Don’t Get Caught in a Pleural Jam!

Dana Buus, CNP
Avera Medical Group Pulmonary and Sleep Medicine
I have no conflicts of interest to disclose.
Discuss causes and treatment of pneumothoraces

Understanding a pleural effusion

Discuss transudative effusions

Discuss exudative effusions

Discuss other pleural disorders
Question #1:
This is a picture of:

- A. Dextrocardia
- B. Pneumothorax
- C. Pneumonia
- D. Rib fractures

http://www.fprmed.com/Pages/Trauma/Simple_Pneumothorax.html
Answer

B. Pneumothorax
Pneumothorax
What is a pneumothorax?

- An accumulation of air into the pleural space, causing a collapse of the lung.
Signs and symptoms of pneumothorax

- Sudden shortness of breath
- Chest pain
- Absent breath sounds
- Subcutaneous emphysema
- Hemodynamic instability
- Hypoxemia
- Respiratory alkalosis
Types of Pneumothoraces

- Primary spontaneous pneumothorax
- Secondary spontaneous pneumothorax
- Iatrogenic Pneumothorax
Primary Spontaneous Pneumothorax (PSP)

- occurs spontaneously in a patient without known lung disease
- usually happens in men
- 25-50% reoccurrence rate with most happening in the first year
- Risk Factors: smoking, family history, Marfan syndrome, thoracic endometriosis
Secondary Spontaneous Pneumothorax

- caused as a complication of underlying lung disease (COPD, CF, lung CA, necrotizing pneumonia, PCP, TB)
Iatrogenic Pneumothorax

- Caused by an invasive procedure:
  - Biopsy
  - Central line placement
  - Thoracentesis
  - Bronchoscopy with transbronchial biopsy
  - Pleural biopsy
  - Mechanical ventilation
Treatment of Pneumothoraces
Initial Treatment

- Oxygen
- Observation in asymptomatic patients with <3cm between lung and chest wall on CXR
- Removal of air from pleural space
  - needle aspiration (primary spontaneous PTX)
  - chest tube placement
Ongoing Treatment

- If persistent airleak for >3 days in PSP, then recommended VATS and pleurodesis, blood patch
Video Assisted Thoracoscopic Surgery
Prevention

- PSP: 25-50% over 1-5 yr follow-up period with highest risk within the first 30 days
- SSP: reoccurrence is common and frequently life threatening. One study with 50% reoccurrence over 3 yrs.
- Both PSP and SSP should undergo procedure to prevent reoccurrences: VATS, thoracotomy or chemical pleurodesis.
Question #2: This is a picture of:

- A. Pneumothorax
- B. Pleural effusion
- C. Both a pneumothorax and pleural effusion
- D. Pneumonia
C. Pneumothorax and Pleural Effusion

Also known as a Hydropneumothorax

Presence of both air and fluid in the pleural space.
What is a pleural effusion?

- collection of fluid in the pleural space when production > absorption
- overproduction
- reduced absorption

http://2.bp.blogspot.com/-6DFpHavFco/U-ok2OPzqql/AAAAAAAARU/iWME5CsrPUY/s1600/pleural%2Beffusion.png
Question #3: How much fluid does the pleural space normally contain?

- A. 0.3ml/kg body mass
- B. 0.5ml/kg body mass
- C. The pleural space does not contain any fluid
- D. 0.4ml/kg body mass
A. 0.3ml/kg body mass

Main function of pleural fluid is to guarantee close apposition of visceral and parietal membranes
Radiographic imaging of pleural effusions
Symptoms

- often can be asymptomatic
- chest pain (sharp, worse with cough or taking a deep breath, sometimes an ache)
- shortness of breath
- cough
- fever
- hiccups
Diagnosis

- initially made by imaging
- pleural fluid analysis
  - thoracentesis
    - pH, LDH (pleural and serum), protein (pleural and serum), glucose, cell count and differential, cultures, cytology
Thoracentesis

When to do a thoracentesis...

