Pleural Diseases

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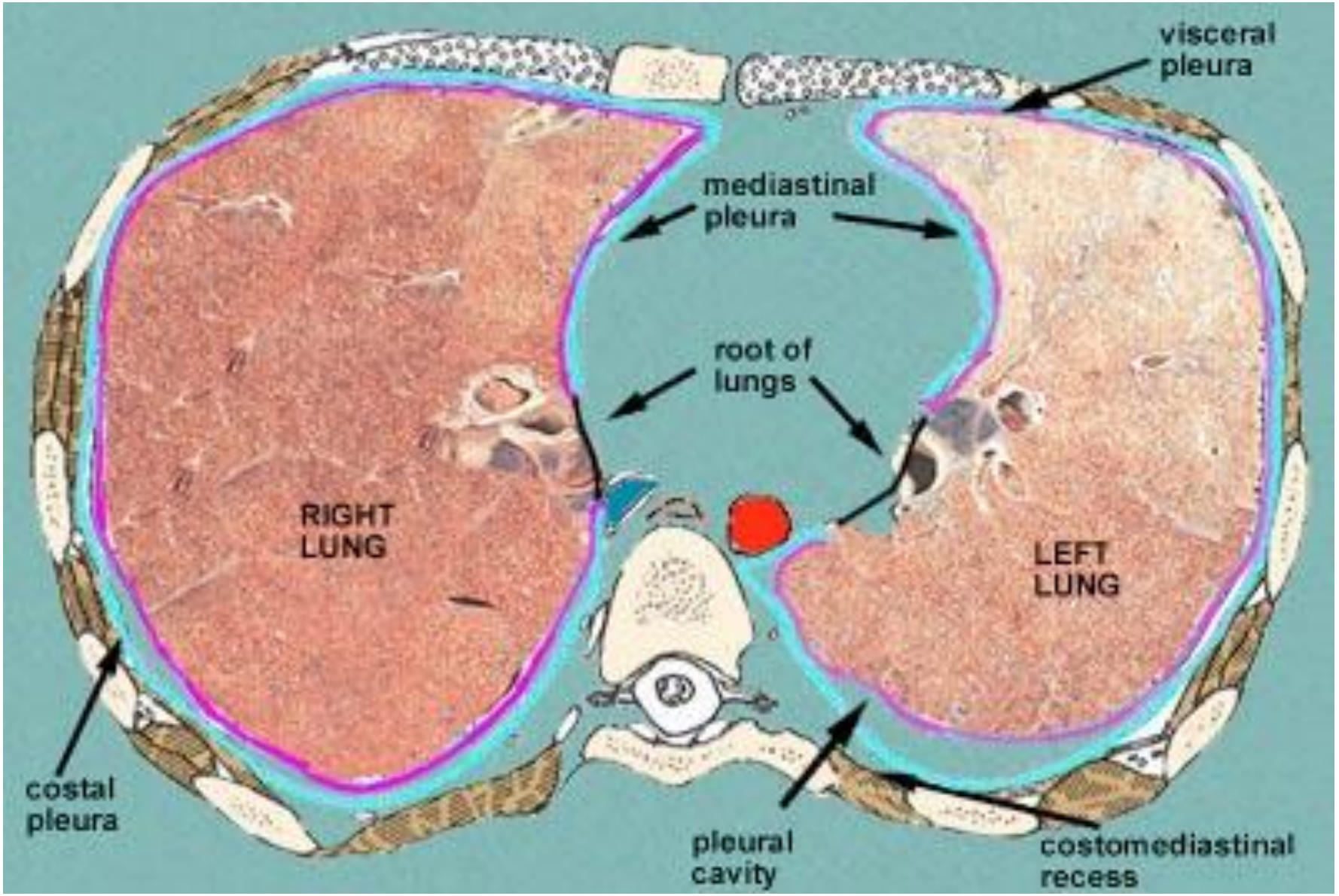
visceral pleura
mediastinal pleura
root of lungs
RIGHT LUNG
LEFT LUNG
costal pleura
pleural cavity
costomediastinal recess

Anatomy

- pleural space - coupling the movement of the chest wall with that of the lungs
  - relative vacuum in the space keeps the visceral and parietal pleurae in close proximity.
  - small volume of pleural fluid (0.13 mL/kg of body weight) serves as a lubricant
  - the volume of fluid is maintained through the balance of hydrostatic and oncotic pressure and lymphatic drainage.

Pleural syndromes

- Dry pleuresy (pleuritis)
- Pleural effusion
- Pneumothorax (aeric pleural syndrome)
- Hydropneumotorax (mixed pleural syndrome)
- Fibrothorax (pahipleuritis)

DRY PLEURISY

- Causes:
  - viruses (*Coksackie),* TB, RA, sarcoidosis, uremia,
- Symptoms:
  - chest pain (a characteristic symptom) which becomes stronger during breathing and coughing
  - cough (is usually dry)
  - general indisposition
  - temperature (subfebrile)

DRY PLEURISY

Physical signs

- Respiration is superficial (deep breathing intensifies friction of the pleural membranes to cause pain).
- Lying on the affected side lessens the pain. Inspection of the patient can reveal unilateral thoracic lagging during respiration.
- Percussion fails to detect any changes except decreased mobility of the lung border on the affected side.
- Auscultation determines pleural friction sound over the inflamed site.

Pleural syndromes

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- Pleural effusion (pleurisy)
- Pneumothorax (aeric pleural syndrome)
- Hydropneumotorax (mixed pleural syndrome)
- Fibrothorax (pahipleuritis)

Pleural effusion

- Pleural effusion - is an abnormal collection of fluid in the pleural space resulting from excess fluid production or decreased absorption.

- Pleural effusion is an indicator of an underlying disease process that may be pulmonary or nonpulmonary in origin and may be acute or chronic.

Ethiology

- Increased capillary permeability or vascular disruption (eg, trauma, malignancy, inflammation, infection, pulmonary infarction, drug hypersensitivity, uremia)

- Reduction in intravascular oncotic pressure (eg, hypoalbuminemia, cirrhosis)

- Increased capillary hydrostatic pressure in the systemic and/or pulmonary circulation (eg, congestive heart failure, superior vena cava syndrome)

Ethiology

- Reduction of pressure in the pleural space, preventing full lung expansion (eg, extensive atelectasis, mesothelioma)
- Decreased lymphatic drainage or complete blockage, including thoracic duct obstruction or rupture (eg, malignancy, trauma)
- Increased peritoneal fluid, with migration across the diaphragm via the lymphatics or structural defect (eg, cirrhosis, peritoneal dialysis)

Epidemiology

- The estimated prevalence of pleural effusion is 320 cases per 100,000 people in industrialized countries,

- distribution of etiologies related to the prevalence of underlying diseases

Epidemiology

- In general, the incidence is equal between the sexes.
- Certain causes have a gender predilection.
  - About two thirds of malignant pleural effusions occur in women. Malignant pleural effusions are significantly associated with breast and gynecologic malignancies.
  - Pleural effusion associated with systemic lupus erythematosus is also more common in women than in men.
  - Pleural effusions associated with chronic pancreatitis are more common in males, with the majority of male cases having alcoholism as the etiology.
  - Rheumatoid effusions also occur more commonly in males than in females.

Clinical presentations
(symptoms)

- Progressive dyspnea
  - the most common symptom associated with pleural effusion
  - is related more to distortion of the diaphragm and chest wall during respiration than to hypoxemia
  - may be caused by the condition producing the pleural effusion, rather than by the effusion itself
- Cough
  - often mild and nonproductive
  - purulent or bloody sputum suggests an underlying pneumonia or endobronchial lesion

Clinical presentations
(symptoms)

- Pleuritic chest pain
  - raises the likelihood of an exudative etiology
  - may be mild or severe
  - localized to the chest wall or referred to the ipsilateral shoulder or upper abdomen, usually because of diaphragmatic involvement

- Other symptoms could be suggestive for the underlying disease
  - increasing lower extremity edema, orthopnea, and paroxysmal nocturnal dyspnea
  - night sweats, fever, hemoptysis, and weight loss
  - acute febrile episode, purulent sputum production

Clinical presentations
(physical signs)

- are variable and depend on the volume of the effusion.
- no physical findings for effusions smaller than 300 mL.

