



# KUHS Exam - Model Question

Essay Question- 10 Marks (1+2+3+2+2=10)

60 yrs old male smoker with DM presented to OPD with high grade fever , right sided chest pain and cough with rusty sputum for 1 week ?

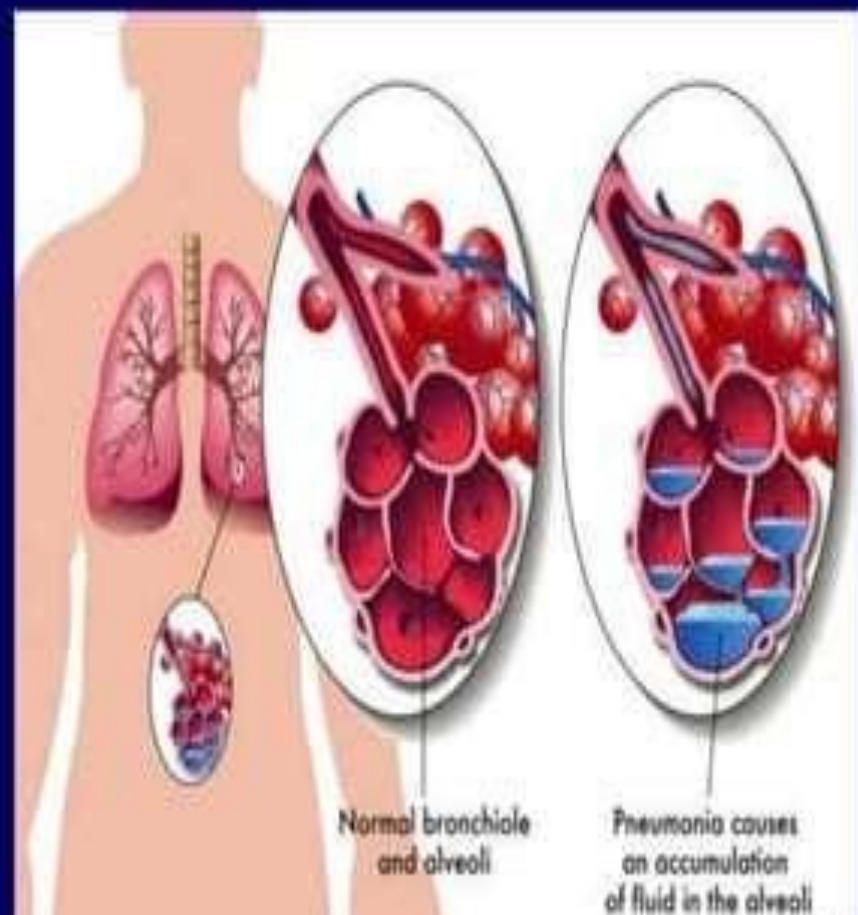
- Give your provisional diagnosis ?
- How will you diagnose?
- What are the causes and pathogenesis ?
- How will you Manage?
- What are the complications ?

# Outline

- Introduction
- Risk factors
- Pathogenesis
- Types
- Etiology
- Clinical features
- Investigation
- Treatment
- Complication

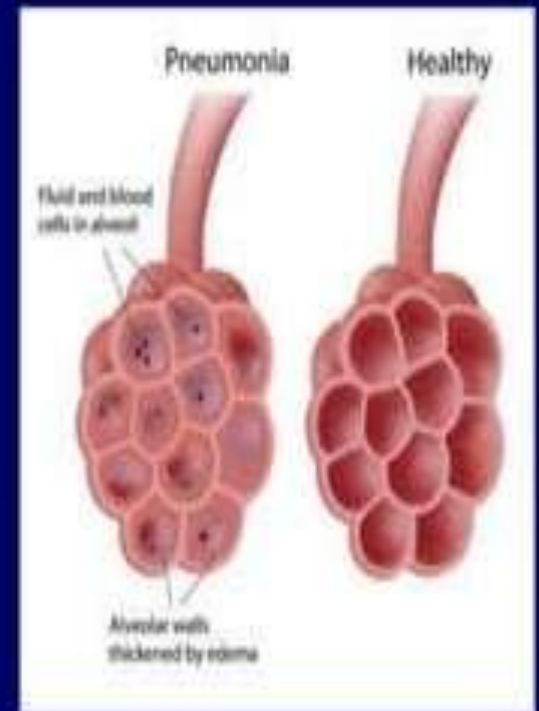
# Pneumonia

- Pneumonia is an infection in one or both lungs.
- Pneumonia causes inflammation in the alveoli.
- The alveoli are filled with fluid or pus, making it difficult to breathe.



