

# Chest X-rays You Will See In The Middle Of The Night

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# Today's Talk

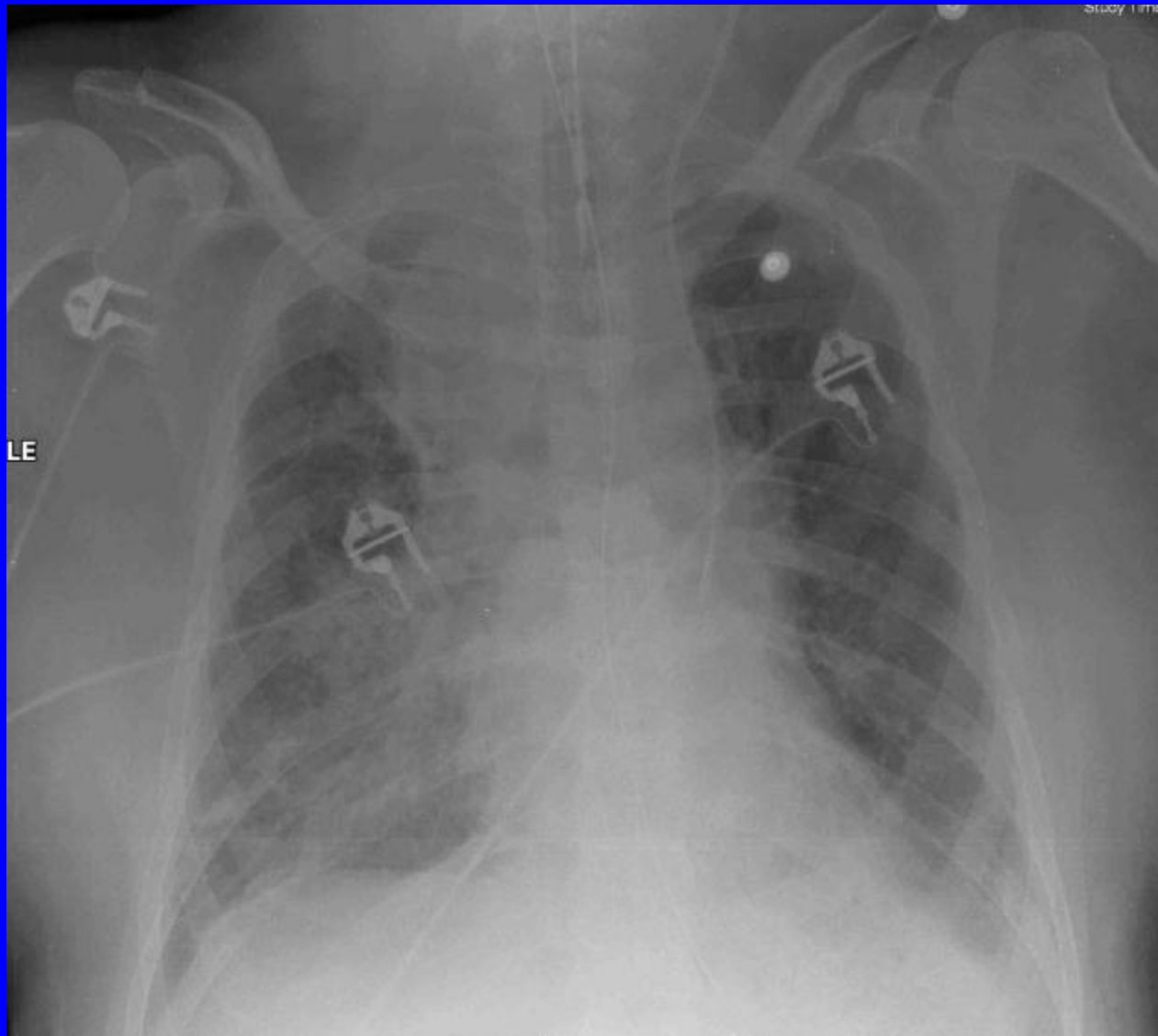
- General principles of x-ray reading will not be covered due to time limitations
- The goal will be to cover x-ray issues you may deal with while on night float or taking admissions
- Additional chest x-ray resources are available:

<https://courses.washington.edu/med610/radiology>

# Case

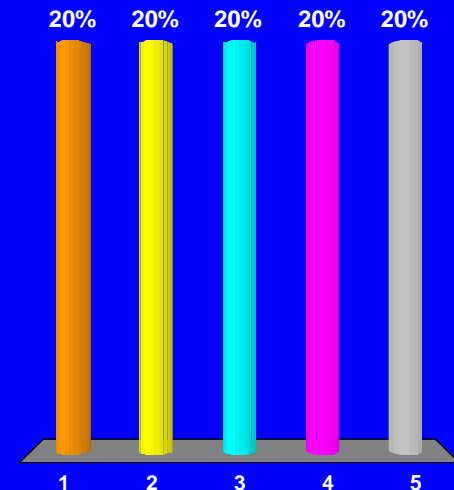
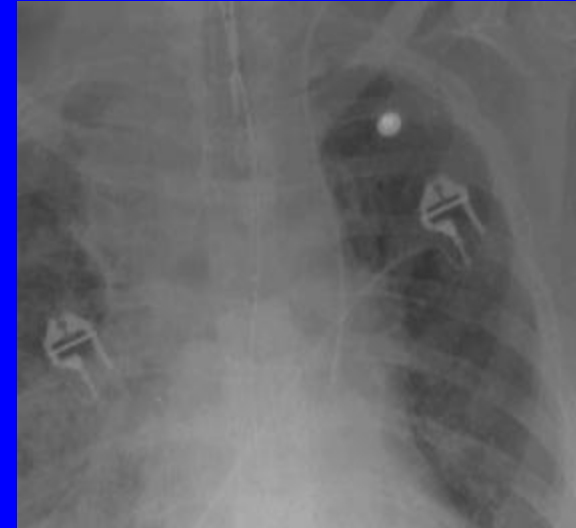
You put a central line into a 24 y.o. woman with Down's Syndrome and sepsis. After failing on the right side, you do the left side without ultrasound guidance. The line goes in smoothly with no problems threading the wire or passing the catheter. You suture it in place at the 17 cm mark. You order a post-procedure chest x-ray and obtain the following film:

# AP Chest X-ray



# After Reviewing The Chest X-Ray, What Should You Do Next?

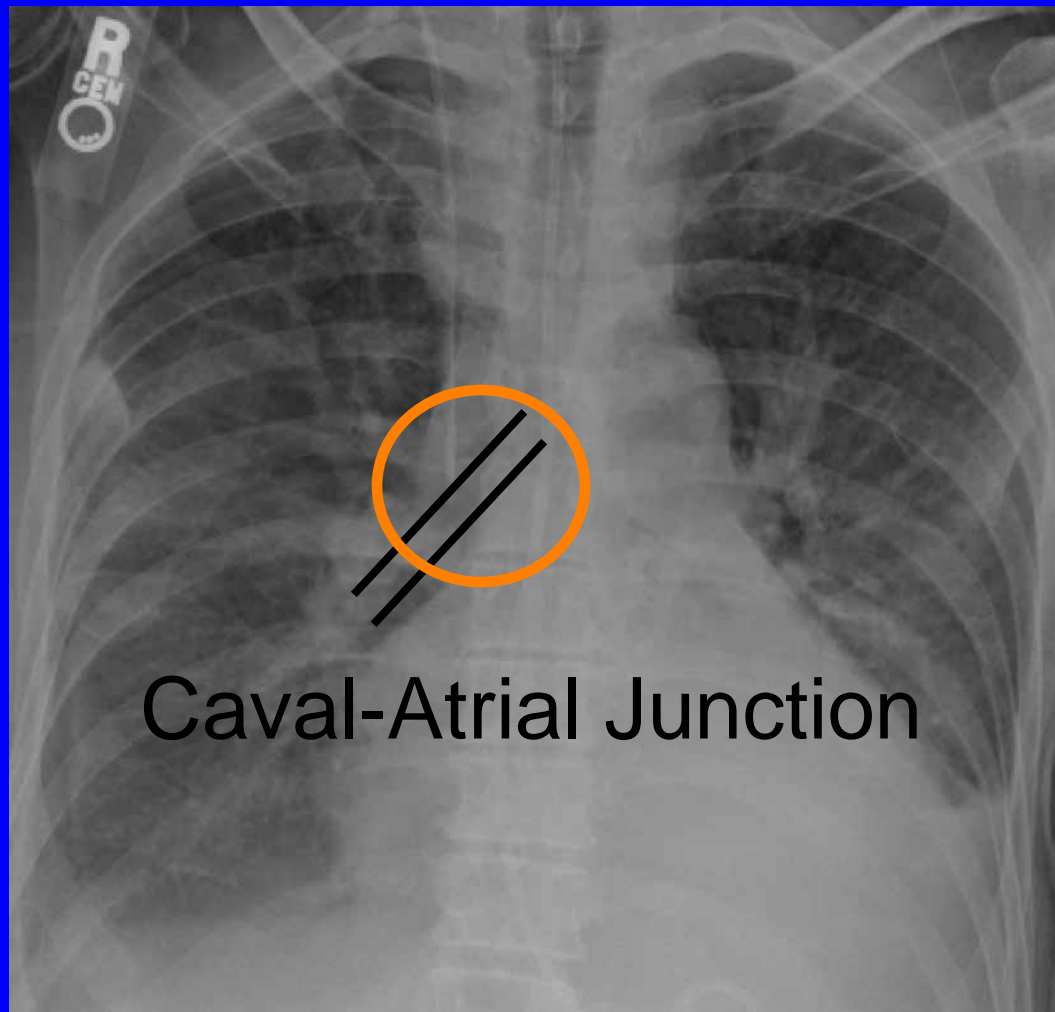
1. Tell the nurse it's okay to use the line
2. Order a blood gas off the line and the wrist
3. Remove the line
4. Ask vascular surgery to pull the line
5. Ask IR to help confirm line position



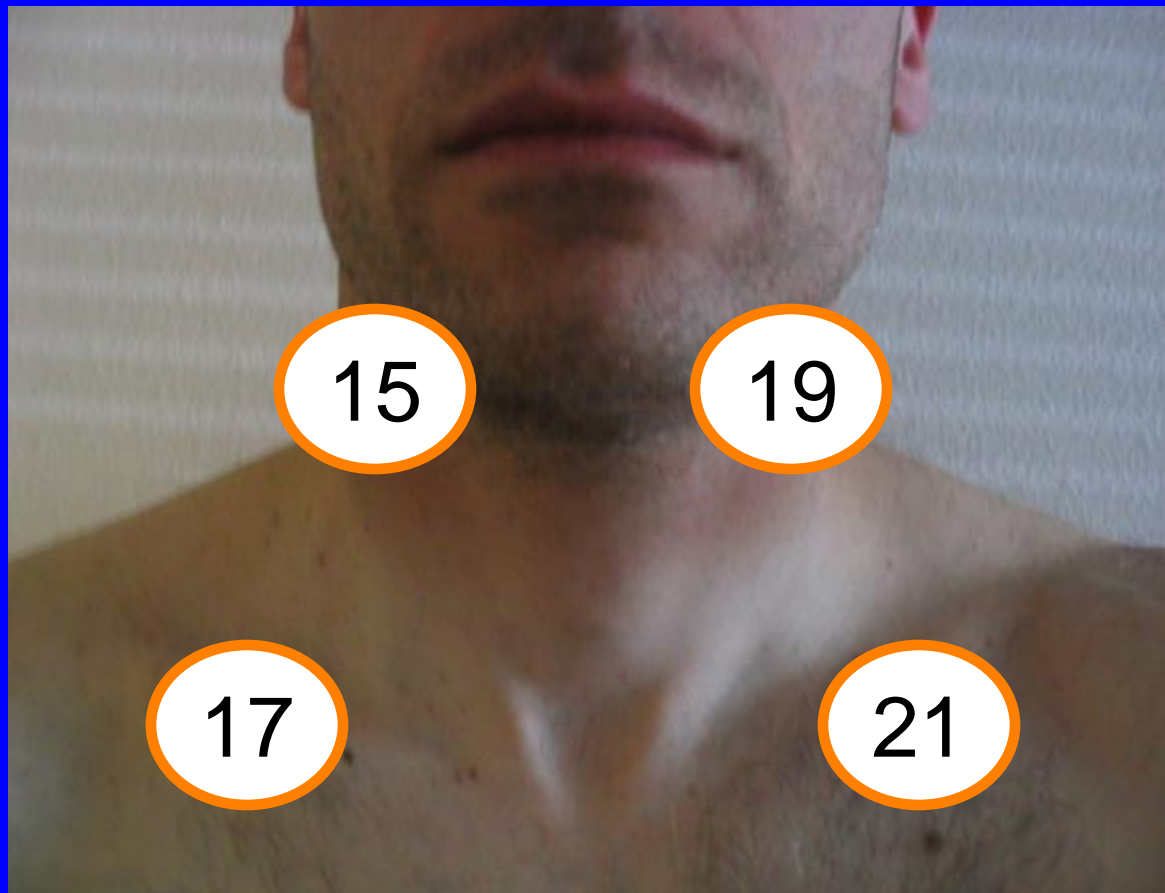
Issue 1:

Lines and Tubes

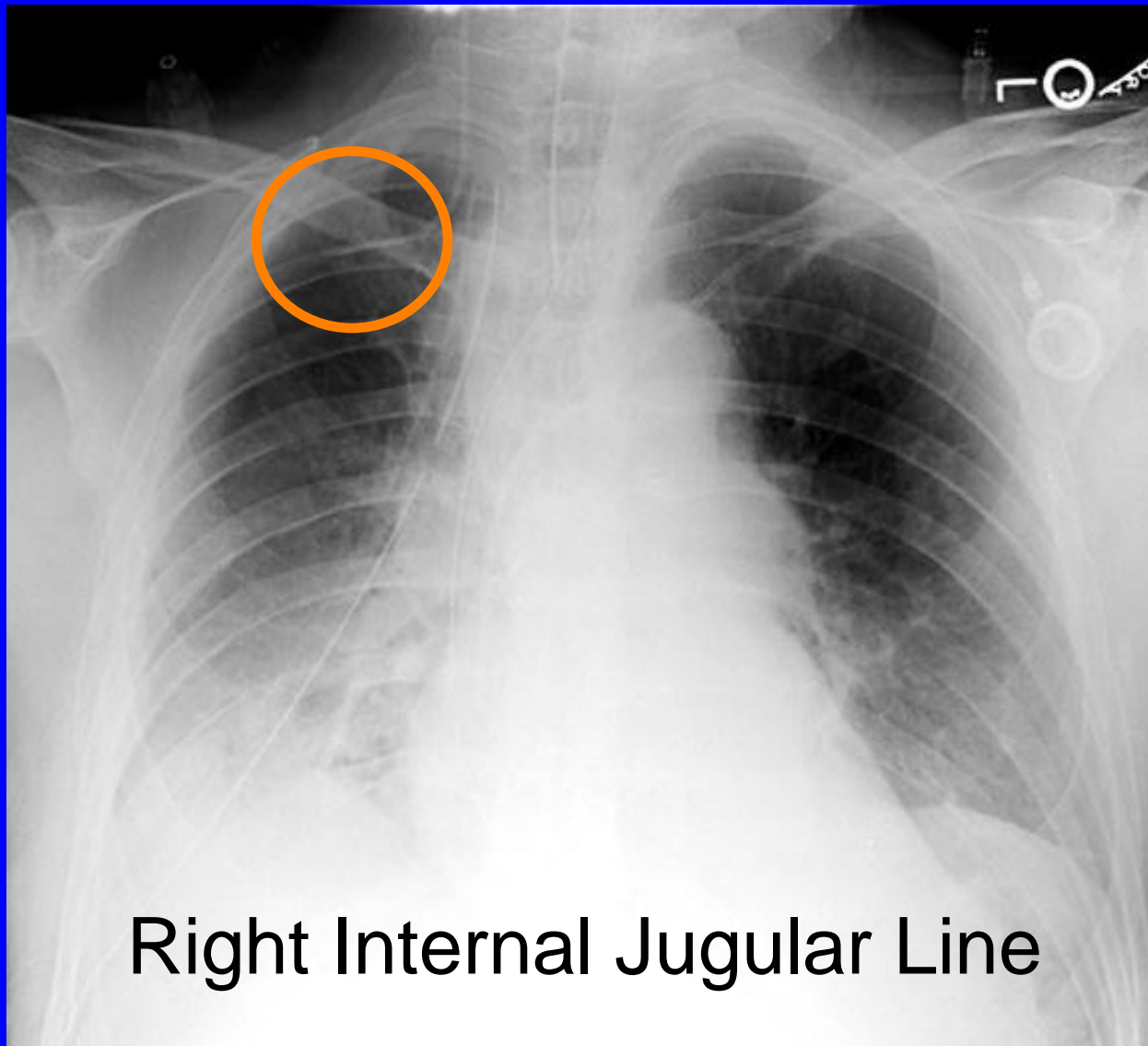
# Where Your Triple Lumen Catheter Tips Should Be



