Subxiphoid Uniportal VATS resections

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The most dangerous phrase in the language is "we've always done it this way."

Innovation

'There's a way to do it better—find it.'
– Thomas Edison
Uniportal VATS

Segmentectomy 2012
Lobectomy 2011

Pericardial Window
& Mediastinal LN bx 2006
Pleurodesis 2005
Wedge resection 2004
Pleural diseases 2003
Sympathectomy 2002

Unisurgeon 2016
Carinal resection 2015
Subxiphoid resections 2015
Non intubated surgery 2014
Double sleeve 2014

PA Resection & Reconstruction
Sleeve Resection 2013
Pneumonectomy 2012

Single-port video-assisted thoracoscopic lobectomy with pulmonary artery reconstruction

Uniportal video-assisted thoracoscopic bronchial sleeve lobectomy: First report

Single-incision video-assisted thoracoscopic right pneumonectomy
Does Single-incision Thoracoscopic Lobectomy for Lung Cancer Reduce Postoperative Pain?

Chao-Yu Liu, Chih-Tao Cheng, Bing-Yen Wang, Chih-Hsun Shih, Chia-Chuan Liu.
Anatomic consideration

Less postoperative wound pain (not mediastinal pain) due to relative nerve sparing around this area.
Subxiphoid single-incision thoracoscopic left upper lobectomy

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Thoracoscopic surgery has been shown to be a feasible and safe technique for performing lobectomy. Thoracoscopic lobectomy is normally performed through 2 or 4 incisions, although cases of single-incision thoracoscopic lobectomy have been reported.2,3 We present a novel technique for performing thoracoscopic lobectomy through a single subxiphoid incision.

CLINICAL SUMMARY
A 49-year-old woman came to our clinic with a pulmonary nodule that was incidentally found on plain film radiographs of the chest. Computed tomography of the chest demonstrated an irregular soft-tissue lesion, measuring 3 × 3 cm, in the left upper lobe without mediastinal lymph node enlargement. Positron emission tomography and computed tomography revealed intense focal fluorodeoxyglucose (FDG) (18F) uptake in the lesion without distant metastases. Computed tomographically guided biopsy of the mass lesion was performed, and the results of histopathological analysis of the biopsy specimen were positive for adenocarcinoma, clinical stage T1N0M0.

After written, informed consent was obtained from the patient, a thoracoscopic lobectomy was performed through a small subxiphoid incision. Radical mediastinal lymph node sampling was also carried out. The intensity of postoperative pain was evaluated every 8 hours by means of a visual analog scale, which ranged from 0 (painless) to 10 (worst pain ever experienced). The mean pain scores at rest were 3, 2, and 0 immediately after the operation, the day after the operation, and 2 days after the procedure, respectively. Pain was limited to the subxiphoid area. The patient's postoperative course was uneventful, and she was discharged on the third day after surgery.

The resected tumor measured 3.5 cm, and the pathologic stage was T2aN1M0. A total of 15 lymph nodes (2 at station 4L, 3 at station 5, 2 at station 7, 1 at station 10, 1 at station 11, and 5 at station 12/13/14) were dissected, and 2 segmental lymph nodes had positive results for malignancy.

TECHNIQUE
After induction of general anesthesia and intubation with a double-lumen endotracheal tube, the patient was put in the right semidecubitus position at a 45° angle to the table. A 4-cm transverse incision was made over the subxiphoid area, a subcostal tunnel was created, and a wound protector was placed into the wound to provide optimal exposure. The sternocostal margin was lifted with a retractor (Figure 1,
Incisions

A 4-cm-long horizontal subxiphoid incision, if infrasternal angle $\geq 70^\circ$

A longitudinal incision if infrasternal angle $< 70^\circ$. 
Subxiphoid single incision

VATS

RETRACTOR
Subxiphoid single incision VATS

Subcostal incision Uniportal
Subcostal incision Uniportal VATS

Bimanual instrumentation
Assistant on the other side
Resection of subxiphoid process
Bilateral resections
Subcostal right upper lobe resection
Subxiphoid right lower lobectomy
Subcostal right upper lobectomy
Subcostal Uniportal left lower lobectomy
Uniportal subxiphoid trisegmentectomy
Subxiphoid apical segment S1
Lymph node dissection
Strong adhesions
Argueta AJ, Cañas SR, Abu Akar F, González-Rivas D. Subxiphoid approach for a combined right upper lobectomy and thymectomy through a single incision. J Vis Surg 2017. doi: 10.21037/jovs.2017.06.06
Complete subxiphoid thymectomy
Obese patient Subxiphoid thymectomy
Subcostal resection big mediastinal mass (11.6x7.9x6.5 cm)

Namibia, Africa. August 2016
Subxiphoid bleeding control
Subxiphoid training
Initial experience in uniportal subxiphoid video-assisted thoracoscopic surgery for major lung resections

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Abstract

OBJECTIVES: Uniportal subxiphoid video-assisted thoracoscopic (SVATS) surgery for major lung resections is a new approach, but clinical evidence is lacking. The aim of this study was to examine our experience with the use of the uniportal subxiphoid approach in video-assisted thoracoscopic (VATS) major lung resections and lymph node dissections.

