



Radiological Anatomy of the Cardiorespiratory System

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[Editing File](#)

objectives:

- To understand the basic radiologic anatomy of the chest and cardiovascular system.
- To recognize the basic radiological examinations applied in chest and cardiovascular system diseases.
- To understand the radiological appearances of common chest and cardiovascular system diseases.

Done by:



Alanoud Salman



Dawood Ismail



Ahad Algrain



Laila Alsabbagh

Revised by:



Aseel Badukhon



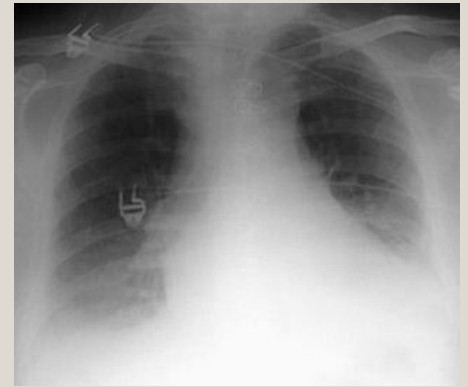
Positioning

PA vs. AP

PA (Posterior-Anterior)

AP (Anterior-Posterior)

image



Position

The X-Ray tube is posterior to the patient, and the film (bucky) is anterior to the patient.
Position is by standing up with hands on hips or by hugging the bucky, benefit of this position is to move the scapula away from the lungs field.

The X-Ray tube is anterior to the patient, and the film (bucky) is posterior to the patient.
Patient is in supine position thus the scapula projection is seen in the lungs field, should be reserved for very ill patients who cannot stand erect.

Direction of X-Ray Beam

The X-ray beam passes from posterior aspect to the anterior side.

The X-ray beam passes from anterior aspect to the posterior side.

Clavicles

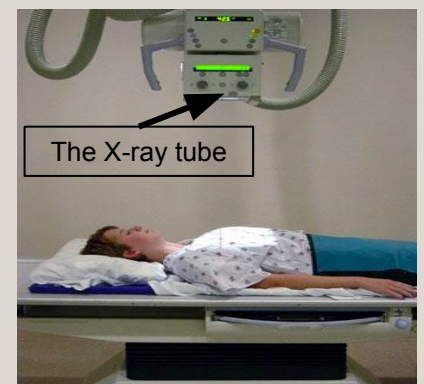
The clavicles projection is V-shaped.

The clavicles are almost straight

Distance

The x-ray tube is almost six feet away. This distance helps to reduce magnification.

Note that the x-ray tube is much closer here. The AP shows magnification of the heart and widening of the mediastinum. Whenever possible the patient should be imaged in an upright PA position.

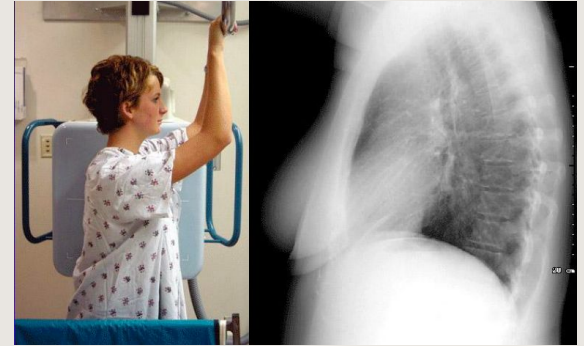


Positioning

Lateral vs. Lateral Decubitus:

1. Lateral:

- The lateral view is obtained with the left chest against the buckey, this diminishes the effect of magnification on the heart
- X-ray beam passes from one lateral to other lateral, and the film is placed at the latter lateral.



2. Lateral decubitus: (used for patients who can't stand up)

- The patient can also be examined in a lateral decubitus position.
- This could be helpful to assess the volume of pleural effusion and demonstrate whether a pleural effusion is mobile or loculated.
- You could also look at the nondependent hemithorax to confirm a pneumothorax in a patient who could not be examined erect.
- Additionally, the dependant lung should increase in density due to atelectasis from the weight of the mediastinum putting pressure on it.
- Failure to do so indicates air trapping.

You will see the **empty space** of pneumothorax in the nondependent aspect of the lung

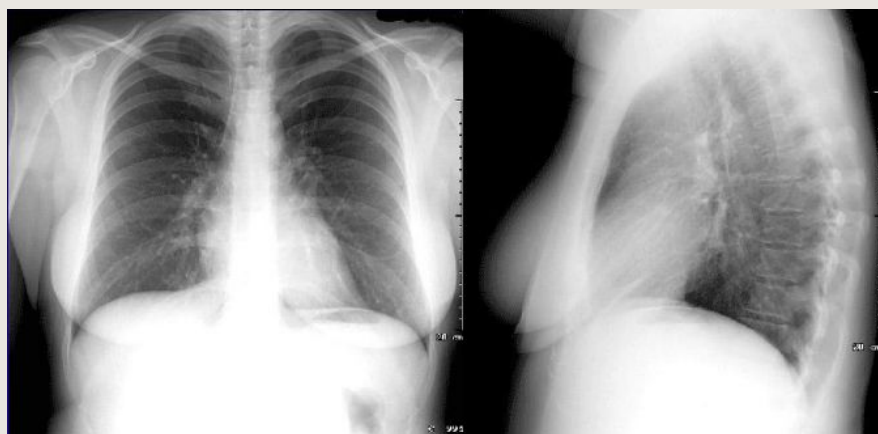
Left photo shows a patient in position for a right lateral decubitus position.

The right photo is an example of a decubitus film, in this case showing a mobile pleural effusion (arrows).



PA and Lateral

Whenever you have them you should read them both, don't depend on one view only.



Adequacy of Film

We determine technical adequacy of the film, by **three** measures:

1. Inspiration
2. Penetration
3. Rotation

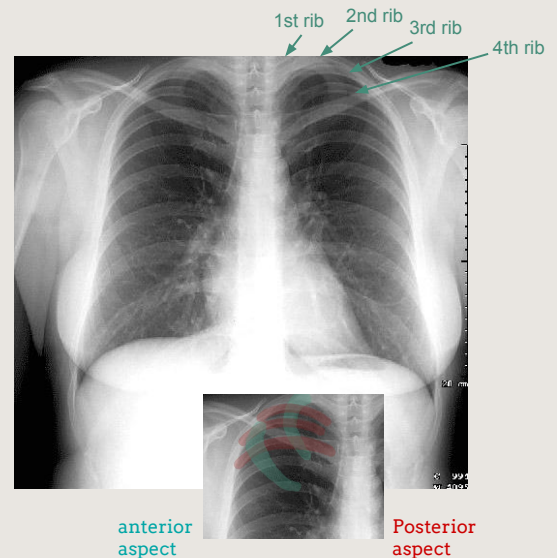
Inspiration:

patients should be examined in full inspiration, and asked to take a deep breath, why? to open up the lungs and see pathologies.

During inspiration the diaphragm moves downwards and the pulmonary vessels are stretched.

How to assess for adequate inspiration?

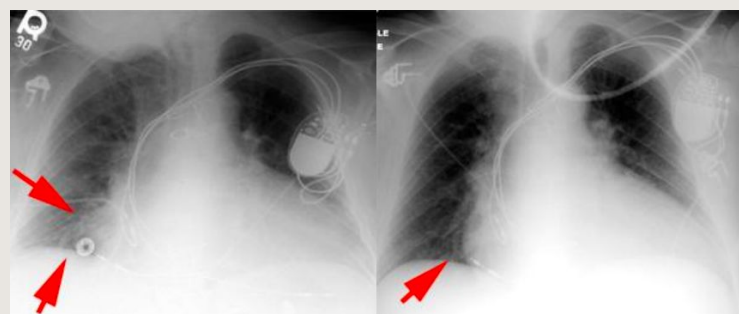
- Count the ribs, it should be 8-10 posterior ribs and 6 anterior ones. (less than 8-10 posterior ribs will indicate poor adequacy).
- The ribs on chest x-rays have both anterior and posterior aspects in the image for each single rib.
- The ribs start from the posterior aspect "the costovertebral" junction and goes all the way to the sternum "the costosternal" junction.



Compare between adequate and inadequate films:

- In an inadequate film the lungs become lighter, why? Because the pulmonary vessels are close to each other (remember blood is radio-opaque).
- In an adequate film lungs are more dark because it's filled with air (air is radio-lucent).

Close pulmonary vessels stimulate pathology; misdiagnosing



First film
Wrong inspiration

Second film
Improved inspiration

- On the first film, the loss of the right heart border silhouette would lead you to the diagnosis of a possible pneumonia or atelectasis. However, the patient had taken a poor inspiration.
- On repeat exam with improved inspiration, the right heart border is normal.

