

**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

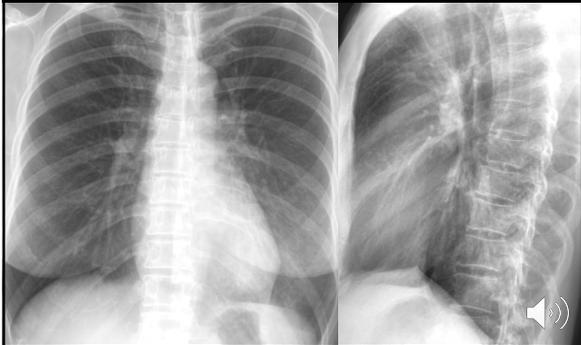
- Learn the pathological processes that are *best seen* on the Lateral Radiograph
- Develop a *practical search pattern* for the Lateral Radiograph
- Discuss imaging clues to diagnosis various Pleural diseases
- Understand that Mediastinal pleural thickening often reflects malignancy
- Review the imaging 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



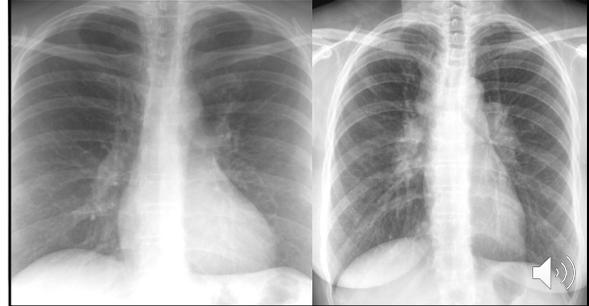
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Asymmetric density of the hilum or heart needs an explanation:
Suggestion: Practice looking at these structures with regards to density over a couple of weeks until your perception of it naturally develops



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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.

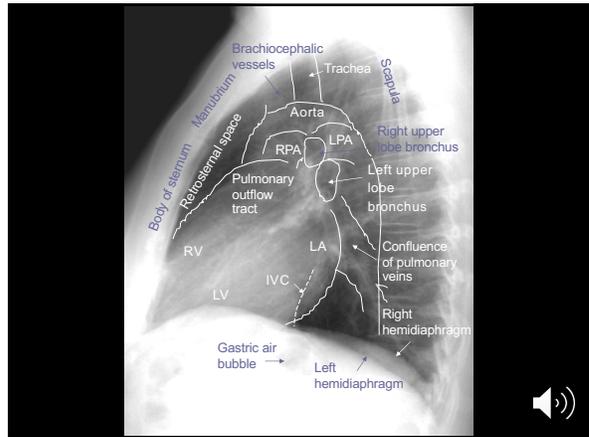


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Lateral Radiograph Objectives

- 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

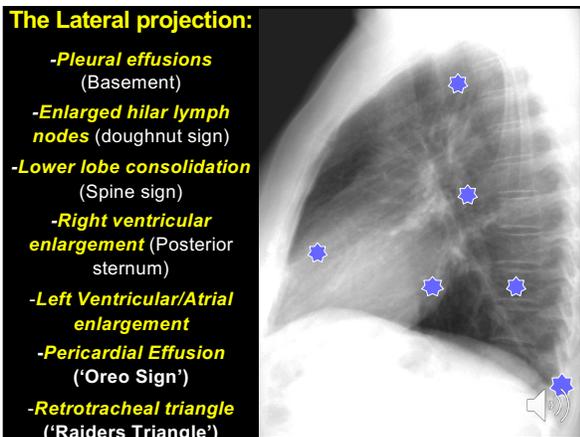
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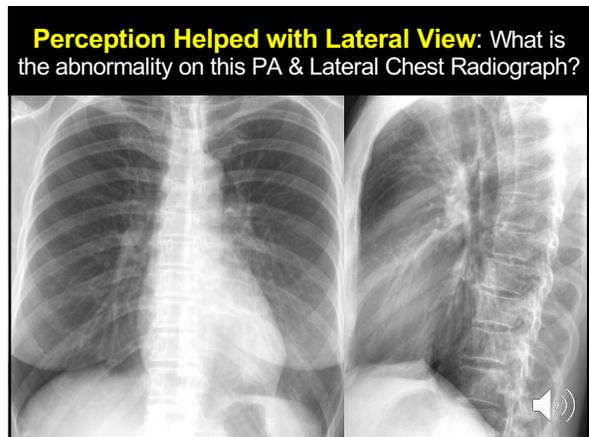
The Lateral projection:

