

# EMPHYEMA    LUNG ABSCESS (SURGICAL LUNG INFECTIONS)

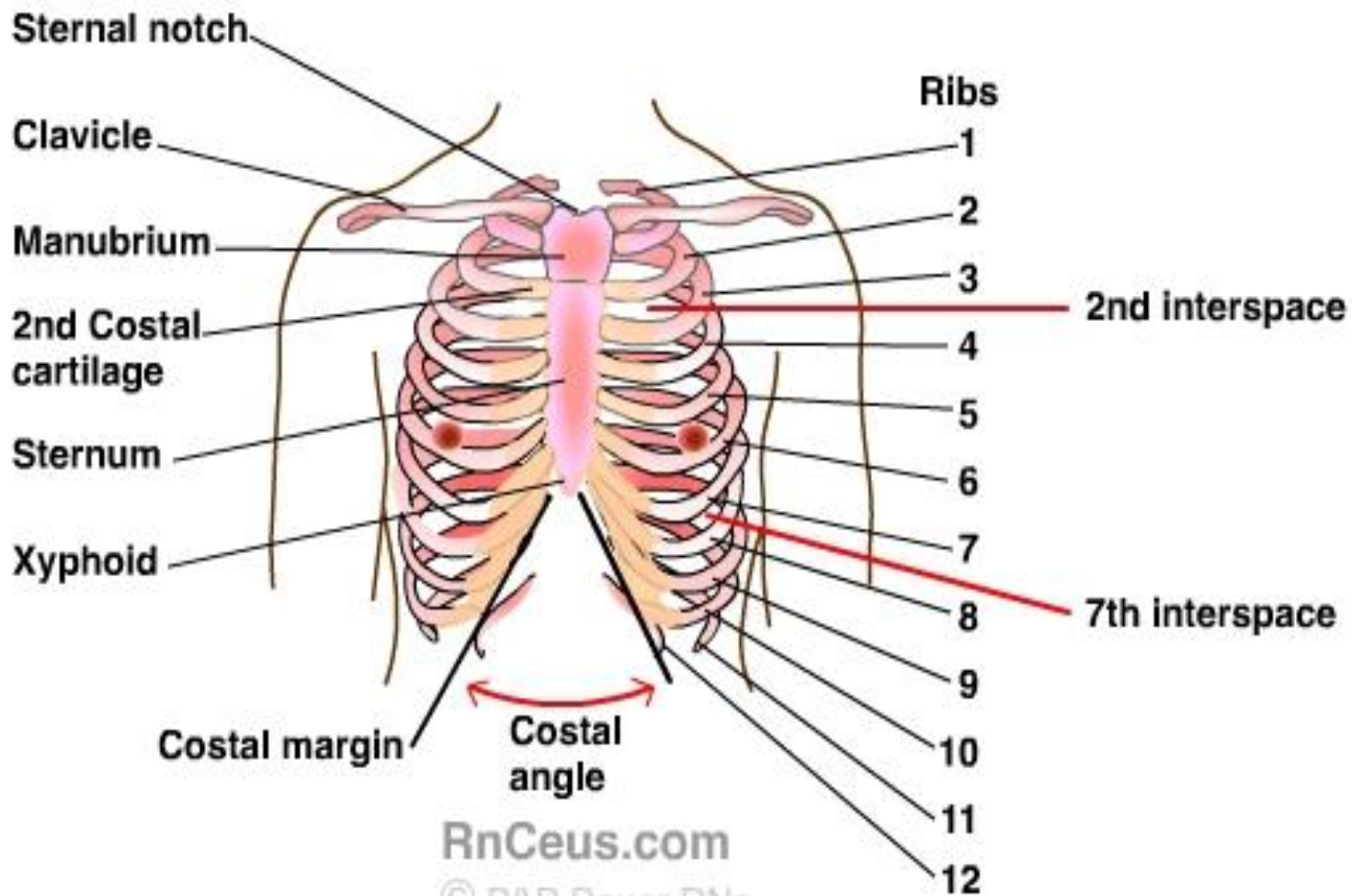
Dr. MAHMOUD ABU-ABEELEH

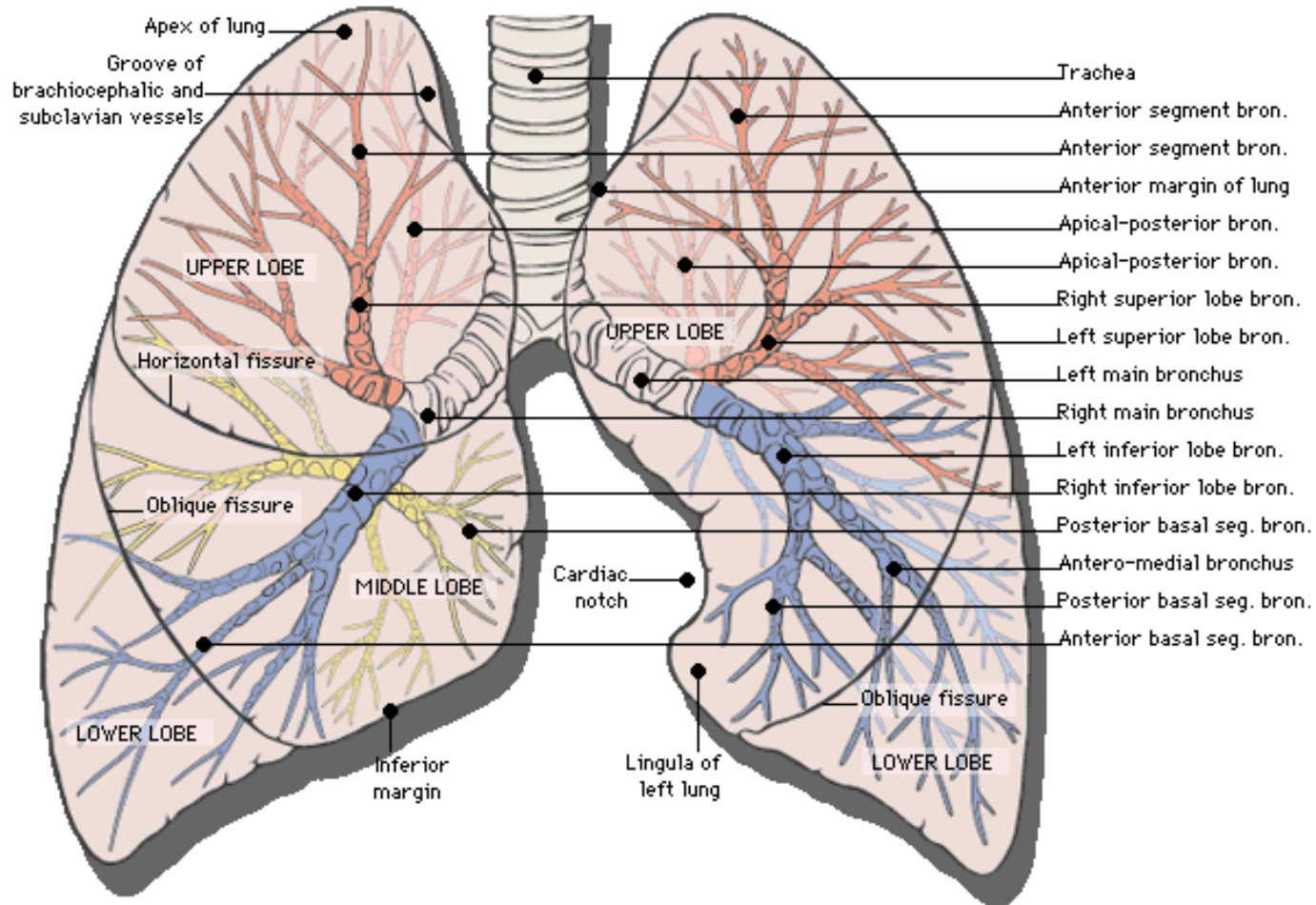
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School of Medicine.

