EMPYEMA LUNG ABSCESS (SURGICAL LUNG INFECTIONS)

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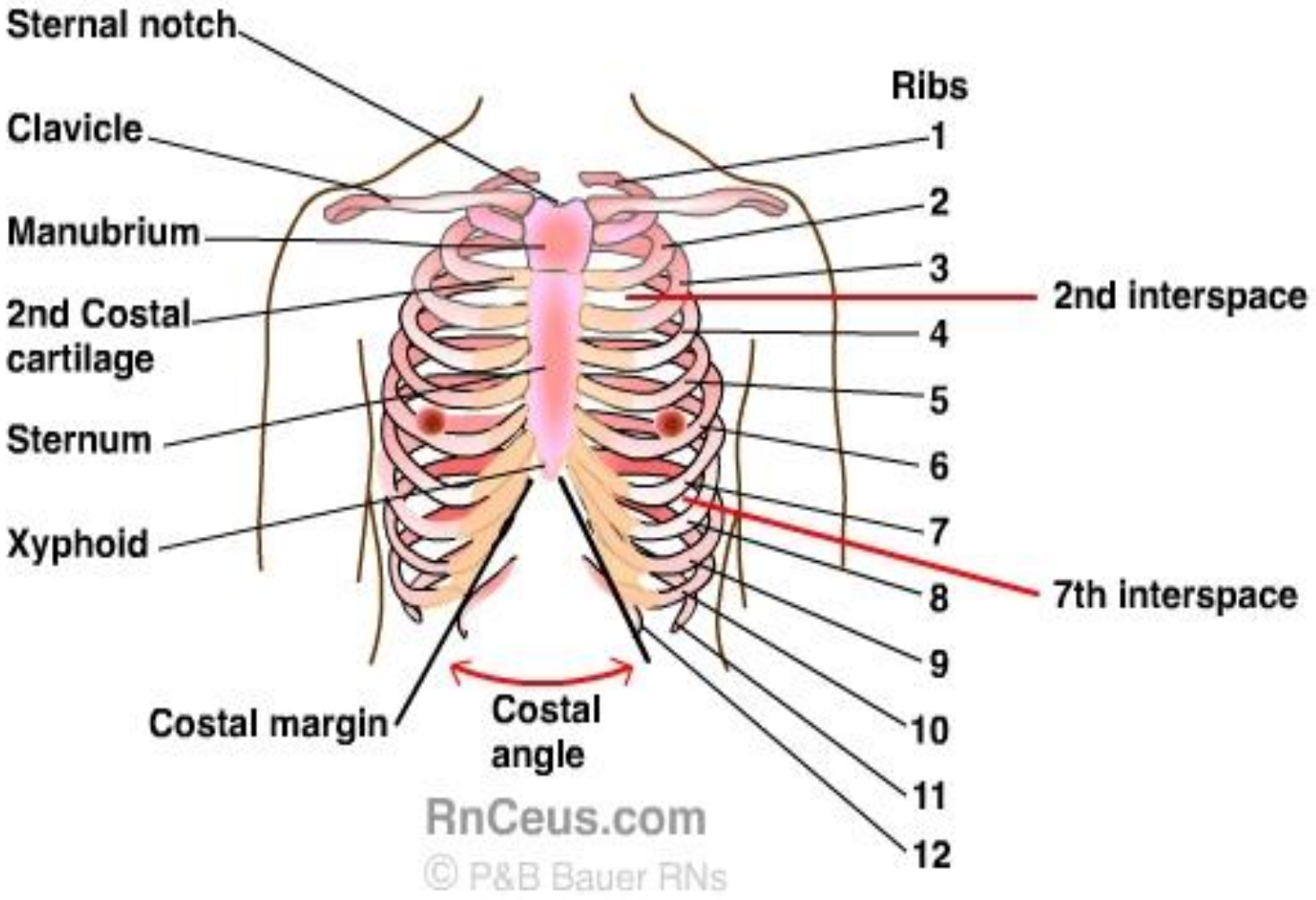
- ANATOMY.
- Empyema Definition classification causes diagnosis management indications for surgery

- Lung abscesses definition causes clinical presentations diagnosis management


Sternal notch
Clavicle
Manubrium
2nd Costal cartilage
Sternum
Xyphoid
Costal margin
Costal angle
Ribs
1
2
3
2nd interspace
4
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6
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7th interspace
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12
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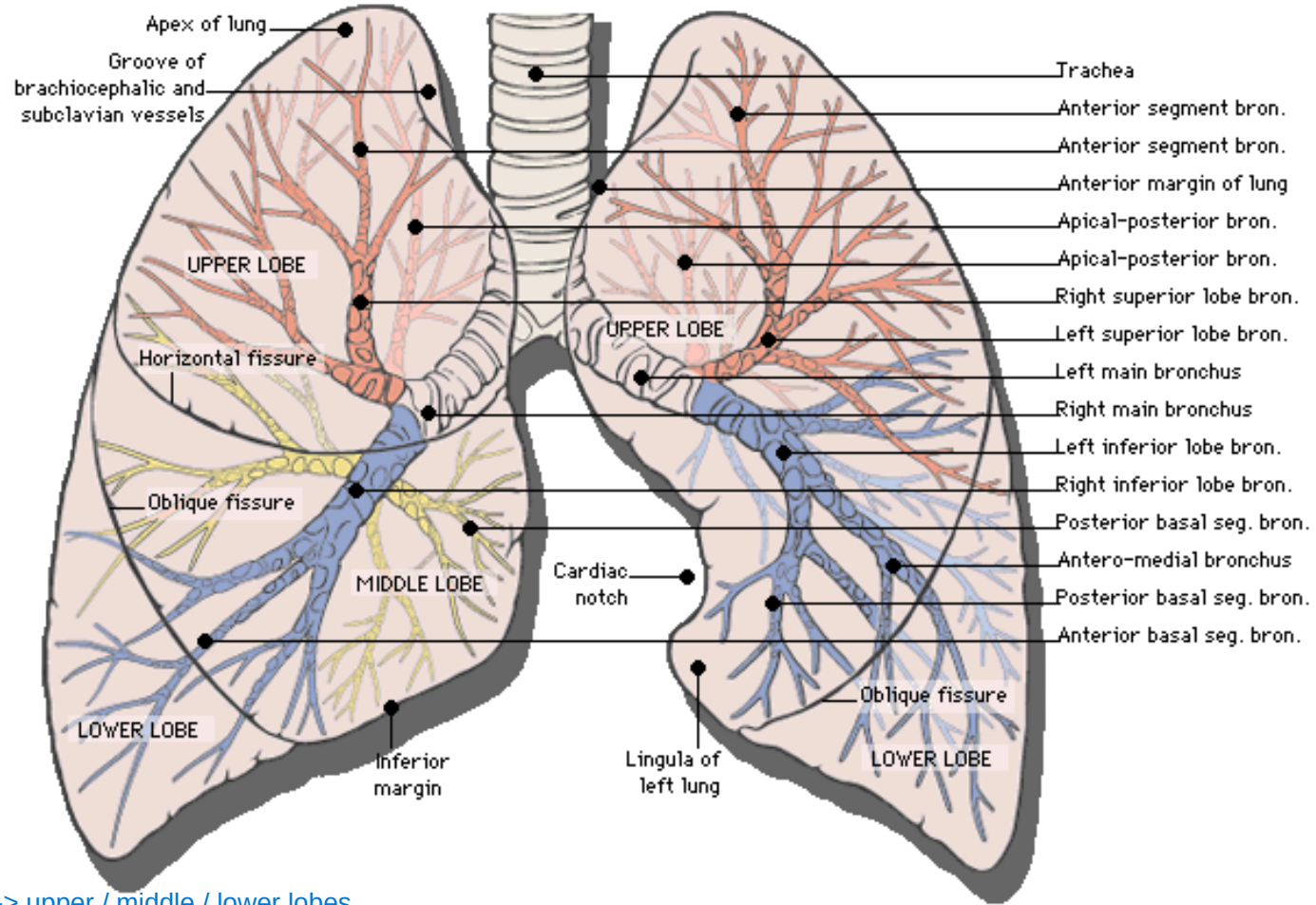


