

Pulmonary Imaging Pearls— Lateral Radiograph and Pleura

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Where *all* think
alike, *no one*
thinks very much."

Walter Lippmann



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Objectives

- Learn the pathological processes that are *best seen* on the Lateral Radiograph
- Develop a *practical search pattern* for the Lateral Radiograph
- Discuss imaging clues to diagnosis various Pleural diseases
- Understand that Mediastinal pleural thickening often reflects malignancy
- Review the imaging findings of a pneumothorax and when it is 'Tension'



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'If you can't explain it
simply...
You don't understand it
well enough.'

Albert Einstein



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Perception of pathology: What is the abnormality
on this PA & Lateral Chest Radiographic exam?



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Question #1: What is the
abnormality on this PA &
Lateral Chest
Radiographic Exam?

- 1. Hilar adenopathy
- 2. Subtle left lower lobe consolidation
- 3. Subtle RML consolidation
- 4. Hiatal hernia



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Density is important in Perception: The *density* of the hilum
and heart should be equal on both sides. Try to incorporate
symmetric density of these structures in your visual search.
Also note that the Aortic arch is higher density than Right
mediastinum/SVC



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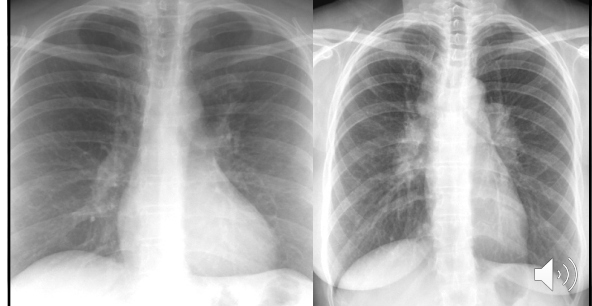
Asymmetric density of the hilum or heart needs an explanation:

Suggestion: Practice looking at these structures with regards to density over a couple of weeks until your perception of it naturally develops



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Hilar size is variable, but the **increase in Hilar density** is a very useful clue **when bilateral**. Try comparing it with the heart.

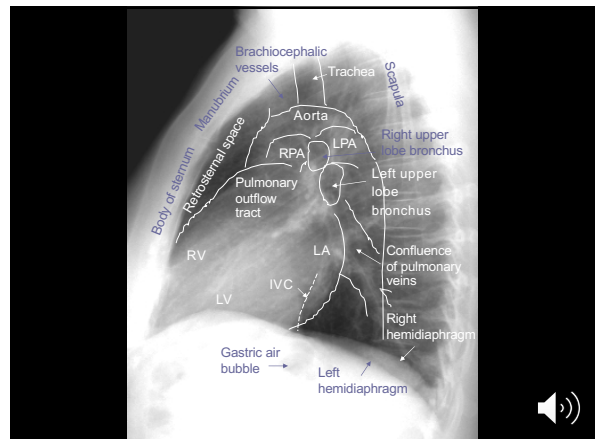


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Lateral Radiograph Objectives

- Review some *basic anatomy* for the lateral radiograph
- Learn the pathological processes that are *best seen* on the lateral radiograph
- Develop a *practical search pattern* for these processes

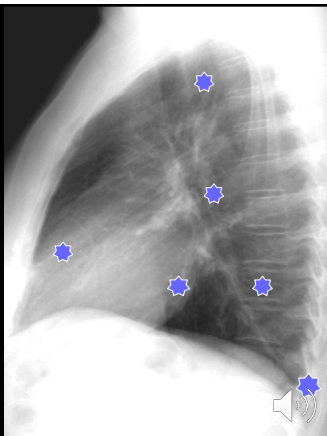
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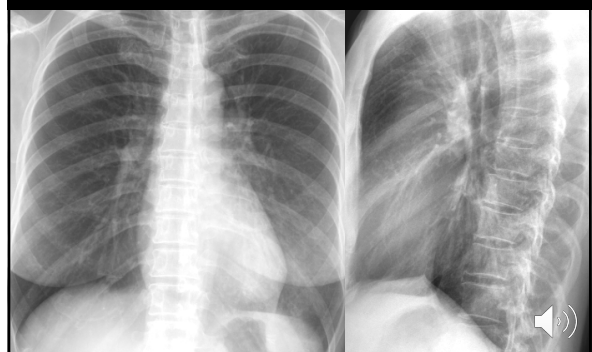
The Lateral projection:

- **Pleural effusions** (Basement)
- **Enlarged hilar lymph nodes** (doughnut sign)
- **Lower lobe consolidation** (Spine sign)
- **Right ventricular enlargement** (Posterior sternum)
- **Left Ventricular/Atrial enlargement**
- **Pericardial Effusion** ('Oreo Sign')
- **Retrotracheal triangle** ('Raiders Triangle')