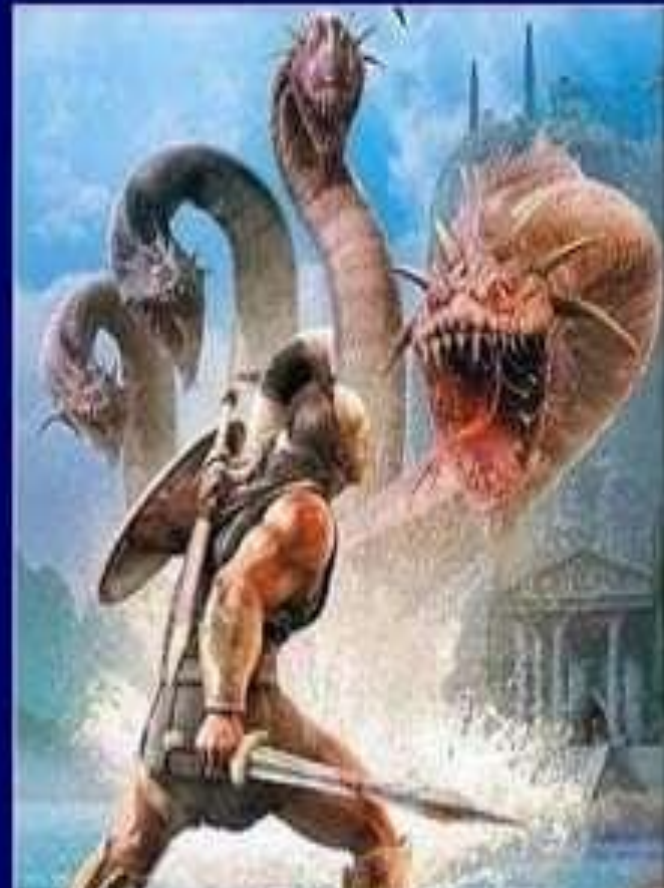
# DEFINITION

- “inflammation and consolidation of lung tissue due to an infectious agent”
- CONSOLIDATION = ‘Inflammatory induration of a normally aerated lung due to the presence of cellular exudative in alveoli’



# How does Pneumonia develop?

- Most of the time, the body filters organisms.
- This keeps the lungs from becoming infected.
- But organisms sometimes enter the lungs and cause infections.
- This is more likely to occur when:
  - immune system is weak.
  - organism is very strong.
  - body fails to filter the organisms.



## Factors that predispose to Pneumonia

- Cigarette smoking
- Upper respiratory tract infections
- Alcohol
- Corticosteroid therapy
- Old age
- Recent influenza infection
- Pre-existing lung disease



## Factors that predispose to Pneumonia

### Reduced host defences against bacteria

- Reduced immune defences (e.g. corticosteroid treatment, diabetes, malignancy)
- Reduced cough reflex (e.g. post-operative)
- Disordered mucociliary clearance (e.g. anaesthetic agents)
- Bulbar or vocal cord palsy



# Factors that predispose to Pneumonia

## Aspiration of nasopharyngeal or gastric secretions

- Immobility or reduced conscious level
- Vomiting, dysphagia, achalasia or severe reflux
- Nasogastric intubation

## Bacteria introduced into lower respiratory tract

- Endotracheal intubation/tracheostomy
- Infected ventilators/nebulisers/bronchoscopes
- Dental or sinus infection