- 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')

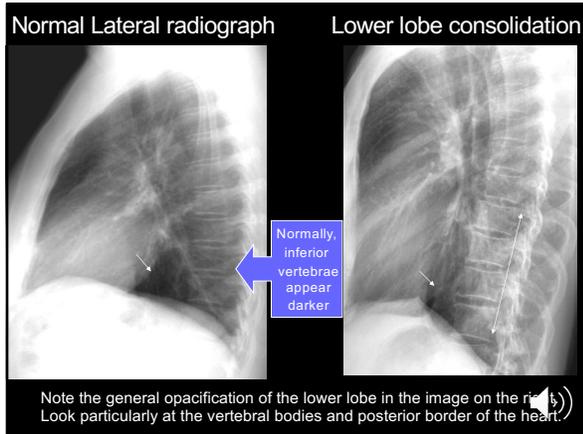


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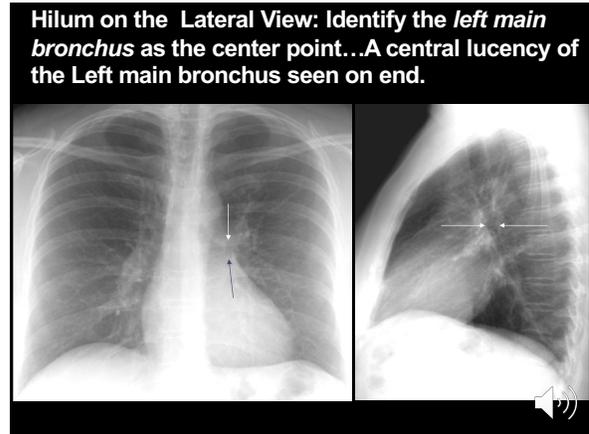
Perception Helped with Lateral View: What is the abnormality on this PA & Lateral Chest Radiograph?