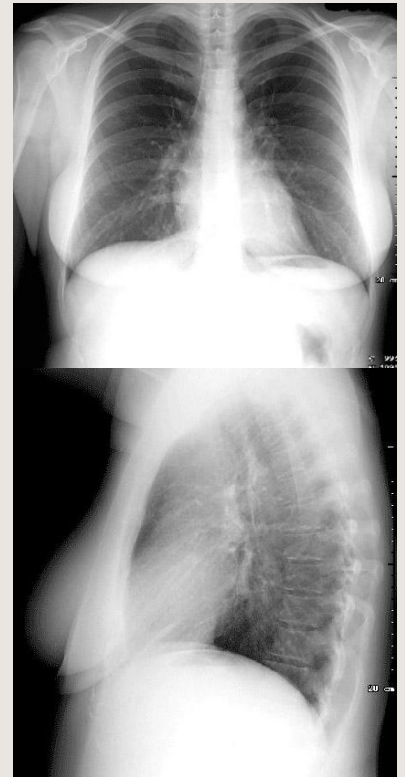
Adequacy of Film

Penetration:

Penetration is the degree to which X-rays have passed through the body.

How to assess for adequate penetration?

- On a good **PA** film, you should see the shadow of the spine.
- the thoracic spine disc spaces should be barely visible through the heart but the bony details of the spine are not usually seen.
- On the other hand penetration is sufficient that bronchovascular structures can usually be seen through the heart.
- On the lateral view, you can look for proper penetration and inspiration by observing that the spine appears to be darken as you move caudally.
- This is due to more air in lung in the lower lobes and less chest wall.
- The sternum should be seen edge on and posteriorly you should see two sets of ribs (left and right).



Compare between adequate and inadequate films:

- Over-penetration: lungs are black, vertebral column is seen in good details.
- Under-penetration: tissues are seen in good details, and the vertebral column is not seen behind the mediastinum.

when you have high energy x-ray light they will penetrate soft tissues and stop at the bone hence most of it will be absorbed by it (over-penetrated) while weak light will stop at the soft tissue



under-penetrated



over-penetrated

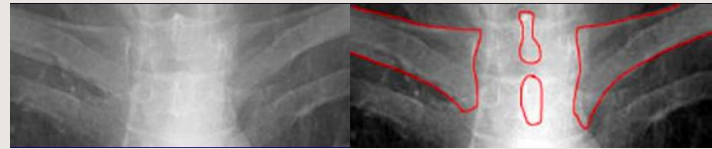
Adequacy of Film

Rotation:

- The technologists are usually very careful to x-ray the patient flat against the bucky.
- If there is rotation of the patient, the mediastinum may look very unusual.

How to assess for adequate rotation?

- One can assess patient rotation by observing the clavicular medial heads and determining whether they are equal distance from the spinous process of the thoracic vertebral bodies.

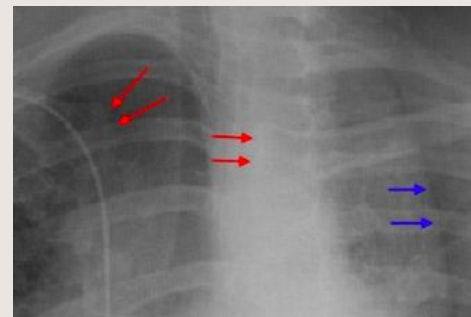
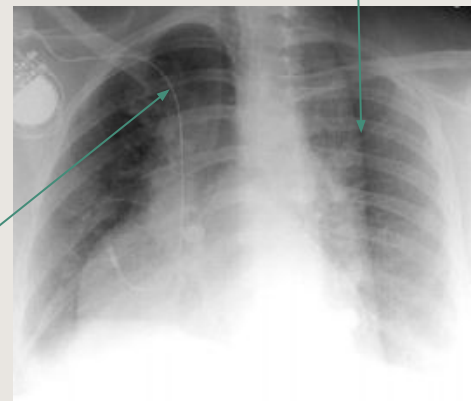


Compare between adequate and inadequate films:

- In over-rotated film one medial end (head) is further away from the vertebral body than the other one.
- The mediastinum will appear wider than normal.
- In this rotated film skin folds can be mistaken for a tension pneumothorax (blue arrows).
- Notice the skewed positioning of the heads of the clavicles (red arrows) and the spinous processes.

You might think this line is pneumothorax

Notice how the clavicle is far away from the midline

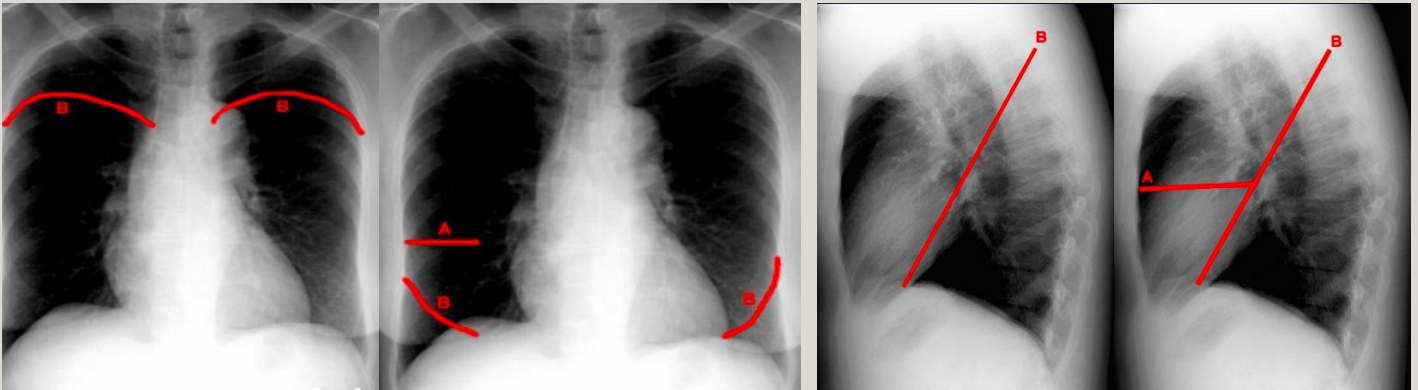


Rotated images **MUST** be repeated

Anatomy

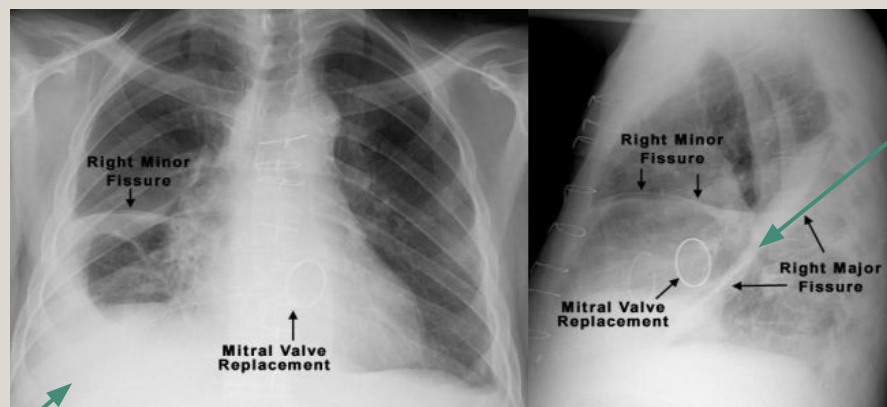
Lobes and Fissures:

- On the PA chest x-ray, the transverse (minor) fissure divides the right middle lobe from the right upper lobe and is sometimes not well seen.
- There is no minor fissure on the left.
- The oblique (major) fissures are usually not well seen on the PA view because you are looking through them obliquely.
- If there is fluid in the fissure, it is occasionally manifested as a density at the lower lateral margin.
- Oblique fissure runs from posterior to anterior "obliquely" while the transverse is quite straight.



A heart failure patient with pleural effusion:

- Notice how the mediastinum is wide.
- He has multiple valve replacement.
- The pleural effusion extended into the right transverse (minor) fissure and to the right oblique (major) fissure.



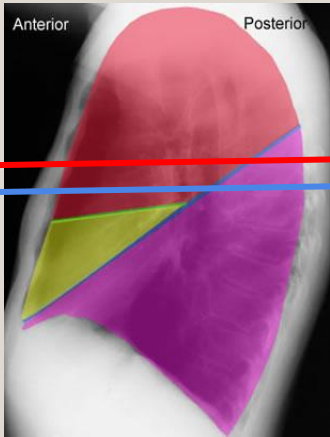
Notice how the oblique fissure is thickened because it is filled with fluids

Pleural effusion

Anatomy

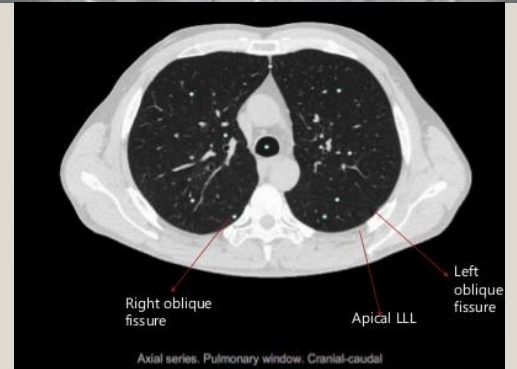
Lobes and Fissures:

- This is how it is see it in a CT scan.
- A thin line starts from the most posterior aspect in the upper lobes and as it goes down it moves towards anterior aspect.