Clinical presentations
(signs)

- Mediastinal shift - this is observed with effusions of greater than 1000 mL
- Asymmetrical chest expansion, with diminished or delayed expansion on the side of the effusion

Clinical presentations
(signs)

- Decreased vocal fremitus,
- Dullness to percussion,
- Diminished or inaudible breath sounds
- Pleural friction rub

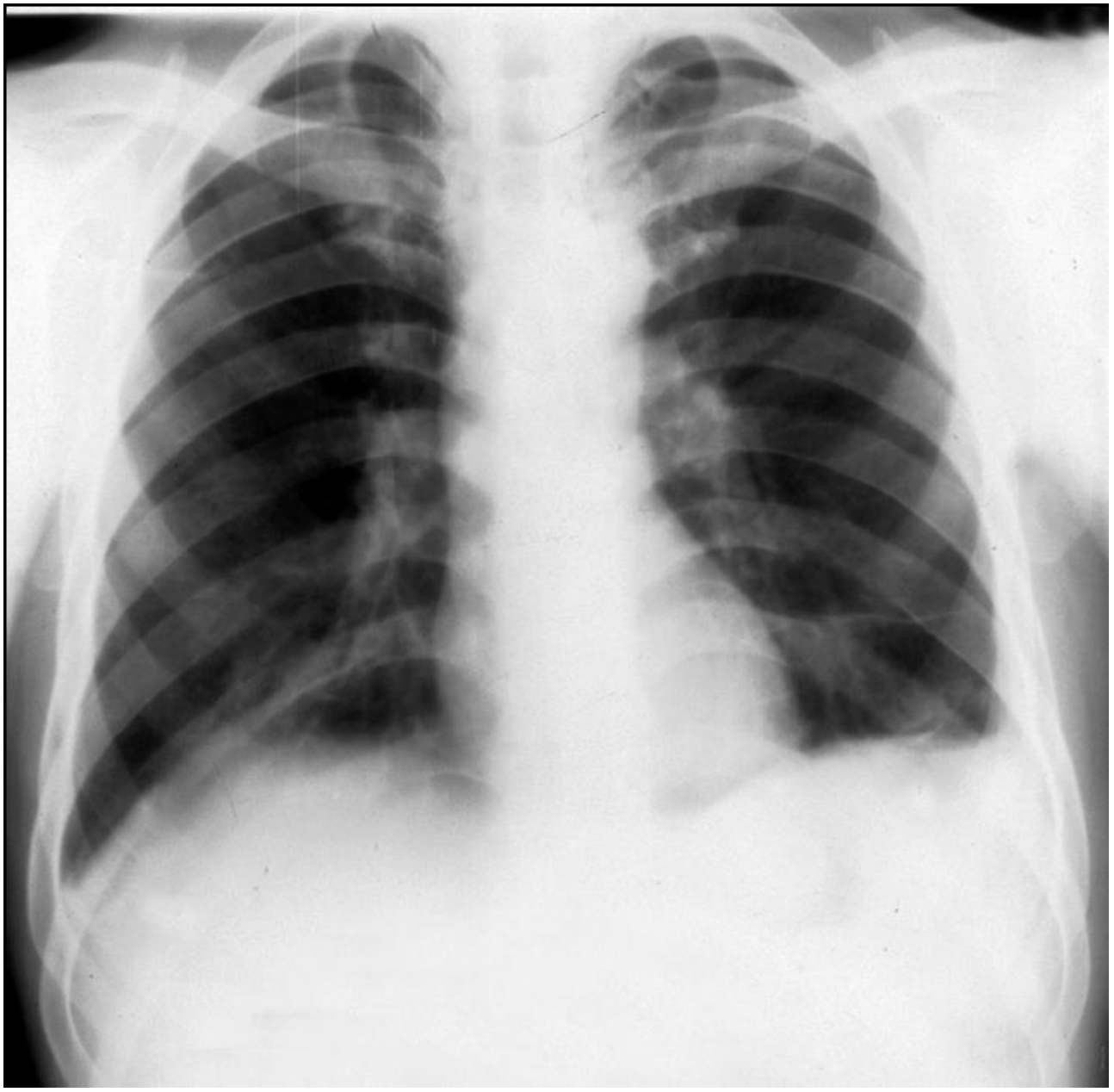
Clinical presentations
(signs)

- Other physical findings suggestive for the underlying cause of the pleural effusion:
  - Peripheral edema, distended neck veins, and S_3 gallop suggest congestive heart failure.
  - Edema may also be a manifestation of nephrotic syndrome; pericardial disease;
  - Cutaneous changes with ascites suggest liver disease
  - Lymphadenopathy or a palpable mass suggests malignancy.

Chest Radiography

- homogenous increase in density spread over the lower lung fields

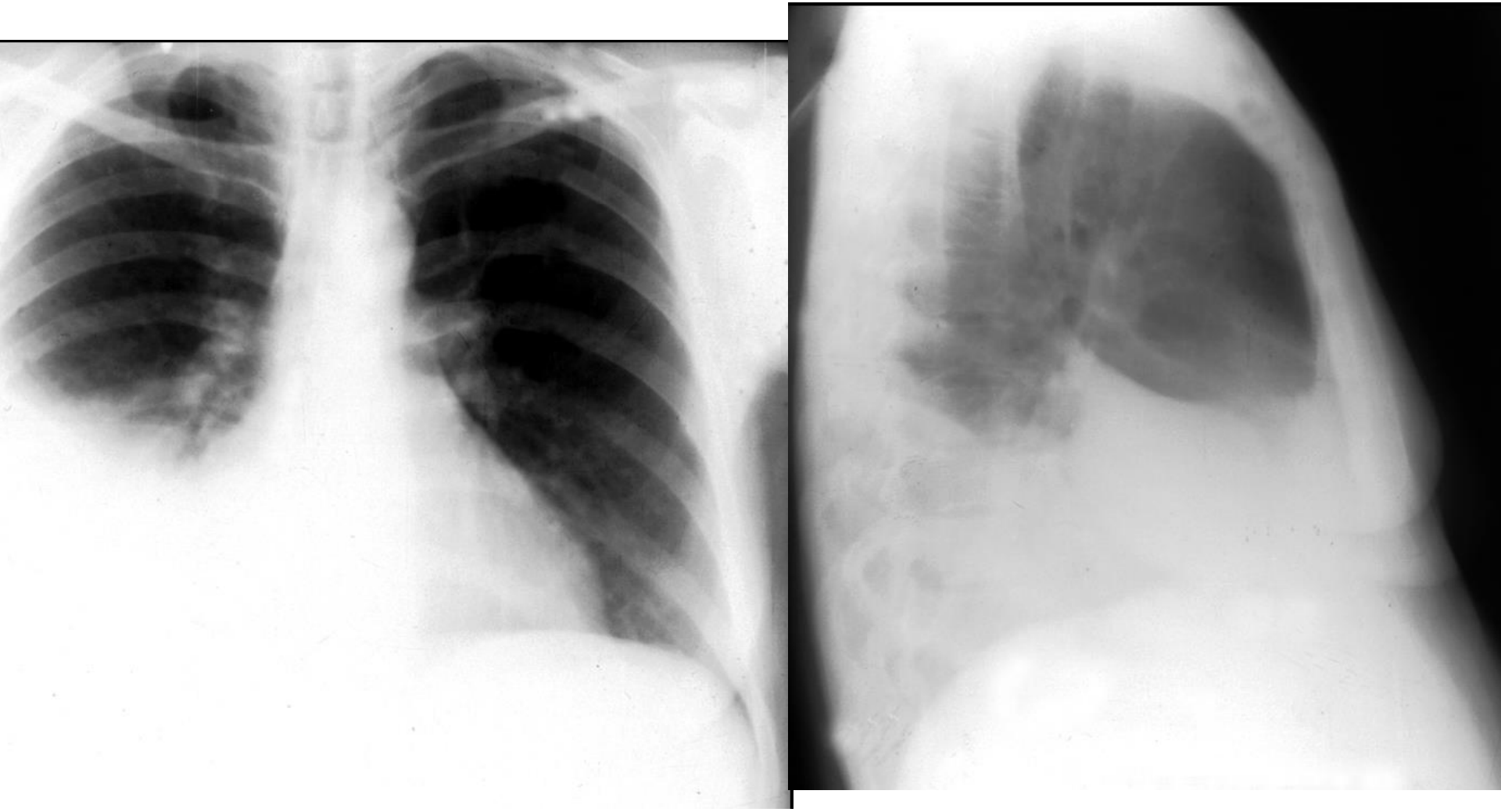
- Apparent elevation of the hemidiaphragm, lateral displacement of the dome of the diaphragm, or increased distance between the apparent left hemidiaphragm and the gastric air bubble suggests subpulmonic effusions