right lobe --> upper / middle / lower lobes
left lobe --> upper (lingula part of the upper lobe) / lower lobe

EMPYEMA THORACIS

- Definition:Invading of the pleural space with bacteria which result in accumulation of pus .
- Classification :(American Thoracic Society)

staging the empyema (timing staging depened on the onset of the disease)

- Stage 1 :Exudative , with swelling of the pleural membranes as a result of ↑ permeability of swollen membranes(Uncomplicated Acute stage)

between 1 week to ma 10 days

due to inflammation

high rich in protein / LDH / acidic PH / low sugar / many WBCs and neutrophils and lymphocytes / +gram stain and culture

- Stage 2:Fibropurulent(Transitional)with heavy fibrin deposits.

from 10 days to one week up to max 4 weeks

- Stage 3:Organizing or Chronic phase.With ingrowth of fiboblast and deposition of collagen

after 4 weeks

ETIOLOGY: the causes of bacterial invasion in our thoracic cavity (pleural space) :

- PARAPNEUMONIC(secodary to a pneumonia)the most common
- Post trauma.
- Post surgery(esophageal or pulmonary)
- Subphrenic Abscess subdiaphragmatic abscess (infection below the diaphragm)

Etiology	No. of patients	% of Patients	Perioperative Mortality
Simple parapneumonic	112	65.0%	0025.4%
Complicated Parapneu-monic			
Transplant patients	11	6%	9%
Postresection	11	6%	18%
Traumatic	8	5%	0.0%
Post-cardiac surgery	5	3%	18%
Malignant empyema	5	3%	0.0%
Local cause of empyema			
Esophageal	12	7%	8%
Subphrenic causes	6	2%	0.0%

Bacteriology

- :Before ABO 10% of Pts survived pneumonia developed EMPYEMA(Streptococci & Pneumococci are the most freuquent)
  - After ABO the incidence as well as the mortality↓. Staph become more prevelent ,90% of empyema in children .

Incidence of Empyema according to Bacteria causing pneumonia

Aerobic	*EFFUSION*		*EMPYEMA*
G +VE low chance <5%			
Strep pneumonia	*50%*		*<5%*
CAP community acquired pneumonia			
Stap Aureus staph aureus more common in children then adults			
CHILDREN the children chance of effusion is higher than in adults (parapneumonic effusion)	*70%*		*80%*
ADULT	*40%*		*20%*
G –VE	*50%*		*90%*
HAP VAP high chance 90%			
hospital acquired pneumonia			
Anaerobes	*35%*		*90%*

Clinical presentation

- Pleuritic chest pain ,fever, S.O.B ,Tacycardia AS Pneumonia.If prolonged symptoms SUSPECT EMPYEMA.

in elderly

/ productive cough
if these symptoms persist more than 10 days (prolongation of symptoms) you need to suspect that the patient is complicated (complication of penumonia by empyema)
if the patient start to have chest pain with fever , tachcardia , SOB --> more complicated patients

- Anaerobic :indolent

if the patient take course antibiotic for 10 days with persistent symptoms you have to suspect complication of pneumonia (mostly empyema)

- P/E:Toxic anxious pt,tacycardia,tacypnea,restricted chest wall excursion,↓ air entry,dullness on percussion.
- Chronic pt Clubbing,Anaemia,wt loss.

not in acute patient

DIAGNOSIS:

- CBC:↑ WBCwith shift to left,↑ CRP ESR.
- CXR:Effusion,↑thickness of the pleura, Air fluid level.
- THORACOCENTESIS: to confirm the diagnosis we take a empyema fluid (the pH must be acidic .....
- Empyema fluid
- PH <7.2 acidic
- Glucose < 40 mg/dL
  LDH > 1000 IU/dL
  Positive Gram stain
  Positive culture (50%)
  Specific gravity > 1.018
  WBC > 500 cells/mm3
  Protein > 2.5 g/dL

PPE

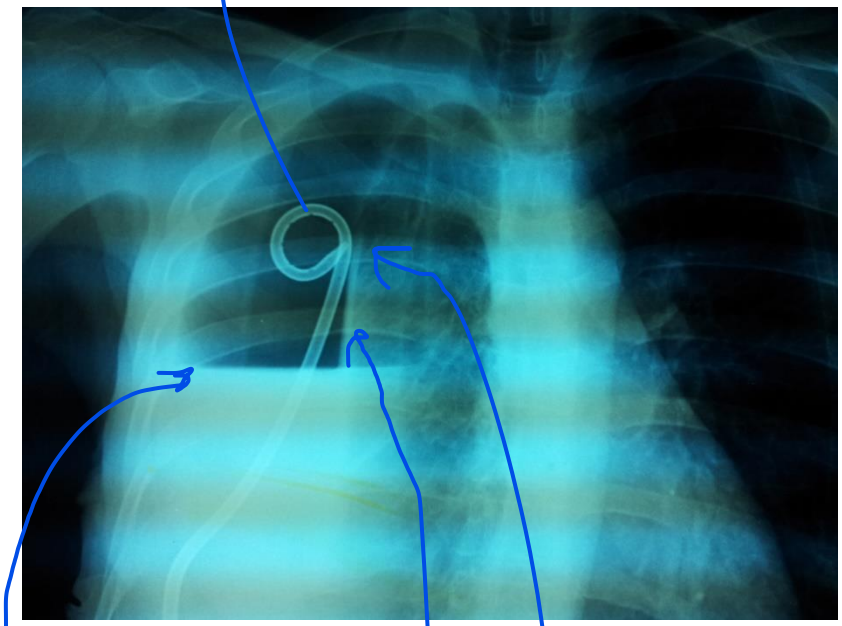
parapneumonic effusion classification :