## Factors that predispose to Pneumonia

Bacteraemia

Abdominal sepsis

Intravenous cannula infection

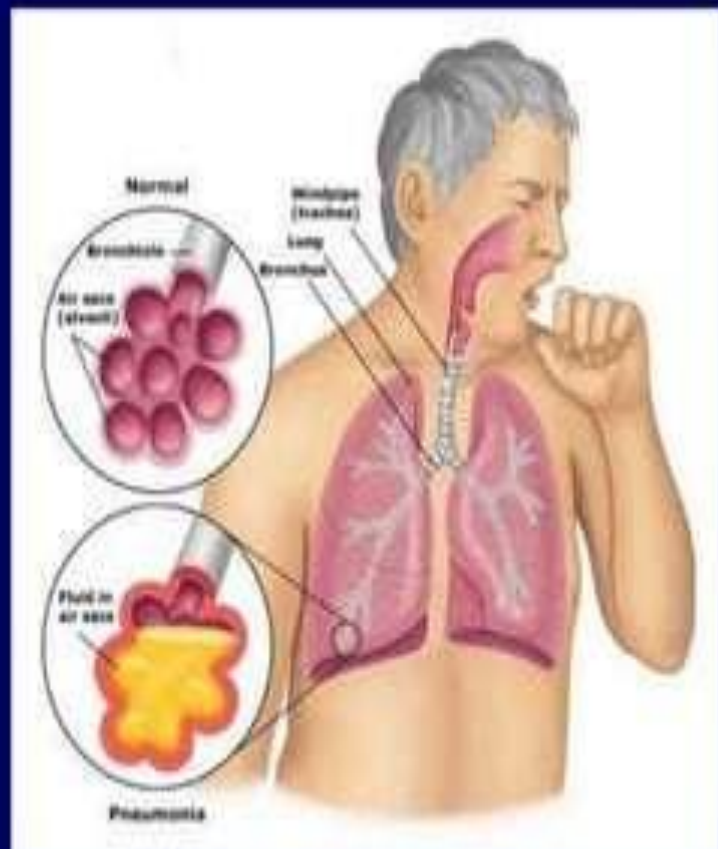
Infected emboli

How does Pneumonia develop?

# PATHOLOGY

## Congestion

• Presence of a **proteinaceous exudate**—and often of bacteria—in the alveoli



# RED HEPATIZATION

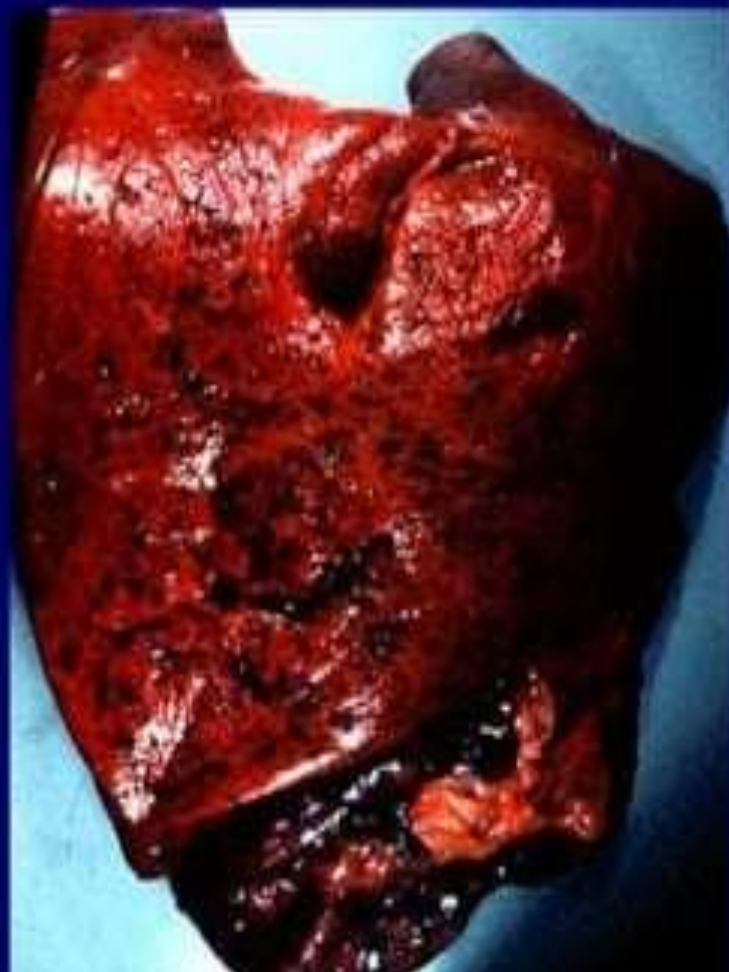
- Presence of **erythrocytes** in the cellular intraalveolar exudate
- Neutrophils are also present
- Bacteria are occasionally seen in cultures of alveolar specimens collected



