Respiratory system

QMA Team
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Objectives:

- **Lung Infections** (Pneumonia, TB, Lung abscesses).
- **Obstructive lung diseases**.
- **Pulmonary function test**.
- **Others**.

Infectious lung diseases
Pneumonia

Pneumonia

- **Etiology:** Definition, Risk factors, Types.
- **Pathophysiology:** Microorganisms.
- **Presentation:** History, Physical examination.
- **Diagnosis.**
- **Treatment Approach.**
- **Complications.**

Etiology:

- **Pneumonia is** an infection of the lung parenchyma.
- **Predisposing factors:** cigarette smoking, diabetes, alcoholism, malnutrition, obstruction of the bronchi from tumors, and immunosuppression in general.
- The **most common cause of community-acquired pneumonia** in all groups is S. pneumoniae (however, viruses are the most common cause in children age <5).
- M. pneumoniae is the **most common cause of atypical pneumonia.**
- **Hospital- acquired or ventilator-associated pneumonia** shows a predominance of Gram-negative bacilli such as E. coli, the other Enterobacteriaceae, or Pseudomonas, as well as MRSA.

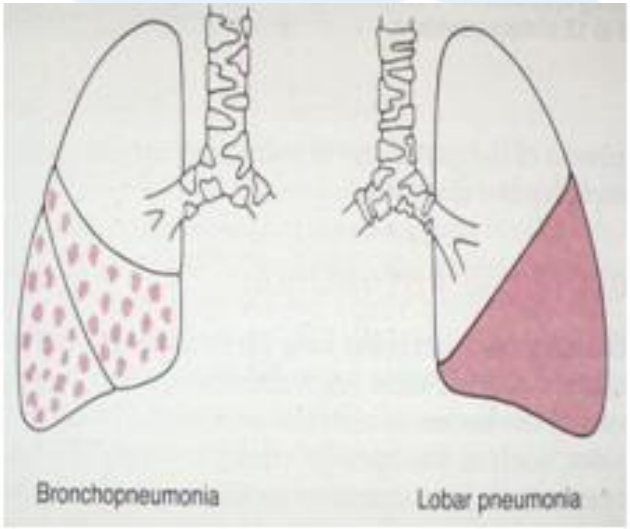
Presentation:

- **cough, fever, and often sputum production, pleuritic chest pain**.
- Severe pneumonia of any cause may present with **dyspnea**.
- **Interstitial infections** such as those caused by **Pneumocystis pneumonia (PCP), viruses, Mycoplasma, and sometimes Legionella** often give a **nonproductive or "dry" cough.**

Physical examination: Crackle + bronchial breathing + increase TVF + dullness percussion.

Diagnosis:

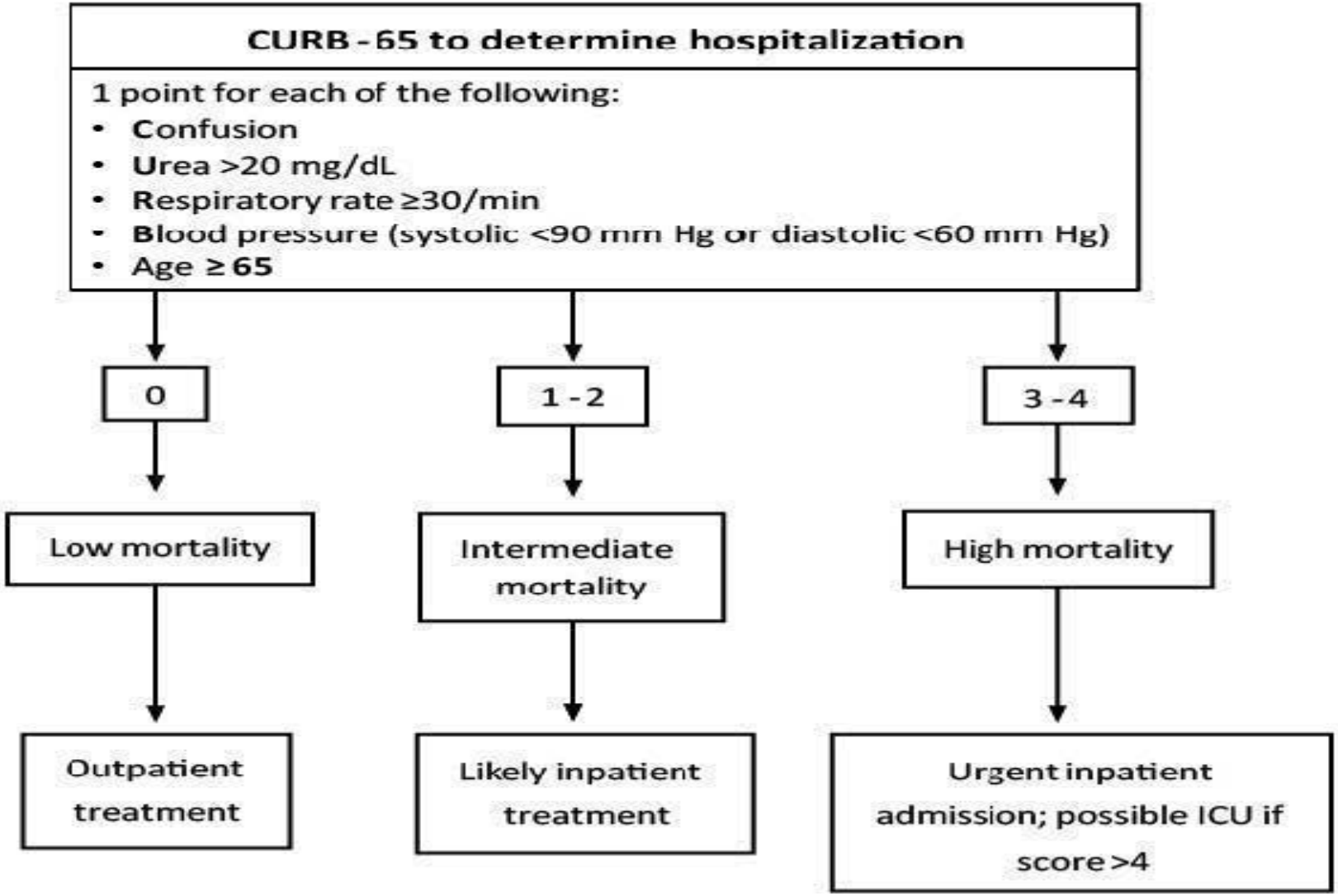
- The most important initial test for any type of pneumonia is the chest x-ray.
- The most important initial clue to the diagnosis is whether the infiltrates are localized to a single lobe of the lung or whether they are bilateral and interstitial.
- S. pneumoniae (and other causes of “typical” pneumonia) usually appear as a lobar pneumonia with parapneumonic pleural effusion.



Treatment:

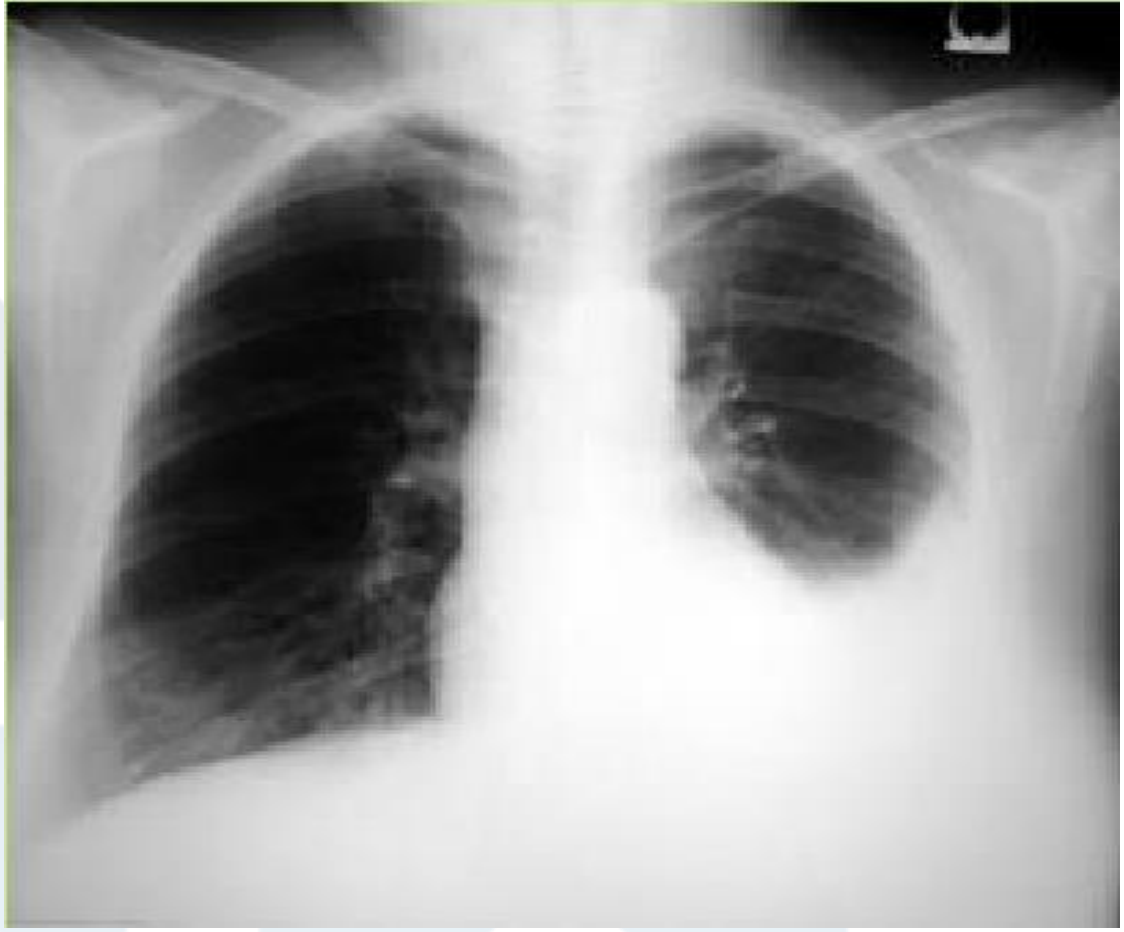
- Depends on whether the patient has a mild disease that can be treated as an outpatient or a more severe illness that must be treated with IV antibiotics as a hospitalized inpatient.
- Patients with CAP are often risk stratified using the pneumonia severity index or CURB-65 criteria to help guide treatment and treatment location (home, medical floor, intensive care unit) decisions.
- Empiric therapy for pneumonia managed as an outpatient is with a macrolide, such as azithromycin or clarithromycin. New fluoroquinolones (levofloxacin, moxifloxacin, or gemifloxacin) are alternatives.
- Hospitalized patients with CAP should receive either levofloxacin, moxifloxacin, or gatifloxacin or a second- or third-generation cephalosporin such as cefotaxime or ceftriaxone combined with a macrolide antibiotic such as azithromycin or clarithromycin.

- Patients with CAP are often risk stratified using the pneumonia severity index or **CURB-65 criteria** to help guide treatment and treatment location (home, medical floor, intensive care unit) decisions



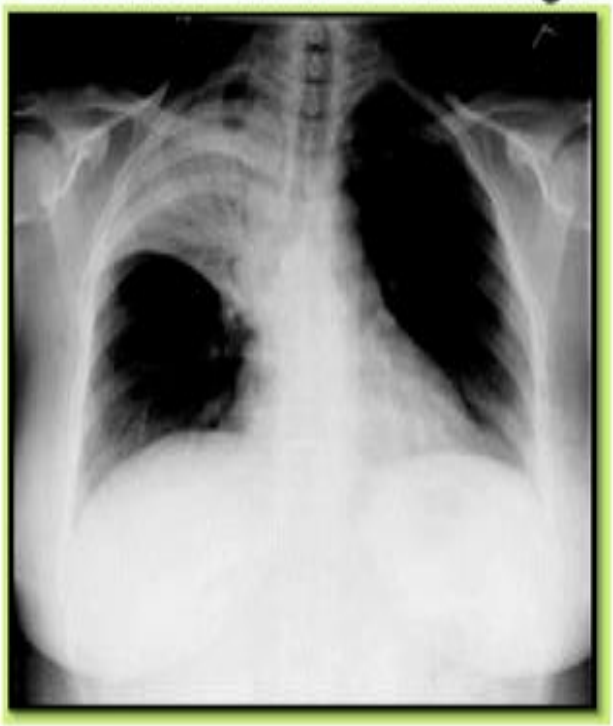
Q1:

A young patient presented with fever & chest pain.



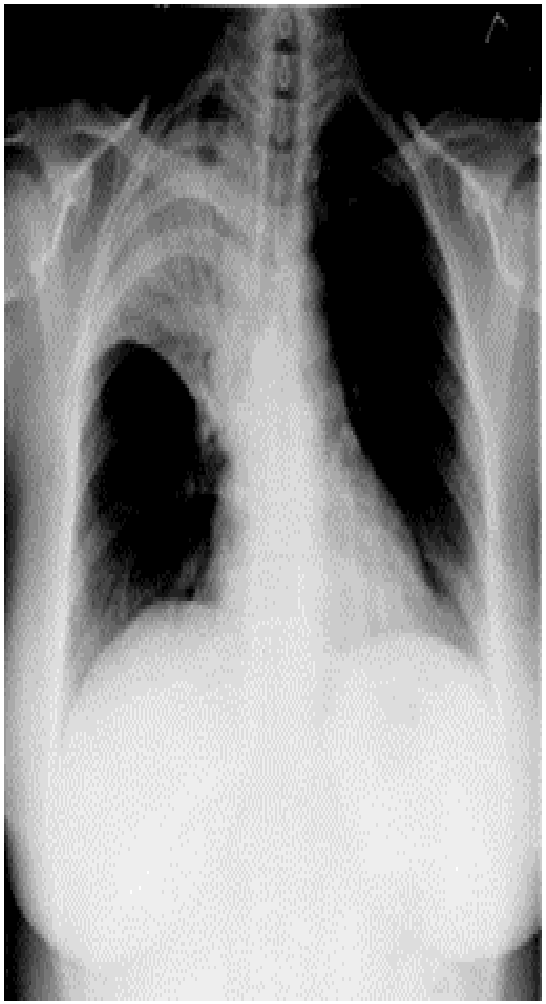
1. What's the X-ray diagnosis? Left pleural effusion
2. What's the underlying cause? Left lower zone Pneumonia.

Q2: Diabetic patient with productive cough of 3 days duration associated with fever & chills. What is the diagnosis?



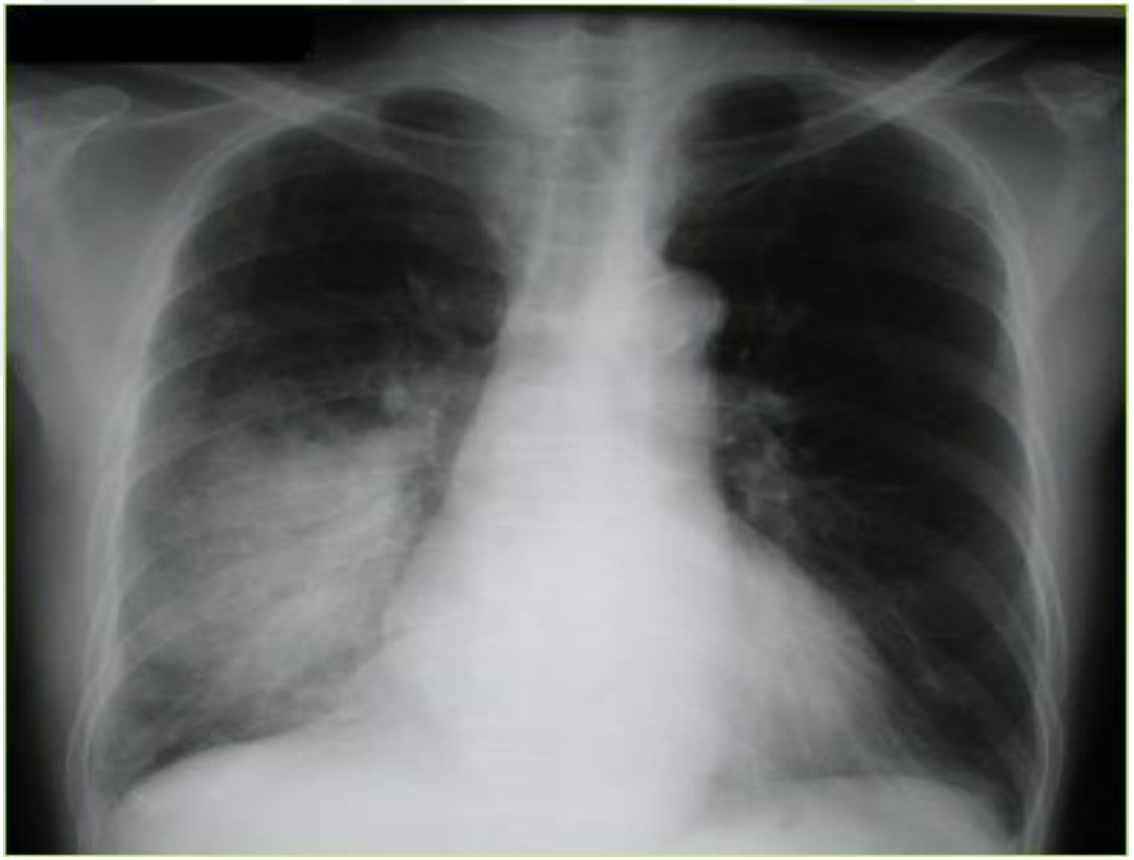
RUL pneumonia.

Q4: Patient presented with cough, fever and SOB what's your diagnosis?



Q3: 35 YO male pt, previously healthy presented complaining of cough of greenish sputum & fever, What's the most likely micro-organism?

Strep. Pneumonia

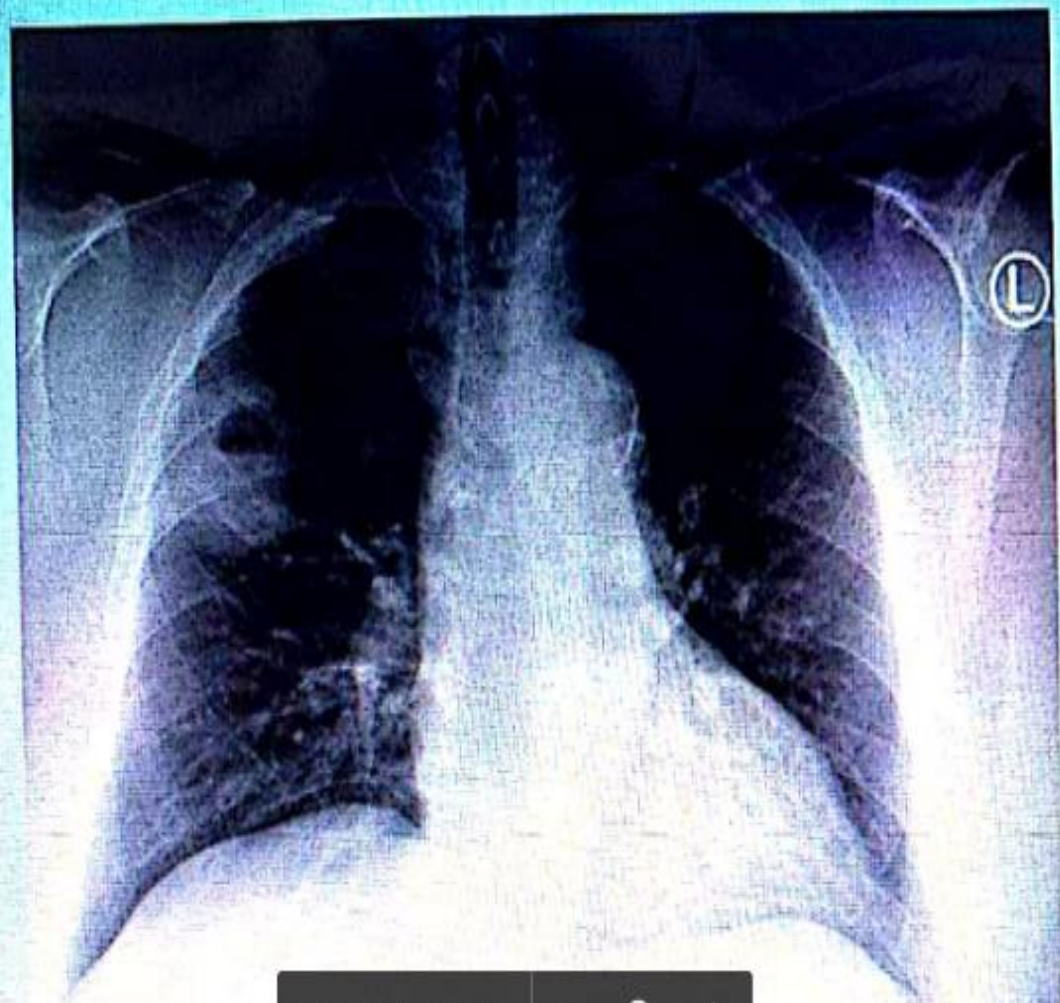


Q5: Mention 2 auscultatory findings in the pts with this X-ray.

A. Crackles, pleural rub.

B. Bronchial breathing.

This is the chest x-ray of a 54-year-old male patient who presented with fever, rigors, and productive cough of yellow sputum. The most likely expected physical finding in the right lower zone is:



Select one:

- a. Vesicular breathing
- b. Hyper-resonant on percussion
- c. Decreased tactile focal fremitus
- d. Bronchial breathing

This is the chest x-ray of a 54-year-old male patient who presented with fever, rigors, and productive cough of yellow sputum. The most likely expected physical finding in the right lower zone is:

a. Expiratory wheezes
b. Hyper-resonant on percussion
c. Inspiratory crackles
d. Decreased tactile focal fremitus
e. Vesicular breathing

Ans:C

- 1-60 years old patient presented with dry cough for 7 days , high grade fever , o2 sat 83% , wbc=5000 , what's your diagnosis ?