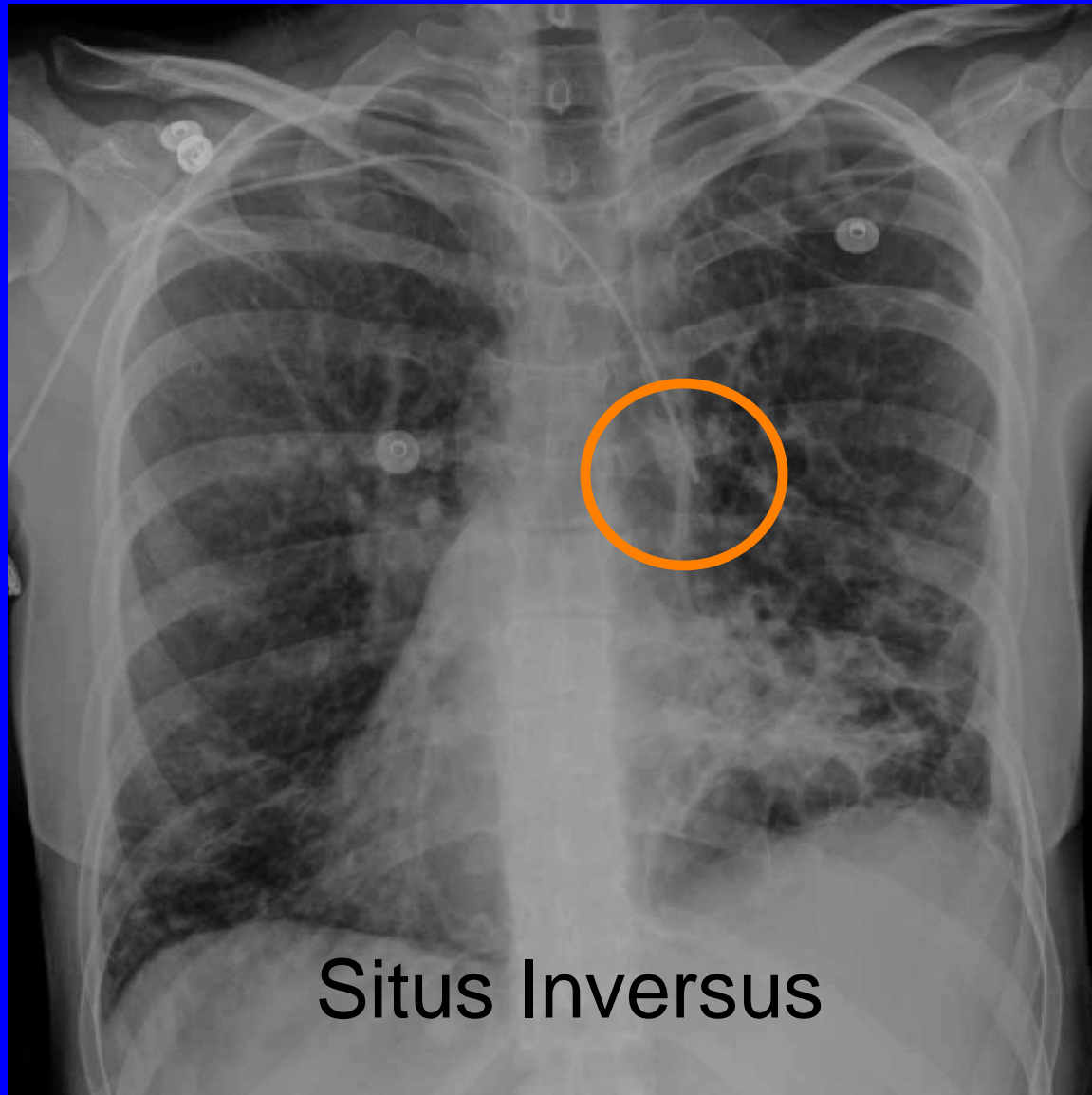
# How To Get The Tip to the Caval-Atrial Junction



# Can You Use This Line?



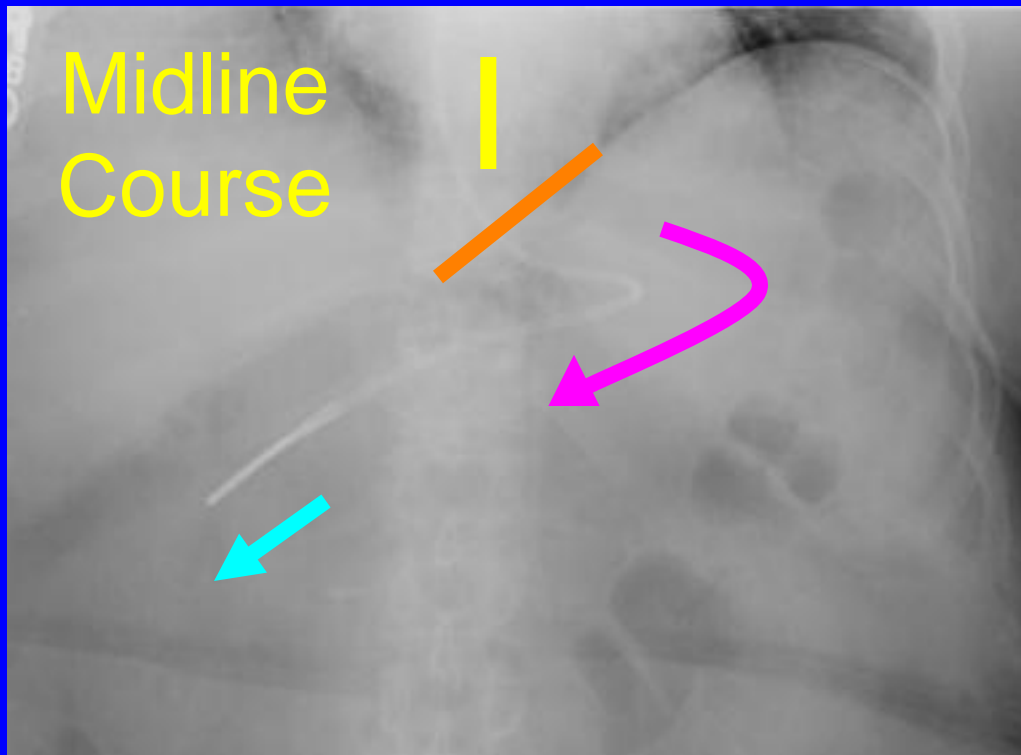
# Can You Use This Line?



# Determining if the Line is In the Artery or Vein

- Draw simultaneous blood gases off the central line and the radial artery and compare the results
- Transduce a pressure waveform (pressure transduction during line placement minimizes the risk of this complication)

# Guidelines for Feeding Tube Placement



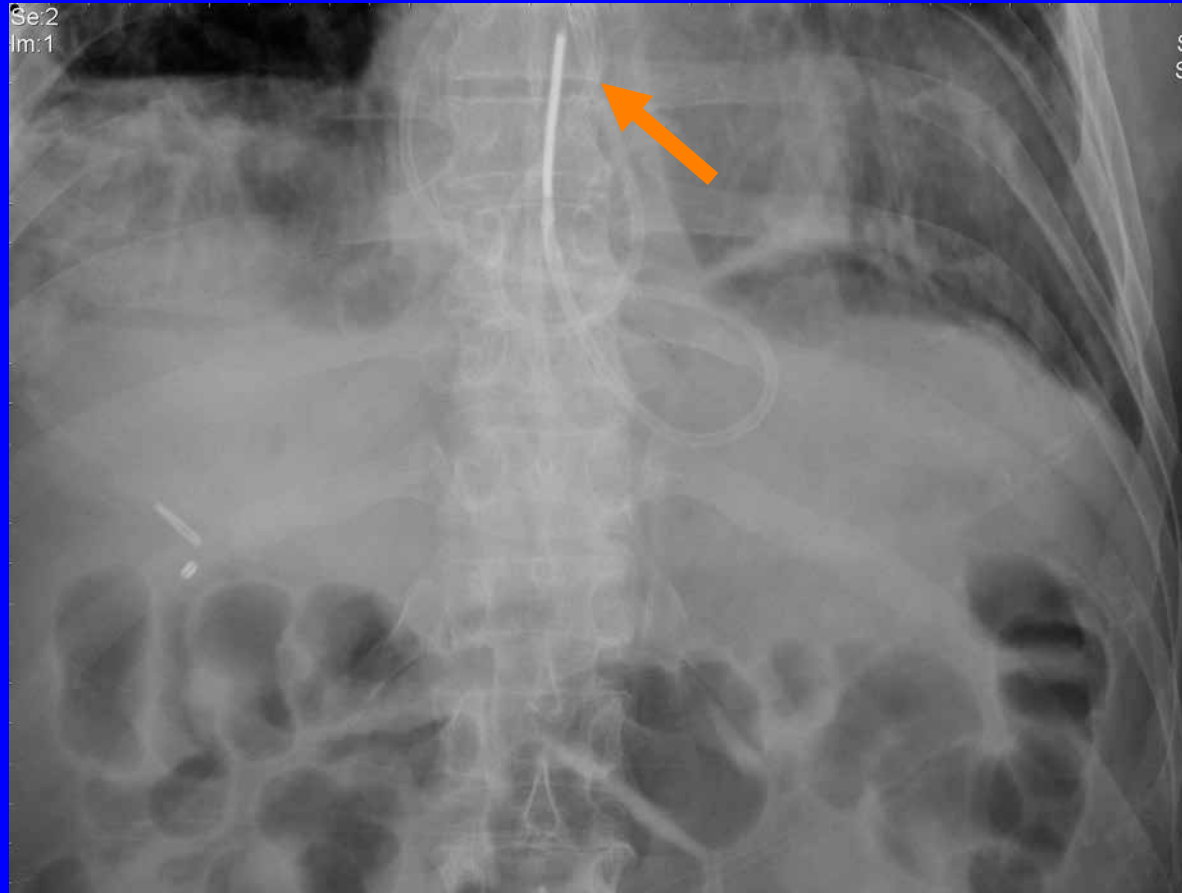
Below Diaphragm

Heads Left First  
Then Goes Right

Tip Points Away  
From G-E Junction

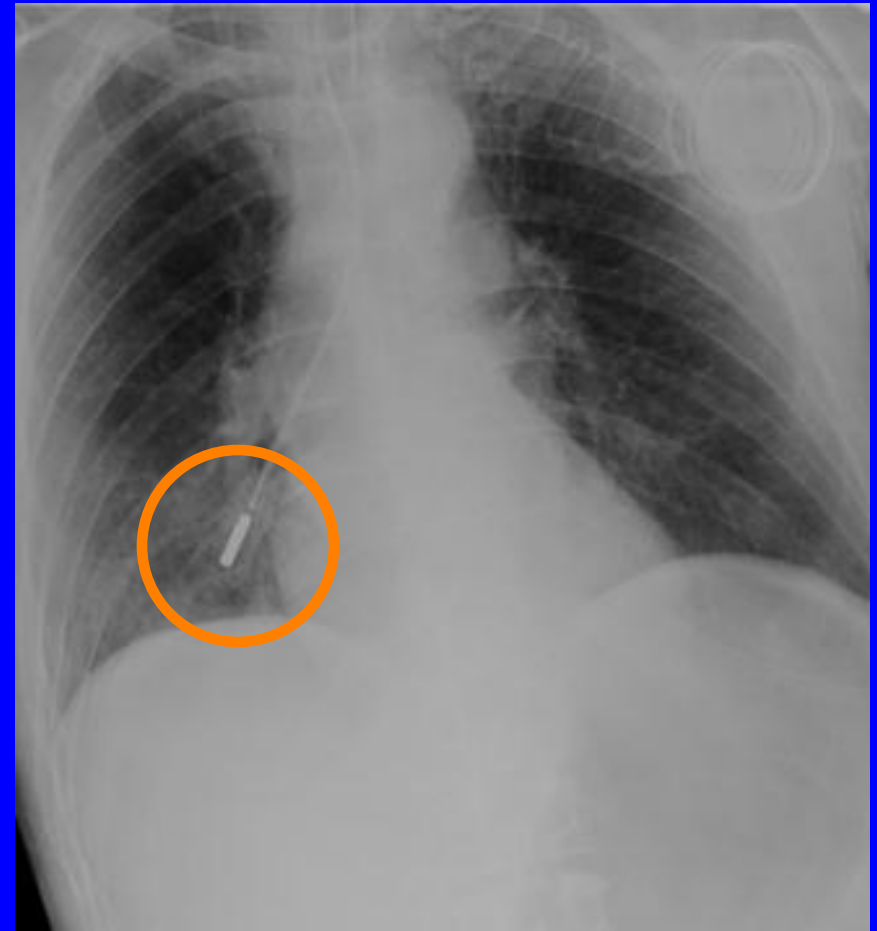
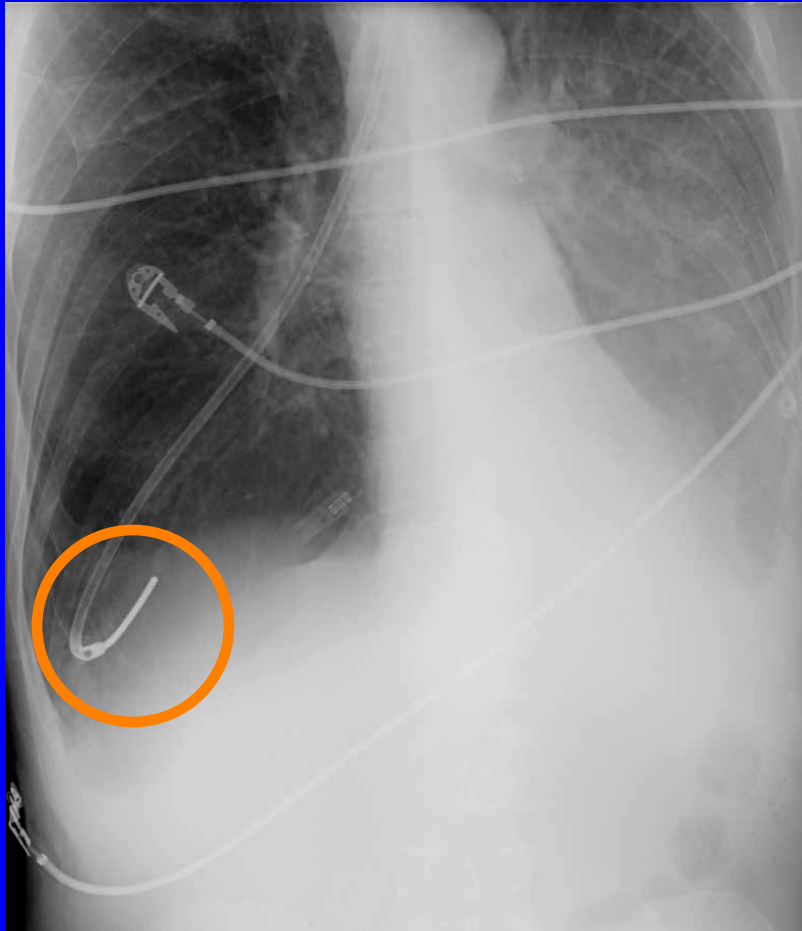
Gastric versus duodenal placement does not change risk of aspiration