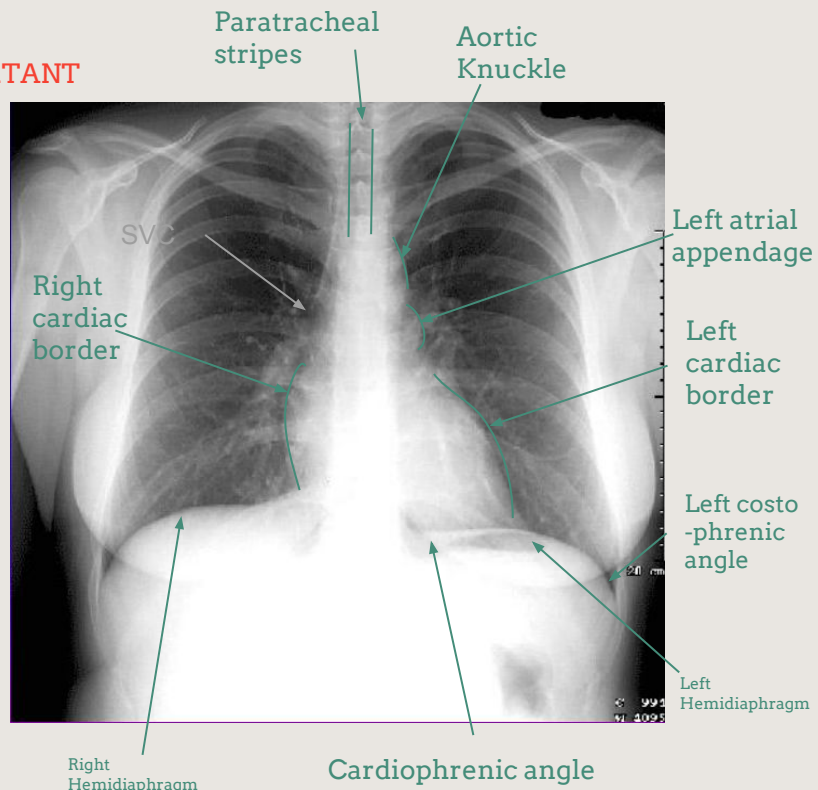
The red line is where the CT image was taken, see how the oblique fissure started from the top posteriorly? This is what we see as small line posteriorly in CT axial image, so if the image was taken lower (blue line) the line seen will move anteriorly. Can you guess what would it look like if it was even lower?

← EXTRA →



Mediastinum and Lungs

IMPORTANT



The aortic knuckle is part of the descending aortic arch

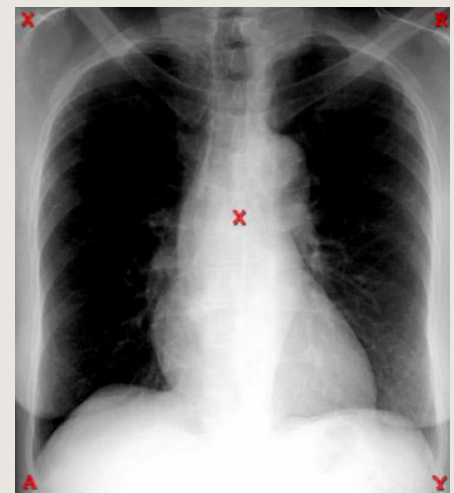
Looking For Abnormalities:

How to Read A Chest X-RAY

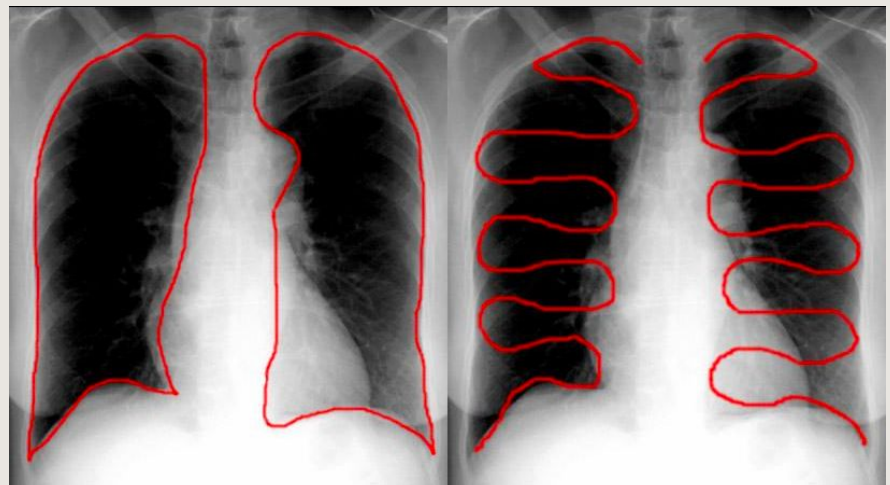
1. Turn off stray lights, optimize room lighting, view images in order.
2. Patient Data (name history #, age, sex, old films).
3. Routine Technique: AP/PA, exposure, rotation, supine or erect.
4. Trachea: midline or deviated, caliber, mass.
5. Lungs: abnormal shadowing or lucency.
6. Pulmonary vessels: artery or vein enlargement.
7. Hila: masses, lymphadenopathy.
8. Heart: thorax: heart width $> 2:1$? Cardiac configuration?
9. Mediastinal contour: width? mass?
10. Pleura: effusion, thickening, calcification.
11. Bones: lesions or fractures.
12. Soft tissues: don't miss a mastectomy.
13. ICU Films: identify tubes first and look for pneumothorax.



- Your eye gaze should scan all portions of the film, follow lung/mediastinal interfaces and look again carefully in areas where you know that mistakes are easily made, such as over the spine on the lateral view and in the apex on the PA view.
- Try to focus your gaze on the X, would you be able to read the letters in the corner?



PA technique for looking at films.
Encompassing the entire lung boundaries (left), scanning with fovea over each part of lung (right).



Signs

Silhouette Sign (IMPORTANT)

When two structures have the same density and come closer to each other they will obscure their borders

- loss of lung/soft tissue interface caused by a mass or fluid in the normally air filled lung.
- In other words, if an intrathoracic opacity is in anatomic contact with, for example, the heart border, then the opacity will obscure that border.
- The sign is commonly applied to the heart, aorta, chest wall, and diaphragm.
- This sign is important to locate pathology.

Example:

- What are the main abnormalities?
 1. Opacity in right middle lobe.
 2. Right cardiac border is silhouetted out.
- This is caused by a pneumonia affecting right middle lobe, because the the right middle lobe sits behind the right cardiac border.



Another example:

- If the right hemidiaphragm was the one silhouetted the pathology location would be right lower lobe.

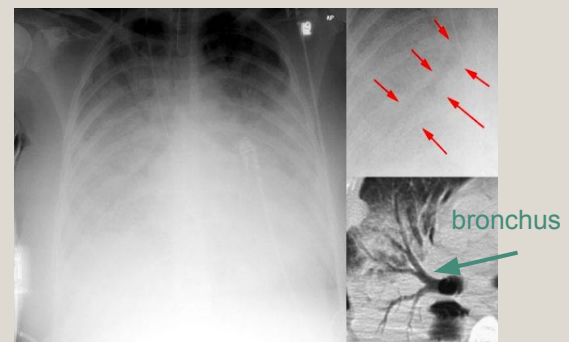
Air Bronchogram Sign

This sign tells us that the pathology is **not** in the chest wall but **inside** the lung

- An air bronchogram is a tubular outline of an airway made visible by filling of the surrounding alveoli by fluid or inflammatory exudates.
- Six causes of air bronchograms are:
 1. lung consolidation.
 2. Pulmonary edema.
 3. Non obstructive pulmonary atelectasis.
 4. severe interstitial disease.
 5. Neoplasm.
 6. Normal expiration.