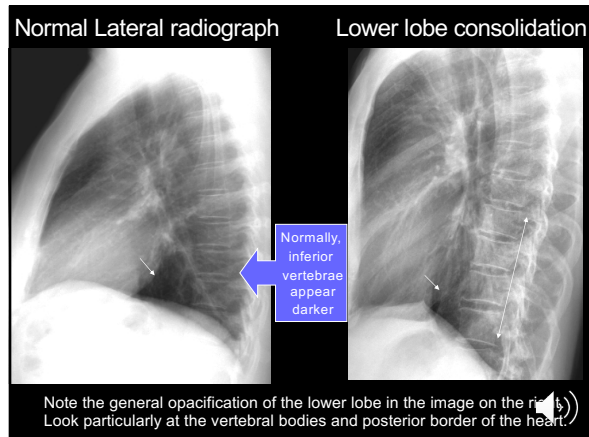


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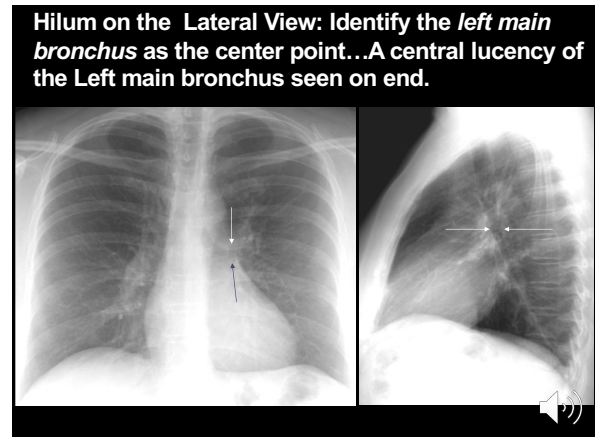
Perception Helped with Lateral View: What is the abnormality on this PA & Lateral Chest Radiograph?