# An Example of a Bad Feeding Tube Placement

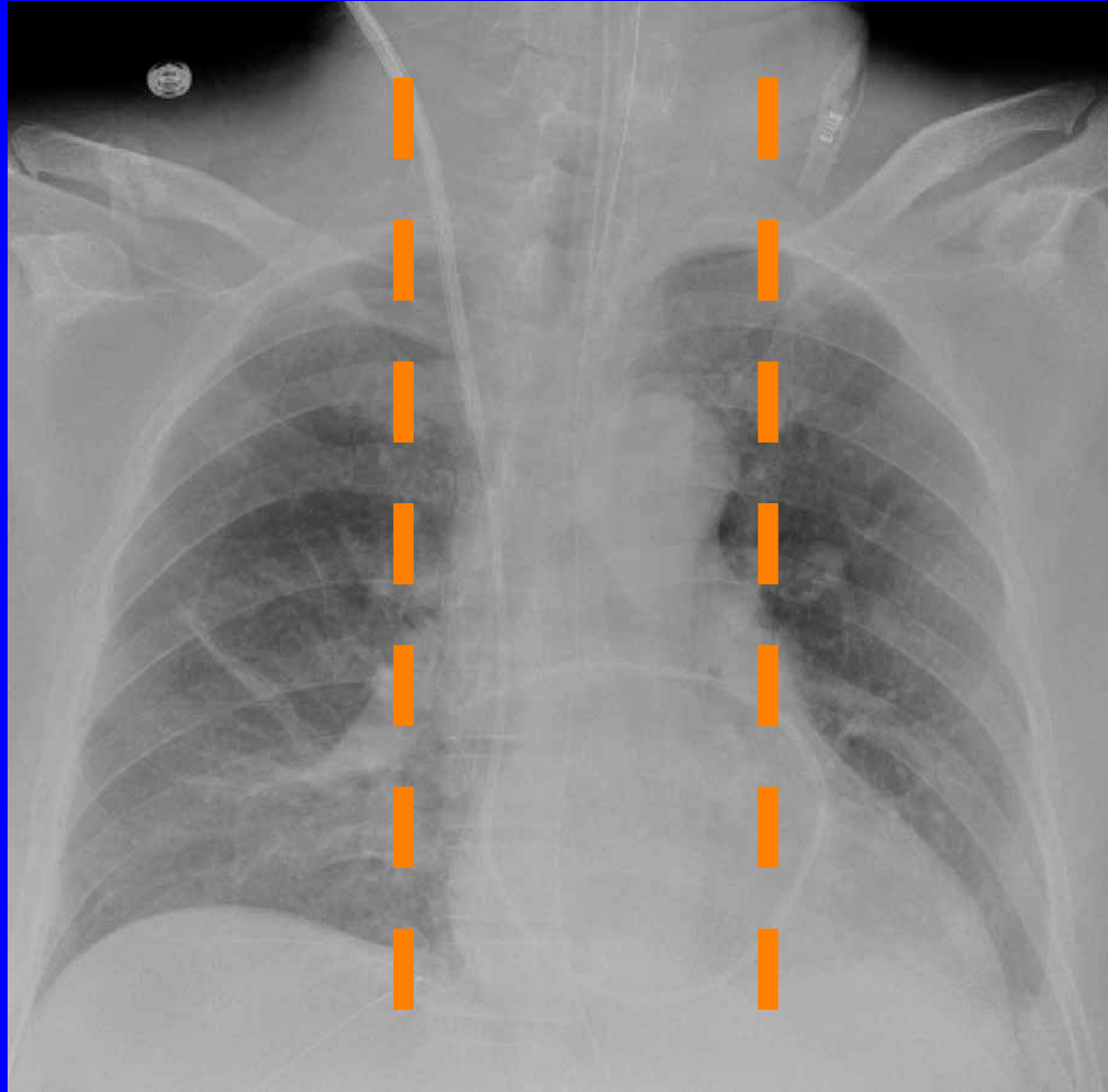


Tip Loops Back Into The Esophagus

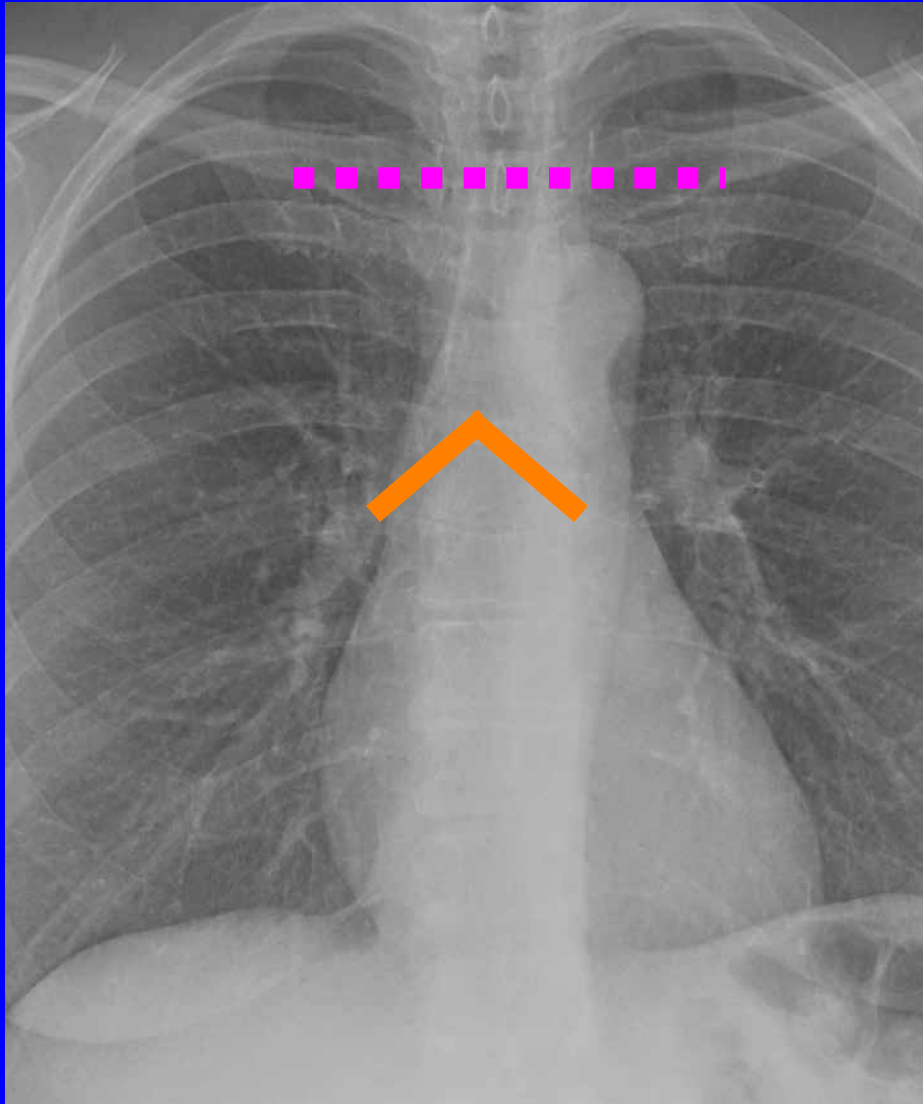
# Can You Spot the Tips of These Feeding Tubes?



# Swan-Ganz Catheters



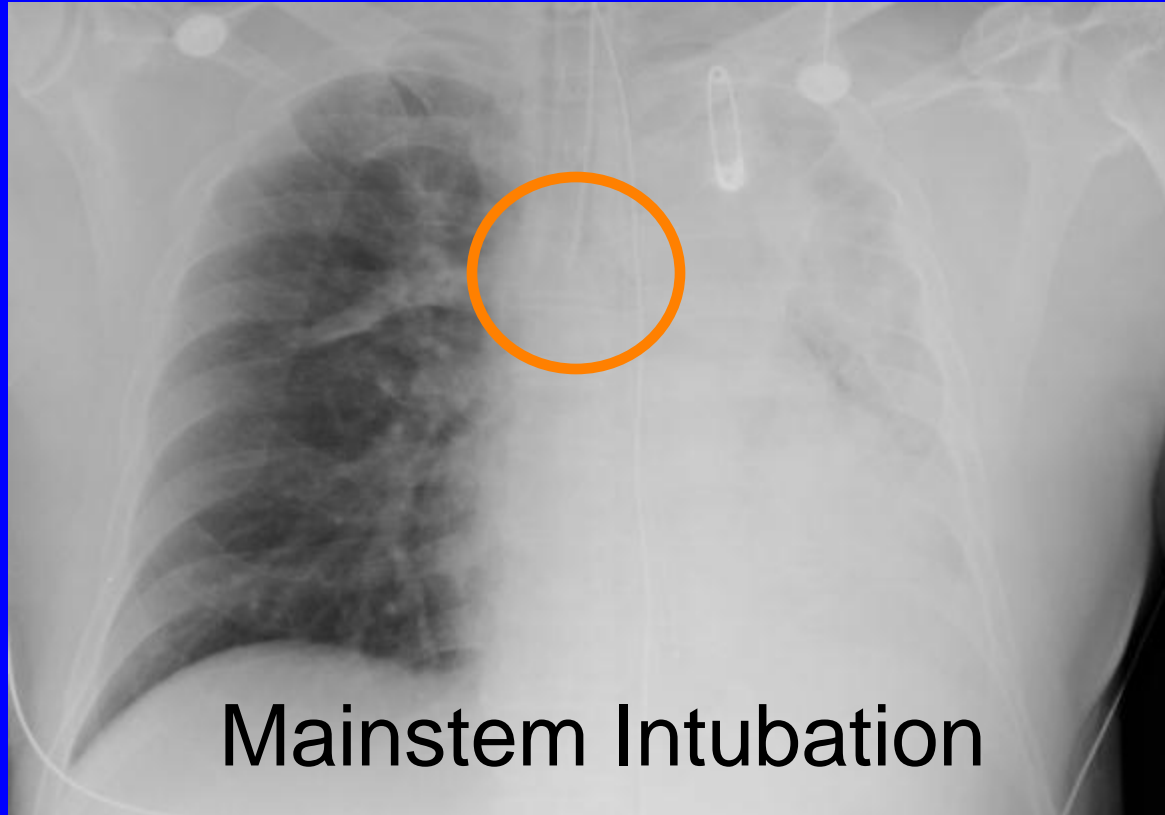
# Endotracheal Tubes



Tip Below The  
Clavicles  
(Or < 6 cm Above Carina)

Tip 2-4 cm Above  
The Carina

# If Your Endotracheal Tube Is Too Deep...



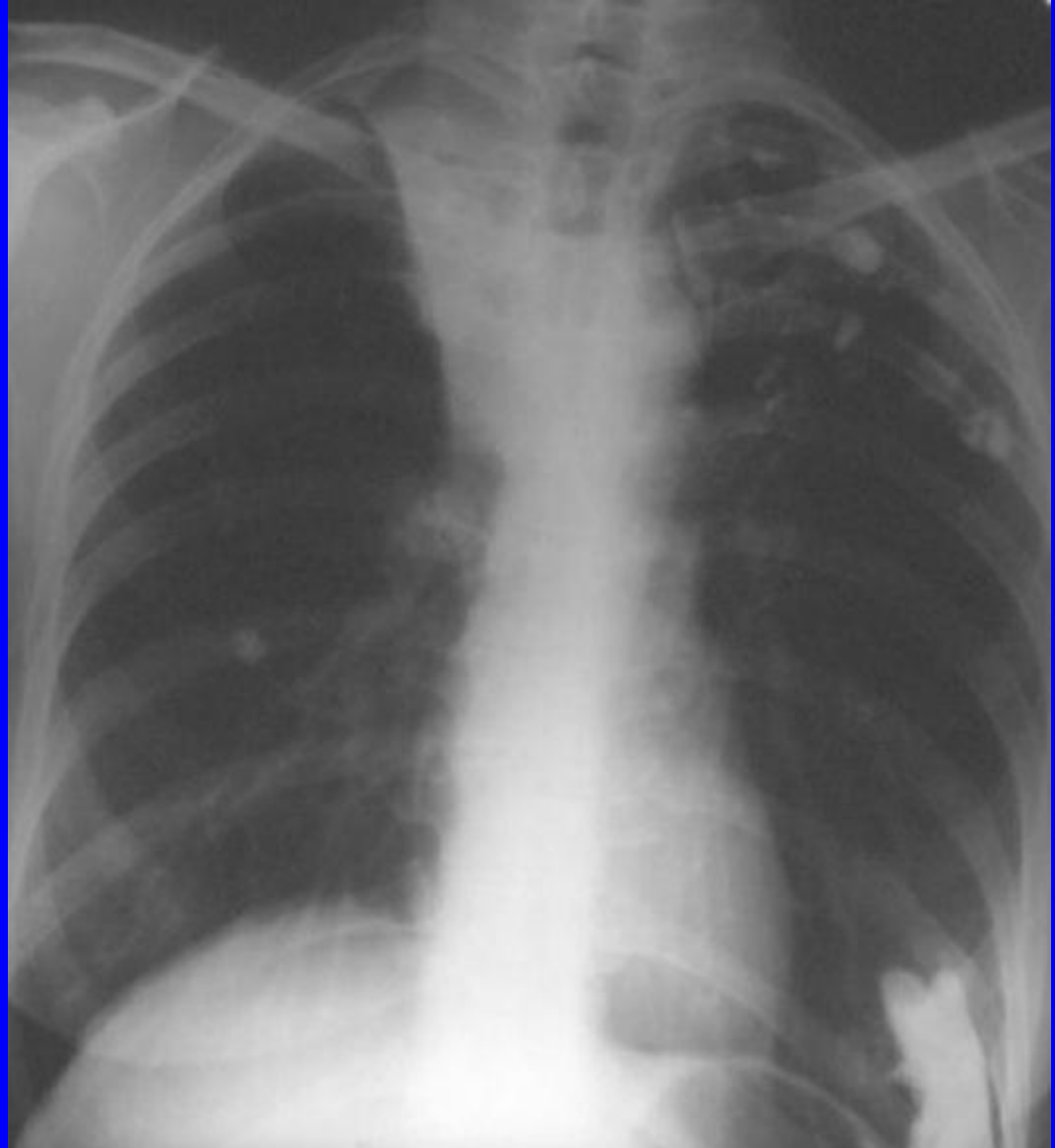
Mainstem Intubation

Tubes that are too high are at risk for coming out inadvertently (unplanned extubation)

# Case

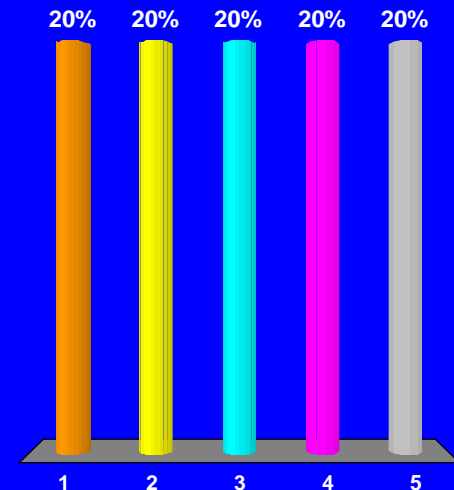
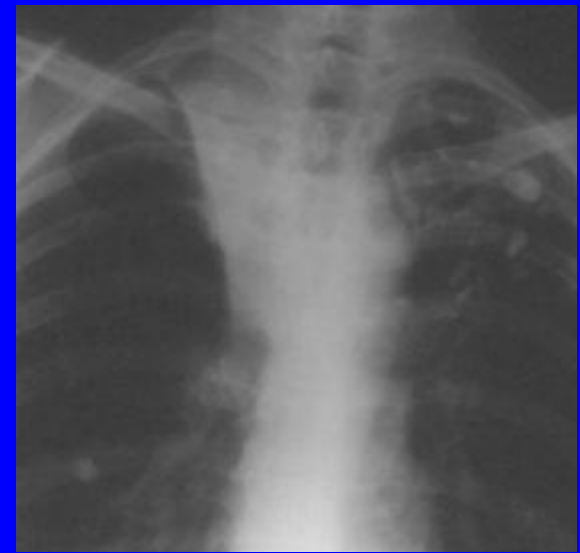
A 62 y.o. man with chronic bronchitis is admitted with a COPD exacerbation. He is started on IV steroids and nebulizers but not put on antibiotics because his chest x-ray did not have an opacity. On hospital day 2, he is put on oral steroids. Later, you are called because his oxygen saturation fell to the low 80% range and is now more short of breath. A chest x-ray shows the following:

His  
Chest  
X-ray



# After Reviewing The Chest X-Ray, What Should You Do Next?

1. Start IV Levofloxacin
2. Restart the IV steroids
3. Increase nebulizer frequency
4. Place a chest tube on the right
5. Ask the RT to perform Chest PT on the right



Issue 2:

Lobar Collapse

# Causes of Lobar or Segmental Collapse

- Older patients: Tumors obstructing the airway lumen
- Younger patients: usually asthma and retained airway secretions
- Infants: retained foreign bodies
- Post-operative patients: retained secretions
- Intubated patients: mainstem intubation or ET tube migration

# Features of Lobar Collapse on Chest X-ray

- Tracheal deviation TOWARD the collapse
- Mediastinal shift TOWARD the collapse
- Elevated hemidiaphragm
- Decreased vascular markings on side of collapse
- Opposite lung herniates across midline
- Hilar mass or other evidence of cancer
- Foreign body visible on chest x-ray

# The Unilateral Lung Whiteout



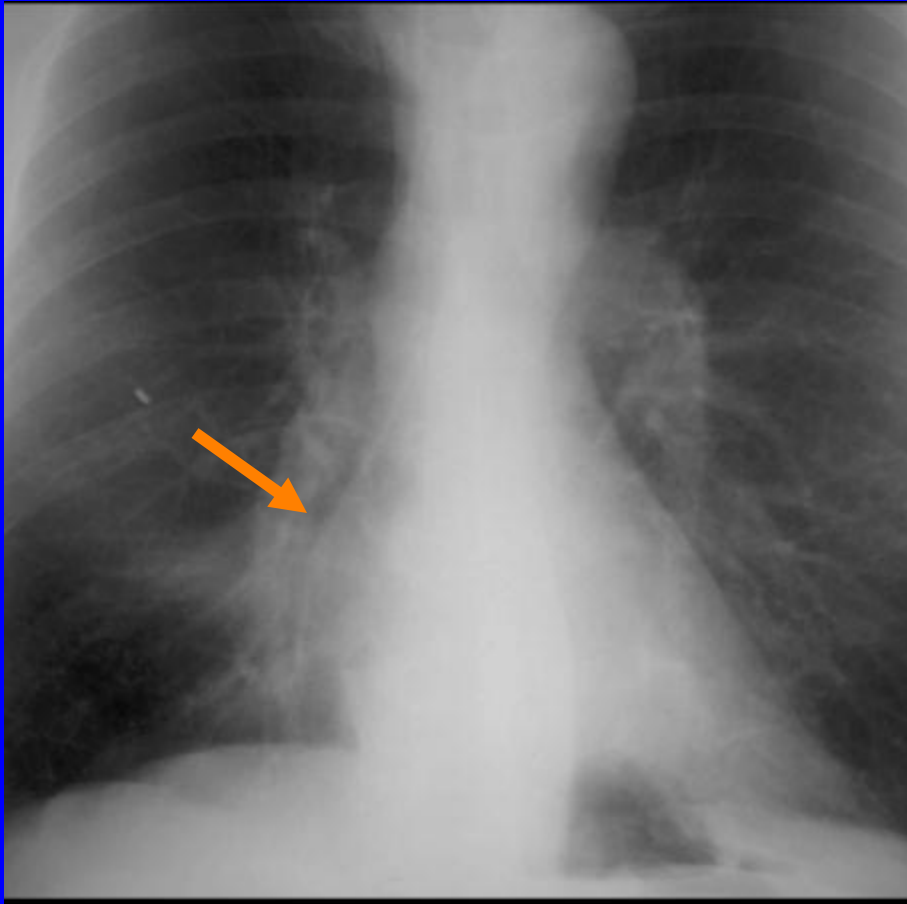
## Differential Diagnosis

- Whole Lung Collapse
- Massive Pleural Effusion

# Distinguishing Lung Collapse From Big Effusions

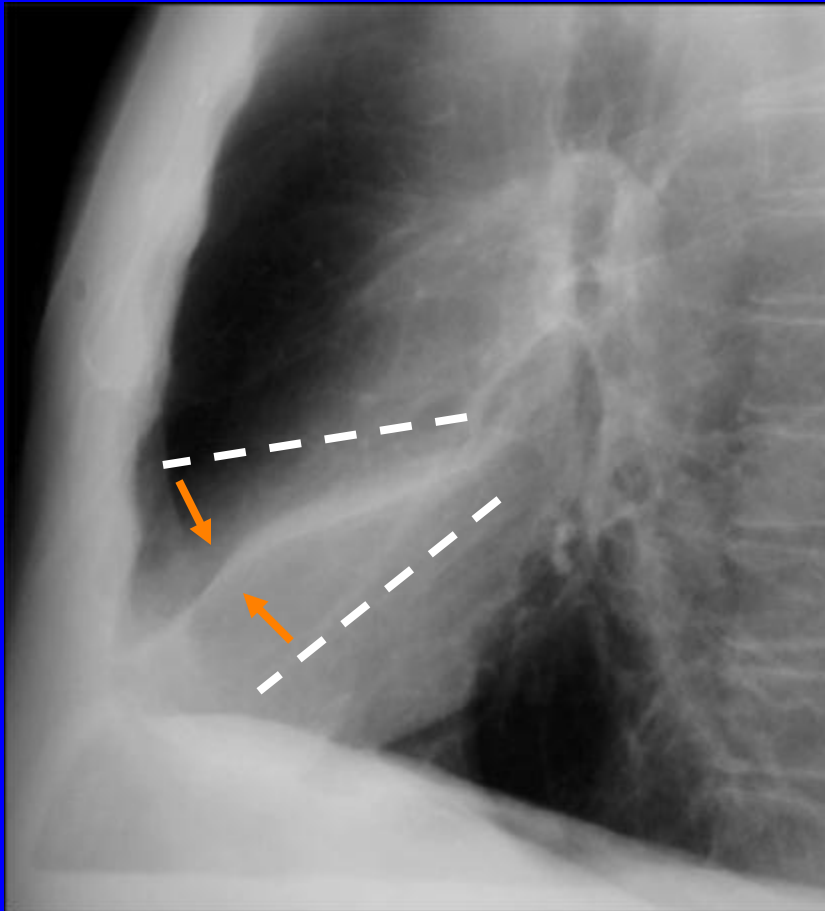
In whole lung collapse, the trachea and mediastinal structures deviate **towards** the opacified side whereas in very large effusions they may move **away** from the opacified side of the chest.

