58th Tri-State Consecutive Case Conference on Lung Disease

Presented by the Southeast Thoracic Association

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Surgery and Small Cell Lung cancer

Surgical Resection Should Be Considered for Stage I and II Small Cell Carcinoma of the Lung

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Historically, the treatment of small cell lung cancer involves chemotherapy and radiation therapy.


Currently, the role of surgery remains unproven.

- Surgical Resection in small case series have reported favorable outcomes for “limited disease”.

- Evaluated the outcomes of surgical resection in the treatment of stage I and II SCLC.
Surgery and Small Cell Lung cancer

MATERIALS AND METHODS

- RESTROSPECTIVE query of The Surveillance, Epidemiology, and End Results (SEER) database sponsored by the NCI
- Covers 28% of the US population and captures 98% of all cancer cases within the surveyed areas
- Included all patients between 1988 and 2007 with stage I or II SCLC
- Demographics, stage of disease, radiotherapy, resection type, and survival
Surgery and Small Cell Lung cancer

MATERIALS AND METHODS

- Pathologic staging whenever available
- Clinical staging for patients
  - No surgical resection
  - No mediastinal surgical staging
# Surgery and Small Cell Lung cancer

## RESULTS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total</th>
<th>Surgical Resection</th>
<th></th>
<th></th>
<th>p Value&lt;sup&gt;b&lt;/sup&gt;</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients</td>
<td>3,566</td>
<td>895(25.1)</td>
<td>2,671(74.9)</td>
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</tr>
<tr>
<td>Male sex</td>
<td>1,734(48.6)</td>
<td>431(48.2)</td>
<td>1,303(48.8)</td>
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<td>0.757</td>
</tr>
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<td>Age, years</td>
<td>68.3±9.8</td>
<td>67.8±8.9</td>
<td>68.9±10.1</td>
<td></td>
<td>0.003</td>
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<tr>
<td>Stage I</td>
<td>2,686(75.3)</td>
<td>683(76.3)</td>
<td>2,003(75.0)</td>
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<td>0.446</td>
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<tr>
<td>Stage II</td>
<td>880(24.7)</td>
<td>212(23.7)</td>
<td>668(25.0)</td>
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<td>0.446</td>
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<tr>
<td>White race</td>
<td>3,104(87)</td>
<td>810(90.5)</td>
<td>2,294(85.9)</td>
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<td>&lt;0.001</td>
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<tr>
<td>Radiotherapy</td>
<td>1,769(49.6)</td>
<td>202(22.6)</td>
<td>1,567(58.7)</td>
<td></td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

<sup>a</sup> Continuous data are shown as mean ± standard deviation; categorical data as frequency (%).

<sup>b</sup> Comparison of patients who underwent surgical resection vs patients who did not.
Surgery and Small Cell Lung cancer

MEDIAN SURVIVAL: RESECTION versus MEDICAL GROUP

![Survival Curve Diagram](image)

Fig 1.
Medical group, **16 months**  
Resection group, **34 months**
Surgery and Small Cell Lung cancer

MEDIAN SURVIVAL: MAJOR versus LIMITED RESECTION

Fig 2.
Wedge resection, **28 months**
Lobectomy/Pneumonectomy, **39 months**
Surgery and Small Cell Lung cancer

MEDIAN SURVIVAL : RESECTION versus MEDICAL for STAGE I and STAGE II

Fig 3.
(A) Stage I : Resection group, 38 months Medical group, 16 months.
(B) Stage II : Resection group, 25.0 months Medical group, 14.0 months.
SUMMARY

- Overall median survival for ALL patients was **18.0 months**
  - Resection patient, 34 months
  - Medical patients, 16-month \( (p < 0.001) \)
- Resection patients
  - Lobectomy or Pneumonectomy, best median survival, **39.0 months**
  - Wedge resection, **28.0 months**
- Wedge resection patients better than non-resection patients \( (p < 0.001) \)
- Stage I SCLC patients
  - Lung resection, **38.0 months**
  - No resection, **16.0 months**
- Stage II SCLC patients
  - Lung resection, **25.0 months**
  - No resection, **14.0 months**
SUMMARY

- Variables significantly associated with survival
  - female sex
  - younger age
  - stage I SCLC
  - treatment with radiotherapy
  - lymph node staging
  - lung resection
Surgery and Small Cell Lung cancer