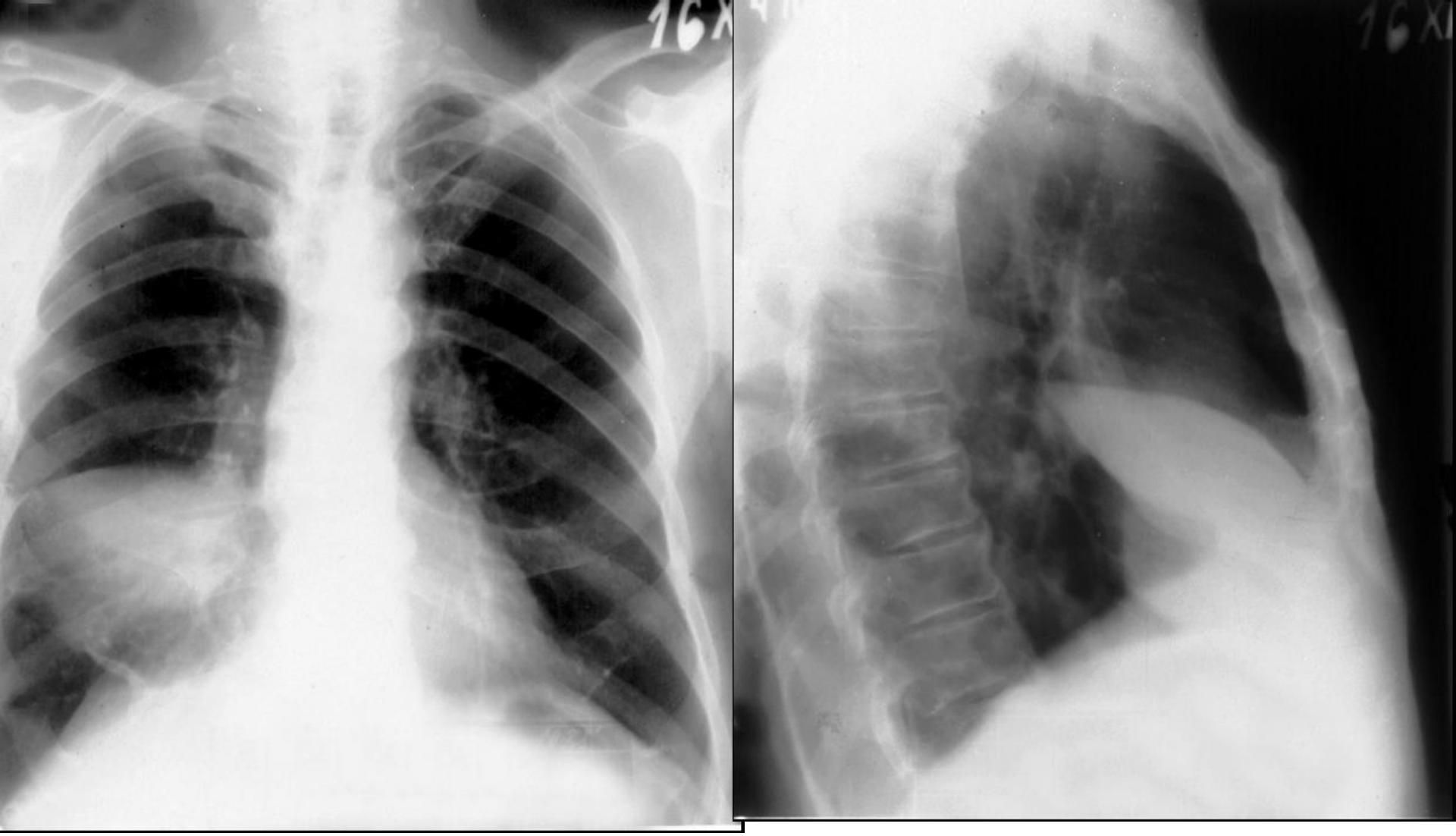
Minimal pleural effusion.
Bounded left sinus

Chest Radiography

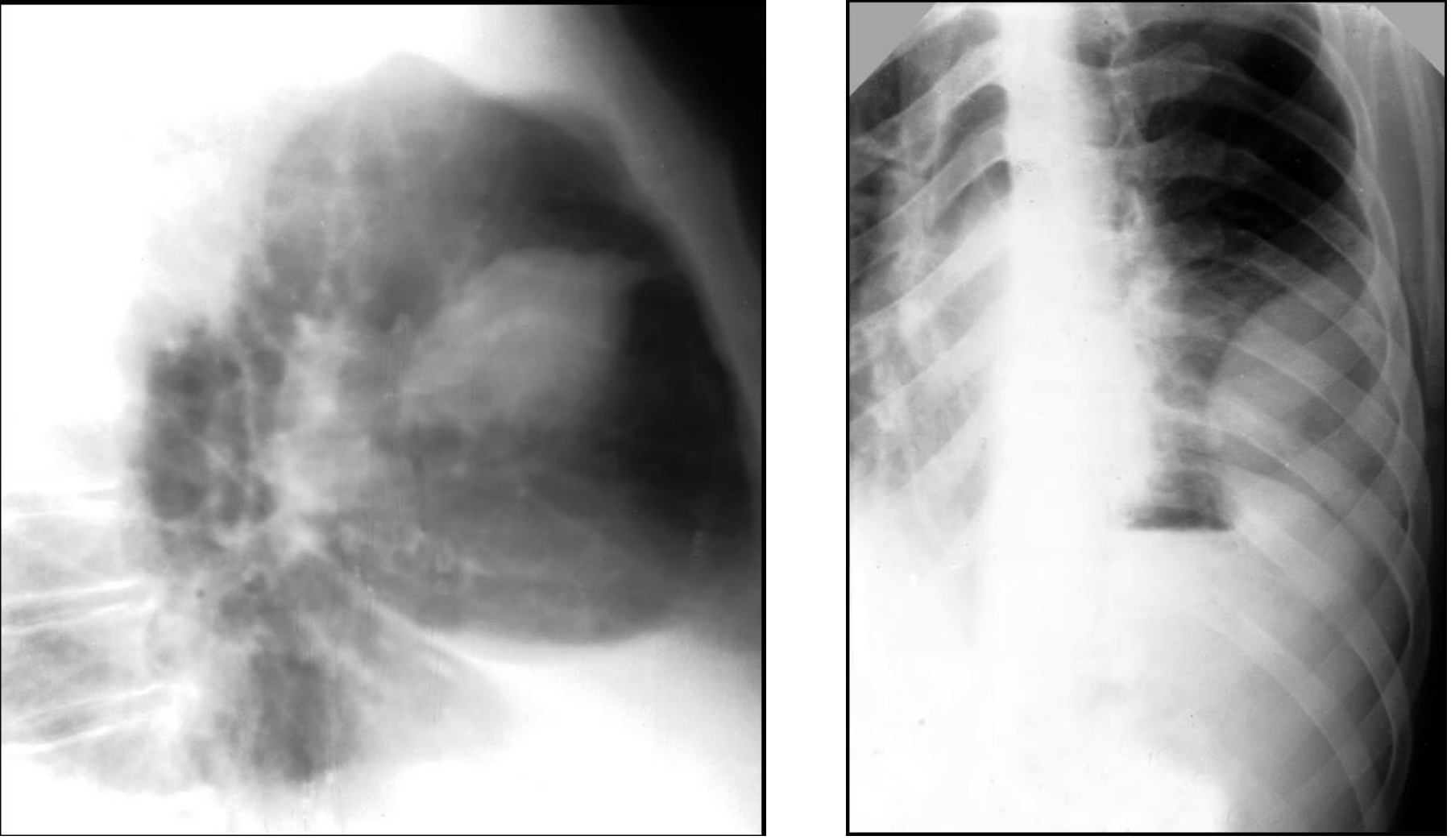
- Lateral decubitus films more reliably detect smaller pleural effusions.
- Layering of an effusion on lateral decubitus films defines a freely flowing effusion and, if the layering fluid is 1 cm thick, indicates an effusion of greater than 200 mL that is amenable to thoracentesis.
- Failure of an effusion to layer on lateral decubitus films indicates the presence of loculated pleural fluid or some other etiology causing the increased pleural density.