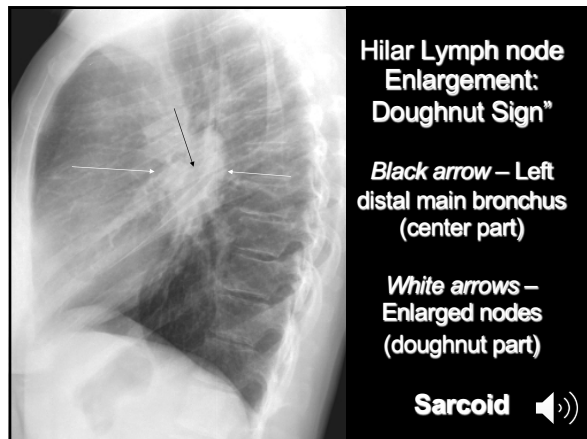
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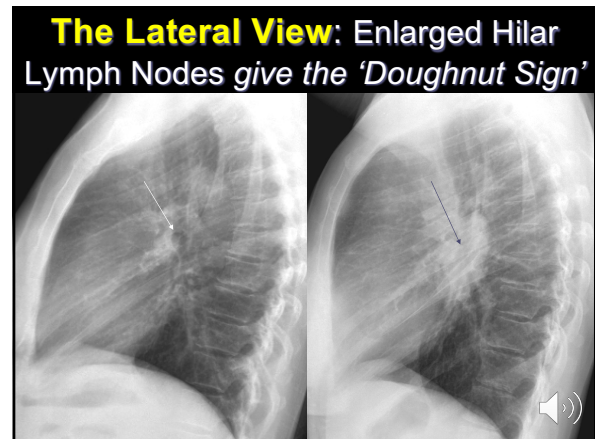
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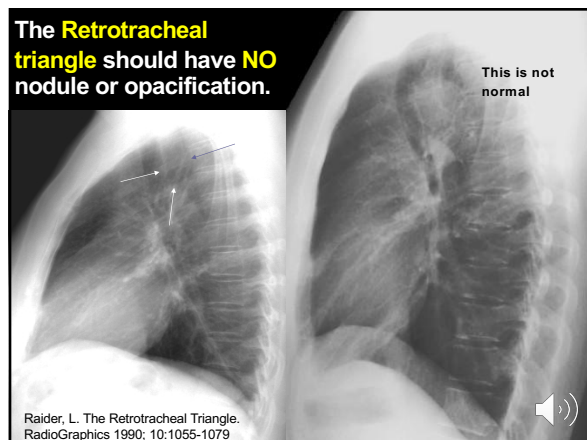
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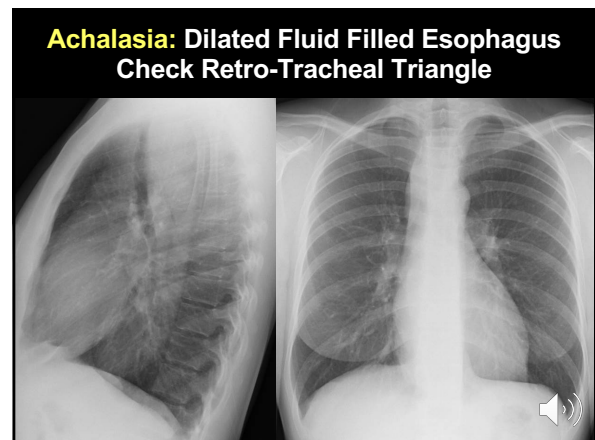
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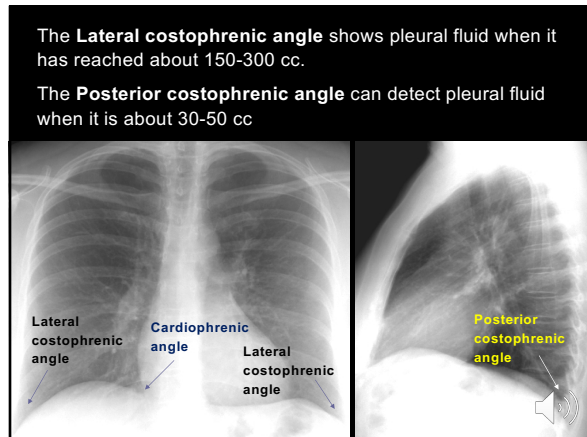
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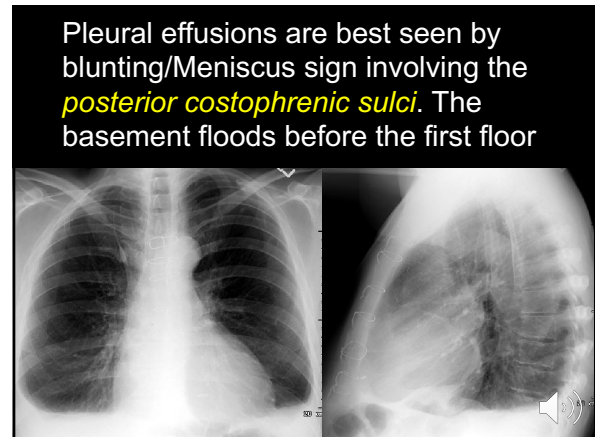
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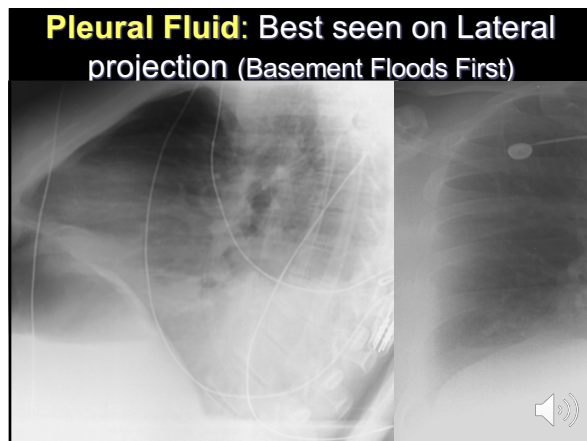
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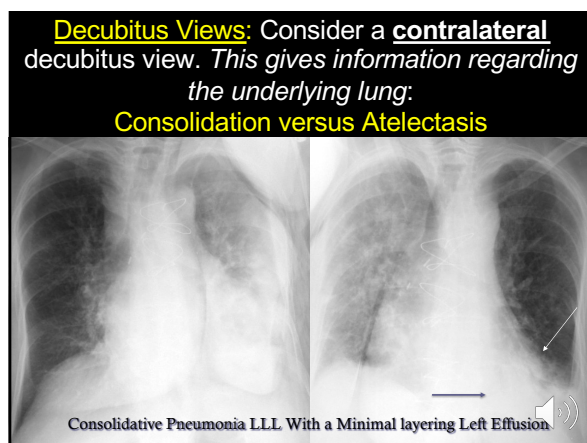
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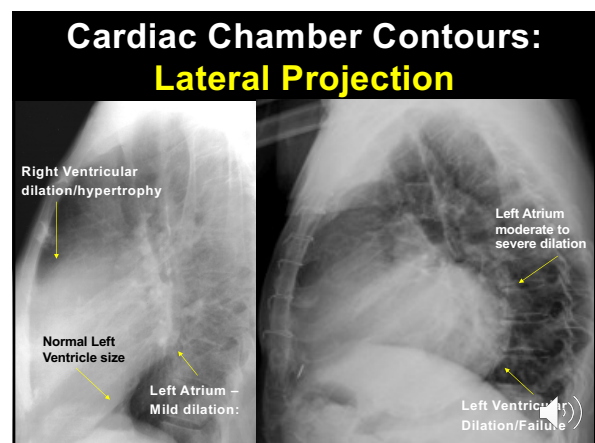
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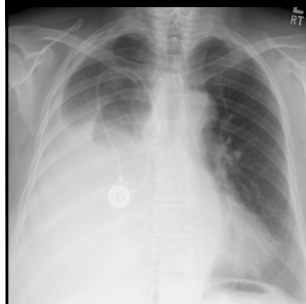
Echocardiography: "Dilated Left Ventricle. No Effusion". What Do You Think?



'Oreo Sign' > 4mm Thick

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Question #2: A large *unilateral* pleural effusion will *almost never* be...



- 1. Empyema
- 2. Malignant effusion
- 3. Hepatic Hydrothorax
- 4. Congestive heart failure
- 5. Hemothorax

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Unilateral large effusion

• It's an **Exudative effusion** until proven otherwise...

