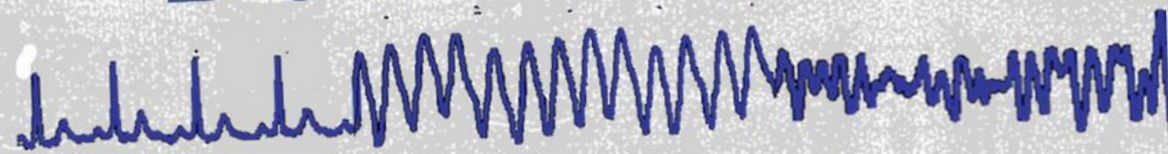




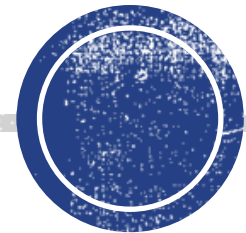
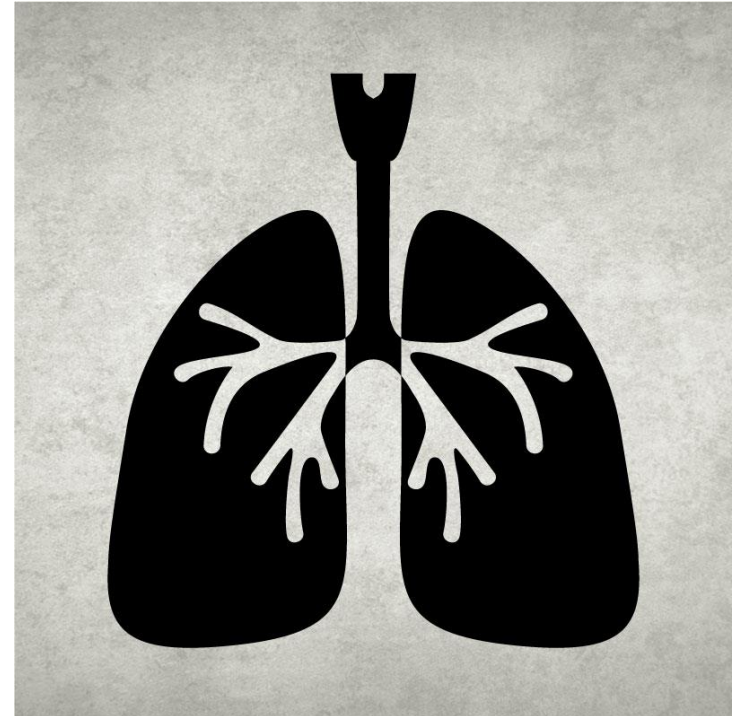
EMERGENCY MEDICINE

BOOT CAMP



INTRODUCTION TO DYSPNEA

José A. Rubero, MD, FACEP, FAAEM
Professor in Emergency Medicine



PHYSIOLOGY

- Hypoventilation
- V/Q Mismatch
- Shunting
- Decreased diffusion
- High altitude



PATHOPHYSIOLOGY

- Hypoventilation
 - Causes
 - Hypoxia/apnea
 - CNS infection/injury/insult
 - Drug OD
 - Neuromuscular weakness
 - Produce high $p\text{CO}_2$
 - Treat with O_2



PATHOPHYSIOLOGY

- V/Q Mismatch
 - Causes
 - PE
 - Atelectasis
 - ARDS
 - Asthma, COPD
 - Reactive airway disease
 - FB
 - Produce decreased O₂
 - Treat with positive end-expiratory pressure; O₂



PATHOPHYSIOLOGY

- Shunting
 - Causes
 - CHD
 - Pneumonia
 - Pulmonary HTN
 - Causes shunting of blood from right to left of the heart
 - Correct the defect

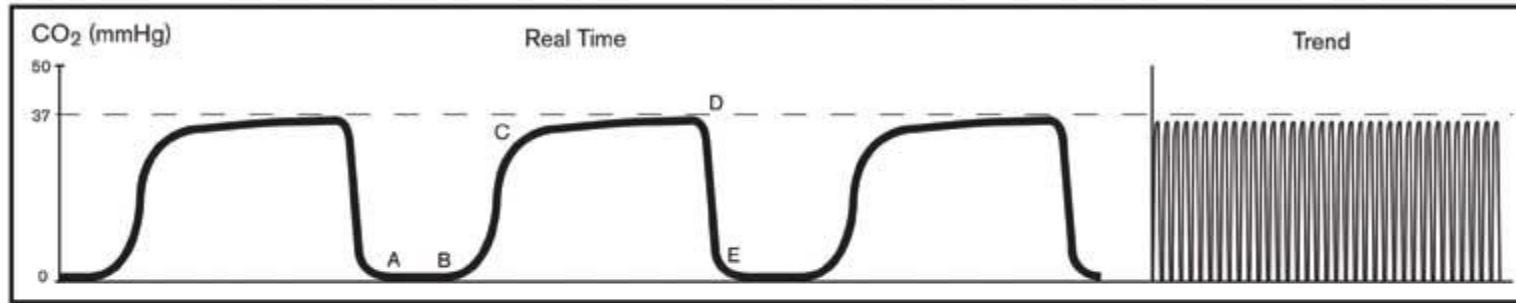


PATHOPHYSIOLOGY

- Decreased diffusion
 - Causes
 - CHF
 - Pneumonia
 - Impairment movement of CO₂ and O₂
 - Treat with BiPap
- High altitude



Normal Capnogram



The "normal" capnogram is a waveform which represents the varying CO₂ level throughout the breath cycle.

Waveform Characteristics:

A-B Baseline

B-C Expiratory Upstroke

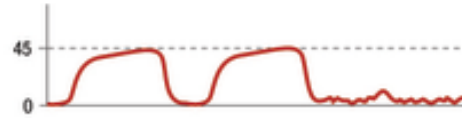
C-D Expiratory Plateau

D End-Tidal Concentration

D-E Inspiration

Sudden loss of waveform

- ET tube disconnected, dislodged, kinked or obstructed
- Loss of circulatory function



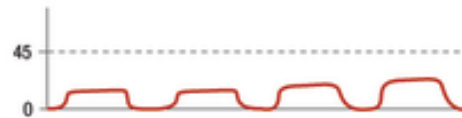
Decreasing EtCO₂

- ET tube cuff leak
- ET tube in hypopharynx
- Partial obstruction



CPR Assessment

- Attempt to maintain minimum of 10mmHg



Sudden increase in EtCO₂

- Return of spontaneous circulation (ROSC)



Bronchospasm (“Shark-fin” appearance)

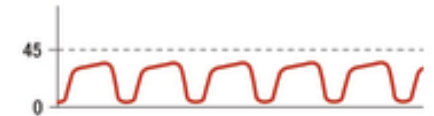
- Asthma
- COPD



Hypoventilation

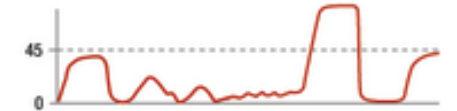


Hyperventilation



Decreased EtCO₂

- Apnea
- Sedation



DYSPNEA

- **IMPACT**

- Impacted foreign body
- MI
- Pneumonia, PE, pneumothorax
- Asthma / Anaphylaxis
- Congestive heart/ COPD
- Tamponade / Trauma



WHEEZING

- CARES
 - Carcinoid, Churgg-Strauss, cardiac
 - Anaphylaxis
 - RSV, reactive airway disease
 - Exposure, embolism
 - Strongyloides, sinusitis

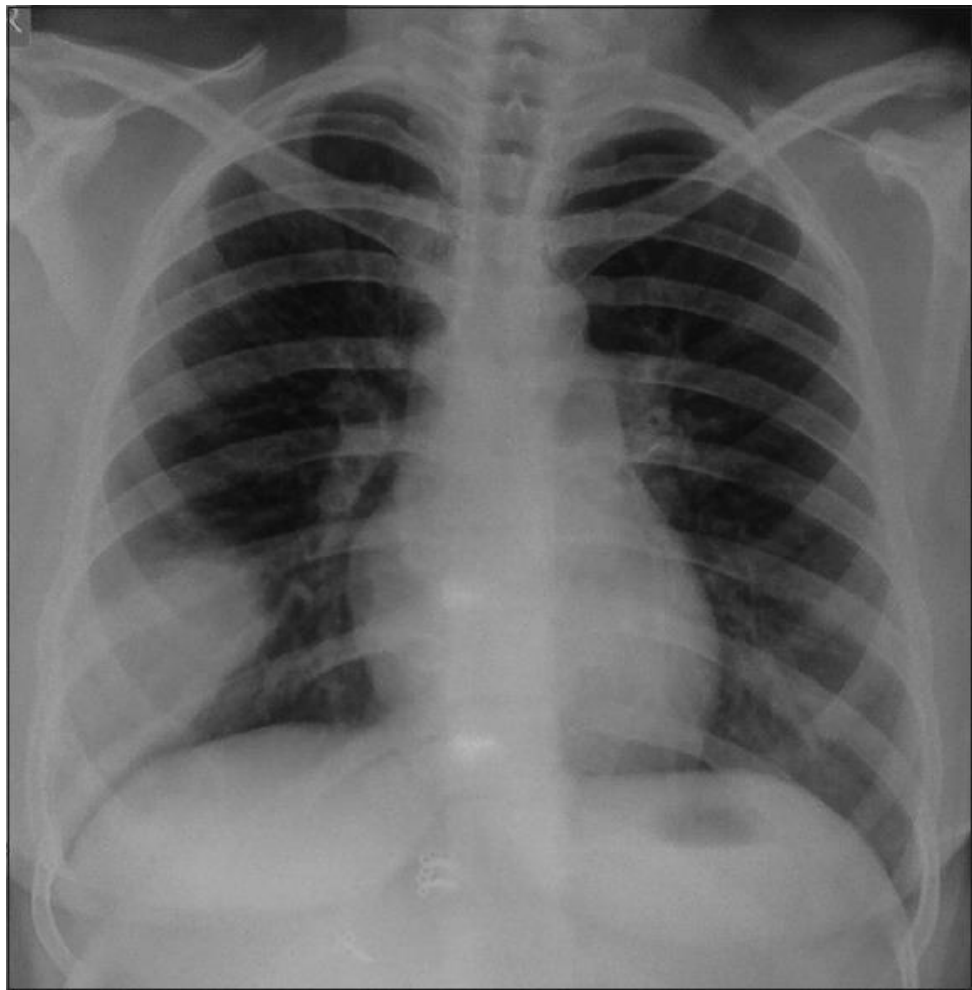


PE

RISK FACTORS (MOIST CAMEL)

- Mobility (decreased)
- Obesity
- Insulin
- Smoking
- Trauma
- Clotting disorder
- Age (>50)
- Malignancy
- Estrogen excess/pregnancy
- Long bone Fx (fat emboli)

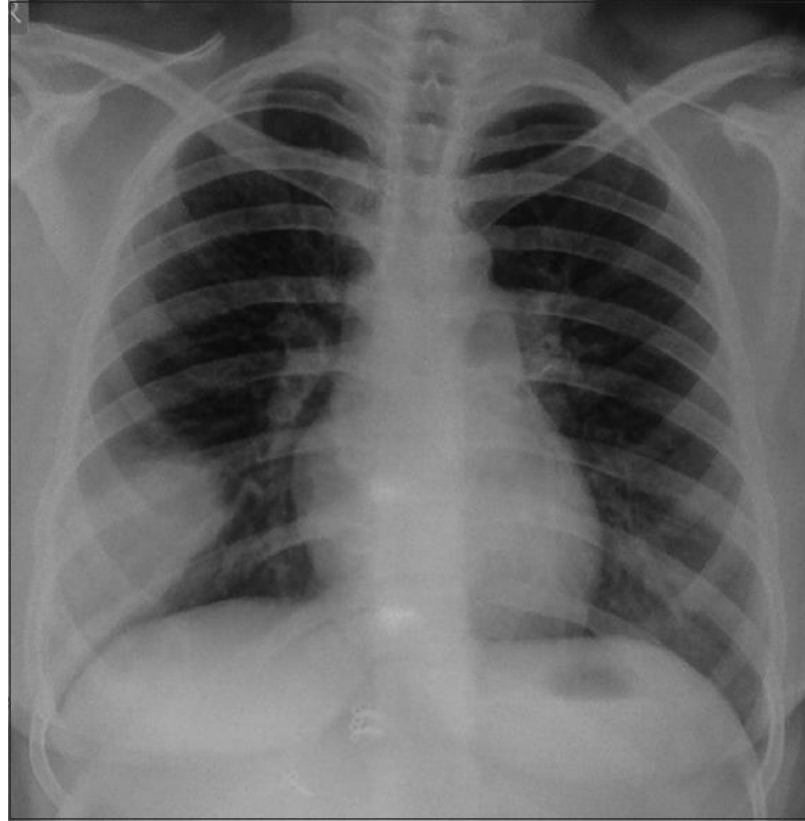




**Tachycardia +
Dyspnea**

**Diagnosis?
Name of XR finding?**





**Tachycardia +
Dyspnea**

**Pulmonary embolism
Hampton's Hump**



PE

- Emboli of LE > UE
- Virchow's Triad
 - Venous injury
 - Hypercoagulable
 - Stasis
- Pulmonary perfusion obstructed leads to V/Q mismatch
- Scores + Clinical Gestalt



PE

- Dyspnea (most common)
- Pleuritic chest pain
- Syncope
- Hemoptysis
- Hypoxemia
- Tachypnea
- Tachycardia



PE

- CXR - usually normal
 - Westermark sign (rare)
- EKG – usually NSR
 - Sinus Tachycardia
 - R strain patten (new RBBB, RAD)
 - T wave inversion V1-4 and III
 - S1Q3T3
- D-dimer (score the pt 1st)
- Echo (RV dysfnx, RV dilation)
- V/Q scan
 - Low pretest + Low prob = 96%NPV
 - High pretest + high prob = 96%PPV
 - Most are intermediate – underlying lung disease
- CT Angio
 - Specific / ~90% Sensitivity



PE

- Heparin for most types
- Thrombolysis for massive and submassive PE when
 - Severe RV strain or RV dysfunction
- Mechanical thrombectomy
- Surgical embolectomy
- IVC filters



SEPTIC PE

- Indwelling catheters / IVDA
- Prosthetic valve infections
- Septic abortions
- Treatment
 - If catheter is cause - remove
 - Broad abx + anaerobic





HEMOPYTOSIS

- Mild < 5mL. **Massive >600 mL/hr**
- Causes: Increased pulmonary vascular pressure, infx, FB, PE, malignancies, bleeding diatheses, CF, trauma,
- Only seen in 3-20% of PEs
- Hematoemesis: Lungs not acidic, hemopytosis usually has cough
- MCC in USA
 - Bronchitits
 - Bronchiectasis
- MCC in the World
 - TB



HEMOPTYSIS

BATTLE CAMP

- Bronchiectasis
- Aspergilloma
- TB
- Tumor
- Lung abscess
- Emboli
- Coagulopathy
- AVM (Osler-Web-Renu)
- Arteritis (Churgg-Strauss, Wegner, Goodpast)
- Mitral stenosis
- Pneumonia



UPPER RESPIRATORY INFECTION (URI)

- Upper Respiratory Infections
 - Frequent patient complaint
 - Common pediatric complaint
 - Rarely life threatening
- Pathophysiology
 - Frequently caused by viral and bacterial infections.
 - Affect multiple parts of the upper airway.
 - Typically resolve after several days of symptoms.