CONCLUSION

- Both Stage I and Stage II SCLC patients appear to benefit from surgical resection
- Consider Surgical Resection for SCLC solitary pulmonary nodule and confirmed early-stage neoplasia
- Lobectomy should be the operation of choice, if feasible
- Lung-sparing procedure, such as wedge resection, also appears to offer survival benefit
- **ADJUVANT THERAPY**, chemotherapy and/or radiation therapy should be considered for all patients.
Surgery and Small Cell Lung cancer

LIMITATIONS

- Retrospective analysis
- Inherent to a national database
  - Reporting inaccuracies
  - Selection biases
- Surgical group comprised younger patients
- The SEER registry does not offer data on comorbidities, another important factor that may affect treatment selection and final outcome
- No data on chemotherapy
- The possible effect of true pathologic staging vs clinical staging is also a potential limitation of this study
Recurrent Spontaneous Pneumothorax

Role of Blebs and Bullae Detected by High-Resolution Computed Tomography and Recurrent Spontaneous Pneumothorax

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Division of Thoracic Surgery, Department of General Surgery and Surgical Specialties and Division of Radiology, Department of Diagnostic and Imaging Services, University of Modena and Reggio Emilia, Modena, Italy

OBJECTIVE

- PREVENT RECURRENCE after a first episode of primary spontaneous pneumothorax (PSP)

- PREDICT THE LIKELIHOOD OF RECURRENCE based on the presence of blebs and bullae detected on high-resolution computed tomography (HRCT)
Material and Methods

- Retrospective review of patients, January 2000 and December 2009
- Identified All patients admitted for a first episode of PSP and completed a HRCT
- Patients older than 50 years were excluded
- Gender, sex, smoking history, body mass index (BMI), side of pneumothorax, and treatment approach were collected for each patient
- Minimum follow up of 12 months
Recurrent Spontaneous Pneumothorax

PSP Management

- **Standardized** Management of the first PSP episode
  - **BED REST**
  - **CHEST DRAIN**

- **BED REST**: Asymptomatic and small pneumothorax

- **CHEST DRAIN**: Pneumothorax in a symptomatic patient
  - Pneumothorax of any other size, regardless of symptoms

*Only patients managed conservatively (chest drain or bed rest) were included in the analysis*
Recurrent Spontaneous Pneumothorax

HRCT Examinations

- Reviewed for all patients
- Identified type, number, and distribution
  - **Blebs**, air containing lesions of 1 cm or less
  - **Bullae**, exceeding 1 cm in diameter
- Developed a **Dystrophic Scoring System** to define the severity of pulmonary lesions
Dystrophic Scoring System

The air-containing pulmonary lesions

- **Type:** 1 or 2 points for blebs or bullae, respectively
- **Number:** 1 or 2 points for single or multiple lesions, respectively
- **Distribution:** 1 or 2 points for unilateral or bilateral lesions, respectively

The final score

- a minimum of 3 points (**low grade**: one unilateral bleb)
- a maximum of 6 points (**high grade**: multiple bilateral bullae).
- Grade 4 and 5 were also considered together as an **intermediate grade**
**Fig 1.** HRCT images show air-containing pulmonary lesions according to the dystrophic severity score. (A) **Low grade:** single monolateral bleb. (B) **Intermediate grade:** (B1) single unilateral bulla and (B2) multiple bilateral blebs. (C) **High grade:** bilateral multiple bullae.
Recurrent Spontaneous Pneumothorax

Statistical Analysis

- **PRIMARY END POINT**: Assess risk of recurrence
  - Ipsilateral recurrence
  - Contralateral recurrence
- Determine **positive and negative predictive values** (PPV and NPV) for recurrence
- Define **Clinical variables predictive of recurrence** using univariate and multivariate analysis
- Ipsilateral and contralateral **recurrence-free survivals** (Ipsi-RFS and Contra-RFS, respectively) according to dystrophic severity score
### Table 1. Clinical Characteristics of the 176 Patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. (%) or Mean (range) (N = 176)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>133(76)</td>
</tr>
<tr>
<td>Female</td>
<td>43(24)</td>
</tr>
<tr>
<td>Age, years</td>
<td>27(14–41)</td>
</tr>
<tr>
<td>Body mass index, kg/m²</td>
<td>20(12–29)</td>
</tr>
<tr>
<td>Smoking history</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>98(56)</td>
</tr>
<tr>
<td>No</td>
<td>78(44)</td>
</tr>
<tr>
<td>Side of pneumothorax</td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>98(56)</td>
</tr>
<tr>
<td>Left</td>
<td>78(44)</td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
</tr>
<tr>
<td>Chest drain</td>
<td>164(93)</td>
</tr>
<tr>
<td>Bed rest</td>
<td>12(7)</td>
</tr>
</tbody>
</table>
### Table 2. High-Resolution Computed Tomography Findings in 176 Patients