# Right Middle Lobe Collapse on PA or AP Films



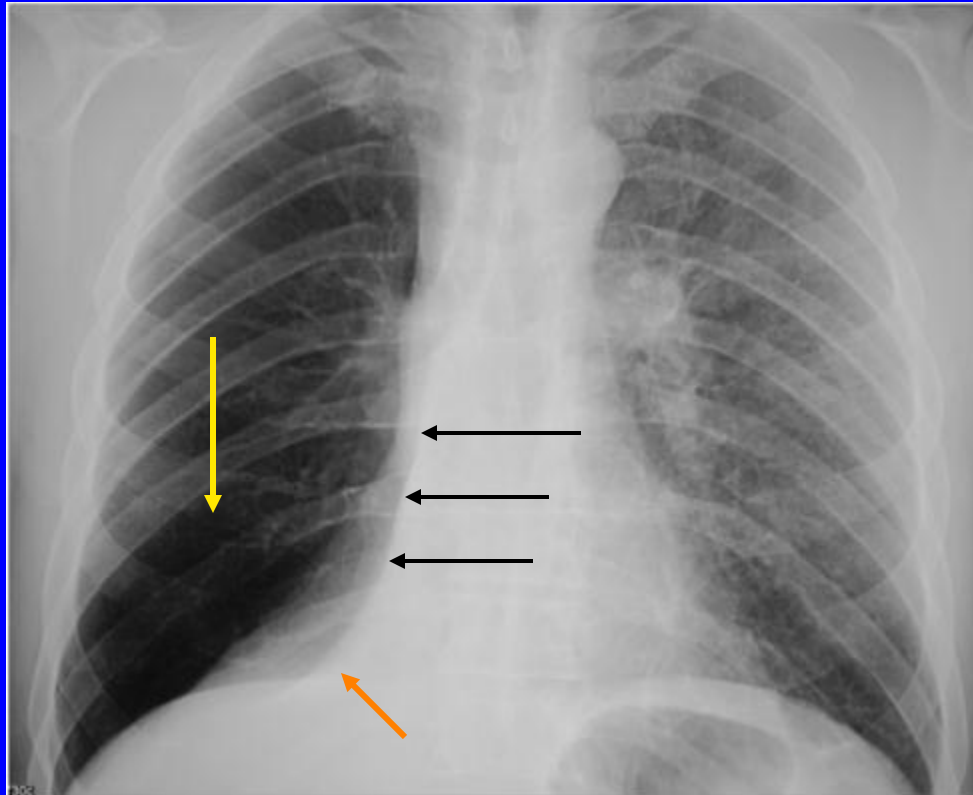
Opacity over the  
right heart  
border

# Right Middle Lobe Collapse On Lateral Film



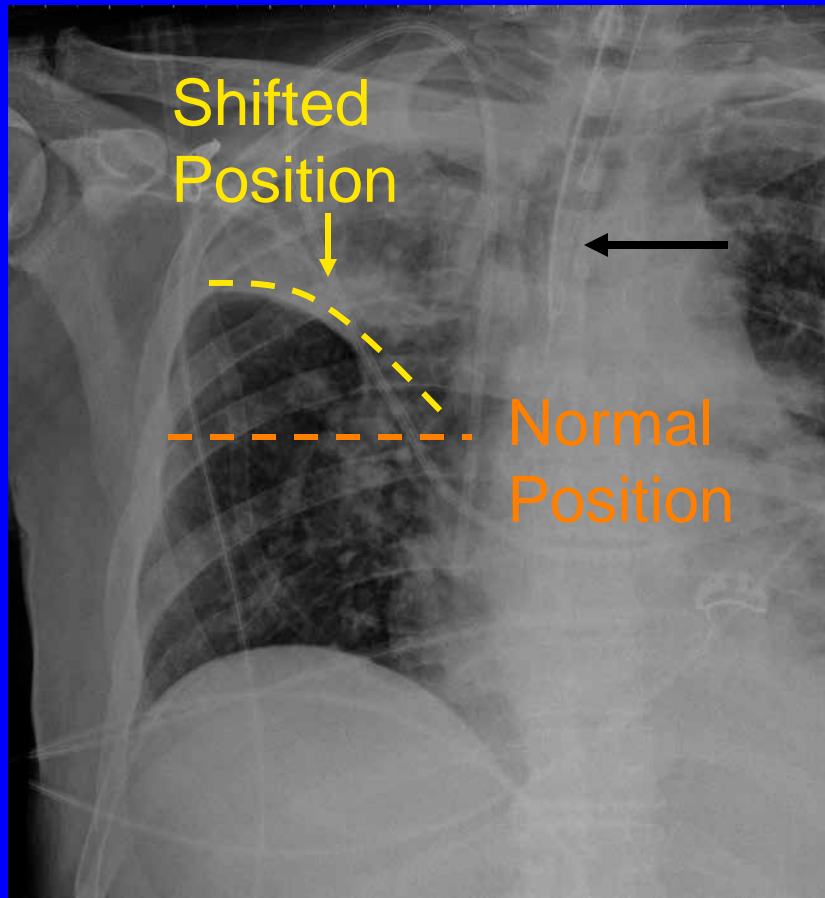
The dashed lines show the normal middle lobe borders. The thin sliver of opacity is the collapsed middle lobe

# Right Lower Lobe Collapse On PA or AP Films



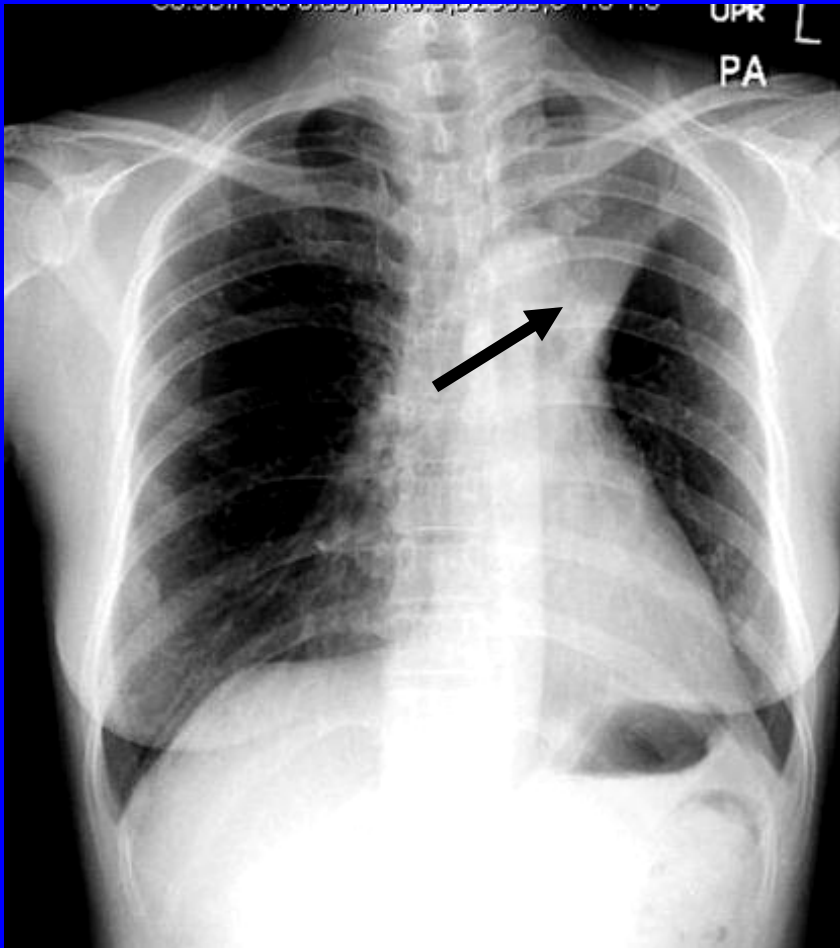
- Medial portion of right diaphragm is obscured (**orange**)
- Increased lucency over lower right part of chest (**yellow**)
- Extra shadow near right side of heart (**black**)

# Right Upper Lobe Collapse On PA or AP Films



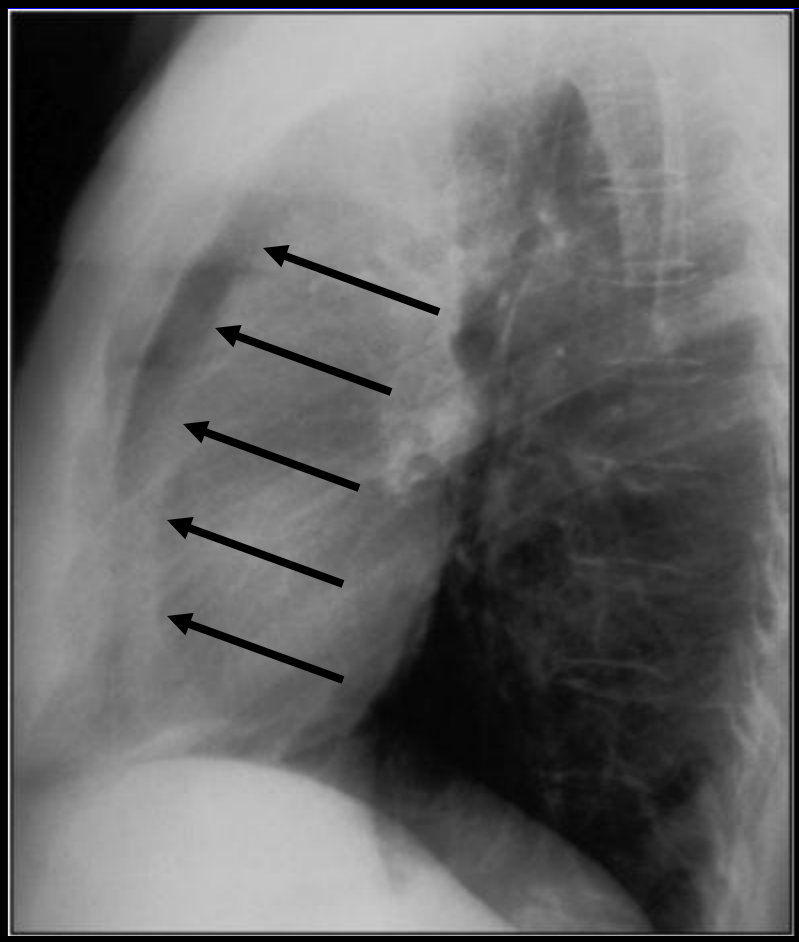
- Opacity over superior aspect of right chest
- Tracheal deviation to the right
- Upward and medial shift of minor fissure

# Left Upper Lobe Collapse On PA or AP Films



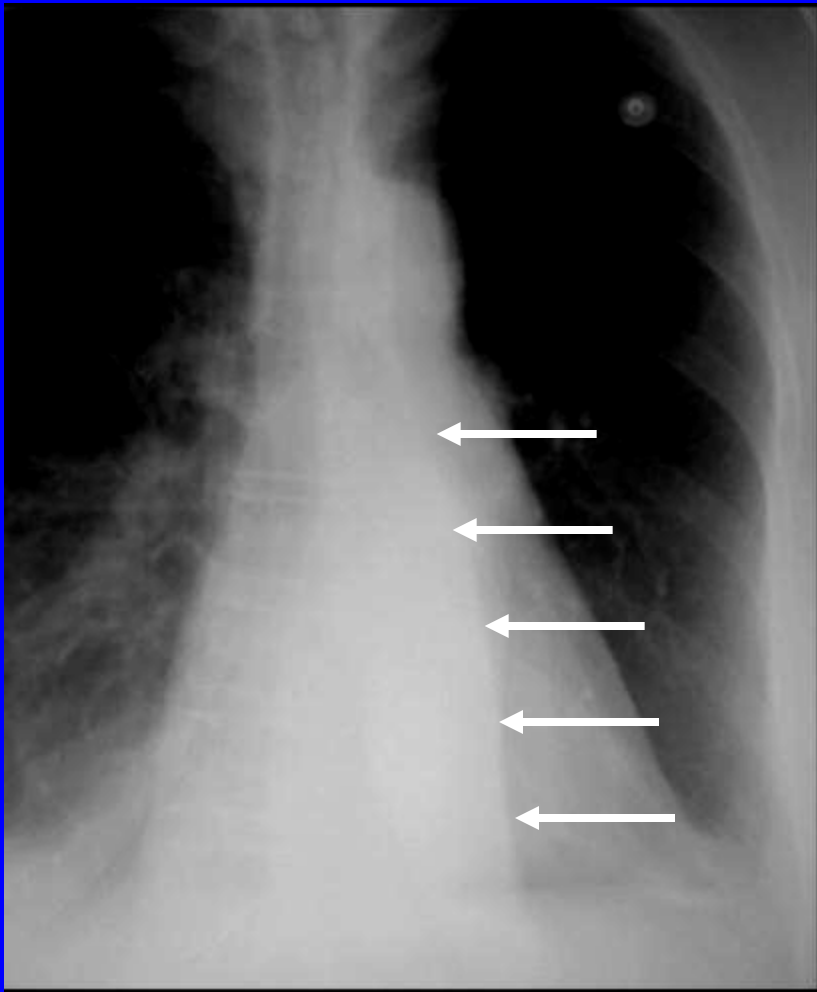
- Hazy opacity over superior aspect of left chest
- The opacity silhouettes the left upper heart border (black arrow)
- Deviation of trachea and heart to the left

# Left Upper Lobe Collapse On Lateral Film



- The left upper lobe shifts upward and anterior with collapse
- Opacity over antero-superior portion of chest.
- Antero-superior shift of the oblique fissure (arrows)

# Left Lower Lobe Collapse On PA or AP Films

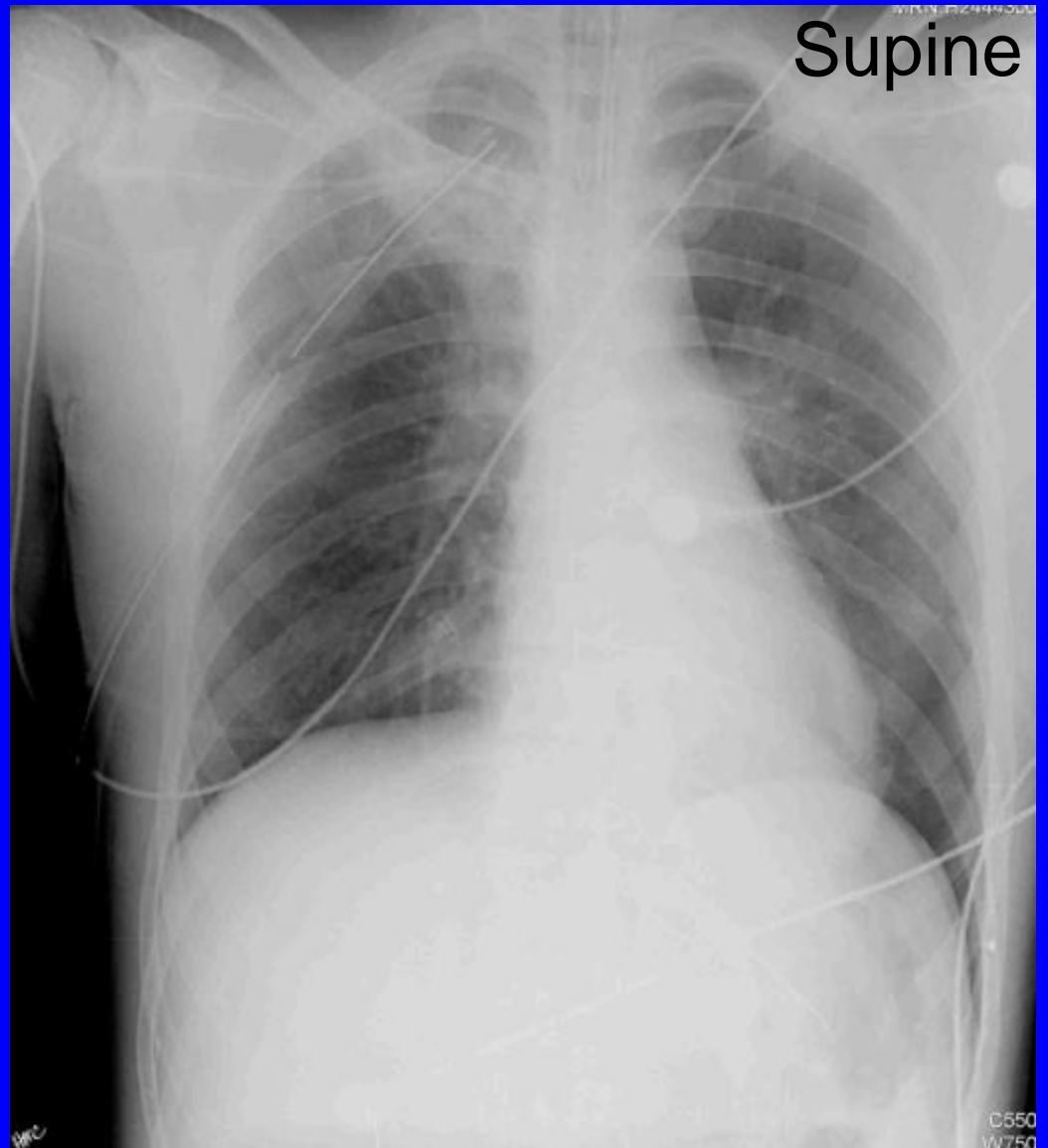


- Triangular opacity visible through the cardiac shadow (arrows)
- Obscured left hemidiaphragm
- Shift of heart and trachea to the left