UPPER RESPIRATORY INFECTION (URI)

Table 1-3 LOCATIONS AND SIGNS AND SYMPTOMS OF UPPER RESPIRATORY INFECTIONS

Structure	Infection	Symptoms	Signs
Nose	Rhinitis	Runny nose, congestion, sneezing	Rhinorrhea
Pharynx	Pharyngitis	Sore throat, pain on swallowing	Erythematous pharynx, tonsil enlargement, pus on tonsils, cervical lymph node enlargement
Middle Ear	Otitis Media	Ear pain, decreased hearing	Red, bulging eardrum, pus behind ear drum, lymph node enlargement in front of or behind ear
Larynx	Laryngitis	Sore throat, hoarseness, pain on speaking	Red pharynx, hoarse quality to voice, cervical lymph node enlargement
Epiglottis	Epiglottitis	Sore throat, drooling, ill appearing	Upright position, drooling, ill appearing
Sinuses	Sinusitis	Headache, congestion	Tenderness over the sinuses, worsening of pain with leaning forward, yellow nasal discharge



- 48 y/o male c/o SOB, difficult swallowing, fever for 3 days
- PMHx: none
- PSHx: none
- Meds: none
- PCP: Dr. None





- VS
 - HR 115; RR 16; T 101.4; BP 147/60; O2Sat 96%
- PE:
 - HEENT: pharynx is WNL; +hoarse voice; +drooling
 - Neck: supple; noisy sound
 - Chest: CTA
- Differential Diagnosis?



- Upon auscultation, you hear



- What will you do next?

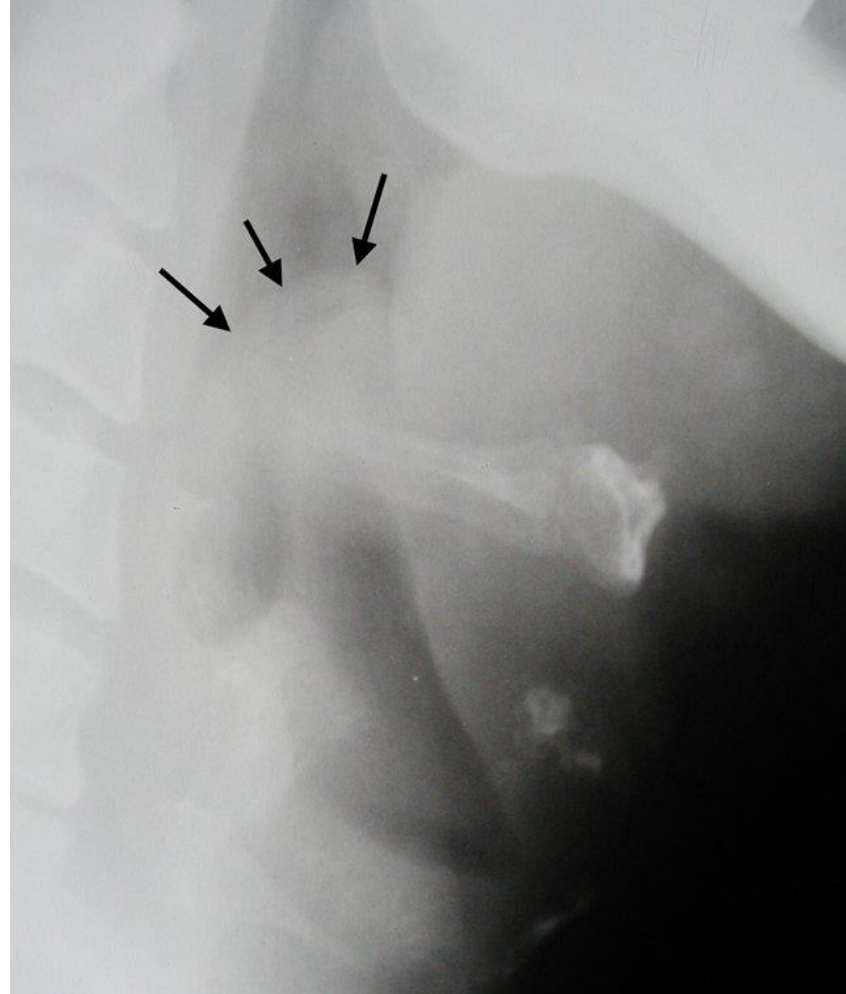


EPIGLOTTITIS

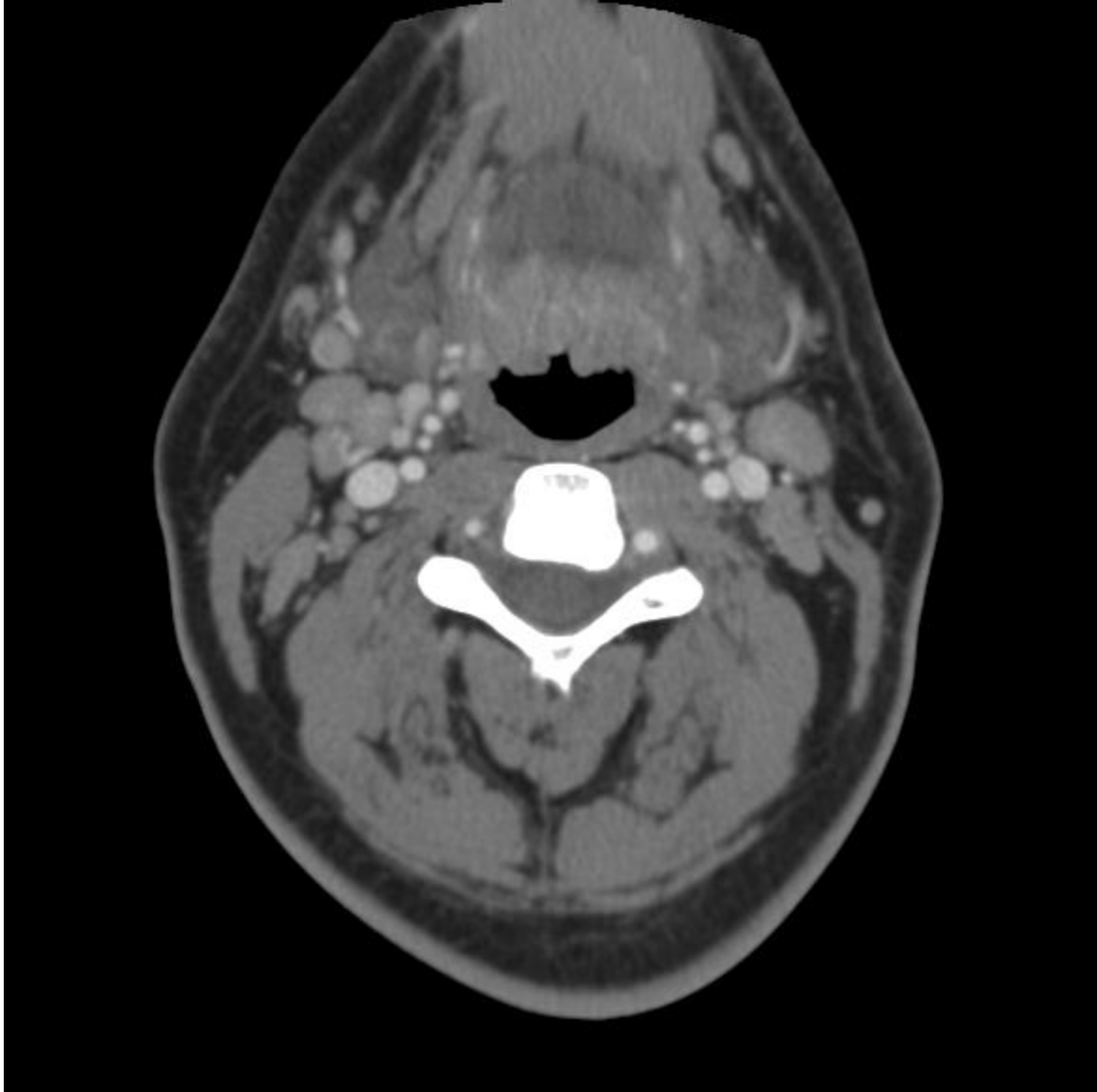
- Causes:
 - H. flu
 - S. pneumoniae
- Pharynx looks normal
- Xray...what are you looking
- Treatment
 - Antibiotic, steroid
 - OR
 - No tongue depressor
 - No agitation

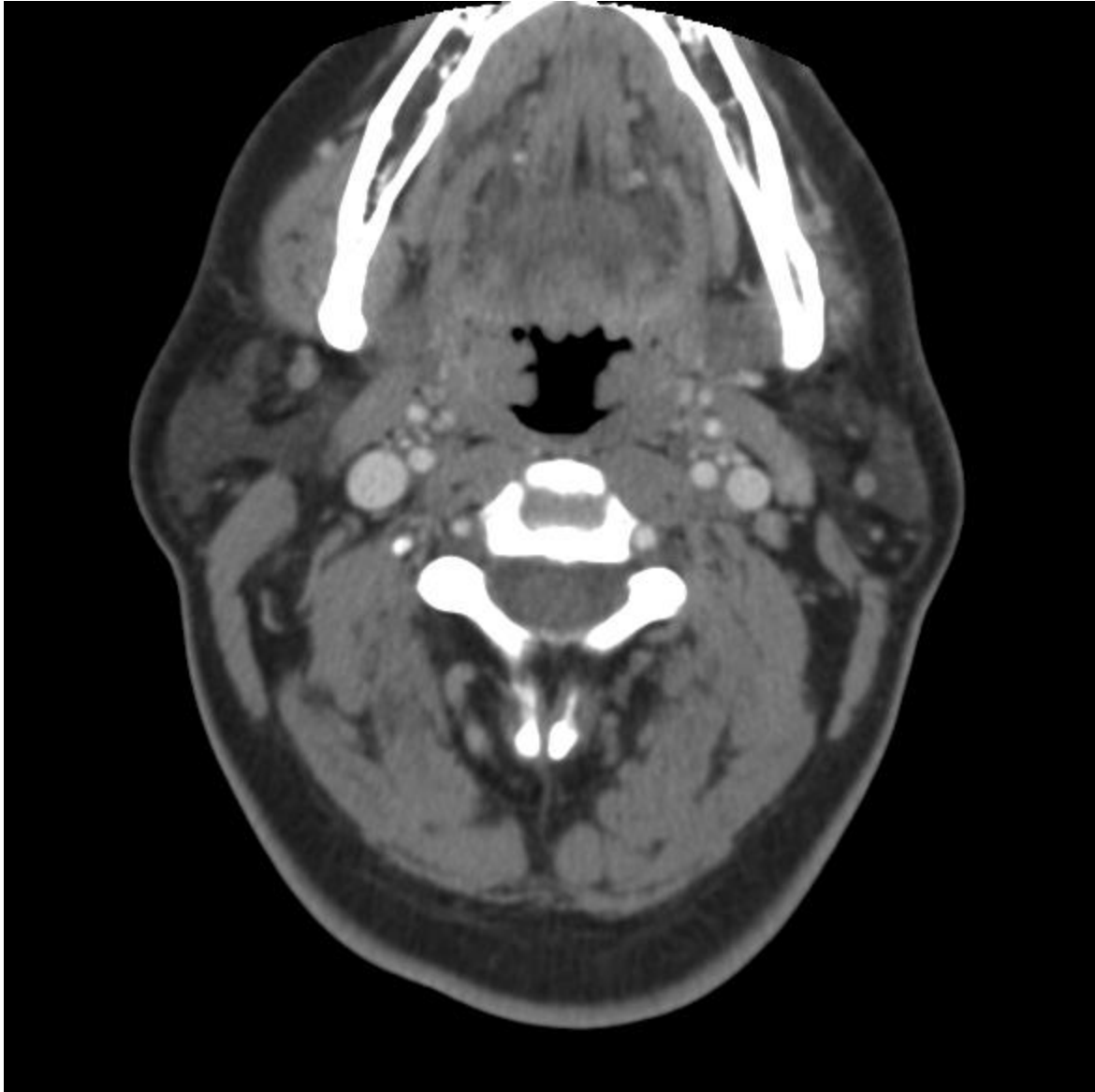


EPIGLOTTITIS









RETROPHARYNGEAL ABSCESS

- Causes:
 - **S. aureus**
 - **H. flu**
 - **Streptococcus**
- Pharynx looks normal
- Xray...what are you looking