- A-sarcoidosis
- B-sever covid-19
- C-pulmonary edema
- D-lung mets

Q4 A 60 y/o patient with exertional dyspnea, low grade fever, O2sat 83%, CRP 125 and WBC 7000, what is your diagnosis?

A. Pulmonary edema
B. Interstitial lung fibrosis
C. Covid-19
D. Wegener vasculitis

Answer: C. Covid-19

this x-ray of patient with productive cough , fever , chills-15

? What's the appropriate drug for treatment

A-Azithromycin

B-prednisolone

C-levofloxacin

D- gentamicin

E-Fluconazole

Tuberculosis

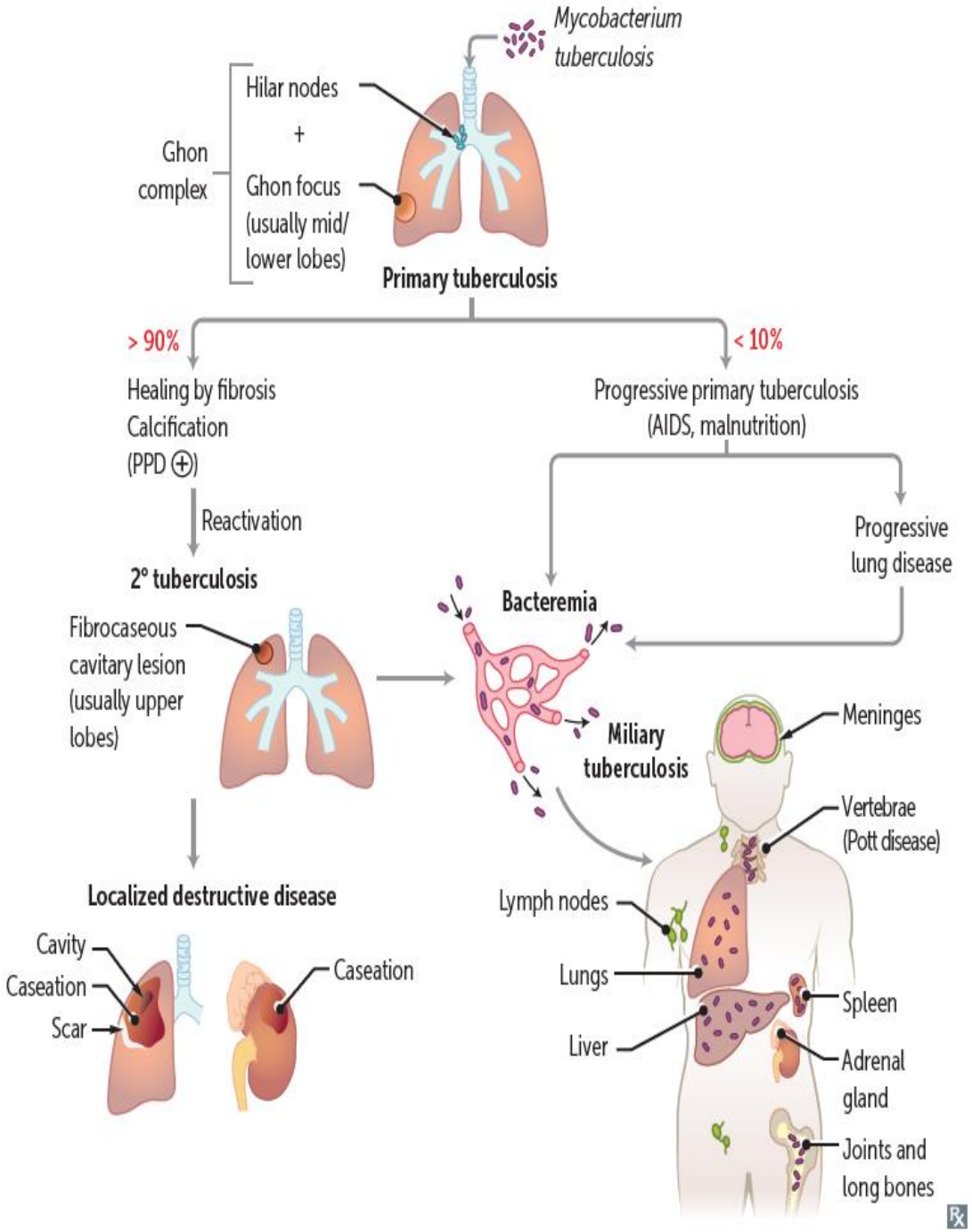
*** TB:**

- Hx: any pt with PROLONG duration of cough (>2 months), that is not relived by regular medications + Hx of risk factors (travel, exposure to TB pt) + symptoms of TB (wt loss, night sweats, productive cough).

- PE: TB LOVES THE UPPER LOBES OF THE LUNG.

TB

- **Etiology:** Definition, Mood of transmission, Risk factors.
- **Pathophysiology:** Primary, secondary (T-cell), and miliary TB.
- **Presentation:** History, physical examination.
- **Diagnosis:** Best initial, Specific test/ The most specific.
- **Treatments: RIPE ,** SE of drugs, and duration.
- **Latent TB:** Diagnosis (PPD/ IGRA) and Treatment.

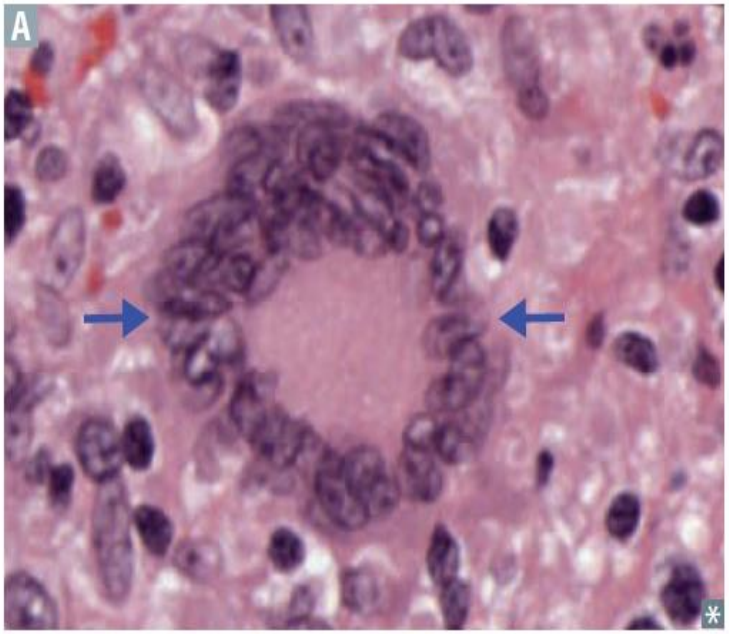


PPD ⊕ if current infection or past exposure.

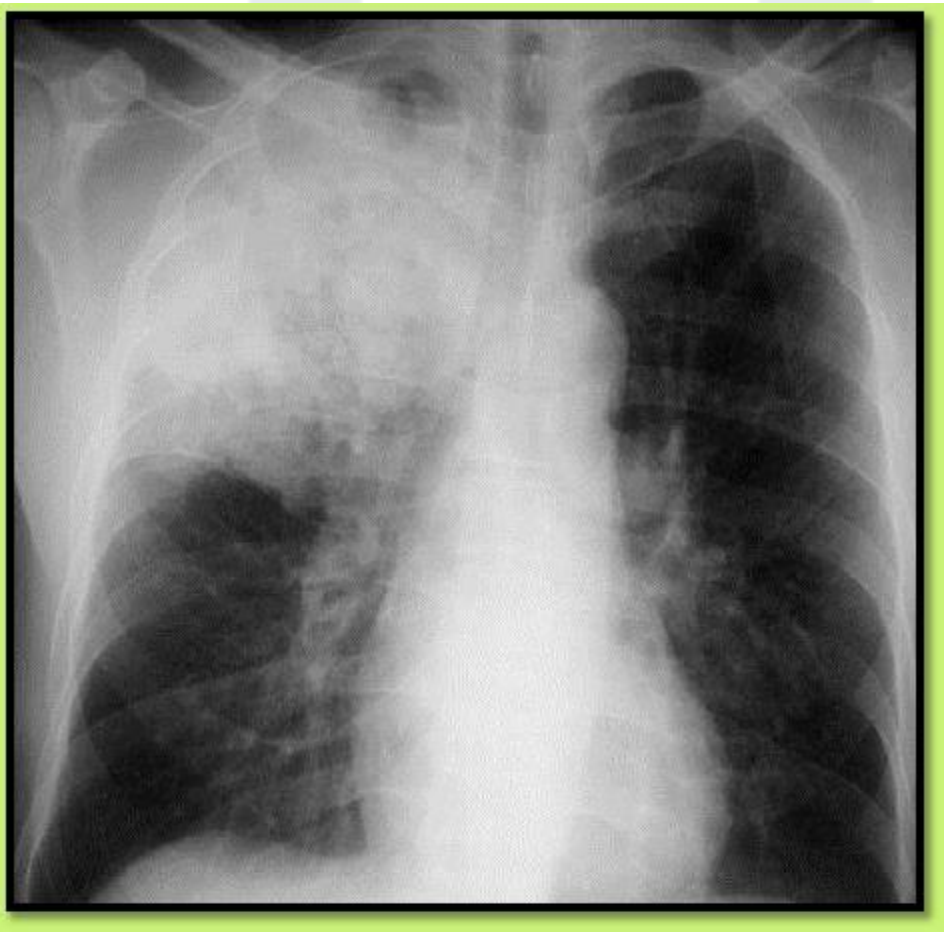
PPD ⊖ if no infection and in sarcoidosis or HIV infection (especially with low CD4+ cell count).

Interferon-γ release assay (IGRA) has fewer false positives from BCG vaccination.

Caseating granulomas with central necrosis and Langhans giant cell (single example in A) are characteristic of 2° tuberculosis.



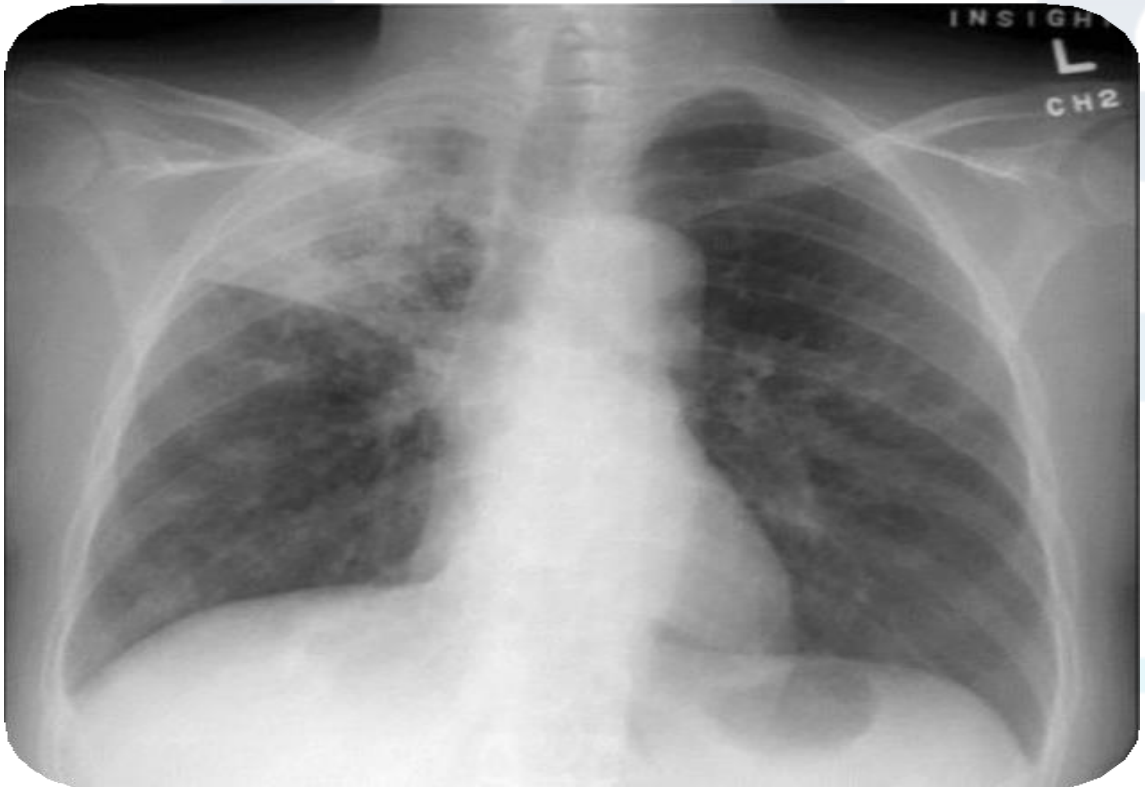
Q1: This pt presented with cough for 8 weeks, fever, Hemoptysis, wt loss, night sweats & anorexia. What is the finding in this CXR? What is your Dx.?



1.Right upper lobe consolidation.

2.Tubercolosis.

Q3:This Alcoholic pt presented with productive cough, hemoptysis, fever, night sweats, & weight loss. What is your diagnosis?



Active tuberculosis

Q4:A patient with suspected TB (or something like that is being tested). Name the substance injected and how long do you wait before you check the test for the result

Answer

A: Purified Protein Derivative (PPD)

B: 48-72 hours

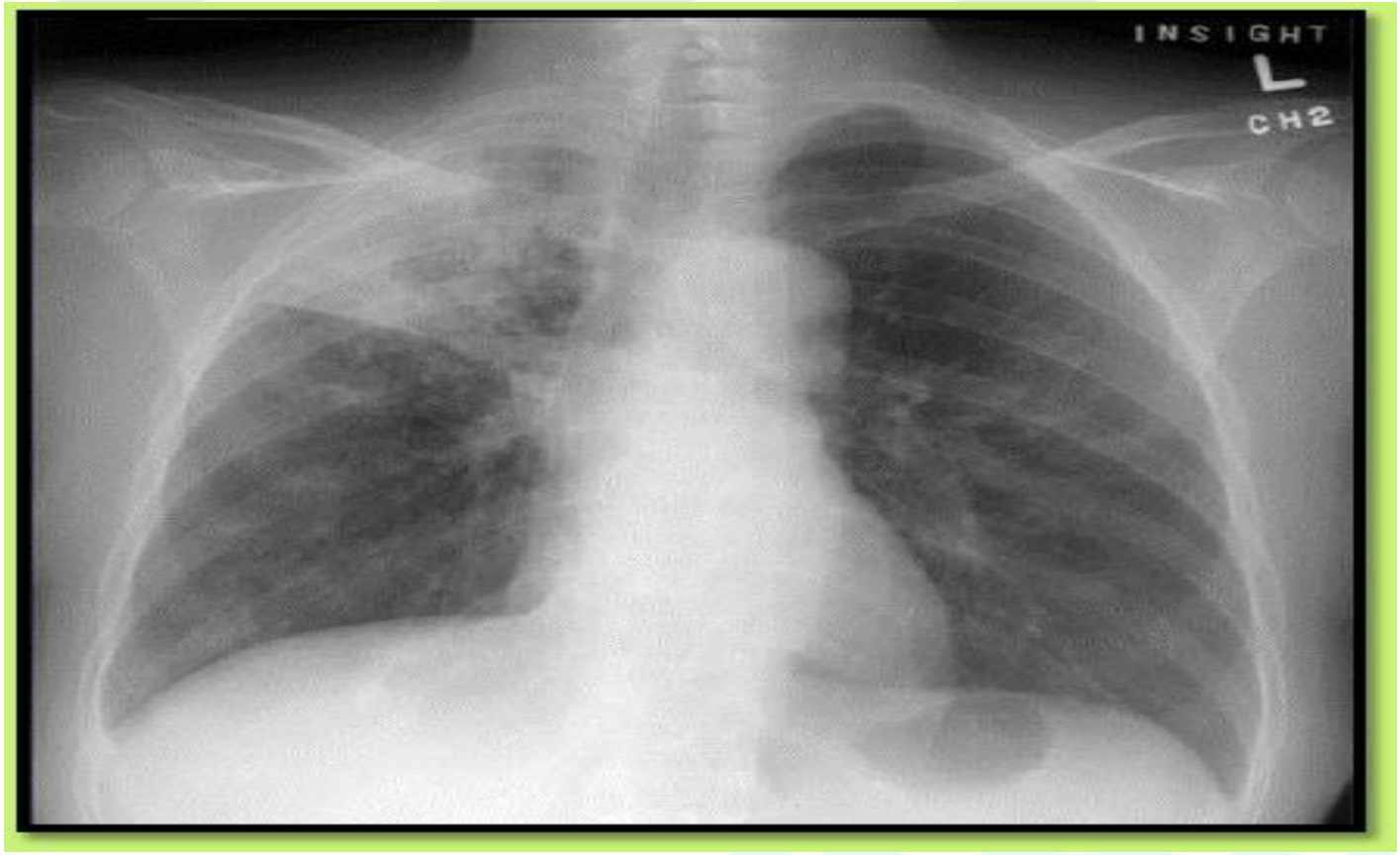
- **Q5: A 22 year old female patient presents with cough, fatigue, hemoptysis and weight loss of 2 weeks duration. Mention 2 differential diagnosis**

A: Tuberculosis
B: Lung Abscess

Q6: This CXR is for a 30 YO farmer complaining of fever & night sweats 2 weeks prior to admission. What is your Dx?

Tuberculosis.

Q7: This pt presented with productive cough, associated with hemoptysis & intermittent fever, resistant to levofloxacillin. what are CXR findings? Investigations?



Rt upper lobe consolidation (TB) >>
PPD, Sputum analysis ,
Bronchoscopy.

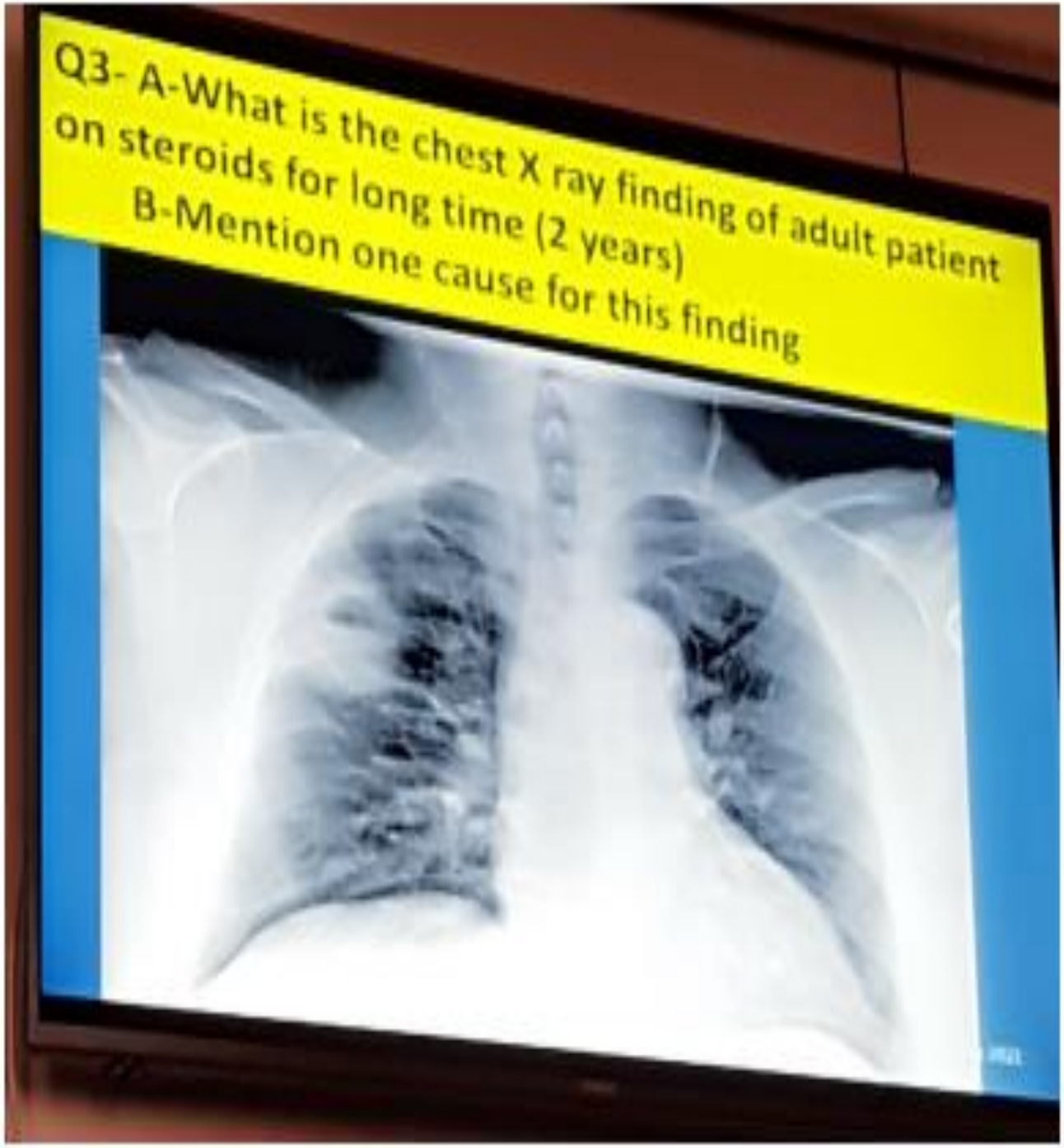
Q7 : 37 YEARS OLD MALE PATIENT WITH 1 MONTH HISTORY OF FEVER AND WEIGHT LOSS , WHAT IS THE FIRST TEST YOU WILL DO IT?