• **Infectious:** Parapneumonic effusion, empyema and TB/Fungal

• **Malignancy:** Adenocarcinoma, Mesothelioma, Lymphoma, Thymoma

• **Hemothorax**

One exception: Hepatic Hydrothorax in the setting of cirrhosis

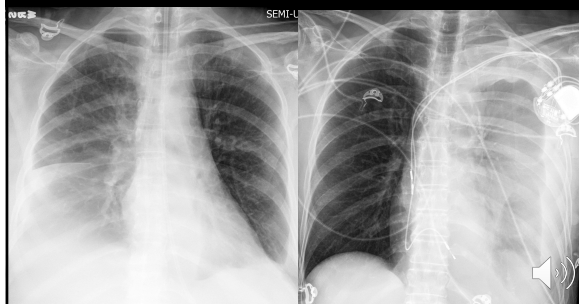


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Gravity Dependent: Pleural Fluid

Free Flowing

Loculated

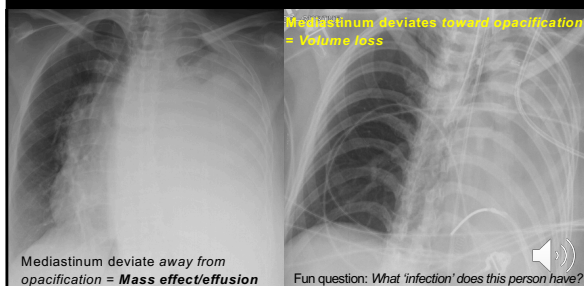


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Complete opacification of hemithorax

Large unilateral effusion **versus** lung collapse/pneumonecrosis

LOOK AT THE MEDIASTINUM!



Mediastinum deviate away from opacification = **Mass effect/effusion**

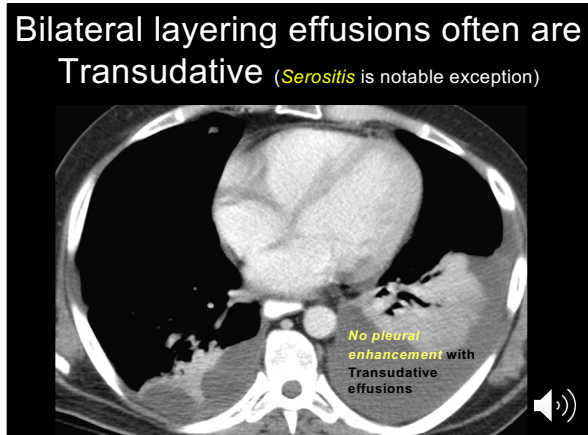
Fun question: What 'infection' does this person have?

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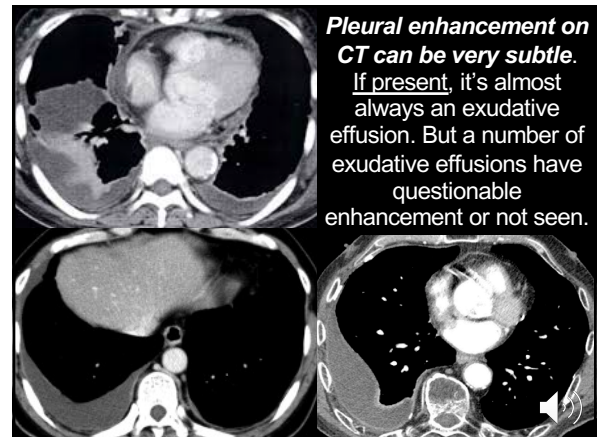
What would you consider if mediastinum is not deviated in the presence of unilateral hemithorax opacification?