Moderate pleural effusion

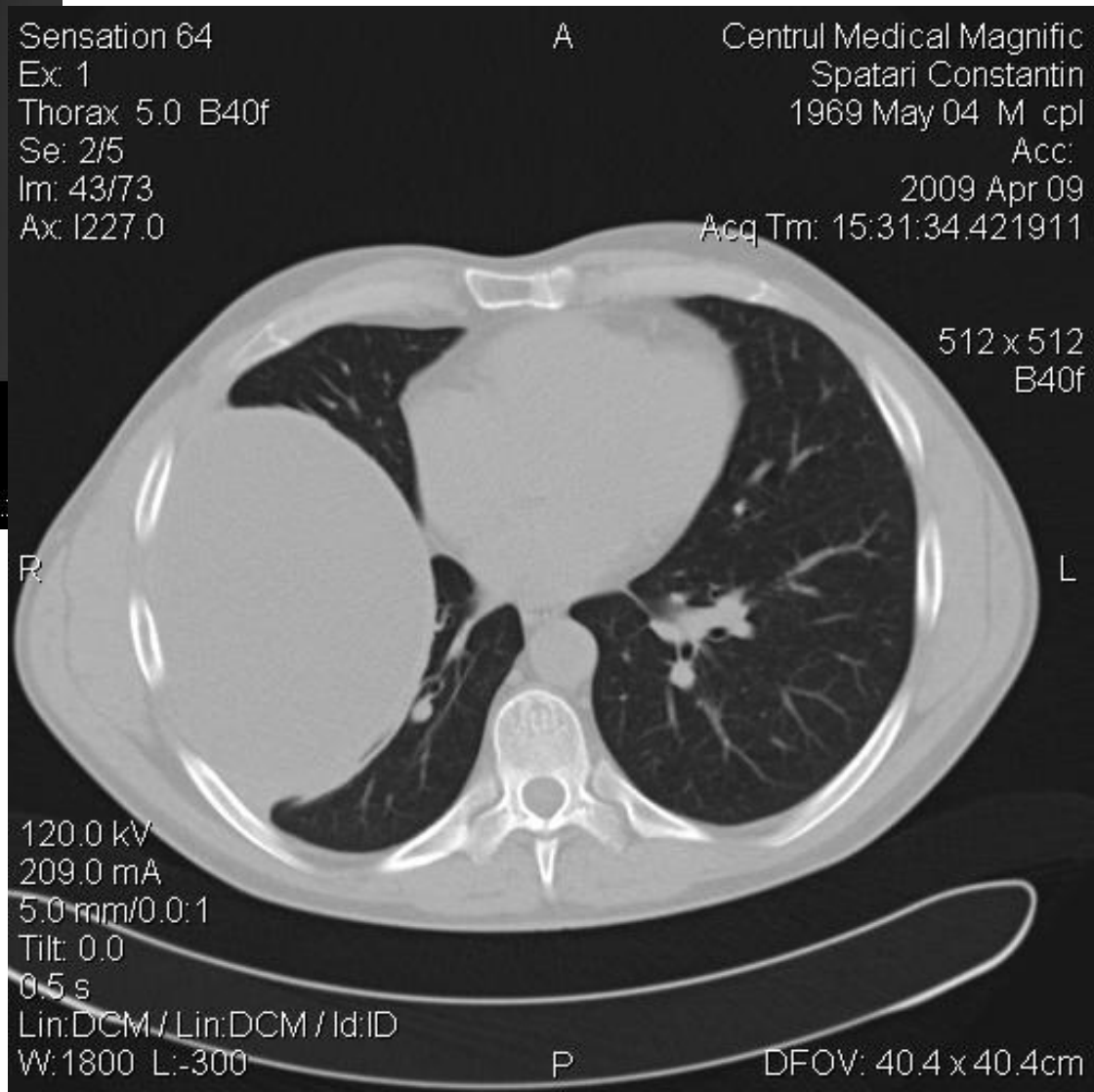


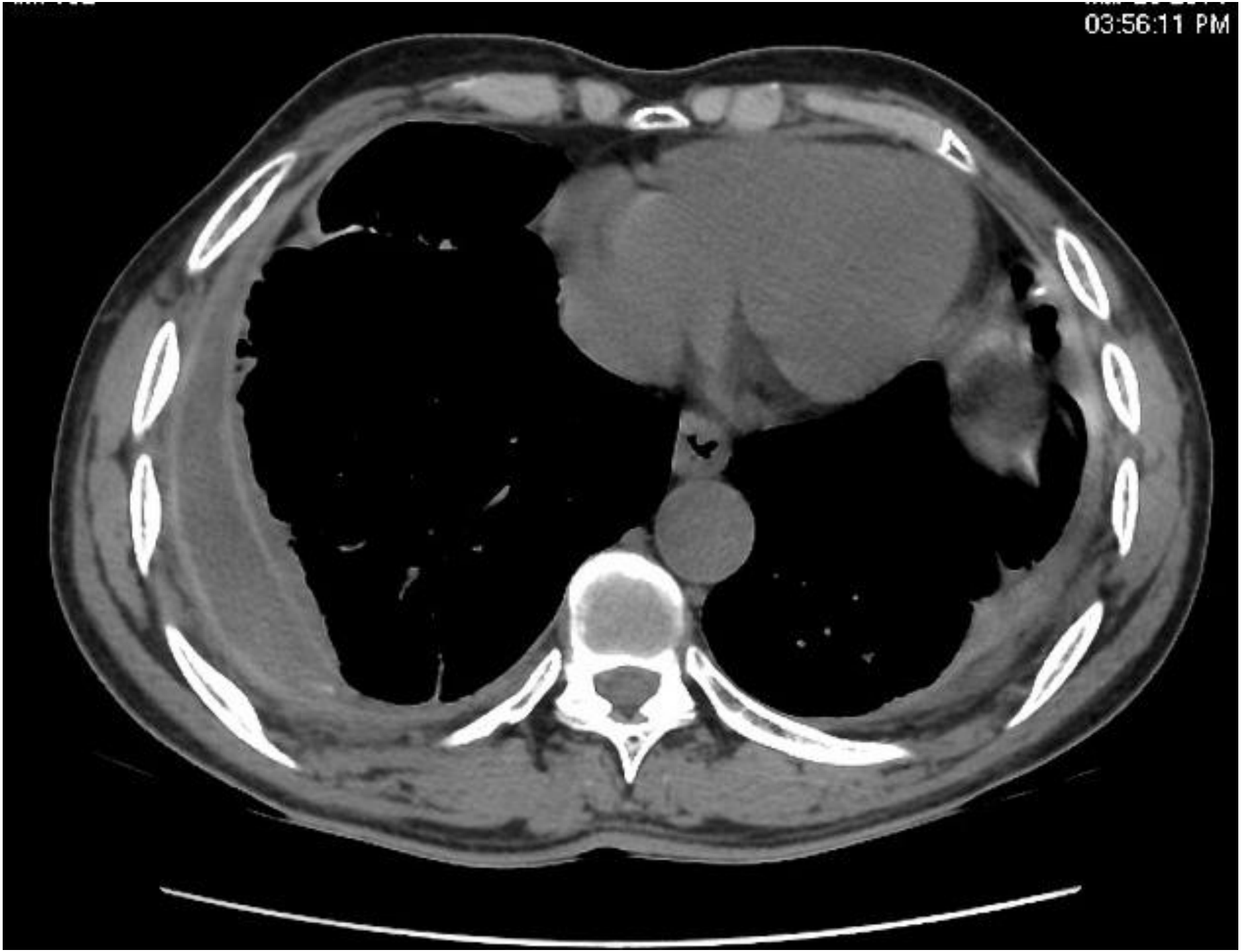
Radiograma de faţă şi profilul drept.
Incidenţa PA - opacitate neomogenă în câmpul pulmonar inferior pe dreapta,caracterul căreia se poate defini din imaginea de profil - pleurezie încarcerată în scizura interlobară oblică cu aspect de lentilă biconcavă.



