

PLEURAL EFFUSION (PLEFF)

(Last updated 07/23/2019; Reviewed by: Yongfang Zhou, MM)

PRESENTING COMPLAINTS: Pleuritic chest pain and dyspnea

FINDINGS

- **A** Normal or deviated airway
- **B** ↑ RR, ↑ work of breathing, short of breath, cough, silent in some cases
- **C** ↓ BP, ↑ HR, weak pulse;
- **D** Variable altered (V, U, D)*
- **E** Decreased breath sounds, dullness to percussion
- **L_{PC}** ABG- Normal
- **U_{PC}** **Thorax-US:** Detecting the presence and volume of pleural fluid and determining the location of pleural fluid; and to guide thoracentesis and related procedures, such as pleural drainage catheter placement.

***V** (verbal), **P** (pain), **U** (unconsciousness), **D** (delirious)

U_{PC} (point of care ultrasound) **L_{PC}** (point of care labs)

OTHER HISTORY

- **Symptoms:** A dry, nonproductive cough; occasionally sharp, nonradiating, pleuritic chest pain that worsens with breathing, dyspnea, dullness on percussion, diminished or absent breath, sounds pleural friction rub; other symptoms may be related to systemic disease. However, it may be relatively asymptomatic, even in large malignant or infectious effusions
- **Predisposing conditions:** Most common conditions: cardiac failure, pneumonia, cirrhosis, malignant neoplasm; other common conditions: pulmonary embolism, benign, asbestos-related pleural effusion; collagen vascular diseases

DIFFERENTIAL DIAGNOSIS

- Atelectasis, lung mass, pleural thickening, total pneumonectomy

OTHER INVESTIGATIONS

- **Imaging:** Chest x-ray, CT chest, ultrasonography
- **Diagnostic thoracentesis and analysis of pleural fluid for:** Protein, lactate dehydrogenase (LDH), pH (send in ABG syringe, on ice), glucose, Gram stain and culture (to identify possible bacterial infections), cell count and differential, cytopathology (to identify cancer cells and may also identify some infective organisms)

- Other tests as suggested by the clinical situation: Cholesterol, triglycerides, lipids, albumin, amylase, fungal culture, viral culture, adenosine deaminase (for tuberculosis), acid fast bacillus stains with cultures, rheumatoid factor (if RA suspected)
- **Analysis of pleural fluid**
 - Generally, pleural fluid protein > 3 g/dL (30 g/L) is exudate
 - If protein is between 2.5 and 3.0 g/dL, apply Light's criteria
 - Exudate if one or more of the following are met:
 - Pleural fluid protein divided by serum protein > 0.5
 - Pleural fluid LDH divided by serum LDH > 0.6
 - Pleural fluid LDH > two-thirds the upper limits of normal serum LDH
 - In hemorrhagic effusions: fluid hematocrit > half of serum hematocrit indicates hemothorax
 - The presence of frank pus indicates an empyema
 - Triglyceride > 110 mg/dL: chylothorax or pseudochylothorax
 - Amylase: pancreatitis or esophageal rupture
 - Creatinine > serum creatinine: urinothorax
 - Consider PCR for tuberculosis/viruses and cell pathology if suspicion of malignancy
 - A low ADH may be helpful to r/o TB, but a high ADH is does not confirm TB
 - Consider flow cytometry to rule out lymphoma
 - Very low glucose may suggest rheumatoid effusion
- **Algorithm:** Refer a recommended algorithm below

THERAPEUTIC INTERVENTIONS

- **Treat underlying etiology**
- **Medications**
 - Congestive heart failure heart: diuretic therapy, loop diuretic medications
 - Pneumonia: antimicrobial therapy
 - Other as indicated: malignancy, TB, collagen vascular disease, etc.
- **Procedures:** Therapeutic thoracentesis, chest tube, pig-tail/Pleurx catheter placement