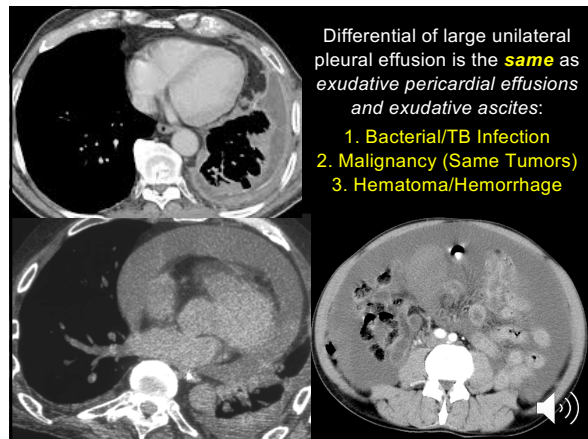
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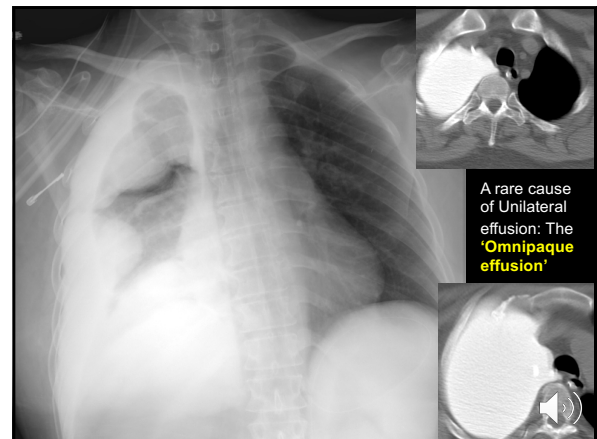
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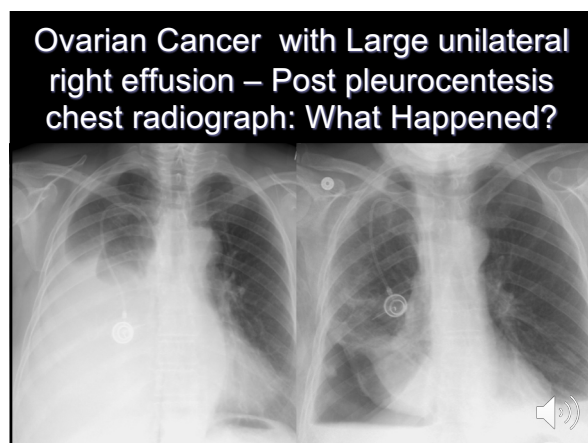
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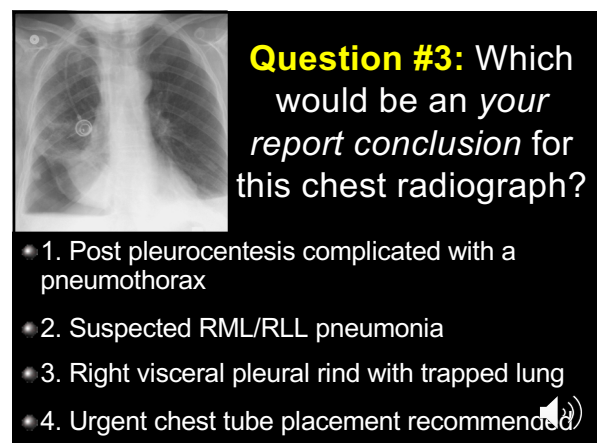
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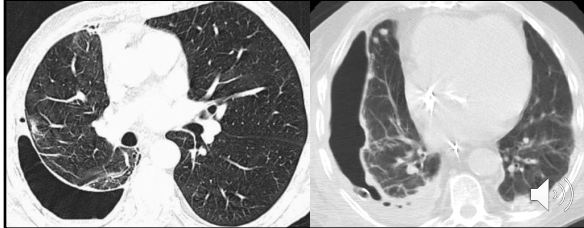
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Concept: Pneumothorax after pleurocentesis *is diagnostic information, not a complication*

- When the lung can not expand as pleural fluid is removed, there is overwhelming a *visceral pleural rind of tissue trapping the lung*.



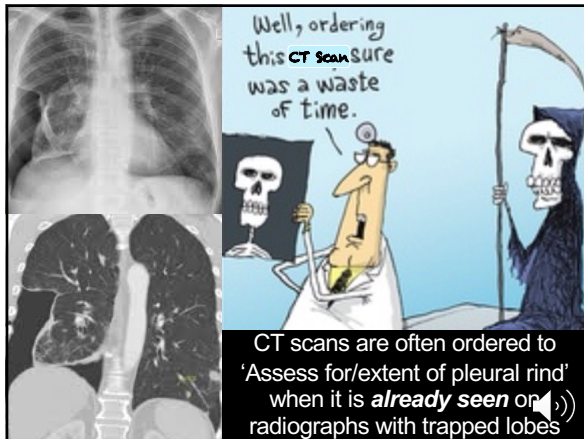
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Implications of Post Pleurocentesis Pneumothorax and Trapped lung

- It will *rarely enlarge* and is usually asymptomatic (Patient may even feel better)
- Refills with fluid over the next few days if no chest tube is present
- Decortication** is indicated with hemothorax and infectious etiologies
- Palliative Care** if malignant



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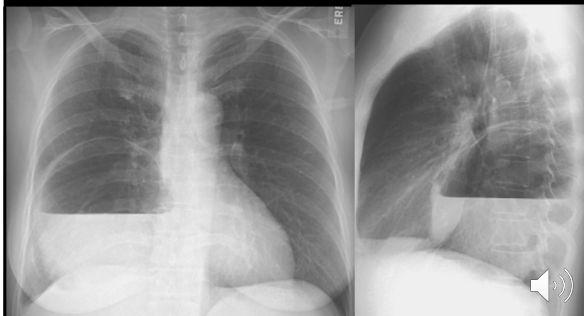
Empyema (Pleural) versus Abscess (Lung)

Unequal length of air-fluid levels on the 2 views = **Pleural**



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Fluid Level *Equal Distance* = Pulmonary Cyst/Cavity/Abscess



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Pleural/Empyema:

- Lung is **pushed** and collapsed
- Often **elliptical** in shape
- The wall is **thin**
- Enhancement to the visceral and parietal pleural: **'Split pleural sign'**