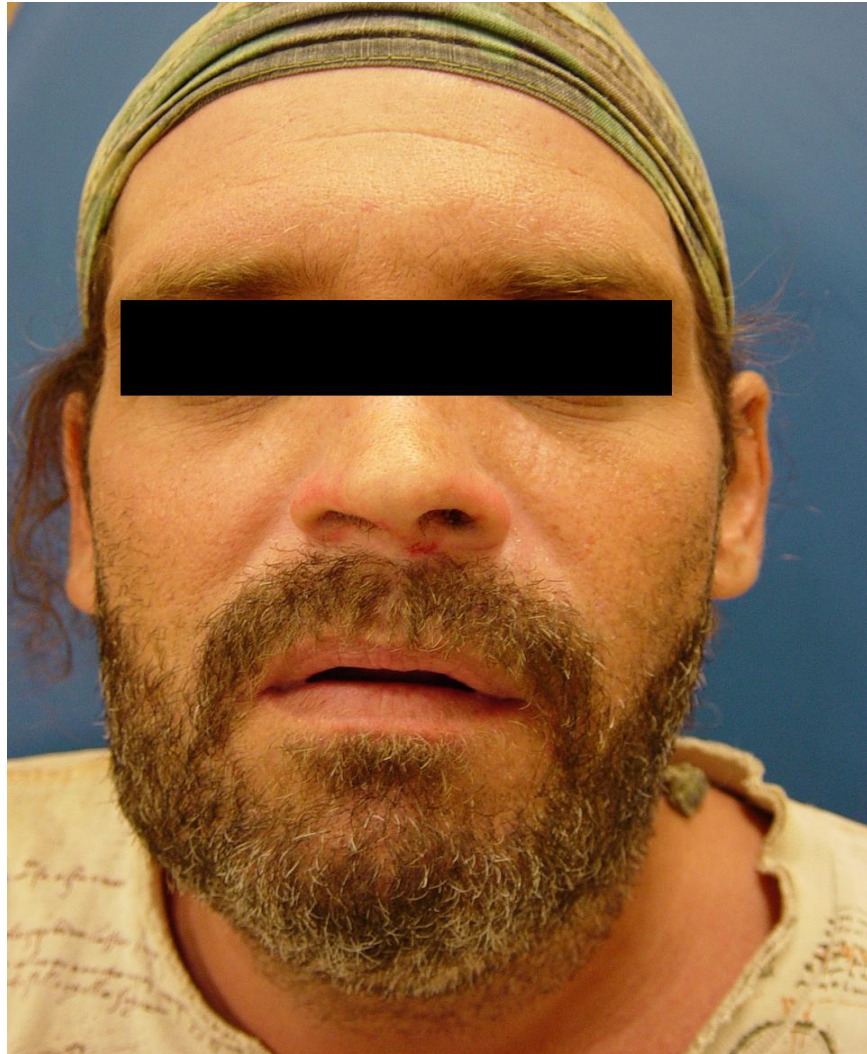


RETROPHARYNGEAL ABSCESS

- Treatment
 - Antibiotic, steroid
 - OR
 - No tongue depressor
 - No agitation
- Complications:
 - Mediastinitis
 - Epidural abscess
 - Jugular venous thrombosis
 - Necrotizing fasciitis
 - Sepsis
 - Erosion into the carotid artery



WHEN YOU NEED TO BE SCARE OF A TOOTHACHE?







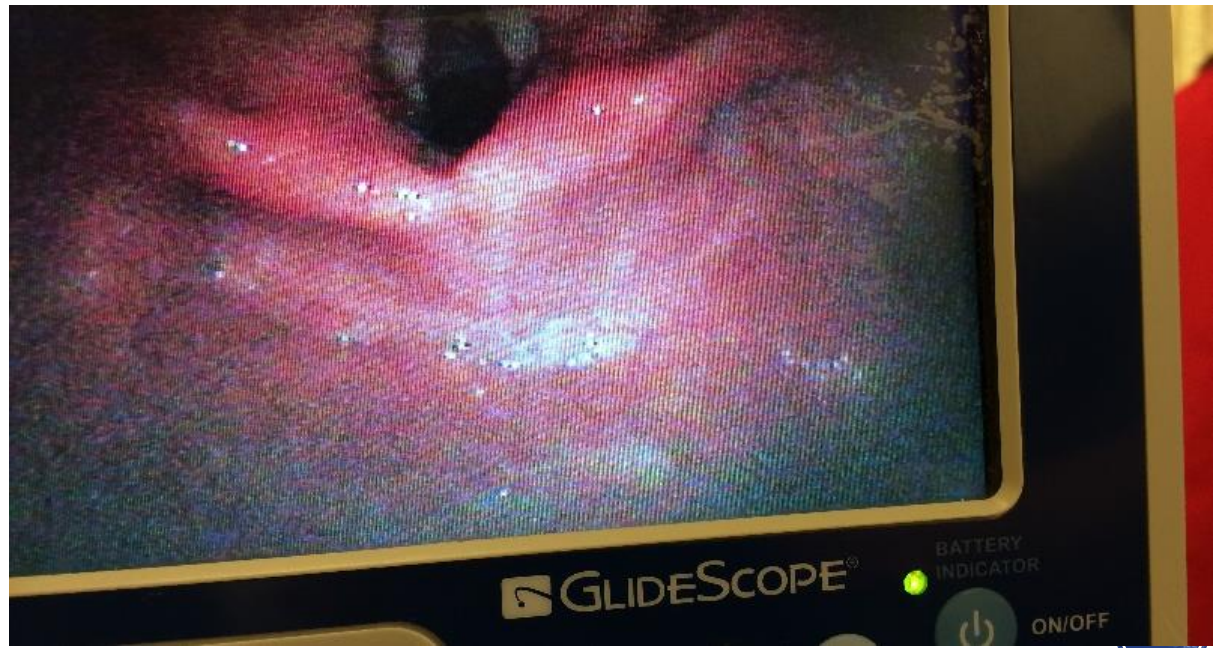


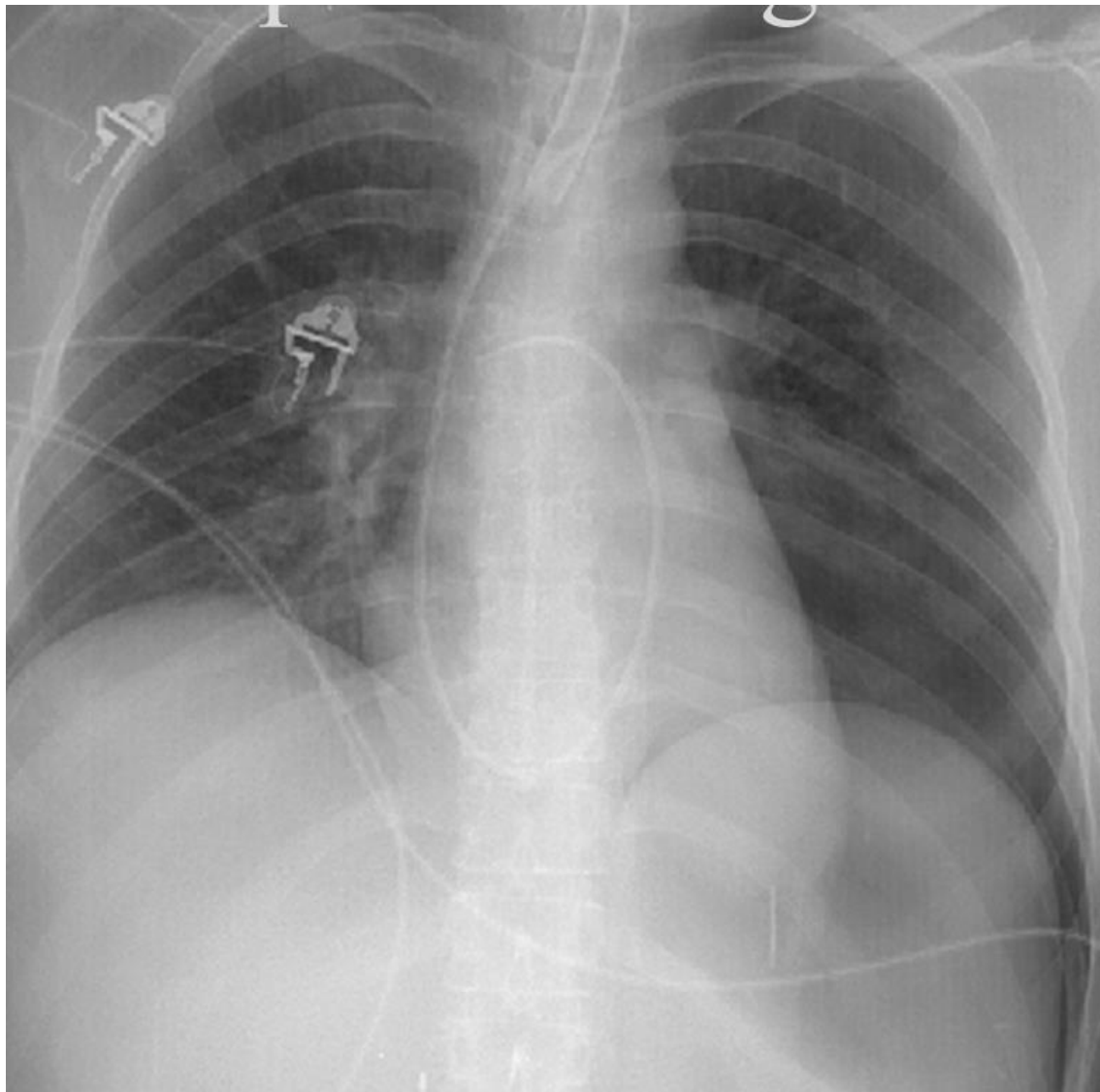


LUDWIG ANGINA

- Causes:
 - S. aureus
 - H. flu
 - Streptococcus
- Pharynx looks normal
- Treatment
 - Antibiotic, steroid
 - OR
 - No tongue depressor
 - No agitation



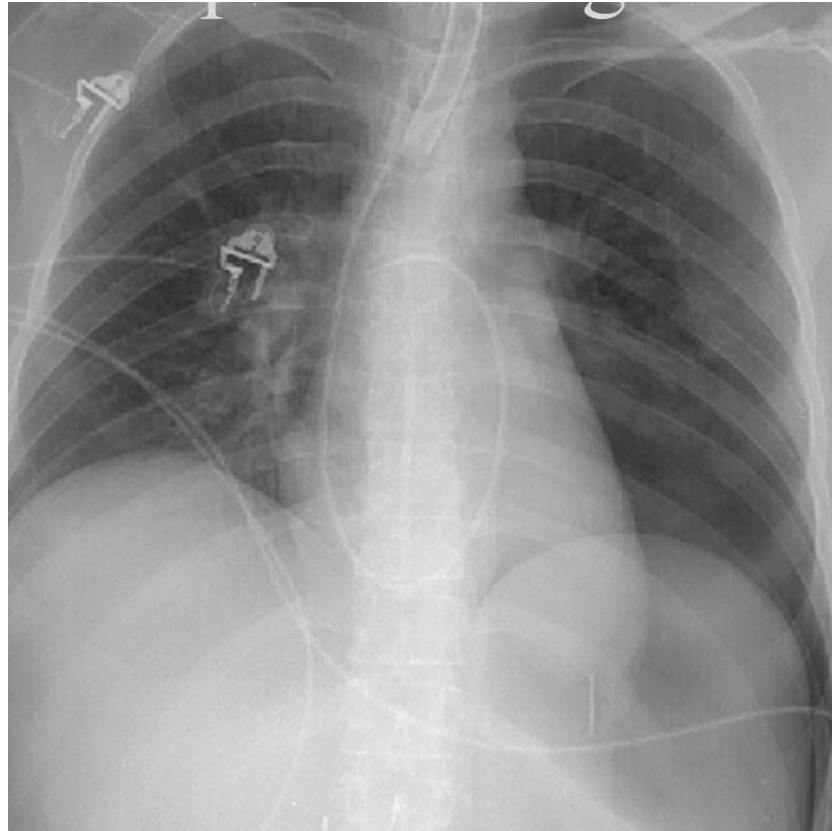




CP + Dyspnea

Diagnosis?
Name of XR finding?





CP + Dyspnea

Pneumothorax
Deep sulcus sign



I would like to extend to you an invitation to the pants party.



SPONTANEOUS PNEUMOTHORAX

- Air between visceral / parietal pleura
- Causes: traumatic, iatrogenic, spontaneous (blebs)
- Primary: male, smoker, tall, Marfan's
- Secondary: COPD, lung disease
- **Upright PA CXR**; US good as well
- Tx: Observation < 20%, **reabsorb @ 1-2% / day, 4-8% with 100% NRB**
- Observe and repeat CXR @ 6 hrs?
- The rest: **tube thoractomy**



Diminished breath sounds
on one side

Hypoxic

HR 140 BP 70/palp

Diagnosis?