29-12-2021

- ANATOMY.
- **Empyema** Definition classification causes diagnosis  
management indications for surgery
- **Lung abscesses** definition causes  
clinical presentations diagnosis management





# EMPYEMA THORACIS

- **Definition:**Invading of the pleural space with bacteria which result in accumulation of pus .
- **Classification** :(American Thoracic Society)
- Stage 1 :Exudative , with swelling of the pleural membranes as a result of ↑ permeability of swollen membranes(Uncomplicated Acute stage)
- Stage 2:Fibropurulent(Transitional)with heavy fibrin deposits.
- Stage 3:Organizing or Chronic phase.With ingrowth of fiboblast and deposition of collagen

## □ ETIOLOGY:

- PARAPNEUMONIC (secondary to a pneumonia) the most common
- Post trauma.
- Post surgery (esophageal or pulmonary)
- Subphrenic Abscess

| Etiology                  | No. of patients | % of Patients | Perioperative Mortality |
|---------------------------|-----------------|---------------|-------------------------|
| Simple parapneumonic      | 112             | 65.0%         | 0025.4%                 |
| Complicated Parapneumonic |                 |               |                         |
| 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 frequent)
  - ▣ After ABO the incidence as well as the mortality ↓. Staph become more prevalent, 90% of empyema in children.



# Incidence of Empyema according to Bacteria causing pneumonia

| <i>Aerobic</i>                                       | <i>EFFUSION</i> | <i>EMPYEMA</i> |
|--|-----------------|----------------|
| <i>G +VE</i><br><i>Strep pneumonia</i><br><i>CAP</i> | <i>50%</i>      | <i>&lt;5%</i>  |
| <i>Stap Aureus</i><br><i>CHILDREN</i>                | <i>70%</i>      | <i>80%</i>     |
| <i>ADULT</i>   | <i>40%</i>      | <i>20%</i>     |
| <i>G -VE</i><br><i>HAP VAP</i>                       | <i>50%</i>      | <i>90%</i>     |
| <i>Anaerobes</i>                                     | <i>35%</i>      | <i>90%</i>     |

## □ Clinical presentation

- Pleuritic chest pain ,fever, S.O.B ,Tachycardia AS Pneumonia.If prolonged symptoms SUSPECT EMPYEMA.
- Anaerobic :indolent
- **P/E**:Toxic anxious  
pt,tachycardia,tacypnea,restricted chest wall excursion,↓ air entry,dullness on percussion.
- **Chronic pt** Clubbing,Anaemia,wt loss.

## □ DIAGNOSIS:

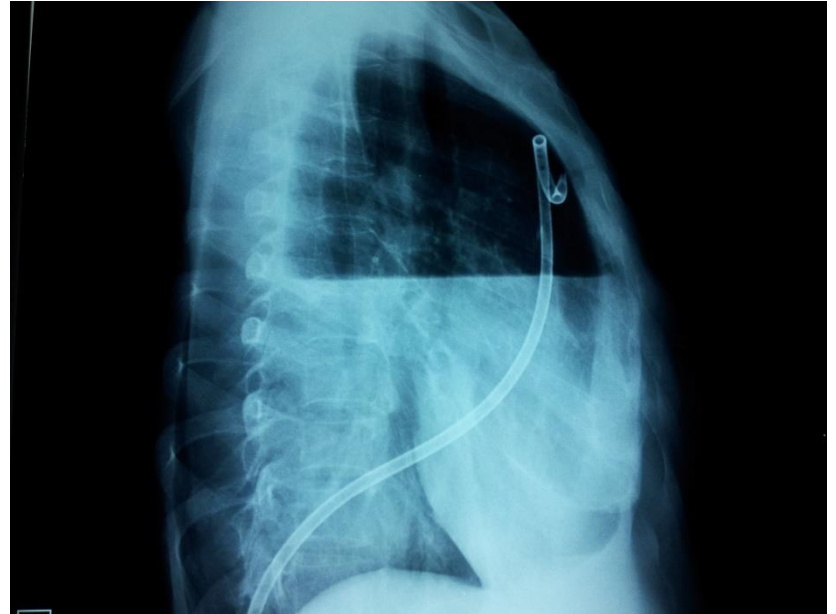
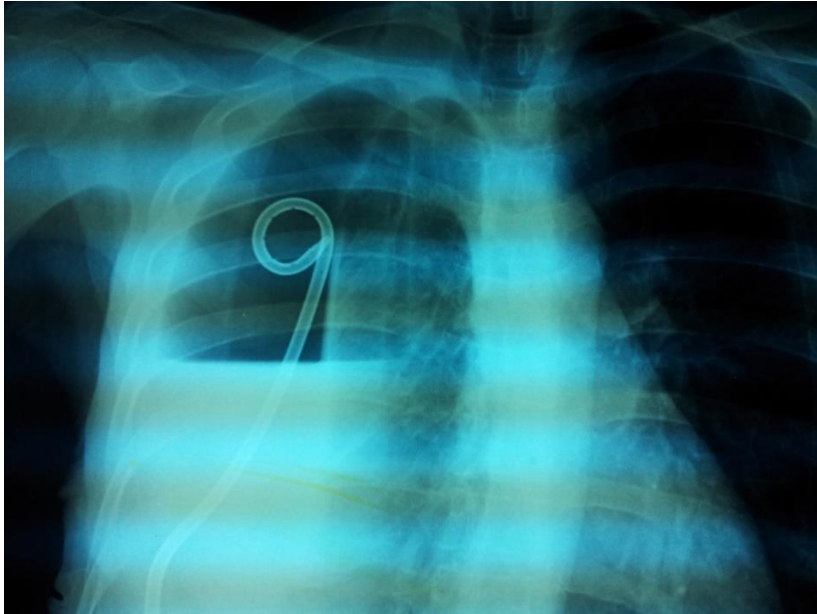
- CBC: ↑ WBC with shift to left, ↑ CRP ESR.
- CXR: Effusion, ↑ thickness of the pleura, Air fluid level.

