PLEURAL DISEASES

(Pleural effusion & empyema)

Menaldi Rasmin

Department of Pulmonology & Respiratory Medicine

Faculty of Medicine, University of Indonesia
Introduction

- Pleural effusion is the most common manifestation of pleural diseases.
- Dyspnea from pleural effusions is related more to distortion of the diaphragm and chest wall during respiration than to hypoxemia.
- Dyspnea also can be caused by underlying intrinsic lung or heart disease, obstructing endobronchial lesions, or diaphragmatic paralysis, especially after coronary artery bypass surgery.
Anatomy of the pleura

Pleura
- Mesothelial lining of each hemithorax
- Derived from embryonic coelomic lining

Visceral pleura: lung

Parietal pleura: wall
- Costal
- Diaphragmatic
- Mediastinal
- Cervical
Pleural cavity

- Potential space between visceral & parietal pleura
- Capillary layer of serous fluid produced by mesothelium
- Reduces friction
- Surface tension provides cohesion between lung and thoracic wall
The normal pleural space contains approximately 1 mL of fluid, representing the balance of hydrostatic and oncotic forces in the visceral and parietal pleural vessels and lymphatic drainage. Pleural effusions result from disruption of this balance.
Diagram representing pressures involved in formation and absorption of pleural fluid.

Schema showing normal pleural liquid turnover. The initial microvascular filtrate in the parietal and visceral pleura is partly reabsorbed (*dashed arrows*). The remaining low-protein interstitial liquid flows across the leaky pleural mesothelial layers into the pleural space. The pleural liquid exits the pleural space via the parietal pleural lymphatic stomata.

Pleural effusion classification

- Transudate
- Exudate
Pleural fluid analysis

- Pleural fluid is considered an exudate if one or more of the following hold true:
  - Pleural fluid protein divided by serum protein is greater than 0.5.
  - Pleural fluid LDH divided by serum LDH is greater than 0.6.
  - Pleural fluid LDH is greater than two-thirds the upper limit of normal for the serum LDH.

- If none of these criteria is met, the patient has a transudative pleural effusion.
Etiology

- **Transudate:**
  - congestive heart failure, cirrhosis with ascites, nephrotic syndrome, hypoalbuminemia, myxedema, peritoneal dialysis, glomerulonephritis, superior vena cava obstruction, pulmonary embolism
Etiology

- **Exudates:**
  - Infections: pneumonia, tuberculosis, lung abscess, viral illness
  - Malignancy: lung cancer, mesothelioma, pulmonary/pleural metastases, lymphoma
  - Connective tissue disease: rheumatoid arthritis, SLE
  - Abdominal disorders: pancreatitis, esophageal rupture, subphrenic abscess
  - Others: pulmonary embolism, uremia, postpartum, drug reaction, chylothorax
History (anamnesis)

- **Dyspnea**
- **Cough:**
  - Mild, nonproductive cough or chest pain
  - More severe cough or production of purulent or bloody sputum suggests an underlying pneumonia or endobronchial lesion
- Constant chest wall pain might reflect chest wall invasion by bronchogenic carcinoma or malignant mesothelioma.
History (anamnesis)

- Pleuritic chest pain suggests either pulmonary embolism or an inflammatory pleural process
- Systemic toxicity evidenced by fever, weight loss, and inanition suggests empyema
Physical findings

- Physical findings do not usually manifest until pleural effusions exceed 300 mL
- Dullness on chest percussion
- Decreased tactile fremitus
- Egophony
- Decreased breath sound in chest auscultation
Diagnostic tools

- Chest imaging:
  - X rays: PA, lateral, lateral decubitus
  - Thoracic ultrasound
  - CT scanning
Diagnostic tools

- Observing the quality of the fluid obtained during thoracentesis
  - Frankly purulent fluid indicates an empyema.
  - A putrid odor suggests an anaerobic empyema.
  - A milky, opalescent fluid suggests a chylothorax, resulting most often from lymphatic obstruction by malignancy or thoracic duct injury by trauma or surgical procedures.
  - Grossly bloody fluid indicates the need for a spun hematocrit test of the sample. A pleural fluid hematocrit level of more than 50% of the peripheral hematocrit level defines a hemothorax.
Diagnostic tools