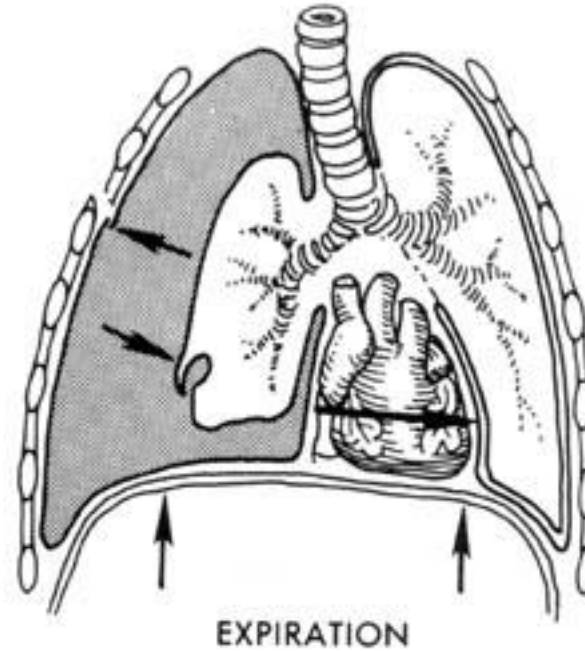
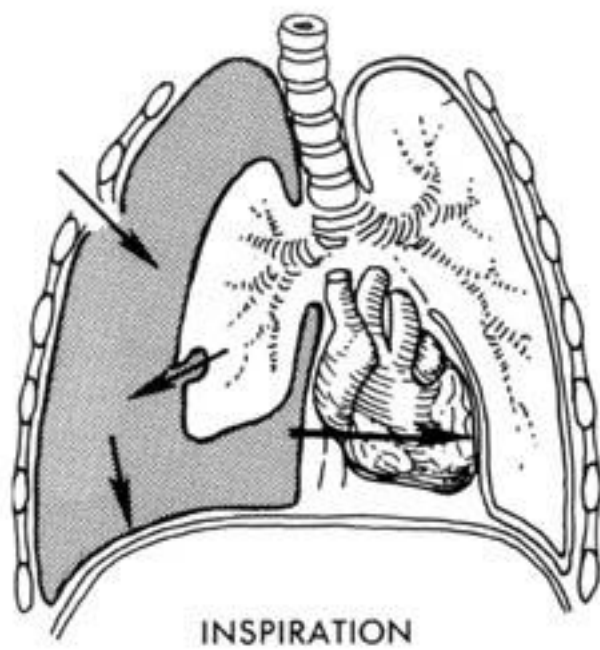


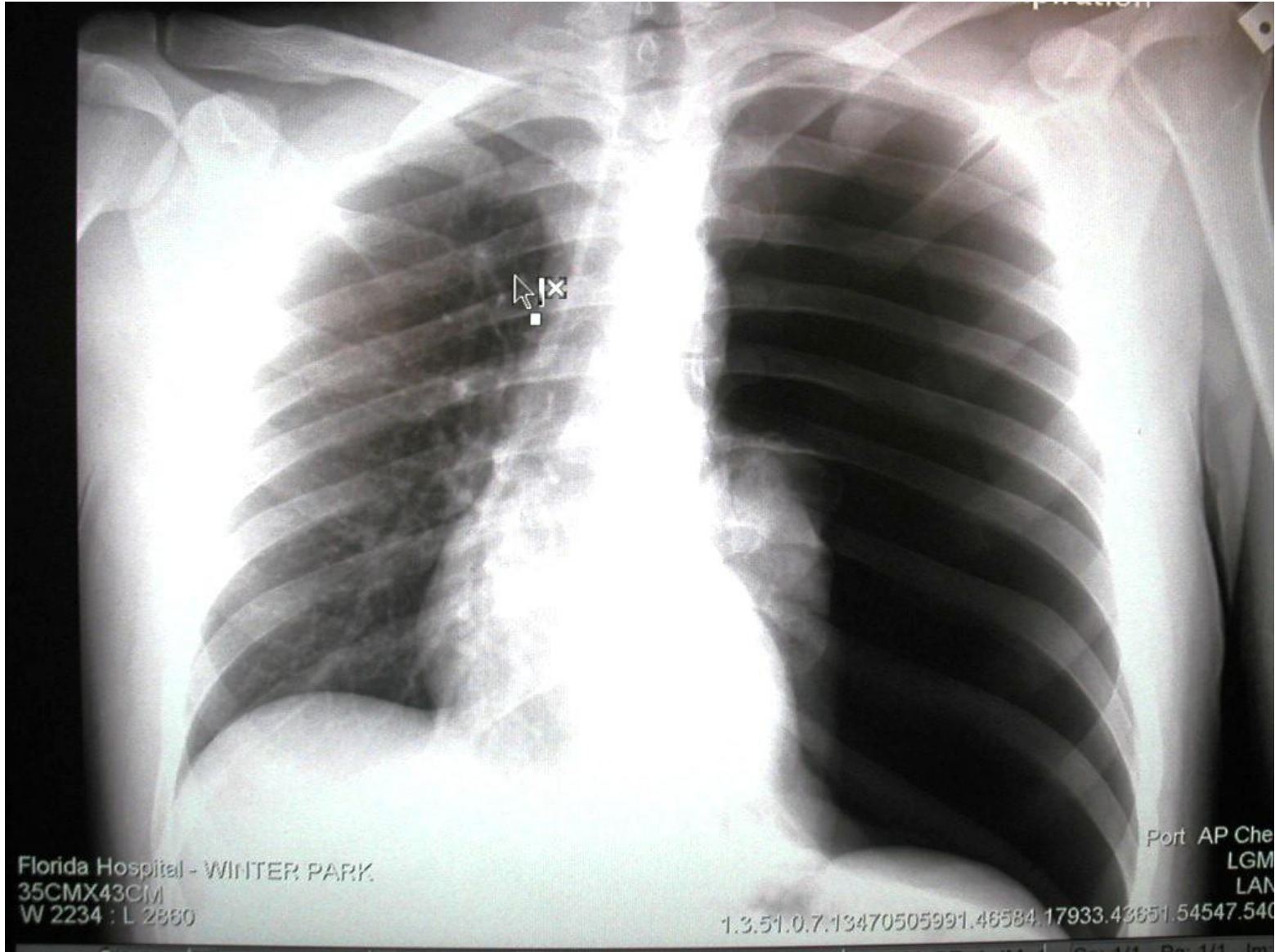
TENSION PNEUMOTHORAX

- Signs:
 - Shortness of breath
 - Deviated trachea
 - Diminished breath sounds
 - Tympani to percussion of chest
 - Distended neck veins
 - Hypotension



TENSION PNEUMOTHORAX





Florida Hospital - WINTER PARK
35CMX43CM
W 2234 : L 2880

Port AP Che
LGM
LAN

1.3.51.0.7.13470505991.46584.17933.43651.54547.540

In a sick patient, diagnosis is made by suspicion, not CXR



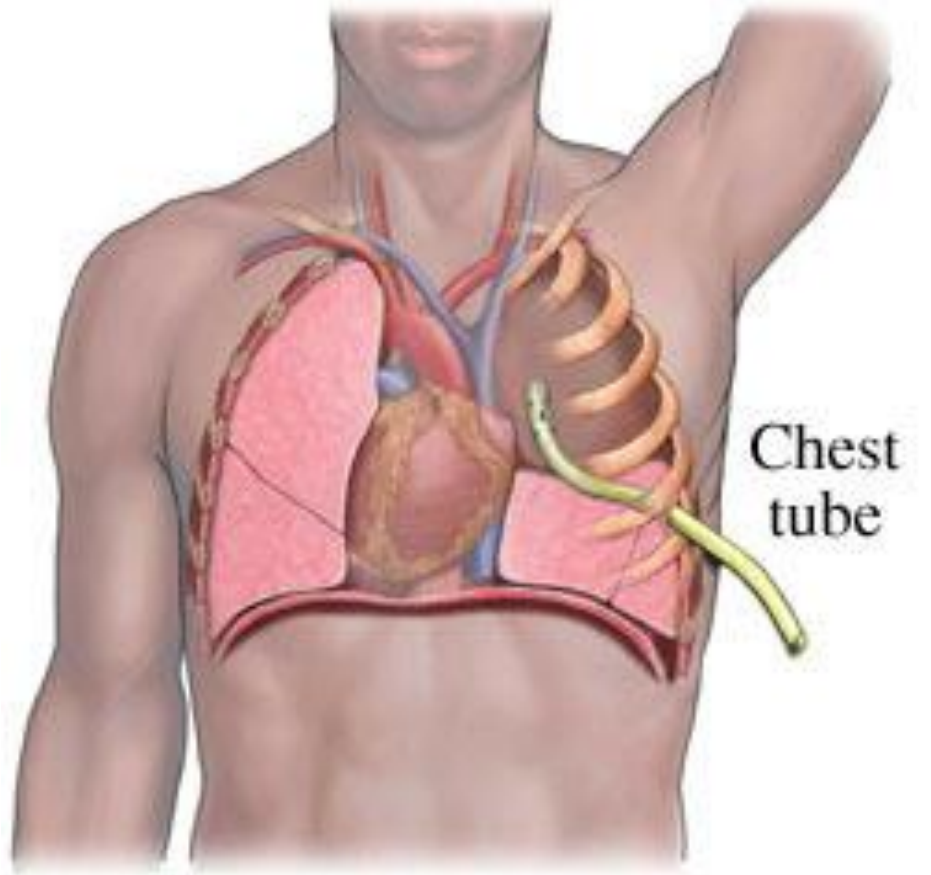
TENSION PNEUMOTHORAX

- Treatment
 - Don't wait for x-rays
 - Needle decompression
 - Chest tube



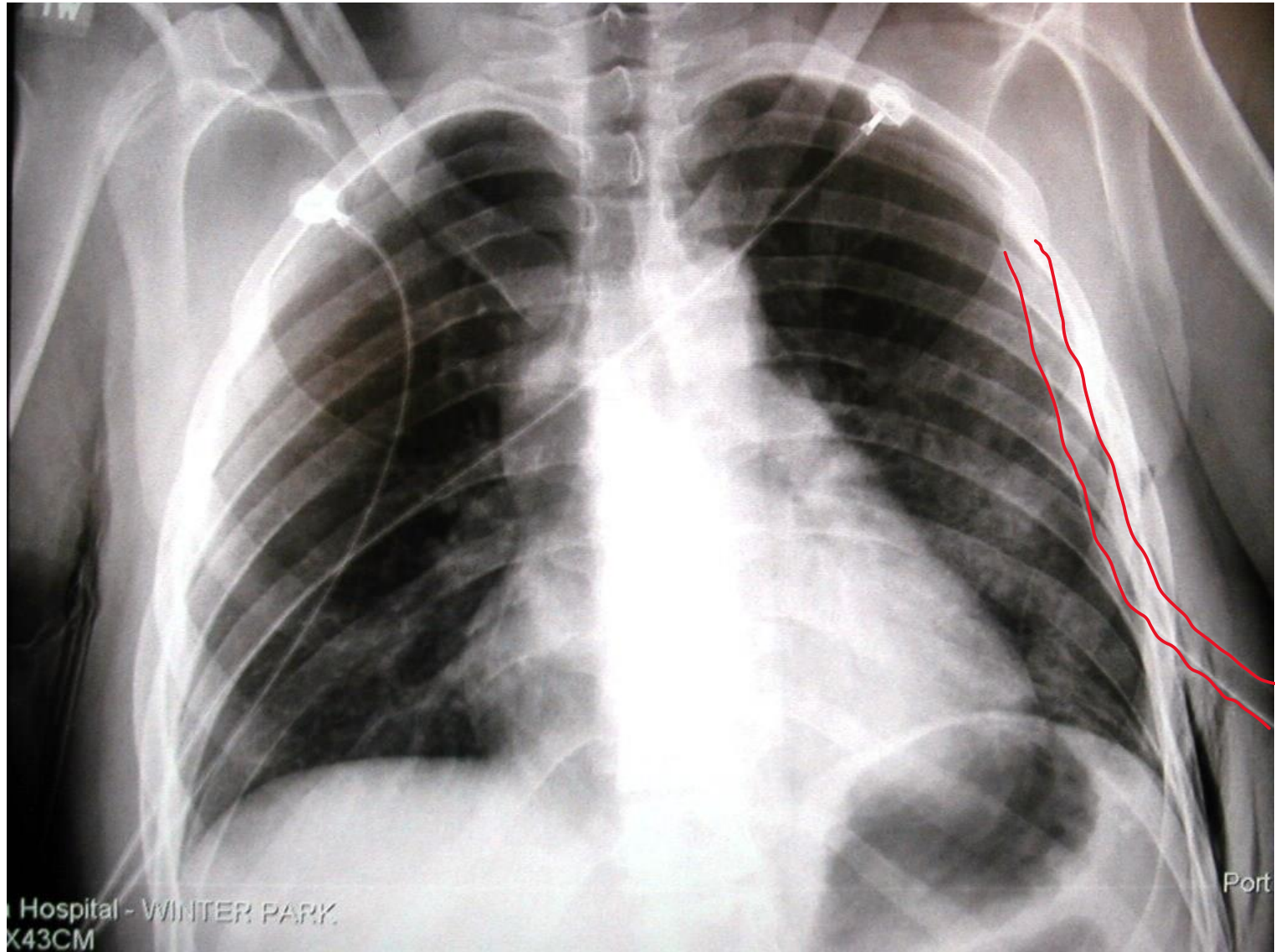


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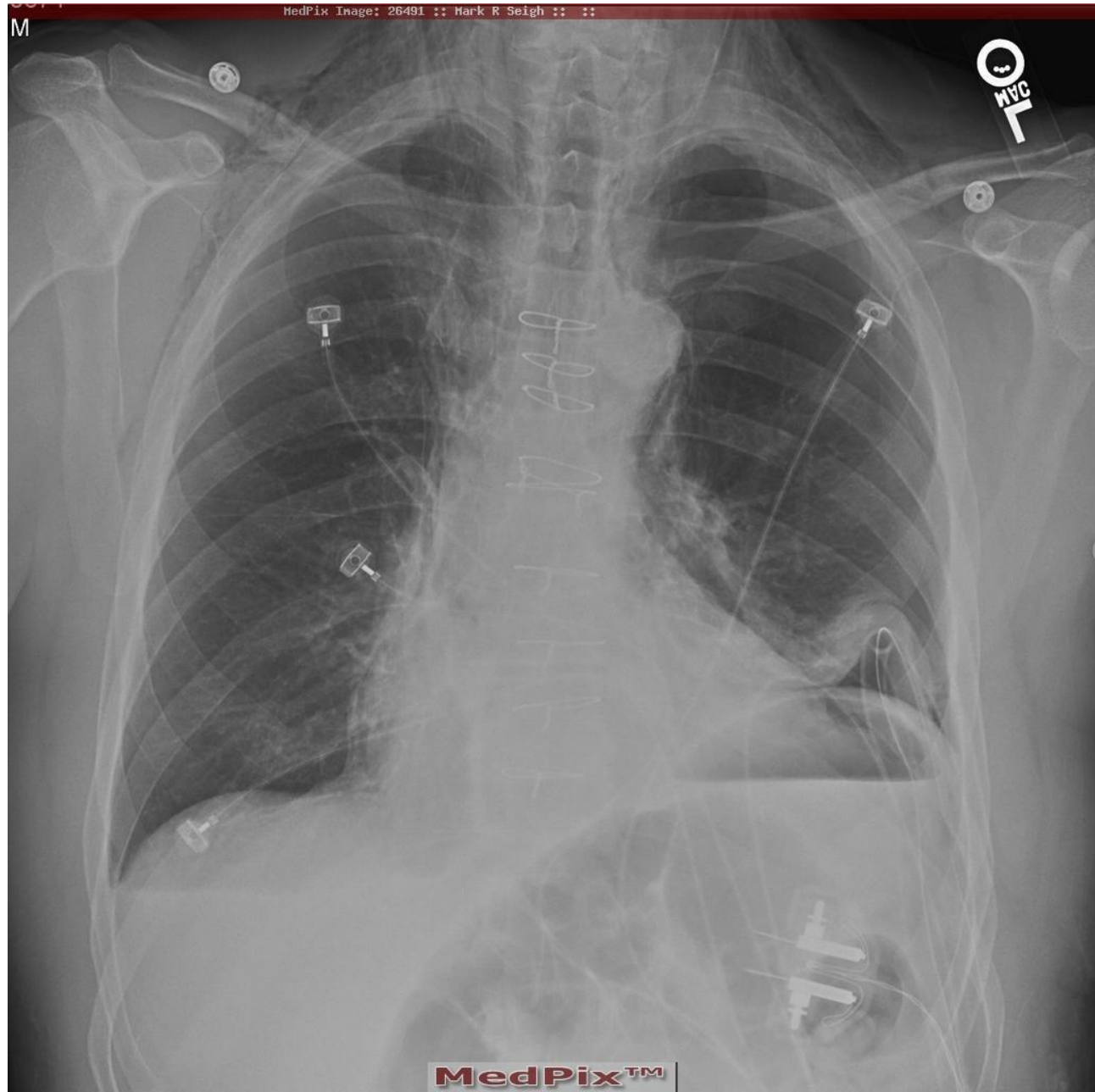