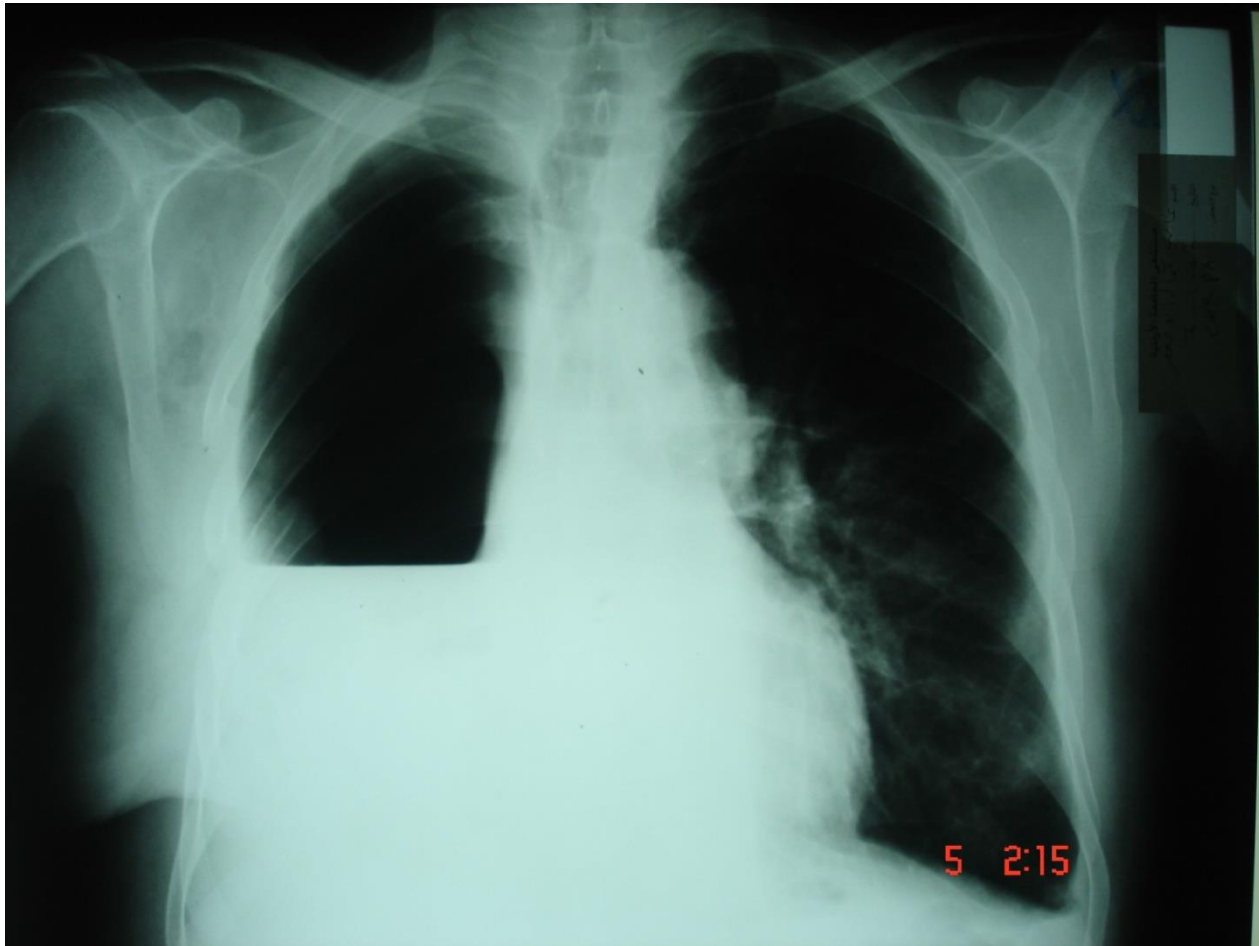
## □ THORACOCENTESIS:

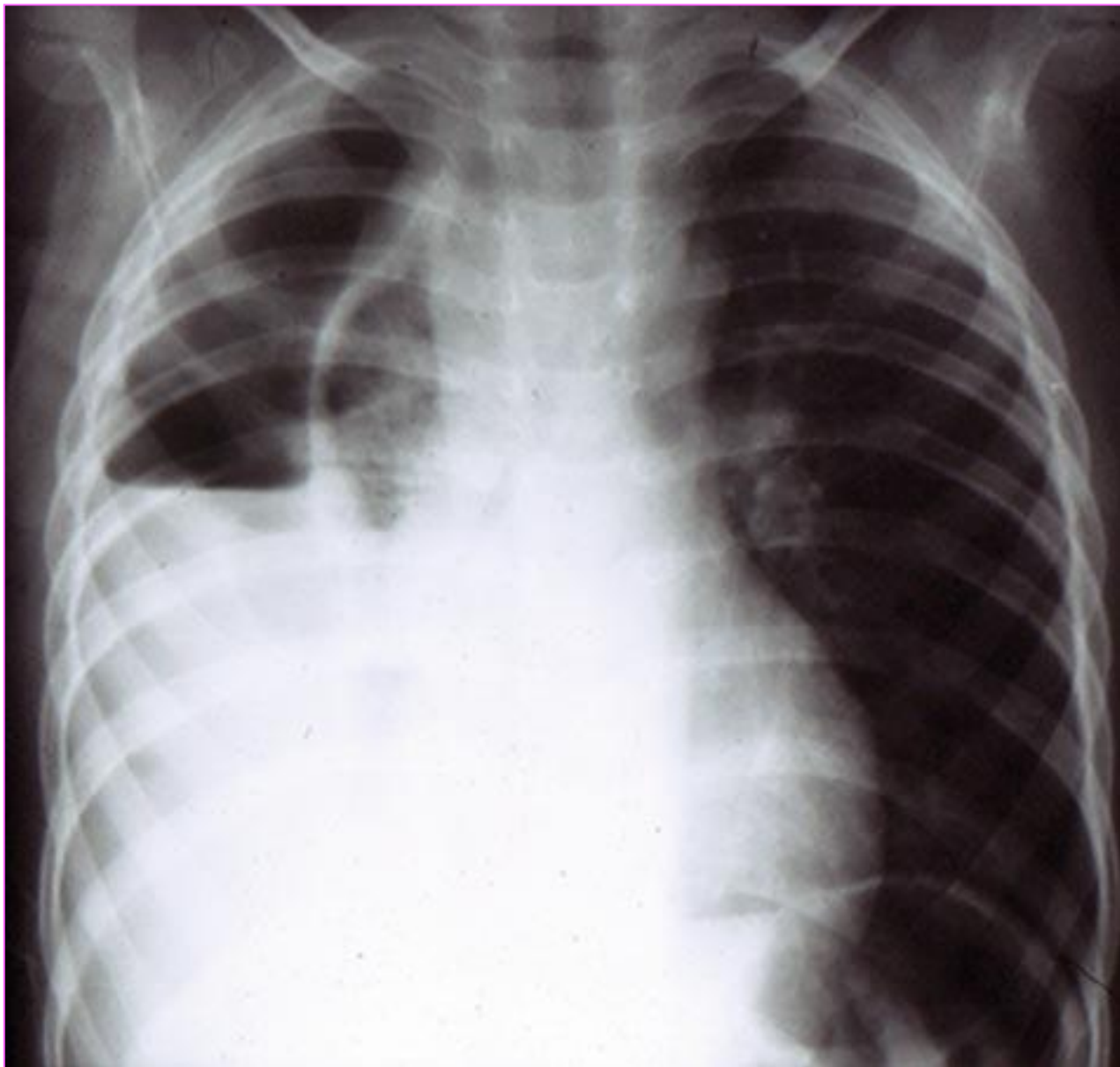
- Empyema fluid
- PH < 7.2
- Glucose < 40 mg/dL
- LDH > 1000 IU/dL
- Positive Gram stain
- Positive culture (50%)
- Specific gravity > 1.018
- WBC > 500 cells/mm<sup>3</sup>
- Protein > 2.5 g/dL