Normal Lung



Red Hepatization



# GRAY HEPATIZATION

- No new erythrocytes are extravasating, and those already present have been lysed and degraded

- Neutrophil is the predominant cell

- Fibrin deposition is abundant

- Bacteria have disappeared

- Corresponds with successful containment of the infection and improvement in gas exchange







# RESOLUTION

**Macrophage** is the dominant cell type in the alveolar space

Debris of neutrophils, bacteria, and fibrin has been cleared

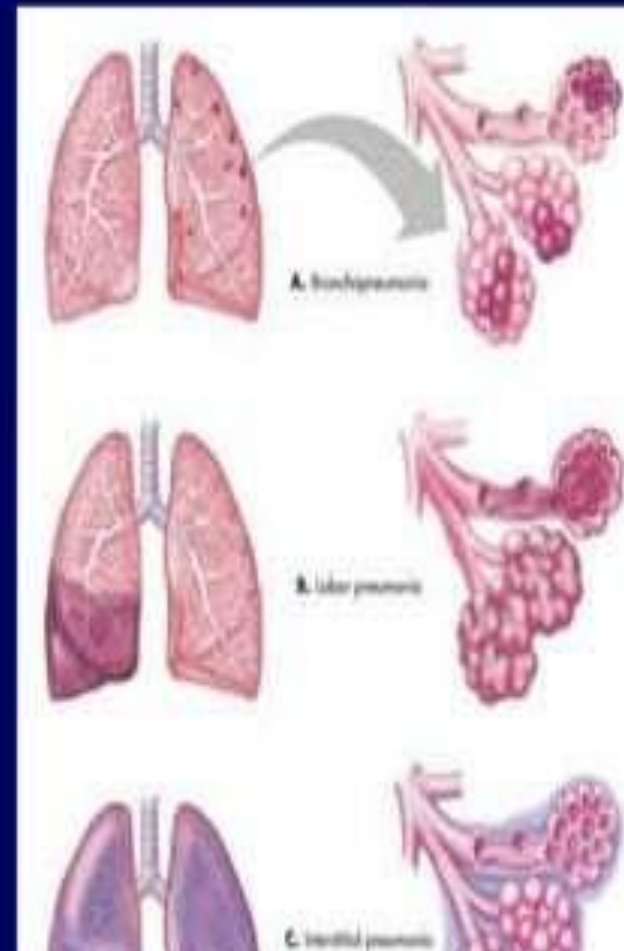
# Types of Pneumonia

# ANATOMICAL CLASSIFICATION

1. **Bronchopneumonia** affects the lungs in patches around bronchi

1. **Lobar pneumonia** is an infection that only involves a single lobe, or section, of a lung.

1. **Interstitial pneumonia** involves the areas in between the alveoli



# CLINICAL CLASSIFICATION

- 1)Community Acquired - Typical/Atypical/Aspiration
- 1)Pneumonia in Elderly
- 1)Nosocomial- HAP,VAP,HCAP
- 1)Pneumonia in Immunocompromised host

# Community Acquired Pneumonia (CAP)

## DEFINITION:

- An infection of the pulmonary parenchyma
- Associated with symptoms of a/c infection
- Presence of a/c infiltrates on CXR or auscultatory findings consistent with Pneumonia
- In a patient not hospitalized or residing in LTC facility for > 14 days prior

# Hospital Acquired pneumonia - HAP

.HAP is defined as pneumonia that occurs **48 hours or more after admission**, which was not incubating at the time of admission.

# Ventilator Associated Pneumonia- VAP

.VAP refers to pneumonia that arises more than 48–72 hours after endotracheal intubation .



# Health Care Associated Pneumonia HCAP

HCAP includes any patient

- .Who was hospitalized in an acute care hospital for 2 or more days within 90 days of the infection
- .Resided in a nursing home or long-term care facility
- .Received recent i.v antibiotic therapy, chemotherapy, or wound care within the past 30 days of the current infection
- .Attended a hospital or hemodialysis clinic



## **ATYPICAL PNEUMONIA - Why 'Atypical'?**

### **Clinically**

- Subacute onset
- Fever less common or intense
- Minimal sputum

### **Microbiologically**

- Sputum does not reveal a predominant microbial etiology on routine smears (Gram's stain, Ziehl-Neelsen) or cultures