A- SPUTUM CYTOLOGY

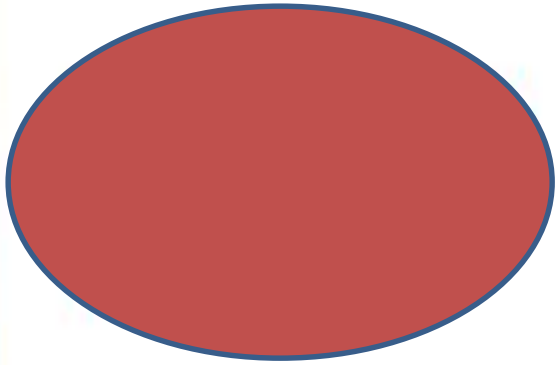
B- BONE MARROW BIOPSY

C- ACID FAST BACILLI

D- BRONCHOSCOPY



Cavitating lung lesion



This chest x ray finding is likely to be associated with long-term treatment with which of the following medications?

a. B-Blockers
b. Loop diuretics
c. Systemic corticosteroids
d. Low molecular weight heparin
e. Bisphosphonates

Ans:C

Q7

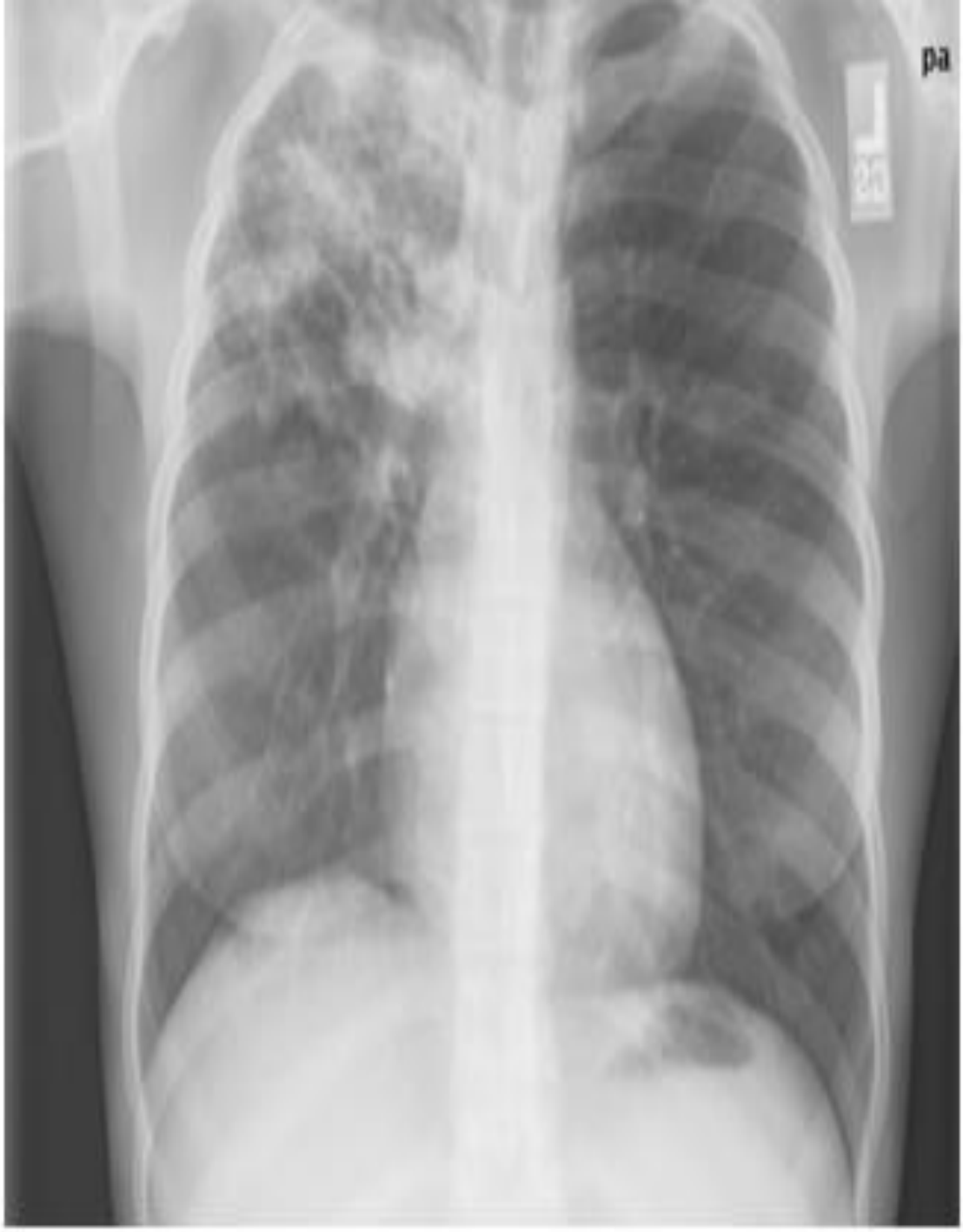
This 40 y/o never smoked presents with cough weight loss and night sweats for 6 weeks, what test helps you to diagnose

a) Sputum for acid base

b) Biopsy

c) Ct

Ans A



Lung Abscess

- **Etiology:** Definition, Risk factors.
- **Pathophysiology:** Microorganisms.
- **Clinical presentation:** History and physical examination.
- **Diagnosis.**
- **Treatment.**

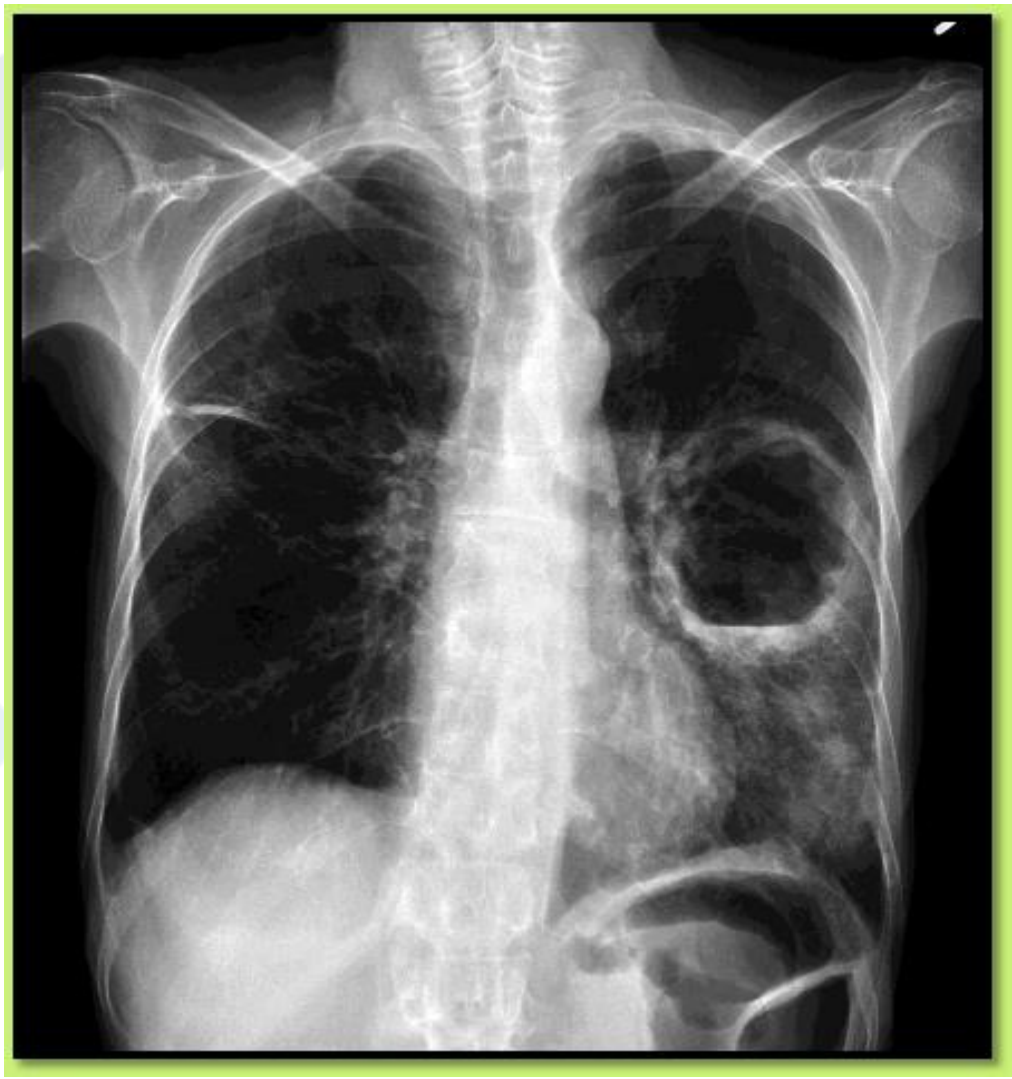
12) This patient came with chills, fever & cough, what is your diagnosis?

A. Lung abscess

Q2: Give 2 DDx?

Cyst with fluid level in the Lt. Lower zone.

Give 2 DDx: TB abscess, hydatid cyst.



Q1: This patient had a 2-week history of fever, rigors and chills.

A- What is the diagnosis?

B- Mention two lines of management.

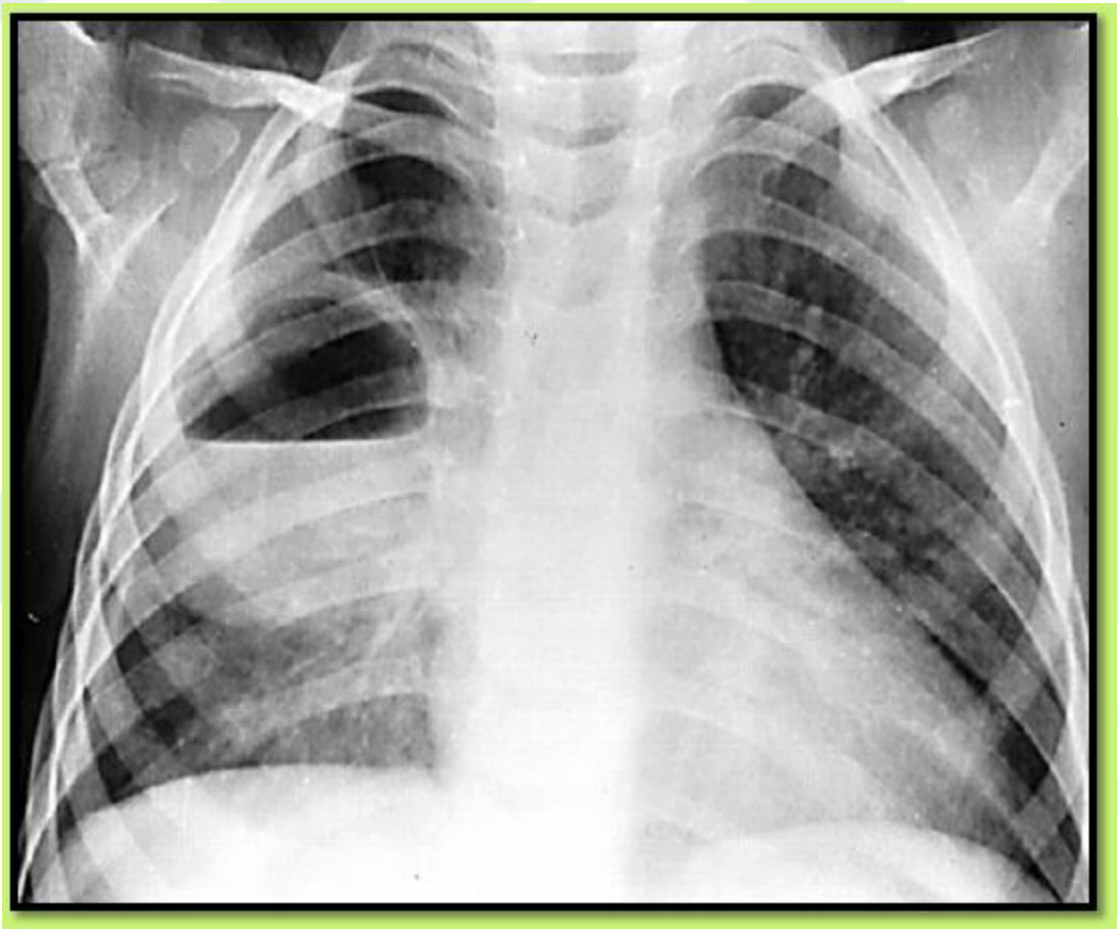
A. Lung abscess (left sided)

B. Antibiotics, Surgical drainage

Q2:

This patient had a history of fever & rigors for 2 weeks. What's the most prominent diagnosis?

Q3: This patient came with chills, fever & cough, what is your diagnosis?



Right Lung abscess.

Obstructive Lung Diseases

- The problem is difficulty with **expiration** (So lung is not fully emptied **= Air trapping**).
- They have a difficulty in doing it at a fast enough rate.
- Involve a mechanical obstruction of the airway:

1. Asthma. 2. COPD (Chronic bronchitis + Emphysema).
3. Cystic fibrosis. 4. Bronchiectasis.

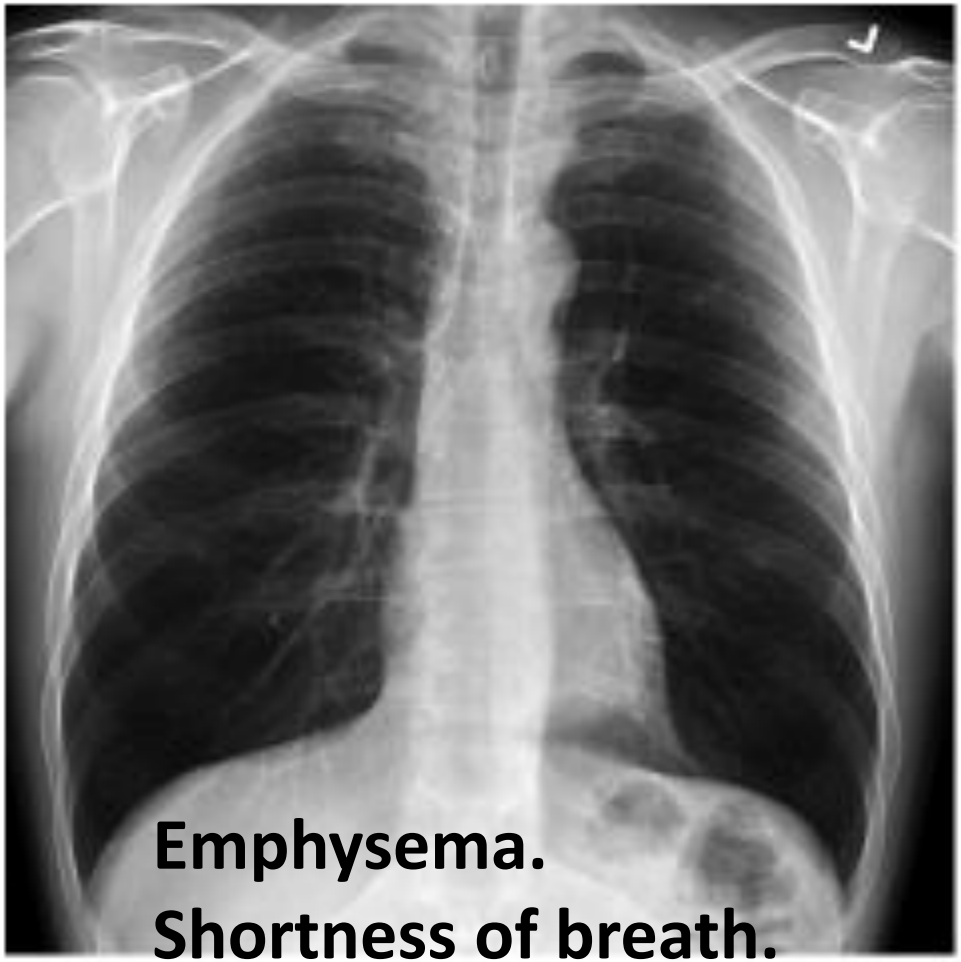
- PX: **Wheezes, dyspnea, rales, cough**.
- CXR: **Hyper-inflated lung, Flattened diaphragm**.

COPD

- **Chronic bronchitis :** persistent **cough > 3 months** for at **least 2 years**. Caused by excess mucus production.
- **Emphysema :** enlarged air spaces with **alveolar destruction** secondary to excess protease activity from chronic bronchoalveolar inflammation .
- **R.F : Smoking** , genetic (alpha 1 antitrypsin def.) environmental .
- **C.P :** 1. Dyspnea . 2. productive cough . 3. wheezing . 4. Recurrent infections. 5. BARREL CHEST.

- **Diagnosis:** C-Xray (hyperinflation , increased lung translucency, subpleural blebs : lead to pneumothorax), Ct-Scan, PFT .
- **Treatment: 1.beta-2 agonist (SABA, LABA). 2. Muscarinic antagonists (SAMA, LAMA). 3. ORAL OR INHALED corticosteroids .**
- **To decrease mortality : 1- stop smoking 2- O2 therapy 3- Vaccination.**

10. Long history of smoking, presented with this chest X-ray, what is your radiological diagnosis? What is the most common presentation?



Emphysema.
Shortness of breath.

Q7.Mention the abnormal radiological finding in this picture?

#Bullous Emphysema

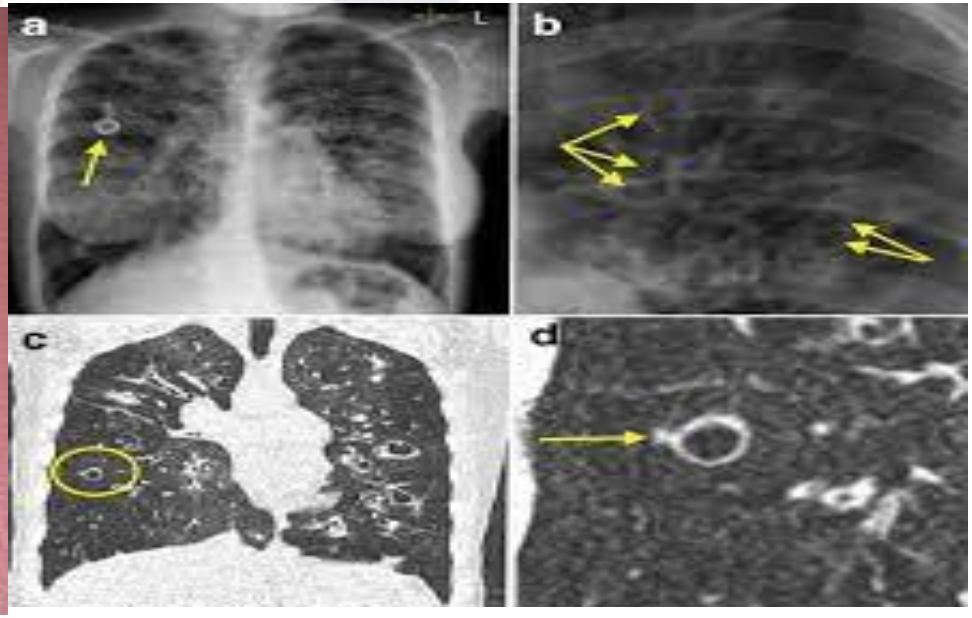
Mention one complication ?

Pneumothorax

Bronchiectasis

- **Pathophysiology:** Irreversible airway dilation that involves the lung.
- Infectious (TB) /noninfectious (**CF**, A1 antitrypsin deficiency, **Immotile cilia syndrome**) / up to 50% idiopathic.
- **Symptoms:** 1. **Productive cough (Yellowish, Bad odder, >30ml, dependent).** 2. Course basal crackles. 3. **Clubbing**. 4. **Recurrent infections.**
- **Diagnosis:** C-Xray (Tram track, signet ring, Cyst emanating from bronchial wall), Ct-Scan, sputum culture.
- **Treatment:** 1. ABX for 7 to 10 days. 2. Physiotherapy (Hydration, Mucolytic, bronchodilator and hyperosmolar agents = Hypertonic saline). 3. If recurrence (>3 times/ year) give Suppressive ABX, Lung transplantation.
- The most common targeted microorganism is Pseudomonas and H.Influenza.

Q15: this young patient has large amounts of sputum production with recurrent infections, what's the Diagnosis?