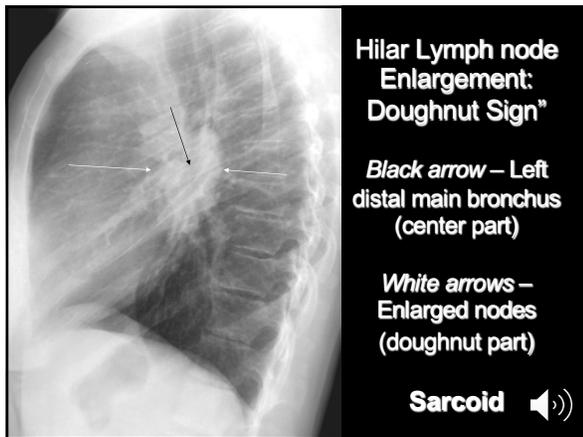
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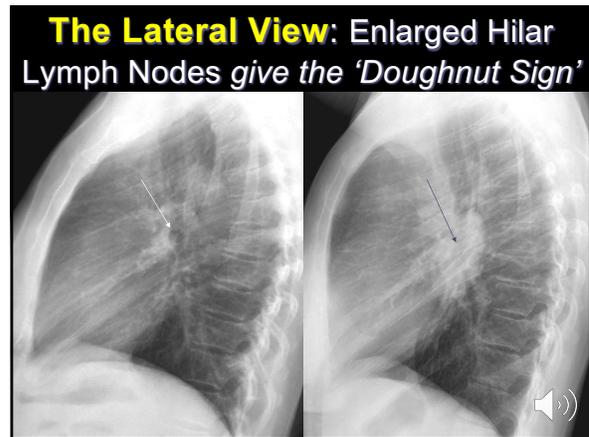
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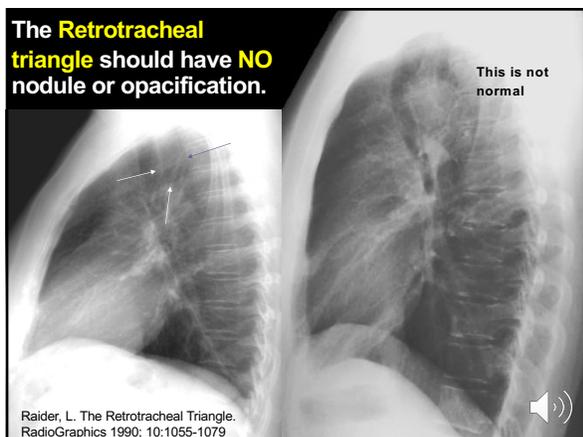
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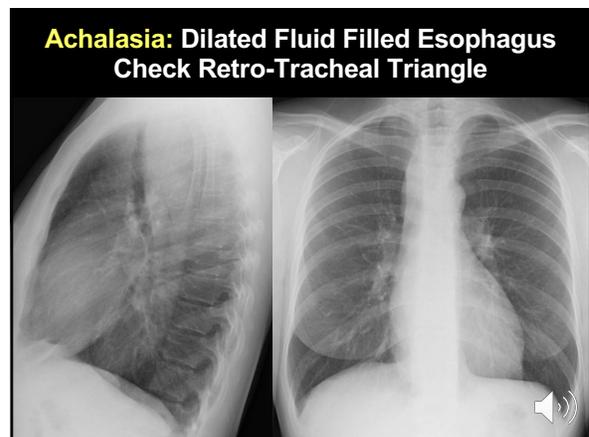
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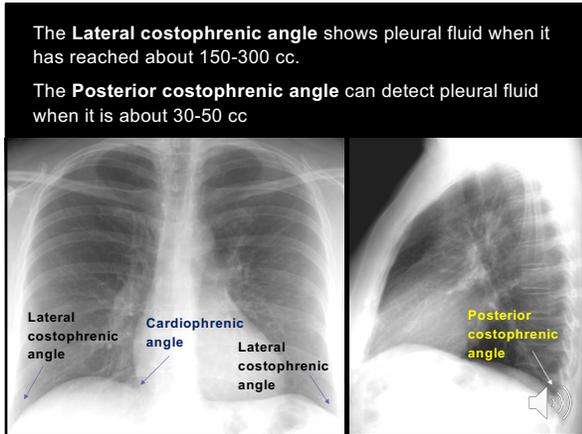
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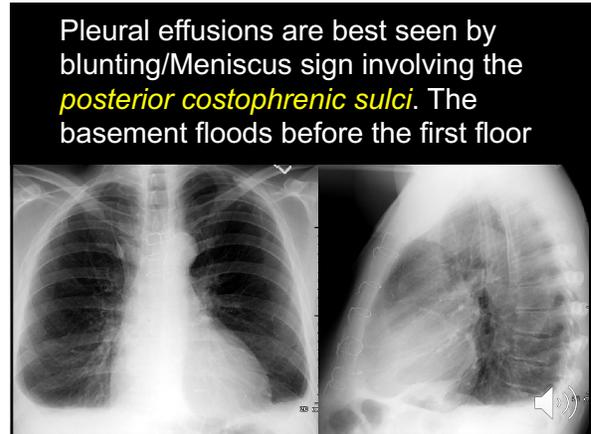
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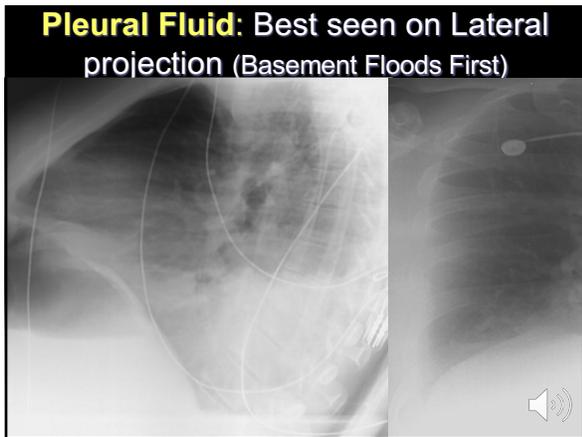
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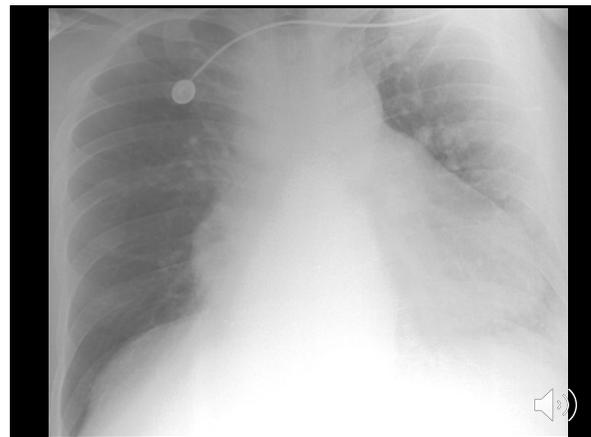
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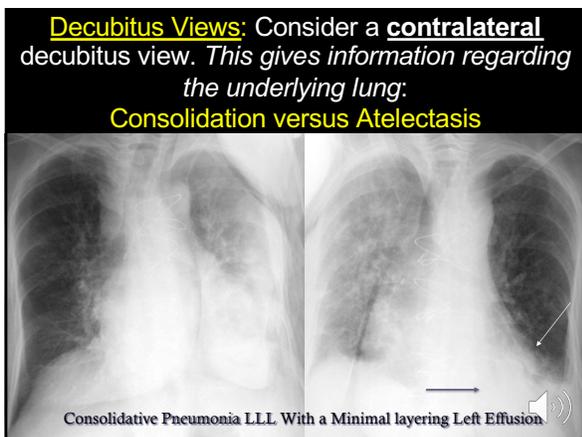
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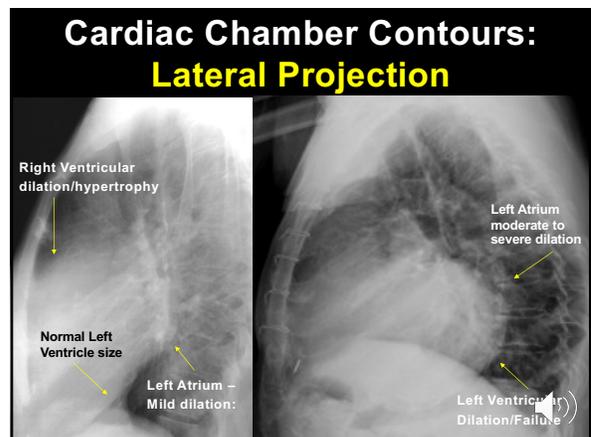
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Echocardiography: "Dilated Left Ventricle. No Effusion". What Do You Think?