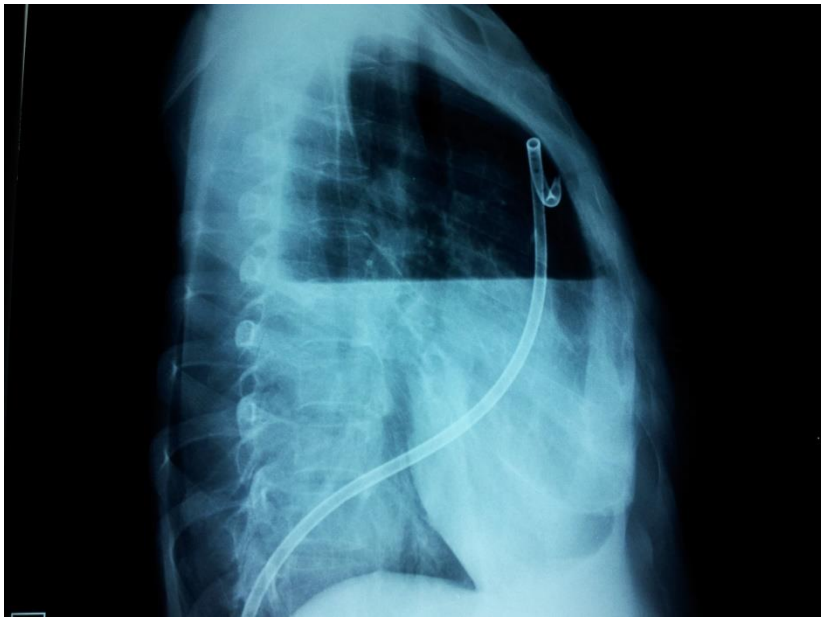
- Clinically, are classified as
- simple PPE, pH > 7.20
- complicated PPE, and frank empyema. complicated PPE are exudates with glucose level <2.2 mmol/l and pH < 7.20.

