Disorders of the pleura, mediastinum, and diaphragm.

I. DISORDERS OF THE PLEURA

Mechanisms responsible for the formation of pleural effusion include the following:
1. Increased hydrostatic pressure in the pulmonary capillaries (congestive heart failure).
2. Decreased oncotic pressure (cirrhosis, nephrotic syndrome).
3. Decreased pleural space pressure (atelectasis).
4. Increased permeability of the capillaries, due to inflammatory process (infections, neoplasms, and immunologic diseases).
5. Obstruction of the lymphatics (tumors, pulmonary fibrosis).
6. Influx of extrapulmonary fluids into the pleural space (ascites).

A transudative pleural effusion occurs when systemic factors that influence the formation and the absorption of pleural fluid are altered. The leading causes are:
- left ventricular failure,
- pulmonary embolism,
- cirrhosis.

An exudative pleural effusion occurs when local factors that influence the formation and absorption of pleural fluid are altered. The leading causes are:
- bacterial pneumonia,
- malignancy,
- viral infection,
- pulmonary embolism.

To diagnose exudative pleural effusion it is necessary to obtain at least one of the following criteria:
1. pleural fluid protein / serum protein > 0.5,
2. pleural fluid LDH / serum LDH > 0.6,
3. pleural fluid LDH more than two-thirds normal upper limit for serum.
Invasive tests in patients with undiagnosed exudative pleural effusion:

1. Needle biopsy of the pleura (with special needles, small specimens of the parietal pleura can be obtained relatively noninvasively)
2. Thoracoscopy (pleuroscopy). (a rigid scope or a fiber-optic scope is introduced through the chest wall into the pleural space after a pneumothorax is induced on the side of the pleural effusion)
3. Bronchoscopy (only if the CT scan demonstrates parenchymal abnormalities).
4. Open biopsy of the pleura (thoracotomy with direct biopsy of the pleura provides the best visualisation of the pleura and the best biopsy specimens; the main indication for open biopsy is progressive undiagnosed pleural disease).

Mesothelioma:
- usually occurs in males during their fifth to sixth decades,
- patients complain of:
  - chest pain, - dyspnea, - weight loss,
  - fever.
- a history of asbestos exposure,
- physical examination: clubbing, hypertrophic pulmonary osteoarthropathy of the hands, feet, or distal tibia and fibula,
- hypoglycaemia,
- the chest film demonstrates a single circumscribed round pleural-based mass or multiple lobulated densities overlying visceral and parietal pleura, pleural effusion,
- to differentiated with metastatic bronchogenic carcinoma,
- diagnostic approach:
  - cytologic examination of pleural fluid,
  - pleural biopsy,
  - minithoracotomy or video-assisted thoracoscopy,
- treatment - surgical removal of the tumor and adjacent chest,
  - adjuvant radiation therapy,
  - chemotherapy.
That treatment is not more effective than symptomatic therapy.
PNEUMOTHORAX

Pneumothorax is the presence of gas in the pleural space.
A spontaneous pneumothorax is one that occurs without antecedent trauma to the thorax.
A primary spontaneous pneumothorax occurs in an individual without underlying lung disease.
- treatment: - simple aspiration,
  - tube thoracostomy with installation of scleroting agent (minocycline)
    (reccurent pneumothorax),
  - thoracopscopy or thoracotomy with pleural abrasion.
A secondary spontaneous pneumothorax occurs in an individual with underlying lung disease.
- treatment - tube thoracostomy and the instalation of a sclerosing agent,
  - open thoracotomy.
A traumatic pneumothorax - results from penetrating or nonpenetrating chest injuries.
- after needle aspiration, thoracentesis, insertion of central intravenous catheter
A tension pneumothorax is a pneumothorax in which the pressure in the pleural space is positive throughout the respiratory cycle.
- usually occurs during mechanical ventilation or resuscitative efforts,
  - a large-bore needle should be inserted into the pleural space through the second anterior intercostal space.

II. DISORDERS OF THE MEDIASTINUM

1. Mediastinal masses
   The most common lesions:
in the anterior mediastinum - thymomas, lymphomas, teratomous neoplasms, thyroid masses;
in the middle mediastinum - vascular masses, lymph nodes enlargements from metastases, granulomatous disease, pleuropericardial and bronchogenic cysts;
in the posterior mediastinum - neurogenic tumors, meningoceles, meningomyeloceles, gastroenteric cysts, esophageal diverticula.
2. Acute mediastinitis
3. Chronic mediastinitis
4. Pneumomediastinum
Differential Diagnosis of Pleural Effusion

TRANSDUATIVE PLEURAL EFFUSION
Congestive heart failure
Pericardial disease
Cirrhosis
Nephrotic syndrome
Peritoneal dialysis
Postpartum pleural effusion
Myxedema
Pulmonary emboli
Sarcoidosis

EXUDATIVE PLEURAL EFFUSION
Neoplastic diseases
Metastatic disease
Mesothelioma
Infectious diseases
Bacterial infections
Tuberculosis
Fungal infections
Actinomycosis and nocardiosis
Viral infections
Parasitic infections
Pulmonary embolization
Gastrointestinal disease
Esophageal perforation
Pancreatic disease
Intra-abdominal abscesses
Diaphragmatic hernia
Post abdominal surgery
Collagen vascular diseases
Rheumatoid pleuritis
Systemic lupus erythematosus
Drug-induced lupus
Immunoblastic lymphadenopathy
Sjögren’s syndrome
Wegener’s granulomatosis
Postpericardiectomy or postmyocardial infarction syndrome
Asbestos exposure
Sarcoidosis
Uremia
Meigs’ syndrome
Yellow nail syndrome
Drug-induced pleural disease
Nitrofurantoin
Dantrolene
Methysergide
Bromocriptine
Procarbazine
Trapped lung
Radiation therapy
Electrical burns
Urinary tract obstruction
Iatrogenic injury
Hemothorax
Chylothorax

(Adapted from Light RW. Pleural diseases. Philadelphia: Lea & Febiger, 1983.)