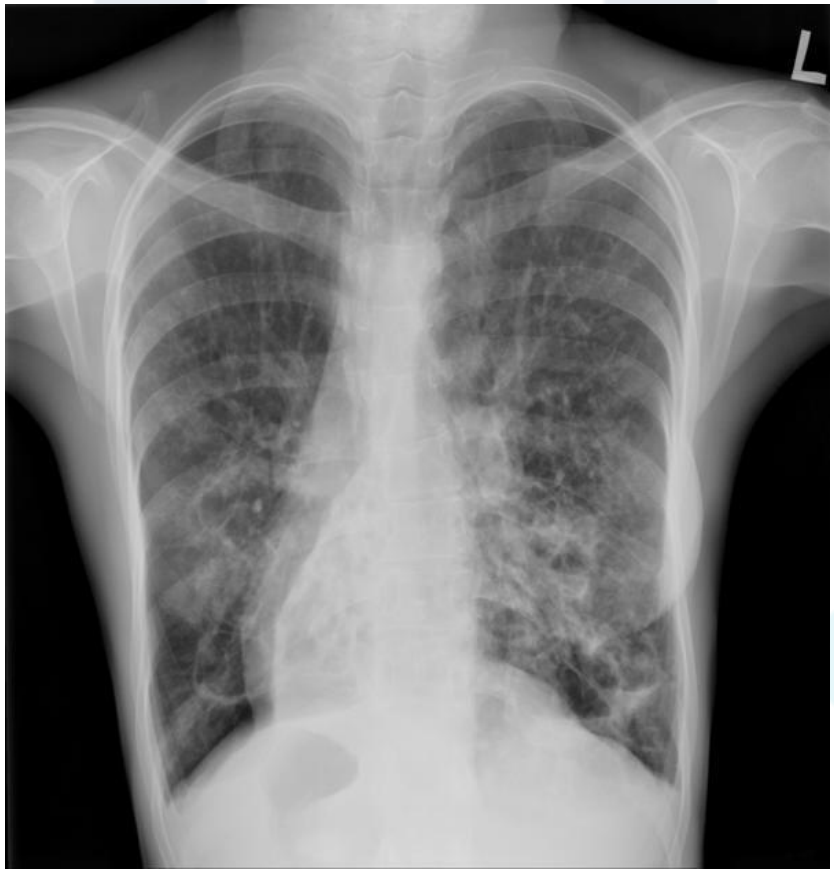
Ans : Bronchiectasis

Cystic fibrosis

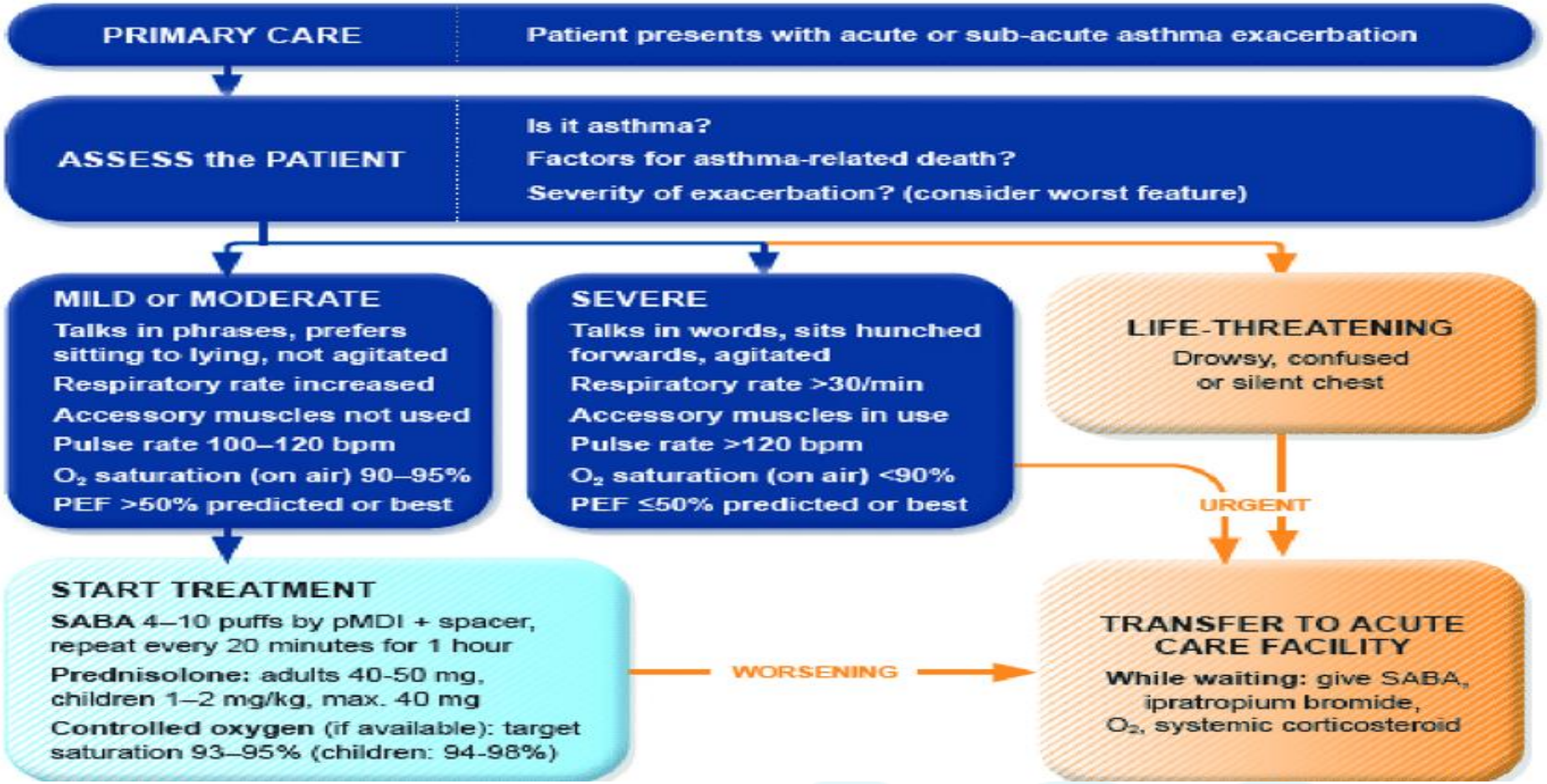
- **Autosomal recessive disorder** characterized by production of viscid mucous secretions by the exocrine glands (**Bronchi, pancreas, biliary system, sweat gland**).
- Defect in Cl channel, or **CFTR** (cystic fibrosis transmembrane conductance regulator) so the Cl will remain inside the cells and no Na and H2O absorption = **Thick secretion and obstruction followed by infection**.
- Clinical presentations: **Lung** (Chronic recurrent lung infections, cough productive, dyspnea, wheeze), **Pancreatitis**, **Biliary cirrhosis**, **Absence vas deferens** , **Salty sweat**.
- Diagnosis: **Sweat chloride test** (High Na content), **C-Xray** (Bronchiectasis), Ct scan, **genetics testing**.
- Treatment: **Like bronchiectasis**, **Dornase alpha inhalation** (Decrease the viscosity of secretion, **Pancreatic enzyme replacement** for malabsorption.

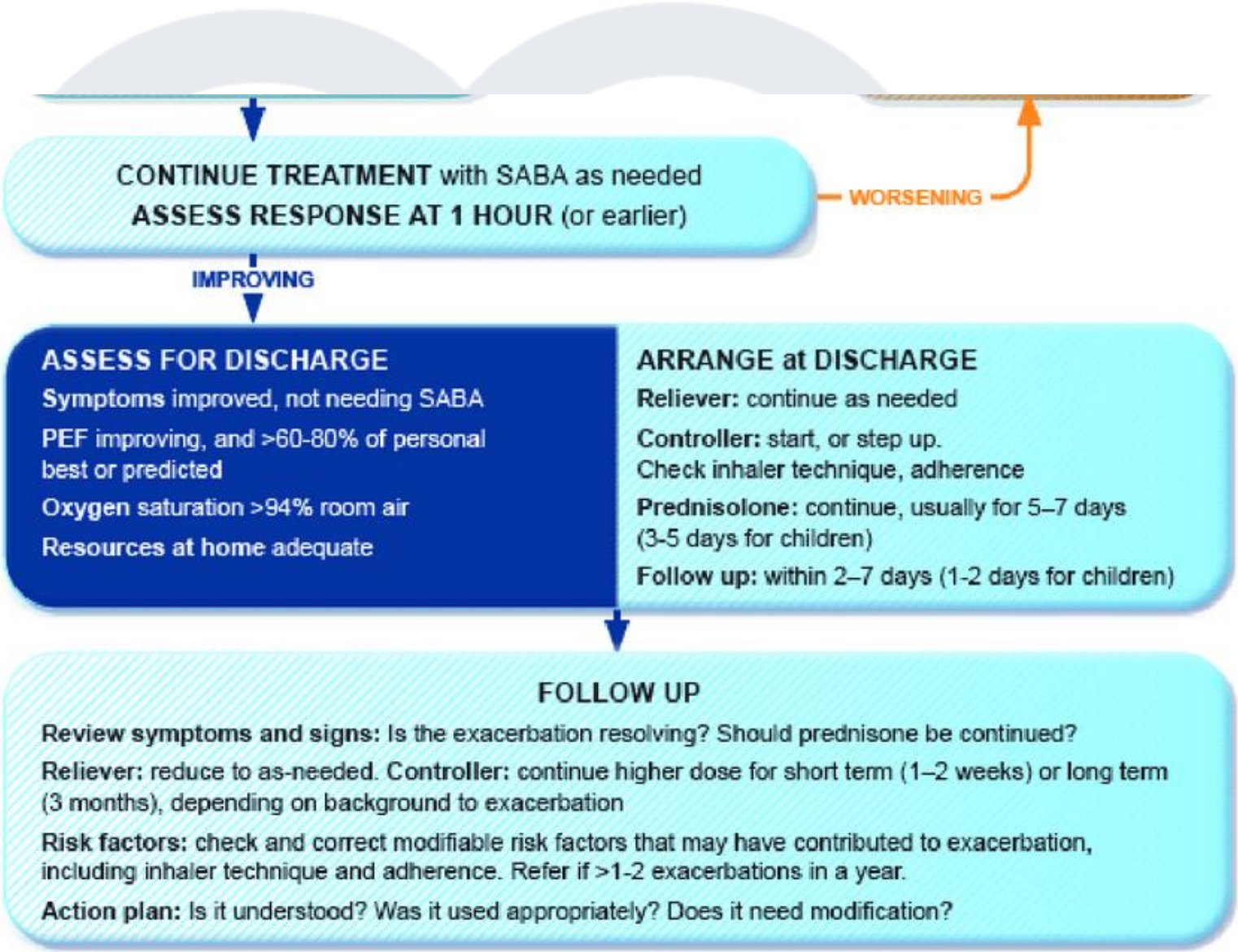
Q9: THIS PT IS PRESENTED WITH COUGH SOB AND LARGE AMOUNTS OF SPUTUM … GIVE TWO ABNORMAL FINDINGS ACCORDING TO THE PICTURES ?

ANSWER : DEXTROCARDIA AND RETICULAR INFILTRATION ON XRAY , FINGER CLUBBING …. (KARTAGENER SYNDROME)



Asthma exacerbation


PRIMARY CARE
Patient presents with acute or sub-acute asthma exacerbation
ASSESS the PATIENT
Is it asthma?
Factors for asthma-related death?
Severity of exacerbation? (consider worst feature)
MILD or MODERATE
Talks in phrases, prefers sitting to lying, not agitated
Respiratory rate increased
Accessory muscles not used
Pulse rate 100–120 bpm
O2 saturation (on air) 90–95%
PEF >50% predicted or best
SEVERE
Talks in words, sits hunched forwards, agitated
Respiratory rate >30/min
Accessory muscles in use
Pulse rate >120 bpm
O2 saturation (on air) <90%
PEF ≤50% predicted or best
LIFE-THREATENING
Drowsy, confused or silent chest
URGENT
START TREATMENT
SABA 4–10 puffs by pMDI + spacer, repeat every 20 minutes for 1 hour
Prednisolone: adults 40-50 mg, children 1–2 mg/kg, max. 40 mg
Controlled oxygen (if available): target saturation 93–95% (children: 94-98%)
WORSENING
TRANSFER TO ACUTE CARE FACILITY
While waiting: give SABA, ipratropium bromide, O2, systemic corticosteroid


CONTINUE TREATMENT with SABA as needed
ASSESS RESPONSE AT 1 HOUR (or earlier)
WORSENING
IMPROVING
ASSESS FOR DISCHARGE
Symptoms improved, not needing SABA
PEF improving, and >60-80% of personal best or predicted
Oxygen saturation >94% room air
Resources at home adequate
ARRANGE at DISCHARGE
Reliever: continue as needed
Controller: start, or step up.
Check inhaler technique, adherence
Prednisolone: continue, usually for 5–7 days (3-5 days for children)
Follow up: within 2–7 days (1-2 days for children)
FOLLOW UP
Review symptoms and signs: Is the exacerbation resolving? Should prednisone be continued?
Reliever: reduce to as-needed. Controller: continue higher dose for short term (1–2 weeks) or long term (3 months), depending on background to exacerbation
Risk factors: check and correct modifiable risk factors that may have contributed to exacerbation, including inhaler technique and adherence. Refer if >1-2 exacerbations in a year.
Action plan: Is it understood? Was it used appropriately? Does it need modification?

Case #1

(the history was about acute asthmatic exacerbation , the following are the main points):

27 YO pt presented with SOB associated with fever, chills & cough with yellow sputum, the patient was unable to talk & uses his accessory muscles, RR=30, BP = 100/70, T=39.5 , he had Hx. of previous attacks.

1. Mention 2 signs indicating the severity from Hx.
2. Mention 3 lines of management.

- patient was unable to talk & BP = 100/70 .
- **Initial Management of Asthma Exacerbation:**

1. Oxygen therapy to maintain O_2 saturation of 94-98%.
2. Nebulized B_2-agonist (salbutamol 5mg or terbutaline 10mg).
3. Systemic corticosteroids (oral prednisolone 30-60mg or IV hydrocortisone 200mg).
4. Antibiotics if evidence of infection on chest X-ray, purulent sputum.
5. IV fluids if necessary.

19.25 Immediate assessment of acute severe asthma

Acute severe asthma

- PEF 33–50% predicted (< 200 L/min)
- Respiratory rate ≥ 25 breaths/min
- Heart rate ≥ 110 beats/min
- Inability to complete sentences in 1 breath

Life-threatening features

- PEF < 33% predicted (< 100 L/min)
- SpO_2 < 92% or PaO_2 < 8 kPa (60 mmHg) (especially if being treated with oxygen)
- Normal or raised $PaCO_2$
- Silent chest
- Cyanosis
- Feeble respiratory effort
- Bradycardia or arrhythmias
- Hypotension
- Exhaustion
- Confusion
- Coma

Near-fatal asthma

- Raised $PaCO_2$ and/or requiring mechanical ventilation with raised inflation pressures

Q6.This patient is receiving inhaled steroids to treat asthma, what's your diagnosis?

#Oral Candidiasis

2. All of the following are Useful in the management of Stable COPD Except:

a) Inhaled Corticosteroids
b) Long Term Oral Corticosteroids
c) Smoking Cessation
d) Long acting antimuscarinic

Answer: B) Long Term Oral Corticosteroids

Sleep apnea

Sleep apnea	Repeated cessation of breathing > 10 seconds during sleep → disrupted sleep → daytime somnolence. Diagnosis confirmed by sleep study. Normal Pa_{O_2} during the day. Nocturnal hypoxia → systemic/pulmonary hypertension, arrhythmias (atrial fibrillation/flutter), sudden death. Hypoxia → ↑ EPO release → ↑ erythropoiesis.
Obstructive sleep apnea	Respiratory effort against airway obstruction. Associated with obesity, loud snoring, daytime sleepiness. Caused by excess parapharyngeal tissue in adults, adenotonsillar hypertrophy in children. Treatment: weight loss, CPAP, surgery.
Central sleep apnea	Impaired respiratory effort due to CNS injury/toxicity, HF, opioids. May be associated with Cheyne-Stokes respirations (oscillations between apnea and hyperpnea). Treat with positive airway pressure.
Obesity hypoventilation syndrome	Obesity (BMI ≥ 30 kg/m^2) → hypoventilation → ↑ $Paco_2$ during waking hours (retention); ↓ Pa_{O_2} and ↑ $Paco_2$ during sleep. Also known as Pickwickian syndrome.

Case #6:

- A 60 year old male, known case of poorly controlled Hypertension, came to your clinic complaining of excessive somnolence & fatigue. He has a short neck, his Body Mass Index > 35.

1. What is your most likely diagnosis?
2. What is the confirmatory test?
3. What complications is the patient expected to have
   - (Mention 2).
4. Mention one line of management (other than smoking cessation).

1. Obstructive Sleep Apnea
2. Polysomnography دراسة النوم
3. Pulmonary Hypertension, cor-pulmonale
4. nCPAP

Q7 This is usually used in all of the following except

A. Obesity hypoventilation syndrome
B. OSA
C. Pulmonary edema
D. Hepatic coma due to esophageal varices
E. COPD

Answer: D. Hepatic coma with esophageal varices

PFT

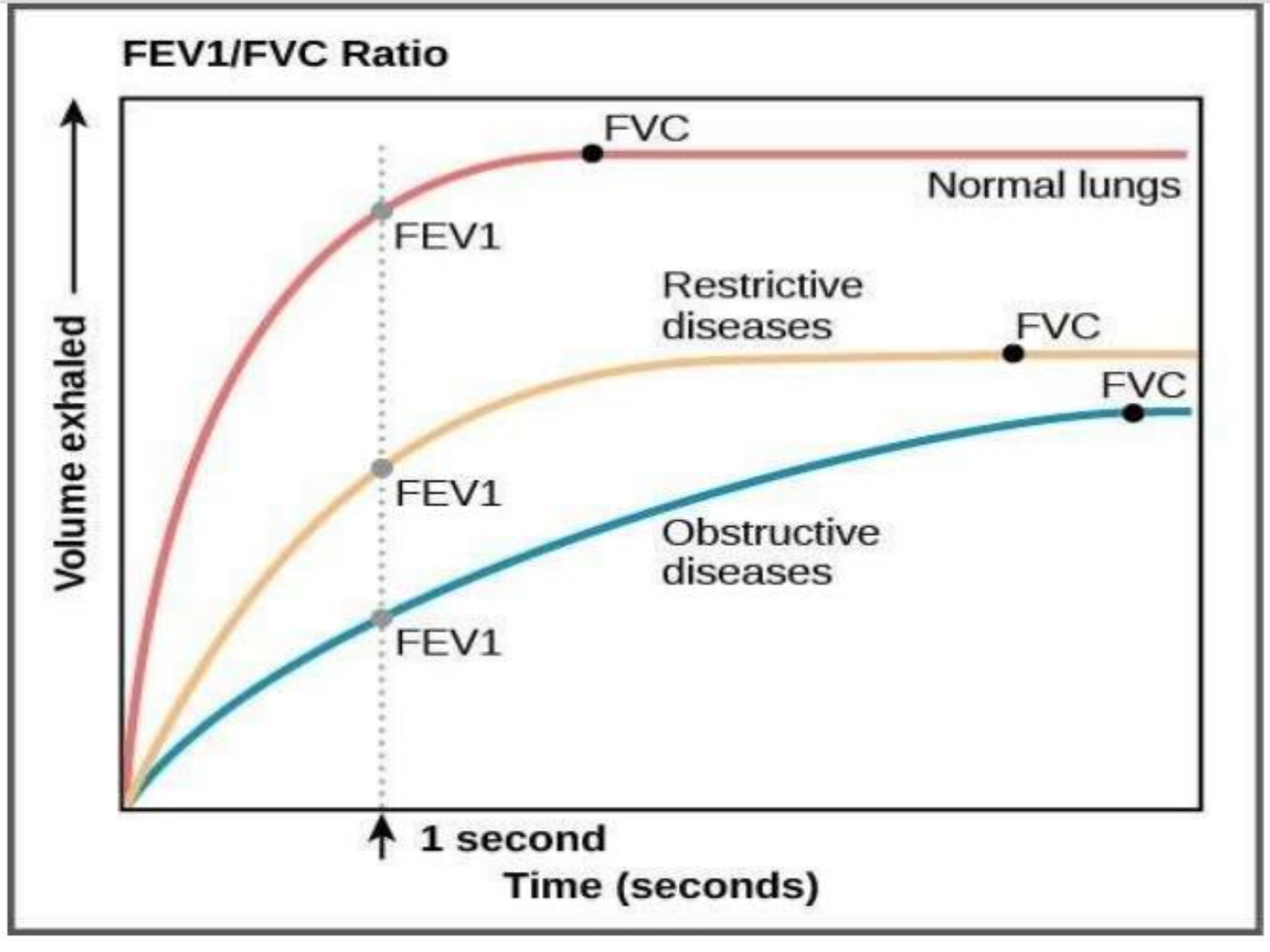
Restrictive vs Obstructive

- Interstitial - (stiff lung)
- Increased tissue
- Relatively normal FEV1:FVC ratio
- Normal PEFR.
- Types:
  - Acute – ARDS,Viral.
  - Chronic - pneumoconioses & sarcoidosis, Int. fibrosis.