low glucose

drain

empyema until proven otherwise

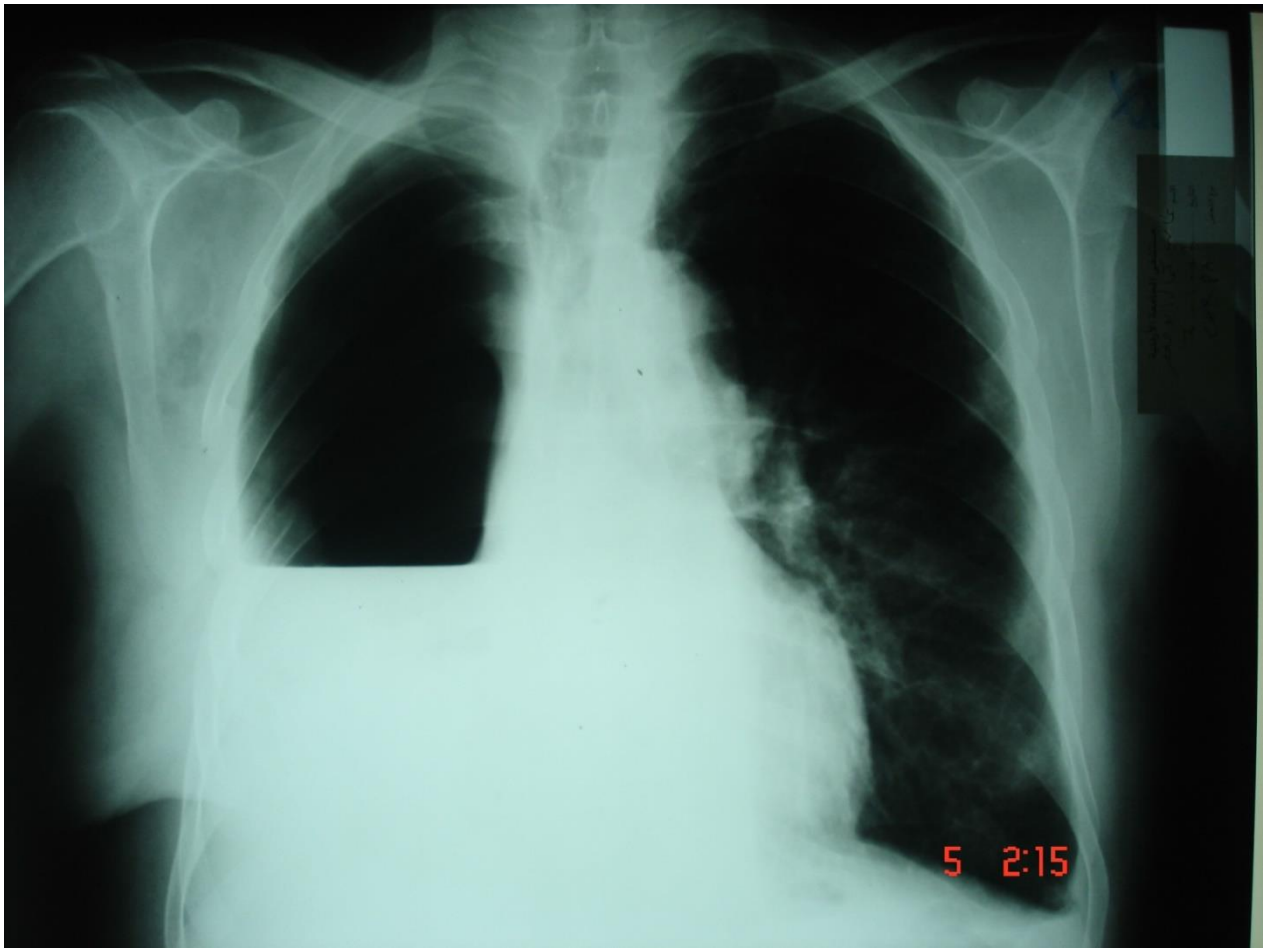




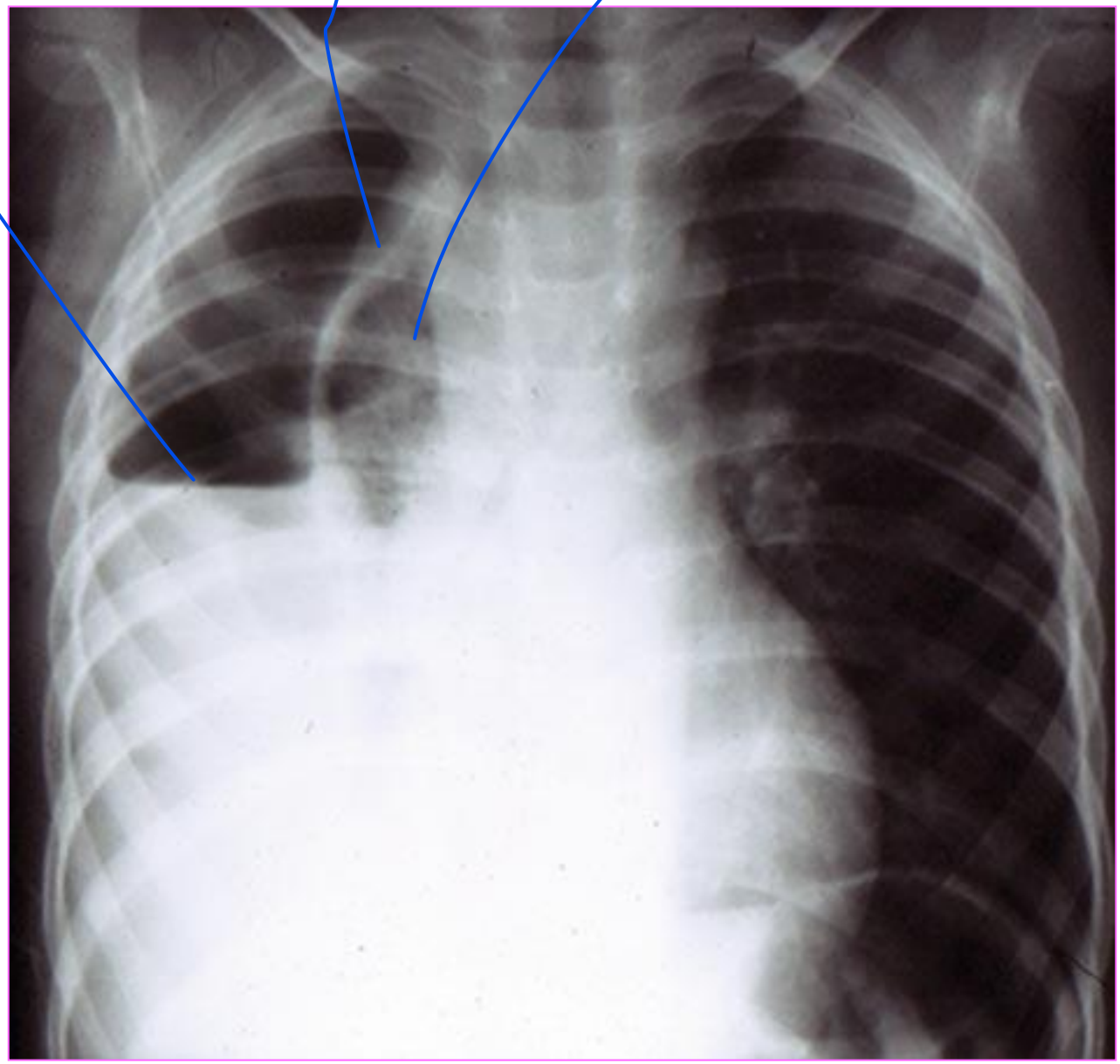
air-fluid level

thickened visceral pleura

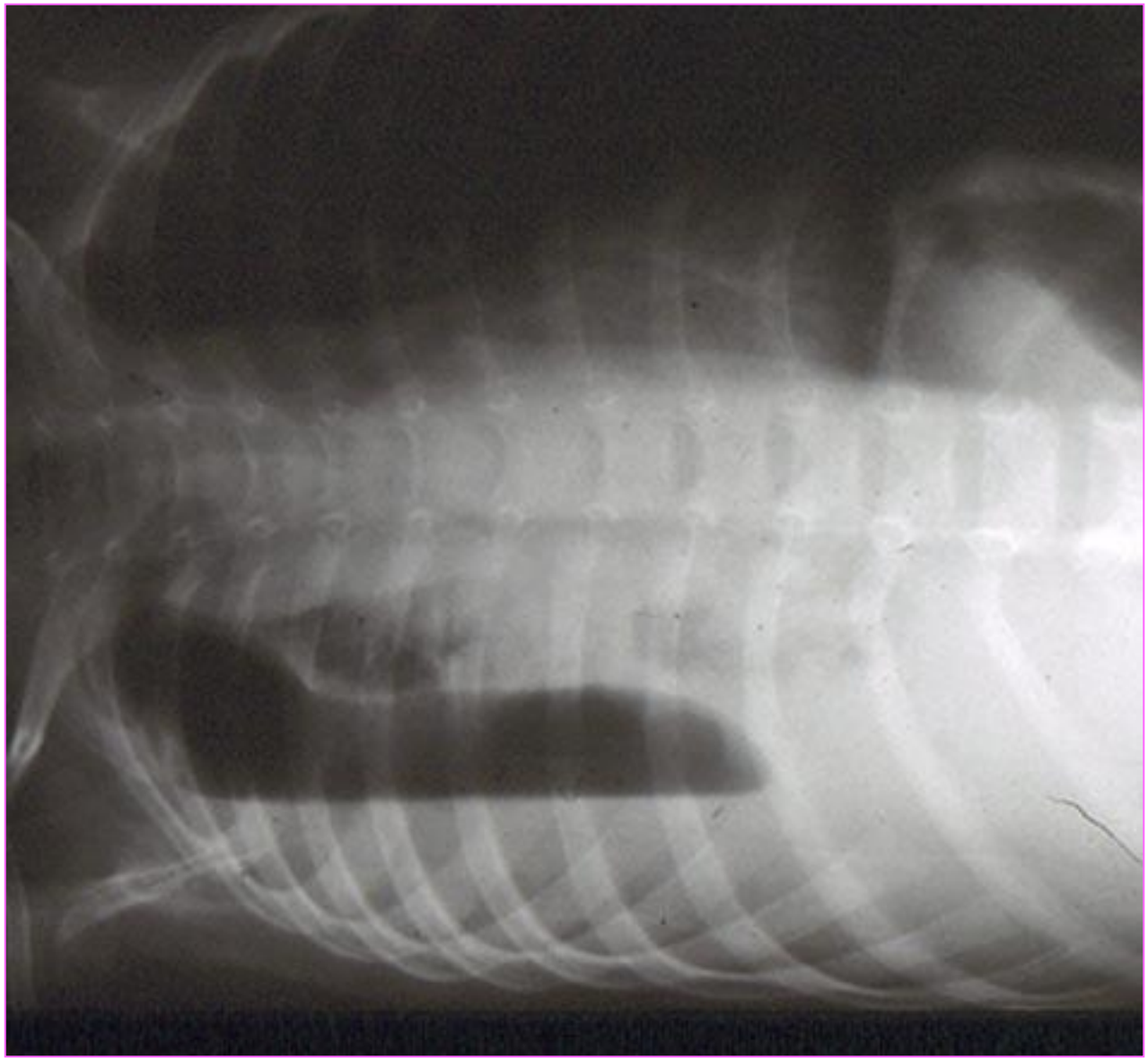
collapsed lung



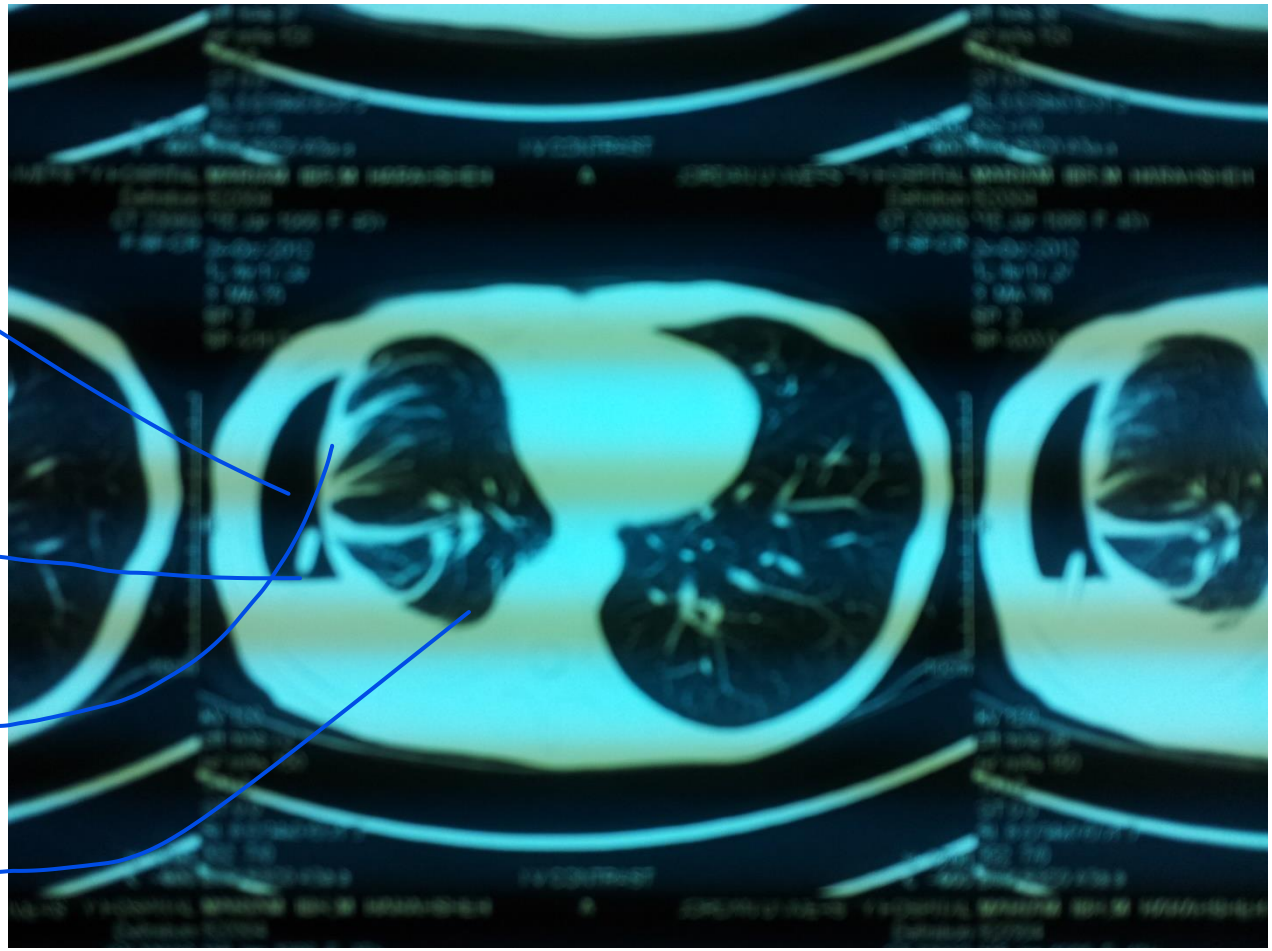
air-fluid level
complete lung collapsed


thick membrane
collapsed lung
air-fluid level
(any air-fluid
level is
empeyma until
proven in
other wise

when we do incupitus film the fluid change its position (confirm the empeyma thoracis diagnosis)

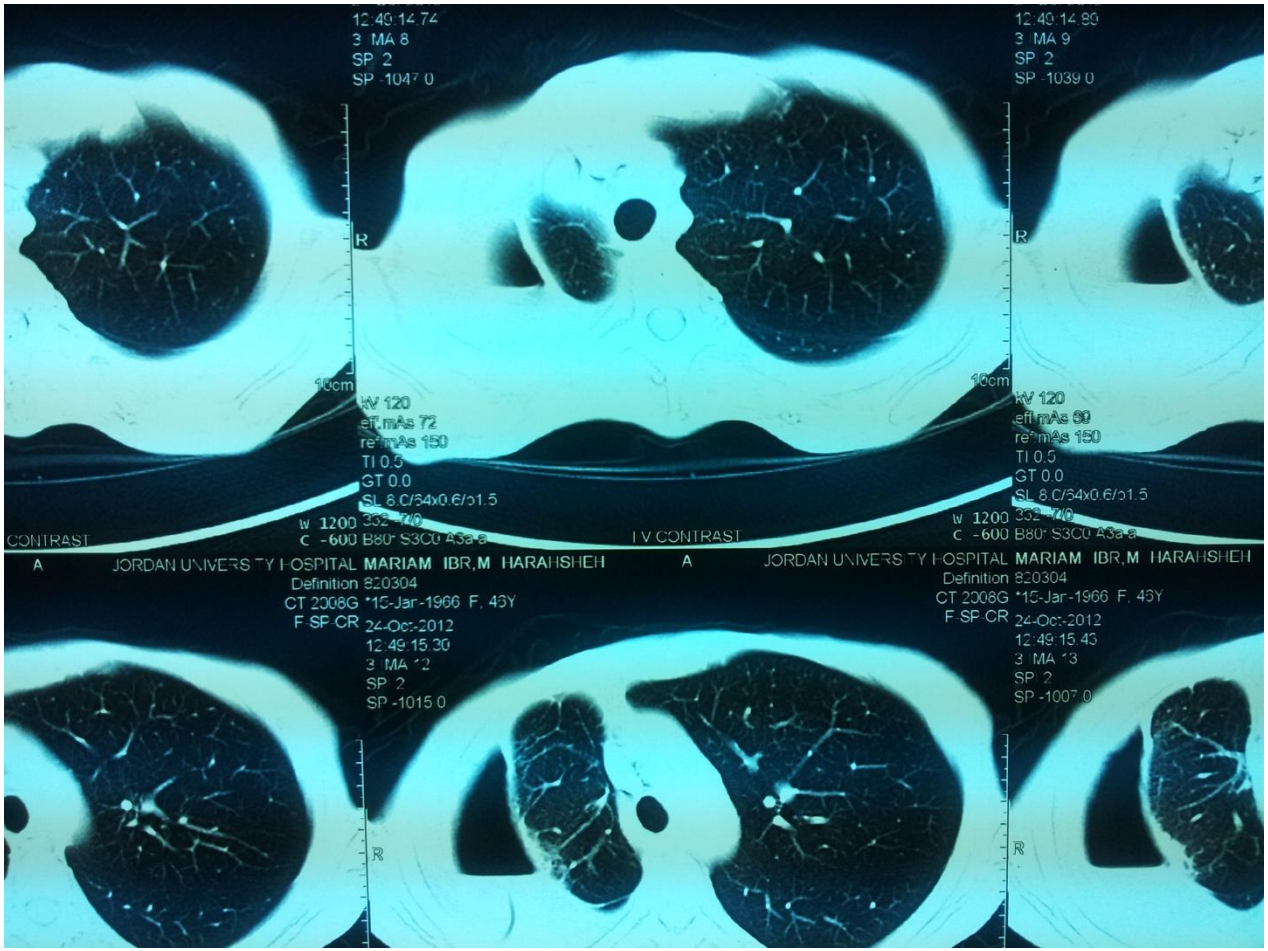


CT scan is mandatory (due to its importance in show the amount of fluids or pus in the pleural space and show the collapsed lung and the adhesions around the lung / show if it is multinucleated



A-P diameter is more in the left side

same as previous



CT Scan:

- ✓ Localize collection.
- ✓ Identify the underlying parenchymal disease,.
- ✓ Distinguish it from lung abscess.
- ✓ Fluid density,loculations. housefield number ?
- ✓ Therapeutic:CT-guided aspiration. to go in the right way (help in drainage of pleura space)

Managment

dependeing if its is hospital or community acquired pneumonia

1. Antibiotics.3rd generation cephalosporine,clindamycin till the result of G stain ,C&S. broad-spectrum antibiotic to cover both gram +/-
2. Evacuation of pus from the pleural space. In stage 1 thoracocentesis,other wise Chest tube insertion and stage 2 most important
3. Obliteration of the empyema cavity.

