

CHEST RADIOLOGY PEARLS FOR THE HOSPITALIST

14th Annual NW Regional
Hospital Medicine Conference
September 27, 2019

ANU BRIXEY, MD

ASSISTANT PROFESSOR

DEPARTMENT OF DIAGNOSTIC RADIOLOGY

SECTION OF CARDIOTHORACIC IMAGING

DEFINITIONS (i.e. words to use)

- ▶ **CONSOLIDATION**
 - ▶ Increased attenuation of lung parenchyma with **OBSCURATION** of blood vessels/architecture.
- ▶ **GROUND GLASS**
 - ▶ Increased attenuation of lung parenchyma with **INDISTINCTNESS** of blood vessels/architecture.
- ▶ **OPACITY**
 - ▶ Increased attenuation of lung parenchyma.
- ▶ **NODULE**
 - ▶ ≤ 3 cm
- ▶ **MASS**
 - ▶ > 3 cm
- ▶ **RETICULATION**
 - ▶ Irregular linear opacities, typically in a lace-like network.

Words NOT to use

- ▶ Infiltrate¹
 - ▶ “Formerly used as a term to describe a region of pulmonary opacification caused by airspace or interstitial disease seen on radiographs and CT scans. *Infiltrate* remains controversial because it means different things to different people. The term is no longer recommended, and has been largely replaced by other descriptors. The term *opacity*, with relevant qualifiers, is preferred.”
 - ▶ Airspace opacity/Interstitial opacity? Maybe, but pattern-based approach preferred.
- ▶ Reticulonodular
 - ▶ ...is for rashes.
- ▶ Fields
 - ▶ ...are for cows.

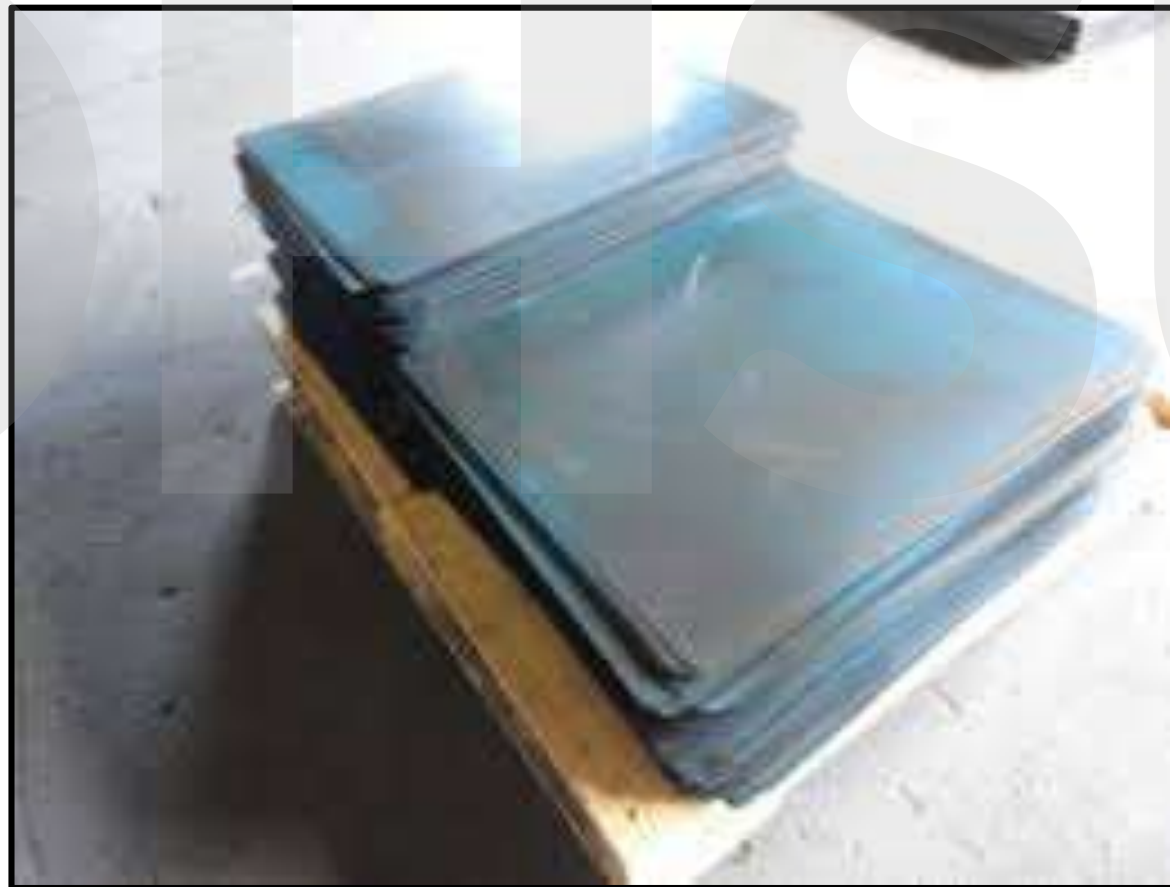
Contrast in the chest...

- ▶ When?
 - ▶ Work up for possible exudative effusion or empyema
 - ▶ Mass abutting the mediastinum or heart
 - ▶ Size of hilar/peribronchial lymph nodes
 - ▶ Consolidation (i.e. pneumonia) versus atelectasis
- ▶ When not?
 - ▶ Lung nodules
 - ▶ Mediastinal lymph nodes or work up of sarcoid
 - ▶ Pulmonary AVMs

