Thoracoscopic Lobectomy:
Technical Aspects in 2015—
16 Years of Progress

8th Masters of Minimally Invasive Thoracic Surgery
Orlando
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Chief Thoracic Surgery, Chief Medical Officer
Duke Cancer Institute
Disclosure

• Consultant for Scanlan
• No conflicts related to this presentation
The Impact of Minimally Invasive Strategies on The Practice Of Thoracic Surgery

- Better outcomes for patients due to the advantages of Minimally Invasive Strategies
- Better outcomes for patients: majority of procedures done by General Thoracic Surgeons
- Advances in technology in General Thoracic Surgery
- Increase in the interest in the specialty of General Thoracic Surgery among residents

- Wedge resection
- Pleural biopsy
- Drainage of effusion
- Mediastinal cysts
- Sympathectomy

- VATS lobectomy was uncertain
Minimally Invasive Thoracic Surgery: 2015

- Lobectomy
- Sleeve lobectomy
- Lobectomy with chest wall resection
- Pneumonectomy
- Metastasectomy
- Thymectomy
- Esophagectomy
Thoracoscopic Lobectomy: Early Studies

Early thoracoscopic technique

1. Simultaneously stapled lobectomy: oncologic issues
2. Working through the fissure: difficult to teach
3. Non-Thoracic surgeons: experience issues
4. Primary comparative studies performed too early
5. Technical issues: approaches and instruments

• Disappointing outcomes
• Minimal adoption
Thoracoscopic Lobectomy: Duke Approach

2 incisions: Camera port (1 cm) + Access incision (4.5 cm)
1996-2002: 128 pts with c-stage I lung cancer

Median operative time: 130 minutes

Median chest tube duration and LOS: 3 days

Mortality: 2/97 (2%)
Thoracoscopic Lobectomy Is a Safe and Versatile Procedure

Experience With 500 Consecutive Patients

Mark W. Onaitis, MD, Rebecca P. Petersen, MD, MSc, Stafford S. Balderson, PA-C, Eric Toloza, MD, PhD, William R. Burfeind, MD, David H. Harpole, Jr., MD, and Thomas A. D’Amico, MD

Ann Surg 2006; 244:420-425

<table>
<thead>
<tr>
<th><strong>Hilar approach: fissureless technique</strong></th>
<th><strong>1999-2003</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest tube duration: median</td>
<td>3 days</td>
</tr>
<tr>
<td>Length of stay: median</td>
<td>3 days</td>
</tr>
<tr>
<td>OR mortality</td>
<td>0%</td>
</tr>
<tr>
<td>Mortality at 30 days</td>
<td>1.2%</td>
</tr>
<tr>
<td>Conversion rate</td>
<td>1.6%</td>
</tr>
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</table>
Advantages of Thoracoscopic Lobectomy

1. Less postoperative pain
2. Shorter chest tube duration and length of stay
3. Faster return to full activity
4. Preservation of pulmonary function
5. Lower inflammatory cytokine response
6. Lower cost
Critical Outcome Advantages of Thoracoscopic Lobectomy

1. Fewer complications

2. Better compliance with adjuvant therapy

3. High-risk patients: physiologic and oncologic
Advanced Procedures

- Larger tumors
- N1 Disease
- Lobectomy after induction therapy
- Chest wall resection
- Pneumonectomy
Impact of T status and N status on perioperative outcomes after thoracoscopic lobectomy for lung cancer

Nestor R. Villamizar MD, Marcus Darrabie MD, Jennifer Hanna MD, Mark W. Onaitis MD, Betty C. Tong MD, Thomas A. D’Amico MD, and Mark F. Berry MD

J Thorac Cardiovasc Surg 2013;145:514-21
Western Thoracic Surgical Association
June 28, 2012

Nestor R. Villamizar MD, Marcus Darrabie MD, Jennifer Hanna MD, Mark Onaitis MD, David Harpole MD, Betty Tong MD, Thomas D’Amico MD, Mark F. Berry MD

Duke Cancer Institute
Trends Over Time

% Total Cases

Year


Central

> 3 cm

Node Positive
T status and N status

Conversions

• Not higher for central tumors or tumors > 3cm
• Higher for clinically node (+) disease
  
cN0  3.3%       cN1-N3   7.2%  
p=0.03

Incidence of complications not related to

• Tumor size >3cm
• Central location
• Clinical node status
Technical Advances

- Uniportal lobectomy
- Energy source vessel control
- RFA: lung and esophagus
- Awake thoracic surgery
- CT-Guided Navigational bronchoscopy
- Simulation
97/102 completed successfully (conversion 5%)
OR time 154.1 ± 46 minutes (60–310)
Mean tumor size was 2.8 ± 1.5 cm (0–6.5 cm)
Median length of hospital stay was 3 days
Evaluation of efficacy of an ultrasonic scalpel for pulmonary vascular ligation in an animal model


Daniel G. Nicastrì, MD, a Maoxin Wu, MD, PhD, b Jaime Yun, MD, c and Scott J. Swanson, MD c

![Bar chart showing percentage of veins, arteries, and total sealed compared across pig numbers 1 to 9.](image-url)
Anvil Extension Technology in Thoracic Surgery