Chest Tube Insertion

- Procedure
- local anaesthesia
- Scrubing & draping
- An incision is made along the upper border of the rib
- By a curved clamp the track is developed by blunt dissection splitting the fibres. A track developed with the operator's finger
- The clamp is angled over the rib & dissection continued until pleura is entered

in stage 1 / 2
we open the chest wall and put a chest tube in pleural space under water sail drainage

Chest Tube Insertion

- Procedure
- A large-bore (32 or 36F) chest tube is passed into the pleural cavity.
- The tube is connected to an underwater seal and sutured / secured in place. a U-stitch
- A chest X-ray is taken to confirm placement & position.

the color depend on the type of bacteria and the underlyiing cause

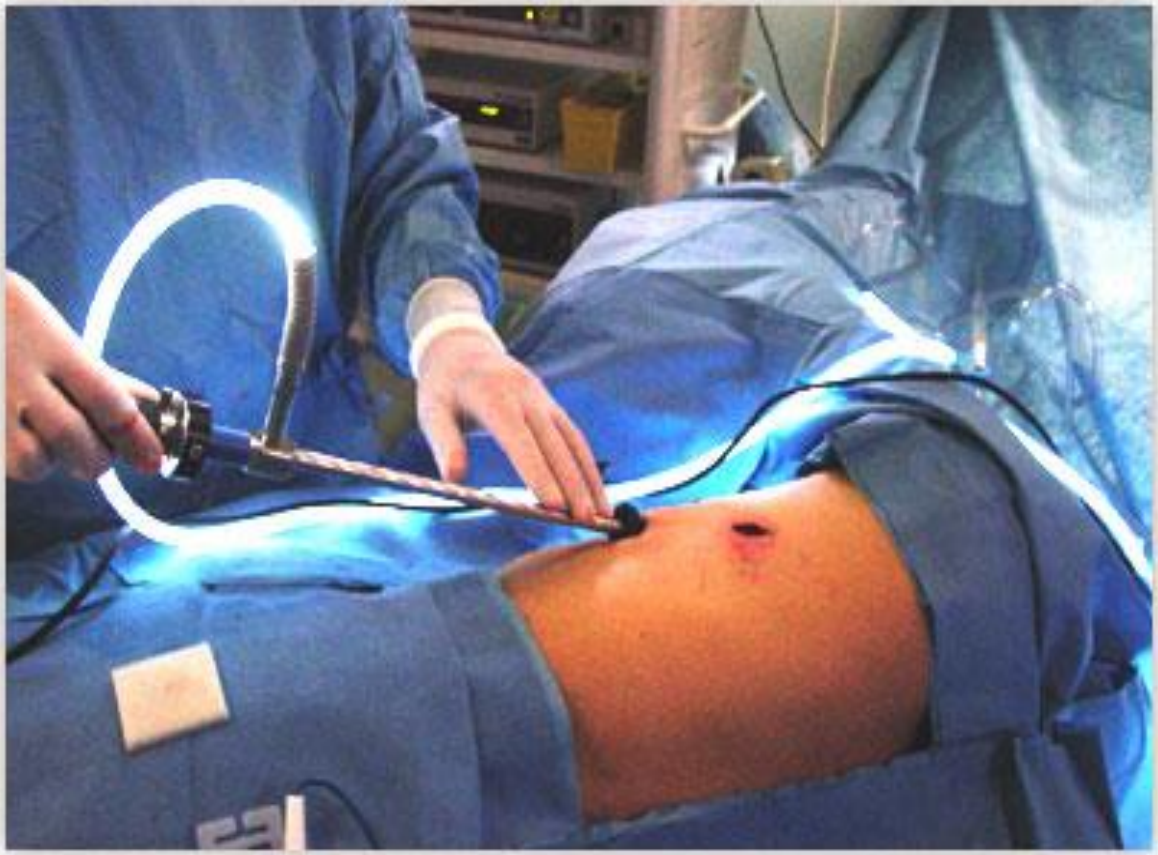
foul-smell / thick fluid

- Clinical improvement within 48 hrs.
- ≥80% of stage 1 managed conservatively.
  and stage 2
  antibiotic for 4 weeks and chest insertion
- Stage 3 80% require thoracotomy.
  we put chest tube / antibiotic (but 80% need surgery)
- Intrapleural Fibrinolytic therapy; STK or Urokinase OR tPA to break loculations produced by membranes composed of fibrin.
  streptokinase
  tissue plasminogen activator
- **Intrapleural DNase**
  - reduce pus viscosity and break down loculations
  - combination with thrombolytic therapy to enhance pus drainage

Surgical management of empyema

if chest tube / antibiotics / intrapleural fibrinolysis / intrapleural DNase were not curative we might put a scope in the pleural space to break down the loculations and do decortication (thoracotomy) and do peeling of parietal and visceral pleura to free the lung from the surrounding adhesions

- V.A.T .S. we do it through holes and insert a camera to break down the loculations
- THORACOTOMY: decortication.



bad disease in the ICU patient

- Epmyema thoracis is associated with high mortality ranging between 6% to 24%.

lung abscess --> in the lung parenchyma
empyema --> in the pleural space

LUNG ABSCESS

- **Definition**:Sub acute pulmonary infection in which the chest X ray shows cavity within the lung parenchyma.
  - ✓ Before ABO era ,high mortality,.
  - ✓ ACUTE &CHRONIC:if duration< 6 weeks. (<6 weeks, >6 weeks)
  - ✓ PRIMARY &SECONDARY (primary --> due to aspiration pneumonia (during eating / alcoholic / elderly) or post pneumonia)
- **PRIMARY**:
  1. Aspiration:The most frequent .
  2. Post-Pneumonic

Secondary:

1. Obstructing carcinoma.
2. COPD
3. Metastatic from extrathoracic source septisemia.
4. F.B aspiration.
5. Pulmonary infarctions.

- The individuals with high risk: ALCOHOL ABUSE, hx of Aspiration,Old TB, Epilepsy,drug abuse,COPD.
- In endemic areas TB:20% of lung abscesses have TB.

