Pleural Effusions
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Epidemiology
✓ Annual incidence: About 1 million Americans each year

Etiology
✓ Pleural Effusion is an abnormal accumulation of fluid in the pleural space.
✓ The first step in evaluating pleural effusions is determining whether it is Transudative or Exudative.
✓ Transudative effusions are a result of pressure filtration without capillary injury (i.e. hydrostatic and oncotic pressure abnormalities).
✓ Exudative effusions are a result of inflammatory fluid leaking between cells.
✓ Most common causes of transudative effusion: 1. LV failure, 2. Cirrhosis
✓ Most common causes of exudative effusion: 1. Bacterial PNA, 2. Viral infection, 3. Malignancy
✓ Most common malignant effusions: 1. Lung Ca (1/3), 2. Breast ca (1/4), & 3. Lymphoma (1/5)

Presentation
✓ Clinical manifestations of pleural effusion can be variable and related to the underlying disease process and small pleural effusions can be asymptomatic.
✓ History: Dyspnea, cough, chest pain can be common, but look for other symptoms such as:
   1. CHF: lower extremity edema, orthopnea, paroxysmal nocturnal dyspnea
   2. TB: night sweats, fever, hemoptysis, weight loss
   3. PNA: fever, purulent sputum
✓ Physical exam depends on size of the effusion: diminished breath sounds, dullness to percussion, decreased tactile fremitus, & occasionally a localized pleural friction rub

On CXR: blunting of the costophrenic angle; a volume of less than 500mL may not be seen on upright CXR, but can be seen on lateral films; Decubitus CXR can help determine if fluid is free flowing or loculated

Diagnosis
✓ Lights Criteria: all 3 conditions must be met for an effusion to be transudative; if you fail one of the criterion, the effusion is exudative.

<table>
<thead>
<tr>
<th>E/S = Effusion to Serum</th>
<th>E/S to Serum protein</th>
<th>LDH (Eff)</th>
<th>E/S LDH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transudative</td>
<td>&lt; 0.5</td>
<td>&lt;200</td>
<td>&lt;0.6</td>
</tr>
<tr>
<td>Exudative</td>
<td>&gt; 0.5</td>
<td>&gt;200</td>
<td>&gt;0.6</td>
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</tbody>
</table>
✓ E/S = Effusion to Serum
✓ Eff = Effusion

1. Thoracentesis: This is the gold standard test; must differentiate between transudative and exudative; Always perform CXR after procedure to rule out pneumothorax;
2. Pleural Fluid WBC > 1000: think exudate
3. Pleural Fluid WBC >10000: think parapneumonic effusion
4. Pleural Fluid WBC >100,000: think empyema
5. Pleural Fluid Eos >10%: PTX, drug reaction, paragonimiasis (trematode: fluke), fungal infection, & asbestosis exposure
6. Pleural fluid Lymphocytes > 50%: Think Tb or malignancy
7. Pleural fluid Neutrophil predominance: Think PNA, pancreatitis, PE, peritonitis
8. Pleural Fluid Glucose: 80 = Tb; 60 = Cancer, empyema; <30 = rheumatoid arthritis
9. Pleural Fluid Amylase: pancreatic fistula, esophageal rupture, & malignancy
10. Pleural Fluid pH: <7 → complicated effusion
11. Pleural Fluid ANA: >1:160 → drug induced SLE & native SLE; if ANA
positive → anti-dsDNA (native SLE) vs anti-histone ab (drug-induced lupus)

12. Pleural fluid Tg: > 115 (due to chylomicrons) → trauma, lymphoma, mediastinal cancer, & lymphangioleiomyomatosis (LAM); < 50 (due to triglycerides) → Tb & Rheumatoid Arthritis

✓ Pleural biopsy: always do if you suspect Tb (20% sensitivity with fluid cultures & 90% sensitivity with bx) or if cytologic analysis is neg for malignancy
✓ Malignancy: Fluid cytology is the gold standard to evaluate for malignancy (3 effusion samples have a combined yield of 90%)
✓ Bacterial: Pleural effusion gram stain and culture are the gold standard tests to order for this etiology

✓ Treatment

✓ Transudative effusion: due to systemic disorder → treat the underlying etiology
✓ Exudative effusion: requires further testing → due to local disorders
✓ Indications for Chest Tube Placement:
  1. Pus in pleural space (>10,000 WBC)
  2. Positive culture and/or gram stain on pleural space fluid
  3. Complicated (loculated) parapneumonic effusion
✓ Thoracotomy: if loculated empyema does not respond to chest tube and antibiotics

✓ Pearls

✓ Always do pleural biopsy if you suspect TB
✓ Effusion cytology is diagnostic test of choice in malignancy
✓ Pulmonary embolism is the most overlooked disorder in the workup of a pleural effusion
✓ After performing thoracentesis always order post-procedure CXR to rule out pneumothorax
✓ Removal of >1.5L in one session may result in re-expansion pulmonary edema

✓ References

✓ Le et al. First Aid for the Internal Medicine Boards. 2006.
✓ Marx: Rosen’s Emergency Medicine, 7th Ed. 2009.