and 70%
- Operative mortality:
  - Wedge resection: 0%
  - Lobectomy: 3%

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**Surgeon’s Choice of Resection**

- **Lobectomy:**
  - May have up to 10% mortality in elderly
  - Higher morbidity
  - Very low recurrence rate (6%)
- **Thoracoscopic Wedge:**
  - Less than 1% mortality rate, even in elderly
  - Less morbidity
  - May have a 17% local recurrence rate
Long-Term Survival of Patients with Early-Stage Non-Small Cell Lung Cancer as a Function of Age and Treatment Modality

Carlos M. Mery, Anastasia Pappas, Jeanne Lukanich, Raphael Bueno, Scott Swanson, Steven Mentzer, David Sugarbaker, Michael Jaklitsch

Division of Thoracic Surgery, Brigham and Women’s Hospital Harvard School of Public Health

Background

- The incidence of lung cancer increases with age.
- Elderly patients appear to have lower survival.
  - ? Patient-related factors
  - ? Differential treatment
- Lobectomy is the standard surgical treatment for early-stage lung cancer.
  - ? Adequacy differs according to age

Objective

To determine the effect of age and extent of surgery on the long-term survival of patients with early-stage non-small cell lung cancer (NSCLC) within a large multi-institutional database.


\[ N = 137,592 \]

Age: 68 ± 11 yrs

59% males, 41% females (1.45 : 1)

Ries, et al. National Cancer Institute, 2000

Demographics

\[ n = 14,555 \]

Gender

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
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<tbody>
<tr>
<td>Males</td>
<td>8080</td>
<td>6475</td>
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</table>

(56%)

(44%)

Age groups

<table>
<thead>
<tr>
<th>Age group</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 65 yrs</td>
<td>5057</td>
<td>(34%)</td>
</tr>
<tr>
<td>65 – 74 yrs</td>
<td>6073</td>
<td>(42%)</td>
</tr>
<tr>
<td>≥ 75 yrs</td>
<td>3425</td>
<td>(24%)</td>
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</tbody>
</table>
Adjusted mortality

<table>
<thead>
<tr>
<th>Age</th>
<th>Overall HR (95% CI)</th>
<th>Lung Ca HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 65 yrs</td>
<td>1.38 (1.29-1.47)</td>
<td>1.23 (1.14-1.33)</td>
</tr>
<tr>
<td>65 - 74 yrs</td>
<td>1.82 (1.69-1.96)</td>
<td>1.56 (1.43-1.71)</td>
</tr>
<tr>
<td>≥ 75 yrs</td>
<td>1.29 (1.22-1.36)</td>
<td>1.23 (1.1-1.26)</td>
</tr>
</tbody>
</table>

Males

<table>
<thead>
<tr>
<th>Stage II</th>
<th>Overall HR (95% CI)</th>
<th>Lung Ca HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.88 (1.76-2.0)</td>
<td>2.17 (2.01-2.34)</td>
</tr>
</tbody>
</table>

Adjusted for gender, age, stage, histology, type of surgery

Adjusted mortality

<table>
<thead>
<tr>
<th>Type of surgery</th>
<th>Overall HR (95% CI)</th>
<th>Lung Ca HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobectomy</td>
<td>1.28 (1.17-1.41)*</td>
<td>1.17 (1.04-1.32)*</td>
</tr>
<tr>
<td>Wedge rsct</td>
<td>1.58 (1.43-1.75)*</td>
<td>1.60 (1.42-1.80)*</td>
</tr>
<tr>
<td>Pneum</td>
<td>3.88 (3.59-4.19)*</td>
<td>4.56 (4.17-4.99)*</td>
</tr>
<tr>
<td>Palliative</td>
<td>3.88 (3.52-4.27)*</td>
<td>4.07 (3.62-4.58)*</td>
</tr>
<tr>
<td>No surgery</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adjusted for gender, age, stage, histology, type of surgery

Overall mortality

No curative surgery

Survival (mos) p = 0.0025

< 65 yrs

Lobectomies

Limited rsct

Survival (mos) p = 0.83

65 - 74 yrs

Lobectomies

Limited rsct

Survival (mos) p = 0.0009

≥ 75 yrs

Lobectomies

Limited rsct

Survival (mos) p = NS
Survival Benefit of Lobectomy Versus Limited Resection

• Lobectomies and Limited Resection similar overall survival for first 25 months.

• Survival curves different after 25 months in patients < 71 yrs of age.

• Survival benefit of lobectomy not observed for patients older the age of 71.

Other Locally Ablative Techniques

• CT guided Radio-frequency or Cryo-ablation

• Locally ablative

• No removal or sampling of N1 nodes

Thoracoscopic Guided RFA or Cryo-therapy

• General anesthesia

• Thoracoscopic inspection of pleural space and sampling of N1 nodes

• Ablative therapy may be better with atelectatic lung

• No issue of post-procedure pneumothorax

Winter Sunset on Commonwealth Avenue