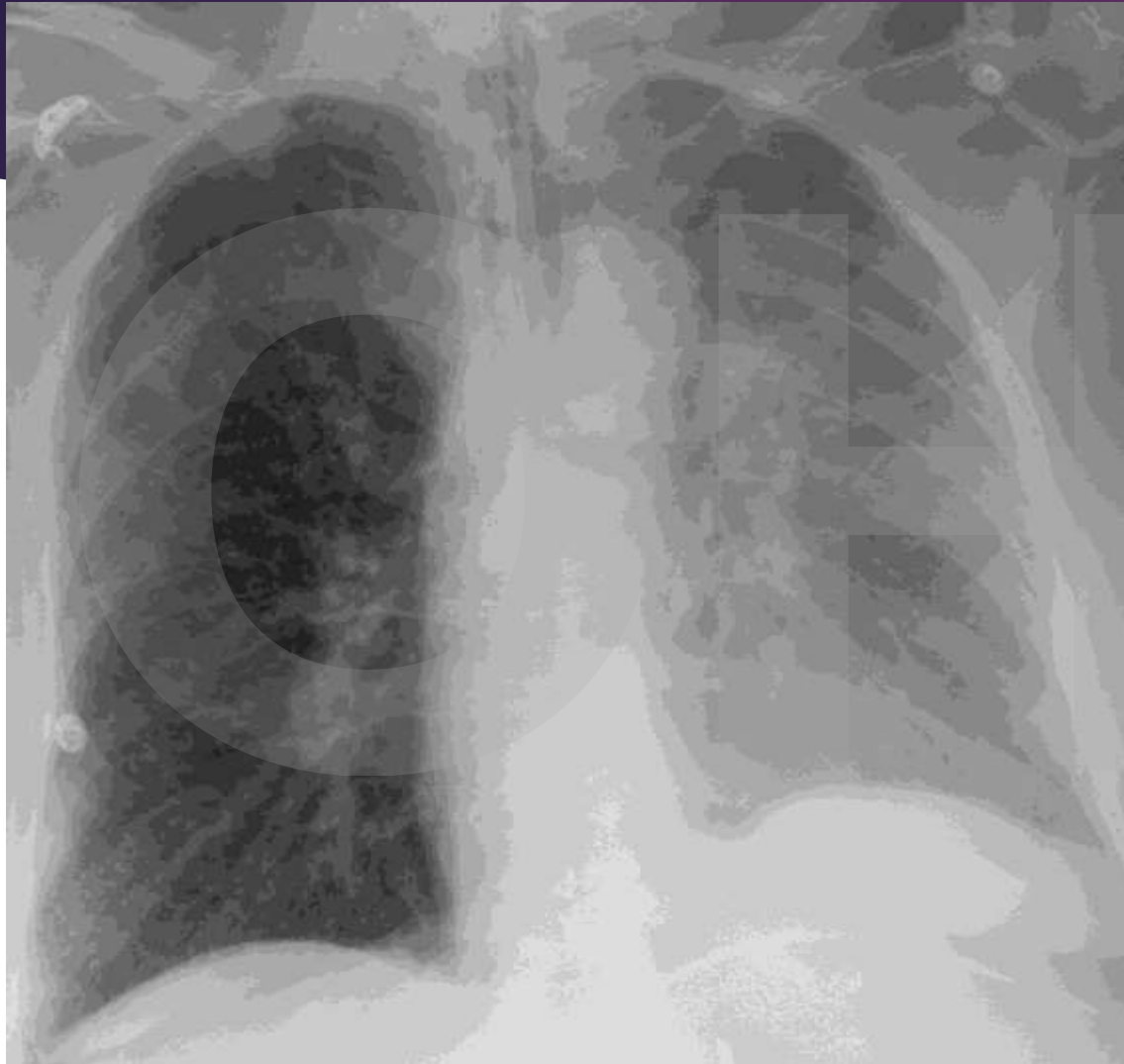
Multiphase CT

- ▶ What is it? When do we use it?

CASES



Case 1: New onset hypoxia



TODAY



YESTERDAY

Left upper lobe collapse

- ▶ Veil-like opacity
- ▶ Decreased left lung volume (ribs, diaphragm, mediastinal shift)
- ▶ Horizontal left main bronchus, vertical LLL bronchus
- ▶ Luftsichel sign (doesn't have to be there!)
- ▶ Lateral: anterior displacement of major fissure with increased retrosternal density