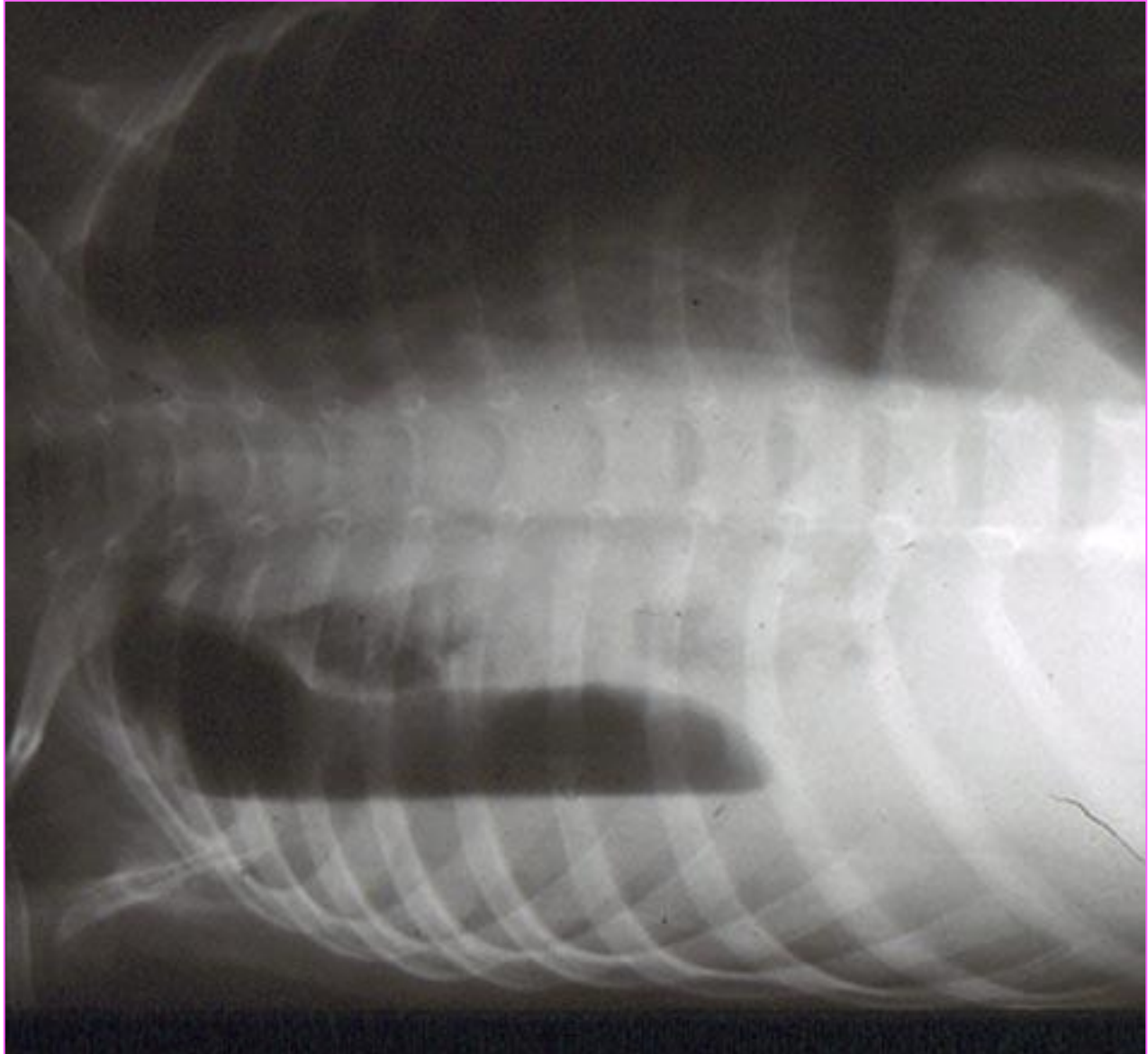
# PPE

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

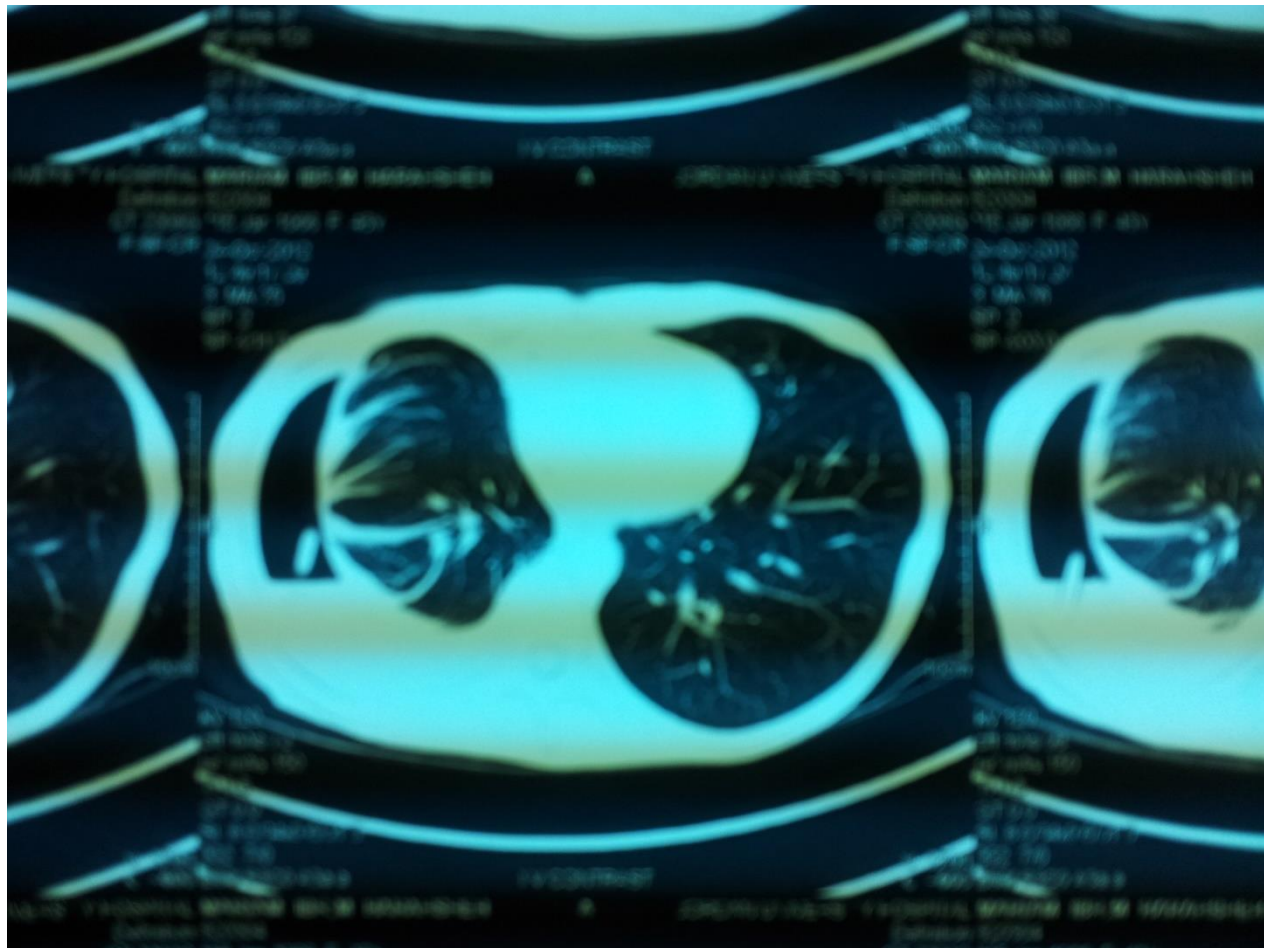


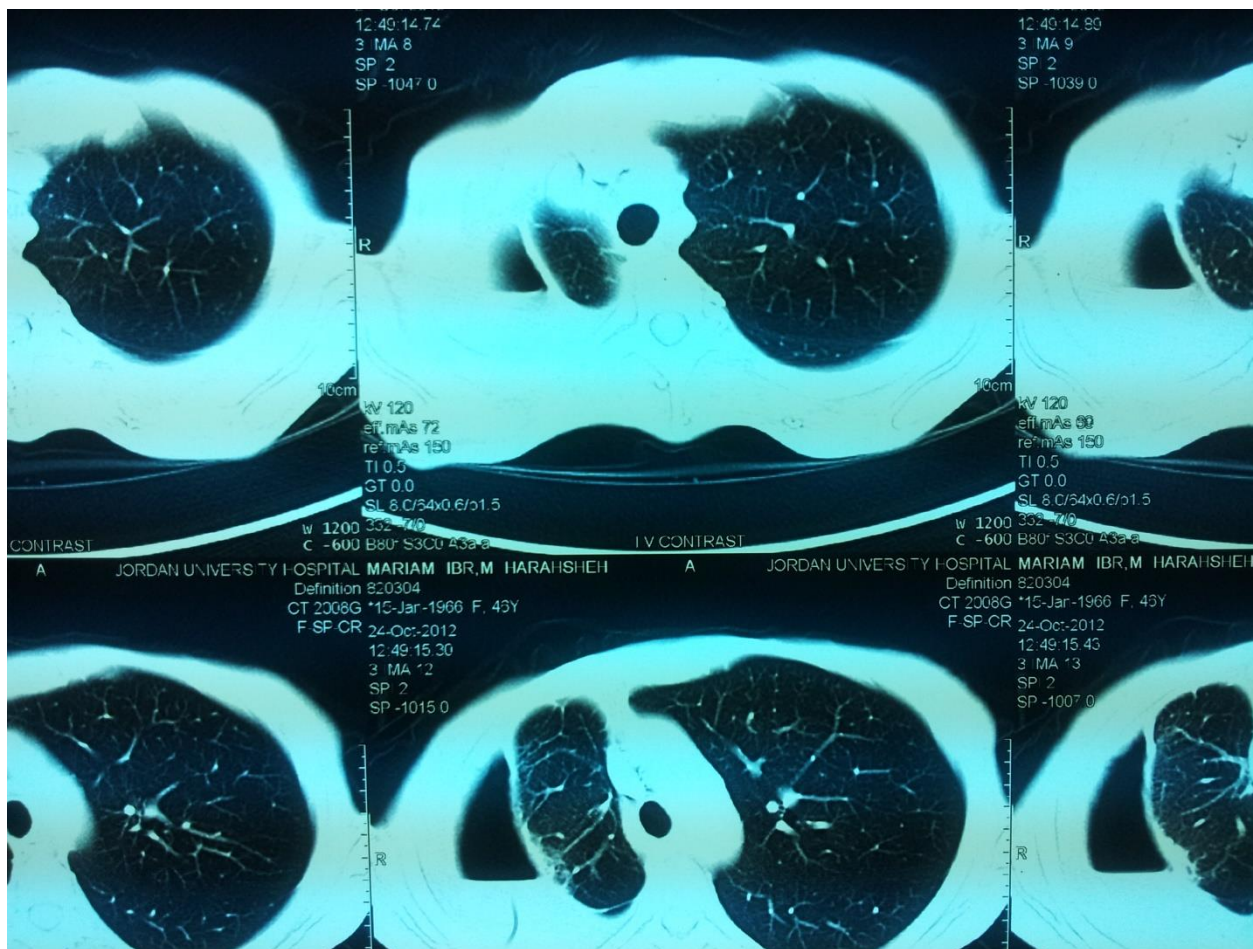












## □ CT Scan:

- ✓ Localize collection.
- ✓ Identify the underlying parenchymal disease,.
- ✓ Distinguish it from lung abscess.
- ✓ Fluid density, loculations.
- ✓ Therapeutic: CT-guided aspiration.

## □ Management

1. Antibiotics. 3<sup>rd</sup> generation cephalosporine, clindamycin till the result of G stain, C&S.