TENSION PNEUMOTHORAX

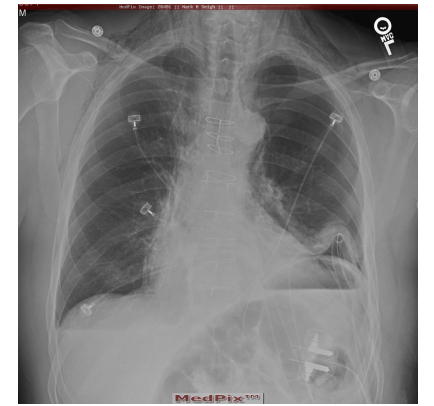
- **One way valve** causing accumulation of air, pushes mediastinal contents away, decreasing venous return. BADNESS.
- Tachycardia, hypoxic, Elevated JVD, hypotension
- Diagnosis and treat **clinically**, not with CXR
- **Midaxillary 4th/5th intercostal space (Midclavicular 2nd/3rd intercostal space in pediatric and “skinny patient”)**, then needs chest tube





PNEUMOMEDIASTINUM

- Spontaneous: exertion, Valsalva, asthma, inhalation
- Secondary: Boerhaave's, trauma
- Chest pain, neck pain, dysphagia
- **CREPITANCE, HAMMAN'S SIGN**
- CXR, though may need CT scan / Gastrograffin swallow
- Tx: supportive

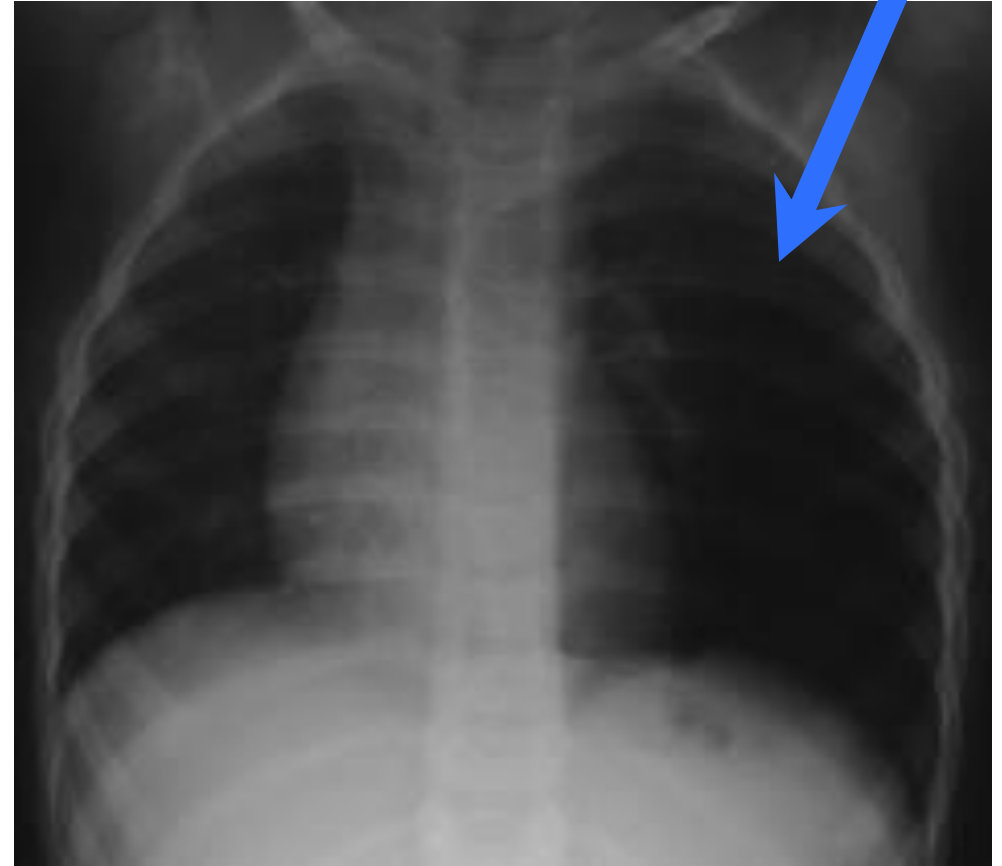
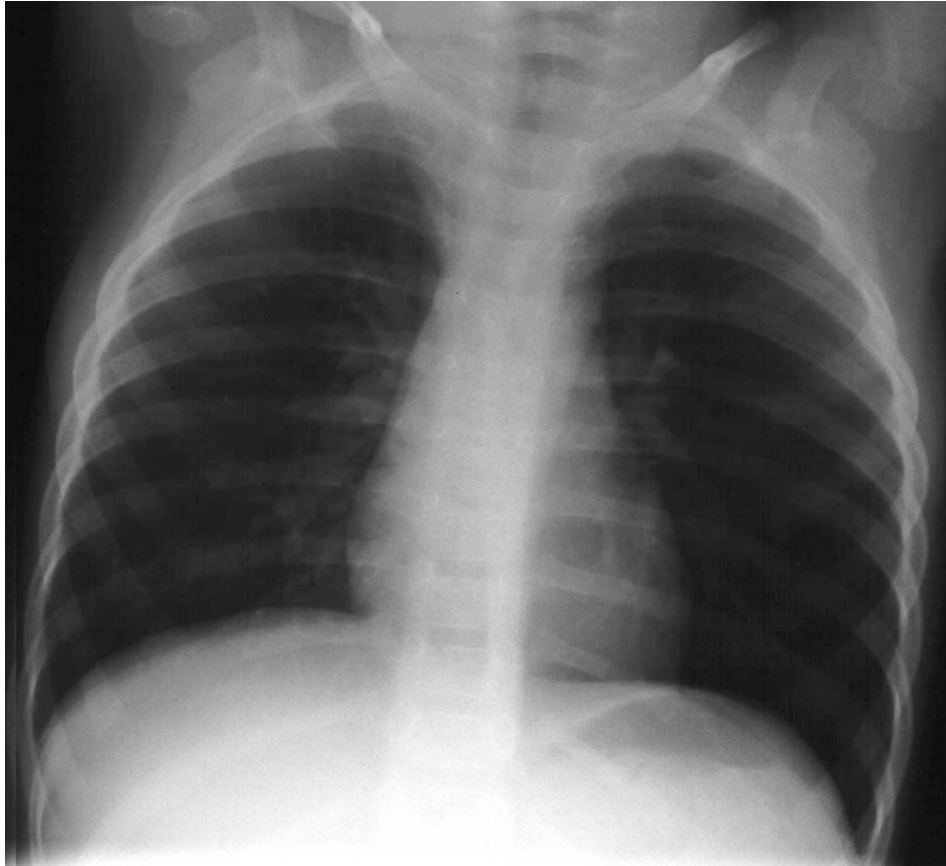


CASE

- 65yo male presents with cough and shortness of breath. States was sleeping in bed when he suddenly woke up with severe cough and some chest pain. Hx/o dental procedure the previous day.



INSPIRATION / EXPIRATION



FOREIGN BODY



- 75% in kids < 9yo. MCC: **COIN**, food after that. Adults: fish bones, dentures, food
- Suspicion with new onset stridor, wheeze, cough or **CHRONIC cough/wheeze** unresolved with medical management
- Localized wheezing, diminished breath sounds, cough, wheeze, throat pain, choking
- Most dependent portion: **RLL**
- Definitive tx: **Bronchoscopy**



- 78 y/o male c/o SOB, orthopnea
- PMHx: none
- PSHx: none
- Meds: none
- PCP: Dr. None





- VS
 - HR 115; RR 26; afebrile; BP 210/99; O2Sat 85%
- PE:
 - HEENT: pharynx is WNL;
 - Neck: supple;
 - Chest:



- Upon auscultation, you hear



- What will you do next?



CAUSES OF LVE

Most common



- Ischemic heart disease
- HTN
- Idiopathic dilated cardiomyopathy
- Valvular disease (aortic or mitral)
- High-output states (anemia, thyrotoxicosis, A-V fistula, Beriberi, Paget's disease)
- Congenital heart disease
- Coarctation of aorta



CAUSES OF RVE

- LVF (most common)
- Pulmonary artery HTN
- Valvular heart disease (pulmonary, tricuspid)
- Restrictive or infiltrative cardiomyopathies
- Myocarditis and some congenital heart disease
- RV MI
- PE
- COPD



SIGNS AND SYMPTOMS

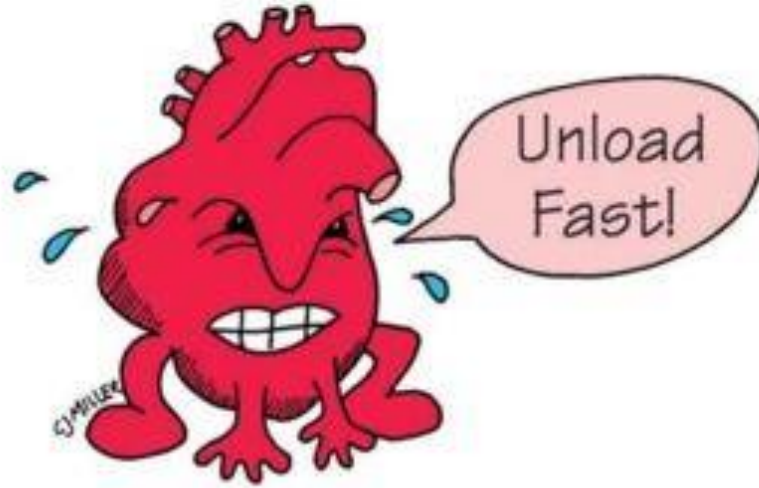
- SOB (most common)
- PND/orthopnea
- Nocturnal angina
- Moist rales or cardiac wheezing
- Cough
- Fatigue/weakness
- Pleural effusion
- Tachypnea/tachycardia
- S₃ / S₄ gallop
- HJR → JVD
- Pale, clammy, diaphoretic
- Edema





Acute MI
Pulmonary edema
Butterfly distribution

TREATING CONGESTIVE HEART FAILURE



- **U**pright Position
- **N**itrates
- **L**asix
- **O**xygen
- **A**CE Inhibitors
- **D**igoxin

- **F**luids (Decrease)
- **A**fterload (Decrease)
- **S**odium Restriction
- **T**est (Digoxin Level, ABGs, Potassium Level)



MANAGEMENT

- Monitor ECG.
- Consider medication administration:
 - Oxygen
 - Nitroglycerine
 - Decreases Pre-load
 - Vasodilate
 - Lasix (furosemide)
 - Works in the kidney...
 - Will not work if HTN or renal stenosis...
 - No renal blood flow



MANAGEMENT

- Consider medication administration:
 - ACEI's
 - Decreases After-load
 - Dobutamine if...
 - Hypotension