Courtesy of: The Internet



Courtesy of: Radiopaedia



Case 2: New fever with shortness of breath

PORTABLE
SEMI-UPRIGHT
@50*

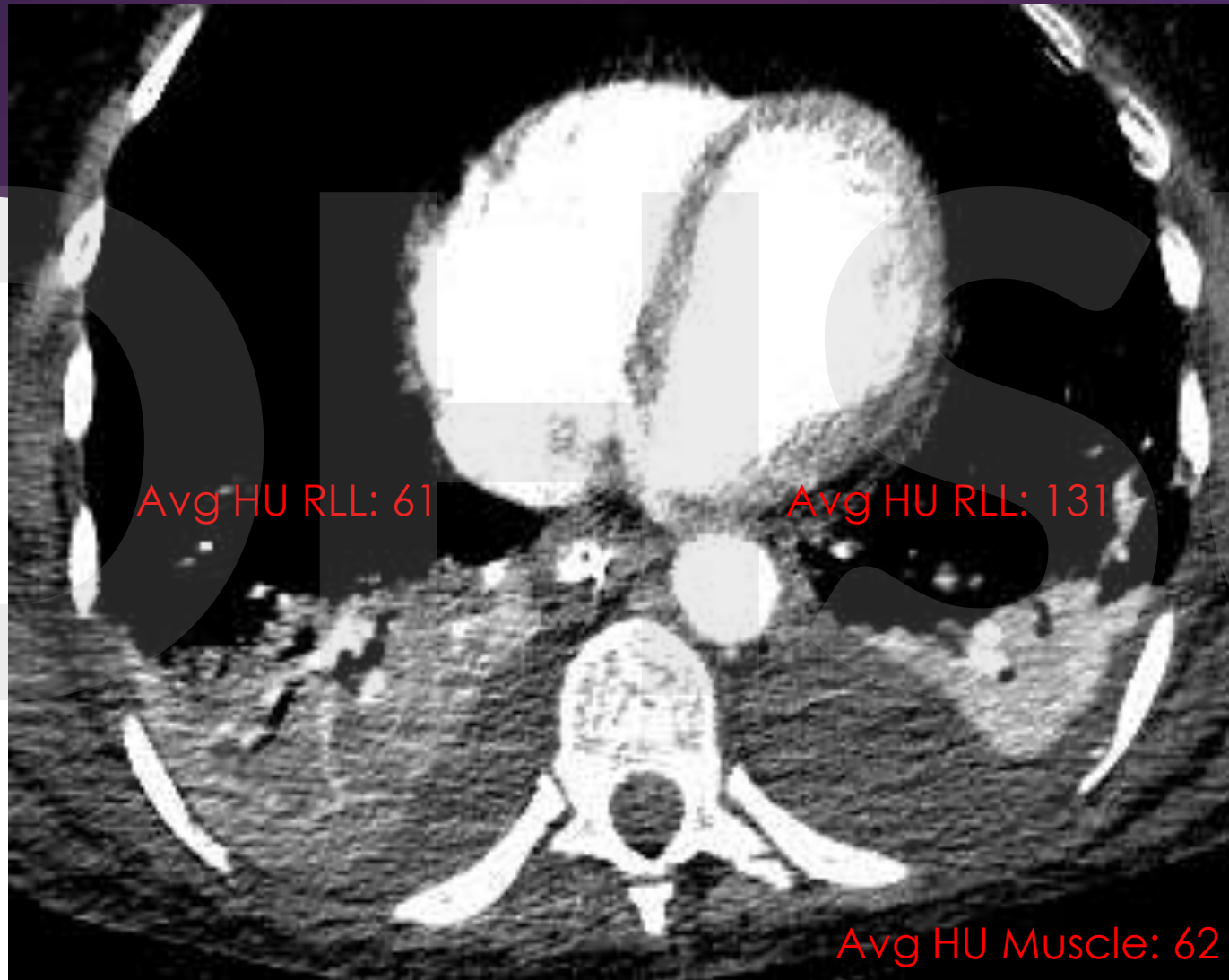


TODAY



FEW DAYS PRIOR

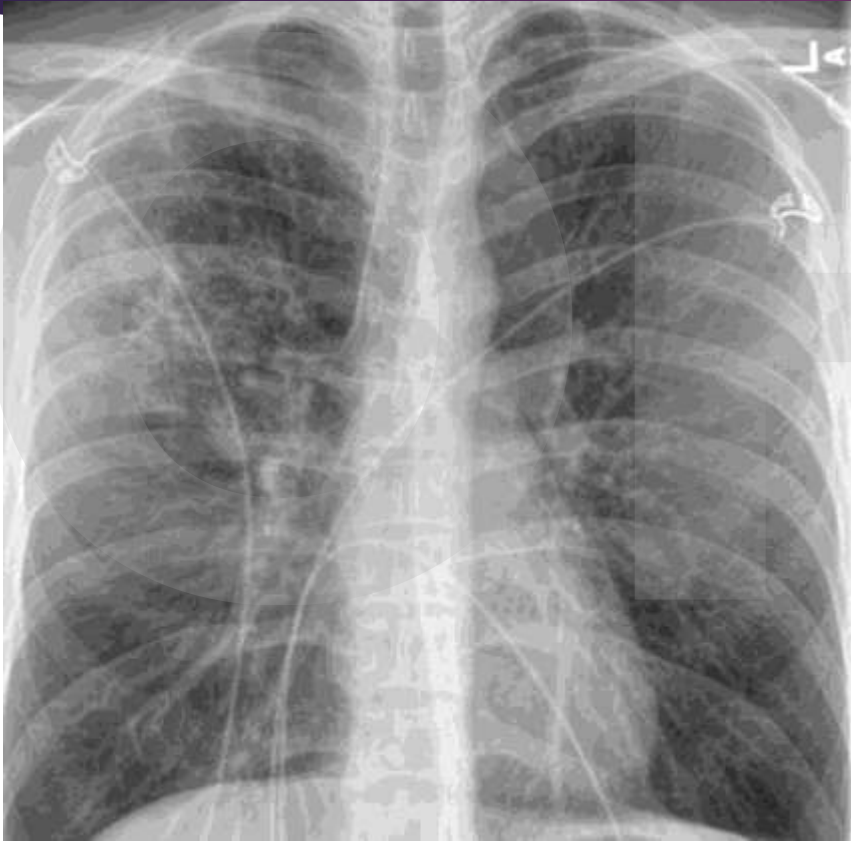
Case 2 cont'd: New fever with shortness of breath



Atelectasis versus PNA on CT

- ▶ Contrast helps!
- ▶ Atelectasis should always be HYPER-attenuating (on contrast enhanced images) relative to paraspinal musculature (unless the patient has severe sarcopenia).
- ▶ HYPO-attenuation suggests consolidation (from pneumonia, aspiration, tumor).
- ▶ Severe HYPO-attenuation suggests necrosis.

Case 3: Two different patients, histories withheld, but asymptomatic at presentation



PATIENT 1



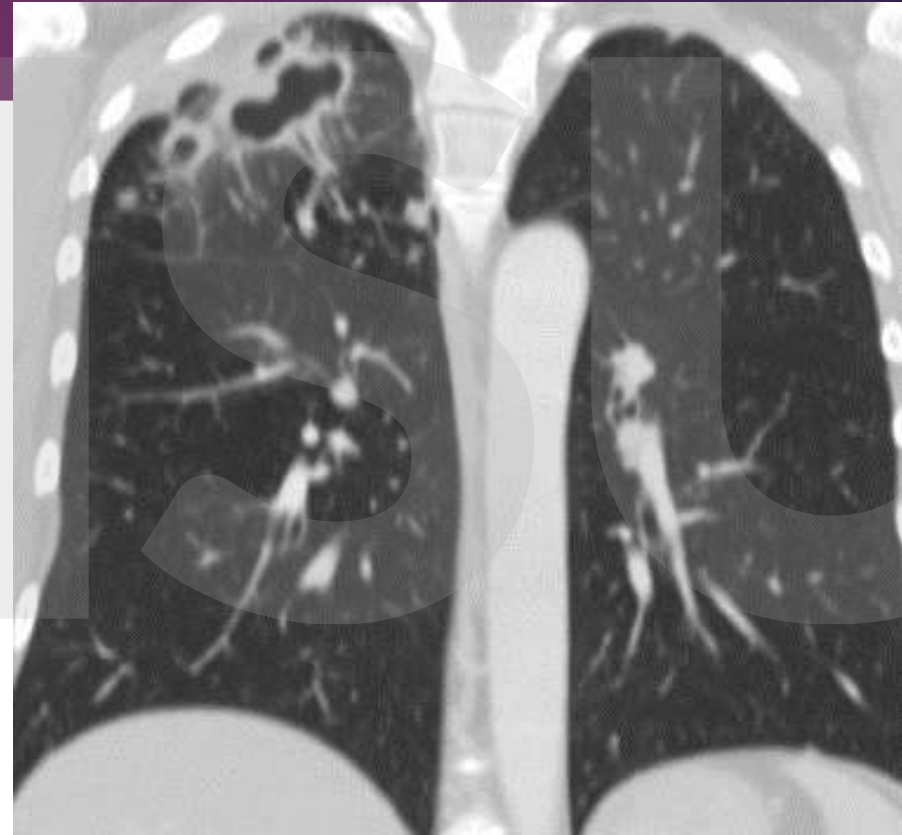
PATIENT 2

WHICH RADIOGRAPH IS MORE CONCERNING?