<table>
<thead>
<tr>
<th>Findings</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of air-containing lesions</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>110(63)</td>
</tr>
<tr>
<td>No</td>
<td>66(37)</td>
</tr>
<tr>
<td>Type of air-containing lesions</td>
<td></td>
</tr>
<tr>
<td>Blebs</td>
<td>80(45)</td>
</tr>
<tr>
<td>Bullae</td>
<td>30(17)</td>
</tr>
<tr>
<td>Number of air-containing lesions</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>38(22)</td>
</tr>
<tr>
<td>Multiple</td>
<td>72(41)</td>
</tr>
<tr>
<td>Distribution air-containing lesions</td>
<td></td>
</tr>
<tr>
<td>Unilateral</td>
<td>61(35)</td>
</tr>
<tr>
<td>Bilateral</td>
<td>49(28)</td>
</tr>
</tbody>
</table>
Recurrent Spontaneous Pneumothorax

Results

- Mean time to ipsilateral recurrence was 12.8 months, 79 patients (44.8%)
- Risk of ipsilateral recurrence
  - Patients with air-containing lesions was 68.1% and a PPV of 68.1%
  - Patients without air-containing lesions was 6.1% and a NPV of 93.9%
Results

- Contralateral recurrence occurred in 21 patients (12%) with air-containing lesions, Mean time to recurrence was 41.7 months
- No contralateral recurrence developed in patients without air-containing lesions
- Risk of contralateral recurrence
  - With air-containing lesions was 19%
  - Without air-containing lesions was 0%, 100% NPV of HRCT for contralateral recurrence
Recurrent Spontaneous Pneumothorax

Results

- Evaluated the role of the dystrophic severity score in predicting recurrence

- Ipsi-RFS at 3 years decreases as follows
  - Without blebs and bullae is 93%
  - With a low-grade severity score is 54%
  - With intermediate-grade severity score is 31%
  - With high-grade scores (22%)
Recurrent Spontaneous Pneumothorax

Results

- Contra-RFS at 3 years
  - 100% for patients without blebs and bullae
  - 100% with a low-grade severity score
  - 89% with an intermediate-grade severity score
  - 80% with a high-grade severity score

- In the multivariate analysis, only the presence of blebs or bullae at HRCT was significantly related to the development of ipsilateral recurrence
Recurrent Spontaneous Pneumothorax

CONCLUSION

- Presence of blebs and/or bullae are significantly related to the development of an ipsilateral recurrence or a contralateral episode of pneumothorax.
- Multiple lesions represent significantly high risk for ipsilateral recurrence, up to 82%.
- Early surgical treatment could be considered to reduce the high risk of ipsilateral recurrence.
- The dystrophic severity score could be a useful tool in surgical decision making, needs further validation.
Malignant Pleural Effusions

Thoracoscopic Talc Versus Tunneled Pleural Catheters for Palliation of Malignant Pleural Effusions

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Division of Thoracic Surgery and Interventional Pulmonology, Center for Pleural Diseases, Swedish Cancer Institute, Swedish Medical Center, Seattle, Washington

Ann Thorac Surg 2012;94:1053–9
Malignant Pleural Effusions

BACKGROUND

- Malignant pleural effusion (MPE) is a late complication of malignancy that affects respiratory function and quality of life.
- Treatment involves a strategy for palliation of the symptoms:
  - Prevent fluid re-accumulation
  - Avoid additional intervention
  - Limit hospital length of stay (LOS)
- Study compared VATS talc insufflation versus placement of a tunneled pleural catheter (TPC) to assess which intervention better fulfilled these palliative goals.
Patients and Methods

- **Retrospective chart review**, 2005 to June 2011
- Patients had **confirmed diagnosis of MPE**
- Data on demographics, LOS, complications, in-hospital mortality, cancer type, and repeat procedures on the ipsilateral hemithorax