'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/pneumonectomy

LOOK AT THE MEDIASTINUM!

Mediastinum deviate toward opacification = Volume loss

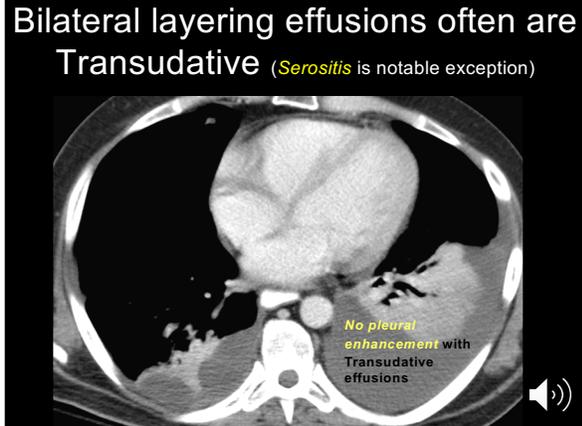
Mediastinum deviate away from opacification = Mass effect/effusion

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

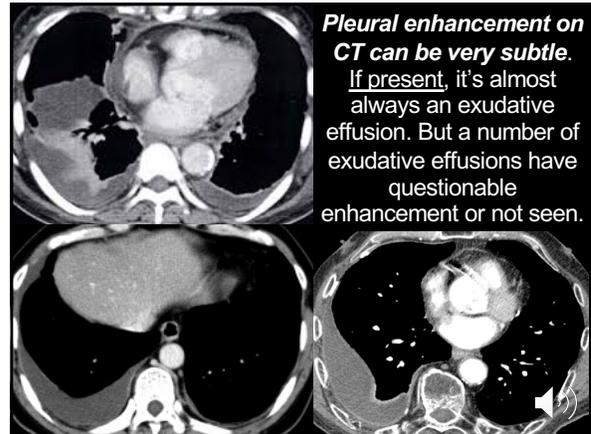
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What would you consider if mediastinum is not deviated in the presence of unilateral hemithorax opacification?