Case 3: Two different patients, histories withheld, but asymptomatic at presentation



PATIENT 1



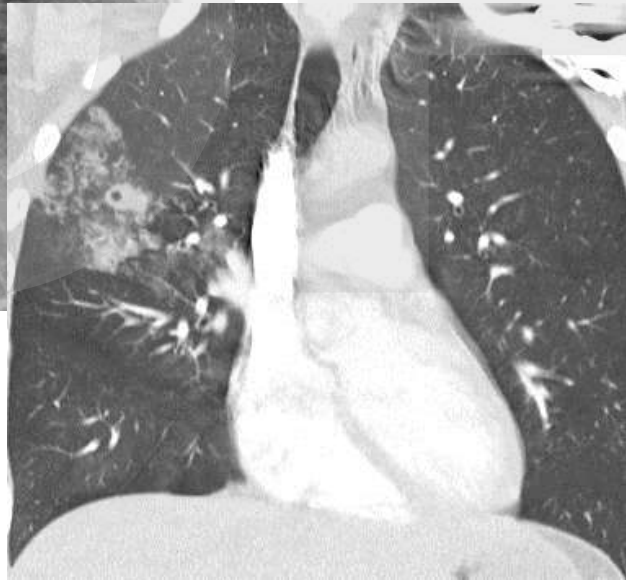
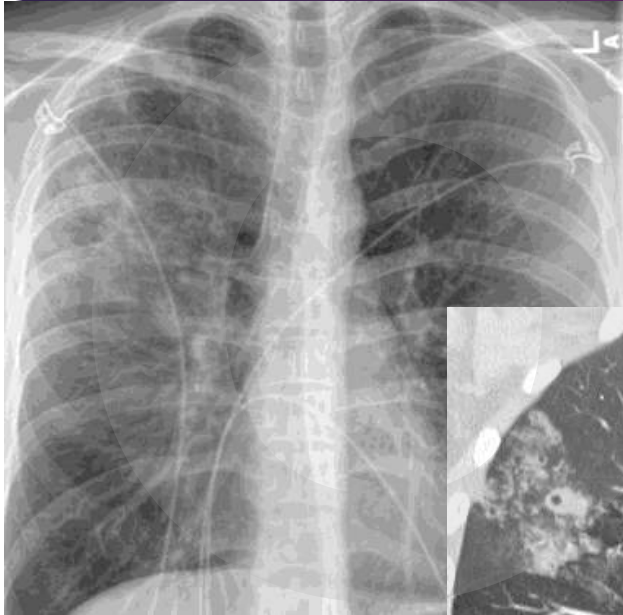
PATIENT 2

WHICH CT IS MORE CONCERNING?

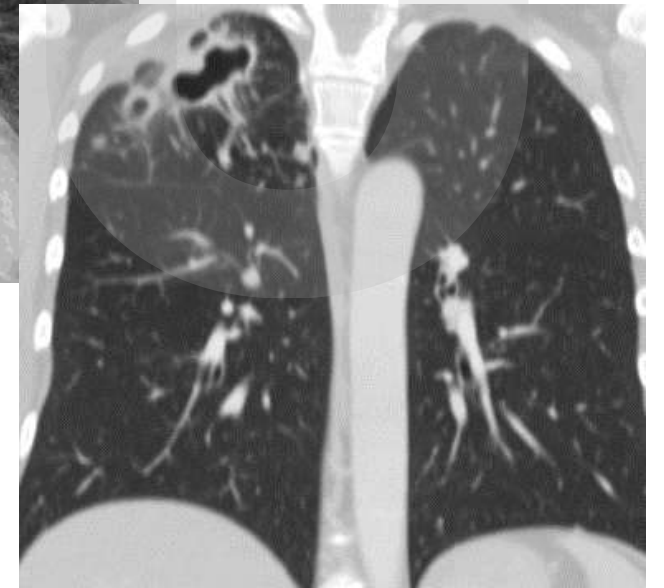
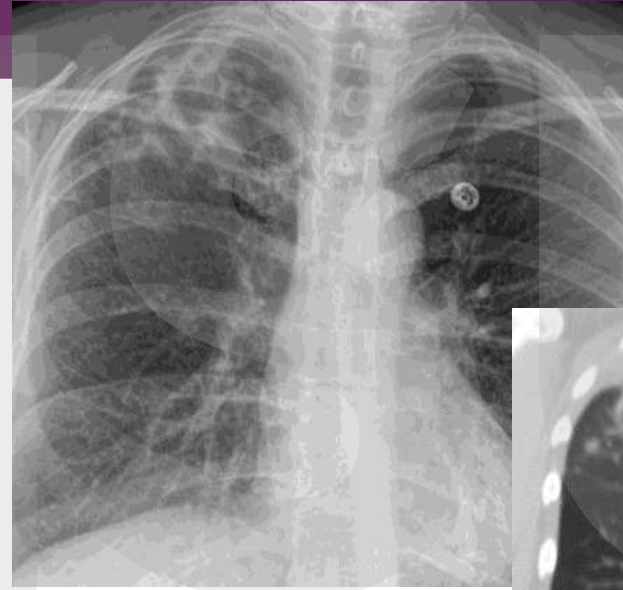
Differential diagnosis for cavitory lesion

- ▶ **C**ancer, particularly squamous cell lung cancer
- ▶ **A**utoimmune diseases, especially vasculitis such as GPA
- ▶ **V**ascular spread of disease, such as septic emboli
- ▶ **I**nfection, such as TB, Fungal, NTM, bacterial lung abscess, Nocardia
- ▶ **T**rauma, post-traumatic pneumatocele
- ▶ **Y**outh, i.e. congenital, such as CPAM