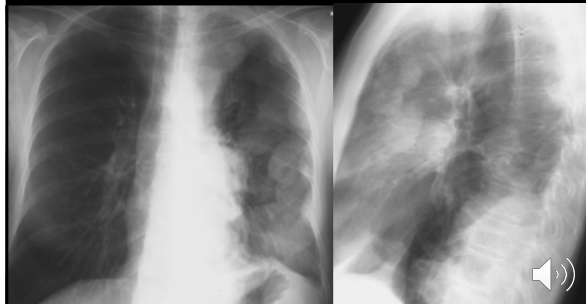
Lung/Abscess:

- Lung is **destroyed** with less compressive atelectasis
- Often **spherical** since lung destruction extends out symmetrically
- The wall is **thicker** and may be nodular



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49 yo female: Left sided chest pain and generalized weakness



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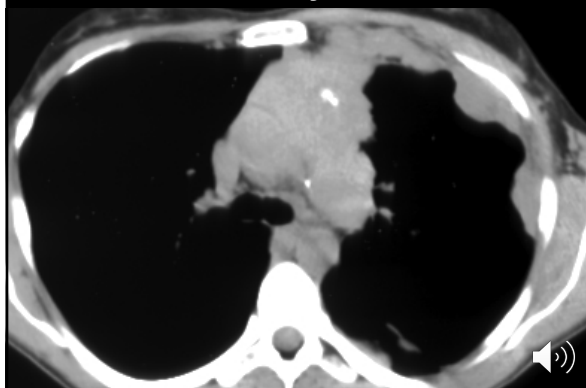


Question #4: What is the most likely explanation for this radiograph?

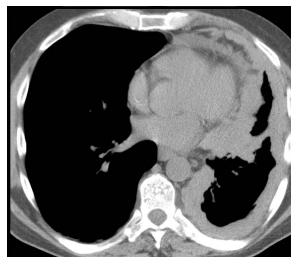
- 1. Left pleural malignancy/effusion
- 2. Multi-lobulated left pleural effusion of unclear etiology
- 3. Left sided bacterial pneumonia
- 4. Multiple rib fractures with extra-pleural hematomas

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Patient also has Myasthenia Gravis



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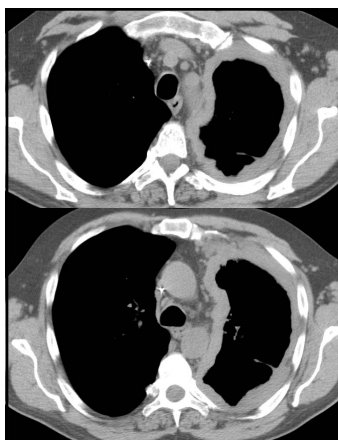
Pleural Malignancy:

1. Adenocarcinoma Metastasis (Pick most likely for patient's age and gender)

The first three are also the **same tumors** that give Malignant **Pericardial and Peritoneal** nodules/fluid

- 2. Mesothelioma
- 3. Lymphoma
- 4. Invasive Thymoma

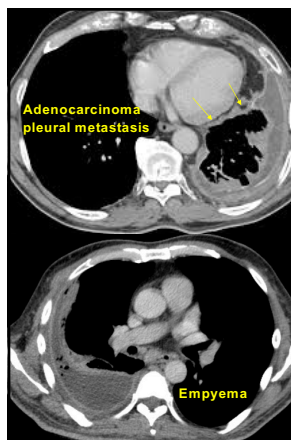
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Mediastinal Pleural thickening/nodularity is an imaging feature that is strongly associated with **Malignancy**.

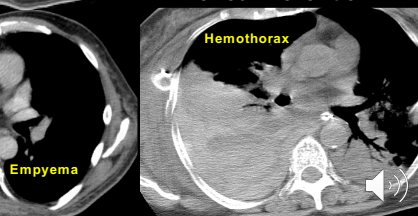
The tumor grows circumferentially around the pleural. The lung is encased and the mediastinum is locked in position – **Contralateral mediastinal shift is often not seen**

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Adenocarcinoma pleural metastasis

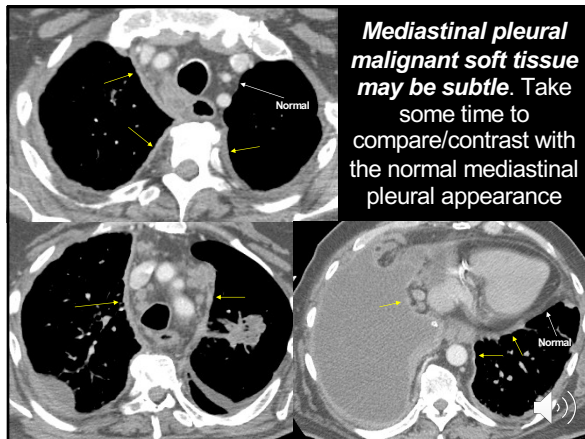
Most **Non-malignant** exudative effusions **do not involve the mediastinal pleural**. If they do, it is only partial - **not circumferential**