BACTERIOLOGY:

- ANAEROBES:75-80%
  - Bacteroid fragilis.
  - Fusibacterium bacilli.
  - Peptostreptococci.
  - Provetella.

in empyema --> depending on the type of bacteria
in lung abscess (aspiration pneumonia)--> ANAEROBES (the most common cause)

- AEROBIC:
  - Kleibsiella &Pseudomonus:IN obstructive infections &Nasocomial.
  - Staph.Auereus.
  - S. pneumonia
  - H.influenza.

DIAGNOSIS:

productive cough --> large amount of pus (half cup or small cup) --> foul smelling and poring pus --> highly suspicion of lung abscess

A. Symptoms:Fever intermittent &night sweats chills.Purulent Foul-smelling sputum is highly suggestive.

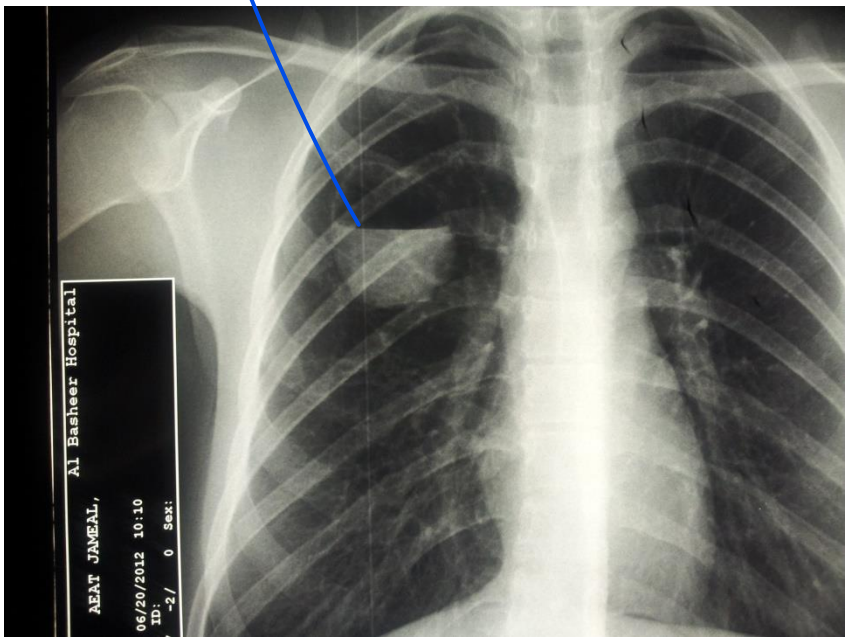
B. Hx of Aspiration,.Sepsis→Respiratory failure.

C. Signs:Tachpnea,consolidation,local chest wall tenderness.

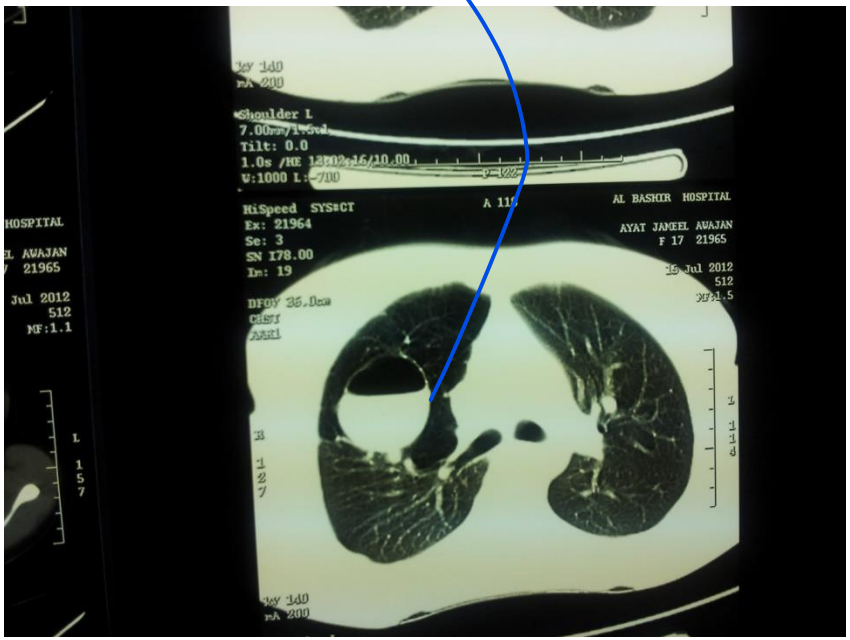
D. CXR:

- Pneumonitis pattern early→Air-fluid level.

air-fluid level within the lung parenchyma
in empyema it was in the pleural space