Diagnosis: TB for patient 1, NTM for patient 2



PATIENT 1: **TB**



PATIENT 2: **NTM**

Cavitary lesion teaching points

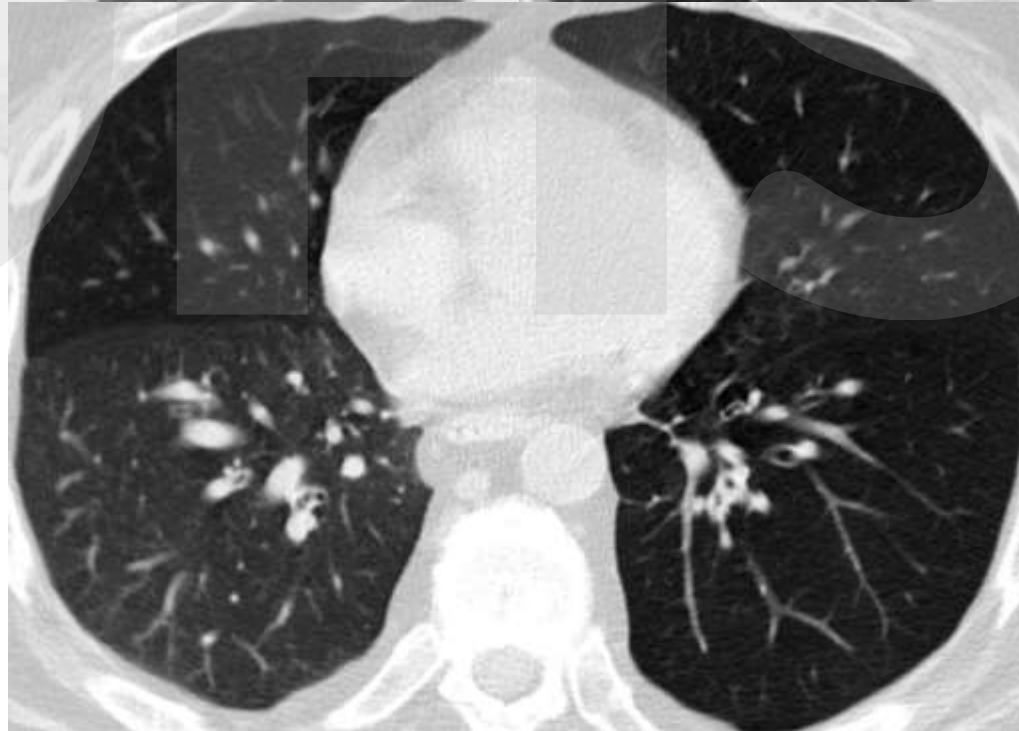
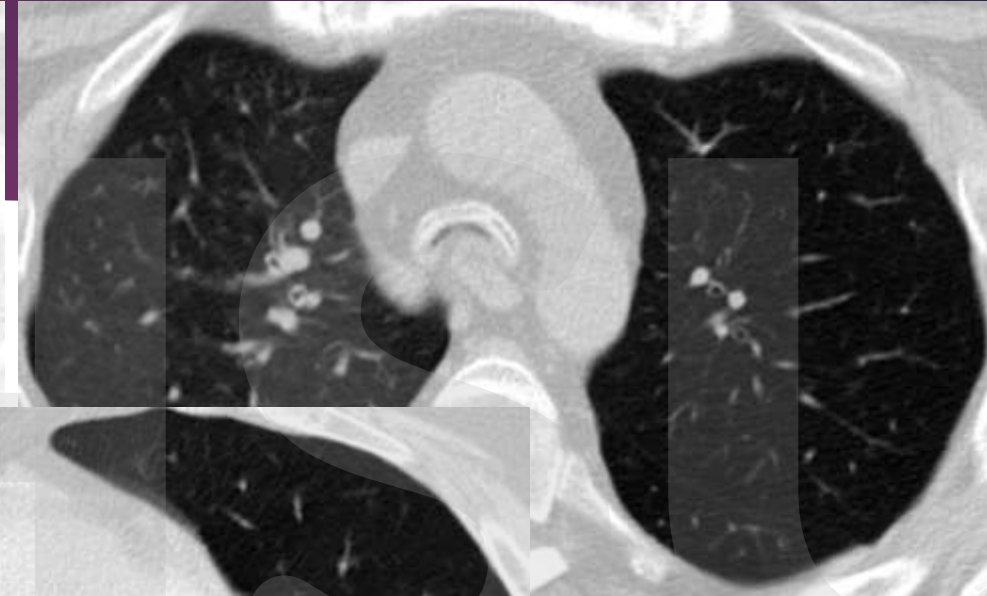
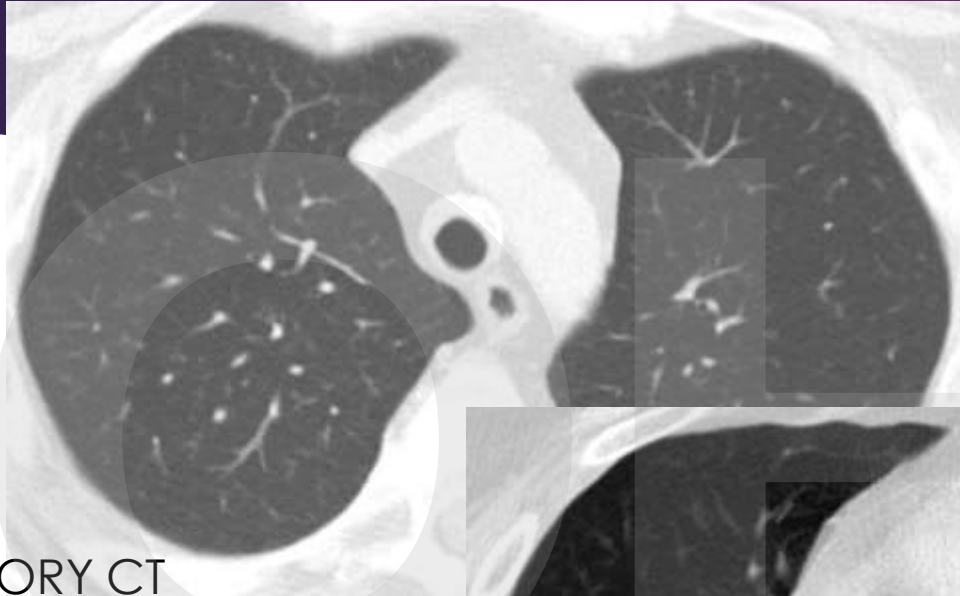
- ▶ Don't forget to look for cavitation, which may be present independently or in conjunction with opacities. An air-fluid level may be your only clue that cavitation is present.
- ▶ Not all that cavitates is TB.
- ▶ But don't forget to think about TB! It's easier to isolate a patient and get induced sputum then to go back and treat dozens of people for TB exposure.
- ▶ If you think of TB, always think of fungal infection and NTM, and vice versa.
- ▶ Always compare to priors.