The example:

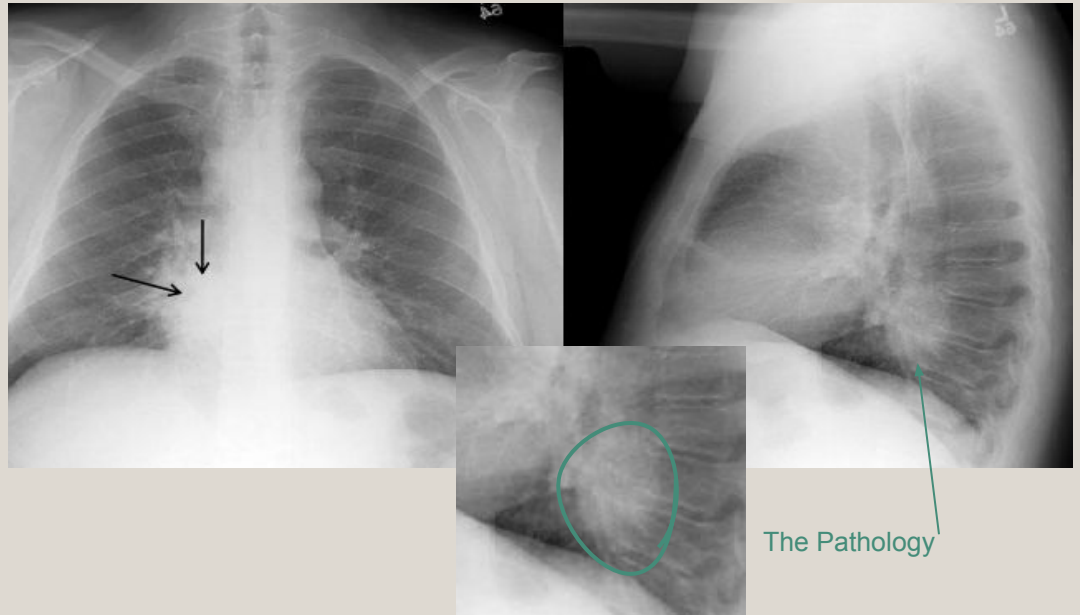
1. This patient has bilateral lower lobe pulmonary edema.
2. The alveoli are filled with fluid making the bronchi visible as an air bronchogram.
3. The upper right image is a closeup of the right side of the film with arrows outlining a prominent air bronchogram.
4. The lower right image is a CT angiogram demonstrating an air bronchogram clearly.



CT angiogram

Double Border Sign

- You're only allowed to have one cardiac border.
- The pathology here is quite clear in the lateral view but in PA view the only clue is the double right cardiac border.
- The problem is posterior to the heart; mediastinum or lungs.



Pathology

Atelectasis:

- Atelectasis is collapse or incomplete expansion of the lung or part of the lung.
- This is one of the most common findings on a chest x-ray.
- It is most often caused by an endobronchial lesion, such as mucus plug or tumor.
- Atelectasis is almost always associated with a linear increased density on chest x-ray.
- The apex tends to be at the hilum.
- The density is associated with volume loss.
- Some indirect signs of volume loss include vascular crowding or fissural, tracheal, or mediastinal shift, towards the collapse.
- There may be compensatory hyperinflation of adjacent lobes, or hilar elevation (upper lobe collapse) or depression (lower lobe collapse).
- Segmental and subsegmental collapse may show linear, curvilinear, wedge shaped opacities. This is most often associated with post-op patients and those with massive hepatosplenomegaly or ascites.

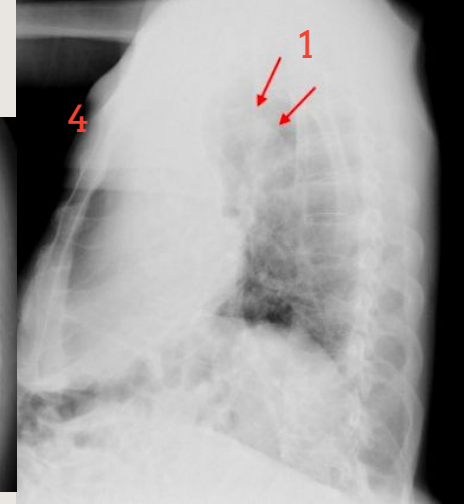
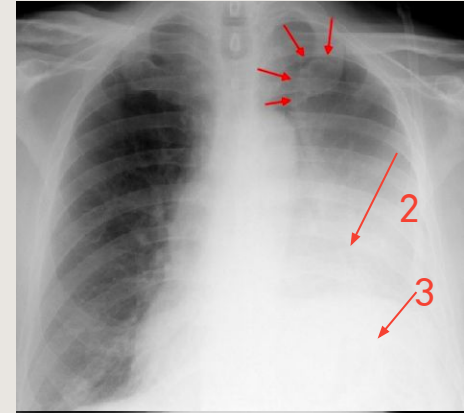


Example of Left upper lobe collapse

Pathology

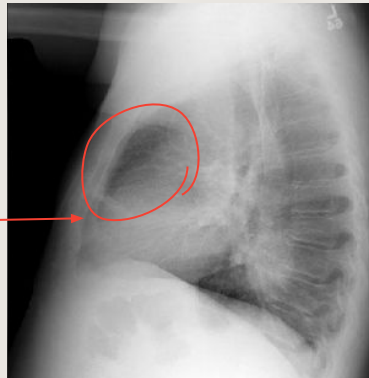
Atelectasis (Left Upper Lobe Collapse):

- Main abnormalities:
 1. **Luftsichel sign.**
 2. Left cardiac border is silhouetted out.
 3. Left hemidiaphragm is silhouetted out.
 4. Disappearance of retrosternal lucency (black area behind the sternum).
- Diagnosis: left upper lobe collapse.
- When the left upper lobe collapses it pushes itself against the anterior wall (anteriorly and medially), hence retrosternal lucency is gone.



The red circle in the left image is the retrosternal lucency, notice how it disappeared in the right image

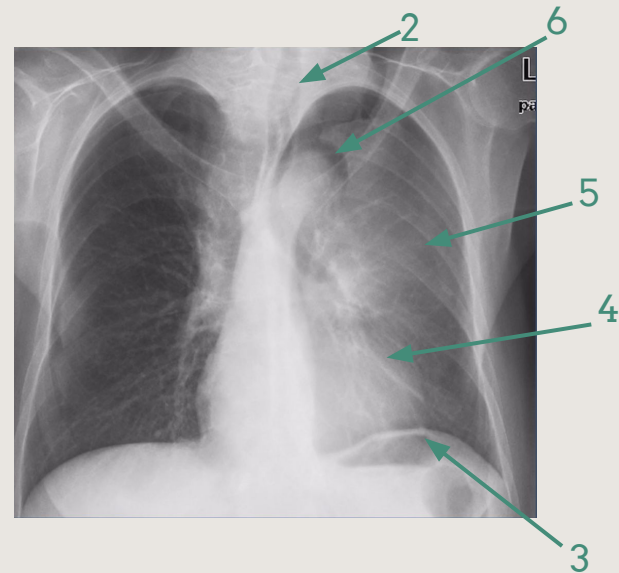
Retrosternal lucency



- **Luftsichel sign:**
 - Luft= Air in German, Sichel= Sickle.
 - **Very specific for left upper lobe collapse.**

- Abnormalities of this x-rays:
 1. Opacity.
 2. Tracheal shift to the left.
 3. Left hemidiaphragm is pulled up.
 4. Silhouette of the left cardiac border.
 5. Narrow intercostal spaces.
 6. Looseness of aortic knuckle (Luftsichel sign).

Part of left upper lobe that is hyperinflating and coming close to the aortic arch and it's called the luftsichel sign.

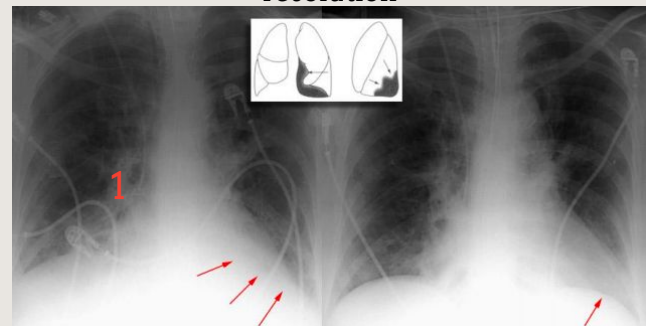


Left lower lobe atelectasis Followed by partial resolution

- It's a volume losing process; air escaping the lungs
- If the upper lobe deflates "collapse" the lower lobe will hyperinflate "takeover"

Atelectasis (Left Lower Lobe Collapse):

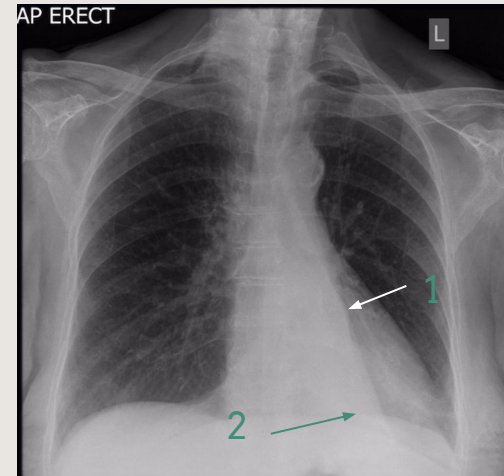
- Main abnormalities:
 1. The diaphragm is silhouetted.
- Diagnosis: left lower lobe collapse.