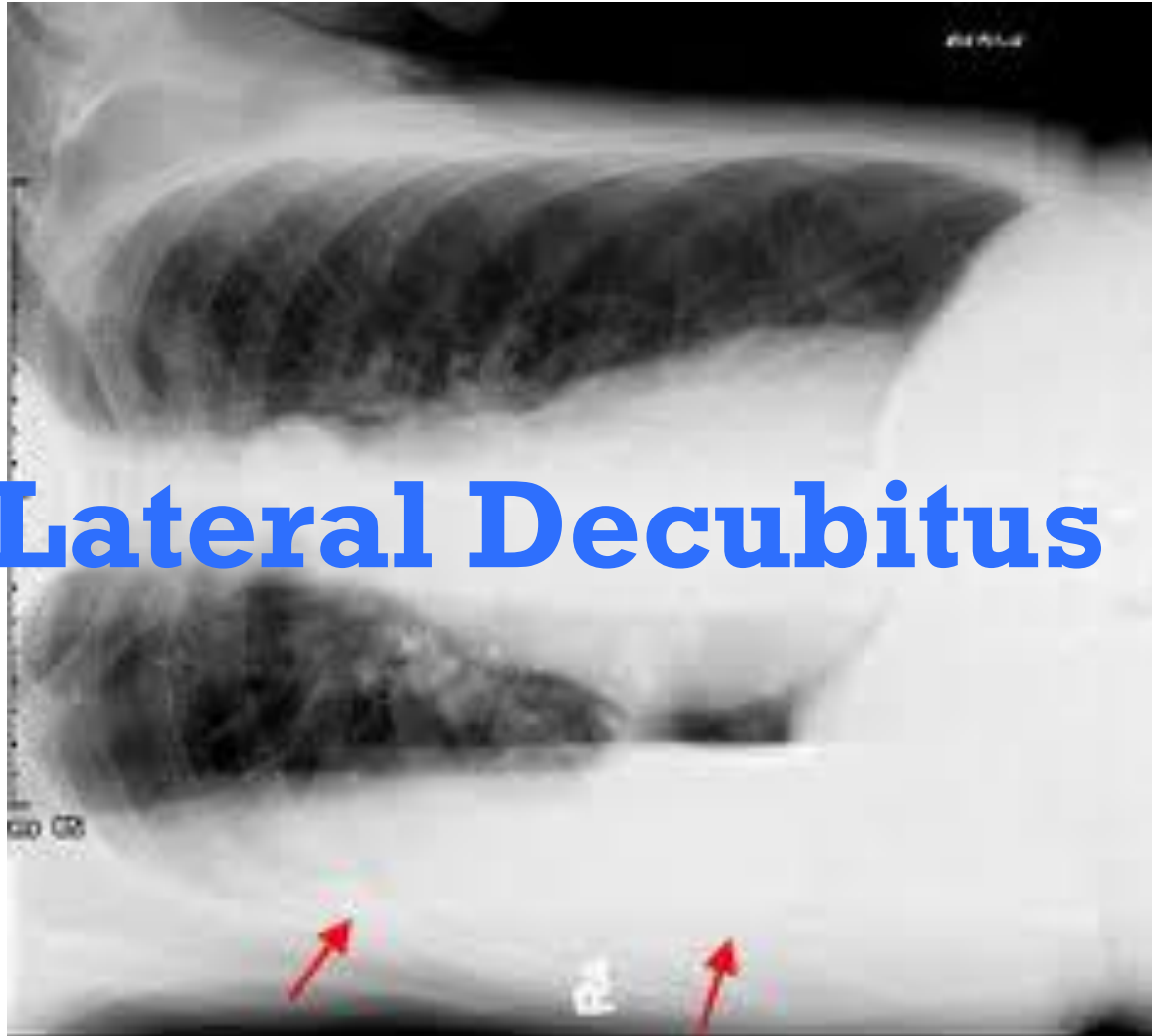


CASE

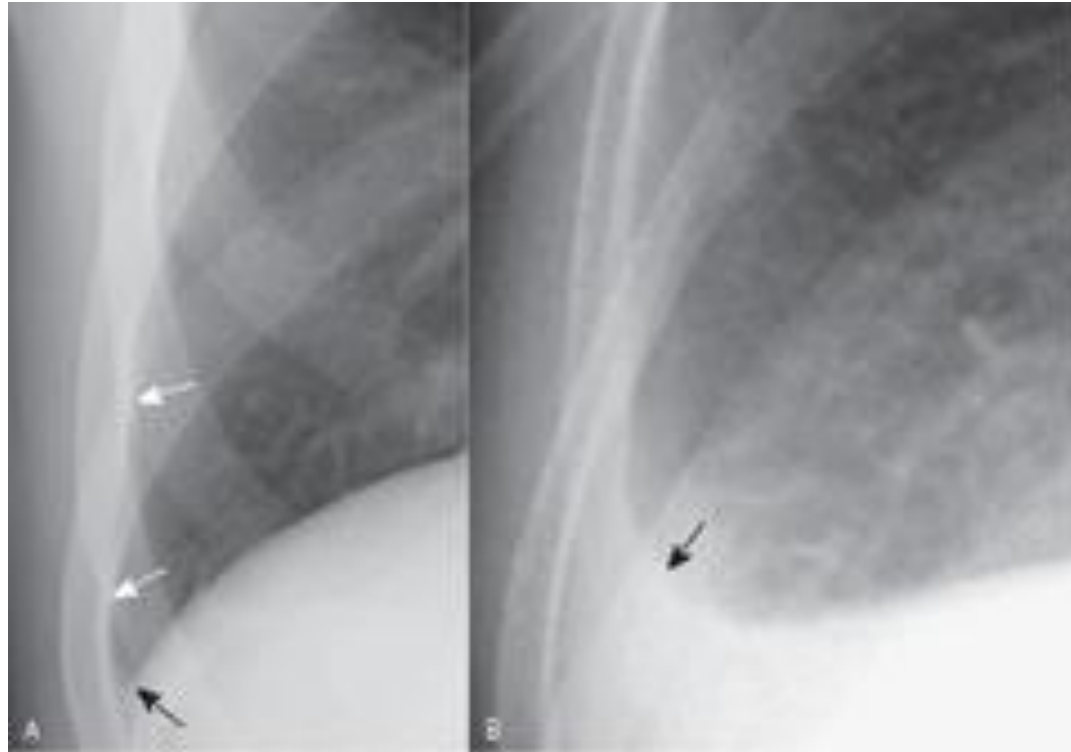
- 80 yo male presents with shortness of breath. Hx/o lung cancer diagnosed 3 months ago, has gotten progressively worse breathing over the past few weeks. Unable to walk very far without getting winded.



Lateral Decubitus



How much fluid is hiding in there?



Herring: Learning Radiology, 2e
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Transudate

VS

Exudate



Transudate	Exudate
Low Protein	HIGH Protein
Increase in hydrostatic pressure	Defective lymphatic drainage
CHF (90%) <40yo: think PE	Parapneumonic (pneumonia) MCC Malignancy 2nd Developing countries: TB



LIGHT'S CRITERIA

EXUDATE IF:

HIGH PROTEIN (pleural:serum > 0.5)

HIGH LDH (pleural:serum > 0.6)

HIGH LDH (pleural LDH $> 2/3$ normal serum LDH)





DON' T BE TAPPING

**UNLESS THEY BE
CRAPPING**



PLEURAL EFFUSION



- Transudate: CHF Exudate: Parapneumonic
- **Lateral decubitus** most sensitive
- Exudate pH < 7.3: parapneumonic; **< 7.0: empyema, esophageal rupture**
- **Chest tubes for empyema** or complicated parapneumonic effusion
- Thoracotomy if > 200 mL/hr
- Abx for infx: Clindamycin + Rocephin



- 48 y/o male c/o SOB, fever for 3 days
- PMHx: none
- PSHx: none
- Meds: none
- PCP: Dr. None





- VS
 - HR 115; RR 26; T 101.4; BP 147/60; O2Sat 89%
- PE:
 - HEENT: pharynx is WNL;
 - Neck: supple;
 - Chest:



- Upon auscultation, you hear



- What you will do next?



WHEEZING

“ALL THAT WHEEZES IS NOT ASTHMA”

- Adults
 - Cardiac disease
 - COPD
 - Emphysema
 - Pneumonia (especially with *Mycoplasma* or *Chlamydia*)
 - Localized obstruction by FB or tumor
 - PE
 - anaphylaxis



WHEEZING

“ALL THAT WHEEZES IS NOT ASTHMA”

- Children
 - Congenital heart disease
 - FB aspiration
 - GERD
 - Bronchiolitis
 - Vocal cord dysfunction
 - Chronic lung disease in a child who was premature



ASTHMA

- Monitor cardiac rhythm.
- Establish IV Access.
- Peak flow
 - ~ 70% predictive value

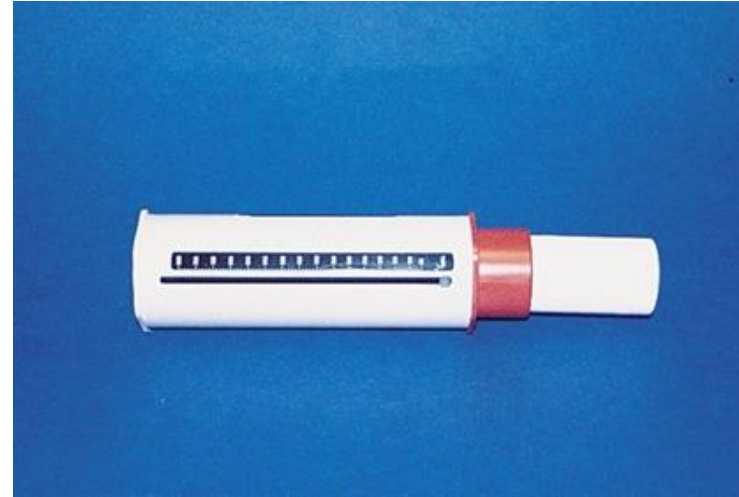


Table 1-2 SPIROMETRY AND PEAK FLOW VALUES FOR ADULTS

FEV ₁ Severity	FEV ₁ (Liters)	FVC (%)	Peak Flow (Liters/Min)
Normal	4.0–6.0 L	80–90%	550–650 (Male) 400–500 (Female)
Mild	3.0 L	70%	300–400
Moderate	1.6 L	50%	200–300
Severe	0.6 L	40%	100



ASTHMA TREATMENT

- O₂
 - How much?
 - Why not 100%?



Emergent Products PortO2vent



ASTHMA TREATMENT

- Beta-agonists
 - Albuterol
 - Epinephrine
 - Brethine
- Anticholinergic
 - Ipratropium bromide
- Corticosteroids
 - PO, IV, IM, nebulizer
- Magnesium SO₄
- BiPAP
- Helium mixed with O₂?



CLASSIFICATION OF ASTHMA

PERSISTENT



SYMPTOMS \leq 2 DAYS PER WEEK

REScue MEDICATION $<$ 2 DAYS PER WEEK

NIGHTTIME SYMPTOMS \leq 2 TIMES PER MONTH



FEV1 $>$ 80% PREDICTED
FEV1/FVC NORMAL

INTERMITTENT



SYMPTOMS $>$ 2 DAYS PER WEEK

REScue MEDICATION $>$ 2 DAYS PER WEEK

NIGHTTIME SYMPTOMS 3-4 TIMES PER MONTH



FEV1 $>$ 80% PREDICTED
FEV1/FVC NORMAL

MILD



DAILY SYMPTOMS

REScue MEDICATION DAILY

NIGHTTIME SYMPTOMS $>$ 1 TIME PER WEEK



FEV1 $>$ 60% BUT $<$ 80% PREDICTED
FEV1/FVC REDUCED 5%

MODERATE



CONTINUAL SYMPTOMS

REScue MEDICATION SEVERAL TIMES PER DAY

NIGHTTIME SYMPTOMS OFTEN $>$ 7 TIMES PER WEEK



FEV1 $<$ 60% PREDICTED
FEV1/FVC REDUCED $>$ 5%

SEVERE



CHRONIC BRONCHITIS

CLINICAL DIAGNOSIS: DAILY PRODUCTIVE
COUGH FOR THREE MONTHS OR MORE, IN
AT LEAST TWO CONSECUTIVE YEARS

OVERWEIGHT
AND CYANOTIC



ELEVATED
HEMOGLOBIN



PERIPHERAL
EDEMA



RHONCHI AND
WHEEZING

www.medcomic.com

EMPHYSEMA

PATHOLOGIC DIAGNOSIS: PERMANENT
ENLARGEMENT AND DESTRUCTION OF AIRSPACES
DISTAL TO THE TERMINAL BRONCHIOLE

OLDER
AND THIN



SEVERE
DYSPNEA



QUIET
CHEST

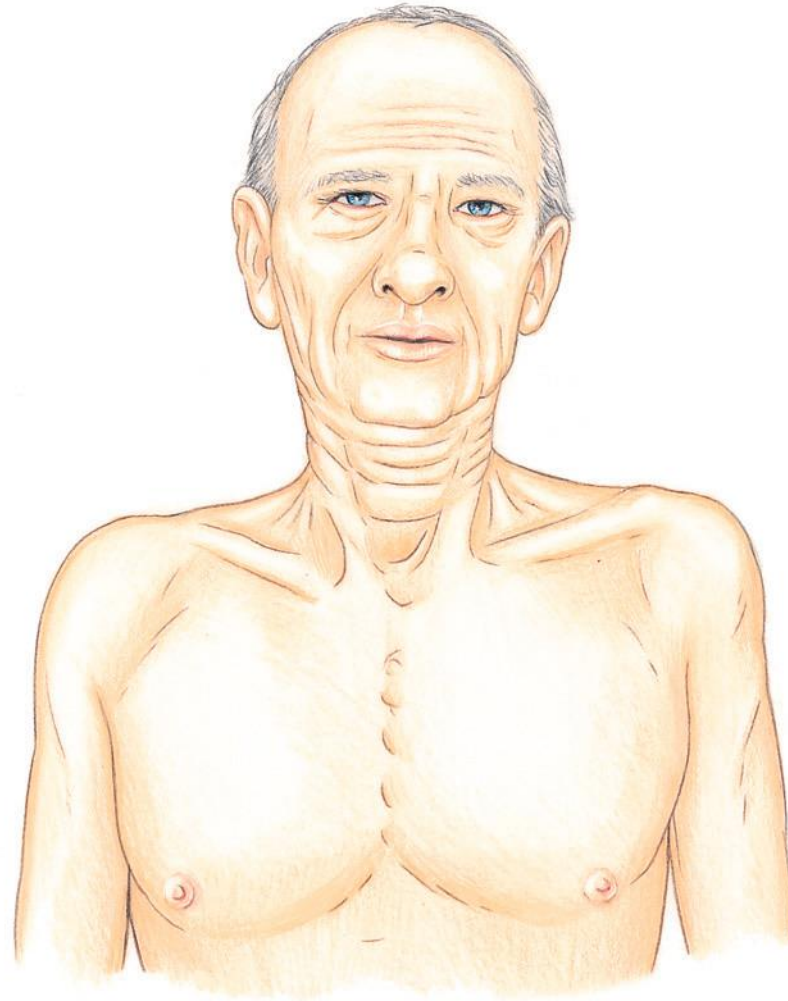
X-RAY:
HYPERINFLATION
WITH FLATTENED
DIAPHRAGMS

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EMPHYSEMA

- Physical Exam
 - Barrel chest.
 - Prolonged expiration and rapid rest phase.
 - Thin.
 - Pink skin due to extra red cell production.
 - Hypertrophy of accessory muscles.
 - “Pink Puffers.”