METHODS: From October 2014 to August 2015, 153 patients with early-stage non-small-cell lung carcinoma (NSCLC) and benign disease underwent uniportal subxiphoid VATS major lung resections. Patients were placed in a lateral position with 60–70° inclination, and a 4– to 5-cm midline median or transverse incision was made below the sternocostal triangle. A 10-mm 30° video camera and VATS instruments were used through the same single incision. Perioperative variables and outcomes were collected prospectively and analysed retrospectively.

RESULTS: Of the 153 patients who underwent surgery with the uniportal subxiphoid VATS approach, 105 had lobectomies and 48 had segmental resections; 135 cases of lung cancer and 18 cases of benign pulmonary disease were noted. Right upper lobectomy was the most common procedure (51%), and left upper lobectomy was the most time-consuming procedure (190 ± 21 min). The mean operating time was 166.9 ± 12.6 min; the average volume of blood loss was 127.5 ± 27.6 ml. In patients with lung cancer, the mean total number of lymph node stations explored was 3.4 ± 0.8. The duration of chest drain use was 2.6 ± 0.2 days. The length of hospital stay was 4.3 ± 0.4 days. Perioperative arrhythmia was the most common complication (13% of cases). Prolonged air leak was the cause of prolonged hospital stay. Five cases were converted to conventional VATS due to technical difficulties, and eight cases were converted to thoracotomy due to major bleeding. Postoperative 30-day mortality was zero and there were no re-admissions. All cases had a RO complete cancer resection on histology.

CONCLUSIONS: Uniportal subxiphoid VATS lobectomy/segmentectomy is a feasible and safe procedure for early-stage lung cancer and benign disease.

Keywords: VATS • Subxiphoid • Uniportal
Advantages

- To avoid chronic postoperative incisional pain
- Suitable for bilateral procedures
- Suitable for anterior mediastinal tumor resection
- No requirement for changes in the body position
- Cost saving, good cosmetic appearance
Relative contraindications

- Diffuse dense adhension
- Lung cancer with lymph nodes enlargement
- Body Mass Index, BMI > 30
- Cardiomegaly patients with left-side diseases
- Reoperation
## Operative variables

<table>
<thead>
<tr>
<th></th>
<th>Right side (n=110)</th>
<th>Left side (n=47)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation time (min)*</td>
<td>156 ± 0.8</td>
<td>156 ± 0.8</td>
<td>0.97</td>
</tr>
<tr>
<td>Intraoperative blood loss (mL)*</td>
<td>107.0 ± 73.2</td>
<td>100.0 ± 54.3</td>
<td>0.56</td>
</tr>
<tr>
<td>Lymph node stations sampled</td>
<td>4.3 ± 0.7</td>
<td>4.3 ± 1.1</td>
<td>0.91</td>
</tr>
<tr>
<td>Lymph node number</td>
<td>12.7 ± 2.2</td>
<td>13.1 ± 2.6</td>
<td>0.54</td>
</tr>
<tr>
<td>Chest drainage volume (L)</td>
<td>254.1 ± 138.0</td>
<td>283.1 ± 154.8</td>
<td>0.25</td>
</tr>
<tr>
<td>Postoperative hospital stay (d)*</td>
<td>4.4 ± 1.8</td>
<td>4.6 ± 1.6</td>
<td>0.61</td>
</tr>
<tr>
<td>Chest tube drainage duration (d)</td>
<td>5.0 ± 1.7</td>
<td>5.0 ± 2.5</td>
<td>0.99</td>
</tr>
</tbody>
</table>

* 4 Patients underwent bilateral procedures were excluded from statistical analysis.

# Operative complications

<table>
<thead>
<tr>
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<th>Right side (n=110)</th>
<th>Left side (n=47)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intraoperative events (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>arrhythmia</td>
<td>7 (6.3)</td>
<td>28 (59.6)</td>
<td>0.00</td>
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<tr>
<td>hypotension</td>
<td>4 (3.6)</td>
<td>36 (76.6)</td>
<td>0.00</td>
</tr>
<tr>
<td>surgery interruption</td>
<td>5 (4.5)</td>
<td>28 (59.6)</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Postoperative complications (%)</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>hemothorax</td>
<td>0 (0)</td>
<td>1 (2.1)</td>
<td>0.29</td>
</tr>
<tr>
<td>prolonged air leak</td>
<td>5 (4.5)</td>
<td>3 (6.3)</td>
<td>0.63</td>
</tr>
<tr>
<td>arrhythmia</td>
<td>7 (6.4)</td>
<td>2 (4.2)</td>
<td>0.72</td>
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<tr>
<td>mortality</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
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