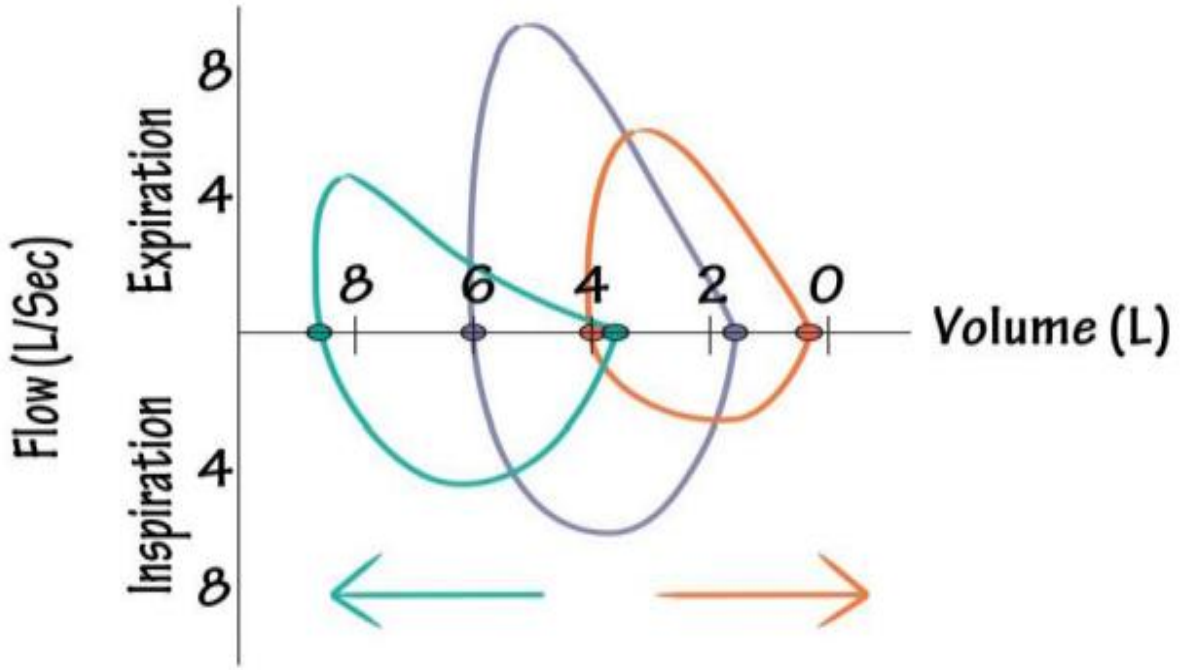
- Obstructive (soft lung)
- Destruction of tissue.
- Low FEV1:VC ratio
- Low PEFR.
- Types:
  - Localised & Diffuse
  - Reversible & progressive.
  - COPD
  - Asthma
  - Bronchiectasis,

Peak flow meter

Spirometry


FEV1/FVC Ratio
Volume exhaled
FVC
Normal lungs
FEV1
Restrictive
diseases
FVC
FVC
FEV1
Obstructive
diseases
FEV1
1 second
Time (seconds)

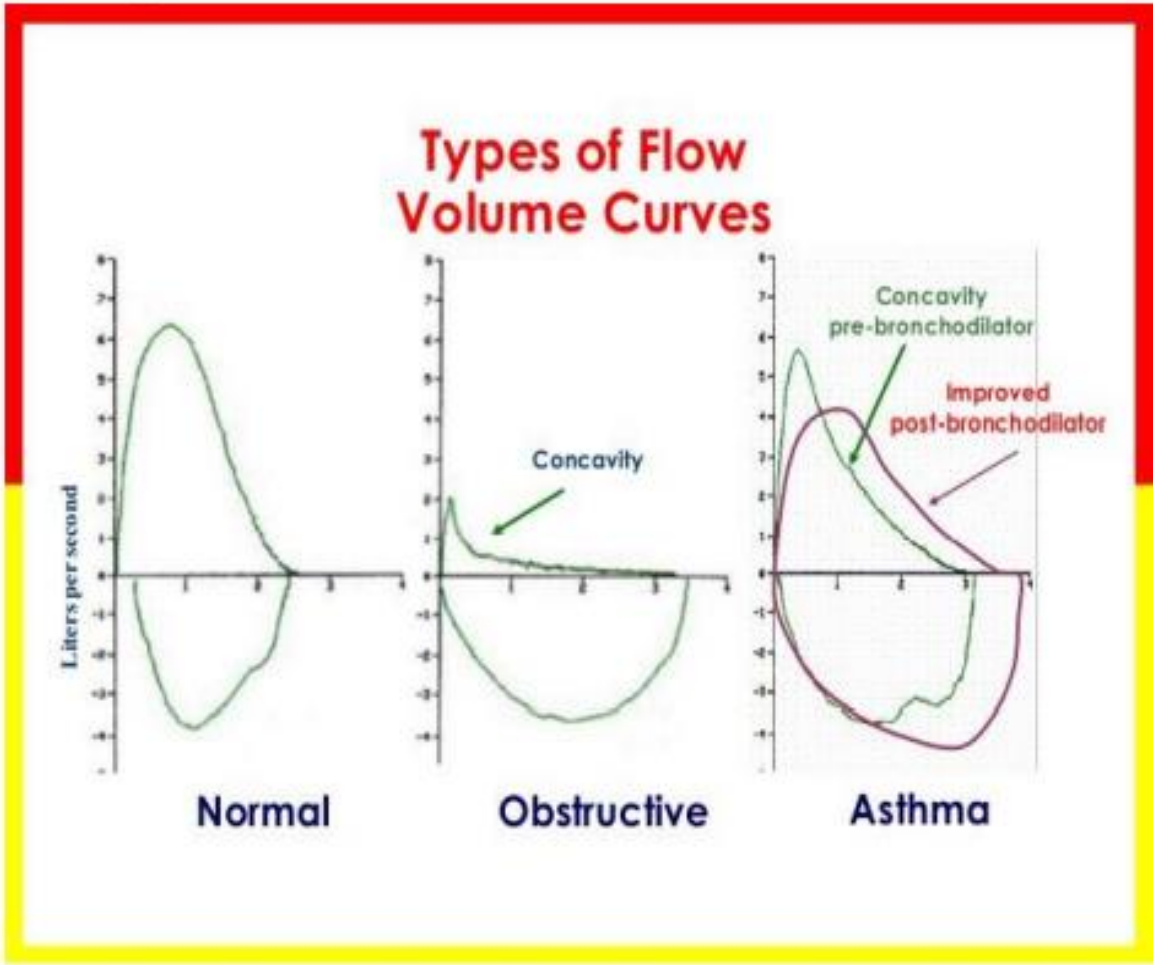
Dynamic Flow-Volume Loops



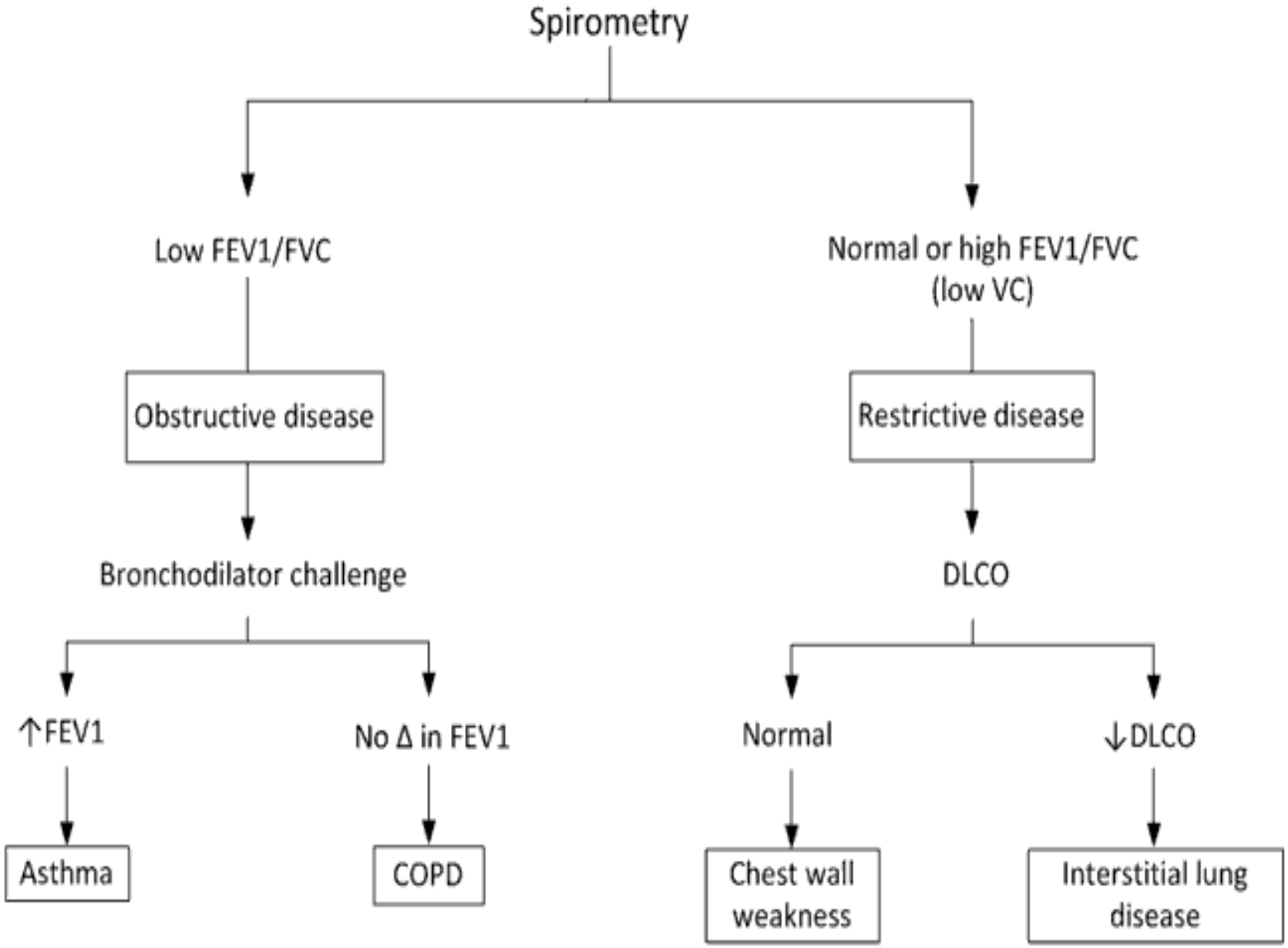
Obstructive: Loop shifts Left,
Volumes are > than normal;
FEV1 decreases more than FVC
(lower FEV1/FVC).

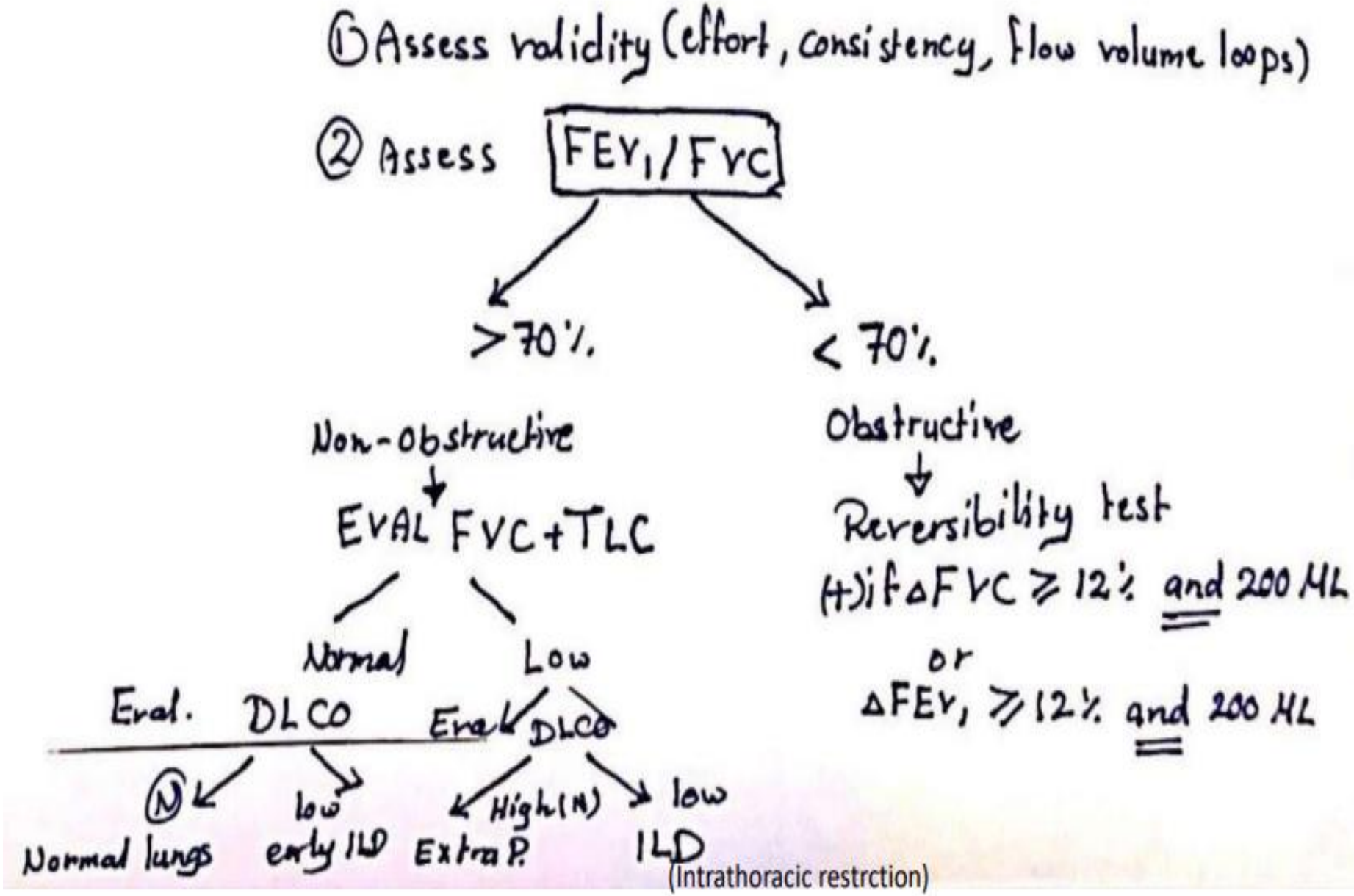
Restrictive: Loop shifts Right;
Volumes are < than normal.
FEV1 and FVC decrease in proportion
(normal or even elevated FEV1/FVC)

3) What does this PFT gives diagnoses for?



Answer: Asthma


Spirometry
Low FEV1/FVC
Normal or high FEV1/FVC
(low VC)
Obstructive disease
Restrictive disease
Bronchodilator challenge
DLCO
↑FEV1
No Δ in FEV1
Normal
↓DLCO
Asthma
COPD
Chest wall
weakness
Interstitial lung
disease



(Intrathoracic restrction)

Q1: What's the Dx. depending on this pulmonary function test?

Age: 59	Height (cm): 172		Weight (kg): 92.0		BMI: 31.10	Gender: male
	Ref	**Pre Meas**	**Pre %Ref**	**Post Meas**	**Post % Chg**	**CI**	**LLN**
FEV_1 (L)	3.11	**2.00	**64	2.85	42	1.00	
FVC (L)	4.35	3.40	78	4.10	21	1.36	
FEV_1/FVC %	72	59		69			
PEF (L/sec)	8.17	4.45	54	6.81	53	3.87	
FEF25-75 (L/sec)	4.06	**1.23	**30	2.24	82	2.67	
FET100% (sec)		7.46		10.62	42		
FEV_6	4.22	3.40	81	3.97	17		3.34
FEV_1/FEV_6	79	59		72			70

Obstructive lung disease (Asthma)

Q2: what is the most likely Dx?

Gender: Male
Age: 49 Race: Caucasian
Height(in): 70 Weight(lb): 211
Any Info:

Date: 03/21/07
Temp: 20 PBar: 712
Physician: D.Musa Malkawi
Technician: R.T RAED BASHTAWI

Spirometry (BTPS)

		PRED	PRE-RX BEST	PRE-RX %PRED	POST-RX BEST	POST-RX %PRED	% Chg
FVC	Liters	4.57	4.52	99	4.59	100	2
FEV1	Liters	3.70	2.34	63	2.75	74	17
FEV1/FVC	%	78	52		60		
FEF25-75%	L/sec	4.03	1.07	27	1.56	39	46
FEF50%	L/sec	4.84	1.34	28	1.84	38	37
PEF	L/sec	8.93	4.61	52	5.92	66	28
MVV	L/min						

Obstructive lung disease (Asthma).

The most likely diagnosis is:

- a. idiopathic pulmonary fibrc
- b. COPD
- c. Bronchial asthma
- d. Pleural effusion
- e. Sarcoidosis

	Pre-Bronch			Post-Bronch		
	Actual	Pred	%Pred	Actual	%Pred	%Chng
--- SPIROMETRY ---						
FVC (L)	2.40	3.61	66	3.38	93	+41
FEV1 (L)	0.94	2.57	36	1.41	54	+50
FEV1/FVC (%)	39	72	54	42	57	+4
FEF 25% (L/sec)	0.92	6.00	15	1.49	24	+6
FEF 75% (L/sec)	0.39	0.81	47	0.67	82	+71
FEF 25-75% (L/sec)	0.44	1.80	24	1.02	56	+133
PEF Max (L/sec)	1.29	6.81	18	1.91	28	+48
FVC (L)	1.74			1.70		-2
FIF Max (L/sec)	1.43			1.67		+17

Ans:C

The most likely diagnosis is:

a. idiopathic pulmonary fibrosis
b. COPD
c. Bronchial asthma
d. Pleural effusion
e. Sarcoidosis

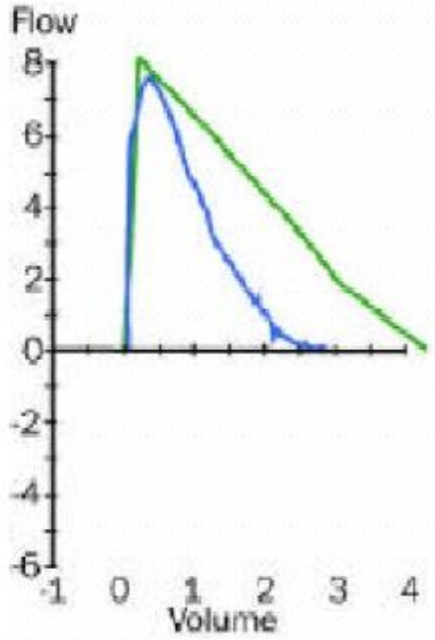
	Pre-Bronch			Post-Bronch		
	Actual	Pred	%Pred	Actual	%Pred	%Chng
--- SPIROMETRY ---						
FVC (L)	2.40	3.61	66	3.38	93	+41
FEV1 (L)	0.94	2.57	36	1.41	54	+50
FEV1/FVC (%)	39	72	54	42	57	+6
FEF 25% (L/sec)	0.92	6.00	15	1.49	24	+61
FEF 75% (L/sec)	0.39	0.81	47	0.67	82	+73
FEF 25-75% (L/sec)	0.44	1.80	24	1.02	56	+133
PEF Max (L/sec)	1.29	6.81	18	1.91	28	+48
FIVC (L)	1.74			1.70		-2
FIF Max (L/sec)	1.43			1.67		+16

Ans:C

Q3: Patient with this Spirometry result, what is his ventilatory defect ?

Age: 49 Height (cm): 167 Weight (kg): 146.5 BMI: 52.53 Gender: male

	Ref	Pre Meas	Pre %Ref	Post Meas	Post % Chg	CI	LLN
FEV_1 (L)	3.24	2.27	70			1.00	
FVC (L)	4.30	**2.85	**66			1.36	
FEV_1/FVC %	75	80					
PEF (L/sec)	8.05	7.59	94			3.87	
FEF25-75 (L/sec)	4.09	2.72	67			2.67	
FET100% (sec)		14.86					
FEV_6	4.23	2.69	64				3.43
FEV_1/FEV_6	80	84					72

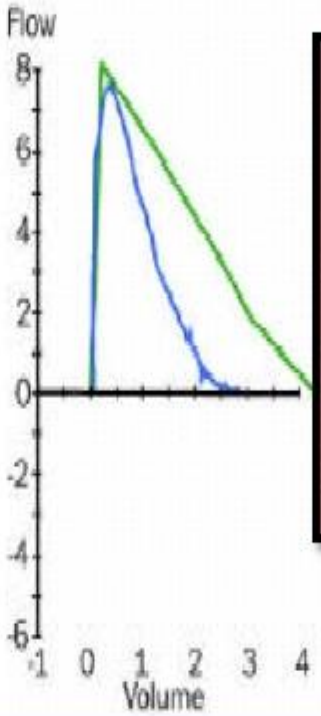


Restrictive lung disease (E.g. lung fibrosis).

Q5: what is the most likely Dx?

Age: 49 Height (cm): 167 Weight (kg): 146.5 BMI: 52.53 Gender: male

	Ref	Pre Meas	Pre %Ref	Post Meas	Post % Chg	CI	LLN
FEV_1 (L)	3.24	2.27	70			1.00	
FVC (L)	4.30	**2.85	**66			1.36	
FEV_1/FVC %	75	80					
PEF (L/sec)	8.05	7.59	94			3.87	
FEF25-75 (L/sec)	4.09	2.72	67			2.67	
FET100% (sec)		14.86					
FEV_6	4.23	2.69	64				3.43
FEV_1/FEV_6	80	84					72



Restrictive lung disease

Sarcoidosis, IPF.

Others

Q13:

Mention 2 causes of this?

1.Bronchiectasis.

2.Lung cancer.

THE END

Respiratory System

Part 2

Abdullah Odeh Alwikhyan

Outlines

1- Restrictive Lung Disease

2- Lung CA

3- Pneumothorax & Pleural effusion

4- Pulmonary edema & ARDS

5- DVT + PE

Restrictive diseases

A- Interstitial Lung Diseases (intrinsic processes)

DEF : Heterogeneous group of processes that distort **the pulmonary interstitium and alveolar wall** , resulting in fibrosis , distortion of lung structure and **impaired gas exchange** .

Etiologies :

- Environmental **(Pneumoconiosis) .**
- Granulamatous **(Sarcoidosis , Vasculaitis (wegner granulamatosis)).**
- **Drug induced** (**M**ethotrexate , **A**miodarone , **C**hemotherapy (bleomycin) , **N**itrofurantoin) .
- Autoimmune CT diseases (SLE , **RA** , **SCLERODERMA**) .
- Others (**Idiopathic Pulmonary Fibrosis** : diagnosis of exclusion).

C.P: Progressive dyspnea , **nonproductive cough** , + Symptoms of underlying etiology , **clubbing** and symptoms of **right sided heart failure (cor pulmonale) : JVD , Lower Limb edema , Ascities.**

Dx : High Resolution CT , **PFT (Decreased lung volumes)** , biopsy , **CXR " Reticular infiltration".**

B- Restrictive pattern (extrinsic processes)

Def : Restrictive disease due to **abnormality in chest wall structure or respiratory musculature** .