- New finding, need to determine a cause
- 2 cases when not required:
  - small amount of fluid and diagnosis determined
  - clinical signs of heart failure
There are no absolute contraindications to perform a thoracentesis.
Pleural Fluid Analysis
- Appearance (color, character, odor)
- Characterization (Transudates, Exudates)
  - Light’s Criteria (1 of 3 positive then exudate)
    - pleural fluid protein/serum protein ratio > 0.5
      or
    - Pleural fluid LDH/serum LDH ratio > 0.6 or
    - Pleural fluid LDH > 2/3 the upper limits of labs normal serum LDH
Pleural fluid appearance

- Pale yellow
- Bloody (malignancy, injury, pulmonary infarct)
- Milky (chylothorax, cholesterol effusion)
- Brown (long standing blood, rupture of liver abscess)
- Black (aspergillus, metastatic melanoma, perforation during charcoal administration, etc)
- Yellow-green (rheumatoid)
- Dark green (biliothorax)
Question #4: Identify type of pleural effusion: pleural fluid LDH 2500/serum LDH 150, pleural protein 5/ serum 2.3

- A. Transudative
- B. Exudative
- C. Pseudoexudative
- D. Malignant Pleural effusion
B. Exudative Pleural Effusion

- protein ratio: $\frac{5}{2.3} = 2.17$
- LDH ratio: $\frac{2500}{150} = 16.6$
- Pleural fluid LDH > 2/3 the upper limits of labs normal serum LDH (usually about 200)
Transudative Effusion

- Imbalances in hydrostatic and oncotic pressures in the chest.
- Causes:
  - CHF
  - Hepatic hydrothorax
  - Nephrotic syndrome
  - Iatrogenic
  - Urinothorax
  - Peritoneal dialysis
CHF

- Transudative
  - can appear pseudo-exudative secondary to diuresis
- Bilateral in 90% of cases

https://www.mypacs.net/cases/2695717.html
Hepatic Hydrothorax

- Transudative
- Usually right sided
- Signs of ascites and/or cirrhosis
- Management: no chest tube (unless infection), therapeutic thoracentesis, salt restriction, diuretics, TIPS, pleurodesis

Exudative Pleural Effusions

- Usually result from pleural and lung inflammation or impaired lymphatic drainage of pleural space.

- Causes:
  - infection
  - malignancy
  - immunologic
  - lymphatic abnormalities
  - noninfectious inflammation
  - iatrogenic
Infection

- Parapneumonic (Uncomplicated vs Complicated)
  - Uncomplicated: usually resolves with abs
  - Complicated: requires drainage or surgery
- Empyema: presence of pus and/or bacteria in pleural fluid
Question #5: What is the mortality rate associated with empyema?

- A. 5-10%
- B. 10-20%
- C. 20-40%
- D. Less than 5%
B. 10-20%
Empyema

- pus or bacterial organisms in the gram stain
- mortality 10-20%
- 1/3rd fail medical management and require surgery
- 25% prolonged hospitalization

Treatment

- Antibiotics
- Chest tube +/- (tPA/DNase)
  - Small bore chest tube (10-14F)
  - pH <7.20
  - glucose <60
- Surgery
  - VATS
  - Thoracotomy
  - Decortication
Malignant Pleural Effusions

- usually secondary to metastatic disease
- Treatment options:
  - periodic thoracentesis if slow re-accumulation
  - indwelling pleural catheter
  - surgery
Benign pleural effusion
- Pleural plaques
- Diffuse pleural fibrosis
- Rounded atelectasis
- Mesothelioma
- Fibrous pleural tumor
Pleural pearls:

- PSP and SSP should undergo procedure to prevent reoccurrences
- If pleural effusion is undetermined, thoracentesis should be completed with pleural fluid analysis
- Complication pleural effusions and empyema should be treated with abx, chest tube, +/- surgery
Questions??
References

thank you!