# ATYPICAL PNEUMONIA - Why 'Atypical'?

## Radiologically

- Patchy infiltrates or
- Interstitial pattern

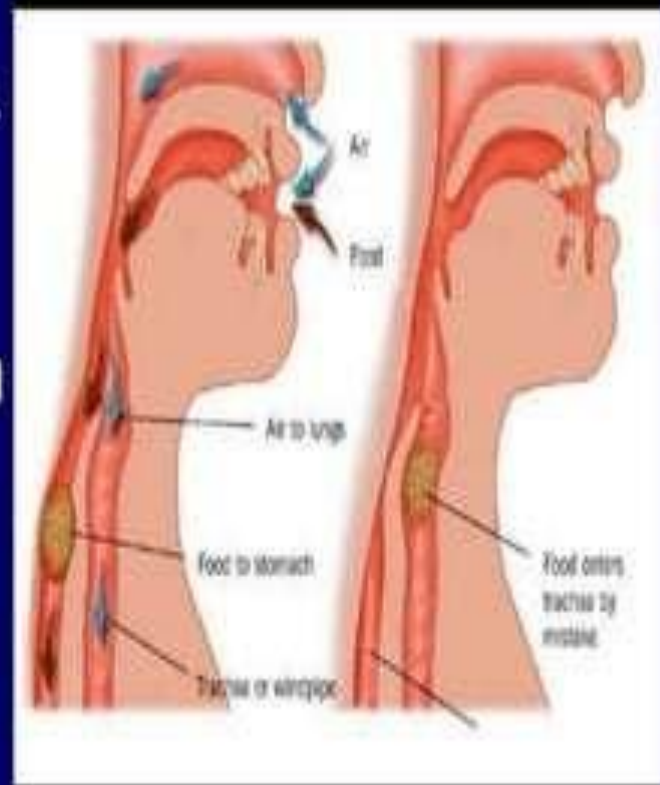
## Haemogram

- Peripheral leukocytosis are less common or intense

# Causes of Atypical Pneumonia

# Aspiration pneumonia

- Overt episode of aspiration or bronchial obstruction by a foreign body.
- Seen in - alcoholism, nocturnal esophageal reflux, a prolonged session in the dental chair, epilepsy
- Usually Anaerobes



# ELDERLY

- Infection has a more gradual onset, with less fever and cough
- often with a decline in mental status or confusion and generalized weakness
- often with less readily elicited signs of consolidation



# MICROBIOLOGY

# Etiology

Bacterial

Viral

mycobacterial

Fungal

parasitic

## *Etiology*

Microbiological diagnosis - 40-71%

*Streptococcus pneumoniae* most common

Viruses – 10-36%

In India -

Streptococci pneumonia	(35.3%)
Staphylococcus aureus	(23.5%)
Klebsiella pneumonia	(20.5%)
Haemophilus influenzae	(8.8%)
Mycoplasma pneumoniae	
Legionella pneumophila	





# VAP Micro

## GENERAL SYMPTOMS

- High grade fever
- Cough-productive
- Pleuritic chest pain
- Breathlessness

# Additional symptoms

- Sharp or stabbing chest pain
- Headache
- Excessive sweating and clammy skin
- Loss of appetite and fatigue
- Confusion, especially in older people

# General Signs

- Febrile
- Tachypnoea
- Tachycardia
- Cyanosis-central
- Hypotension
- Altered sensorium
- Use of accessory muscles of respiration
- Confusion- advanced cases

# SIGNS OF CONSOLIDATION

- Percussion-dull
- Bronchial Breath sounds
- Crackles
- Increased VF & VR
- Aegophony & Whispering Pectoriloquy
- Pleural Rub