# Case

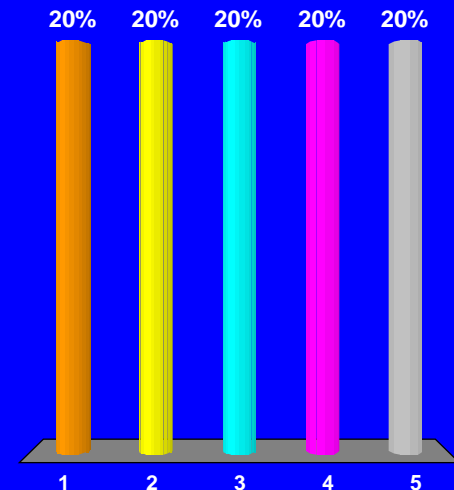
The ER admits a patient who was in a car accident earlier in the evening. His trauma work-up was negative except for a right pneumothorax which was managed with a chest tube. Upon arrival on the floor, he has an oxygen saturation of 90% on 2 liters nasal cannula. You review the x-ray done in the ER after the chest tube was placed and see the following:

# The AP Chest X-ray



# After Reviewing The Chest X-Ray, What Should You Do Next?

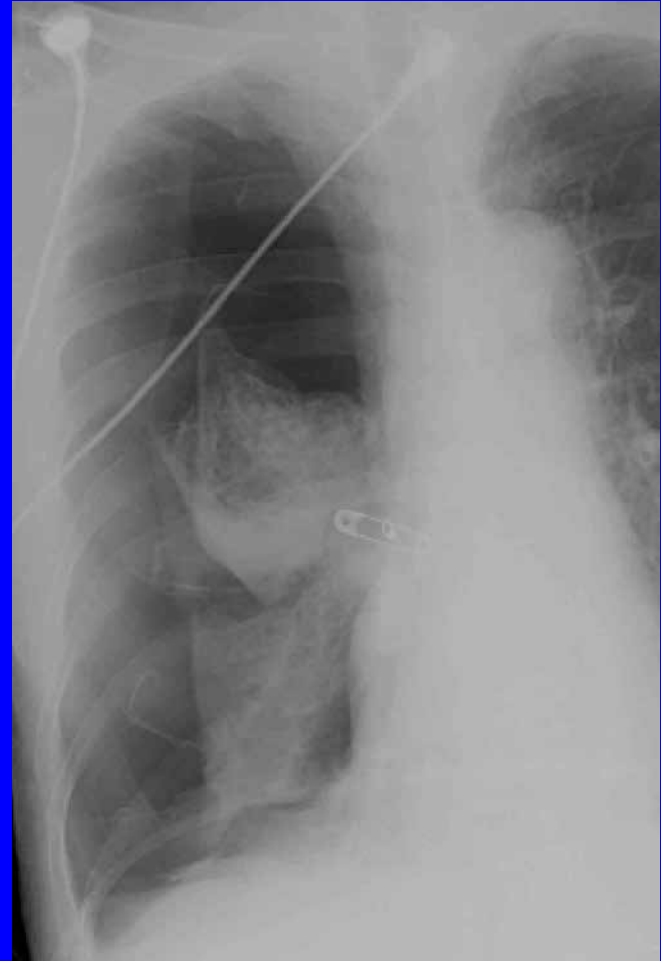
1. Order a CT pulmonary angiogram
2. Place another right chest-tube
3. Start IV Levofloxacin
4. Perform an upright chest x-ray
5. Consult pulmonary for bronchoscopy



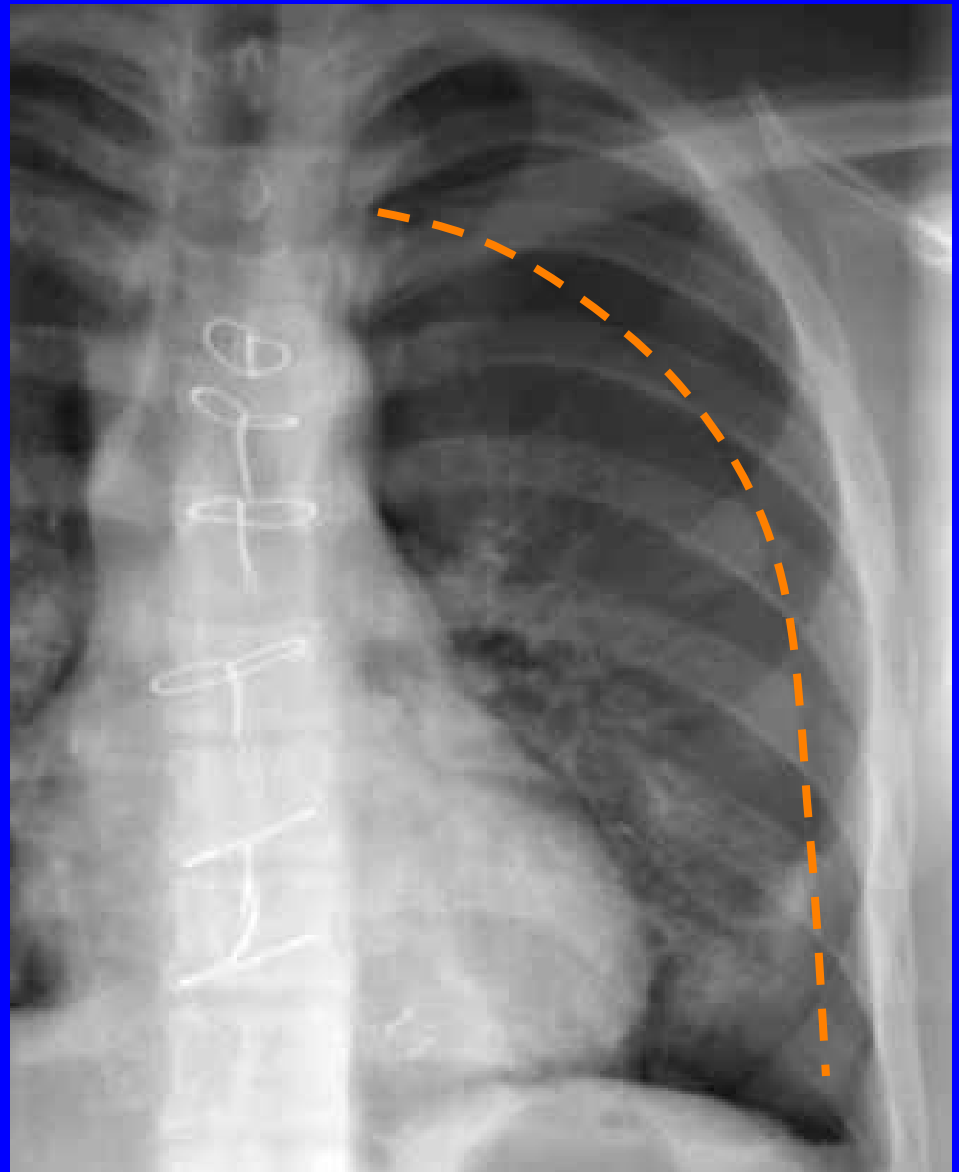
# Issue 3:

Air That Should  
Not Be There

# Some Pneumothoraces Are Obvious



Some Are  
Less  
Obvious

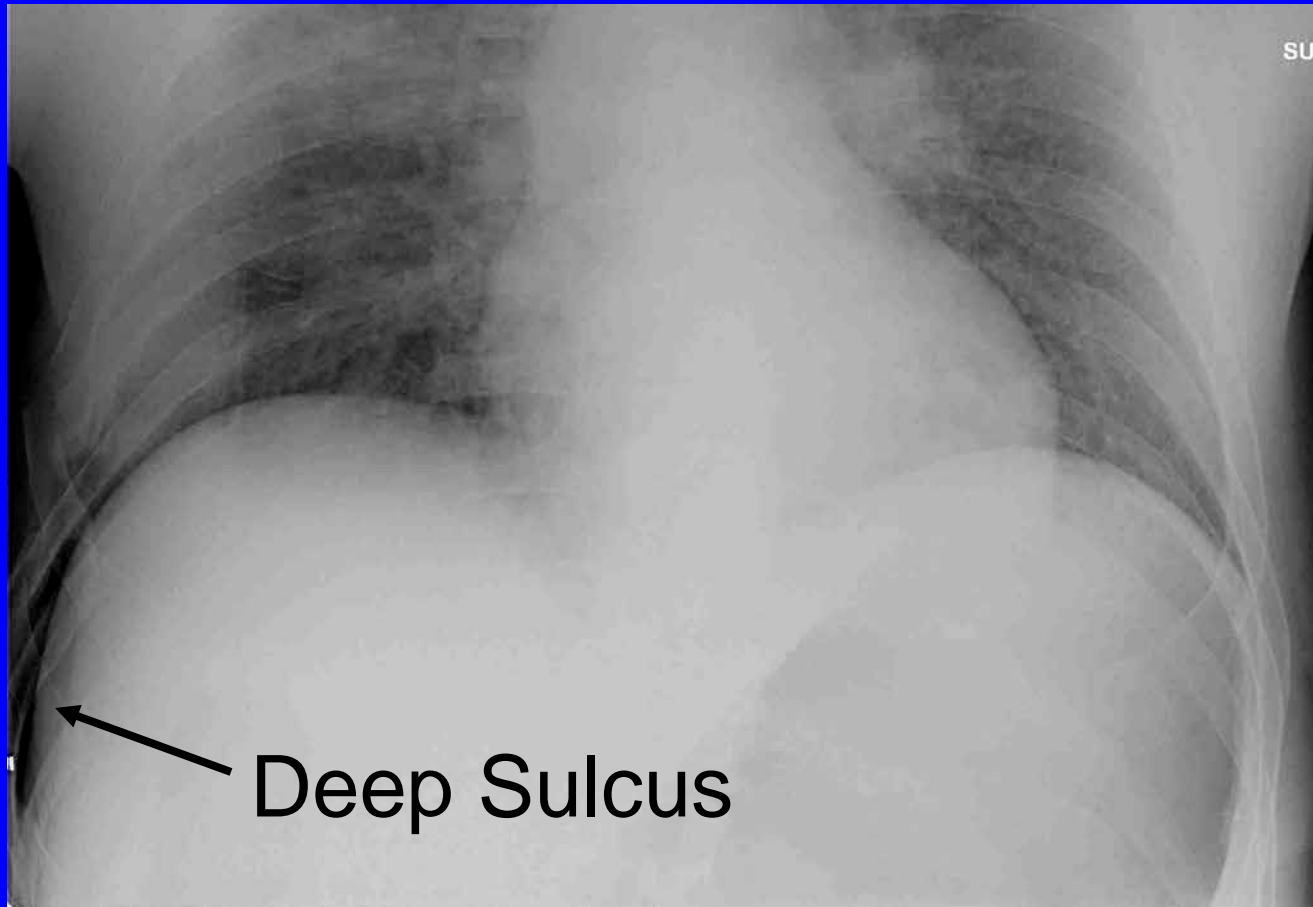


If Unsure: expiratory films or non-contrast CT

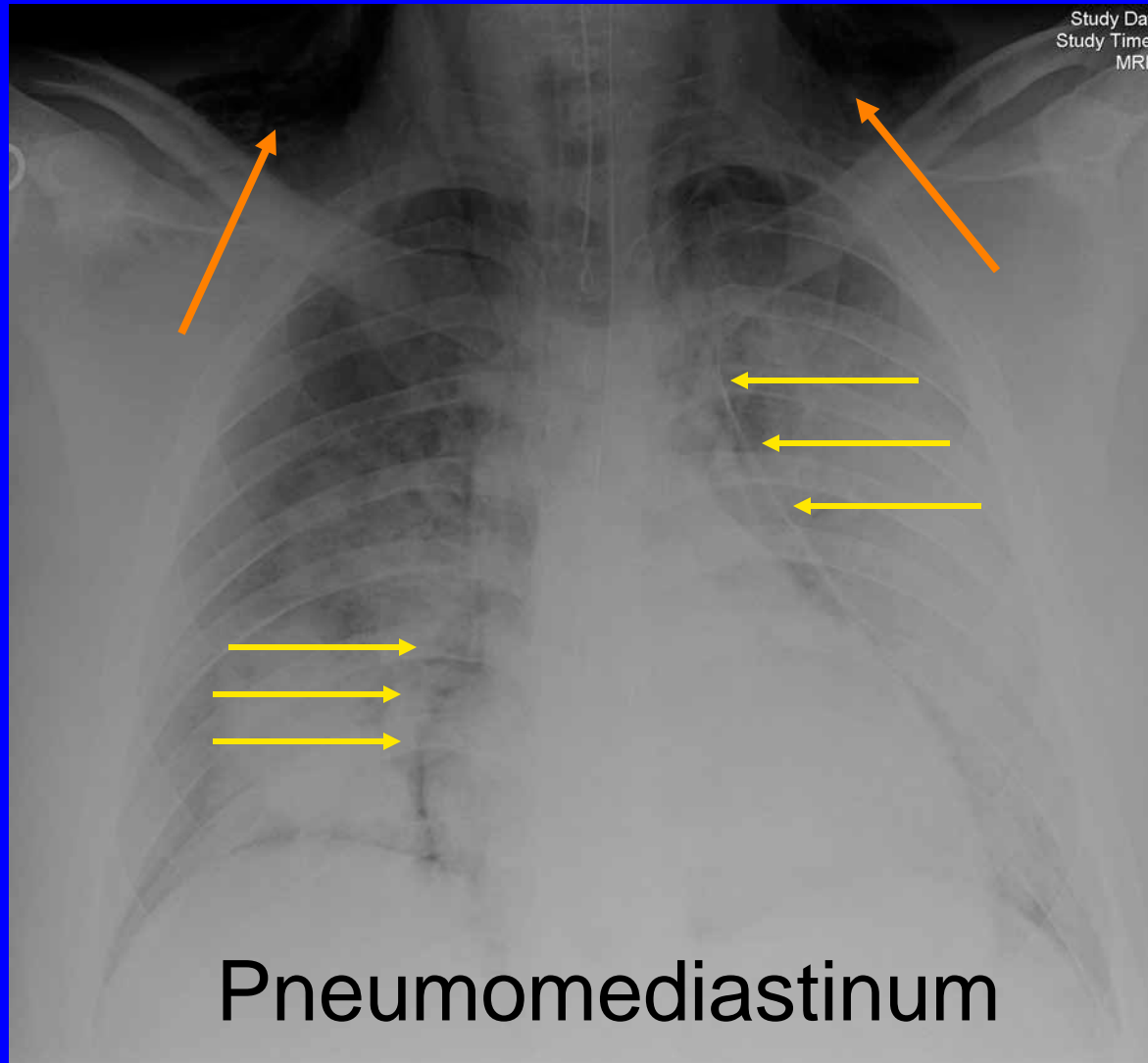
# Pneumothorax Can Look Different in Supine Patients

- Pleural air moves to the costophrenic recess when patients are supine
- Instead of the classic findings of pneumothorax, patients have a deep sulcus sign: deep, narrow sulcus that is asymmetric relative to the other side
- To confirm the presence of pneumothorax: repeat the x-ray with the patient in upright position