Case 4: Recent COPD exacerbation with completion of steroid course, presenting with dyspnea



WHAT TO DO NEXT?

Case 4 cont'd: Treated COPD exacerbation w/persistent dyspnea



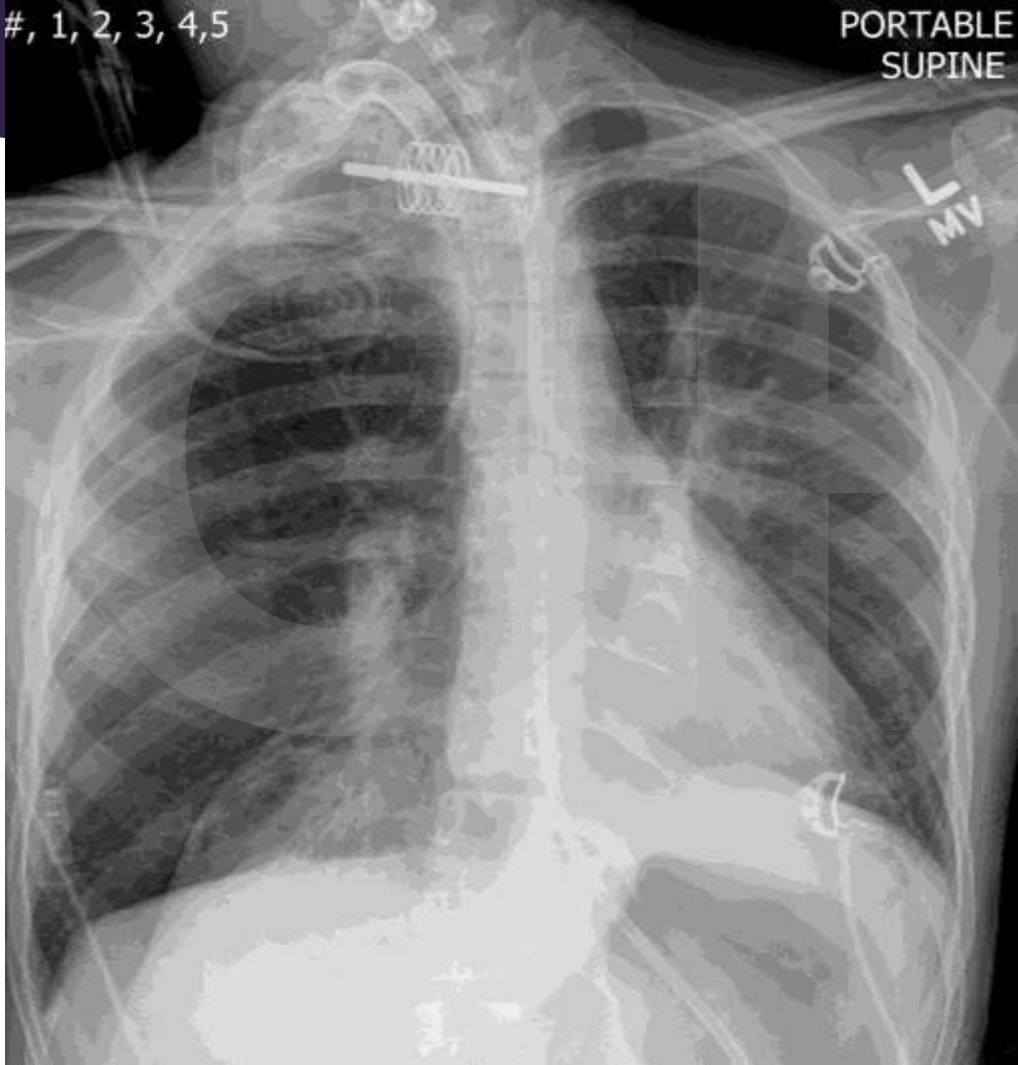
INSPIRATORY CT

EXPIRATORY CT

Tracheobronchomalacia

- ▶ Hallmark clinical symptoms: persistent shortness of breath or chronic cough.
- ▶ Diagnosed on expiratory phase CT (or by bronchoscopy).
- ▶ Tracheomalacia manifests as >70% collapse of the trachea on expiration. Bronchomalacia follows a similar rule and often occurs in conjunction.
- ▶ EDAC (excessive dynamic airway collapse) is a term typically used when patients are asymptomatic/minimally symptomatic but there is 50-70% collapse.
- ▶ No definite treatment, but nocturnal Bi-PAP may help.
- ▶ Steroids will worsen the problem.