Etiologies : - neuromuscular (mysthenia gravis , multiple sclerosis) - chest wall (obesity , kyphoscoliosis)

LUNG Fibrosis

Respiratory Failure

Hypoxemic Respiratory Failure	Hypercapnic Respiratory Failure
Known as: Type I ARF, Lung Failure, Oxygenation Failure, Respiratory Insufficiency	***Known as:*** Type II ARF, Pump Failure, Ventilatory Failure
Definition: The failure of lungs and heart to provide adequate O_2 to meet metabolic needs	***Definition:*** The failure of the lungs to eliminate adequate CO_2

Case

A 55 year old male patient presented with **progressive SOB for 3 months**. On examination he had **raised JVP**, **lower limb oedema**, & **clubbing**. And this is his chest X ray. Lab results:

- ABG: pH 7.46 / CO2 30 / O2 60
- PFT: FEV/FVC **90** / FVC 60 / **TLC low**

1. What is the Dx ?
2. What is the Acid base abnormality in his ABGs?
3. What is the interpretation of his ABG?
4. What is the interpretation of his spirometry?
5. What is the treatment ?

1. Idiopathic pulmonary fibrosis with cor pulmonale.
2. Chronic respiratory alkalosis.
3. Hypoxia without hypercapnia **(Type I respiratory failure).**
4. Restrictive lung disease.
5. Supportive measures, O2 supplement.

Q2: 35 YO female, known case of AF, on amiodarone. Chiefly complaining of dyspnea.

FEV1\FVC >80%, FVC 60%, TLC 55%, DLCO low.

1. what is this ventilatory pattern?

2. what is the cause of her dyspnea?

1. **Restrictive pattern.**
2. **Amiodarone induced lung fibrosis.**

Amiodarone—pulmonary fibrosis, hepatotoxicity, hypothyroidism/hyperthyroidism (amiodarone is 40% iodine by weight), acts as hapten (corneal deposits, blue/gray skin deposits resulting in photodermatitis), neurologic effects, constipation, cardiovascular effects (bradycardia, heart block, HF).

2. This patient has Raynaud Phenomenon, severe heart burning sensation and dysphagia presents with chronic hypoxia.

- Name 2 possible causes of chronic Hypoxia

1. lung fibrosis 2. pulmonary hypertension

This patient presents with history of **recurrent sinusitis**. He presents with **hemoptysis** and **acute renal failure.**

- What is the most likely underlying diagnosis?
- What is the likely cause of hemoptysis?

1. Wegener's granulomatosis (granulomatosis with polyangiitis).
2. vasculitis in the pulmonary blood vessels.

Question 1

A- describe what u see

B- what's most likely diagnosis?

Q1) A- reticular lung infiltration& fibrosis.

B- IPF

Sarcoidosis

DEF: systemic disease of unknown cause, characterized histologically by the presence of nonspecific **noncaseating granulomas** in the lung and other organs

Can involve almost any organ system, but :

- Pulmonary involvement is **most common**.
- **Ocular (uveitis) , arthritis , Bells palsy**
- Cutaneous **(ERYTHEMA NODOSUM : painful red nodules on shins) .**
- Myocardium (arrhythmia + cardiomyopathies) .
- Occurs in young adults, is 3-4 times more common in **African Americans, and affects more women than men**.
- **Hypercalcemia**: due to increased circulation of vitamin D produced by macrophages (granulomas in sarcoidosis make vitamin D). **Sx of hypercalcemia**

Diagnostic Tests: - Chest x-ray is the best initial test. **1- Bilteral Hilar lymphadenopathy** is present in more than 95% of patients **2- reticulnodular infiltration** .

Lymph node biopsy is the most accurate test.

Ttt : steroids if symptomatic.

Erythema NODOSUM - Mnemonic

NO cause found in 60% of cases
D rugs (antibiotics e.g., sulfonamides, amoxicillin)
O ral Contraceptives
S arcoidosis or Lofgren's syndrome
U lcerative Colitis, Crohns, Bechet's
M icro: TB

- Viral: HSV, EBV, HIV, HepB, HepC
- Bacterial: Campylobacter, Rickettsiae, Salmonella, Psittacosis, Bartonella, Syphilis
- Parasitic: Amoebiasis, Giardiasis

Q1: A 45 y old Female was complaining of progressive shortness of breath with red nodule on her lower limbs. Mention 2 findings.

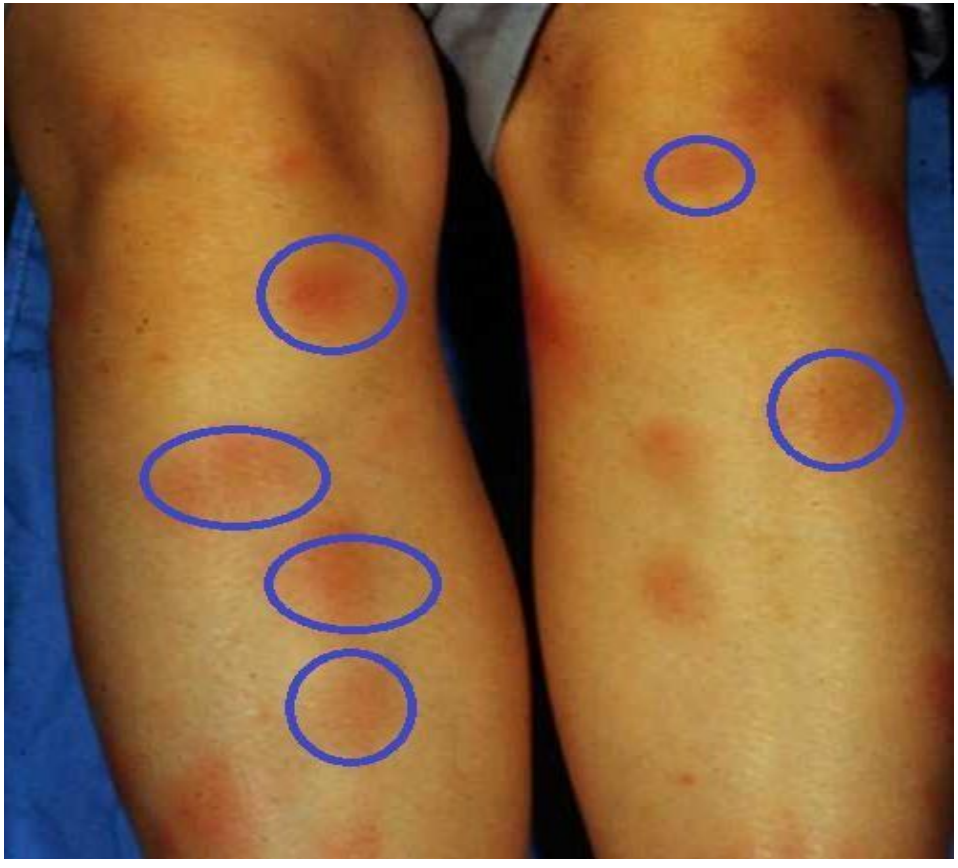
1.Erythema nodosum
2. bilateral hilar lymphadenopathy.
3.reticulonodular infiltration /

Dx=Sarciodosis.

9) A patient with hypercalcemia.

a) What are the findings in this x-ray? Bilateral hilar lymphadenopathy

b) What's your diagnosis? Sarcoidosis



- Q5: A 28 year old female patient presents with those painful nodules on her legs. Write down two possible diagnoses

Answer

A. Sarcoidosis

B. Inflammatory Bowel Disease (Ulcerative Colitis/Crohn's Disease)

A Patient presented with cough, SOB , arthritis , painful Lower limb lesions

1) **What is your diagnosis ?**
2) **mention one investigation to confirm your diagnosis ?**
3) **mention 3 extra pulmonary manifestations of the disease ?**

1- Sarcoidosis

2- CXR to detect bilateral hilar lymphadenopathy , and then **Excisional lymph node biopsy** (to see the noncaseating granulomas)

3 – uveitis / hypercalcemia / bells palsy

Lung Cancer

- **Types of Primary lung cancer :**

1- Small cell lung carcinoma: 3As : ADH , ACTH , Antibody " Lambert eaton"

2- Non-small cell:

A- Adenocarcinoma.

B- Squamous cell carcinoma associated with **hypercalcemia.**

C- Large cell carcinoma.

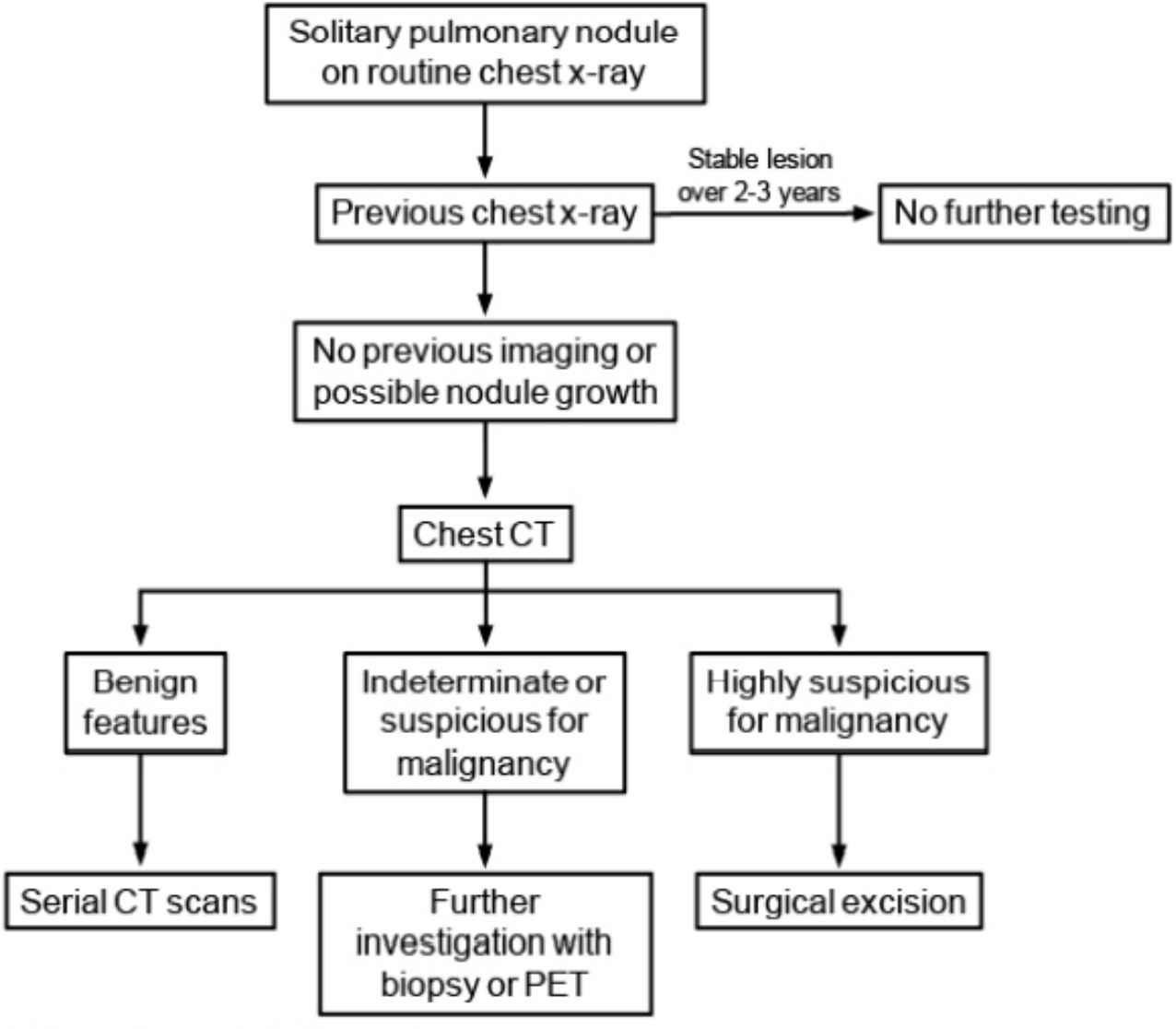
- **C/Presentation:**

- Cough/hemoptysis , **Weight loss** , **Hoarseness of voice**, **Superior vena cava syndrome** can occur **(Pancoast tumor)** , Tumor compression of **the brachial plexus** can cause radiating **arm pain , paresthesias & muscles wasting. Or Sx of Paraneoplastic**

- Strongly associated with smoking hx.

Lung Cancer

Type of tumor	Incidence	Location	Clinical associations
Adenocarcinoma	40%-50%	• Peripheral	• Clubbing • Hypertrophic osteoarthropathy
Squamous cell carcinoma	20%-25%	• Central • Necrosis & cavitation	• Hypercalcemia
Small cell carcinoma	10%-15%	• Central	• Cushing syndrome • SIADH • Lambert-Eaton syndrome
Large cell carcinoma	5%-10%	• Peripheral	• Gynecomastia • Galactorrhea



PET = positron emission tomography.

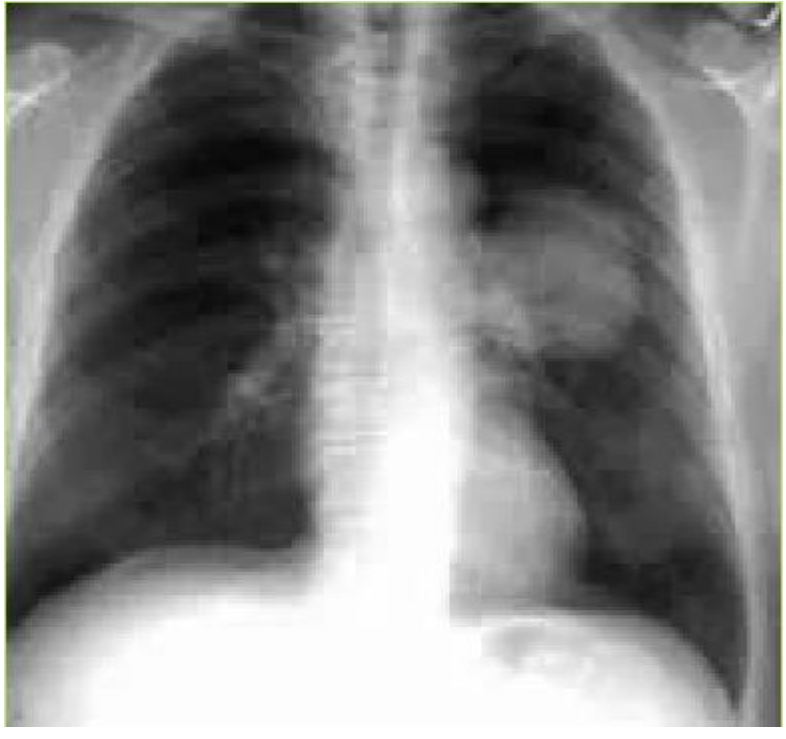
Q1: A 55 year old smoker patient presented with hemoptysis and weight loss of 4 weeks duration and has the following chest xray. Your diagnosis is

Answer

- Bronchogenic Carcinoma
  (Lung cancer)

Q2: This patient presented with hemoptysis.

1. What's your diagnosis?
2. What's your next investigation?



1.Lung cancer.

2. Bronchoscopy & biopsy.

Q6

This 67 y\o asymptomatic patient took this cxr preoperativly which of the following is not part of the test planned or required?

a) Ct of the chest

b) Pet scan

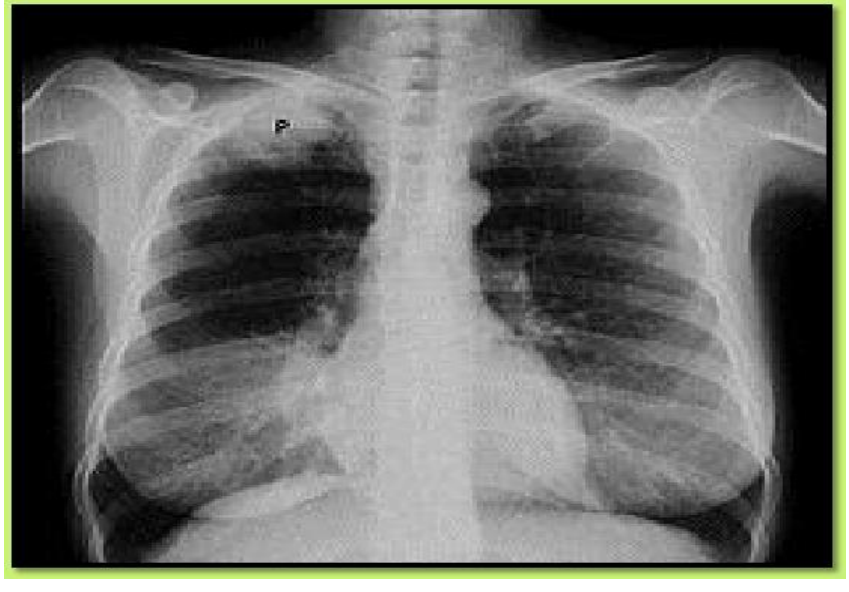
c) Sputum for acid base

d) Previous cxr

e) Bronchoscopy and biopsy

Ans C

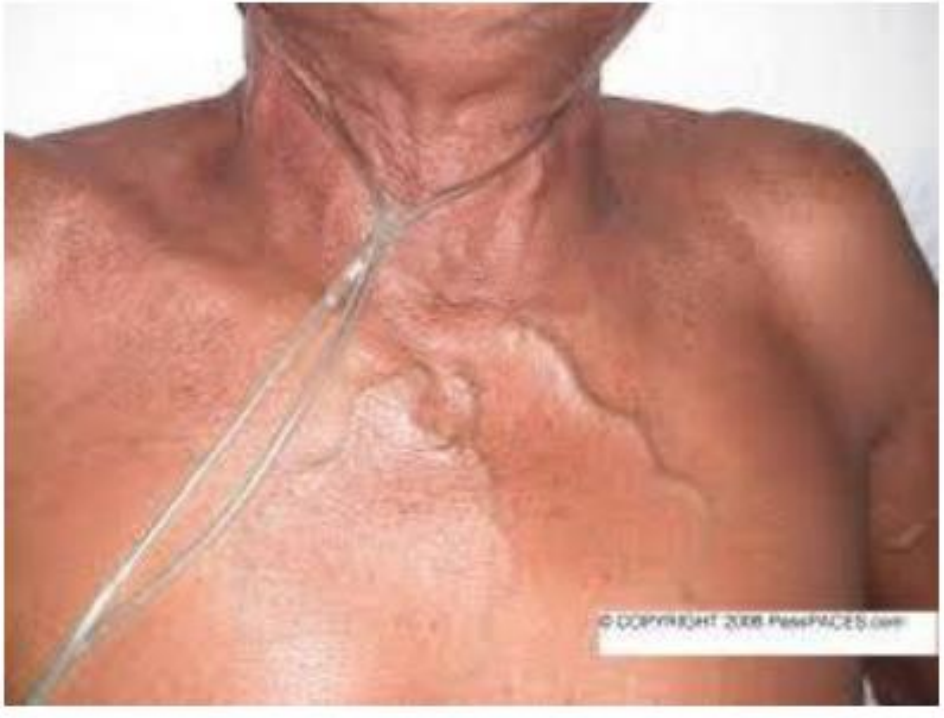
Q4: This pt presented with ptosis & miosis on the right side of his face. Mention 2 findings can be seen in this pt's hand.



1. Muscle atrophy.
2. Muscle weakness.
3. Numbness/Parasthesia.
4. Clubbing.

8. A 75 year-old man presented with hoarseness of voice, cough and weight loss What is the most likely cause of his appearance?

Superior Vena Cava compression [This is dilation of the collaterals is due to superior vena cave compression, which may be caused by thyroid cancer or lung cancer].



Q5: 65 YO male smoker came with cough, hymoptosis, loss appetite, polyurea & polydepsia. what is the Dx? & what's the cause of polyurea?

- Bronchogenic Ca .
- hypercalcemia.

Q6: Hx. of patient with bronchogenic carcinoma,
what is the cause of his constipation ?

Hypercalcemia.

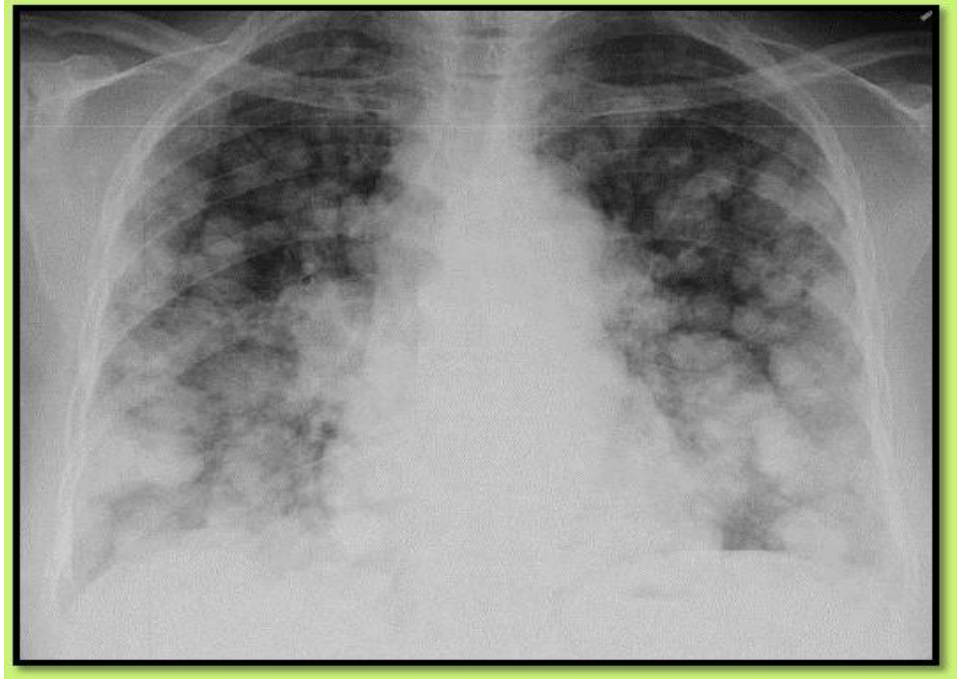
Case 3

A non smoker 45 years-old women with history of ovarian tumor presented with mild dyspnea.

- OE: Non-specific lung findings.
- CXR shows multiple nodules of different size.