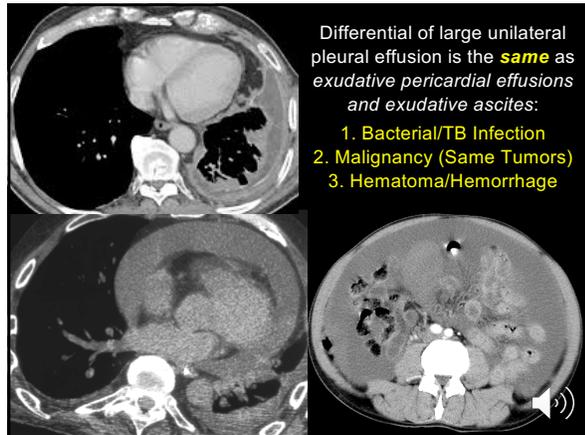
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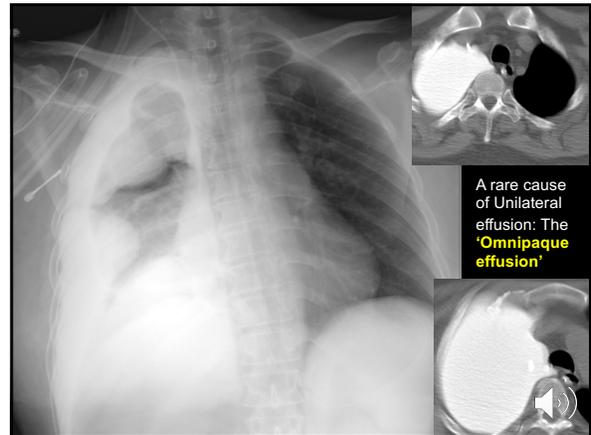
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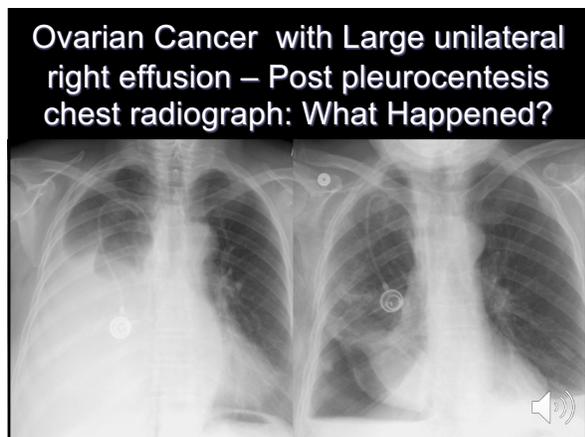
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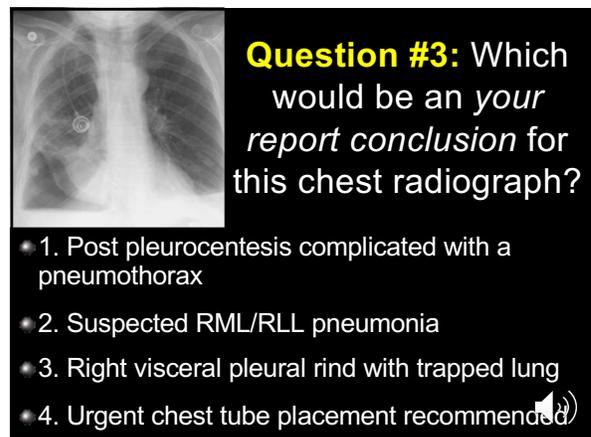
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Concept: Pneumothorax after pleurocentesis is **diagnostic information**, not a complication

- 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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Well, ordering this CT scan sure was a waste of time.

CT scans are often ordered to 'Assess for/extent of pleural rind' when it is **already seen** on radiographs with trapped lobes

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Empyema (Pleural) versus Abscess (Lung)

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

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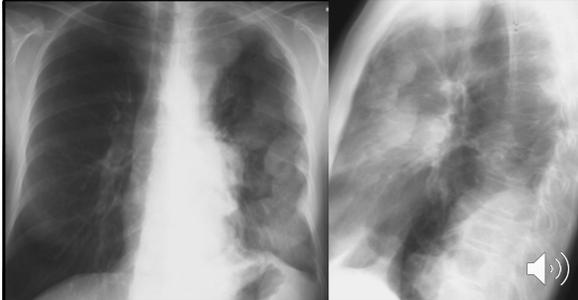
Fluid Level **Equal Distance** = Pulmonary Cyst/Cavity/Abscess