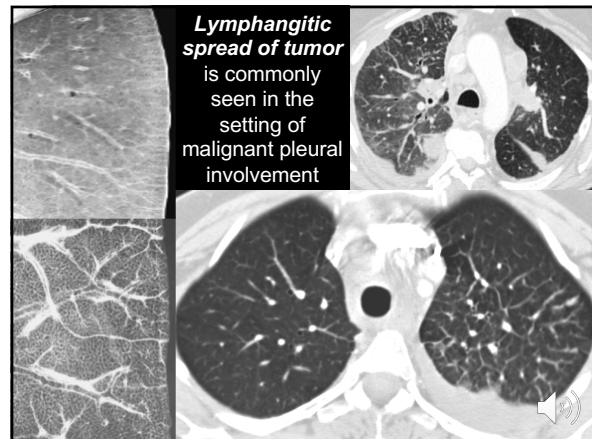
Hemothorax

Empyema

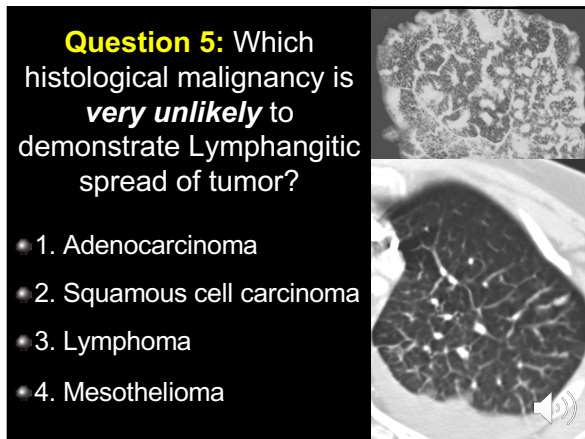
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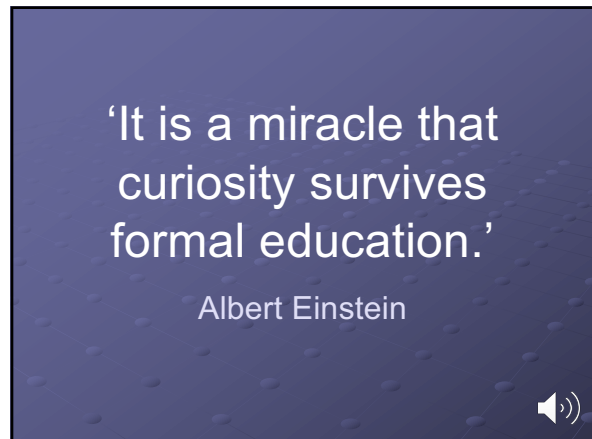
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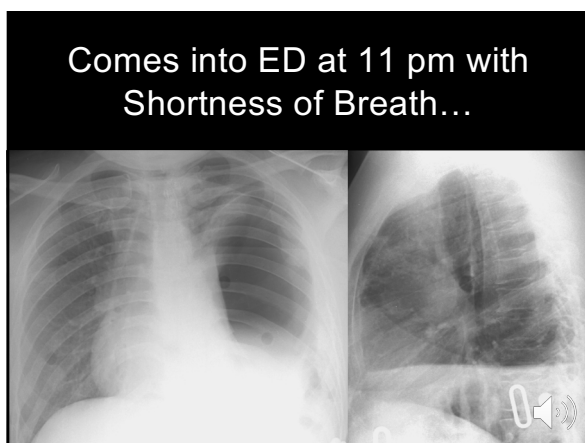
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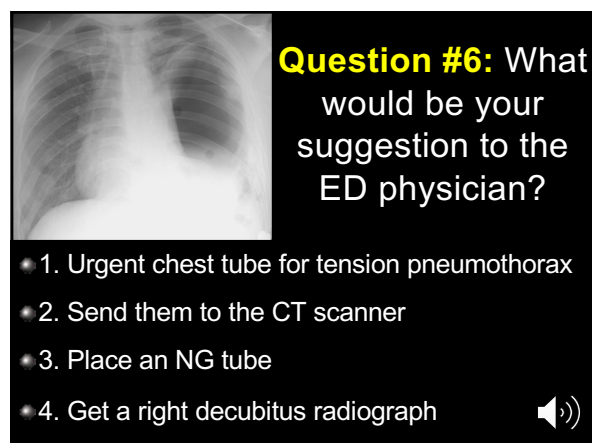
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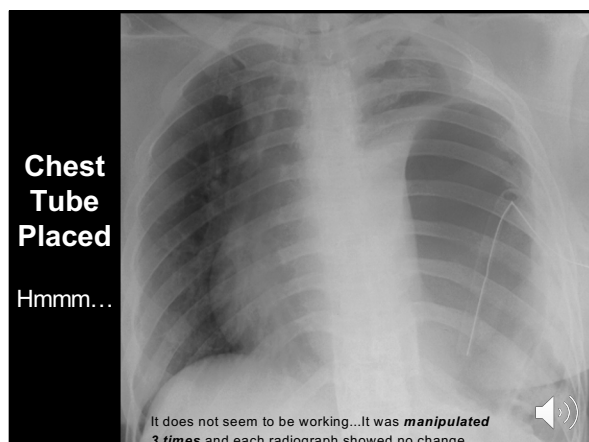
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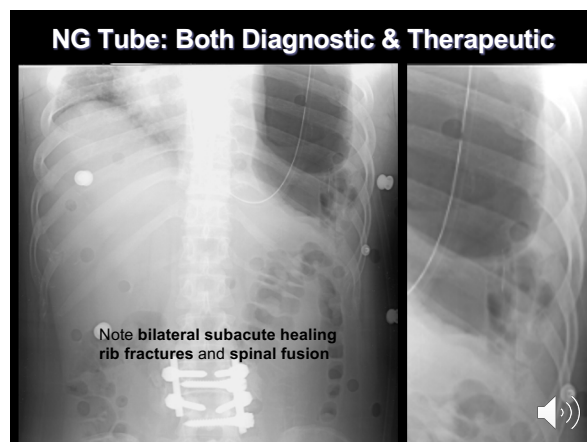
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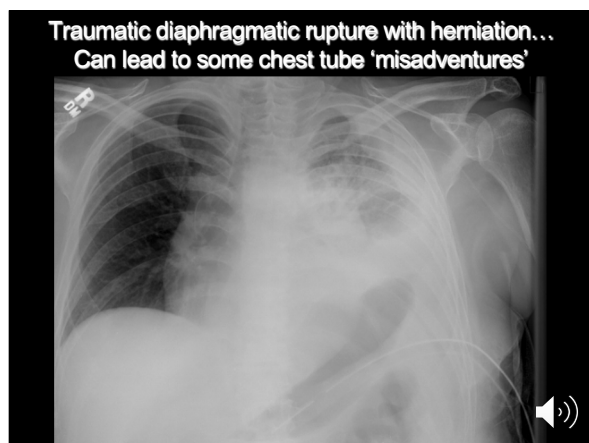
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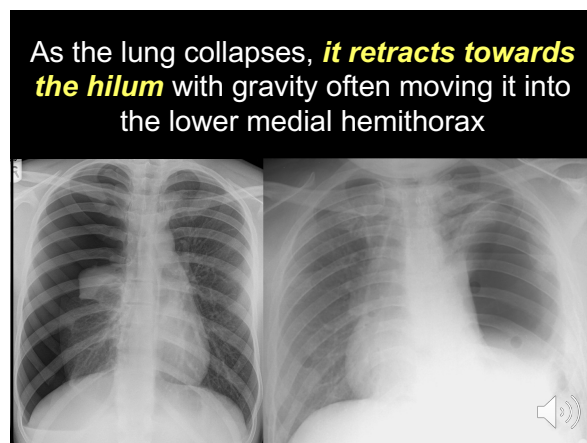
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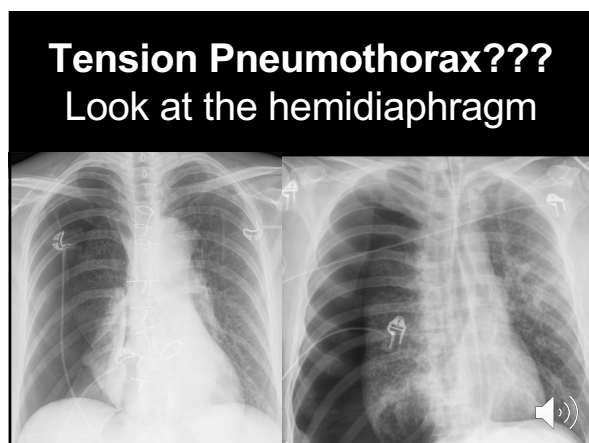
