

Knowledge

Pleural effusion

- A systematic approach to analysis of the fluid should allow the clinician to diagnose the cause of an effusion in about 75 percent of patients at the first encounter :
 - A definitive diagnosis, provided by the finding of malignant cells or specific organisms in the pleural fluid, 25 percent of patients.
 - A presumptive diagnosis, based on the pre-thoracentesis clinical impression, additional 50 percent of patients.
- Even with a nondiagnostic thoracentesis, pleural fluid analysis can be useful in excluding other possible causes, such as infection, or guiding subsequent diagnostic studies.
- Thus, clinical decision-making information can be gained from pleural fluid analysis in over 90 percent of patients.

Collins TR, Sahn SA. Chest 1987; 91:817.

Diagnoses established "definitively" by pleural fluid analysis

Disease	Diagnostic pleural fluid tests
Empyema	Observation (pus, putrid odor), positive culture
Malignancy	Positive cytology
Tuberculous pleurisy	Positive AFB stain, culture
Esophageal rupture	High salivary isoenzyme form of amylase, low pH (often as low as 6), ingested vegetable or meat fragments
Fungal-related effusions	Positive fungal stain, culture
Chylothorax	Triglycerides >110 mg/dL, chylomicrons by lipoprotein electrophoresis
Cholesterol effusion	Cholesterol >200 mg/dL with a cholesterol to triglyceride ratio >1, cholesterol crystals under polarizing light
Hemothorax	Ratio of pleural fluid to blood hematocrit >0.5
Urinothorax	Pleural fluid creatinine to serum ratio always >1 but diagnostic if >1.7
Peritoneal dialysis	Protein <0.5 mg/dL and pleural fluid to serum glucose ratio >1 in peritoneal dialysis patient
Extravascular migration or misplacement of a central venous catheter	Pleural fluid to serum glucose ratio >1, pleural fluid gross appearance mirrors infusate (eg, milky white if lipids infused)
Rheumatoid pleurisy	Cytologic evidence of elongated macrophages and distinctive multinucleated giant cells (tadpole cells) in a background of amorphous debris
Glycinothorax	Measurable glycine after bladder irrigation with glycine-containing solutions
Cerebrospinal fluid leakage into pleural space	Detection of beta-2 transferrin
Parasite-related effusions	Detection of parasites

Observations of pleural fluid helpful in diagnosis

	Suggested diagnosis
Color of fluid	
Pale yellow (straw)	Transudate, some exudates
Red (bloody)	Malignancy, benign asbestos pleural effusion, postcardiac injury syndrome, or pulmonary infarction in absence of trauma
White (milky)	Chylothorax or cholesterol effusion
Brown	Long-standing bloody effusion; rupture of amebic liver abscess
Black	Aspergillus
Yellow-green	Rheumatoid pleurisy
Dark green	Biliothorax
Color of:	
Enteral tube feeding	Feeding tube has entered pleural space
Central venous catheter infusate	Extravascular catheter migration
Character of fluid	
Pus	Empyema
Viscous	Mesothelioma
Debris	Rheumatoid pleurisy
Turbid	Inflammatory exudate or lipid effusion
Anchovy paste	Amebic liver abscess
Odor of fluid	
Putrid	Anaerobic empyema
Ammonia	Urinothorax

Causes of transudative pleural effusions

Causes of transudative effusions	Comment
Processes that <i>always</i> cause a transudative effusion	
Atelectasis	Caused by increased intrapleural negative pressure
Cerebrospinal fluid leak into pleural space	Thoracic spinal surgery or trauma and ventriculopleural shunts
Heart failure	Acute diuresis can result in borderline exudative features
Hepatic hydrothorax	Rare without clinical ascites
Hypoalbuminemia	Edema liquid rarely isolated to pleural space
Iatrogenic	Misplaced intravenous catheter into the pleural space; post Fontan procedure
Nephrotic syndrome	Usually subpulmonic and bilateral
Peritoneal dialysis	Acute massive effusion develops within 48 hours of initiating dialysis
Urinothorax	Caused by ipsilateral obstructive uropathy
Processes that <i>may</i> cause a transudative effusion, but <i>usually</i> cause an exudative effusion	
Amyloidosis	Often exudative due to disruption of pleural surfaces
Chylothorax	Most are exudative effusions
Constrictive pericarditis	Bilateral effusions
Hypothyroid pleural effusion	From hypothyroid heart disease or hypothyroidism per se
Malignancy	Usually exudative, but 3 to 10 percent transudative possibly due to early lymphatic obstruction, obstructive atelectasis, or concomitant disease (eg, heart failure)
Pulmonary embolism	Most are exudative effusions
Sarcoidosis	Stage II and III disease
Superior vena caval obstruction	May be due to acute systemic venous hypertension or acute blockage of thoracic lymph flow
Trapped lung	A result of remote or chronic inflammation