Pleural Effusions

a small amount of fluid lies between the parietal and visceral pleural layers. (approximately 10 mL) The fluid continues to be *filtered* and *reabsorbed* by the *lymphatic system* within a very delicate balance of hydrostatic and oncotic pressure forces. When an imbalance occurs, fluid will accumulate at a rate faster than the lymphatic system is capable of draining. The etiology of the fluid accumulation will determine the nature of fluid. A transudate results from a change in the transpleural pressure balance, and the resulting fluid will have a relatively low leukocyte count, lower levels of protein and be relatively alkalotic as is seen in hypoalbuminemic states and cardiac failure

an exudative accumulation results from either increased vascular permeability of pleural capillary beds or impaired lymphatic drainage, such as seen in infection. The resulting exudate will be more acidic, high in white blood cells (neutrophils, lymphocytes, eosinophils), protein, and lactate dehydrogenase (LDH) but relatively low in glucose

Common Causes of Pleural Effusions

Transudate

- Cardiac disease (e.g.,congestive heart failure, congenital heart disease, pericarditis)
- Renal disease (e.g.,nephrotic syndrome)
- Hypoalbuminemia (e.g., secondary to liver failure)
- Superior vena cava obstruction
- Hepatic cirrhosis

Exudate

- Infectious
- Malignancy (e.g., leukemia, lymphoma)
- Lymphatic abnormalities and chylothorax
- Postoperative surgical complications (e.g., scoliosis surgery)
 Pulmonary infarction

- Connective tissue and vasculitic disorders (e.g., rheumatoid pleurisy, Churg-Strauss, sarcoidosis) Abdominal pathology (e.g., pancreatitis, viral hepatitis, subphrenic abscess)
- Endocrine (e.g., hypothyroidism)

Clinical Manifestations

pleuritic pain

- As fluid accumulates, pleuritic pain may disappear
- asymptomatic (if the effusion remains small)
- Large fluid collections can produce cough, dyspnea, retractions, tachypnea, orthopnea, or cyanosis

Dullness to flatness may be found on percussion

- Breath sounds are decreased or absent
- Diminution in tactile fremitus
- Shift of the mediastinum away from the affected side, and, occasionally, fullness of the intercostal spaces
- Friction rubs are usually detected only during the early or late plastic stage

Laboratory Findings

Radiographic examination shows a generally homogeneous density obliterating the normal markings of the underlying lung Small effusions may cause obliteration of only the costophrenic or cardiophrenic angles or a widening of the interlobar septa

Ultrasonographic examinations are useful and may guide thoracentesis if the effusion is loculated

Examination of the fluid is essential to differentiate exudates from transudates and to determine the type of exudate pleural fluid is sent for culture for bacterial, fungal, and mycobacterial cultures; antigen testing; Gram staining; and chemical evaluation of content, including protein, lactic dehydrogenase and glucose, amylase, specific gravity, total cell count and differential, cytologic examination, and pH. Complete blood count and serum chemistry analysis should be obtained

FEATURE	TRANSUDATE	EXUDATE
Appearance	Serous	Cloudy
Leukocyte count	<10,000/mm ³	>50,000/mm ³
pH	>7.2	<7.2
Protein	<3.0 g/dL	>3.0 g/dL
Ratio of pleural fluid protein to serum	<0.5	>0.5
LDH	<200 IU/L	>200 IU/L
Ratio of pleural fluid LDH to serum	<0.6	>0.6
Glucose	≥60 mg/dL	<60 mg/dL

Exudates usually have at least 1 of the following features:

 \blacktriangleright protein level >3.0 g/dL, with pleural fluid:serum protein ratio >0.5 pleural fluid lactic dehydrogenase values >200 IU/L; or fluid:serum lactic dehydrogenase ratio >0.6 ▶ pH < 7.20

Glucose is usually <60 mg/dL in malignancy, rheumatoid disease, and tuberculosis

The finding of many small lymphocytes and a pH < 7.20 suggest tuberculosis



Thoracentesis should be performed when pleural fluid is present or is suggested, unless the effusion is small, and the patient has a classic-appearing lobar pneumococcal pneumonia Thoracentesis can differentiate

serofibrinous pleurisy,empyema, hydrothorax, hemothorax, and chylothorax

Treatment

- Therapy should address the underlying disease
- If the effusion is less than 10 mm in size on a chest x-ray, then there is no need for drainage
- With a large effusion, draining the fluid makes the patient more comfortable

When a diagnostic thoracentesis is performed, as much fluid as possible should be removed for therapeutic purposes

➤ Rapid removal of ≥1 L of pleural fluid may be associated with the development of reexpansion pulmonary edema If the underlying disease is adequately treated, further drainage is usually unnecessary, but if sufficient fluid reaccumulates to cause respiratory embarrassment, chest tube drainage should be performed

In older children with suspected parapneumonic effusion, tube thoracostomy is considered necessary if the pleural fluid pH is <7.20 or the pleural fluid glucose level is <50 mg/dL

If the fluid is thick, loculated, or clearly purulent, tube drainage with fibrinolytic therapy or less often videoassisted thoracoscopic surgery (VATS) is indicated

Patients with pleural effusions may need analgesia,particularly after thoracentesis or insertion of a chest tube