- **Primary outcomes**: Overall LOS, LOS after the procedure, and ipsilateral reintervention
- **Secondary endpoints**: complications, in-hospital mortality, and hospital readmission for an ipsilateral effusion
Malignant Pleural Effusions

Patients and Methods

- **VATS talc group**
  - All patients had **reexpansion of the lung** at surgery
  - **Pleurodesis** with 4 grams of aerosolized talc
  - A chest tube was placed patients discharged on the same day their chest tube was removed

- **TPC group**
  - Percutaneous PleurX catheter placement
  - VATS required for another indication (such as pleural biopsies or a pericardial window)
  - Failure of the lung to reexpand at the time of VATS (no pleurodesis)
  - Catheters drained on a schedule that is individualized for each patient.
Patients and Methods

• 109 consecutive patients with MPE
• 59 patients comprised the TPC group, 54%
• 50 patients comprised the VATS group, 46%

• One VATS talc case was converted to open to control bleeding from pleural biopsies (2% conversion rate)

• Patient demographics and cancer type (Table 1) were similar between the groups
# Malignant Pleural Effusions

## Table 1. Patient Demographics and Cancer Types

<table>
<thead>
<tr>
<th>Demographic</th>
<th>TPC (n = 59)</th>
<th>Talc (n = 50)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>38(64%)</td>
<td>27(54%)</td>
<td>0.36</td>
</tr>
<tr>
<td>Male</td>
<td>21(36%)</td>
<td>23(46%)</td>
<td>0.36</td>
</tr>
<tr>
<td><strong>Mean age, years</strong></td>
<td>66</td>
<td>66</td>
<td>0.95</td>
</tr>
<tr>
<td><strong>Cancer Type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td>27(46%)</td>
<td>15(30%)</td>
<td>42(39%)</td>
</tr>
<tr>
<td>Mesothelioma</td>
<td>5(8%)</td>
<td>15(30%)</td>
<td>20(18%)</td>
</tr>
<tr>
<td>Breast</td>
<td>10(17%)</td>
<td>5(10%)</td>
<td>15(14%)</td>
</tr>
<tr>
<td>Ovarian</td>
<td>11(19%)</td>
<td>4(8%)</td>
<td>15(14%)</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>2(3%)</td>
<td>6(12%)</td>
<td>8(7%)</td>
</tr>
<tr>
<td>Other</td>
<td>4(7%)</td>
<td>5(10%)</td>
<td>9(8%)</td>
</tr>
</tbody>
</table>
Malignant Pleural Effusions

RESULTS

• Primary endpoints
  o Shorter Overall LOS for TPC group compared to VATS group
  o Postprocedure LOS significantly shorter after TPC placement
  o TPC group had significantly fewer reinterventions for recurrent ipsilateral effusions

• Complications
  o TPC group, 3 patients: Empyema, intraoperative bleeding, death
  o VATS talc group, 7 patients: ARDS, exacerbation of hepatic encephalopathy, hypoxia requiring home oxygen, intraoperative bleeding, empyema, wound dehiscence, and atrial fibrillation
  o No statistical difference
## Table 2. Comparison Between Tunneled Pleural Catheter and Video-Assisted Thoracic Surgery Talc Malignant Pleural Effusions

<table>
<thead>
<tr>
<th>Variables</th>
<th>TPC (n = 59)</th>
<th>VATS (n = 50)</th>
<th>p Value</th>
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</thead>
<tbody>
<tr>
<td>LOS, days</td>
<td></td>
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<tr>
<td>Mean</td>
<td>7</td>
<td>8</td>
<td>0.006</td>
</tr>
<tr>
<td>Mode</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Postprocedure LOS, days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3</td>
<td>6</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mode</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Reintervention</td>
<td>1(2%)</td>
<td>8(16%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Complications</td>
<td>3(5%)</td>
<td>7(14%)</td>
<td>0.18</td>
</tr>
<tr>
<td>Readmission for ipsilateral effusion</td>
<td>7(12%)</td>
<td>6(12%)</td>
<td>0.78</td>
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<tr>
<td>In-hospital mortality</td>
<td>2(3%)</td>
<td>4(8%)</td>
<td>0.41</td>
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</table>
Malignant Pleural Effusions

CONCLUSION

- TPC group had significantly reduced LOS.

- TPC group had significantly fewer ipsilateral reinterventions.