ONGOING TREATMENT

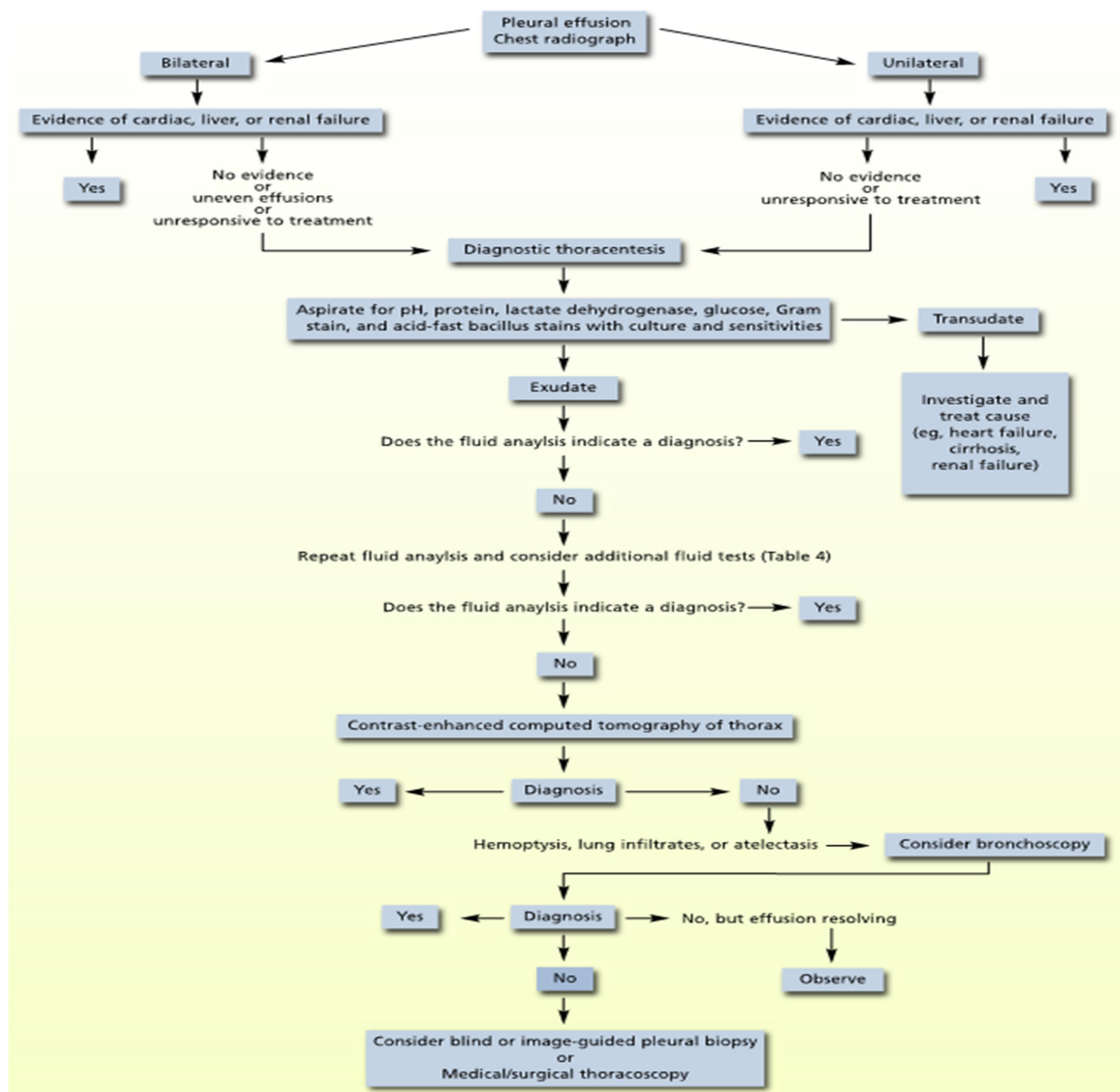
- **Follow-Up:** Follow-up and monitoring depends on the underlying illness
- **Further diagnostics testing:** Computed tomography (CT) of the thorax, bronchoscopy, video-assisted thoracoscopic surgery (VATS), medical pleuroscopy
- **Further Treatment:** Further drainage via Pleurx catheter or chest tube, decortication, pleurodesis

CAUTIONS

- **Possible Complications**

- Chronic empyemas, entrapped or trapped lung, bronchopleural fistula
- Chronic diuretic therapy may confound Light's criteria
 - Up to 25% of transudates may be classified as exudates (pseudo-exudates): In those cases, a serum albumin minus the pleural fluid albumin (gradient) of less than 1.2 g/dL signifies a true exudative effusion
- A pleural fluid pH < 7.2 may indicate an empyema and may require urgent drainage, especially with very low pleural fluid glucose levels
- Pneumothorax occurs even with ultrasound guidance through suction trauma by the catheter, entry of air from outside, pneumothorax ex-vacuo
 - A drop in the hematocrit, hypotension, and a new pleural effusion after thoracentesis is suggestive of hemothorax: A complication of thoracentesis with laceration of an intercostal artery and is a surgical emergency and requires emergent consultation with thoracic surgery

ALGORITHM:



(Source: McGrath, E. E. and P. B. Anderson (2011). "Diagnosis of pleural effusion: a systematic approach." Am J Crit Care 20(2): 119-127;)

REFERENCES & ACKNOWLEDGMENTS

Acknowledgement: *MK Arslantas, MD; Kashiouris Kashani, MD; Yongfang Zhou, MM; Gustavo Matute-Bello, MD; Hiroshi Sekiguchi, MD*

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