# INVESTIGATIONS

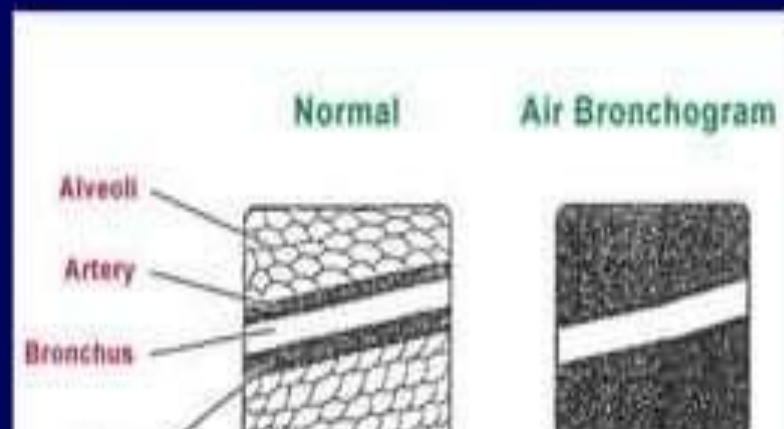
# SPUTUM

- Gram Staining
- AFB
- Giemsa or methenamine silver stain
- KOH mount
- Culture



# X Ray

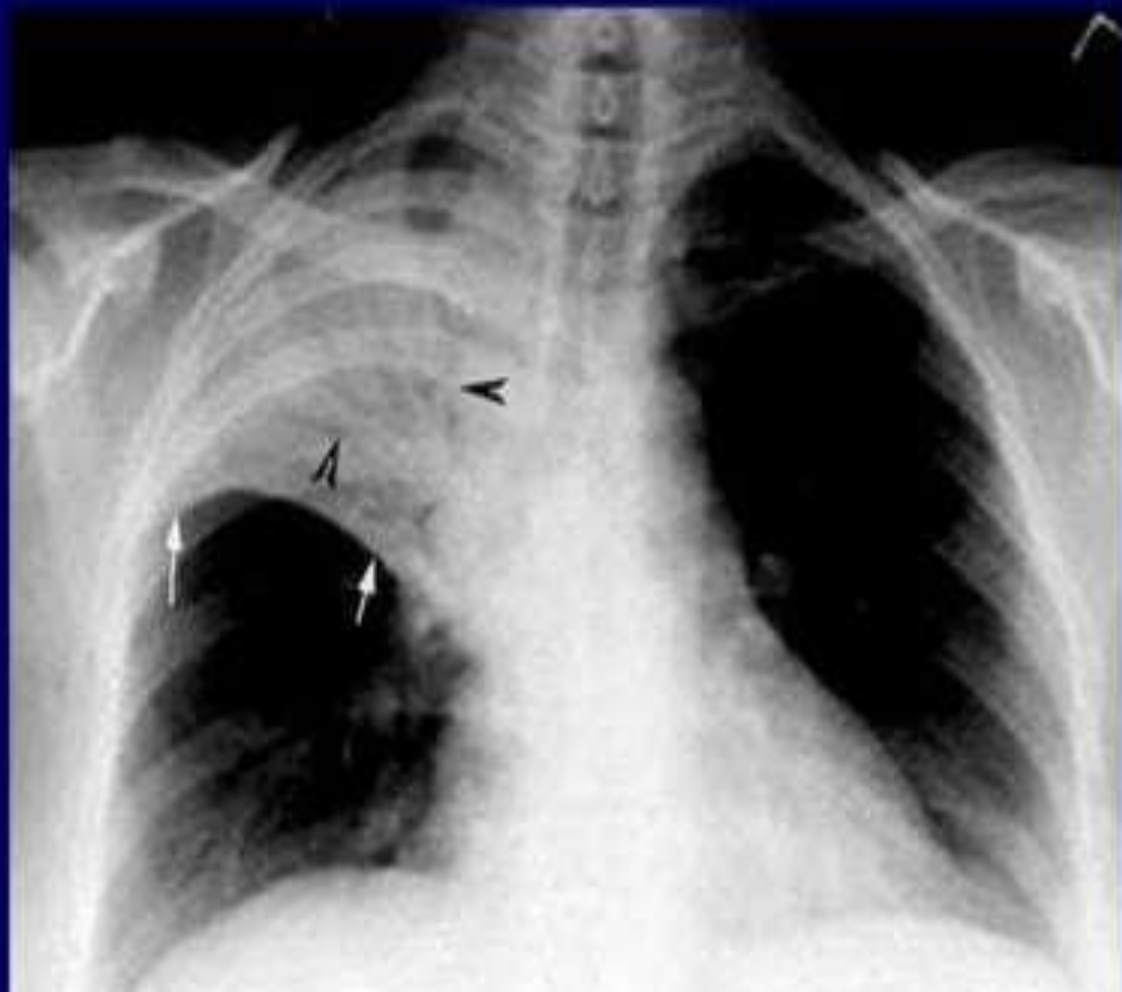
Homogenous opacity with **air bronchogram**