Todd L. Demmy, MD, and William R. Mayfield

Ann Thorac Surg 2012;93:1280-1284

Department of Thoracic Surgery, Roswell Park Cancer Institute and University at Buffalo, Buffalo, New York; and WellStar Thoracic Surgery Associates, LLC, Marietta, Georgia
Randomized comparison of awake nonresectional versus nonawake resectional lung volume reduction surgery

Eugenio Pompeo, MD, Paola Rogliani, MD, Federico Tacconi, MD, Mario Dauri, MD, Cesare Saltini, MD, Giuseppe Novelli, PhD, and Tommaso C. Mineo, MD, for the Awake Thoracic Surgery Research Group

(J Thorac Cardiovasc Surg 2012;143:47-54)
Awake Thoracoscopic Biopsy of Interstitial Lung Disease

Eugenio Pompeo, MD, Paola Rogliani, MD, Benedetto Cristino, MD, Orazio Schillaci, MD, Giuseppe Novelli, PhD, and Cesare Saltini, MD

Departments of Thoracic Surgery, Pulmonology, Nuclear Medicine, and Genetics, Policlinico Tor Vergata University, Rome, Italy

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall (n = 30)</th>
<th>Epidural Anesthesia (n = 20)</th>
<th>Intercostal Blocks (n = 10)</th>
<th>Intergroup p Valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anesthesia time (minutes)</td>
<td>25 ± 10</td>
<td>31 ± 5.0</td>
<td>13 ± 4.0</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Operative time (minutes)</td>
<td>22 ± 5.0</td>
<td>22 ± 4.0</td>
<td>18 ± 3.0</td>
<td>0.94</td>
</tr>
<tr>
<td>Global operating-room time (minutes)</td>
<td>47 ± 11</td>
<td>52 ± 6.0</td>
<td>35 ± 9.0</td>
<td>&lt;0.000002</td>
</tr>
<tr>
<td>Conversion to thoracotomy (n)</td>
<td>1</td>
<td>1</td>
<td>—</td>
<td>1.0</td>
</tr>
<tr>
<td>Feasibility (score)</td>
<td>3.43 ± 0.7</td>
<td>3.5 ± 0.8</td>
<td>3.3 ± 0.7</td>
<td>0.39</td>
</tr>
<tr>
<td>Postoperative pain VAS at 6 hours</td>
<td>1.9 ± 0.6</td>
<td>1.8 ± 0.6</td>
<td>2.0 ± 0.7</td>
<td>0.50</td>
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<tr>
<td>Postoperative pain VAS at 24 hours</td>
<td>1.7 ± 0.6</td>
<td>1.5 ± 0.5</td>
<td>2.1 ± 0.6</td>
<td>0.02</td>
</tr>
<tr>
<td>T1-T5 ΔPaO₂/FiO₂ (mm Hg)</td>
<td>3.0 ± 10</td>
<td>4.0 ± 9.0</td>
<td>0.8 ± 12</td>
<td>0.52</td>
</tr>
<tr>
<td>T1-T5 ΔPaCO₂ (mm Hg)</td>
<td>0.3 ± 3.0</td>
<td>0.2 ± 2.0</td>
<td>0.5 ± 3.0</td>
<td>0.98</td>
</tr>
<tr>
<td>Morbidity (N)</td>
<td>1</td>
<td>1</td>
<td>—</td>
<td>1.0</td>
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<tr>
<td>Hospital stay (days)</td>
<td>1.4 ± 0.7</td>
<td>1.5 ± 0.8</td>
<td>1.2 ± 0.4</td>
<td>0.26</td>
</tr>
<tr>
<td>Cost (euro dollars)</td>
<td>2,670 ± 474</td>
<td>2,800 ± 486</td>
<td>2,410 ± 337</td>
<td>&lt;0.002</td>
</tr>
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</table>
Feasibility and Safety of Nonintubated Thoracoscopic Lobectomy for Geriatric Lung Cancer Patients

Chun-Yu Wu, MD,* Jin-Shing Chen, MD, PhD,* Yi-Shiuan Lin, MD, Tung-Ming Tsai, MD, Ming-Hui Hung, MD, Kuang Cheng Chan, MD, and Ya-Jung Cheng, MD, PhD

Department of Anesthesiology, National Kinmen Hospital, Kinmen; Division of Thoracic Surgery, Departments of Surgery and Anesthesiology, National Taiwan University Hospital and National Taiwan University College of Medicine, Taipei, Taiwan

- 84 pts (≥ 65 years) stage I/II NSCLC VATS lobe
- 48 pts SLV; 36 pts no ETT (epidural, sedation)
- Comparable OR duration and blood loss
- Anesthetic duration shorter in nonintubated group
- 1 conversion to tracheal intubation
Thoracoscopic Lobectomy: The Future

• Higher proportion of early stage patients, which will increase based on screening trial
• VATS lobectomy now a required case for Board certification in US
• Improved surgical instrumentation to facilitate
  • Larger tumors, chest wall, diaphragm
  • Stage IIIA, pneumonectomy, sleeve resections,