- Placement of TPC should be considered for palliation of MPE-associated symptoms.
Malignant Pleural Effusions

LIMITATIONS

- **Retrospective** study
- No data
  - Symptoms
  - Cost
  - Comorbidities
  - Functional status
- Patient *selection bias*
Treatment of pleural empyema

Surgical decortication as the first-line treatment for pleural empyema

Jung Ar Shin, MD, Yoon Soo Chang, MD, PhD Tae Hoon Kim, MD, PhD, Seok Jin Haam, MD, Hyung Jung Kim, MD, PhD, Chul Min Ahn, MD, PhD, and Min Kwang Byun, MD

Gangnam Severance Hospital, Yonsei University College of Medicine, Yonsei University Health System, Seoul, Korea.
Treatment of pleural empyema

Objective

- Evaluate the clinical outcomes of Surgical decortication versus Simple drainage as the first line of treatment for pleural empyema.

Patients and Methods

- Retrospective review
- 111 patients with empyema, 01/2008 to 07/2011
Patients and Methods

- **Empyema Diagnosis and staging**
  - Septations or loculations identified in the pleural space by computed tomography (2 radiologists)
  - Aspiration of **frank pus**
  - **Positive** Gram stain or culture
  - **Empyema stage defined** using the American College of Chest Physicians (ACCP) classification of parapneumonic effusion

- **Treatment**
  - **Surgical group**: Open or VATS procedure
  - **Drainage group**: Pigtail catheter or 32fr chest tube
Treatment of pleural empyema

Results

- **Surgical Group**, 27 (24.3%) patients
  - 24 patients underwent Open Surgery
  - 3 patients underwent VATS

- **Drainage Group**, 84 (75.7%) patients
  - Large-bore chest tube, 56 patients (66.7%)
  - Small-bore pigtail catheter, 28 patients (33.3%)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (N = 111)</th>
<th>Surgery (n = 27)</th>
<th>Drainage (n = 84)</th>
<th>P value</th>
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<tbody>
<tr>
<td>Age, y</td>
<td>56.1 ± 20.0</td>
<td>52.0 ± 13.2</td>
<td>57.4 ± 21.7</td>
<td>.222</td>
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<td>Gender, male, n (%)</td>
<td>88 (79.3)</td>
<td>22 (81.5)</td>
<td>66 (78.6)</td>
<td>.746</td>
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<td>BMI, kg/m²</td>
<td>21.6 ± 3.7</td>
<td>23.5 ± 3.2</td>
<td>21.0 ± 3.7</td>
<td>.002</td>
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<td>Diabetes, n (%)</td>
<td>23 (20.7)</td>
<td>8 (29.6)</td>
<td>15 (17.9)</td>
<td>.189</td>
</tr>
<tr>
<td>CCI, median (range)</td>
<td>0 (0-6)</td>
<td>0 (0-3)</td>
<td>1 (0-6)</td>
<td>.014</td>
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<tr>
<td>Mean arterial pressure, mm Hg (mean ± SD)</td>
<td>85.9 ± 18.2</td>
<td>86.9 ± 13.7</td>
<td>85.6 ± 19.5</td>
<td>.766</td>
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<td>ECOG, n (%)</td>
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<td>&lt;.001</td>
</tr>
<tr>
<td>0</td>
<td>53 (47.7)</td>
<td>23 (85.2)</td>
<td>30 (35.7)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>22 (19.8)</td>
<td>2 (7.4)</td>
<td>20 (23.8)</td>
<td></td>
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<tr>
<td>2</td>
<td>15 (13.5)</td>
<td>2 (7.4)</td>
<td>13 (15.5)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11 (9.9)</td>
<td>0 (0.0)</td>
<td>11 (13.1)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10 (9.0)</td>
<td>0 (0.0)</td>
<td>10 (11.9)</td>
<td></td>
</tr>
<tr>
<td>APACHE II score at diagnosis, median (range)</td>
<td>7 (0-33)</td>
<td>6 (0-14)</td>
<td>9 (0-33)</td>
<td>.013</td>
</tr>
<tr>
<td>Diagnosis, n (%)</td>
<td></td>
<td></td>
<td></td>
<td>.087</td>
</tr>
<tr>
<td>Parapneumonic</td>
<td>73 (65.8)</td>
<td>21 (77.8)</td>
<td>52 (61.9)</td>
<td></td>
</tr>
<tr>
<td>TB</td>
<td>33 (29.7)</td>
<td>4 (14.8)</td>
<td>29 (34.5)</td>
<td></td>
</tr>
<tr>
<td>Postoperative</td>
<td>4 (3.6)</td>
<td>1 (3.7)</td>
<td>3 (3.6)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>1 (0.9)</td>
<td>1 (3.7)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>Duration of symptoms to admission, d</td>
<td>9.6 ± 12.0</td>
<td>10.3 ± 9.0</td>
<td>9.3 ± 12.8</td>
<td>.728</td>
</tr>
<tr>
<td>Duration of symptoms to treatment, d</td>
<td>13.5 ± 10.1</td>
<td>13.9 ± 8.9</td>
<td>13.3 ± 10.4</td>
<td>.800</td>
</tr>
</tbody>
</table>
# Treatment of pleural empyema