# LOBAR PNEUMONIA

- Peripheral airspace consolidation pneumonia
- Without prominent involvement of the bronchial tree

# RUL Consolidation



# RML Consolidation



# RLL Consolidation



# BRONCHOPNEUMONIA

- Centrilobular and Peribronchiolar opacity pneumonia
- Tends to be **multifocal**
- Patchy** in distribution rather than localized to any one lung region



# INTERSTITIAL PNEUMONIA

- Peribronchovascular Infiltrate
- Mycoplasma , viral



# CT THORAX

Seldom used



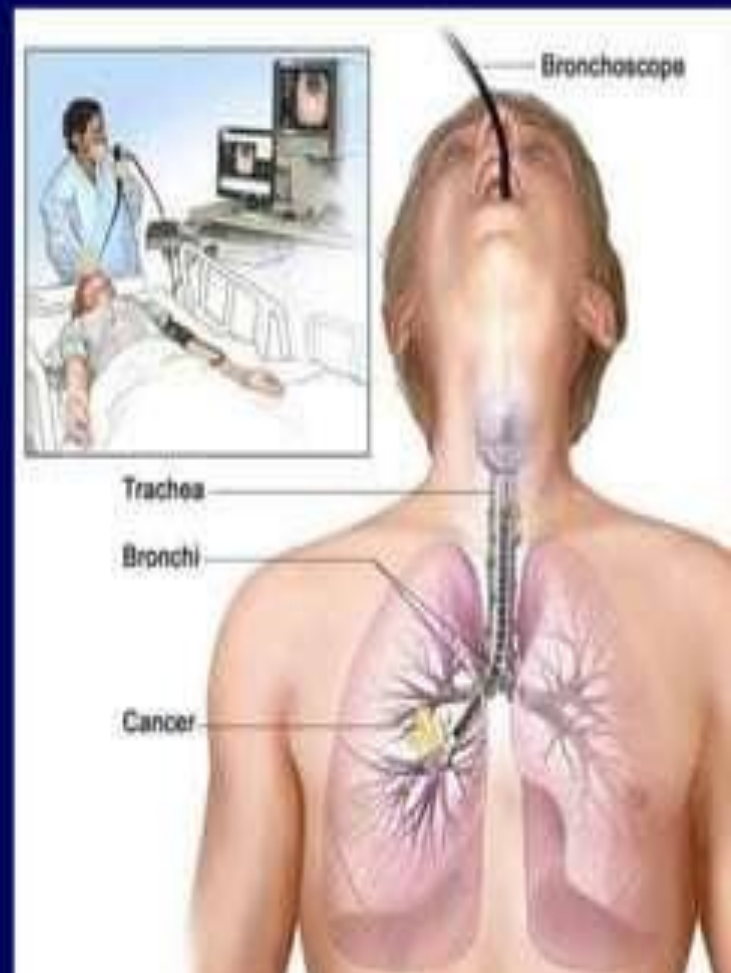


# INVESTIGATIONS

- Complete white blood count
- Blood Sugar
- Electrolytes
- Creatinine
- Blood culture
- Screening for retro(ICTC)
- Oxygen saturation by pulse oximetry
- ABG
- USG Chest
- Mantoux

# INVASIVE

- Bronchoscopy
- Thoracoscopy
- Percutaneous aspiration/biopsy
- Open lung biopsy
- Pleural aspiration



# OTHER TESTS

- Bacterial antigen in sputum and urine
- Rapid viral antigen detection in respiratory secretion
- Serological- mainly for atypical
- Molecular study
- C-reactive Protein, serum procalcitonin, and neopterin

# TREATMENT



# CURB 65

## Outpatients Treatment(empirical)

Previously healthy and no antibiotics in past 3 months

•A macrolide (clarithromycin or azithromycin or Doxycycline )

Comorbidities or antibiotics in past 3 months:

•Respiratory fluoroquinolone [moxifloxacin ,levofloxacin ] or  $\beta$ -lactam ( high-dose amoxicillin or amoxicillin/clavulanate)

# Inpatients, non-ICU

- A respiratory **fluoroquinolone** [moxifloxacin ,levofloxacin ]
- **$\beta$ -lactam** [cefotaxime ,ceftriaxone ,ampicillin] **plus a macrolide** [oral clarithromycin or azithromycin)