2. Evacuation of pus from the pleural space. In stage 1 thoracocentesis, otherwise Chest tube insertion
3. Obliteration of the empyema cavity.

# Chest Tube Insertion

- Procedure
- local anaesthesia
- Scrubbing & 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

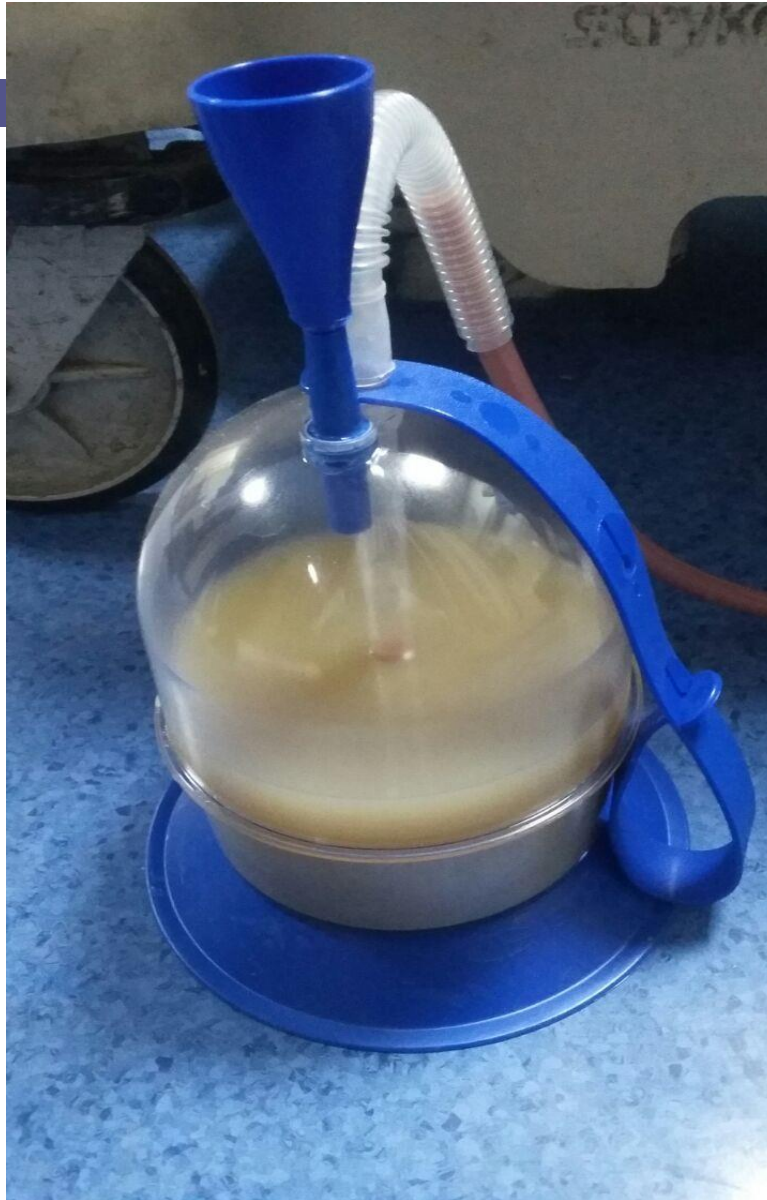


# Chest Tube Insertion

- 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.