Pathology

Atelectasis (Left Lower Lobe Collapse):

- What are the main abnormalities?
 1. Left double cardiac border.
 2. The medial side of left hemidiaphragm is silhouetted (compare it to right hemidiaphragm).
- Diagnosis: left lower lobe collapse
- The oblique left fissure moved closer to the heart due to the collapse, and is seen in x-rays as straight line (white arrow) "the medial line of the double border"

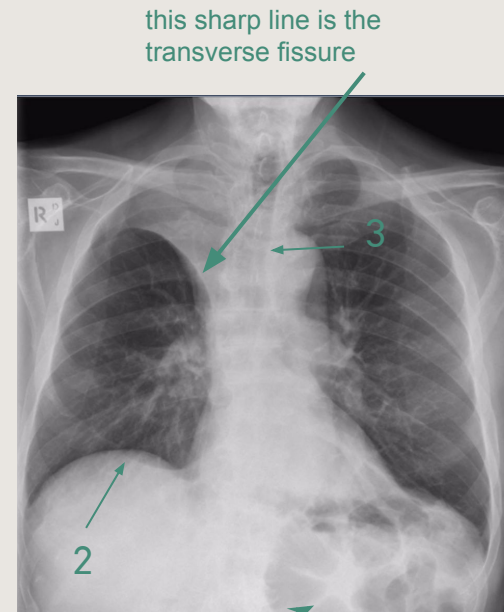


Straight border doesn't indicate pneumonia; straight means fissure

Atelectasis (Right Upper Lobe Collapse):

- What are the main abnormalities?
 1. Opacity in the upper right lobe.
 2. Mild Elevation of right hemidiaphragm.
 3. Mild Tracheal deviation "shifting" to the right.
- Diagnosis: right upper lobe collapse.
- Notice: no silhouette signs which indicates that right middle lobe and lower lobe are not involved.

NOTE: Pancoast tumor is a lung cancer of the apical segment of the right upper lobe

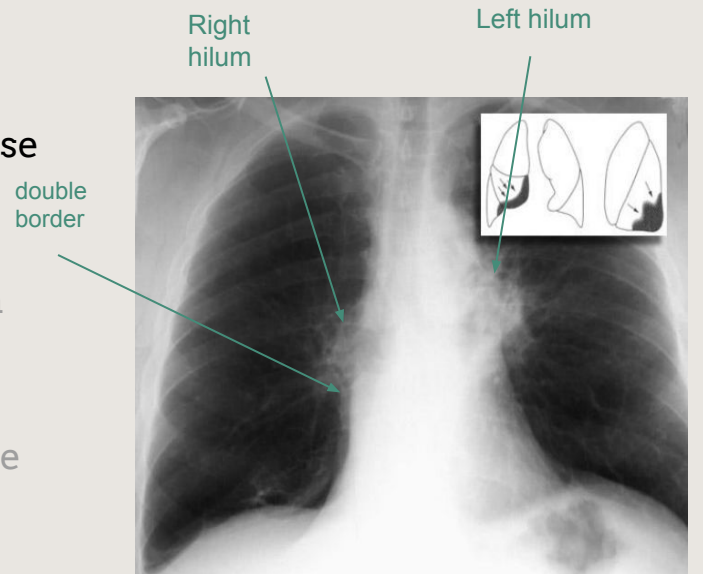


this sharp line is the transverse fissure

Air inside colon; normal

Atelectasis (Right Lower Lobe Collapse):

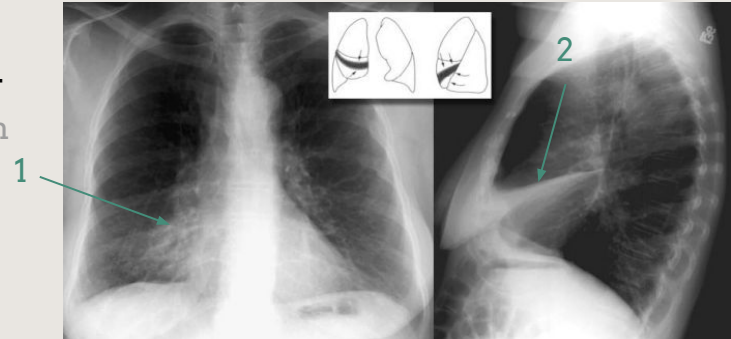
- What are the main abnormalities?
 1. Double right cardiac border.
- Diagnosis: complete and chronic collapse of right lower lobe.
- Notice how the right hilum is displaced inferiorly because of the hyperinflation of right upper lobe pushing the hilum inferiorly (remember once one lobe collapse the other take over and become overexpanded).



Pathology

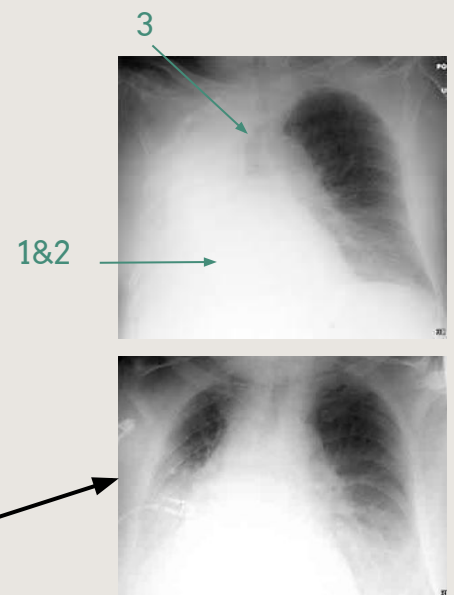
Atelectasis (Right Middle Lobe Collapse):

- What are the main abnormalities?
 1. Silhouette sign to the right cardiac border and NOT the right hemidiaphragm (which excludes lower lobe involvement).
 2. Wedge shaped opacity in lateral view.
- Diagnosis: right middle lobe collapse.
- When the right middle lobe collapses the two fissures (transverse and oblique) move towards the collapse (move toward each other) thus making the wedge opacity sign.



Atelectasis (Complete Right Lung Collapse):

- Main abnormalities?
 1. Complete opacification of right lung.
 2. Silhouette sign to right cardiac border and right hemidiaphragm.
 3. Deviation of the trachea to the right (pulling the trachea toward the abnormality indicates volume losing process).
- Diagnosis: complete right lung collapse.
- This is post bronchoscopy and mucus plug was found in right main bronchus.



Pulmonary Edema:

- Pulmonary edema is an abnormal buildup of fluid in the lungs, often caused by congestive heart failure.
- When the heart is not able to pump efficiently, blood can back up into the veins.

X-ray findings:

- On a CXR, cardiogenic pulmonary edema can show; cephalization of the pulmonary vessels, peribronchial cuffing, "bat wing" pattern, patchy shadowing with air bronchograms, and increased cardiac size.
- In the pulmonary vasculature of the normal chest, the lower zone pulmonary veins are larger than the upper zone veins due to gravity.
- In a patient with congestive heart failure, the pulmonary capillary pressure rises and the upper zone veins dilate and are equal in size or larger than the lower zone vessels, termed **cephalization**.

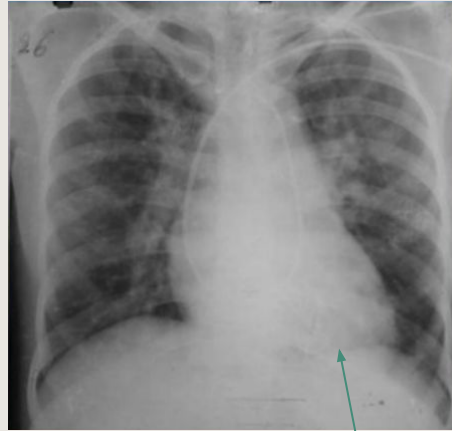


Pathology

Pulmonary Edema:

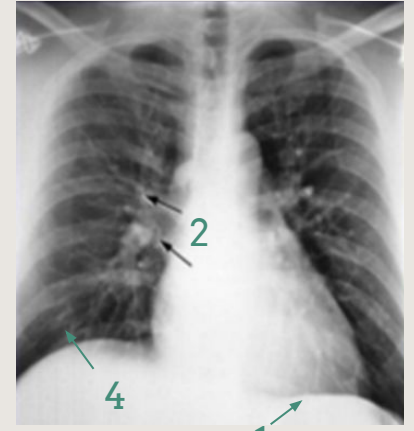


Please notice these photos are not the same as the ones in the presentation but they are very close and have all the signs doctor pointed out except for the thickened fissure but you can see it in the photo we took during the lecture



DAY 1

1. Silhouette of left hemidiaphragm

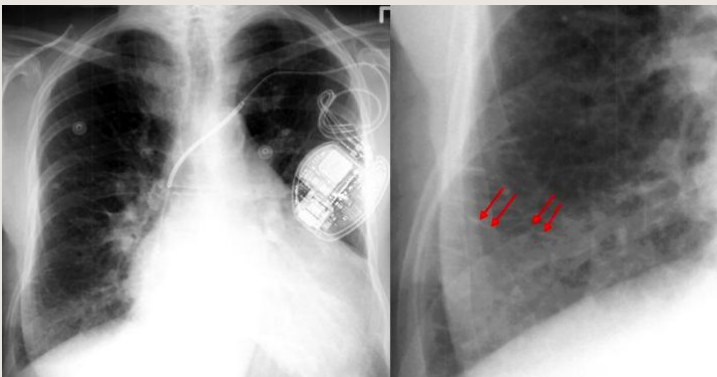


DAY 2

1. **NO silhouette of left hemidiaphragm** (important negative sign).
2. Vessels are more prominent.
3. The transverse fissure is thickened.
4. Kerley B lines.