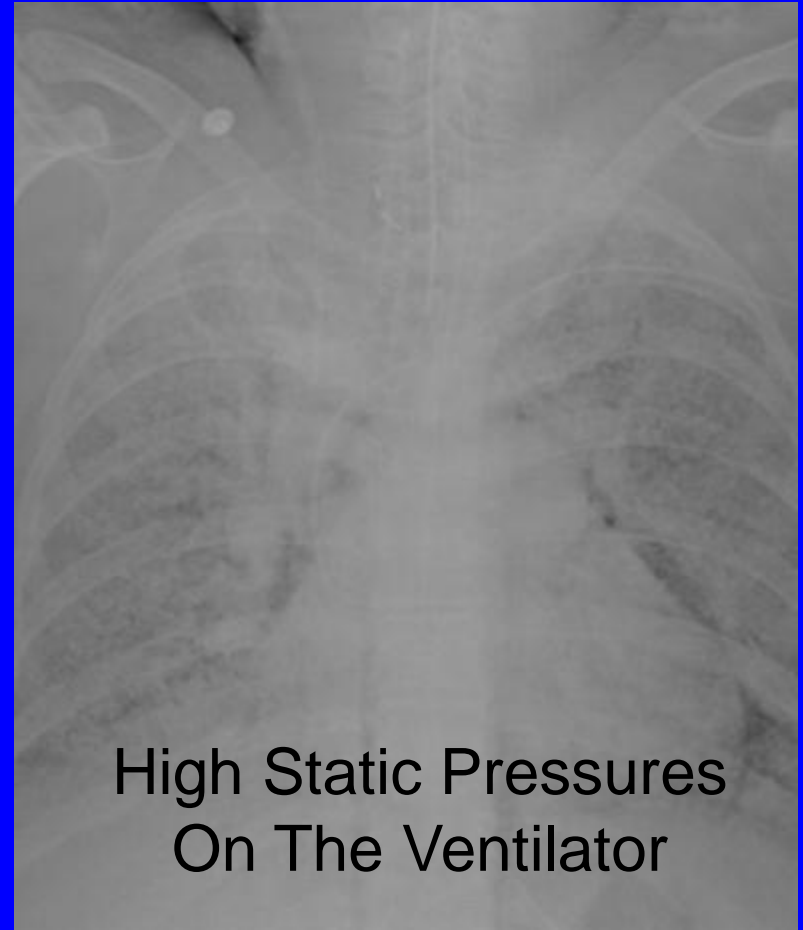
# An Example of a Deep Sulcus Sign



# What's Wrong in This Film?

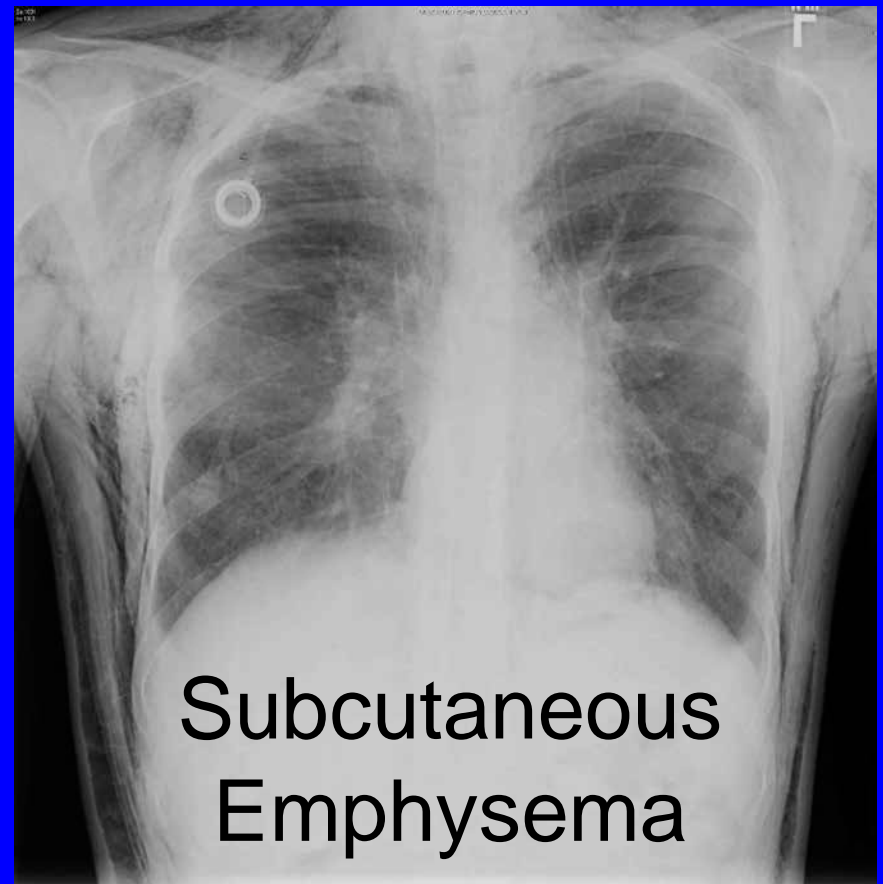


# Other Examples of Pneumomediastinum

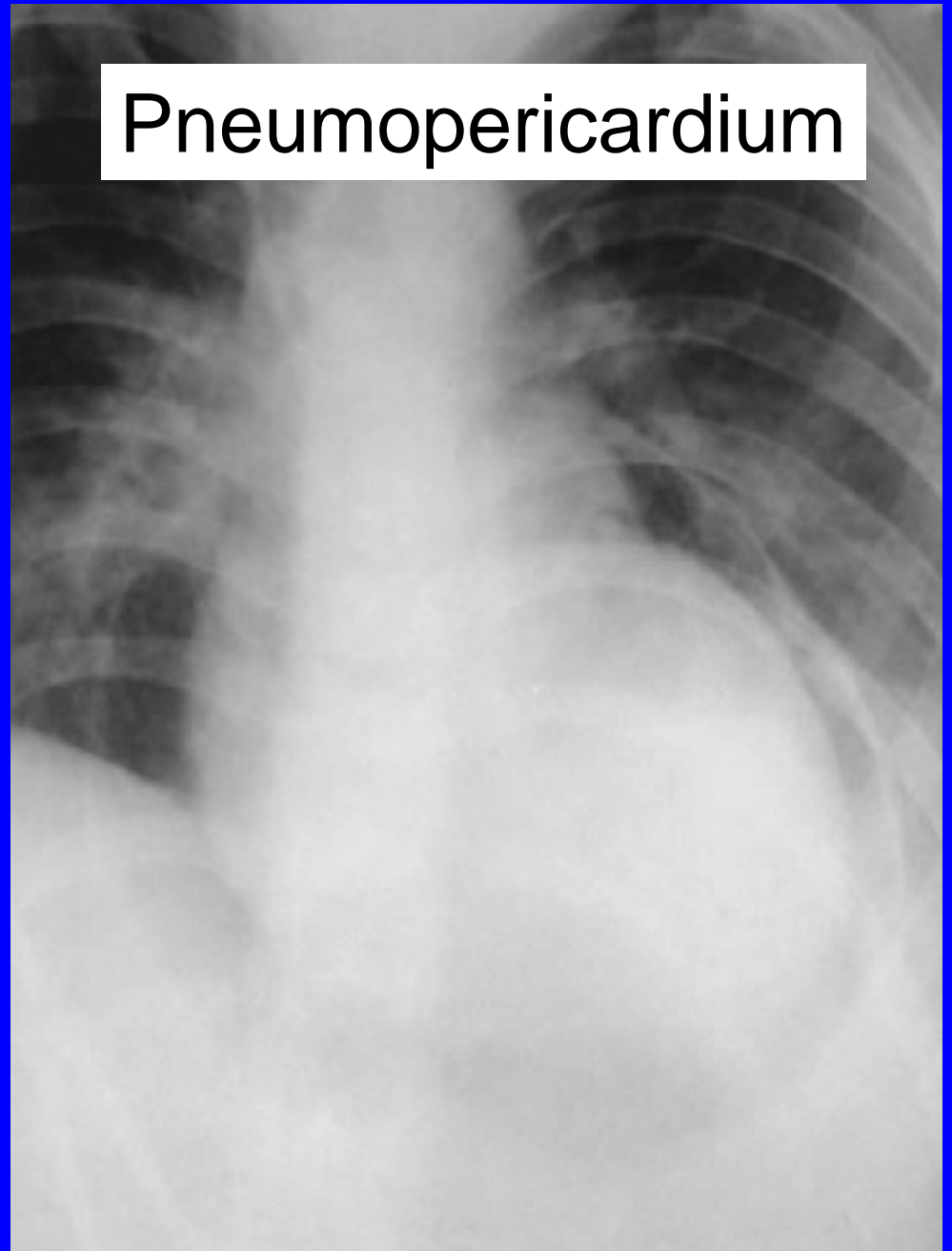


# A Related Finding Seen With Pneumomediastinum

- Pneumomediastinum can track to the neck and expand through the skin to the chest
- Can occur with instrumentation that violates the skin surface
  - Eg. chest tube



What's  
Wrong  
in This  
Film?

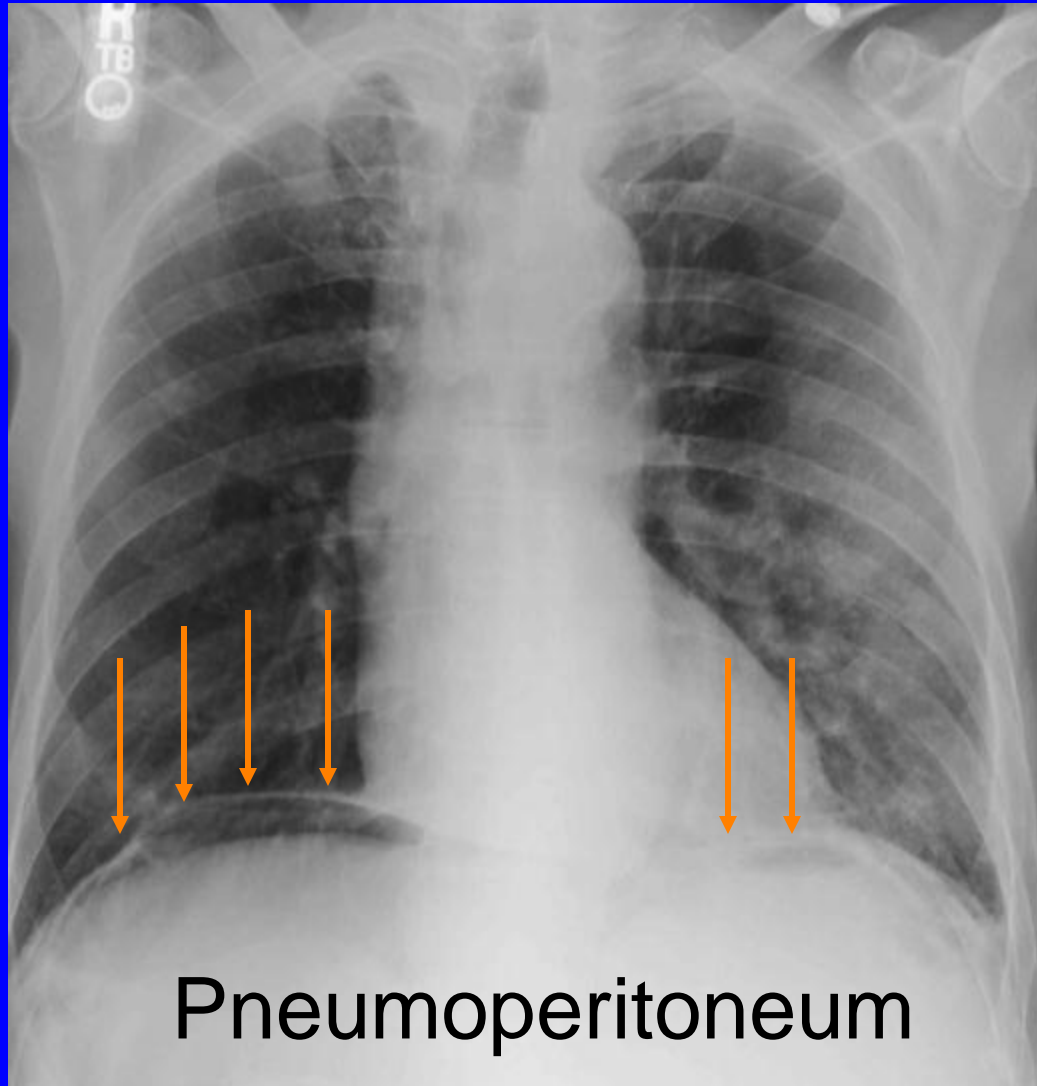


# More Pericardial Air



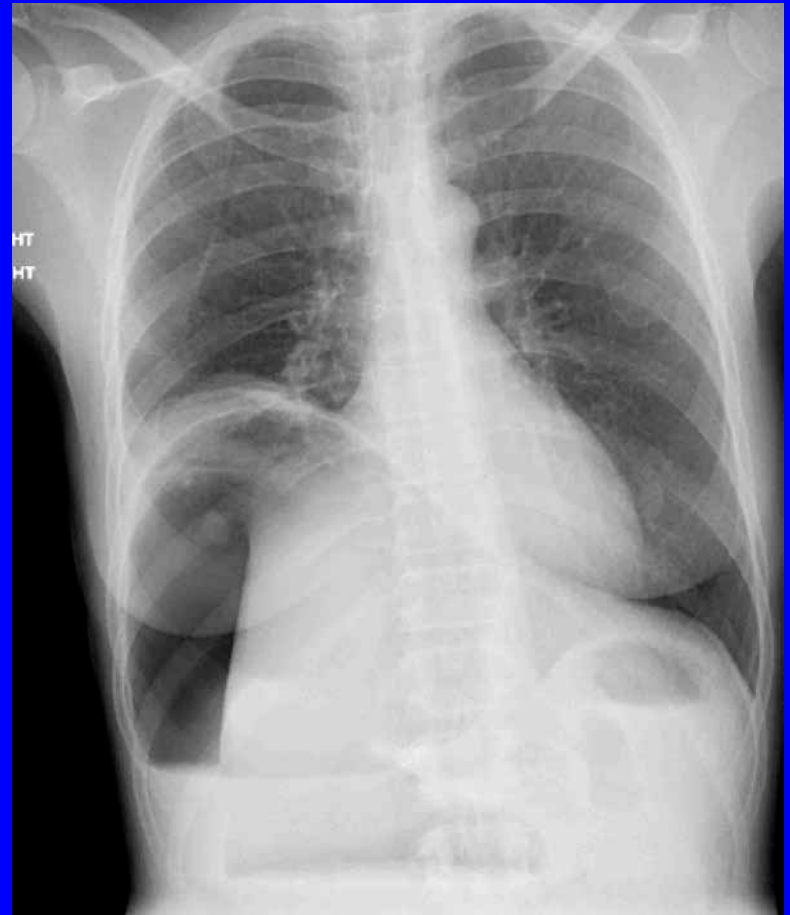
54 y.o. woman s/p stem cell transplant

# What's Wrong in This Film?



# A Few Words On Pneumoperitoneum

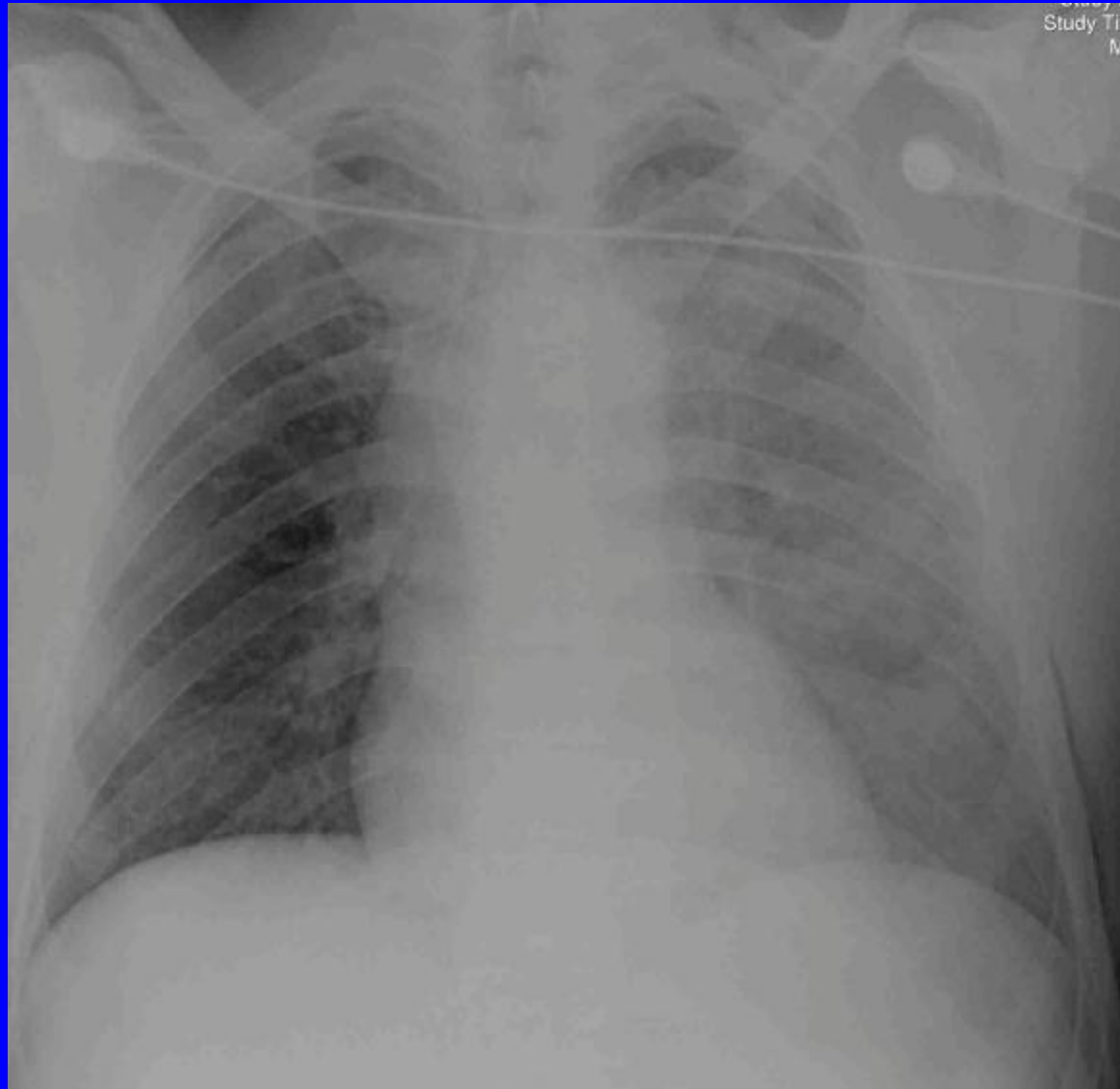
- Generally denotes an abdominal emergency warranting surgical consultation
- In some cases, the air is “allowed to be there”:
  - Recent PEG tube insertion
  - Recent laparoscopic or open abdominal surgery