Diverse aspecte radiografice la pacienţi cu pleurezii încarcerate.
A - profil drept; colecţia lichidiană încarcerată în scizura interlobară orizontală prezintă o opacitate ovală;opacitatea inferioară atestă lichid liber în marea cavitate.
B - radiogramă în poziţie oblică, pleurezia parietală încarcerată se prezintă ca opacitate ovoidă, bine delimitată în câmpul inferior stâng.

Empiem pleural

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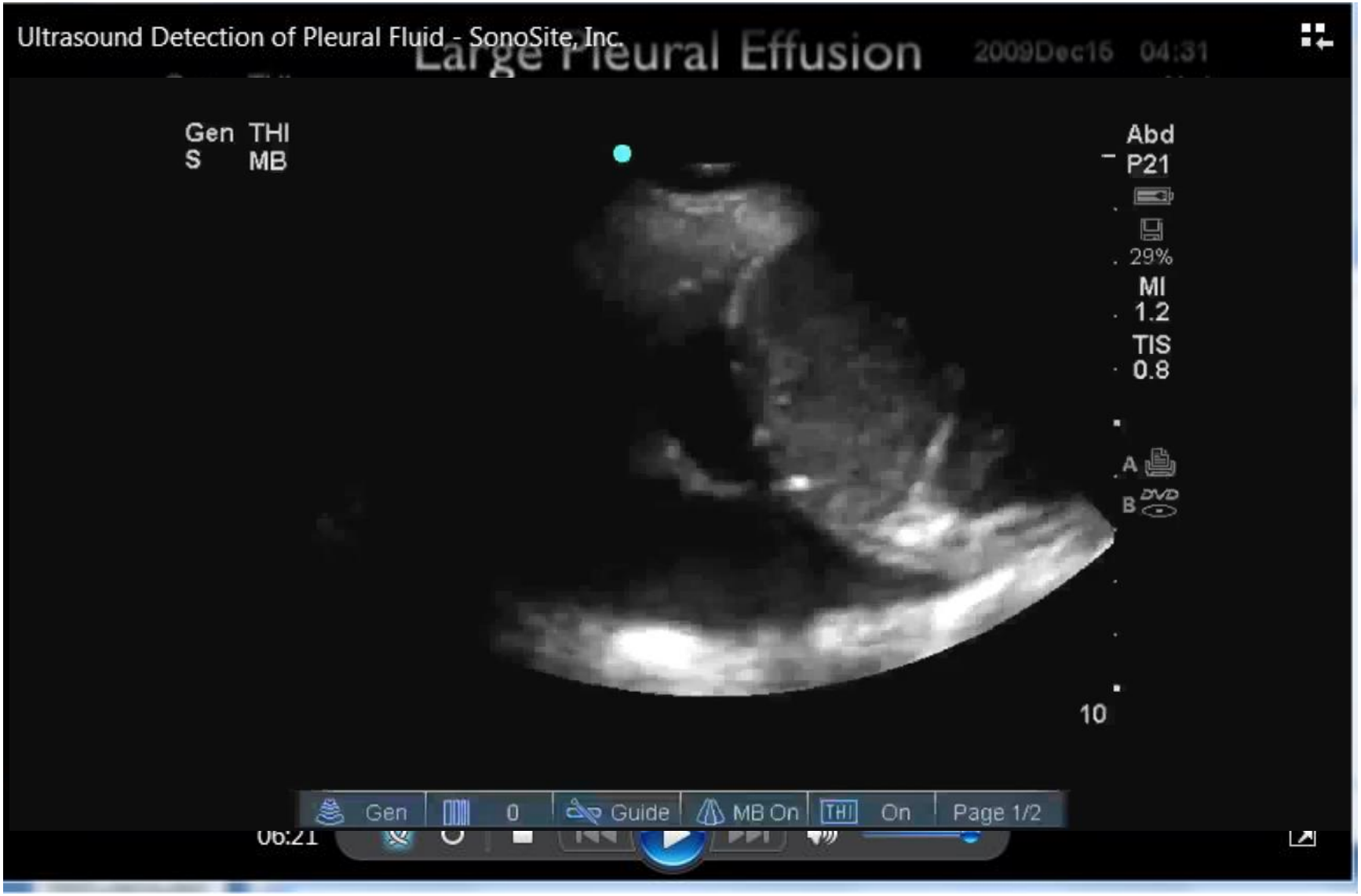
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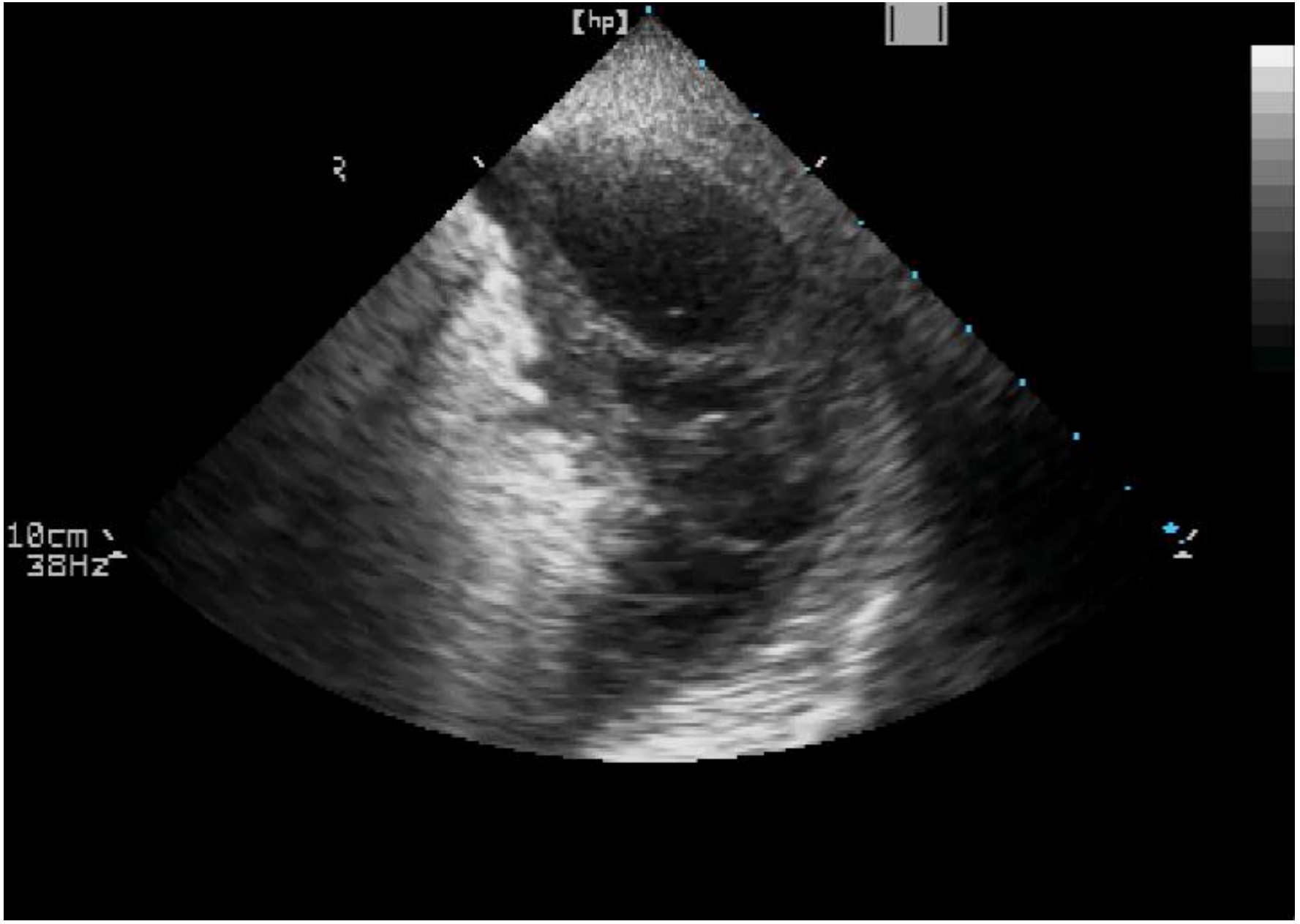
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Analysis of pleural fluid