# Inpatients, ICU

•  $\beta$ -lactam *plus* Azithromycin or a fluoroquinolone



# *Pseudomonas*

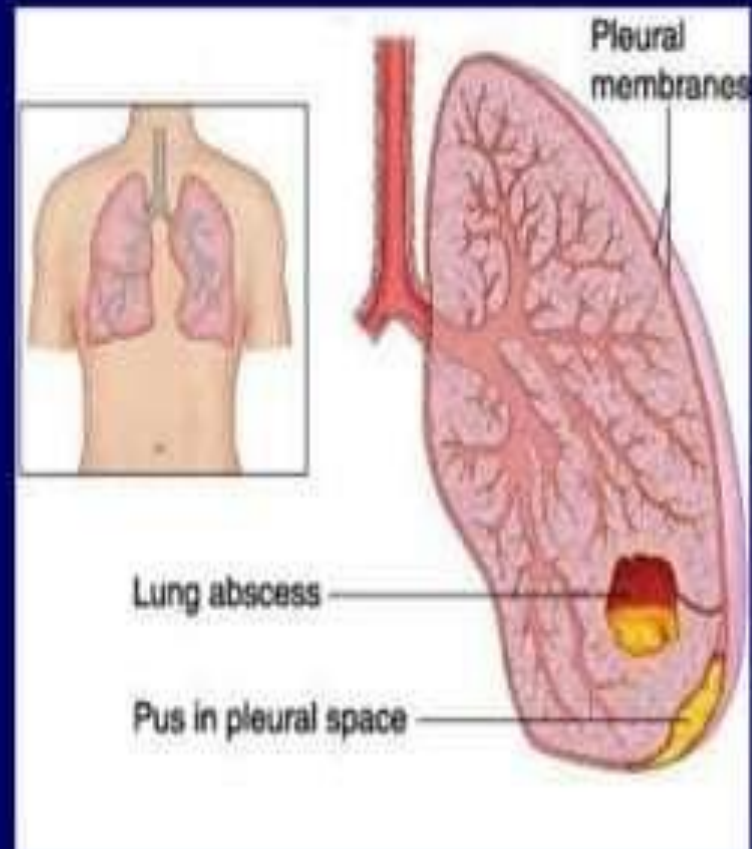
- An antipneumococcal, antipseudomonal  $\beta$ -lactam  
[piperacillin/tazobactam, cefepime , imipenem , meropenem *plus*  
flouoroquinolons
- Above  $\beta$ -lactams *plus* an aminoglycoside and azithromycin
- Above  $\beta$ -lactams *plus* an aminoglycoside *plus* an  
antipneumococcal fluoroquinolone

# Methicillin-resistant Staphylococcus aureus

If MRSA , add **linezolid** or **vancomycin**

# COMPLICATIONS

- Lung abscess
- Para-pneumonic effusions
- Empyema
- Sepsis
- Metastatic infections  
(meningitis, endocarditis, arthritis)
- ARDS , Respiratory failure
- Circulatory failure
- Renal failure



# Pneumonia complications

**SLAP HER** *(please don't)*

- .S - Septicaemia
- .L - Lung abcess
- .A - ARDS
- .P - Para-pneumonic effusions
- .H - Hypotension
- .E - Empyema
- .R - Respiratory failure /renal failure



# Course

- ❖ Most healthy people recover from pneumonia in one to three weeks, but pneumonia can be life-threatening.
- ❖ The mortality rate associated with community-acquired pneumonia (CAP) is very low in most ambulatory patients and higher in patients requiring hospitalization, being as high as 37 percent in patients admitted to the intensive care unit (ICU).

# Prevention

- Smoking cessation
- Better Nutrition
- Respiratory hygiene measures
- Pneumococcal polysaccharide vaccine
- Inactivated influenza vaccine
- Live attenuated influenza vaccine

# Conclusion

- .The presence of an infiltrate on plain chest radiograph is considered the "gold standard" for diagnosing pneumonia when clinical and microbiologic features are supportive
- .Most initial treatment regimens for hospitalized patients with community-acquired pneumonia (CAP) are empiric
- .The mortality rate associated with community-acquired pneumonia (CAP) is very low in most ambulatory patients and higher in patients requiring hospitalization

# THANK YOU !!!

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