Thoracoscopic Lobectomy for Lung Cancer

Clearly Superior to Open Resection

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Resident Debate
May 15, 2006
Lung Cancer in the US

- The leading cause of cancer-related deaths: 165,000 predicted deaths in 2006
- 180,000 new cases per annum
- 80% of cases are non-small cell lung cancer
- 90% are expected to die from lung cancer
Surgery for Lung Cancer

- Resection is considered the most effective modality for controlling the primary tumor for Stage I, II and selected III patients.

- Less than 25% of cases are potentially curable.
Video-Assisted Thoracic Surgery

- 1910: Jacobeus introduces thoracoscopy to facilitate collapse therapy
- 1940’s: Widespread use in Europe for tuberculosis
- 1990-present: Rapid expansion in diagnostic and therapeutic applications
Contraindications to VATS lobectomy

- Need for bronchoplastic resection
- Chest wall involvement
- Endobronchial involvement
- Large size
- T3 disease
Does VATS lobectomy provide standard of care?

- Safety
- Oncologic effectiveness
  - Recurrence rate
  - Survival
  - Adequacy of mediastinal lymph node sampling
Safety

Operative Mortality

- McKenna (n=1,100, 2006) 0.8%
- Thomas (n=511, 2002) 2.7%
- Walker (n=159, 2003) 0.8%
- McKenna (n=298, 1998) 0.3%
- Lewis (n=200, 1999) 0%
- Yim (n=214, 1998) 0.5%

Blood loss

Suguira et al.: Less blood loss in VATS cohort
(150 ± 126 cc vs. 300 ± 192 cc, p=0.009)
Oncologic Adequacy: Survival

- **Walker et al. Eur J CTS 2003**
  - Stage I: 5 yr survival 80%
  - Stage II: 5 yr survival 51%

- **Thomas et al. Eur J CTS 2002**
  - Retrospective comparison of VATS vs open resections

- **Alexander et al. ATS 2003**
  - Multicenter retrospective review of VATS lobectomy
Improved survival?

  - 97.2% 8-year survival following thoracoscopic lobectomy for Stage 1A

  - 90% 3 and 5-year survival following thoracoscopic lobectomy for Stage 1A
Oncologic Adequacy: Recurrence

- Alexander et al. ATS 2003
  - Local recurrence 5.7%
  - Metastatic disease 14%
- McKenna et al. ATS 1998
  - Incision site recurrence in 1 case in 258 (0.3%)
Oncologic Adequacy: Mediastinal Lymph Node Dissection

- **Watanabe et al. Surgery 2005**
  - Retrospective analysis of Stage 1A patients
  - Equivalent number of lymph nodes obtained

### Table III. Number of dissected nodes in right side

<table>
<thead>
<tr>
<th></th>
<th>Upper + Middle</th>
<th>Lower</th>
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<tbody>
<tr>
<td></td>
<td>VATS (n = 78)</td>
<td>OT (n = 52)</td>
</tr>
<tr>
<td>TNDN</td>
<td>30.7 ± 11.1</td>
<td>31.1 ± 13.4</td>
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</table>

### Table IV. Number of dissected nodes in left side

<table>
<thead>
<tr>
<th></th>
<th>Upper</th>
<th>Lower</th>
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<tbody>
<tr>
<td></td>
<td>VATS (n = 48)</td>
<td>OT (n = 40)</td>
</tr>
<tr>
<td>TNDN</td>
<td>28.0 ± 10.2</td>
<td>28.1 ± 11.3</td>
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Thoracotomy is a Morbid Incision
Potential Benefits

- Less impairment of pulmonary function
- Maintenance of immune function
- Reduced postoperative pain
- Faster recovery
- Cosmesis
Postoperative Pulmonary Function

- PaO2, O2 sat and peak flow rate higher in the postoperative period
  (Nakata et al. ATS 2000)

- Reduced impairment in 6 minute walk and vital capacity
VATS reduces acute phase response: CRP and IL-6

IL-8 and IL-10 production diminished following VATS lobectomy
(Yim et al. ATS 2000)
**Improved Immunologic Surveillance**

  - Prospectively randomized comparing VATS vs open lobectomy
  - Evaluated effects on cellular immunity

- Thoracotomy resulted in greater reduction in circulating CD4 cells at 2 days, NK cells at 7 days

- Leukocyte signaling (generation of reactive oxygen species) depressed further following open lobectomy

- VATS may confer an improved maintenance of host immune anti-tumor defenses
Postoperative Pain

- **Nomori et al. ATS 2001**
  - Lobectomy via VATS vs limited anterior thoracotomy
  - Pain scores significantly less from POD 1-7 (p=0.03)
  - Analgesic requirement significantly less at POD 7 (p<0.001)

- **Demmy et al. ATS 1999**
  - At 3 weeks, pain far better for the VATS group

- **Sugiura et al. Surg Laparos Endosc 1999**
  - Shorter need for epidural (3 v 7 days)
Demmy et al. ATS 1999
- Earlier return to full preoperative activity
- 2.2 ± 1.0 vs. 3.6 ± 1.0 months (p=0.02)

Sugiura et al. Surg Laparos Endosc 1999
- Time to return to full preoperative activity with VATS
- 2.25 ± 1.7 vs. 7.8 ± 8.6 months (p=0.027)
**Length of Stay**

- **Demmy et al. ATS 1999**
  - Far shorter length of stay with VATS approach
  - 5.3 d vs. 12.2 d (p=0.02)

- **McKenna et al. ATS 2006**
  - Reports results from 1,100 VATS lobectomies
  - Length of stay: median 3 days; mean 4.7 days
Cost

- VATS typically incurs a higher operative cost with the use of disposables.
- Overall cost may favor VATS if hospital stay is significantly shorter.
Thoracoscopic lobectomy is a safe operation

The VATS approach does not compromise survival rates

VATS lobectomy confers multiple advantages over thoracotomy

- Improved postoperative pulmonary function
- Diminished pain
- Quicker recovery
Conclusion

- Thoracoscopic lobectomy should be considered the operation of choice for resection of early stage lung cancer.

- A multicenter prospective, randomized trial will definitively provide answers regarding the role of thoracoscopic lobectomy in the surgical treatment of lung cancer.
What would your patient prefer?