Case 5: Shortness of breath



TODAY

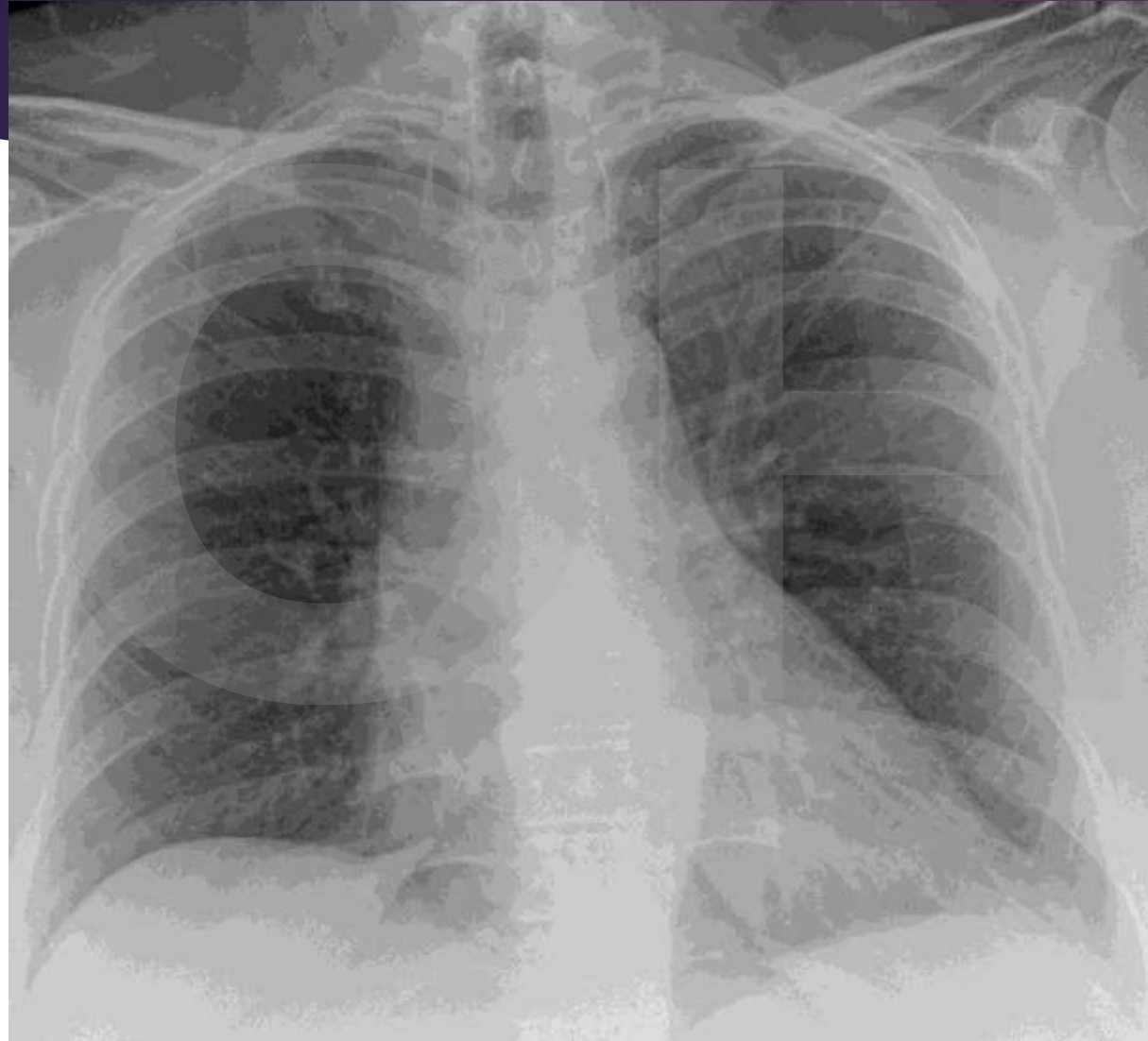


YESTERDAY

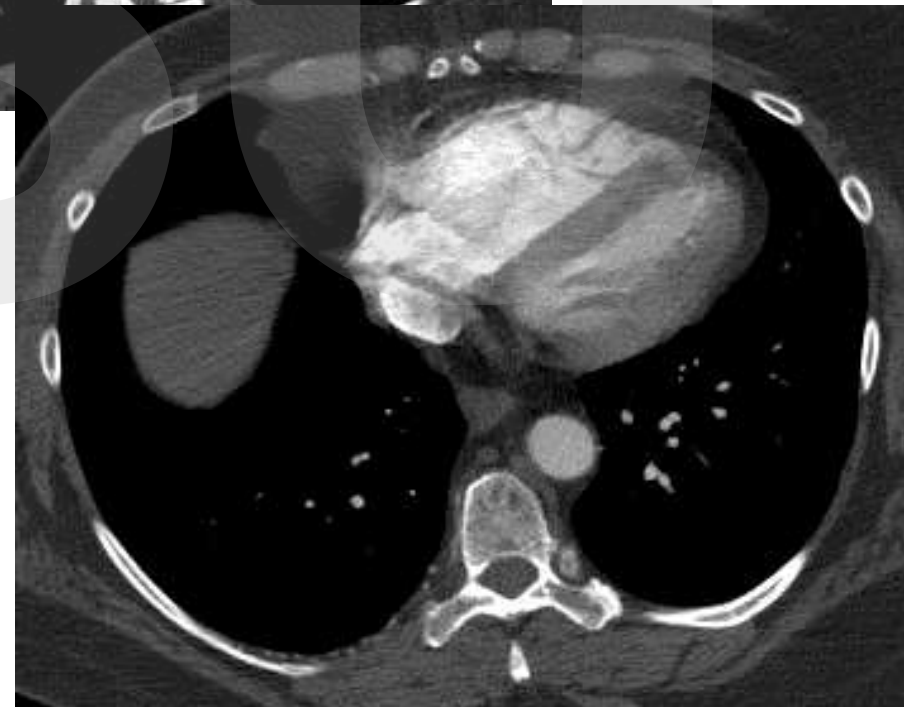
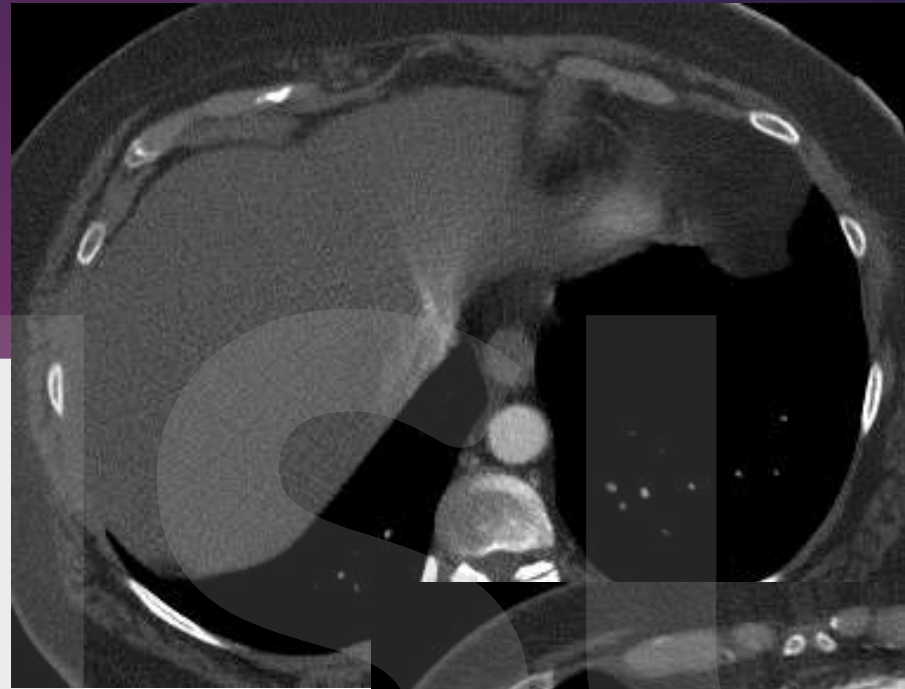
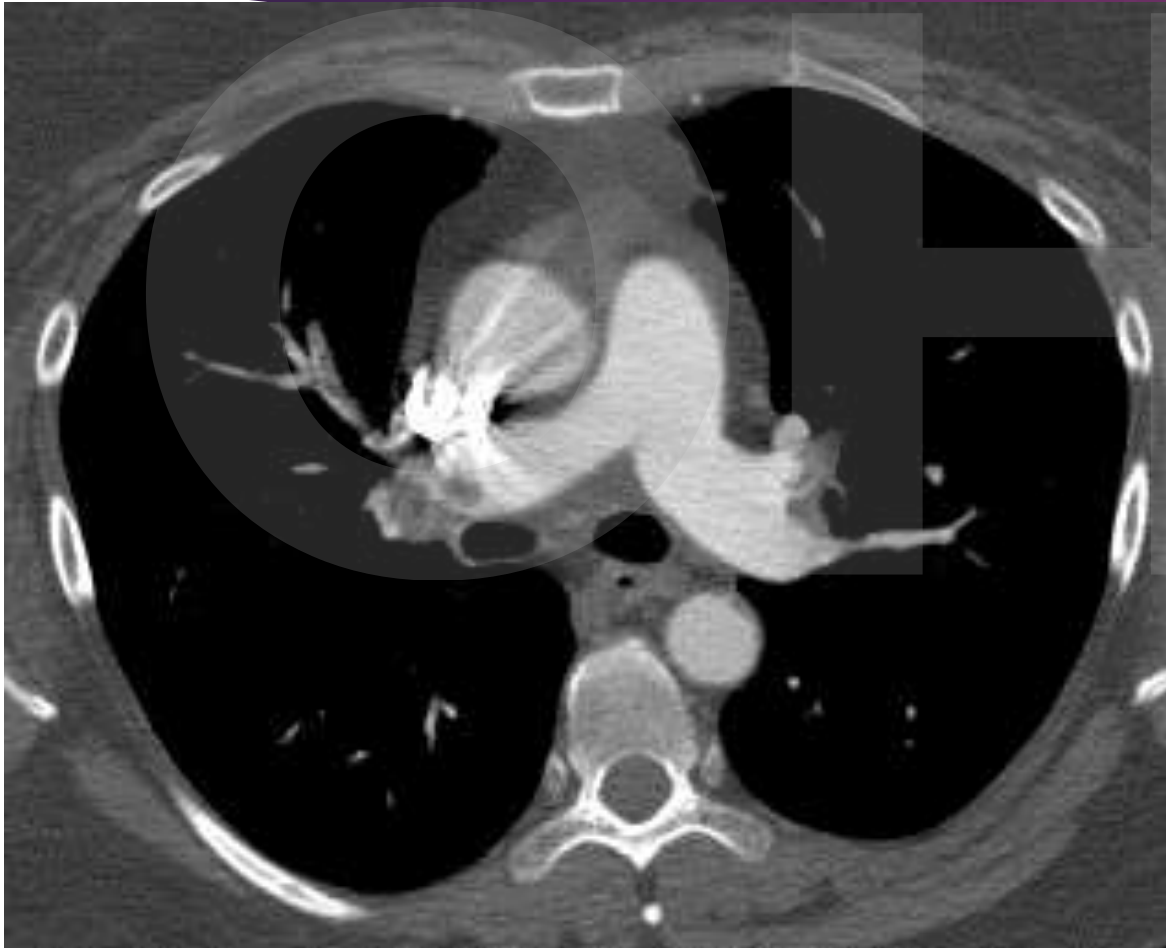
Pneumothorax

- ▶ What do you look for in TENSION pneumothorax?
 - ▶ Mediastinal shift
 - ▶ Depression of hemi-diaphragm
 - ▶ Comparison to priors (occasionally only depressed hemi-diaphragm is seen)
- ▶ How does patient POSITION affect presentation of pneumothorax?
 - ▶ SUPINE: deep sulcus sign, without evidence of pleural line
 - ▶ UPRIGHT: apical pneumothorax, with presence of pleural line

Case 6: Shortness of breath



Case 6 cont'd: Shortness of breath



Pulmonary embolism

- ▶ Once you've identified a PE, the finding that has the most effect on severity of symptoms and patient prognosis is:
 - ▶ A: Size of pulmonary embolism
 - ▶ B: Right ventricular enlargement
 - ▶ C: Left ventricular enlargement
 - ▶ D: Presence of PFO

Right heart strain

- ▶ Patients can die as a result of this.
- ▶ CT findings:
 - ▶ Straightening of the interventricular septum (D sign).
 - ▶ Increased RV to LV diameter (in end diastole).
 - ▶ Reflux of contrast into the intrahepatic IVC.
 - ▶ Other signs to consider are right atrial enlargement and azygous vein dilation.



Summary

- ▶ Describe parenchymal opacities as consolidation or groundglass or mixed. Reticulonodular is not a helpful descriptor.
- ▶ Remember to use contrast with pleural disease or para-mediastinal masses. No contrast needed for simple pulmonary nodules.
- ▶ With acute symptoms and acute radiographic change, don't forget to think about lobar collapse.
- ▶ Think about tracheobronchomalacia in a patient who has received repeated courses of steroids for shortness of breath without abatement of symptoms.
- ▶ Appearance of pneumothorax will change depending on patient positioning.
- ▶ Right heart strain is the most critical factor to evaluate in the setting of pulmonary embolism.

Questions?

- ▶ Contact info:
Anu Brixey
brixey@ohsu.edu