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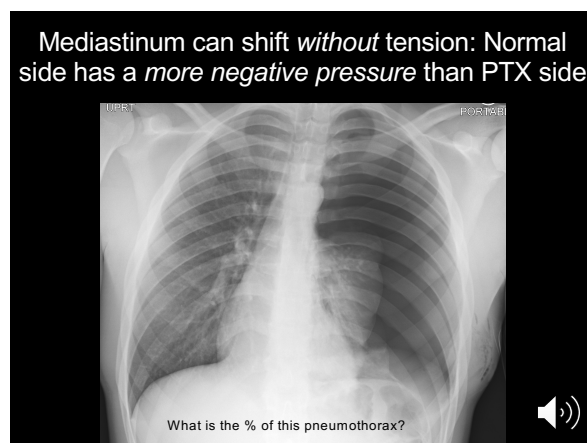
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Summary: Lateral Radiograph and the Pleura

- **Asymmetric density** of structures helps perception
- **Pleural effusions and hilar adenopathy** best assessed on Lateral projection
- Large unilateral effusions should be considered **exudative** (Exception: Cirrhosis)
- Post pleurocentesis pneumothorax often **diagnostic information** rather than complication
- **Mediastinal pleural thickening** often indicates malignancy



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Thank you!

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When radiologists take a selfie

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