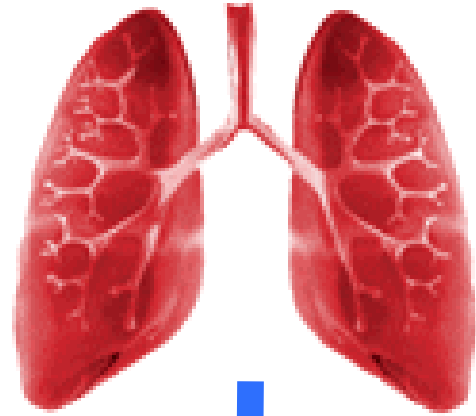
CASE

- 12yo presents with shortness of breath. Started having URI symptoms a few days ago and has progressively gotten worse. Has had episodes like this before needing nebulizer treatment. No fevers or chills. Wheezing on exam.

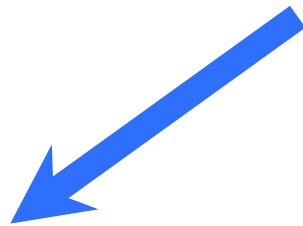


This tastes amazing!





Inflammatory Response



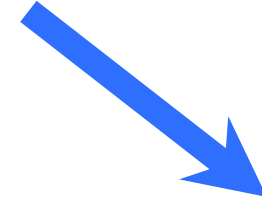
Hyperreactivity



Vascular congestion



Bronchial edema



Secretions





Permissive
hypercapnia



Lower vent rate,
Higher inspiratory
flow rate

Tidal
Volume 6-
8 mL/kg

Ketamine / Propofol



ASTHMA



- Can be induced by **aspirin**, NSAIDs, ACE, **exercise**.
- Risks: Hx/o sudden severe attack, prior **intubations/ICU admissions**, >3 ED visits or admissions/yr, >2 canisters/month, systemic steroids, comorbidities.
- Wheezing - severe may not have any. Consider asthma with nocturnal wheezing.
- **CXR not required** unless considering other dx.
- FEV1: Forced expiratory volume in 1 sec.
- If discharge, usually asthma plan and steroids for 3-10 days.



COPD



- Chronic bronchitis vs emphysema
- 90% due to smoking, alpha-antitrypsin deficiency, more common in men, 10% have it > 55yo, 4th cause of death.
- **Needs CXR** to look for other causes
- Oxygen: Usually needed; think about **hypoxic drive**
- Bronchodilators, anticholinergics, steroids
- Abx: fever, sputum change, CXR changes
- **NPPV for hypercapnia**, impending respiratory failure. Remember the reasons when its too late.



- Partially reversible obstructive airway disease - inflammation and bronchospasm
- Chronic bronchitis - “blue bloaters” - lots of mucus - may mimic CHF
 - Cyanosis, Hypercarbia, Recurrent Lung Infxn, obese
- Emphysema - “pink puffers” - less cough
 - Pursed lips, hyperinflation (barrel), irreversible lung damage, thin pts
- Bronchiectasis
- Smoking hx (older pts) - barrel chest
- Anti a-trypsin deficiency (younger pts)



**WHAT IS THE MOST LIKELY TRIGGER FOR A
COPD EXACERBATION?**

???

**IN WHICH DISEASE SHOULD SUPPLEMENTAL O2
BE USED JUDICIOUSLY?**

ASTHMA COPD BOTH



**WHAT IS THE MOST LIKELY TRIGGER FOR A
COPD EXACERBATION?**

Infection

**WHEN SHOULD SUPPLEMENTAL O2 BE USED
JUDICIOUSLY?**

COPD



Asthma vs. COPD

	ASTHMA	COPD
Underlying Problem	Chronic inflammatory disease with acute exacerbation 2/2 bronchospasm leading to airflow obstruction	Chronic inflammation leading to narrowed small airways and damaged alveoli, may have excessive mucous production
Trigger	Allergens, Meds, Exercise, URI	Most likely 2/2 INFECTION
Supplemental Oxygen	No harm in supplemental O2	Too much O2 may worsen CO2 retention by decreasing hypoxic drive; Supplement O2 PRN for Goal Sat 88-92%
Antibiotics	Give ABX if evidence of associated pneumonia	Give ABX if change in sputum production/purulence, worsened SOB, or in sicker patients requiring admission; Fluoroquinolone or Macrolide (cover Pseudomonas if ICU-bound)



VENT SETTINGS FOR ASTHMA/COPD: HIGH OR LOW

Rate?? TV?? I:E??

ASTHMA/COPD PATIENT CRASHES AFTER INTUBATION...WHAT TO DO?

Name 2 Interventions



VENT SETTINGS FOR ASTHMA/COPD: HIGH OR LOW

Rate- LOW TV- LOW I:E- LOW

ASTHMA/COPD PATIENT CRASHES AFTER INTUBATION...WHAT TO DO?

Manually Bag IVF Decompress Chest

Needle Chest Paralyze Suction



Asthma and COPD

INTUBATION & VENT MANAGEMENT											
When	Refractory Hypoxia, AMS, BiPAP Failure, Shock										
Possible Complications	Minimal Reserve, Breath Stacking/Air Trapping (High ITP), Hypotension, Pneumothorax, Difficult to wean from vent										
Strategies	Aggressive Preoxygenation (BiPAP as able), IVF bolus, Minimize Auto-PEEP, Permissive Hypercapnea										
Meds	<p>Premedication: Consider nebulized or IV Lidocaine (may blunt cough, gag, reflex tachy and HTN); Low dose Ketamine</p> <p>Sedation: Consider Ketamine 2mg/kg (weak bronchodilator)</p> <p>Paralysis: Succinylcholine 2mg/kg OR Rocuronium 1mg/kg</p>										
Settings	<table border="0"> <thead> <tr> <th>General</th> <th>Specialized</th> </tr> </thead> <tbody> <tr> <td>Resp Rate: 8-10</td> <td>I:E: 1:4, 1:5</td> </tr> <tr> <td>Tidal Volume: 5-6 cc/kg IBW</td> <td>Inspiratory Flow: 60-100 L/m</td> </tr> <tr> <td>PEEP: 0</td> <td>Goal Plateau Pressure < 30</td> </tr> <tr> <td>Titrate O2 for Sats to low 90s</td> <td></td> </tr> </tbody> </table>	General	Specialized	Resp Rate: 8-10	I:E: 1:4, 1:5	Tidal Volume: 5-6 cc/kg IBW	Inspiratory Flow: 60-100 L/m	PEEP: 0	Goal Plateau Pressure < 30	Titrate O2 for Sats to low 90s	
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PEEP: 0	Goal Plateau Pressure < 30										
Titrate O2 for Sats to low 90s											
Crisis Considerations	Disconnect from Vent, Manually Bag, Aggressive Suctioning, Manually Decompress Chest, Needle Thoracostomy if PTX, Paralysis for Vent Dyssynchrony, IVF for Hypotension										



**WHAT DIAGNOSIS EXCLUDES ARDS AS A CAUSE
FOR RESPIRATORY FAILURE?**

???

**VENT SETTINGS FOR ARDS:
HIGH OR LOW**

Rate?? TV?? PEEP??



WHAT DIAGNOSIS EXCLUDES ARDS AS A CAUSE FOR RESPIRATORY FAILURE?

Heart Failure

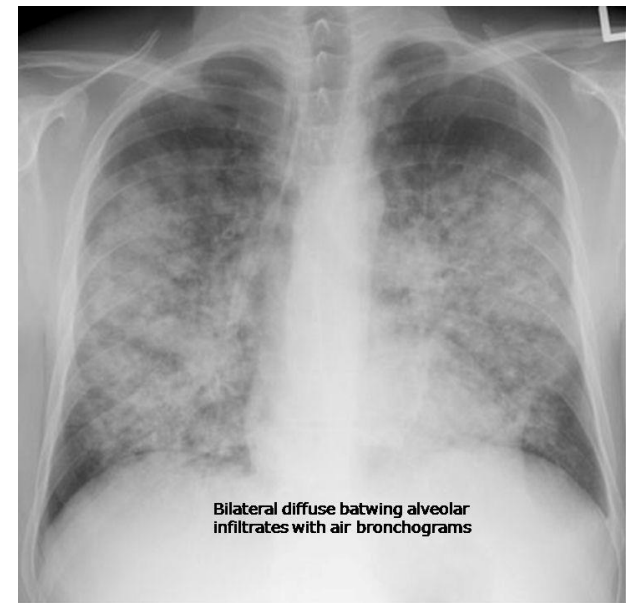
VENT SETTINGS FOR ARDS: HIGH OR LOW

Rate: HIGH TV: LOW PEEP: HIGH



ARDS

- **Noncardiogenic** pulmonary edema
- Increased **permeability**
- **Sepsis / SIRS / Septic Shock MCC**
- Aspiration, trauma, inhalation, fat emboli, HAPE, drugs (aspirin, amiodarone, TCA)
- RF: >75yo, alcoholics, metabolic acidosis, combination of causes
- HIGH mortality (>75%), multiorgan failure
- Tx underlying dx, **NO STEROIDS**. Use PEEP



ARDS

ACUTE RESPIRATORY DISTRESS SYNDROME				
What	Acute inflammatory response leading to non-cardiogenic pulmonary edema with severe hypoxia, shunt physiology and decreased lung compliance			
Causes	Severe Sepsis, Toxins, Aspiration, Infection, Emboli to Lungs, Major Trauma, Blood Transfusions, Pancreatitis			
Diagnostic Criteria	Symptoms < 1wk from clinical insult	CXR Diffuse Infiltrates, Normal Heart	Respiratory Failure NOT 2/2 HF or Volume Overload	Impaired O2 Exchange PaO ₂ /FiO ₂ < 300
Treatment	General Treat Underlying Problem Intubate Lung Protective Settings Supplement Bicarb prn		Vent Settings High PEEP (5-20) Low Tidal Volume (4-6cc/kg) Inspiratory Pressure < 30 Supp O ₂ for Sats in Low 90s	

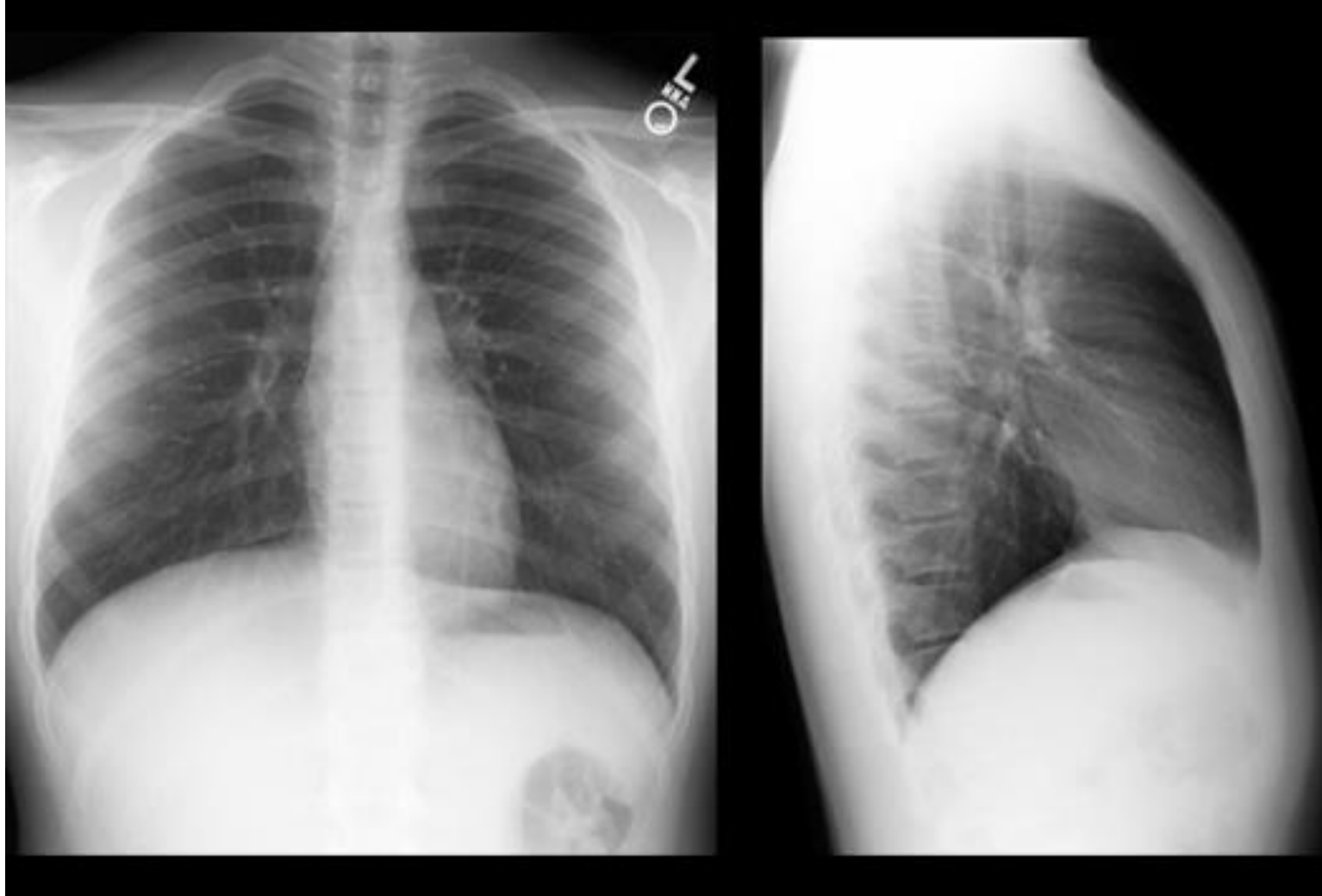


CASE

- 30yo female presents due to cough. Has been present for past few days, some sputum production. Otherwise healthy, not a smoker. Low grade fever. Exam shows possible slight wheeze, other unremarkable. Well appearing.