Kerley B lines:

- These are horizontal lines less than 2cm long, commonly found in the lower zone periphery.
- These lines are the thickened, edematous interlobular septa.
- Causes of Kerley B lines include; pulmonary edema, lymphangitis carcinomatosa and malignant lymphoma, viral and mycoplasmal pneumonia, interstitial pulmonary fibrosis, pneumoconiosis, sarcoidosis.



When blood has completely filled the vessels it starts to move out to the interstitium, so you see interstitial thickening hence you see kerley B lines and thickening of the fissures

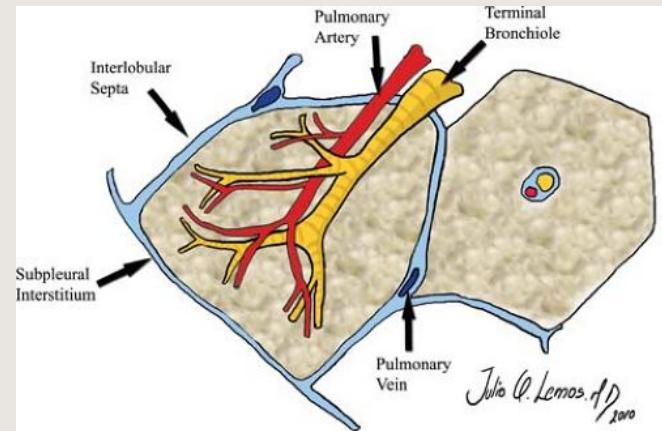
- The patient above is suffering from congestive heart failure resulting in interstitial edema.
- Notice the Kerley's B lines in right periphery (arrows).

Pathology

Pulmonary Edema:

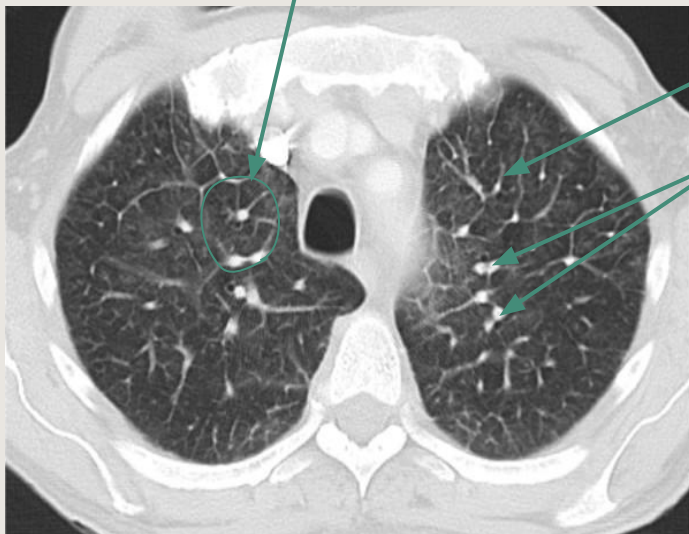
Kerley B lines:

- When pulmonary vein becomes filled with fluids you see the kerley B lines on X-rays.



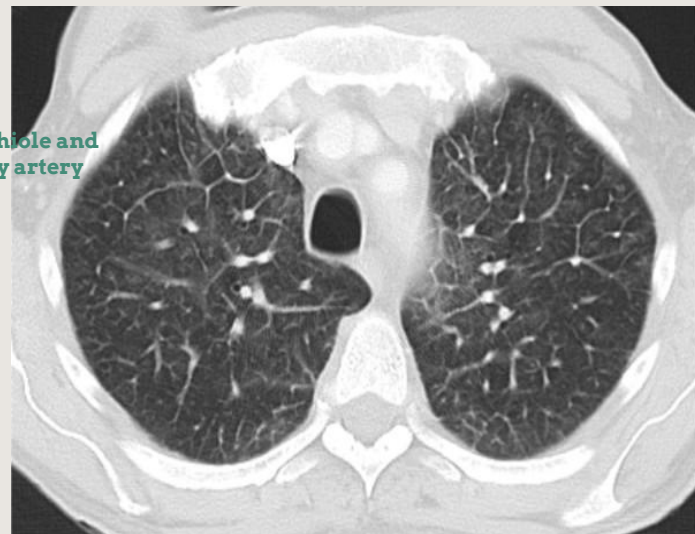
2cm (secondary lobular anatomy)

Secondary lobular anatomy



septa

The bronchiole and pulmonary artery

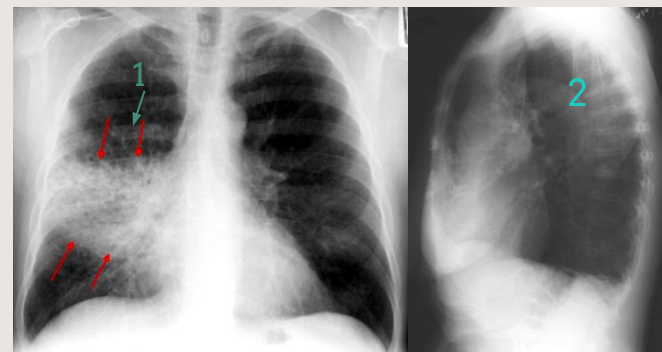


Pneumonia:

- Findings:
 1. Opacity in right middle lobe silhouetted the right cardiac border.
 2. On lateral view no wedge sign is seen (excludes right middle lobe collapse).
 3. On PA, fissures are away from each other. (red arrows)
 4. No volume loss, How did we know that? Because there is no wedge sign and the fissures are away from each other.
 5. Air bronchogram.

- All findings indicate consolidation.

- Pulmonary consolidation: is a region of normally compressible (elastic) lung tissue that has filled with liquid instead of air. The condition is marked by induration (swelling or hardening of normally soft tissue) of a normally aerated lung. It is considered a radiologic sign.



In right middle lobe lesions we don't look for trachea deviation but in upper and lower we do look because these lobes do affect trachea

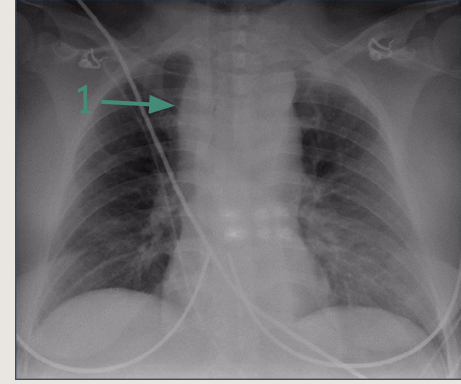
Pneumonia → inflammatory cells inside the air space
Edema → fluid inside the air space

Pathology

Aortic Dissection:

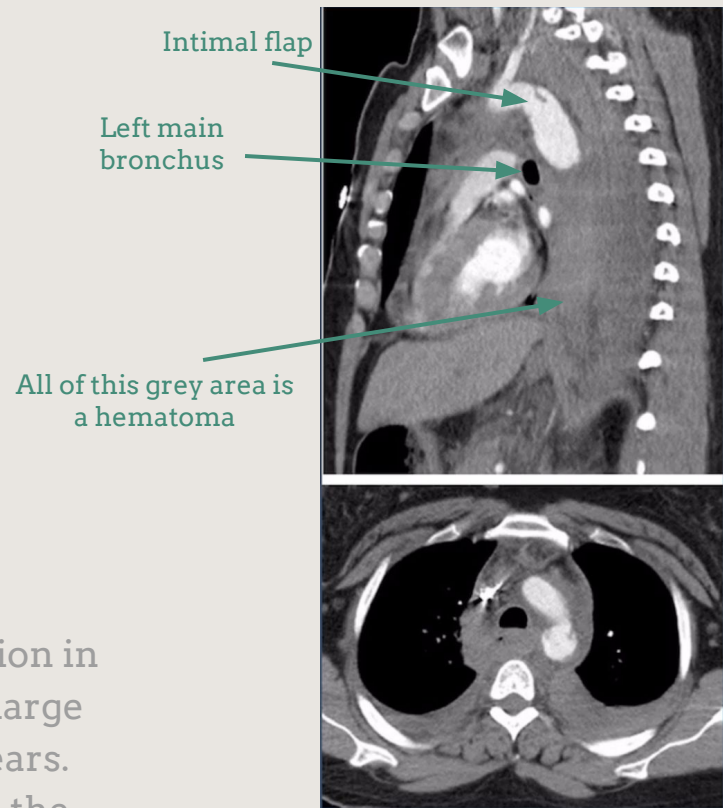
- Main abnormality?
 1. Widening of the mediastinum.
- Next step is CT angiogram, why? Because there is a major risk to the mother bleeding out.