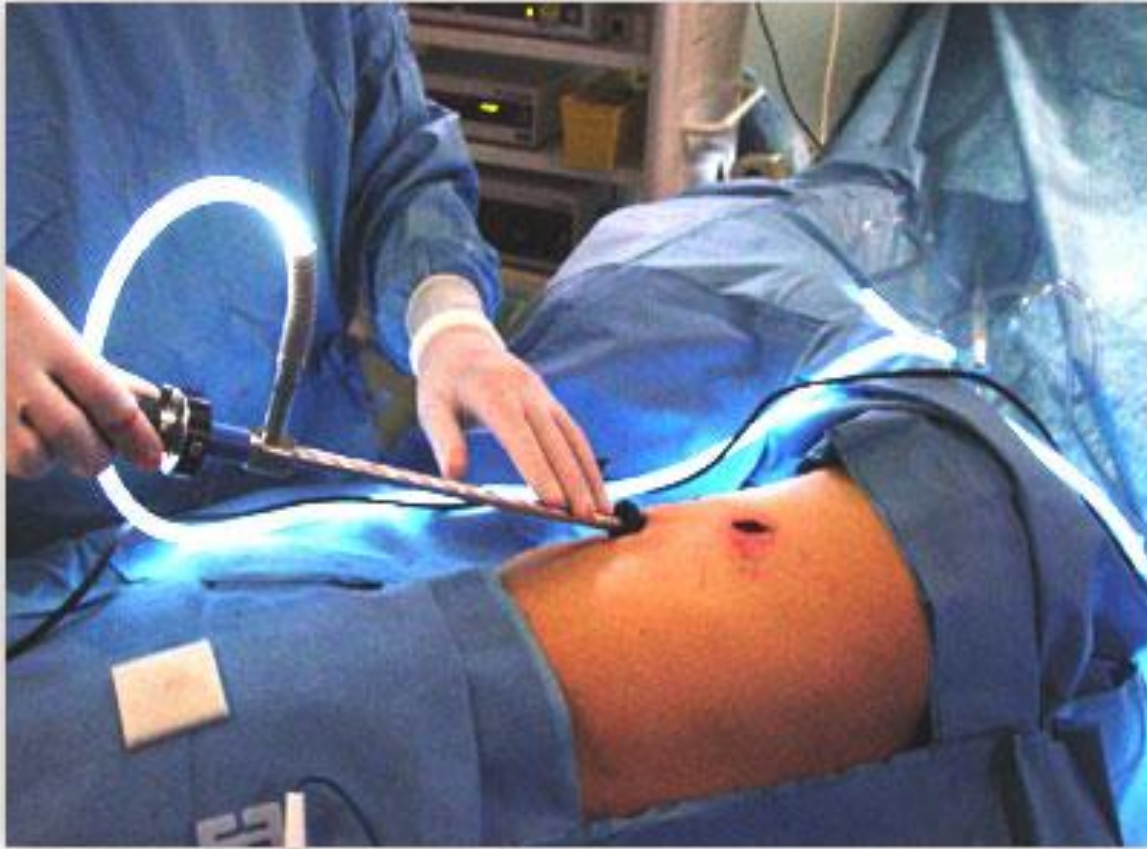
- Clinical improvement within 48 hrs.
- $\geq 80\%$  of stage 1 managed conservatively.
- Stage 3 80% require thoracotomy.
- Intrapleural Fibrinolytic therapy; STK or Urokinase OR tPA to break loculations produced by membranes composed of fibrin.
- **Intrapleural DNase**
  - reduce pus viscosity and break down loculations
  - combination with thrombolytic therapy to enhance pus drainage

# Surgical management of empyema

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- V.A.T .S.
- THORACOTOMY: decortication.





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

# □ 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.
- ✓ PRIMARY & SECONDARY

## ■ PRIMARY:

1. Aspiration: The most frequent .
2. Post-Pneumonic

## □ Secondary:

1. Obstructing carcinoma.
  2. COPD
  3. Metastatic from extrathoracic source  
septicemia.
  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.

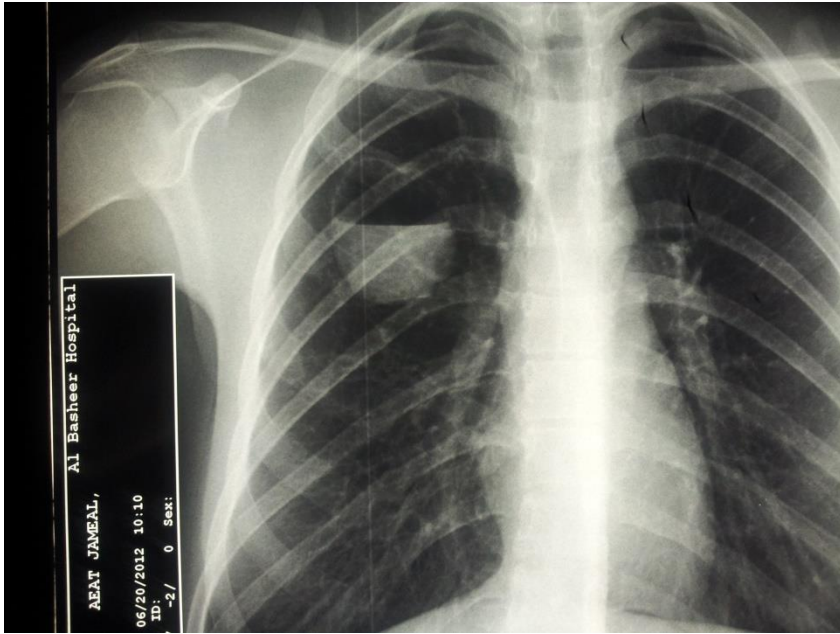
## • AEROBIC:

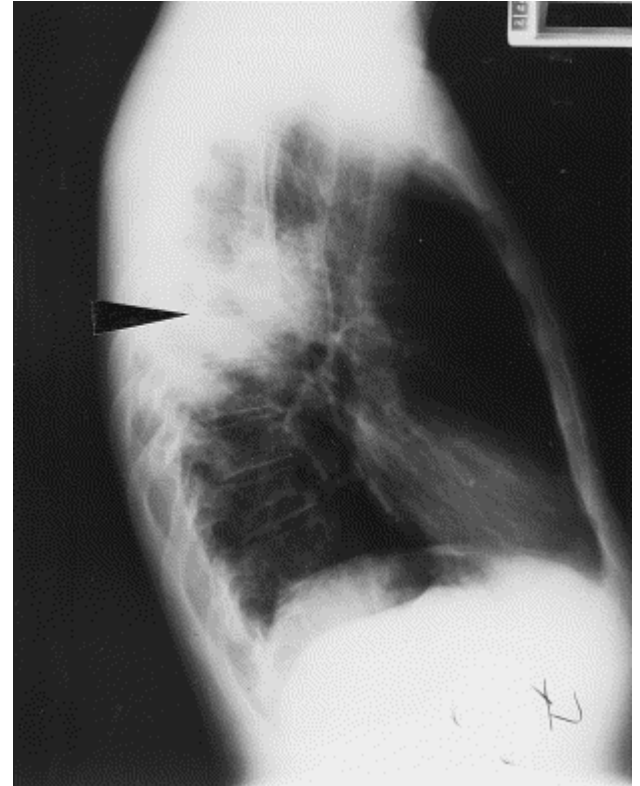
- Kleibsiella &Pseudomonus:IN obstructive infections &Nasocomial.
- Staph.Auereus.
- S. pneumonia
- H.influenza.

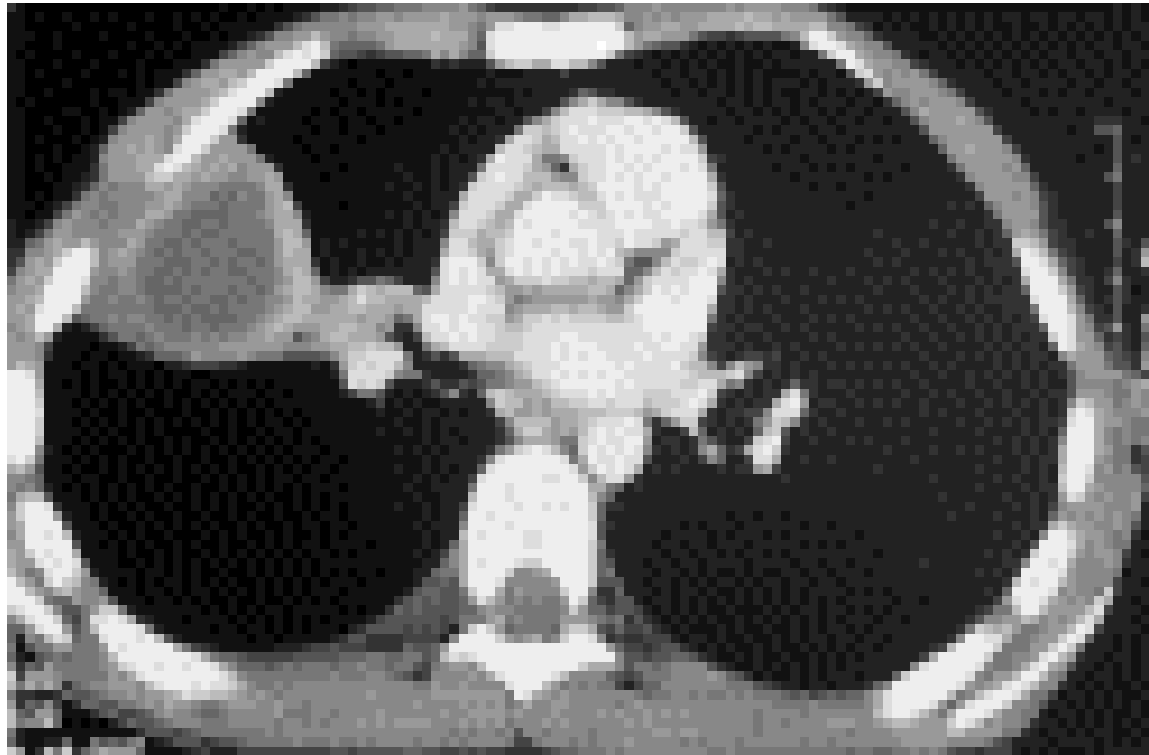


# □ DIAGNOSIS:

- A. **Symptoms:** Fever intermittent & night sweats  
chills. Purulent Foul-smelling sputum is highly  
suggestive.
- B. Hx of Aspiration, Sepsis → Respiratory failure.
- C. **Signs:** Tachypnea, consolidation, local chest wall  
tenderness.
- D. **CXR:**
  - Pneumonitis pattern early → Air-fluid level.







- SPUTUM analysis&culture  
Aerobic, anaerobic, fungal & TB.
- CT-scan.
- **Fiberoptic Bronchoscopy:is** mandatory
  - Take samples for culture.
  - 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.

## • D.Dx of cavitory lung lesion:

1. Cavitory carcinoma.
2. T.B or fungal abscess.
3. Pyogenic lung abscess.
4. Empyema with bronchopleural fistula.

## Management: Principles of therapy:

- Identify the organism → proper ABO therapy for 6-8 wks.

- Drainage:

- Chest physiotherapy.

- Bronchoscopy = internal drainage or indwelling transbronchial catheter drainage.

- Percutaneous cath. Drainage.

- SURGERY.

- 80-90% of Lung abscess respond to medical tt. Flagyl or Clindamycin for anaerobes.

- Gentamicin or 3<sup>rd</sup> 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.  $\uparrow$  size while on ABO.
- 1) Chest tube thoracostomy.
  - 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 syptoms 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 Nosocomial infections.
- Underlying diseases.
- Size of the abscess >6 cm.
- Organism: Pseudomonas & G -ve the highest.



**QUESTIONS**

**SUMMARY**