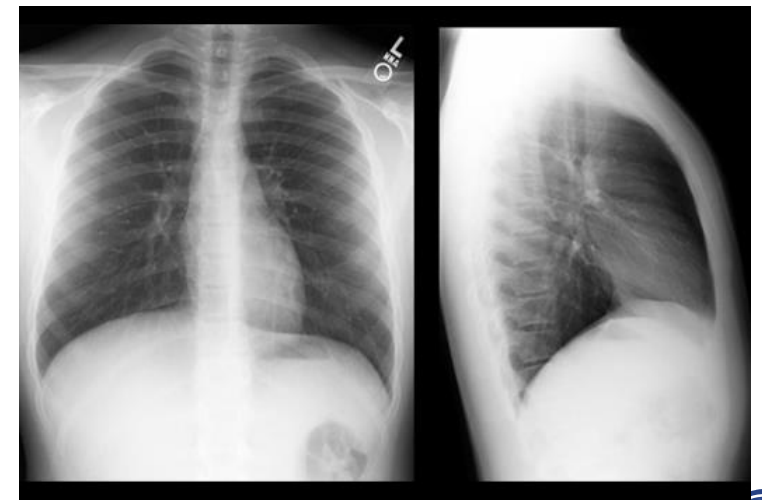
Do it or Press
Gainey will
hear about
this





BRONCHITIS

- MCC **viruses** (influenza, parainfluenza, RSV)
- < 1 week of cough
- No benefit from antibiotics
- **Albuterol may be useful**
- If prolonged; think pertussis or chlamydia



- 8 month old male c/o SOB, fever for 3 days
- PMHx: none
- PSHx: none
- Meds: none
- PCP: Dr. None







- VS
 - HR 115; RR 36; T 101.4; BP 90/60; O2Sat 94%
- PE:
 - HEENT: pharynx is WNL;
 - Neck: supple;
 - Chest:



- Upon auscultation, you hear

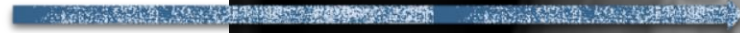


- What will you do next?



CROUP

Steeple sign





CROUP

- Cause
 - Parainfluenza
- Pharynx looks normal
- Xray...what are you looking
- Treatment
 - Steroid
 - Warm moist



HR 140s
T 37





BRONCHIOLITIS

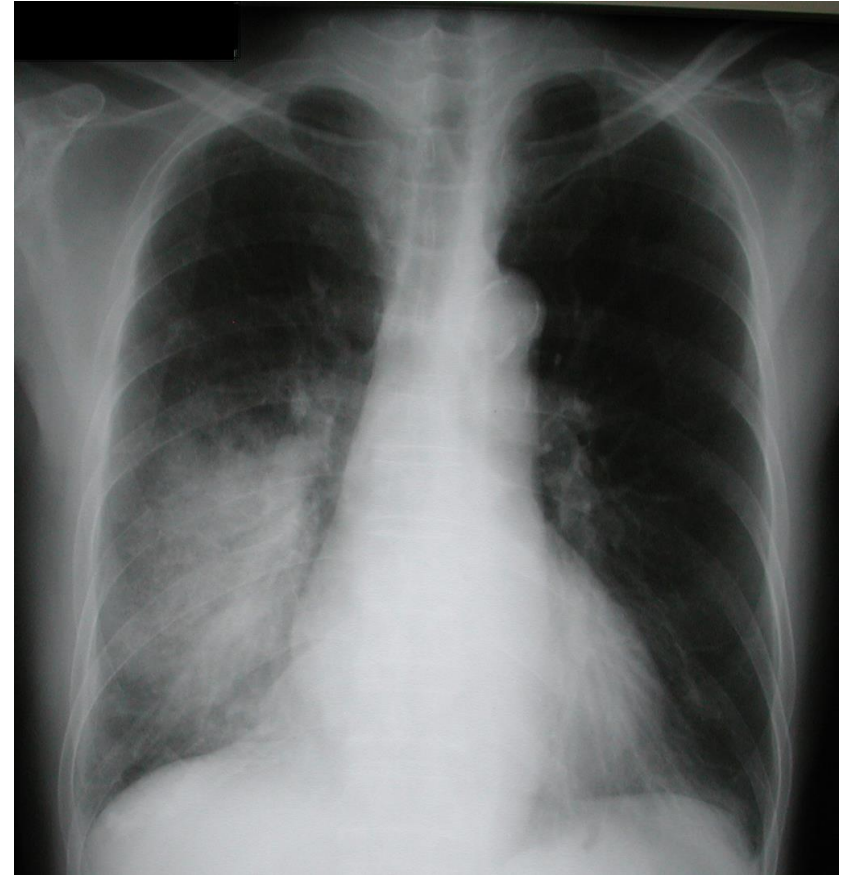
- MC lower respiratory infx in children. **RSV MCC**, parainfluenza second
- **Nasal congestion**, cough, wheezing sometimes. Usually well appearing.
- Risks for more seriousness (ie admission/apnea): Pulse ox < 95%, RFs (**prematurity**, congenital heart defect), retractions, poor feeding
- CXR: likely normal, may have bronchial markings
- Tx: Bronchodilators may help, **NO steroids/antibiotics**. Nasal suctioning



HR 120

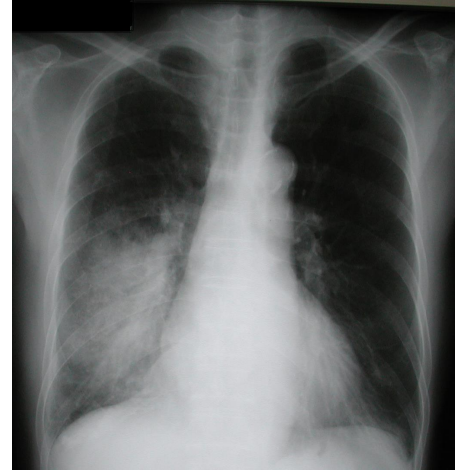
Pulse ox

93%



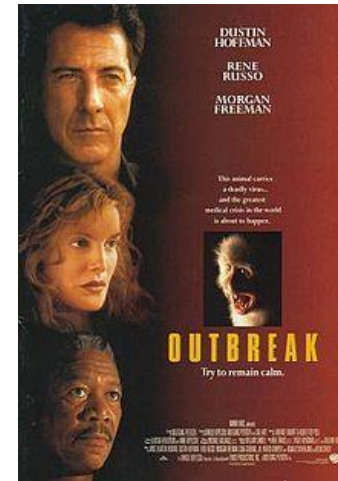
PNEUMONIA

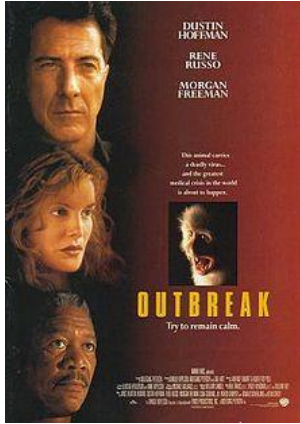
- 5-6th leading cause of death
- SOB, fever, cough
- Elderly - look for with any mental change
- Diagnosis with CXR
- Otherwise healthy tx: **Macrolide** (Z-pak), doxycycline, fluoroquinolone (moxi, levo).
- Early abx decreases mortality



ABEM PNEUMONIA



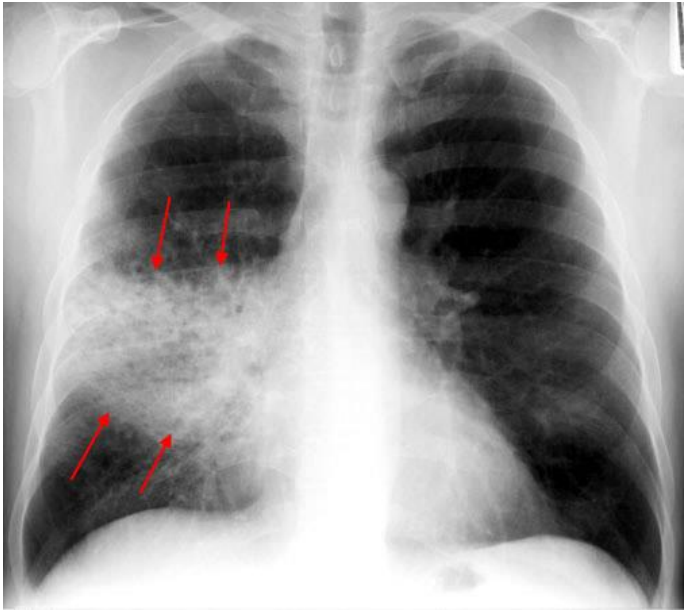


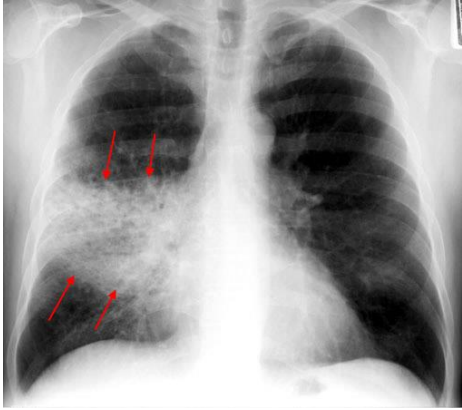


Legionella

- **Outbreaks, water supply**
- **Elderly** - MC atypical
- **Pneumonia + GI symptoms**
- **Hyponatremia / LFTs**







Strep (pneumococcal) pneumoniae

- **MCC CAP in adults**
- **Rusty sputum**
- High fever
- Classic lobar pneumonia
- Asplenic / immunosuppressed
- H.flu 2nd MCC





I'm
under
40, I
swear





Mycoplasma Pneumonia

- **MCC pneumonia < 40yo**
- Patchy infiltrate
- Look for other symptoms: sore throat, rash, **bullous myringitis**, GBS, aseptic meningitis
- Think Chlamydia pneumoniae as well







Staph aureus

- **URI that leads to pneumonia + cavitory lesion**
- **IVDA**
- **Add Vancomycin for MRSA**





Klebsiella pneumoniae

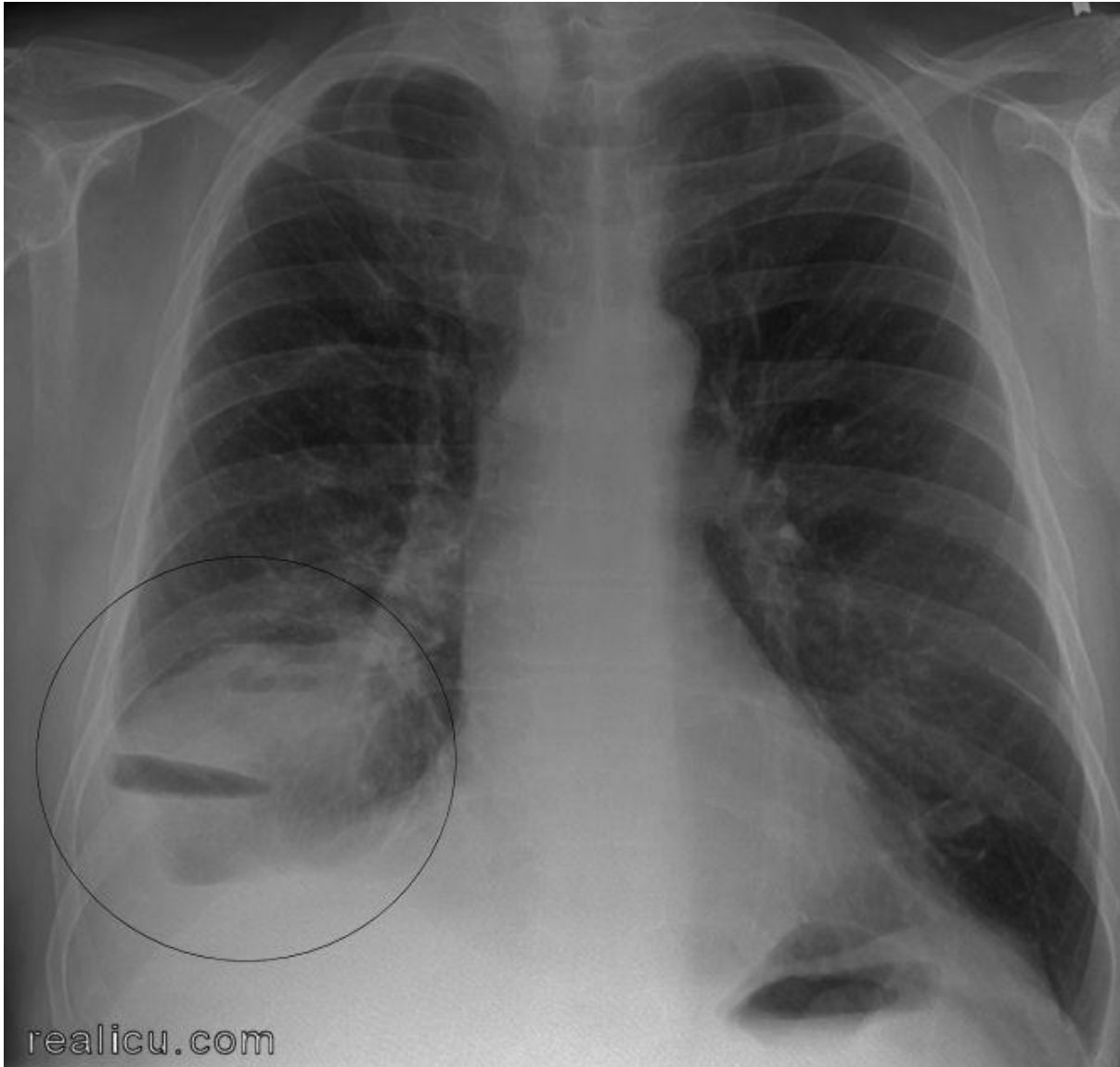
- Elderly, diabetic, **alcoholics (aspiration)**
- Abscess, bulging fissure



ASPIRATION PNEUMONIA

- Disrupts surfactant
- Risk: stroke, tube feeding, alcohol, AMS
- Severity: amount, pH < 2
- **RLL** MC location in upright/sitting
- **Polymicrobial** with anaerobes
- No tx unless symptoms (Clindamycin)
- **NO STEROIDS**





LUNG ABSCESS

- **ASPIRATION** 1-2 weeks before
- Consider cancer as well
- Anaerobes
- No surgery, usually just conservative tx
- **Clindamycin**