When you have an MCV patient with widening of mediastinum first thing to consider is Aortic injury due to deceleration



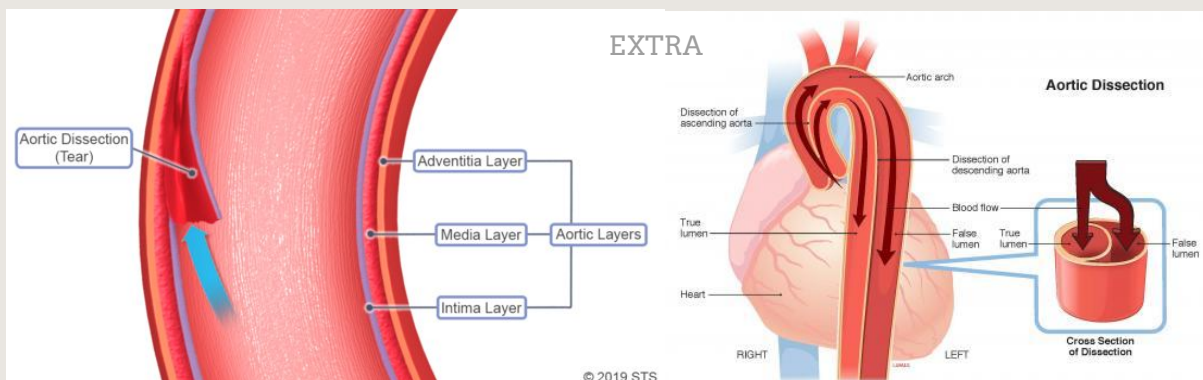
A 26 years old pregnant female is imaged post-motor vehicle collision (MVC)

- Abnormalities?
 1. Intimal flap of the aorta.
 2. Hematoma (what was seen as mediastinal widening).
- Diagnosis? Traumatic aortic injury.
- What is Aortic Dissection? EXTRA
- Recall
 - Aortic layers from innermost to outermost:
 1. Tunica intima
 2. Tunica media
 3. Tunica adventitia



Images of the CT angiogram

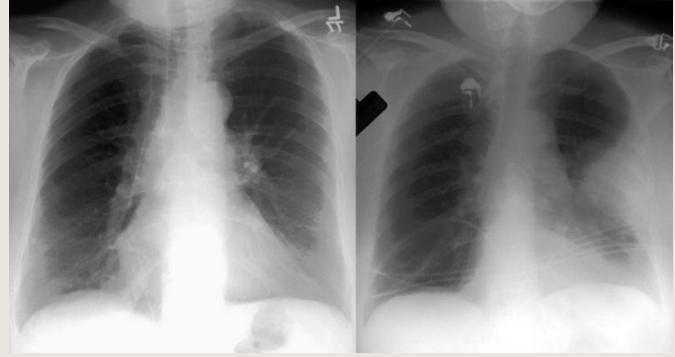
- An aortic dissection is a serious condition in which the inner layer of the aorta, the large blood vessel branching off the heart, tears. Blood surges through the tear, causing the inner and middle layers of the aorta to separate (dissect)



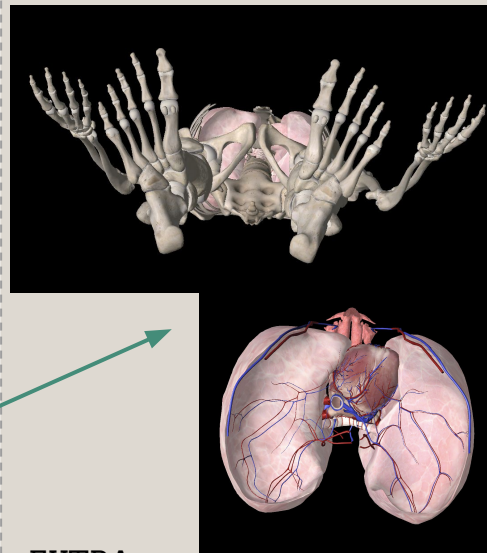
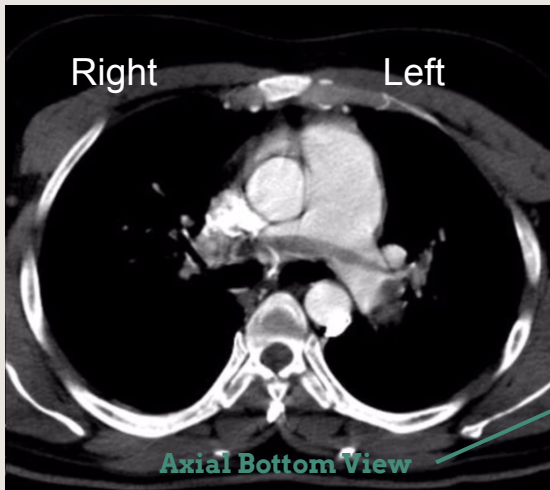
Pathology

Pulmonary Embolism:

- In pulmonary embolism we look for the filling defect.
- The pulmonary artery is locked with huge embolus hence the pulmonary artery is enlarged.

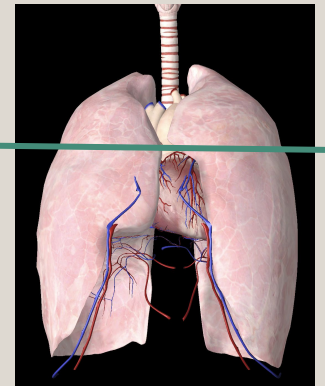


1. 40 years old male with acute chest pain and tachycardia:

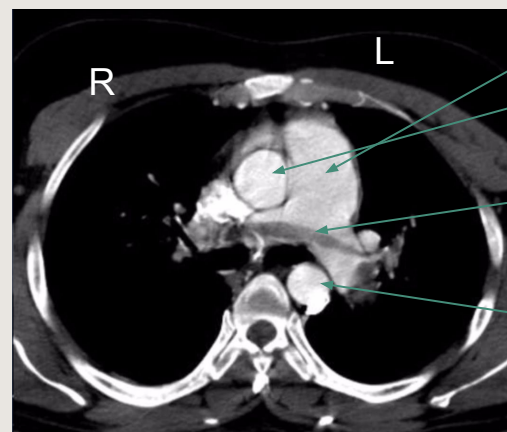


EXTRA:

The slice to which where the image was taken. Above the heart so that's why you don't see it in the image.



- Main abnormalities?
 1. Large sized pulmonary artery.
 2. Posterior thick line.
- Diagnosis: pulmonary embolism.



Pulmonary artery
Ascending aorta
This thick line is the filling defect
Descending aorta

2. Another Example:



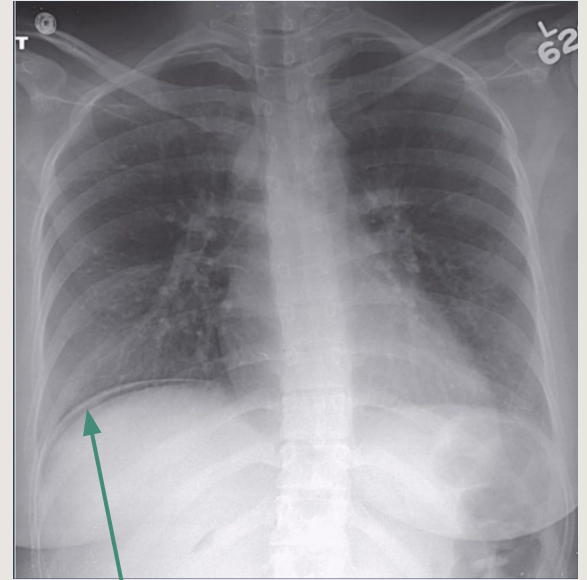
Pulmonary embolism

Left lower lobe collapse

Pathology

Pneumoperitoneum:

- Main abnormality:
 1. An opaque line above right hemidiaphragm which suggests air below the diaphragm.
- Diagnosis: hemoperitoneum (air inside abdomen).
- Common causes:
 1. Perforated peptic ulcer.
 2. Perforated duodenal ulcer.