# Case

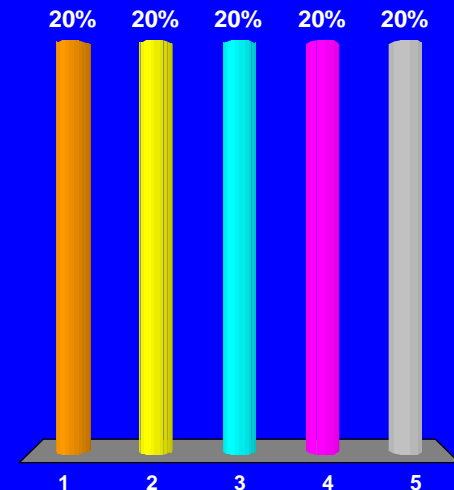
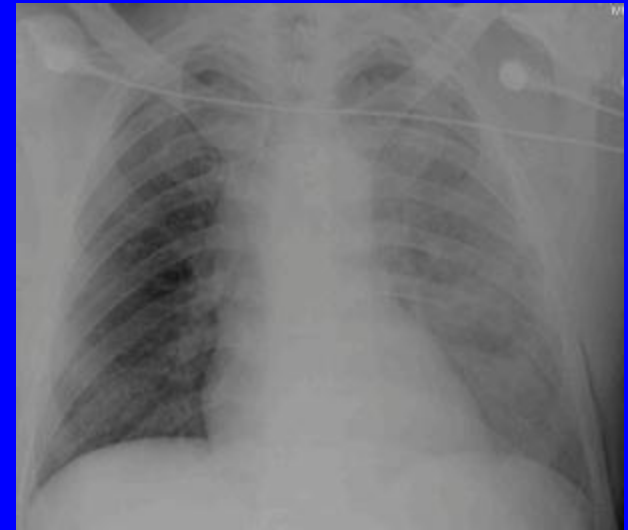
A 55 y.o. man presents increasing dyspnea and left-sided pleuritic pain one day after he fell off his horse. On exam, he is afebrile and has stable vitals except for a mildly elevated respiratory rate. He had decreased breath sounds on the left. A CXR is obtained with him in the semi-recumbent position

# His Chest X-ray



# After Reviewing The Chest X-Ray, What Should You Do Next?

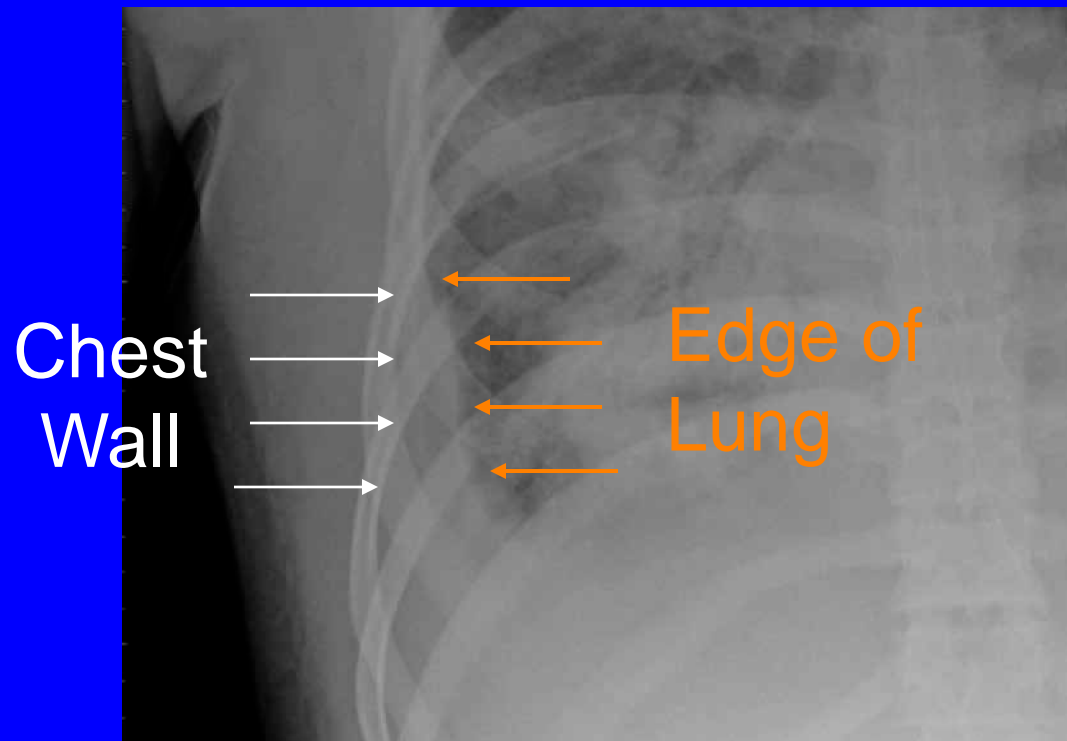
1. Order a Chest CT
2. Order lateral decubitus X-rays
3. Start him on IV Levofloxacin
4. Perform a diagnostic thoracentesis
5. Start intravenous pain medications



Issue 4:

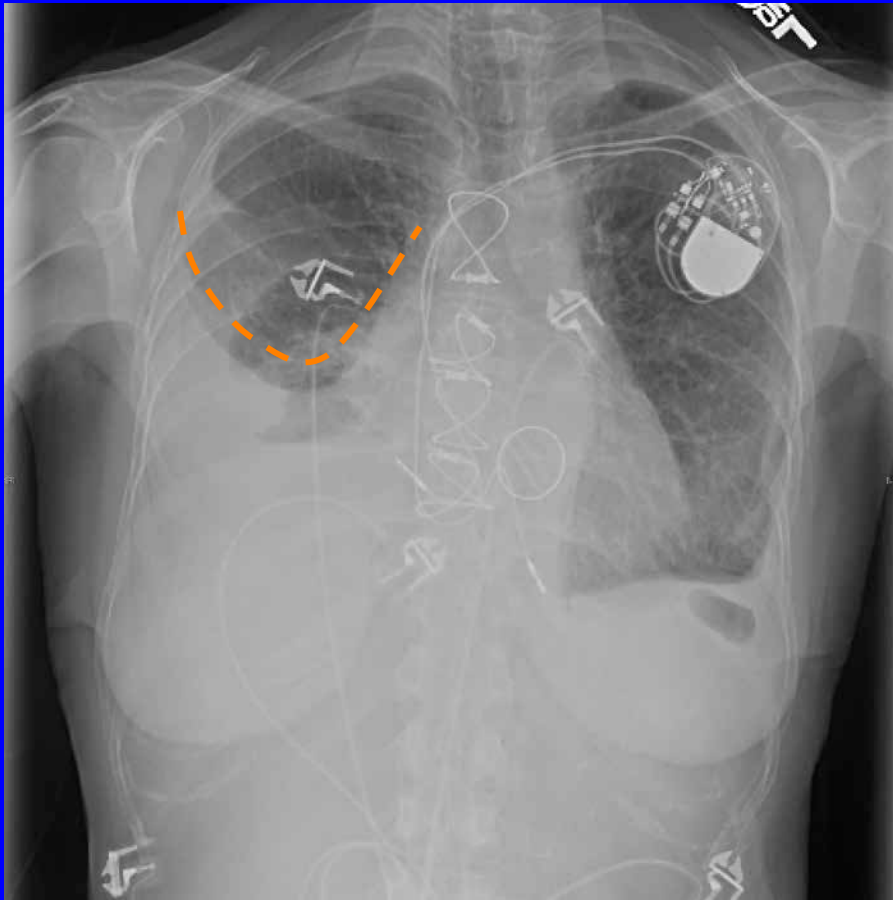
# Pleural Effusions

# The Lung Does Not Always Extend To The Chest Wall



This is called “**Pleural Separation.**” It denotes that fluid, a mass, or other material are in the pleural space

# The Classic Appearance Of A Pleural Effusion

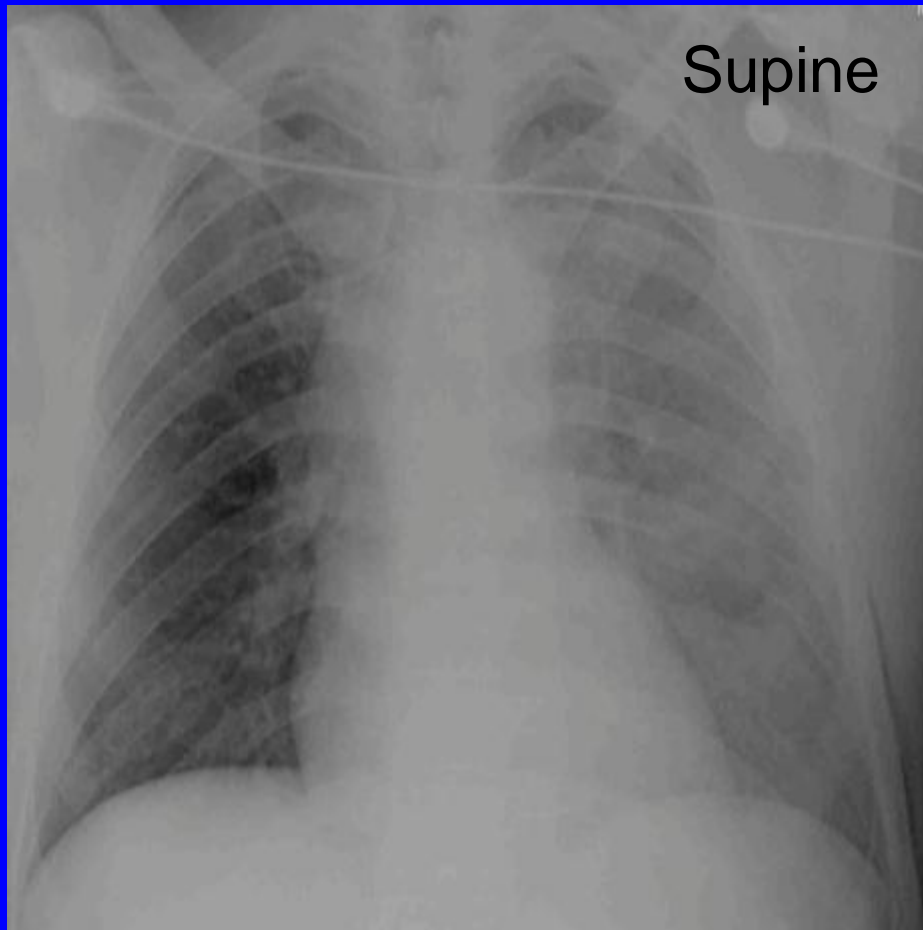


- Meniscus Sign (----)
- Homogeneous appearance with no lung markings seen in the opacity
- Obscures the hemidiaphragm

# A Less Classic Appearance: Loculated Effusion



# This Patient Also Has A Pleural Effusion



- When patient's are supine, pleural fluid layers behind the lung
- The effusion appears as greater unilateral opacification without silhouetting the lung vessels
- Can confirm with an upright film

# Case

A 65 y.o. man is admitted for an evaluation of chest pain. His EKG and serial cardiac enzymes were negative.

You are called to see him at night because he is having more chest pain.

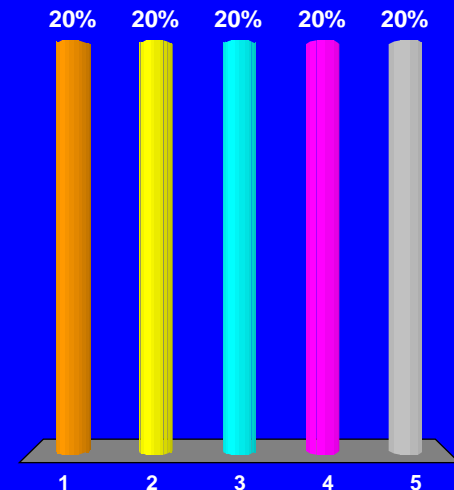
His EKG is normal. His oxygen saturation is 92% on room air. You review the chest x-ray that was done on admission.

# The Chest X-ray

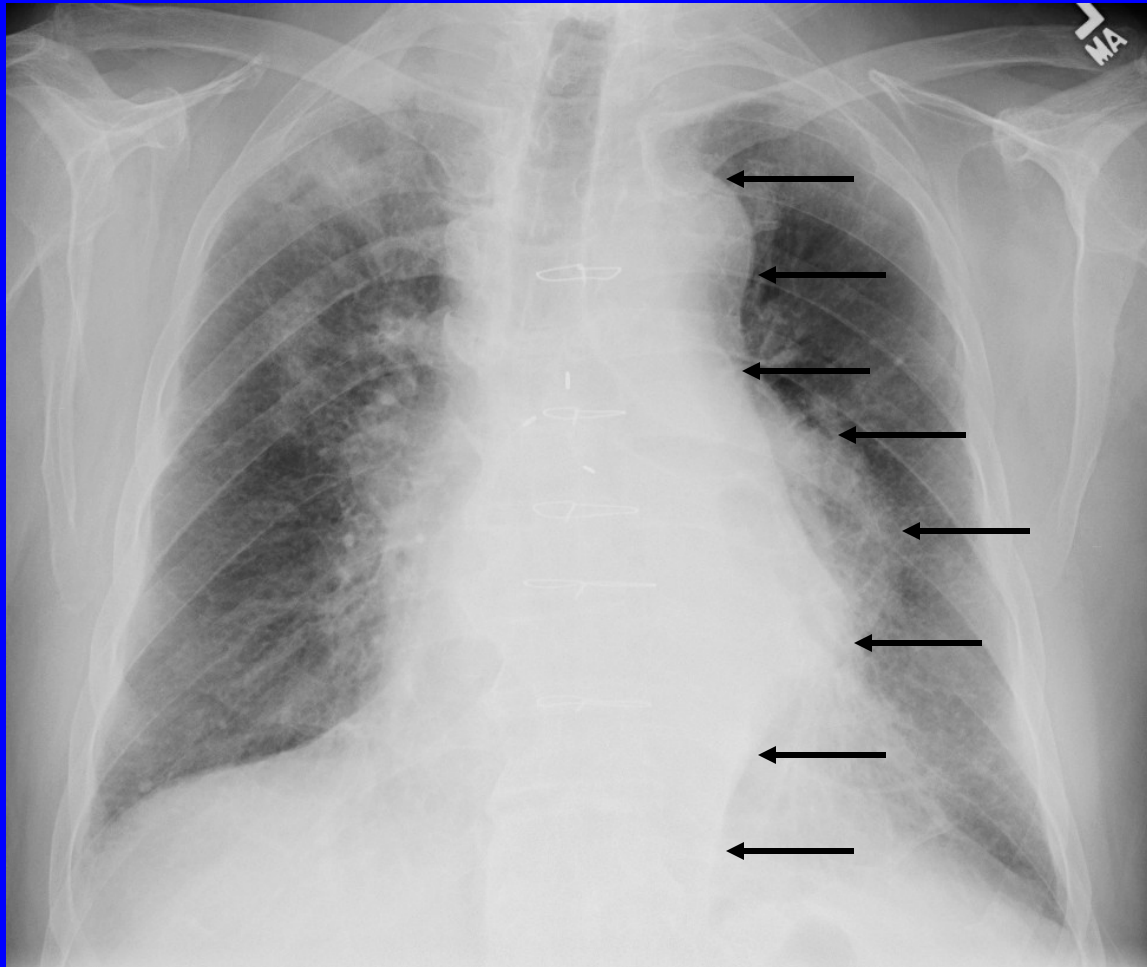


# After Reviewing The Chest X-Ray, What Should You Do Next?

1. Administer intravenous Furosemide
2. Start intravenous Levofloxacin
3. Order a stat echocardiogram
- 4. Order a CT aortogram**
5. Begin bronchodilators and IV solumedrol