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<p>Pleural/Empyema:</p> <ul style="list-style-type: none"> Lung is pushed and collapsed Often elliptical in shape The wall is thin Enhancement to the visceral and parietal pleural: 'Split pleural sign' 	<p>Lung/Abscess:</p> <ul style="list-style-type: none"> 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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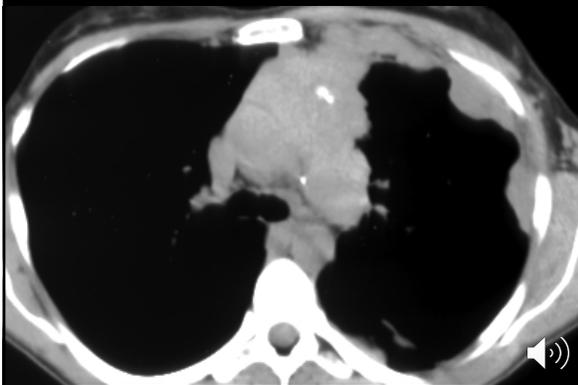


Question #4: What is the most likely explanation for this radiograph?

- 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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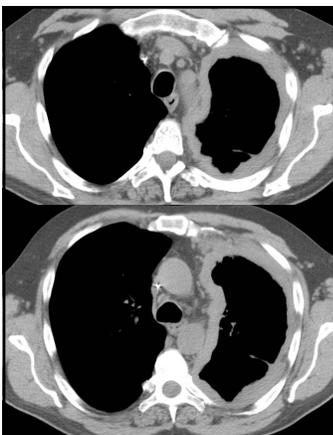
Pleural Malignancy:

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

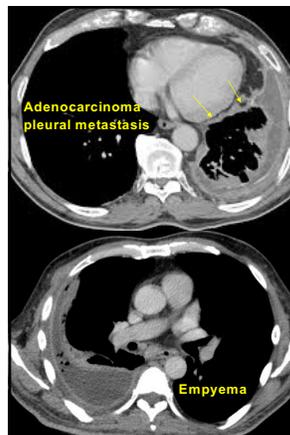
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Mediastinal Pleural thickening/nodularity is an imaging feature that is strongly associated with **Malignancy**.

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

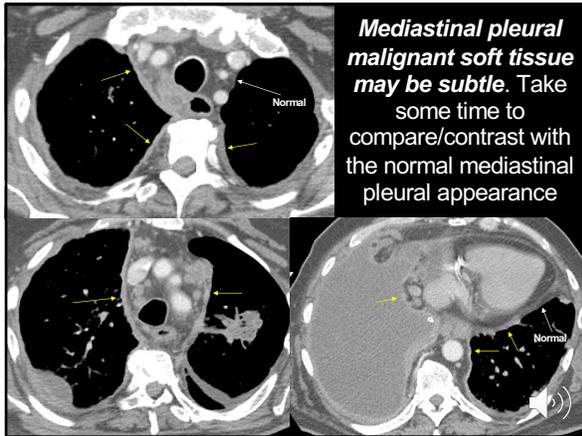
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Most **Non-malignant** exudative effusions **do not involve the mediastinal pleura**. If they do, it is only partial - **not circumferential**

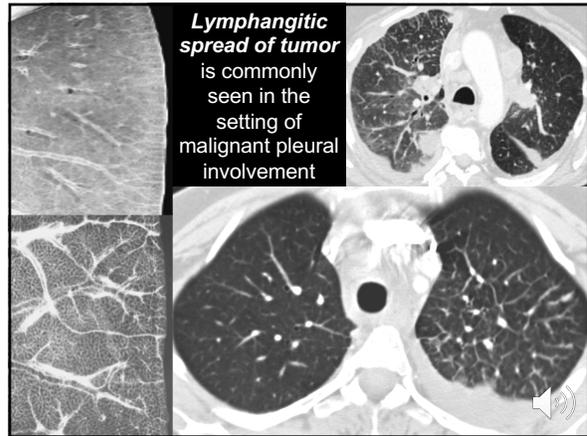
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Mediastinal pleural malignant soft tissue may be subtle. Take some time to compare/contrast with the normal mediastinal pleural appearance

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Lymphangitic spread of tumor is commonly seen in the setting of malignant pleural involvement

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Question 5: Which histological malignancy is **very unlikely** to demonstrate Lymphangitic spread of tumor?