## Table 3. Radiologic and laboratory findings and severity of pleural empyema

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (N = 111)</th>
<th>Surgery (n = 27)</th>
<th>Drainage (n = 84)</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Laboratory findings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBC/mm(^2)</td>
<td>12,799.5 ± 7861.13</td>
<td>13,776.7 ± 5344.25</td>
<td>12,485.4 ± 8517.21</td>
<td>.460</td>
</tr>
<tr>
<td>ESR, mm/h</td>
<td>71.3 ± 33.96</td>
<td>83.7 ± 33.34</td>
<td>67.2 ± 33.39</td>
<td>.047</td>
</tr>
<tr>
<td>CRP, mg/L</td>
<td>169.7 ± 122.52</td>
<td>213.3 ± 140.28</td>
<td>155.2 ± 113.30</td>
<td>.035</td>
</tr>
<tr>
<td>Albumin, g/dL</td>
<td>3.33 ± 0.60</td>
<td>3.48 ± 0.52</td>
<td>3.28 ± 0.62</td>
<td>.143</td>
</tr>
<tr>
<td><strong>Pleural fluid</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>7.03 ± 0.746</td>
<td>7.04 ± 0.116</td>
<td>7.02 ± 0.814</td>
<td>.934</td>
</tr>
<tr>
<td>WBCs/mm(^2)</td>
<td>13,247.9 ± 36,202.03</td>
<td>9801.4 ± 12,393.83</td>
<td>13,908.9 ± 39,178.26</td>
<td>.700</td>
</tr>
<tr>
<td>Glucose, mg/dL</td>
<td>89.5 ± 63.76</td>
<td>103.0 ± 51.16</td>
<td>86.9 ± 66.10</td>
<td>.492</td>
</tr>
<tr>
<td>Gross pus, n (%)</td>
<td>46 (52.9%)</td>
<td>11 (78.6%)</td>
<td>35 (47.9%)</td>
<td>.035</td>
</tr>
<tr>
<td><strong>Category, n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td>.703</td>
</tr>
<tr>
<td>1</td>
<td>1 (0.9%)</td>
<td>0 (0.0%)</td>
<td>1 (1.2%)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3 (2.7%)</td>
<td>0 (0.0%)</td>
<td>3 (3.6%)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>61 (55.0%)</td>
<td>16 (59.3%)</td>
<td>45 (53.6%)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>46 (41.4%)</td>
<td>11 (40.7%)</td>
<td>35 (41.7%)</td>
<td></td>
</tr>
</tbody>
</table>
Treatment of pleural empyema

Results

- Outcomes based on Treatment Modality
  - **Surgical** group, *96.3% treatment success* rate (26/27 patients)
    - 1 treatment failure patient died
  - **Drainage** group, *58.3% treatment success* rate (49/84 patients)
    - 24 patients required **surgical treatment**
    - 2 patients treated with a large-bore chest tube
    - 11 treatment failure patients **died**
Treatment of pleural empyema

Results

- Outcomes based on Treatment Modality
  - Overall Survival not significantly different between the 2 treatment groups (96.3% vs 86.9%)
  - Time to discharge and hospital LOS (days) was shorter in the surgical group
Treatment of pleural empyema

Results

- Subanalysis With Propensity-Scored Matching
  - Excluded 61 patients
  - 50 patients further analyzed
    - Surgical group, 20 patients
    - Drainage group, 30 patients
  - No difference between the 2 groups in clinical and laboratory findings, Table 4.
Table 4. Clinical and laboratory characteristics after propensity-scored matching