1

Atelectasis	Pneumonia
Volume loss (escaped air)	Normal or increased volume (due to pus, blood or bacteria etc.)
Associated ipsilateral tracheal shift	No tracheal shift, or if present then contralateral
Opacity: Linear, Wedge-shaped	Opacity: Consolidation, Air space process
Apex at hilum (apex of wedge sign)	Not centered at hilum
Air bronchogram can occur in both	

SUMMARY

Position	X-ray direction
PA	X-ray beam passes from posterior aspect to the anterior side
AP	X-ray beam passes from anterior aspect to the posterior side
Lateral	X-ray beam passes from one lateral to other lateral, and the film is placed at the latter lateral.
PA and Lateral	AP and Lateral Decubitus
first choice, better quality.	for ill patients who can't stand up

	Inspiration	Penetration	Rotation
Definition	During inspiration the diaphragm moves downwards and the pulmonary vessels are stretched. The patient should be examined in full inspiration.	Penetration is the degree to which X-rays have passed through the body	the patient should be flat against the bucky.
Assessment method	Count the ribs, posterior ribs= (8-10) anterior rib= 6	- The thoracic spine disc spaces should be barely visible through the heart - bony details of the spine are not usually seen.	observing the clavicular heads and determining whether they are equal distance from the spinous process of the thoracic vertebral bodies.
Misdiagnosis	Poor respiratory cause loss of the right heart border silhouette which may be diagnosed mistakenly as possible pneumonia or atelectasis.		May be diagnosed mistakenly for a tension pneumothorax

Signs	Definition	Example
Silhouette sign	loss of lung/soft tissue interface caused by a mass or fluid in the normally air filled lung.	pneumonia affecting right middle lobe
Air bronchogram	An air bronchogram is a tubular outline of an airway made visible by filling of the surrounding alveoli by fluid or inflammatory exudates.	lower lobe pulmonary edema. The alveoli are filled with fluid making the bronchi visible
Double border	It's only allowed to have one cardiac border	Right lower lobe atelectasis
Luftsichel sign	Luft= German word for air Sichel= sickle	left upper lobe collapse
Kerly B lines	These are horizontal lines less than 2cm long, commonly found in the lower zone periphery.	pulmonary edema Congestive heart failure

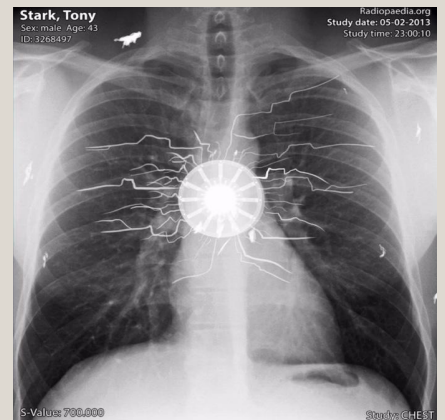
Atelectasis:	Right upper lobe	<ul style="list-style-type: none"> - Opacity in the upper right lobe - Mild Elevation of right hemidiaphragm - Mild Tracheal deviation "shifting" to the right
	Right middle lobe	Silhouette sign to the right cardiac border and NOT the right hemidiaphragm
	Right lower lobe	Double right cardiac border
	Left upper lobe	<ul style="list-style-type: none"> - Luftsichel sign - Left cardiac border is silhouetted out - Left hemidiaphragm is silhouetted out - tracheal shift to the left
	Left lower lobe	<ul style="list-style-type: none"> - The diaphragm is silhouetted - double left cardiac border - silhouetting of medial end of left hemidiaphragm

Disease	Radiological findings
Pulmonary edema	<ul style="list-style-type: none"> - kerley B lines - Cephalization
Pneumonia	- consolidation
Aortic Dissection	<ul style="list-style-type: none"> - X-rays: mediastinal widening - CT: aortic intimal flap
pneumoperitoneum	An opaque line above hemidiaphragm

QUESTIONS

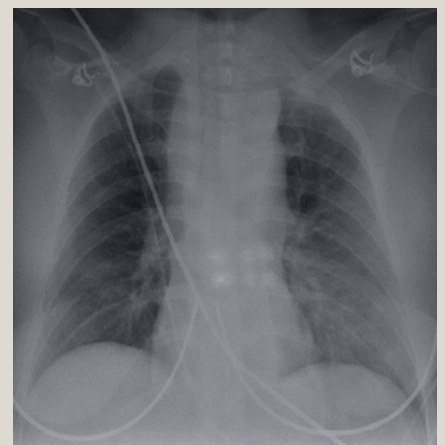
1. 43 year -old male had a sudden chest pain after lifting a truck

- a) Multiple lead pacemaker
- b) Arc generator
- c) foreign body
- d) Normal chest x-ray



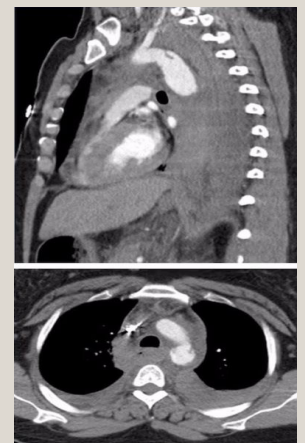
2. 26 year -old pregnant female is imaged post motor vehicle collision (MVC). Which of the following is the next best step?

- a) CT angiogram of the chest
- b) non contrast CT of the chest
- c) MR angiogram of the chest
- d) direct angiography



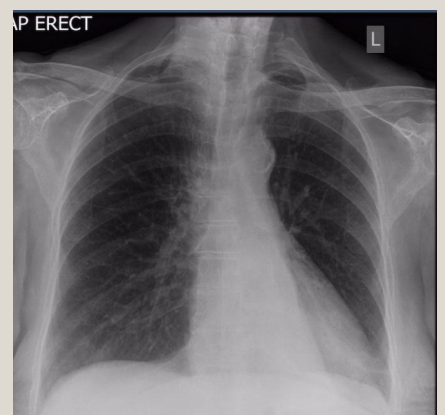
3. What is the most likely diagnosis?

- a) Amniotic fluid embolism
- b) Traumatic aortic injury
- c) pneumothorax
- d) Tension pneumothorax



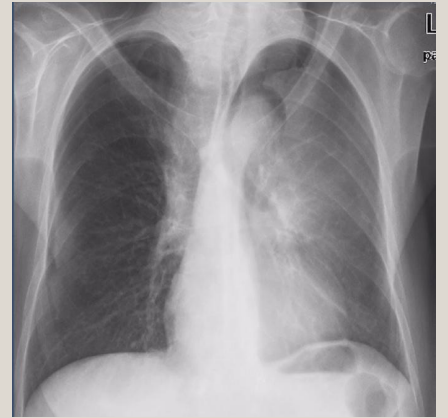
4. What is the diagnosis

- a) Mass
- b) Hiatal hernia
- c) pneumonia
- d) collapse



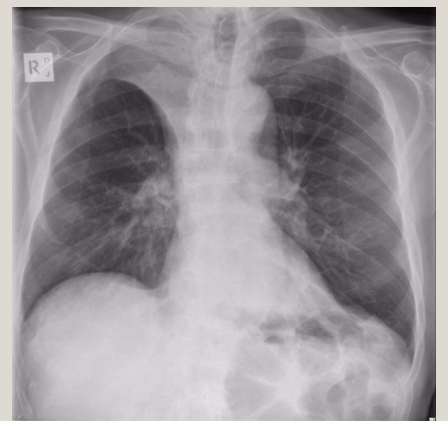
5. What is the diagnosis

- a) Large pleural effusion
- b) Left upper lobe collapse
- c) complete lung consolidation
- d) Left sided hemothorax



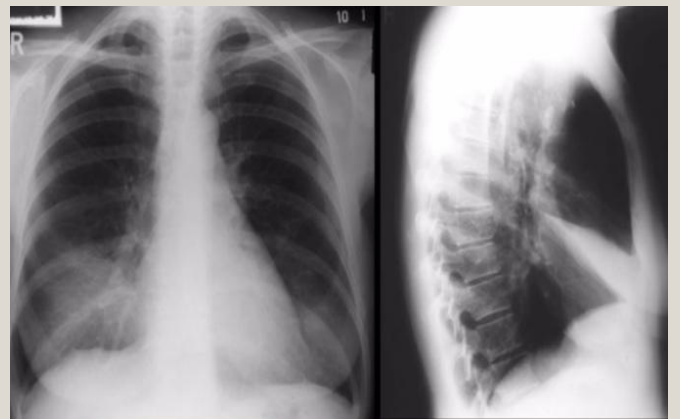
6. What is the diagnosis

- a) pancoast tumor
- b) apical fibrosis
- c) right upper lobe collapse
- d) pneumonia



7. What is the diagnosis

- a) pseudotumor
- b) pulmonary contusion
- c) pleural plaque
- d) right middle lobe collapse



8. What is the diagnosis

- a) diffuse pneumonia
- b) ARDS
- c) diffuse hemorrhages
- d) pulmonary edema



QUESTIONS

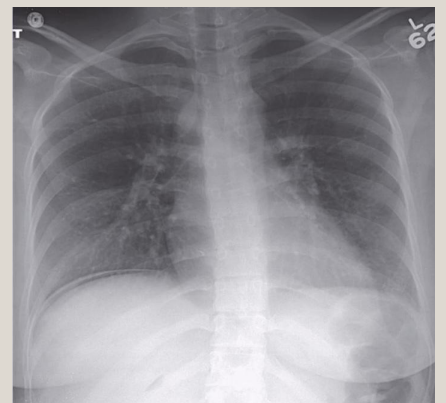
9. Patient with septic shock and respiratory failure, what is the most likely diagnosis

- a) bronchopneumonia
- b) cardiogenic pulmonary edema
- c) ARDS
- d) Acute interstitial pneumonia



10. Sudden onset of chest and shoulder pain. where is the abnormality?

for the answer go back to slide #19



7. Where is the abnormality

for the answer go back to slide #18



7. Where is the abnormality

for the answer go back to slide #18



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RadiologyRadiology437@gmail.com



@437Radiology



please fill this very very quick form



References

- ✓ Slides
- ✓ 436 Teamwork



THANK YOU FOR CHECKING OUR WORK

