Easy and safe visualization method for creating an intersubsegmental plane by bronchial closure using a slip-knot in thoracoscopic anatomical lung subsegmentectomy

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Disclosure

None
Background

- **Segmentectomy** has increased because small-sized lung nodules have often been found due to the recent widespread use of CT.
- Visualization of the intersegmental plane is the key process.
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**Conventional methods**

- Inflated segment → Preservation
- Deflated segment → Resection
Background

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Recent methods

- Segment inflated ← Jet ventilation, bronchoscope

Alternative methods

- Dye Injection ← Indocyanine green, methylene blue
**Background**

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- Visualization of the intersegmental plane is the key process.

**Recent methods**

- Segment inflated ← Jet ventilation, bronchoscope

**Subsegmentectomy:** Bronchus is very thin. Thoracoscopic surgery: Working space is limited.

**Difficult!**
Purpose

To evaluate the efficacy of our new method for visualization of an intersubsegmental plane during thoracoscopic subsegmentectomy.
Slip-knot method

New method to make an intersubsegmental plane

1. Monofilament suture
   - Slip-knot
   - Tumor
   - Air

2. Inflation

3. Deflation
   - Intersubsegmental plane
Surgical technique

Thoracoscopic subsegmentectomy

1. Division of Pulmonary Artery
   ↓

2. Bronchus (1) Lung ventilation
   ↓
   - Slip-knot
     (Temporal bronchial closure)
   - (2) Ligation
   - (3) Division
   → Visualization of intersubsegmental plane

3. Division of Pulmonary Veins
   ↓

4. Division of Parenchyma

4 Ports

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Patients and methods

Nov 2006 – Dec 2014 63 Cases

Thoracoscopic subsegmentectomy which managed the subsegmental bronchus.

< Patient characteristics >

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>65 ± 12 (20-85)</th>
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</thead>
<tbody>
<tr>
<td>Male / Female</td>
<td>30 / 33</td>
</tr>
<tr>
<td>Tumor size (mm)</td>
<td>16 ± 6.5 (5-35)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CT findings</th>
<th>Lung cancer</th>
<th>Metastatic lung tumor</th>
<th>Benign tumor</th>
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<tbody>
<tr>
<td>Solid</td>
<td>23</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Non-solid</td>
<td>40</td>
<td>38</td>
<td>1</td>
</tr>
<tr>
<td>Total (n)</td>
<td>63</td>
<td>48</td>
<td>12</td>
</tr>
</tbody>
</table>

< Variables > Bronchial diameter, operative outcome

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# Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Before (n=11)</th>
<th>After (n=42)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical time (m)</td>
<td>237 (158-373)</td>
<td>168 (71-275)</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Blood loss (mL)</td>
<td>109 (3-913)</td>
<td>8 (0-400)</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Chest tube duration (d)</td>
<td>2 (1-7)</td>
<td>1 (1-6)</td>
<td>0.12</td>
</tr>
<tr>
<td>Postoperative hospital stay (d)</td>
<td>7 (2-26)</td>
<td>6 (3-13)</td>
<td>0.96</td>
</tr>
</tbody>
</table>

**Introduction of slip-knot method**

- No. of cases applied the slip-knot method: 42
- No. of closed subsegmental bronchi: 60
- Diameter of subsegmental bronchus (mm): 3.5 (2.0-5.2)
- No. of cases with nodules contained within the resected lung: 42 (100%)
Discussion

Slip-knot method: Merits

1. Simple and easy
   (Just pulling the slip-knot after lung inflation)

2. Less cost
   (Material: Monofilament suture)

Visualization of the intersubsegmental plane

Thoracoscopic subsegmentectomy Possible
Our new slip-knot method was useful and safe to visualize an intersubsegmental plane by closing bronchus in thoracoscopic subsegmentectomies.

See another VIDEO at LEANING CENTER # 9, Exhibit Hall.