Normal pleural fluid

- Clear ultrafiltrate of plasma that originates from the parietal pleura
- pH of 7.60-7.64
- Protein content of less than 2% (1-2 g/dL)
- Fewer than 1000 white blood cells (WBCs) per cubic millimeter
- Glucose content similar to that of plasma
- Lactate dehydrogenase (LDH) less than 50% of plasma

Gross characteristics

- Frankly purulent fluid indicates an empyema
- A foul smelling suggests an anaerobic empyema
- A milky, opalescent fluid suggests a chylothorax, resulting most often from lymphatic obstruction by malignancy or thoracic duct injury by trauma or surgical procedure
- Grossly bloody fluid may result from trauma, malignancy, postpericardiotomy syndrome, or asbestos-related effusion, and indicates the need for hematocrit test of the blood sample; a pleural fluid hematocrit level of more than 50% of the peripheral hematocrit level defines a hemothorax, which often requires tube thoracostomy

Exsudate vs Transudate

Light`s criterions

- Ratio of pleural fluid to serum protein greater than 0.5
- Ratio of pleural fluid to serum LDH greater than 0.6
- Pleural fluid LDH greater than two thirds of the upper limits of normal serum value

Clinical judgment is required when pleural fluid test results fall near the cutoff points

Pleural Fluid Cell Count Differential

- Pleural fluid lymphocytosis,
  - lymphocyte values greater than 85% of the total nucleated cells, suggests TB, lymphoma, sarcoidosis, chronic rheumatoid pleurisy, yellow nail syndrome, or chylothorax.
  - Pleural lymphocyte values of 50-70% of the nucleated cells suggest malignancy.

Pleural Fluid Cell Count Differential

- Pleural fluid eosinophilia (PFE)
  - most often caused by air or blood in the pleural space.
  - pulmonary embolism with infarction or benign asbestos pleural effusion.
  - parasitic disease (especially paragonimiasis)
  - fungal infection (coccidioidomycosis, cryptococcosis, histoplasmosis)
  - medications.
  - PFE does not exclude a malignant effusion
  - PFE makes tuberculous pleurisy unlikely
  - makes the progression of a parapneumonic effusion to an empyema unlikely.

Pleural Fluid Cell Count Differential

- Mesothelial cells greater than 5% of total nucleated cells makes a diagnosis of TB less likely.
- Markedly increased numbers of mesothelial cells, especially in bloody or eosinophilic effusions, suggests pulmonary embolism as the cause of effusion.

Pleural fluid cytology

- The reported diagnostic yields in cytology vary from 60-90%, depending on the extent of pleural involvement and the type of primary malignancy.
- Cytology findings are positive in 58% of effusions related to mesothelioma.

Other tests for pleural fluid

- Amylase
- Triglyceride, cholesterol
- Immunological markers (RF, DNA anti-body, etc.)
- ADA
- IGRA
- Microbiological examination
- Biopsy

Treatment

- Transudative effusions are usually managed by treating the underlying medical disorder.

- However, refractory transudates causing severe respiratory symptoms, even if the cause is understood and disease-specific treatment is available, can be drained to provide relief.

Treatment

- The management of exudative effusions depends on the underlying etiology of the effusion. Pneumonia, malignancy, or TB causes most diagnosed exudative pleural effusions, with the remainder typically deemed idiopathic.
- Complicated parapneumonic effusions and empyemas should be drained to prevent development of fibrosing pleuritis.
- Malignant effusions are usually drained to palliate symptoms and may require pleurodesis to prevent recurrence.

Prognosis

- Morbidity and mortality of pleural effusions are directly related to cause, stage of disease at the time of presentation, and biochemical findings in the pleural fluid.
- Morbidity and mortality rates in patients with pneumonia and pleural effusions are higher than those in patients with pneumonia alone.
  - Parapneumonic effusions, when recognized and treated promptly, typically resolve without significant sequelae.
  - However, untreated or inappropriately treated parapneumonic effusions may lead to empyema, constrictive fibrosis, and sepsis.

Prognosis

- Development of a malignant pleural effusion is associated with a very poor prognosis.
  - The most common associated malignancy in men is lung cancer, and the most common associated malignancy in women is breast cancer.
  - Median survival ranges from 3-12 months, depending on the malignancy.
- A lower pleural fluid pH is often associated with a higher tumor burden and a worse prognosis.

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Pneumothorax

an accumulation of air in the pleural space with secondary lung collapse.

