

Diagnosis of Pleural Effusions: Review Questions

Rebecca L. Shriver, MD, FCCP

QUESTIONS

Choose the single best answer for each question.

All questions refer to the following case.

A 67-year-old man presents to the emergency department with a 5-day history of fever and cough that produces green sputum. He has a history of tobacco use and ischemic cardiomyopathy with a left ventricular ejection fraction of 25%. He is admitted with a presumptive diagnosis of pneumonia and is started on antibiotics. A chest radiograph is obtained and shows a left-sided infiltrate and moderate-size effusion.

- Why should a diagnostic thoracentesis be performed on this patient?**
 - This patient's effusion is likely related to his congestive heart failure (CHF)
 - The effusion is a new finding and its etiology is unknown
 - Thoracentesis should be performed on all pleural effusions
 - This patient's effusion is malignant given his smoking history
- Which of the following studies can be used to determine if the patient's effusion is due to his CHF (a transudate) or is a parapneumonic effusion (an exudate)?**
 - Pleural fluid pH
 - Pleural fluid glucose
 - Pleural fluid cell count
 - Lactate dehydrogenase (LDH)
- The fluid from thoracentesis has a pH of 7.3, which can be consistent with either CHF or a parapneumonic effusion. Which of the following types of pleural effusions have a pleural fluid pH greater than 7.2?**
 - Empyema
 - Rheumatoid pleuritis
 - Hepatic hydrothorax
 - Urinothorax
- Results of the patient's pleural fluid and serum glucose measurements are 56 mg/dL and 90 mg/dL, respectively. Which of the following types of effusions typically have a pleural fluid glucose concentration similar to that of blood glucose?**
 - Malignant effusion
 - Lupus pleuritis
 - Esophageal rupture
 - Effusion due to CHF
- Results of additional pleural fluid studies reveal an LDH of 670 U/L and a protein level of 3.4 g/dL. Gram stain and culture are negative. Based on these data, what is the most likely cause of this patient's pleural effusion?**
 - Typical parapneumonic effusion
 - Complicated parapneumonic effusion
 - Empyema
 - CHF

(turn page for answers)

Dr. Shriver is an assistant professor of medicine, Division of Pulmonary and Critical Care Medicine, University of Missouri–Kansas City, Kansas City, MO.

ANSWERS AND EXPLANATIONS

1. **(B) The effusion is a new finding and its etiology is unknown.** Diagnostic thoracentesis is indicated when pleural effusion is a new finding and the etiology is unknown. Observation without thoracentesis may be warranted in pleural effusions due to uncomplicated CHF, ascites, and other volume overload states. This patient's pneumonia may be the cause of the effusion; therefore, it cannot be determined if the effusion is caused by CHF alone. It is not possible to determine the etiology of a pleural effusion based on chest radiograph alone, and therefore malignancy cannot be determined at this point.¹
2. **(D) LDH.** Traditionally, Light's criteria have been used to differentiate transudative from exudative effusions. These criteria include: (1) pleural fluid protein to serum protein ratio greater than 0.5, (2) pleural fluid LDH to serum LDH ratio greater than 0.6, and (3) pleural fluid LDH ratio greater than two thirds the upper limit of normal for the serum LDH. Exudative effusions meet at least 1 of Light's criteria, and transudates meet none. Recently, several other tests have been proposed as well. A pleural fluid cholesterol concentration greater than 60 mg/dL and a pleural fluid to serum albumin gradient of less than 1.2 may also suggest an exudative effusion.² Pleural fluid glucose, pH, and cell count levels are helpful in characterizing pleural effusions but do not differentiate between transudates and exudates.
3. **(C) Hepatic hydrothorax.** Hepatic hydrothorax is a transudative effusion. With transudative pleural effusions, the pleural fluid pH is usually similar to or slightly higher than the simultaneous blood pH. Therefore, pleural fluid pH levels will be greater than 7.3. Urinothorax is a notable exception; it is an acidic transudate and has a pleural fluid pH less than 7.2. Measurement of the pleural pH is useful in the differential diagnosis and prognosis of exudative effusions. The following conditions will have

pleural fluid pH less than 7.2: empyema, complicated parapneumonic effusion, esophageal rupture, rheumatoid pleuritis, tuberculous pleuritis, malignant pleural disease, hemothorax, systemic acidosis, paragonimiasis, and lupus pleuritis.

4. **(D) Effusion due to CHF.** Most pleural effusions have a pleural fluid glucose concentration similar to that of blood glucose, including effusions due to CHF and nearly all transudates. The following exudates may have a low (< 60 mg/dL) pleural fluid glucose concentration: rheumatoid pleurisy, parapneumonic effusion or empyema, malignant effusion, tuberculous pleurisy, lupus pleuritis, and esophageal rupture.³
5. **(A) Typical parapneumonic effusion.** Based on the patient's history of infectious respiratory symptoms and results of pleural fluid studies revealing a low pleural fluid glucose concentration and borderline low pH, the case patient has class 2 or typical parapneumonic effusion. Typical parapneumonic effusions can usually be treated with antibiotics and do not require further intervention after the initial diagnostic thoracentesis. Both complicated parapneumonic effusions and empyema would have a pleural fluid pH less than 7.2. An empyema would also have a positive Gram stain or culture. A pleural effusion due to CHF would be a transudate, with pleural fluid pH and glucose similar to serum values (this was an exudate).²

REFERENCES

1. Sahn SA. State of the art. The pleura. *Am Rev Respir Dis* 1988;138:84.
2. Light RW. Pleural diseases. 4th ed. Philadelphia: Lippincott Williams & Wilkins; 2001:44–45, 57–8, 163–5.
3. Sahn SA. Pathogenesis and clinical features of diseases associated with a low pleural fluid glucose. In: Chretien J, Bignon J, Hirsch A, editors. *The pleura in health and disease*. New York: Marcel Dekker; 1985:267–85.

PULMONARY DISEASE

A current list of certification and recertification exam dates and registration information is maintained on the American Board of Internal Medicine Web site, at <http://www.abim.org>.