What's your primary impression? Metastatic ovarian cancer

Q3: Patient with back pain, hematurea, Weight loss, anorexia & general weakness. What is the Dx.?



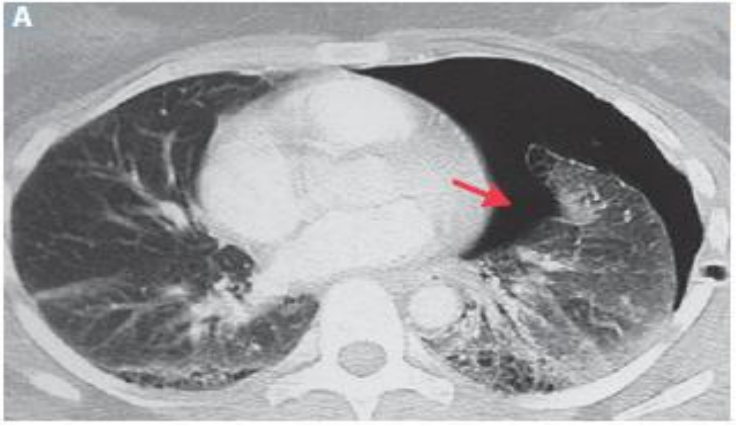
Lung metastasis.

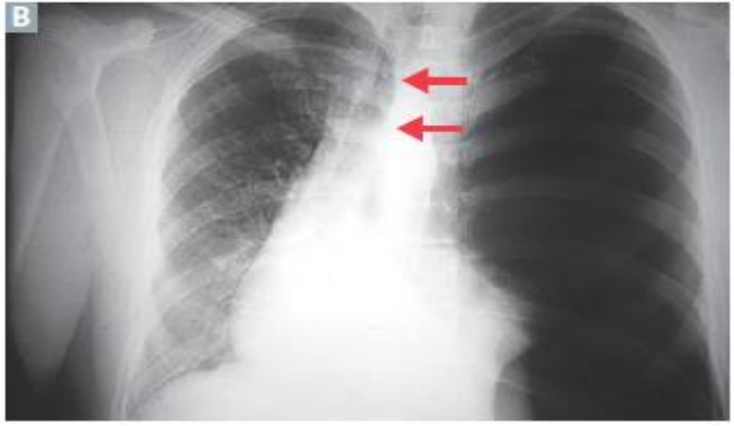
Common causes of tracheal deviation

Towards the side of the lung lesion	
• Upper lobe or lung collapse • Upper lobe fibrosis	• Pneumonectomy
Away from the side of the lung lesion	
• Tension pneumothorax	• Massive pleural effusion
Upper mediastinal mass	
• Retrosternal goitre • Lymphoma	• Lung cancer

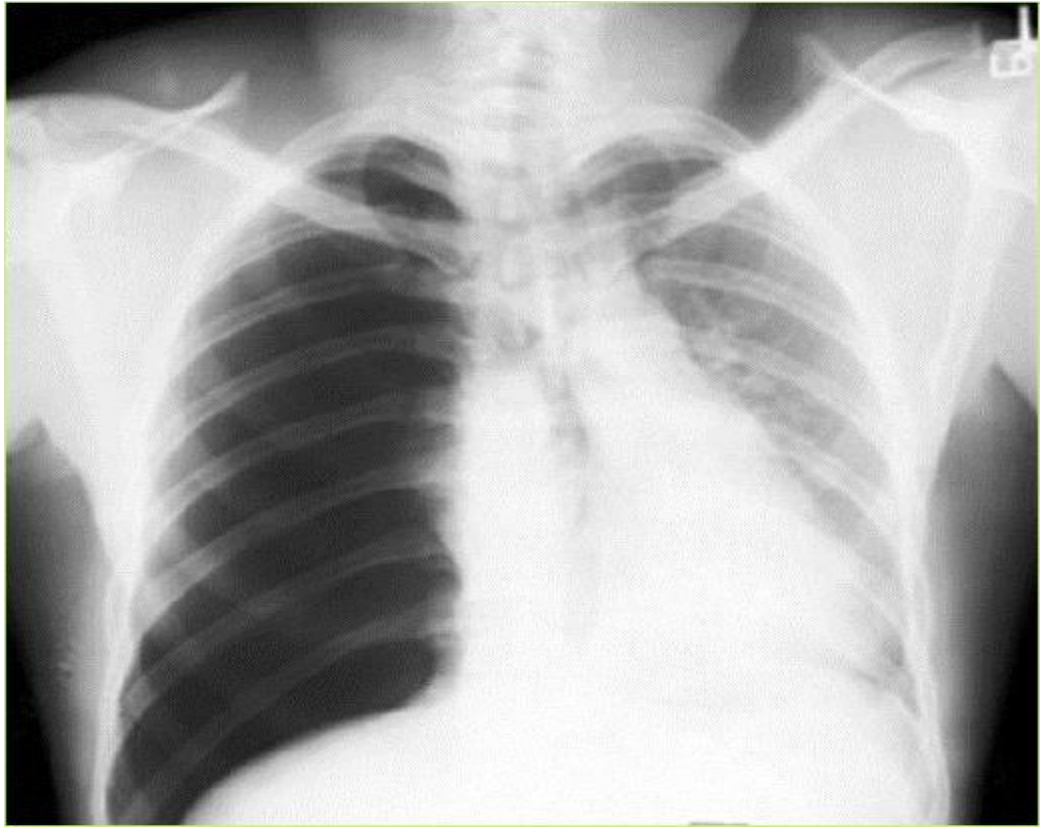
Pneumothorax

Pneumothorax	Accumulation of air in pleural space A. Dyspnea, uneven chest expansion. Chest pain, ↓ tactile fremitus, hyperresonance, and diminished breath sounds, all on the affected side.
Primary spontaneous pneumothorax	Due to rupture of apical subpleural bleb or cysts. Occurs most frequently in tall, thin, young males.
Secondary spontaneous pneumothorax	Due to diseased lung (eg, bullae in emphysema, infections), mechanical ventilation with use of high pressures → barotrauma.
Traumatic pneumothorax	Caused by blunt (eg, rib fracture) or penetrating (eg, gunshot) trauma.
Tension pneumothorax	Can be any of the above. Air enters pleural space but cannot exit. Increasing trapped air → tension pneumothorax. Trachea deviates away from affected lung B. Needs immediate needle decompression and chest tube placement.





Q1: A-What is the diagnosis?
B-How to manage?

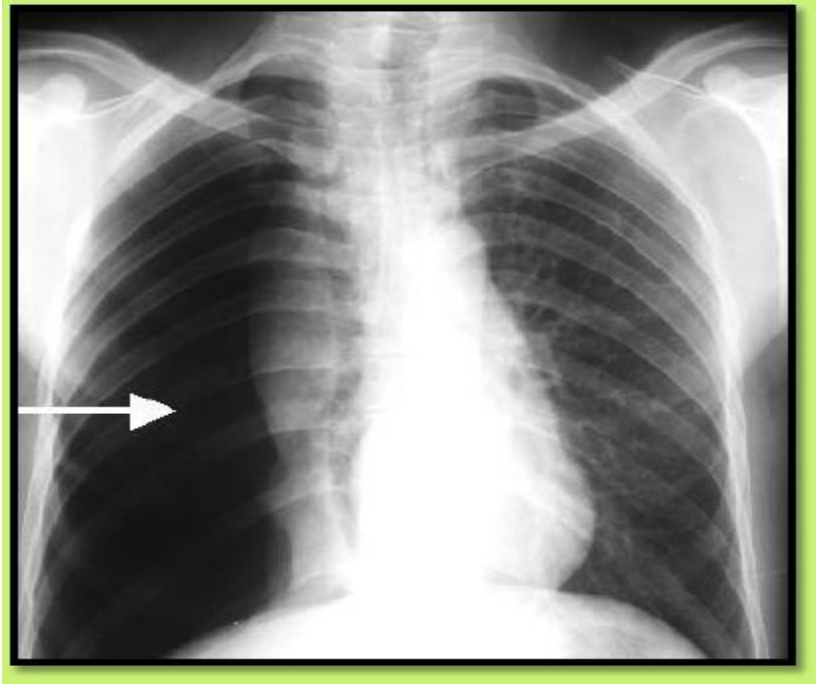


A. Right-sided tension pneumothorax .

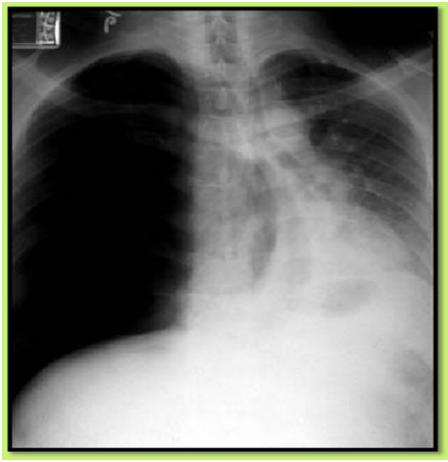
B. Insertion of a chest tube .

Q3: Patient presented with sudden onset chest pain & SOB. What is the 1st step in management?

Needle thoracostomy

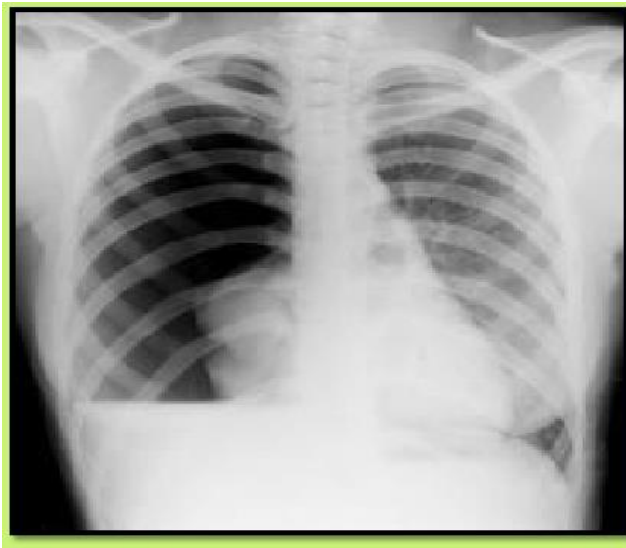


Q3: A 42 YO RTA pt is presented with sudden onset breathlessness . An urgent CXR was done for him & showed the following.



- What is your spot Dx?

- What is the immediate treatment for this patient?



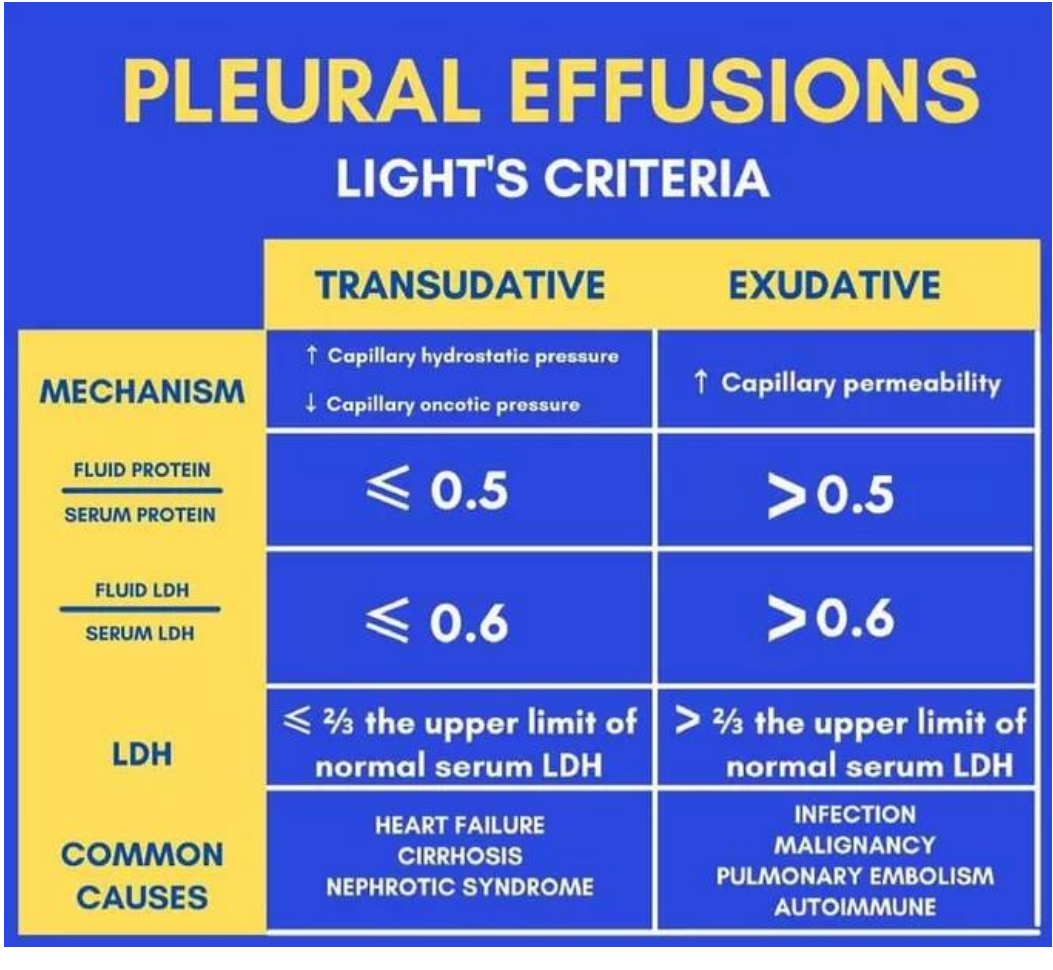
1- Right sided tension Pneumothorax.
In the lower pic there is ass. **Hemothorax.**

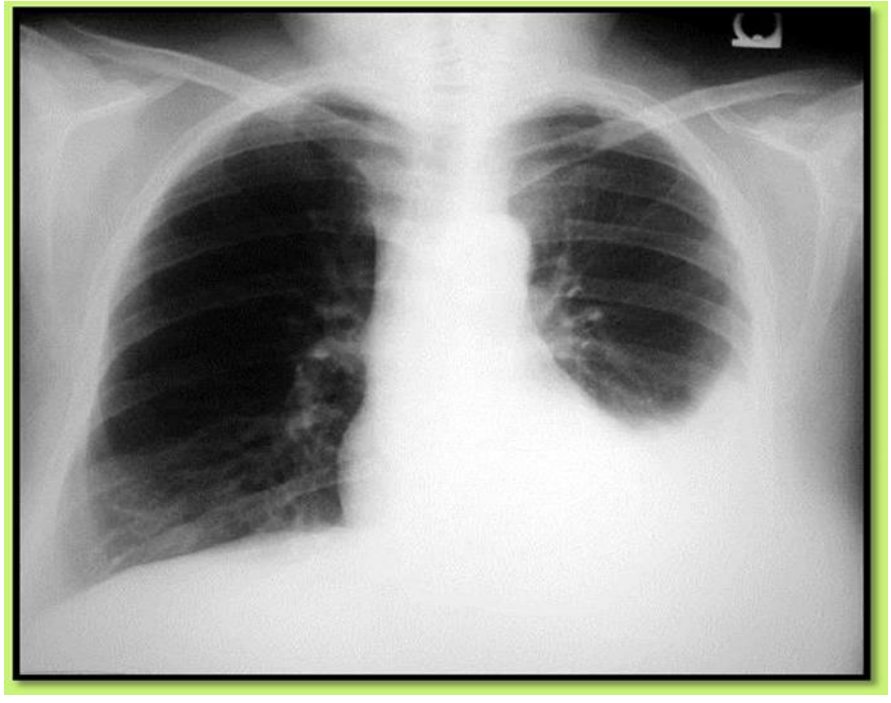
2- Needle thoracostomy (Chest tube).

Pleural effusion

A pleural effusion is **collection of fluid abnormally present in the pleural space**, usually resulting from excess **fluid production** and/or **decreased lymphatic absorption**.

- ON P/E : Limited chest expansion , decreased TVF + VR , **absent breath sound** , **Stony Dull on percussion**
- ON CXR : Obliterated costophrenic angle
- After **thoracocentesis** its divided according to **lights criteria into :**
1- Transudative
2- Exudative





Left Pleural effusion.

Q6: This X-ray is for a pt admitted with SOB, he has stony dullness on percussion, diminished breath sounds, decreased vocal resonance & fremitus over the left side, What is your Dx?

Left pleural effusion

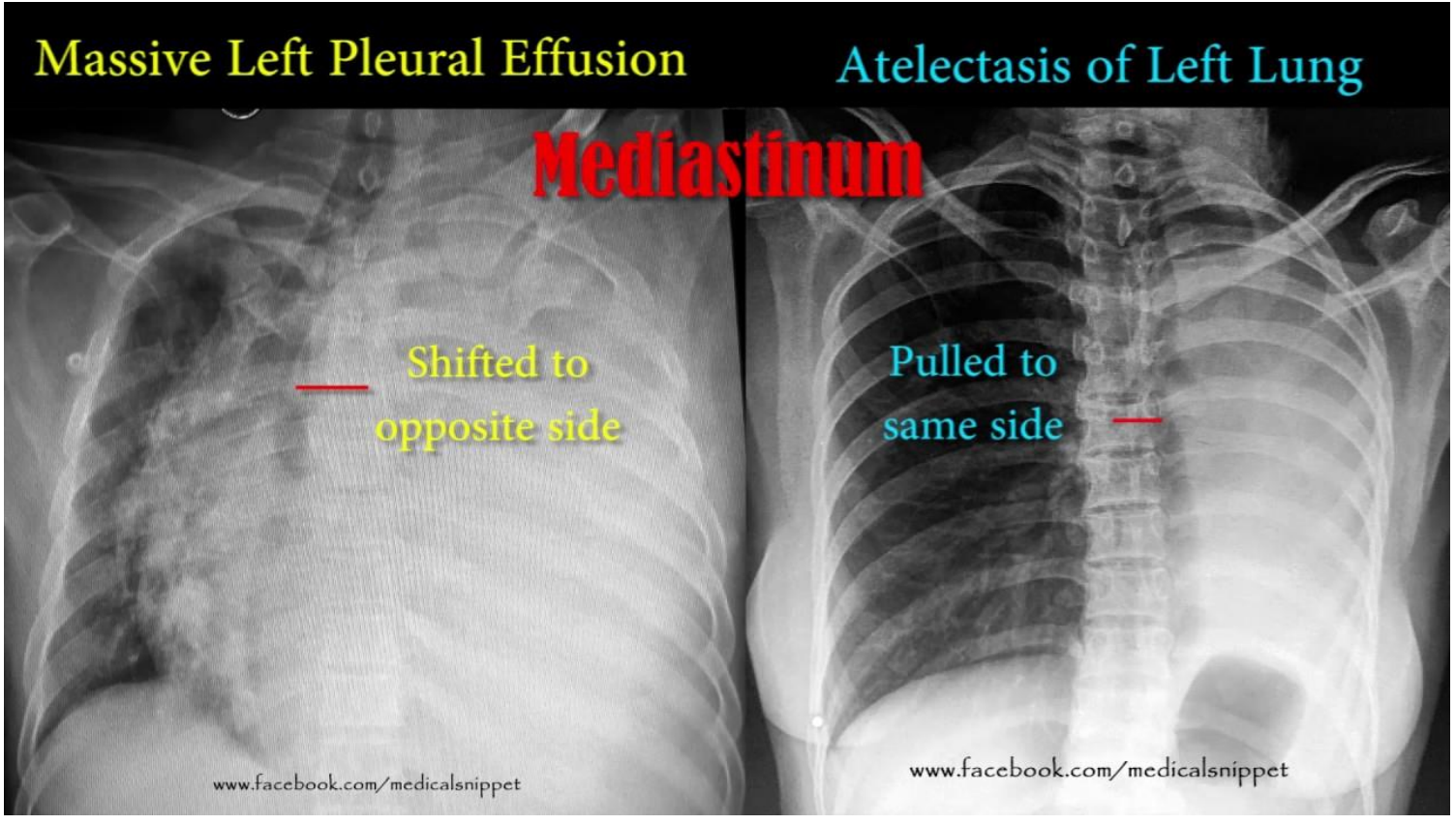
- The patient presented with fever, cough, SOB. This is the CXR, what’s your diagnosis, what's the most probable cause?

- Left side Pleural effusion
- Left side Pneumonia, para-pneumonic effusion

15. Dyspneic patient, chest exam **reveals both sided dullness** and **basal decreased air entry**, you obtain this chest radiography. Name the Diagnosis .