Pathogenesis

- Visceral pleural rupture with air leakage - most common
- Rupture of other containing organs
- Chest wall integrity
- Gas forming microorganism

Table 1. Classification of pneumothorax

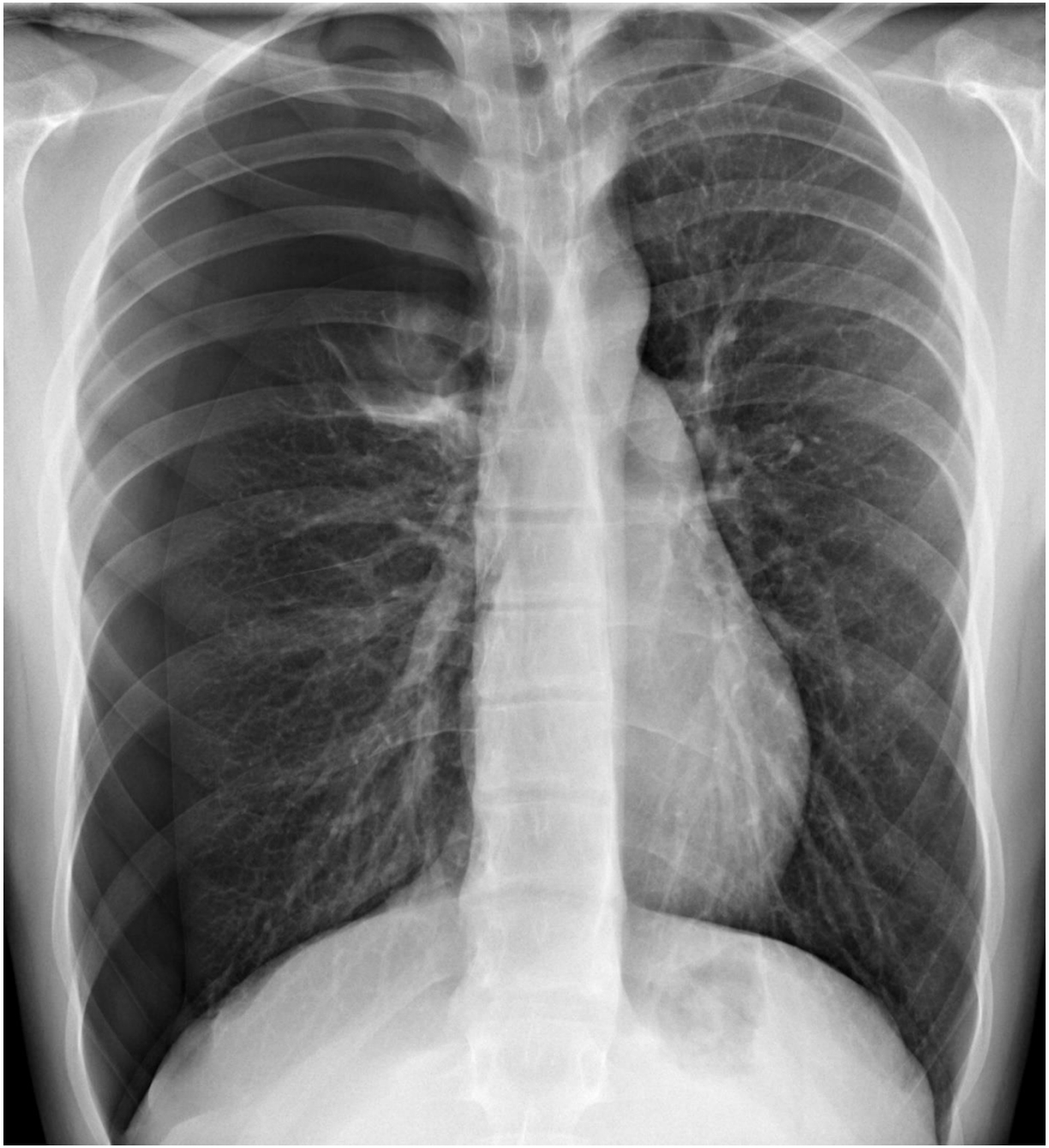
Spontaneous
Primary (healthy individuals)
Secondary (underlying pulmonary disease)
COPD
Infection
Neoplasm
Catamenial
Miscellaneous
Traumatic
Blunt
Penetrating
Iatrogenic
Inadvertent
Diagnostic
Therapeutic

Clinical presentations

- depends on degree of lung colaps
- minor symptoms without any physiological changes
- chest pain, dispnea
- decreased chest wall movement on the affected side
- Hyperresonance or tympanic on perccusion
- decreased or absent breath sounds, tachycardia
- tension pneumothorax – progresses, hemodynamic and respiratory instability, hypoxia and shock