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total (N = 50)</th>
<th>Surgery (n = 20)</th>
<th>Drainage (n = 30)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>49.8 ± 17.5</td>
<td>53.0 ± 13.7</td>
<td>47.7 ± 19.5</td>
<td>.300</td>
</tr>
<tr>
<td>Gender, male, n (%)</td>
<td>40 (80.0%)</td>
<td>15 (75.0%)</td>
<td>25 (83.3%)</td>
<td>.470</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>23.2 ± 3.0</td>
<td>23.7 ± 3.5</td>
<td>22.9 ± 2.7</td>
<td>.362</td>
</tr>
<tr>
<td>Diabetes, n (%)</td>
<td>11 (22.0%)</td>
<td>6 (30.0%)</td>
<td>5 (16.7%)</td>
<td>.265</td>
</tr>
<tr>
<td>CCI, median (range)</td>
<td>0 (0-6)</td>
<td>0 (0-3)</td>
<td>0 (0-6)</td>
<td>.611</td>
</tr>
<tr>
<td>Mean arterial pressure, mm Hg</td>
<td>86.6 ± 17.2</td>
<td>87.1 ± 14.7</td>
<td>86.2 ± 18.9</td>
<td>.864</td>
</tr>
<tr>
<td>ECOG, n (%)</td>
<td></td>
<td></td>
<td></td>
<td>.841</td>
</tr>
<tr>
<td>0</td>
<td>40 (80.0%)</td>
<td>16 (80.0%)</td>
<td>24 (80.0%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5 (10.0%)</td>
<td>2 (10.0%)</td>
<td>3 (10.0%)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4 (8.0%)</td>
<td>2 (10.0%)</td>
<td>2 (6.7%)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1 (2.0%)</td>
<td>0 (0.0%)</td>
<td>1 (3.3%)</td>
<td></td>
</tr>
<tr>
<td>APACHE II score at diagnosis, median (range)</td>
<td>5 (0-33)</td>
<td>6 (0-11)</td>
<td>5 (0-33)</td>
<td>.554</td>
</tr>
<tr>
<td>Duration of symptoms to admission, d</td>
<td>9.9 ± 8.7</td>
<td>9.6 ± 9.1</td>
<td>10.1 ± 8.5</td>
<td>.839</td>
</tr>
<tr>
<td>Duration of symptoms to treatments, d</td>
<td>12.4 ± 8.5</td>
<td>13.5 ± 8.9</td>
<td>11.8 ± 8.3</td>
<td>.500</td>
</tr>
</tbody>
</table>
Treatment of pleural empyema

Results

- Propensity-Scored Matching Analysis
  - **Surgical group**
    - Treatment success rate of **95.0%** (19/20 patients)
    - Patients Discharged earlier
  - **Drainage group**
    - Treatment success rate of **56.7%**
    - Many Required a second *surgical* intervention
    - Significantly prolonged hospital stay
Treatment of pleural empyema

Figure 1
Multivariate analysis of overall treatment success

Before matching adjustment

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds ratio (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI ≥ 17</td>
<td>1.242 (0.226-6.830)</td>
<td>0.803</td>
</tr>
<tr>
<td>ECOG</td>
<td>0.801 (0.498-1.288)</td>
<td>0.359</td>
</tr>
<tr>
<td>APACHE II &lt; 20</td>
<td>3.169 (0.259-38.757)</td>
<td>0.367</td>
</tr>
<tr>
<td>Mean BP ≥ 60mmHg</td>
<td>1.619 (0.105-25.084)</td>
<td>0.730</td>
</tr>
<tr>
<td>Serum albumin ≥ 3.0</td>
<td>1.941 (0.642-5.867)</td>
<td>0.240</td>
</tr>
<tr>
<td>Decortication as a first intervention</td>
<td>17.251 (2.131-139.622)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

After matching adjustment

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds ratio (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decortication as a first intervention</td>
<td>14.529 (1.715-123.074)</td>
<td>0.014</td>
</tr>
</tbody>
</table>
Conclusions

- The **best predictor of empyema treatment success** was the selection of surgical decortication as the first line of treatment.

- **Surgical decortication** for advanced pleural empyema is an independent and important positive prognostic factor for treatment success.
Tuberculosis empyemas were analyzed with nontuberculous empyemas. This included 33 patients (29.7%) with tuberculous empyema.

Early thoracoscopic intervention for tuberculous empyema showed good outcomes in previous studies. The outcomes of surgical treatment for tuberculous and nontuberculous empyema were not different in this study.
"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."