# Let's Review The Chest X-ray



# Issue 5:

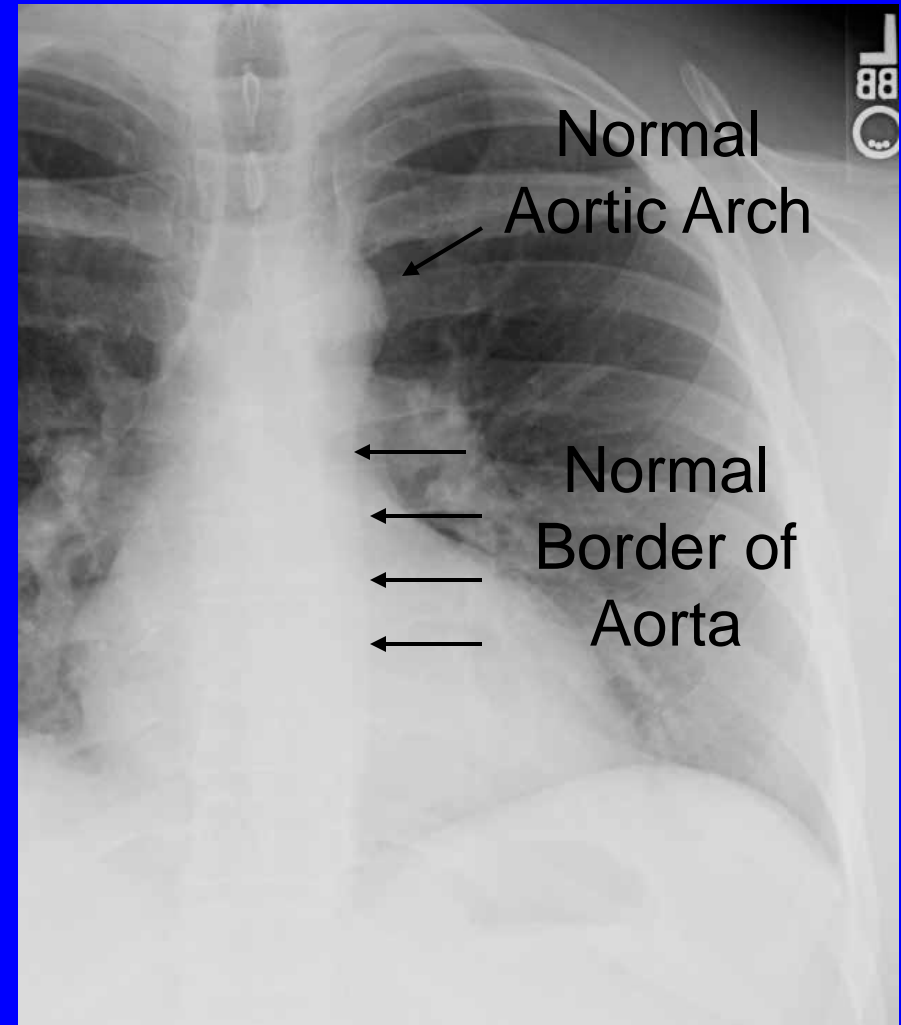
Chest Pain X-rays

You Do NOT

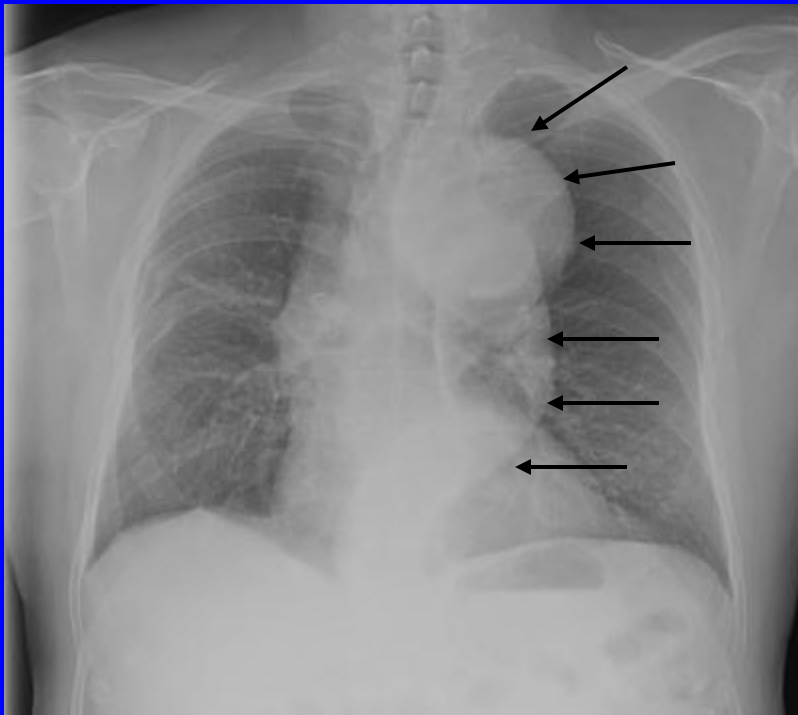
Want to Miss

# The Normal Aorta

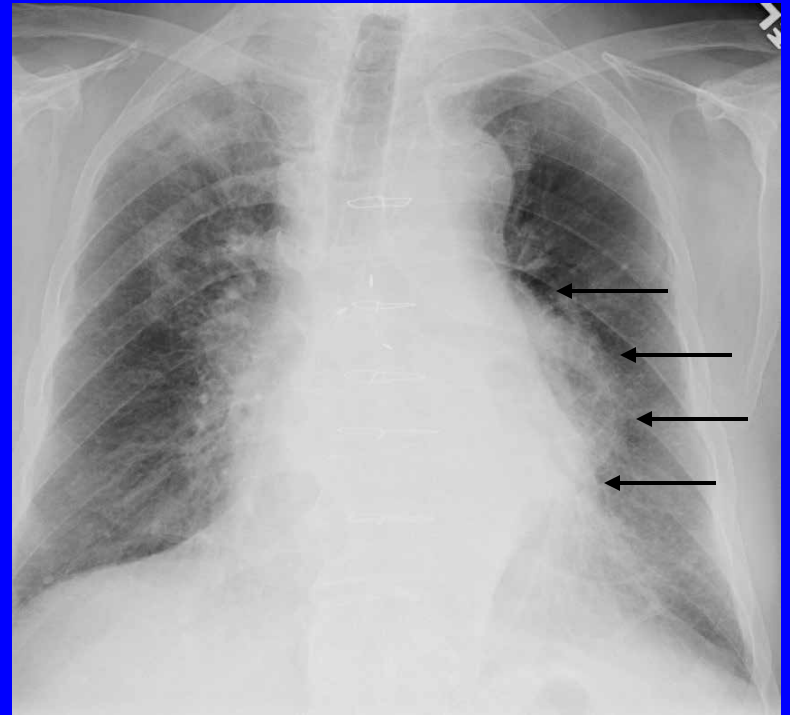
- The aortic arch should:
  - Be left of midline
  - Not be too prominent
- The aorta should follow a relatively straight course to the abdomen
- The descending aorta may arc leftward normally in elderly patients



# Examples of Aortic Aneurysms

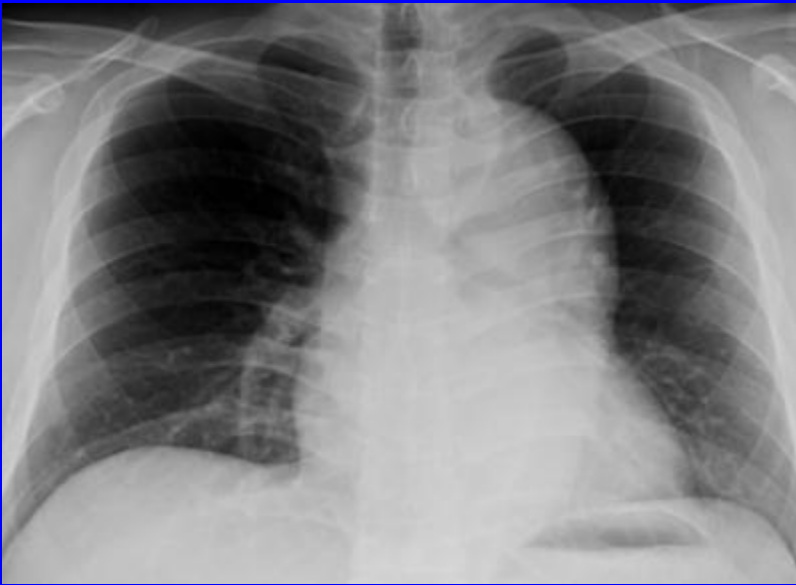


Aortic Arch and  
Descending Aorta



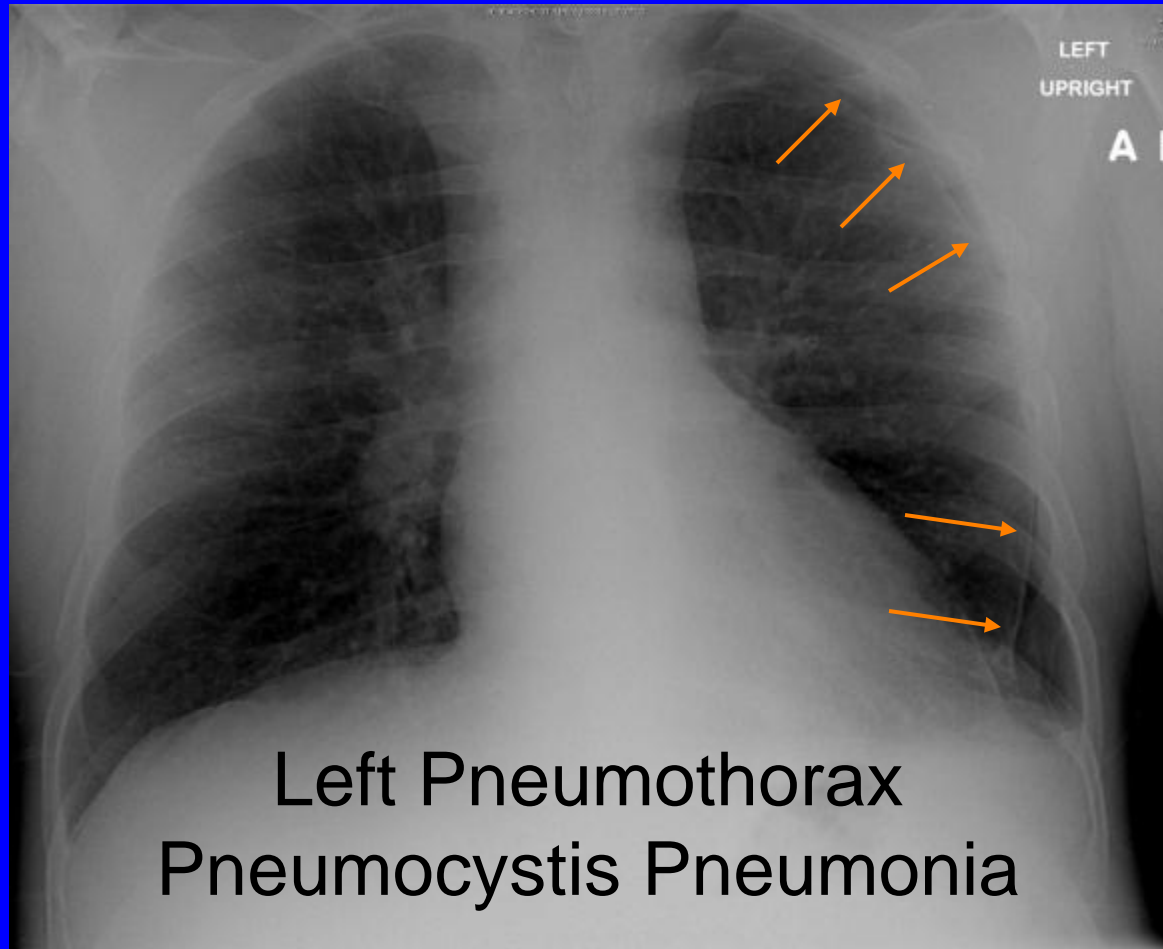
Descending Aorta

# Examples of Aortic Dissection



Dissections and aneurysms can look alike. Clinical history and CT imaging are needed to differentiate

# 45 y.o. man with HIV: Sudden Onset Chest Pain



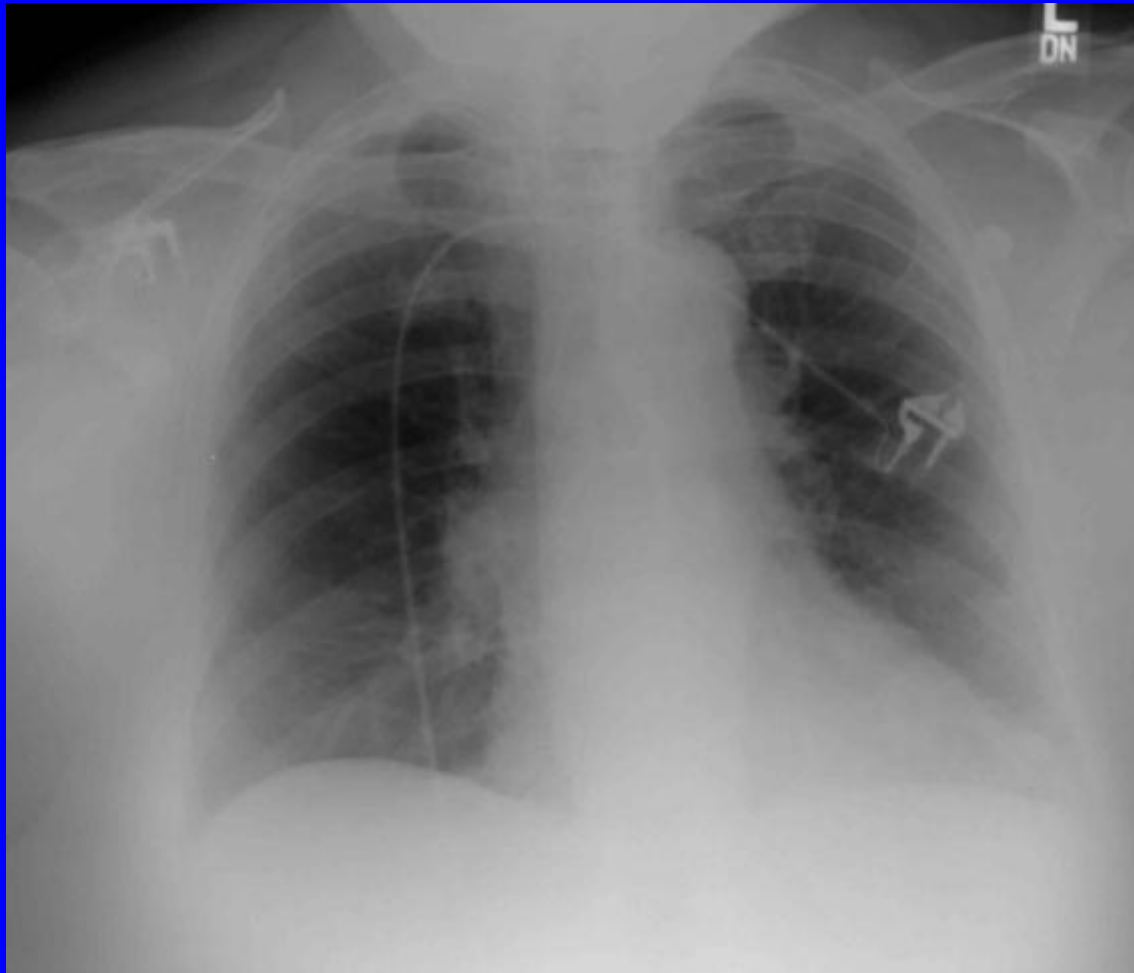
55 year-old woman: back pain, dyspnea and fever



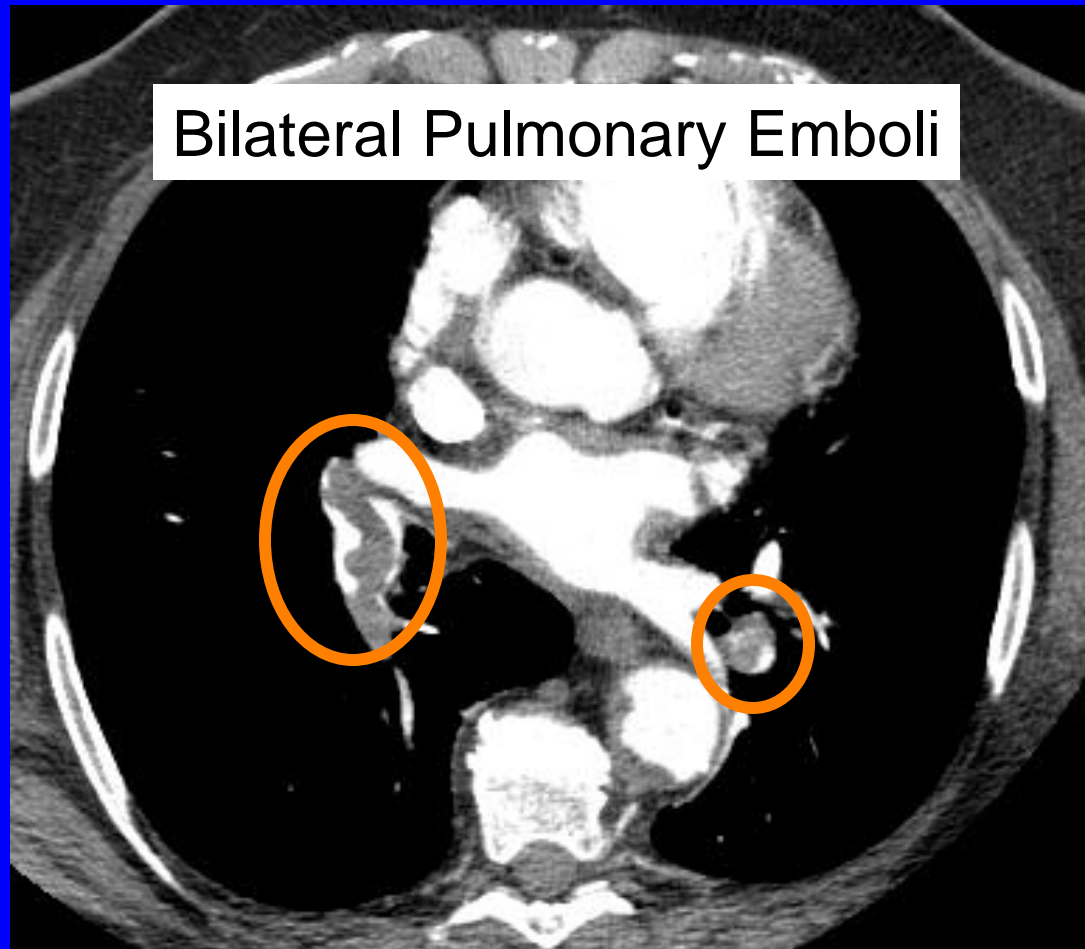
# Don't Forget the Retrocardiac Space!



# 75 y.o. Woman: Dyspnea and Pleuritic Chest Pain



# Be Wary of the Normal- Appearing CXR



**Thank You!!!**

**Best of Luck With  
Internship!**