Diagnosis

- PA chest Xray
- CT usually unnecessary

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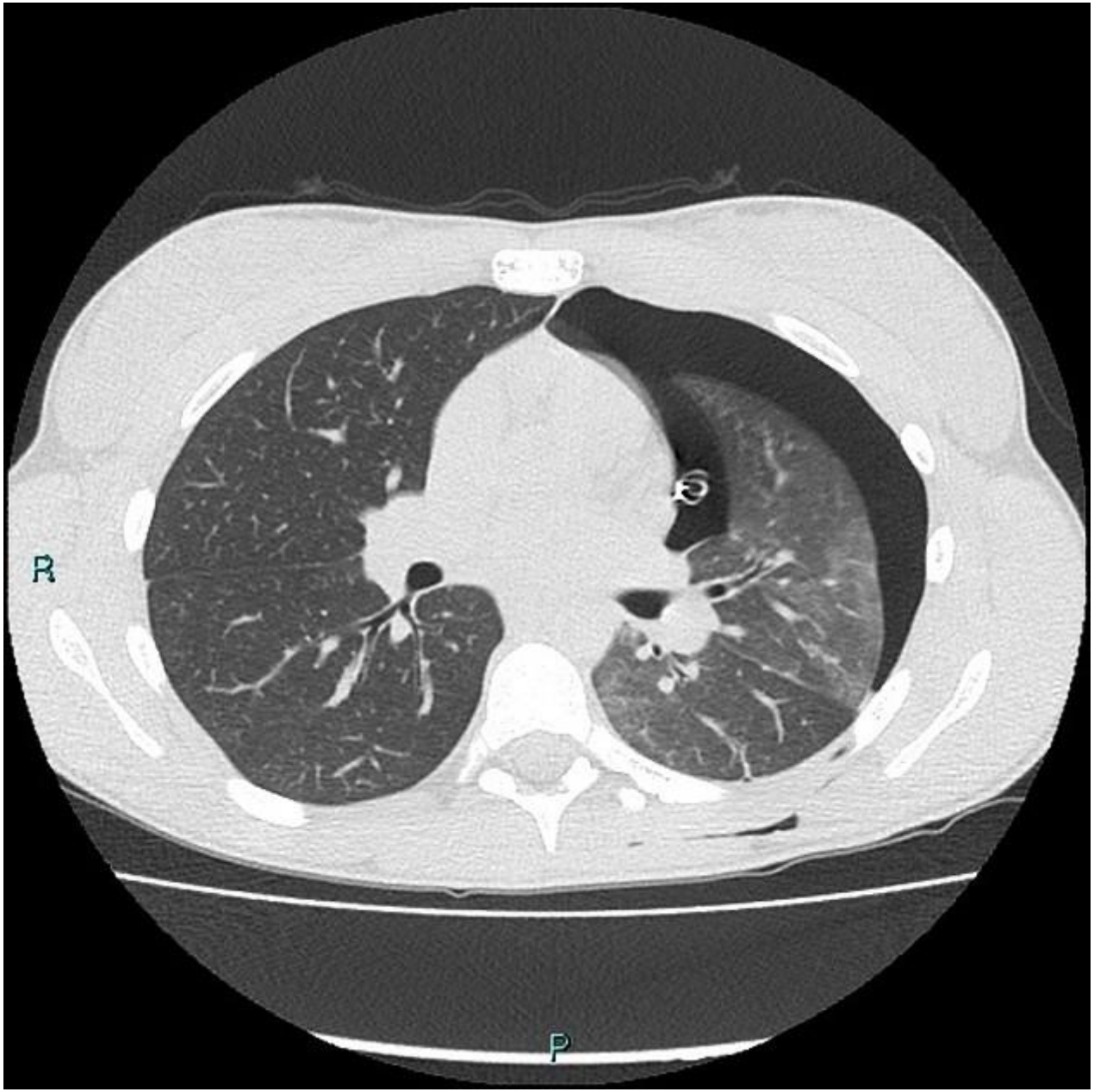
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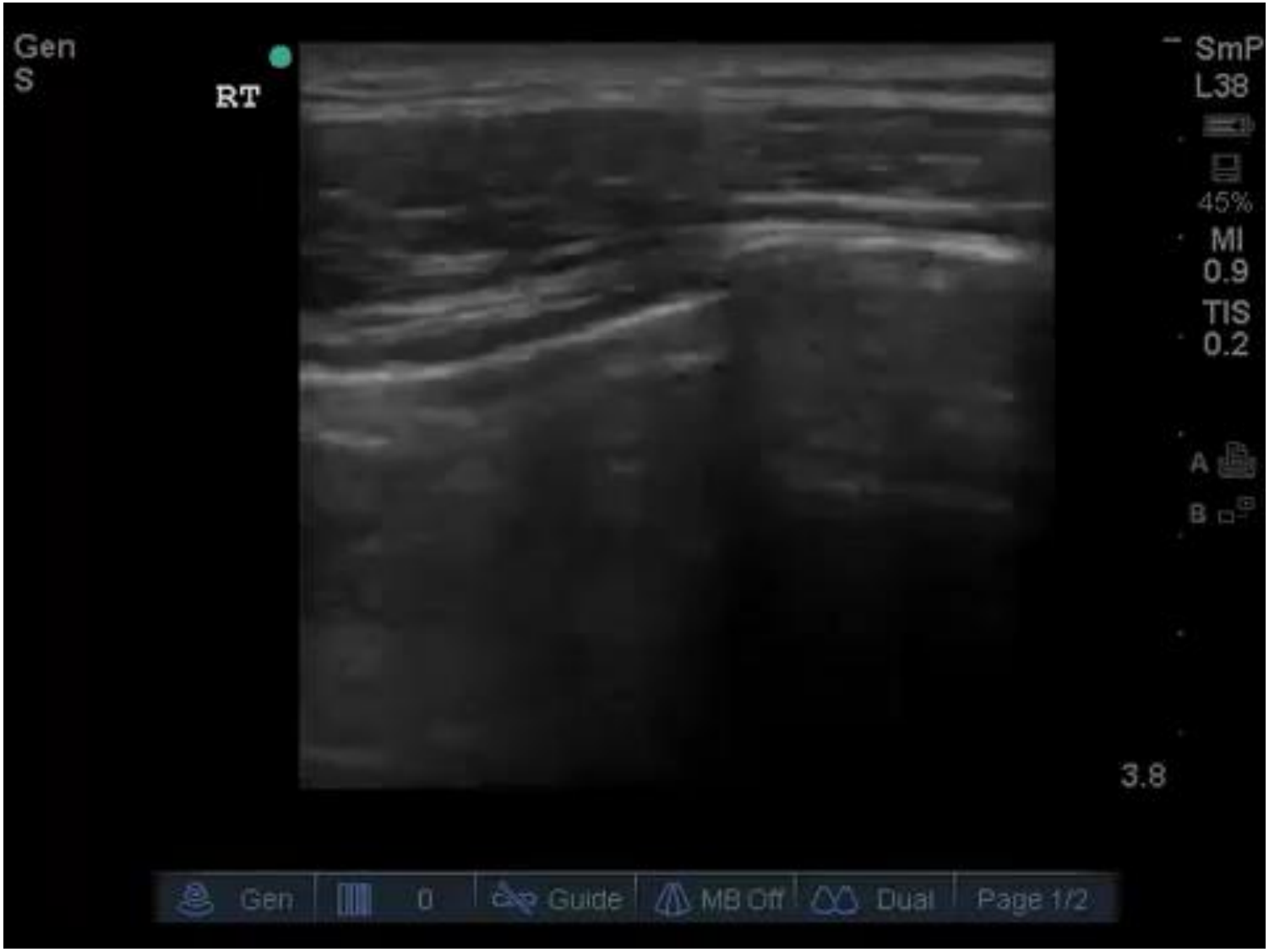
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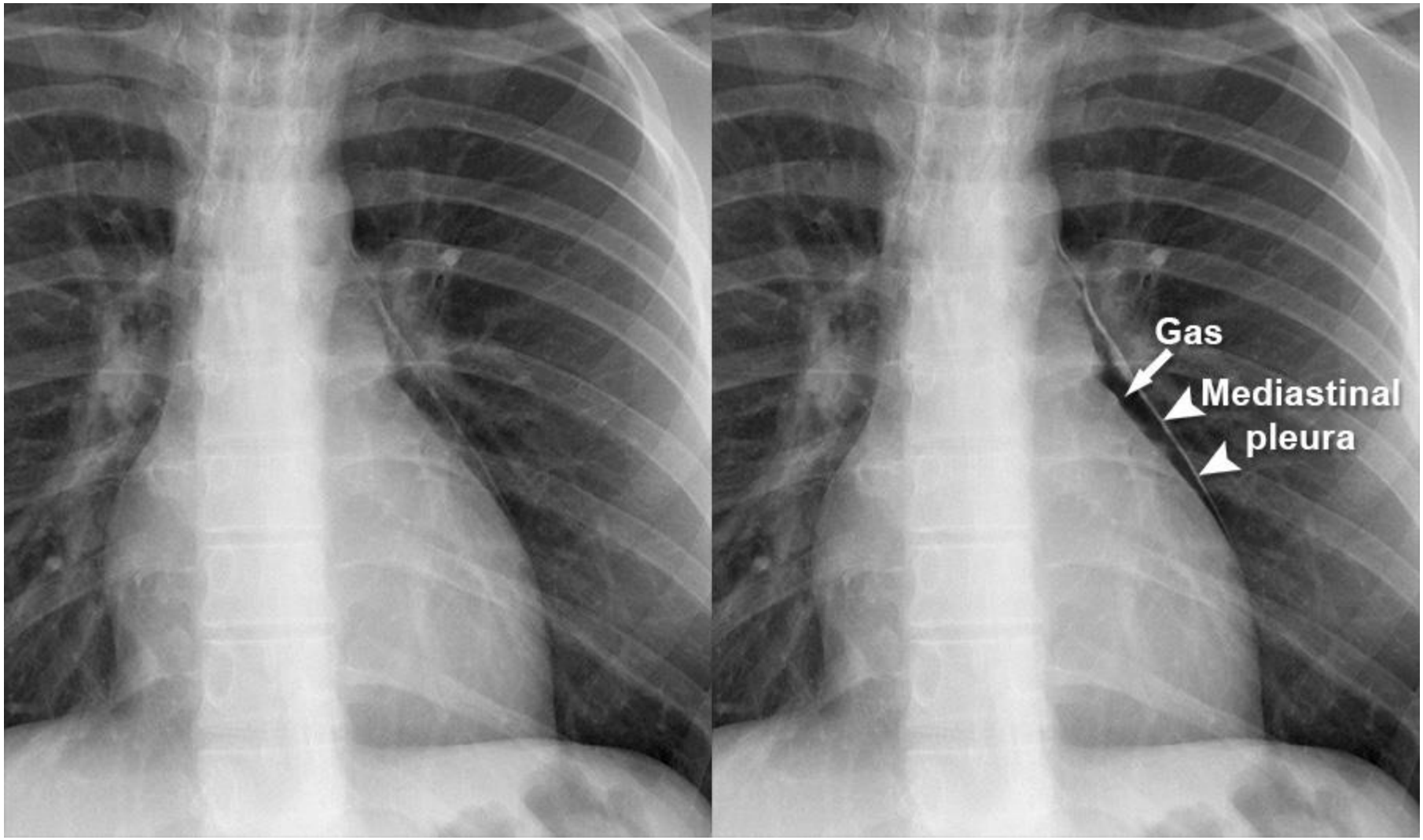
Complication

- persistent leakage
- pneumomediastinum
- subcutaneous emphysema
- pneumoperitoneum


Gas
Mediastinal pleura

Treatment

- Observation (small pneumothorax)
- Aspiration and drainage (G16, 9F)
- Conventional tube drainage
- Chemopleurodesis
- Surgical treatment

Thank you !