QUESTION 79 - Respiratory

A 21 yo overseas student from India presents with malaise, mild shortness of breath and low-grade fevers over four weeks. Her chest XR is shown below.

Which one of the following investigations is most likely to provide the diagnosis?

A. Pleural fluid aspiration
B. Mantoux testing
C. Sputum culture
D. Bronchoscopy
E. Pleural biopsy

TIME COURSE
- Parapneumonic: 1-2 weeks
- TB pleurisy: six weeks to 4 months

CXR
- At least 75mL of pleural fluid is required to obliterate the posterior costophrenic sulcus on lateral XR
- At least 175mL are needed to obscure the lateral costophrenic sulcus on an erect PA XR
- 500mL will obscure the diaphragmatic contour
- 1000mL will reach the level of the fourth rib anteriorly
- Absent air bronchograms
- Pulmonary vessels are visible through the opacity

TRANSUDATIVE EFFUSIONS
- Most common cause is LVF
- 90% bilateral in LVF
- Other common causes include pericarditis, cirrhosis and renal failure
- Most often due to imbalances in hydrostatic and oncotic pressures in the chest
- Can also result from movement of fluid from peritoneal or retroperitoneal spaces or iatrogenic causes (eg: migrated CVC)
- Can occasionally loculate and mimic tumours (if sitting in fissure)
- Rarely can have bilateral pleural effusions of different origins (eg: Transudate 2’ LVF on R and exudate 2’ pneumonia/empyema on L); this is Contarini’s condition
- Most transudates have protein < 3.0g/dL
- Transudates normally have pH in range of 7.40 to 7.55

Causes of transudative pleural effusions:
1) CCF
2) Cirrhosis (rare without ascites)
3) Nephrotic syndrome
4) Peritoneal dialysis
5) Hypoalbuminaemia
6) Atelectasis
7) Constrictive pericarditis
8) SVC obstruction
9) Urinothorax (ipsilateral obstructive uropathy)
10) PE
11) Hypothyroidism

EXUDATES
- Pneumonia then malignancy most common
Causes (many and varied):

1) Infective
   a. Pneumonia
   b. Subphrenic/hepatic/splenic

2) Increased negative intapleural pressure (eg: atelectasis)

3) Malignancy

4) Connective tissue disease

5) Endocrine (eg: hypothyroidism)

6) Iatrogenic
   a. Drug-induced
   b. Oesophageal perforation
   c. CVC migration/misplacement
   d. Post-CABG
   e. Radiation injury

7) Lymphatic abnormalities (eg: chylothorax, yellow nail syndrome)

8) PE

9) Sarcoidosis

10) Pericardial disease

11) Trapped lung

12) Haemothorax

13) Movement of fluid from abdomen to pleural space
   a. Pancreatitis
   b. Pseudocyst
   c. Meigs' syndrome
   d. Abscess

   - Large unilateral exudate in a young person is suspicious for TB
   - In older people malignancy is more common
   - If one of the following criteria is present the fluid is virtually always an exudate:
     i. Pleural fluid protein/serum protein > 0.5
     ii. Pleural fluid LDH/serum LDH > 0.6
     iii. Pleural fluid LDH > 2/3 upper limit of normal serum LDH

OTHER LABORATORY MEASUREMENTS

Protein:

- TB exudates will almost always have protein concentrations > 4.0g/dL
- When protein is in the range of 7-8g/dL should consider Waldenstrom’s macroglobulinaemia and multiple myeloma

LDH:

- LDH > 1000 IU/L characteristically found in empyema, rheumatoid pleurisy and pleural paragonimiasis
- Pneumocystis jiroveci pneumonia characteristically has pleural/serum LDH >1.0 and pleural/serum protein <0.5

Glucose:

- A glucose concentration < 3.33mmol/L or a pleural/serum ration < 0.5 narrows the DDx of exudates to
  i. Rheumatoid pleurisy
Empyema

- Other causes of exudates have glucose levels similar to serum concentrations

pH:

- Above conditions also associated with low pleural pH (<7.30)
- Exudates normally have pH in range of 7.30 to 7.45

Cell Counts:

- Lymphocytosis associated with TB, lymphoma, sarcoidosis, rheumatoid, yellow nail syndrome and chylothorax
- Eosinophilia associated with pneumothorax, haemothorax, pulmonary infarction, benign asbestos pleural effusion, parasitic disease, fungal infection, drugs and malignancy

EMPYEMA

- Vast majority due to pulmonary infections
  - Anaerobic or mixed aerobic-anaerobic most common
- Other possible causes are trauma and surgical procedures
- Three stages in the evolution of empysemas:
  - Exudative pleural effusion with >15,000 leukocytes/microliter
  - Fibrinopurulent stage with adhesions
  - Organising stage with development of a thick pleural peel
- Can be easily drained in stage 1
- Decortication may be required in stages 2 and 3
- Diagnosis by CT
- In the 2nd and 3rd stages, CT shows enhancement of the visceral and parietal pleurae (split pleura sign)

Empyema after CABG