- Diagnostic thoracentesis:
  - Distinguishing exudates from transudates by pleural fluid analysis (as described above) or using Light’s criteria
- pH of pleural fluid
- Cytologic examination of pleural fluid
- Closed needle pleural biopsy – histologic examination
- Tumor markers
Diagnostic tools

- Measure pleural fluid amylase if a pancreatic origin or ruptured esophagus is suspected or if a unilateral left pleural effusion remains undiagnosed after initial testing. Additional assay of amylase isoenzymes can distinguish a pancreatic source from other etiologies.

- Measure triglycerides on milky pleural fluids when chylothorax is suspected.

- Consider immunologic studies, including pleural fluid antinuclear antibody and rheumatoid factor, when collagen vascular diseases are suspected.
Diagnostic tools

- Consider bronchoscopy if needed

- In tuberculous pleural effusion, acid fast bacilli staining is rarely diagnostic (<10%) & pleural fluid cultures grow *Mycobacterium tuberculosis* in less than 65% of cases because most of this effusion are due to inflammatory reaction
Note

- Despite primary evaluation with serial thoracenteses with cytology and pleural biopsy, approximately 25% of exudative effusions remain undiagnosed.

- Consider pulmonary embolism in such patients and order radionuclide perfusion lung scanning if reasonable clinical suspicion exists.
Management

- Treat the etiology
- Therapeutic thoracentesis
- Tube thoracostomy
- Pleurodesis or pleural sclerosis
- Surgery as indicated and/or VATS
- Diet (chylothorax)
Case

- Female, 70 years old
- Dyspnea since 1 mo before admission, chest pain, cough (-), fever (-)
- Weight loss (-)
- History of antituberculosis drugs therapy for 1 mo but no improvement
- History of pleural tapping 2x @ 500 – 100 cc serohemorrhagic
Physical examination

- Moderate illness, compos mentis
- BP 100/80, HR 92x/m, RR 24x/m
- No lymph nodes enlargement
- Heart: S1-2 regular, murmur (-), gallop (-)
- Lung: asimetric, there was less movement on the left lung, dull / sonor, tactile fremitus on left lung was diminished, diminished vesicular / vesicular, ronchi - / -, wheezing -/-
- Abdomen: no abnormalities were found
- Extremities: no clubbing fingers
## Laboratory findings

<table>
<thead>
<tr>
<th>31 Oct 2004</th>
<th>1 November 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hb</strong></td>
<td><strong>Albumin</strong></td>
</tr>
<tr>
<td>10.0</td>
<td>2.8</td>
</tr>
<tr>
<td><strong>Leucocytes</strong></td>
<td><strong>Total bilirubin</strong></td>
</tr>
<tr>
<td>7900</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Platelets</strong></td>
<td><strong>Indirect bil</strong></td>
</tr>
<tr>
<td>219000</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>Blood sugar</strong></td>
<td><strong>Direct bil</strong></td>
</tr>
<tr>
<td>81</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td><strong>SGOT/PT</strong></td>
</tr>
<tr>
<td></td>
<td>14 / 9</td>
</tr>
<tr>
<td></td>
<td><strong>Ureum/creat</strong></td>
</tr>
<tr>
<td></td>
<td>23 / 1.1</td>
</tr>
</tbody>
</table>
Cytology examination of pleural fluid

- Adenocarcinoma
Other examinations

- Gynecologic evaluation: no suspicion of tumor
- Digestive tract examination: no suspicion of tumor
- Other diagnostic plans: abdominal ultrasound, tumor marker (CEA, AFP)
Diagnosis

- WD/ Right lung cancer T4N?M?
adenocarcinoma stg min IIIB PS 70-80
Management

- Water sealed drainage for pleural fluid evacuation
- Pleurodesis with doxycycline 500 mg
- Analgetic
- Chemotherapy
Thank you