- 1. Adenocarcinoma
- 2. Squamous cell carcinoma
- 3. Lymphoma
- 4. Mesothelioma

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‘It is a miracle that curiosity survives formal education.’
 Albert Einstein

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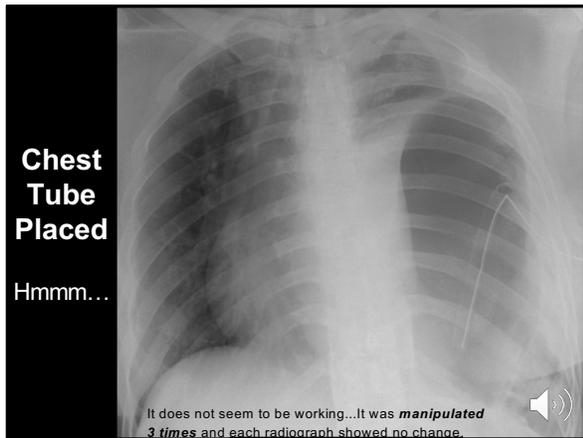
Comes into ED at 11 pm with Shortness of Breath...

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Question #6: What would be your suggestion to the ED physician?

- 1. Urgent chest tube for tension pneumothorax
- 2. Send them to the CT scanner
- 3. Place an NG tube
- 4. Get a right decubitus radiograph

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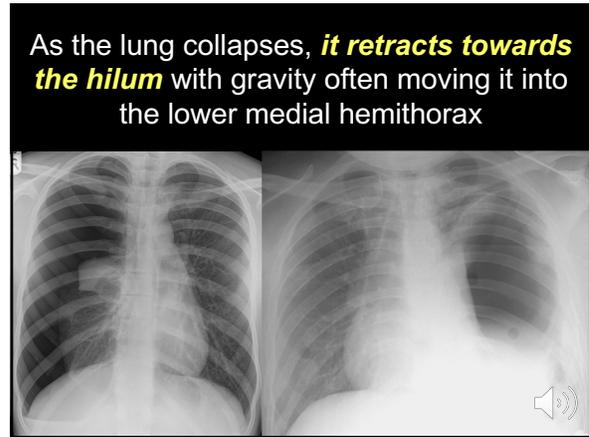
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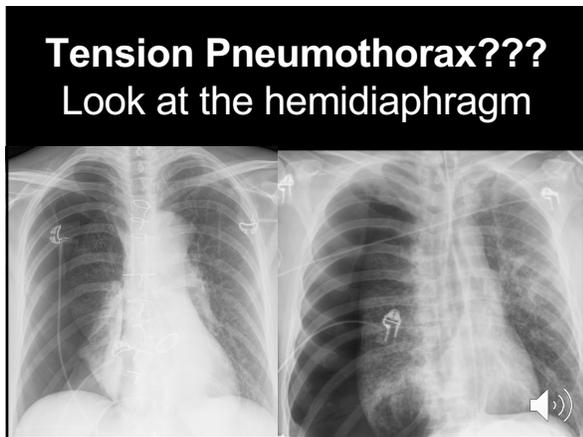
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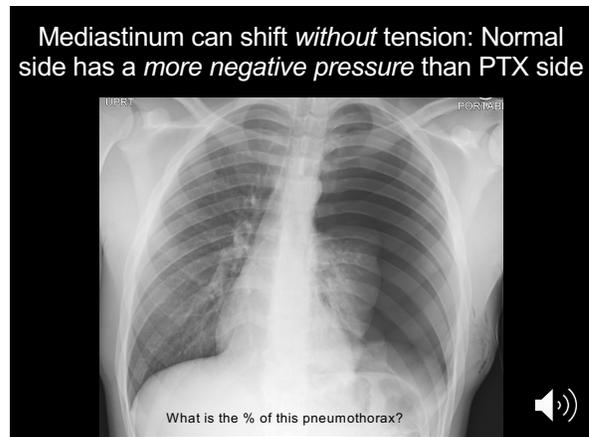
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Summary: Lateral Radiograph and the Pleura

- **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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