-Bilateral pleural effusion

White Lung


Massive Left Pleural Effusion
Atelectasis of Left Lung
Mediastinum
Shifted to opposite side
Pulled to same side
www.facebook.com/medicalsnippet
www.facebook.com/medicalsnippet

Q8

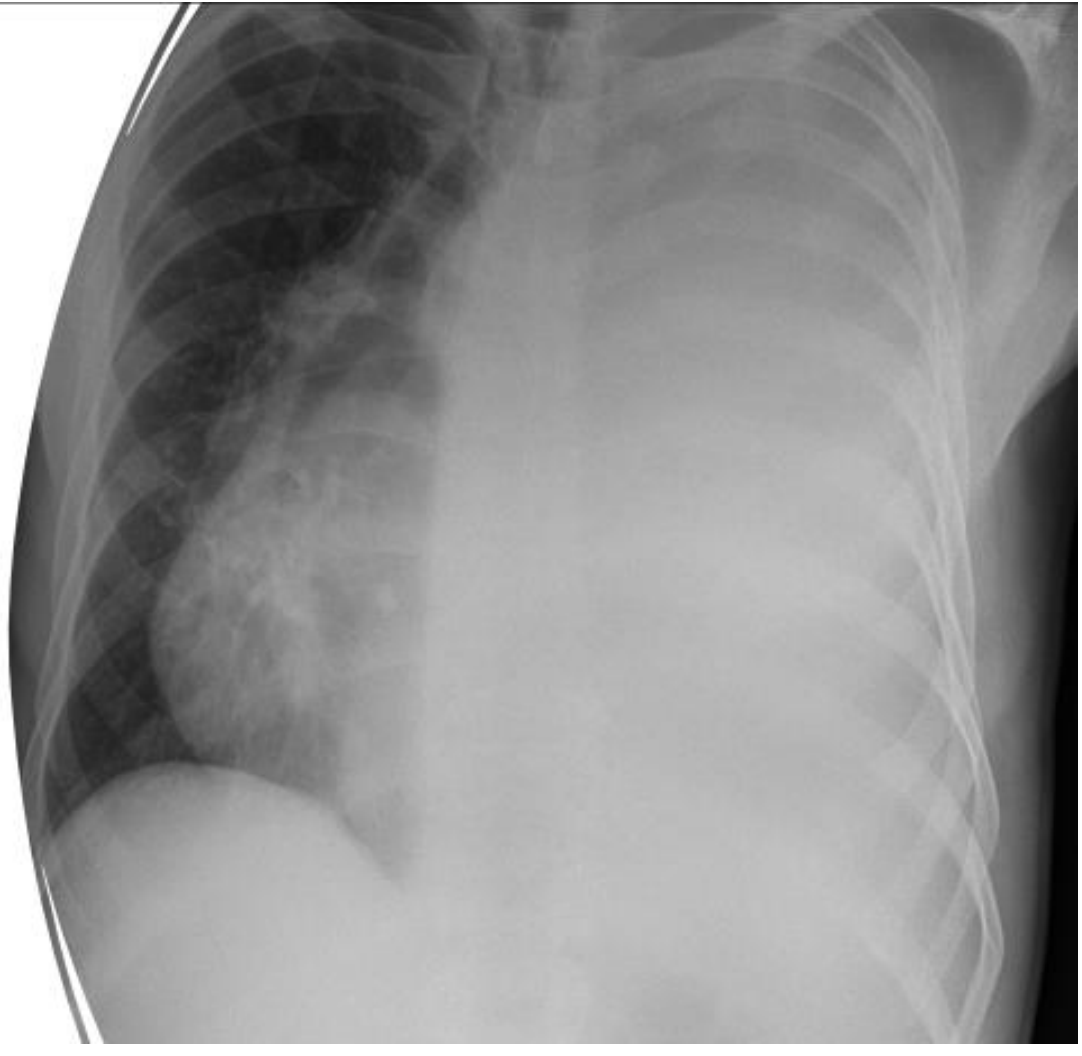
Dx

a) Massive left sided plural effusion

b) Pneumothorax

c) Left sided lung collapse

Ans A



Q4: The pt presented with SOB. On physical exam, his chest was dull to percussion. What's your Dx. from the x-ray?

Right-side atelectasis (lung collapse)

ARDS & Pulmonary edema

Acute respiratory distress syndrome

Risk factors	• Infection, trauma, massive transfusion, acute pancreatitis
Pathophysiology	• Lung injury → fluid/cytokine leakage into alveoli • Impaired gas exchange, decreased lung compliance, PHTN
Diagnosis	• New/worsening respiratory distress within 1 week of insult • **Bilateral lung opacities** (pulmonary edema) *not* due to CHF/fluid overload • Hypoxemia with **PaO_2/FiO_2 ratio ≤300 mm Hg**
Management	• Mechanical ventilation (eg, low TV, high PEEP, permissive hypercapnia)

CHF = congestive heart failure; **FiO_2** = fraction of inspired oxygen; **PaO_2** = partial pressure of arterial oxygen; **PEEP** = positive end-expiratory pressure; **PHTN** = pulmonary hypertension; **TV** = tidal volume.

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Acute respiratory distress syndrome

PATHOPHYSIOLOGY

Alveolar insult → release of pro-inflammatory cytokines → neutrophil recruitment, activation, and release of toxic mediators (eg, reactive oxygen species, proteases, etc) → capillary endothelial damage and ↑ vessel permeability → leakage of protein-rich fluid into alveoli → formation of intra-alveolar hyaline membranes (arrows in A) and noncardiogenic pulmonary edema (normal PCWP).

Loss of surfactant also contributes to alveolar collapse.

CAUSES

Sepsis (most common), aspiration, pneumonia, trauma, pancreatitis.

DIAGNOSIS

Diagnosis of exclusion with the following criteria (ARDS):

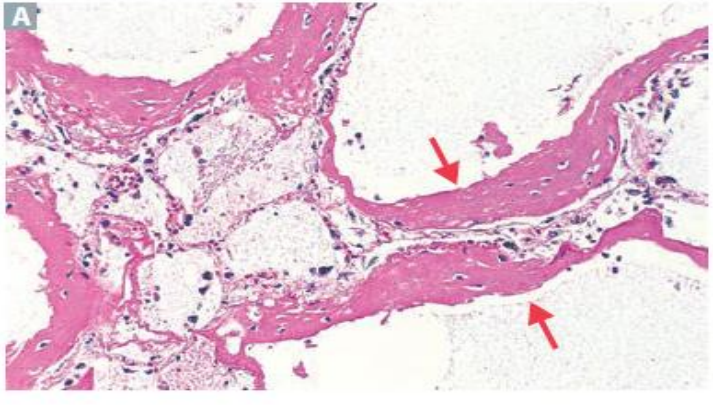
- Abnormal chest X-ray (bilateral lung opacities) B
- Respiratory failure within 1 week of alveolar insult
- Decreased Pao_2/Fio_2 (ratio < 300, hypoxemia due to ↑ intrapulmonary shunting and diffusion abnormalities)
- Symptoms of respiratory failure are not due to HF/fluid overload

CONSEQUENCES

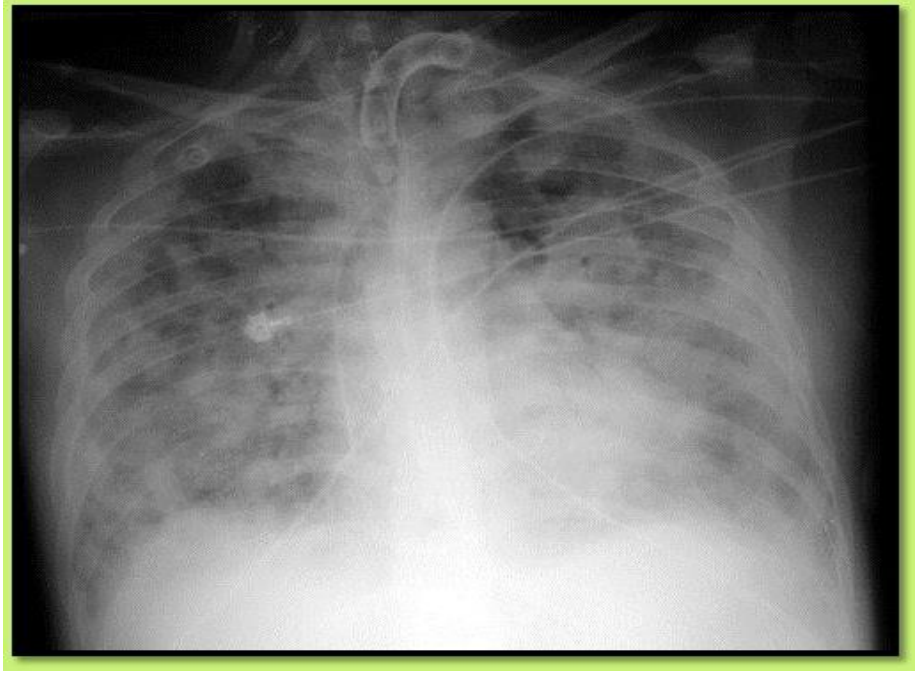
Impaired gas exchange
↓ lung compliance
Pulmonary hypertension

MANAGEMENT

Treat the underlying cause
Mechanical ventilation: ↓ tidal volumes, ↑ PEEP



Q7: 35 YO male pt, known case of pancreatitis only, presented to ER complaining of SOB, What's the cause of his SOB?



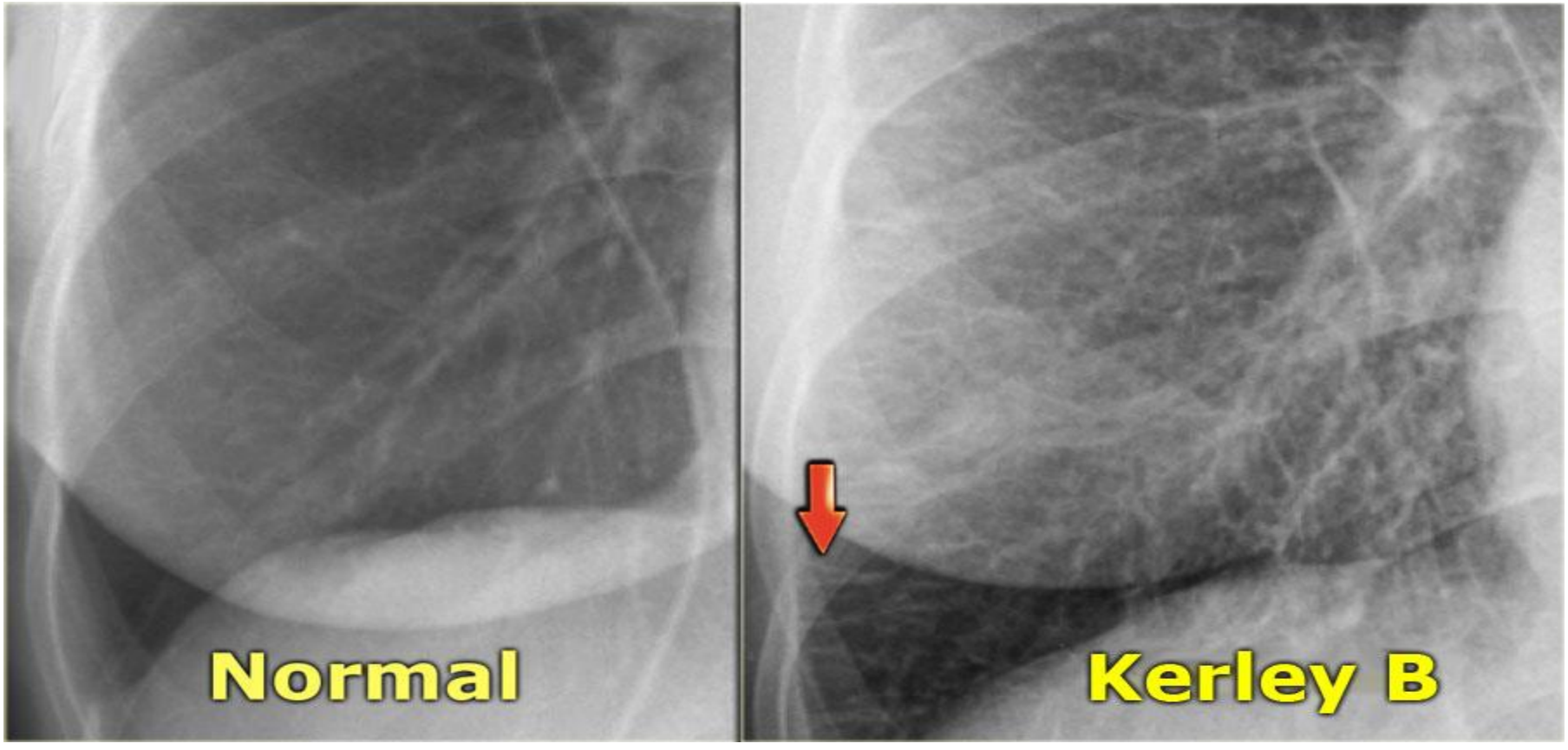
Pulmonary Edema

- **Pulmonary edema** is a condition in which the lungs fill with fluid. It's also known as lung congestion, lung water, and **pulmonary** congestion. When **pulmonary edema** occurs, the body struggles to get enough oxygen and you start to have shortness of breath

PULMOARY EDEMA

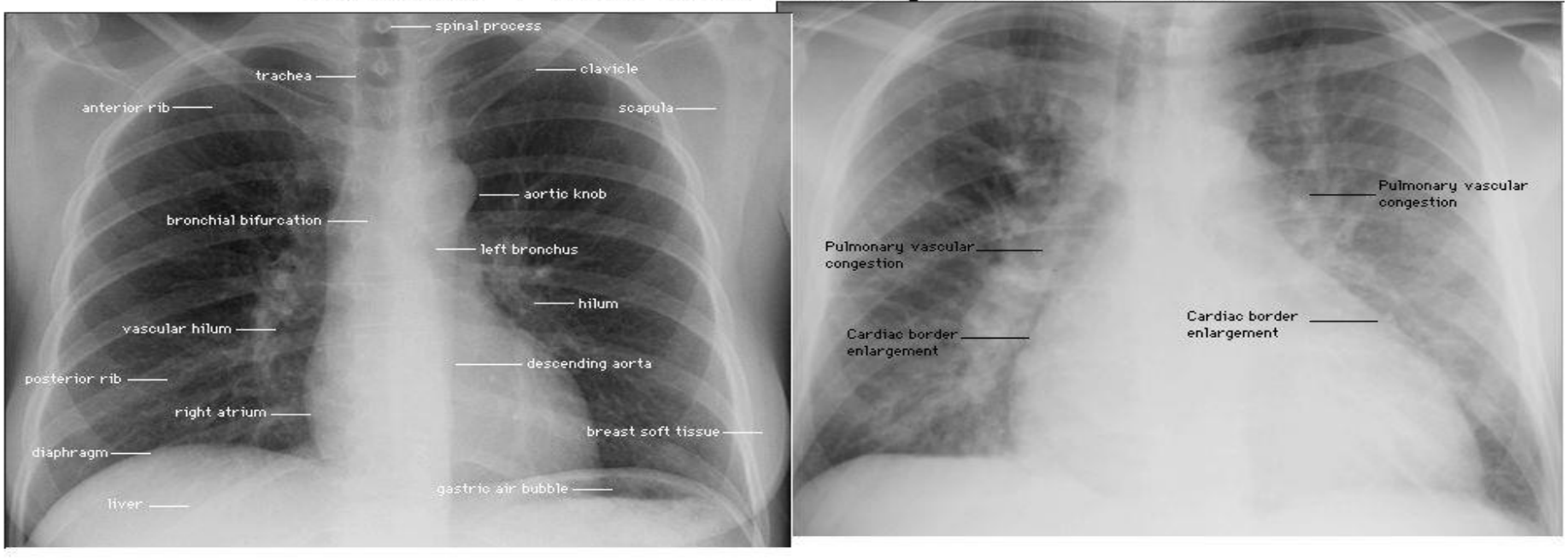
Pulmonary Edema
Acute Diffuse Alveolar

- Bilateral
- Diffuse
- Butterfly pattern
- Soft fluffy lesions
- Coalescing
- Air bronchogram



- Kerley B lines: **Represent thickened interlobular septa in the lung periphery. This is often due to interstitial oedema**. Can also be due to **tumour infiltration, fibrosis, infection**

CXR: Pulmonary Edema



CXR findings: heart size, congestion, pleural effusion

www.yale.edu/imaging/contents.html

Q8:A known case of hypertension presents with increasing shortness of breath, what is your diagnosis?

- Pulmonary Edema

60-year-old male patient presenting to the ER with severe shortness of breath for 6 hours. Upon arrival, his BP 140/90 mmHg, pulse 160 bpm, irregularly irregular, O2 saturation 80% on room air. He had orthopnea and chest exam was full of crepitations. CXR was done:
What is the most likely diagnosis?

-Pulmonary edema.

Question 18

Patient with SOB..

A- What’s the most affected valve?

B- What’s the cause of SOB?

Q18)

A- mitral.

B- acute pulmonary edema

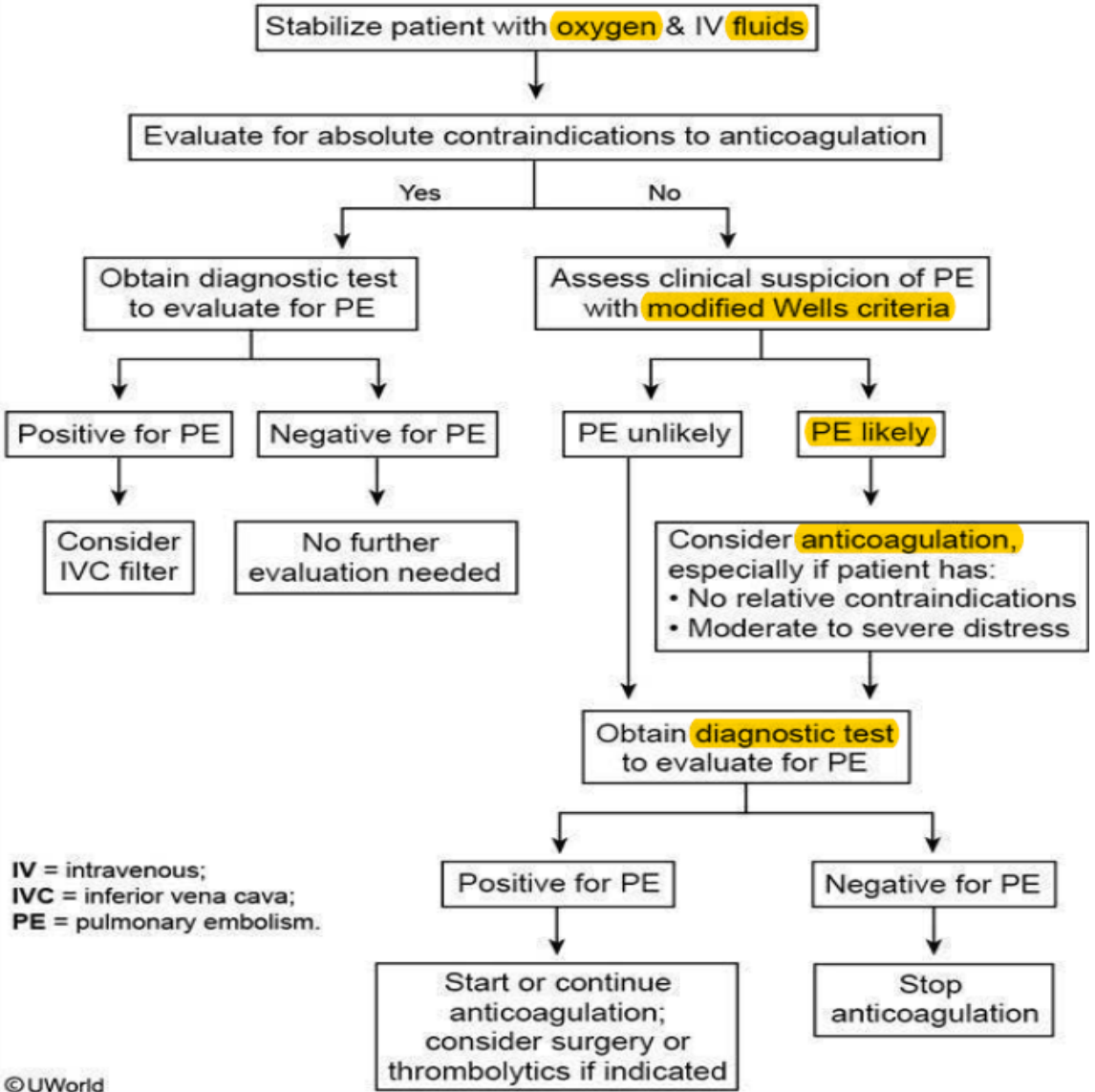
PE / DVT

- Pulmonary emboli derive from **DVT of the large vessels of the legs** .
- **Presentation:**
- Acute-onset dyspnea and pleuritic chest pain , **Tachypnea → Respiratory alkalosis** , tachycardia and cough / Hemoptysis .
- Hx of unilateral limb swelling .
- **Risk factors** : Lack of movement / Injury or surgery / Pregnancy / oral contraceptives / Obesity / active Cancer.
- **Dx :** CXR " Wester mark , hampton hump " , Ecg : tachycardia

D-dimer , Doppler , CT angio .

- **TTT :** Oxygen **,** anticoagulation , if **not stable** thrombolytic or immediate thromboectomy

Approach to patient with suspected pulmonary embolism



IV = intravenous;
IVC = inferior vena cava;
PE = pulmonary embolism.

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Q12: This patient was presented with sudden onset chest pain with S.O.B.

A-What is the cause of his presentation?

B-How to diagnose?

A.Pulmonary embolism

B.CT-Angiography

Case

32 YO female pt, presented with sudden onset of dyspnea, she has Hx of pregnancy 2 weeks ago.

1. **What is the most probable Dx?** “2 marks”
2. **Give 2 diagnostic tests for this pt?**
3. **What is the treatment?**

1. Pulmonary embolism.
2. CT angio, D-dimer, V\Q scan.
3. LMWH (Anticoagulant).

Q7:

This patient had unilateral lower limb swelling & redness. What's the investigation that you'll do to diagnose this case?

Venous Doppler Ultrasound

Q8: This pt was presented with swollen, red, warm & painful right leg. WBCs = 17.000, what is your spot Dx.?

Cellulitis.

Q9: Pt with DM & HTN, give 2 DDx?

A. DVT .
B. Cellulites
C. Rupture becker cyst

pH		7.54	↑ (7.35-7.45)
PCO2		20 mm Hg	↓ (32-46)
HCO3		17 mmol/L	↓ (22-29)
BE		0-5.2 mmol/L	↓ (-2-3)
PO2		53 mm Hg	↓ (71-104)

Select one:

- a. Ethylene glycol intoxication
- b. Pulmonary embolism
- c. Severe diarrhea
- d. Aspirin toxicity
- e. Intravenous furosemide

Thank you