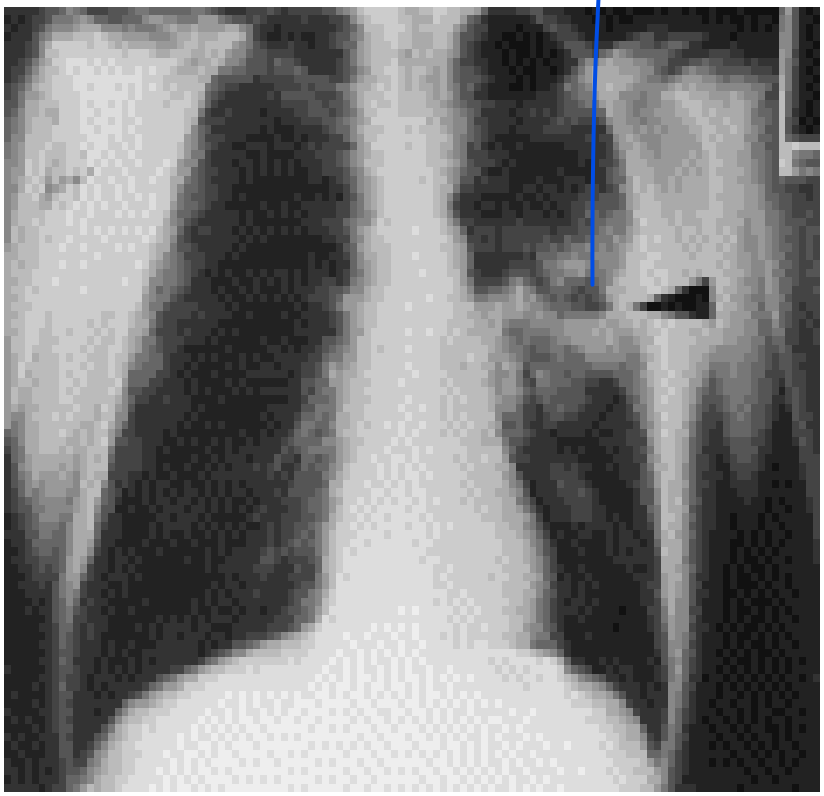
X-RAY

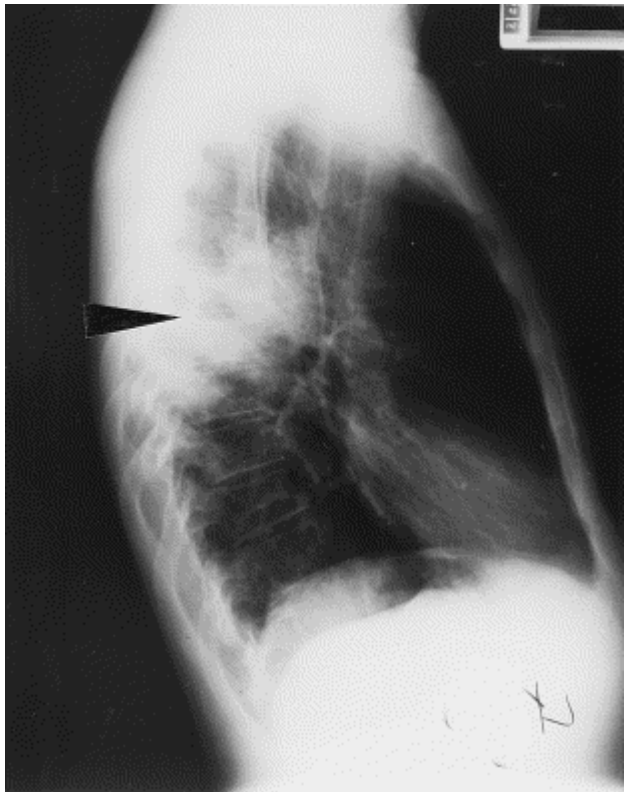


CT scan
-show the size of the pus
-the amount of fluid
-the distance between the fluid and the chest wall

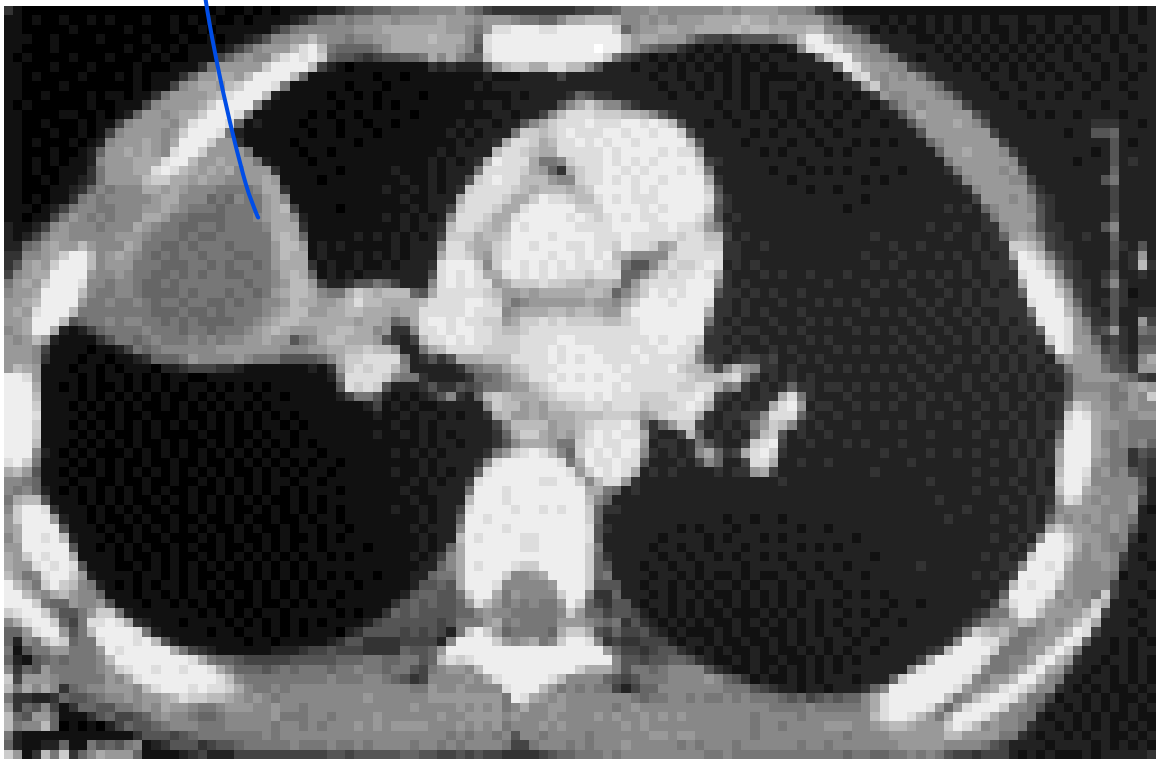
cavitary lung lesion
when we see it we think about 4 things :
1- pyogenic lung abscess
2- TB or fungal abscess
3-cavitary carcinoma
4- empyema with bronchopleural fistula

same as previous in the left lung





lung abscess in the right side attached to the chest wall (as adhesion with chest wall) but it still within the lung parenchyma



- SPUTUM analysis&culture
  Aerobic,anaerobic,fungal &TB.
- CT-scan.
- Fibrooptic Bronchoscopy:is mandatory
  - Take samples for culture.
    to rule out
  - R/O endobronchial tumour or obstruction.
  - To assess if can be drained internally.

- SITES:
  - Superior segment of Rt lower lobe.
  - Lat. Part of Post. Segment of R.U.L.
  - Superior segment of L.L.L.

most of aspiration pneumonia go here

- D.Dx of cavitary lung lesion:
  1. Cavitary carcinoma.
  2. T.B or fungal abscess.
  3. Pyogenic lung abscess.
  4. Empyema with bronchopleural fistula.

- **Managment:** Principles of therapy:

  - Identify the organism→proper ABO therapy for 6-8 wks.
  - Drainage:
    I. Chest physiotherapy.
    II. Bronchoscopy=internal darainaige or indwelling transbronchial catheter drainage.
    III. Percutaneous cath. Drainage. under CT guide
  - SURGERY.

- 80-90%of Lung abscess respond to medical tt.Flagyl or Clindamycinfor anaerobes.
- Gentamicin or 3rd generation cephalosporines for aerobes.

External drainage:

I. If remain septic.
II. Failure to wean from mechanical ventilation.
III. Soiling of the contralateral lung.
IV. Abscess cavity >4 cm& under tension on CXR.
V. ↑ size while on ABO.

1) Chest tube thoracostom.
2) CT-guided catheter.
3) Open pneumonostomy =MONALDI procedure.

- 30% of Pt will need definitive surgery.

- Clinical improvement within 48 hrs.

INDICATIONS FOR SURGERY:

1. Acute : for complications
   - Bronchopleural fistula.
   - Empyema.
   - Hemoptysis.(Massive)
2. Chronic =Definitive.
   - Persistant symtoms despite long term ABO therapy.
   - Suspecius of carcinoma.
   - Complications:Empyema,bronchopleural fistula.
   - Persistant cavity >6 cm after ABO therapy.

- Lobectomy is the standard procedure.
- **Mortality**:
  - 2.5% after community acquired pneumonia.
  - 66% with Nasocomial infections.
  - Underlying diseases.
  - Size of the abscess >6 cm.
  - Organism: Pseudomonus & G –ve the highest.

QUESTIONS

SUMMARY