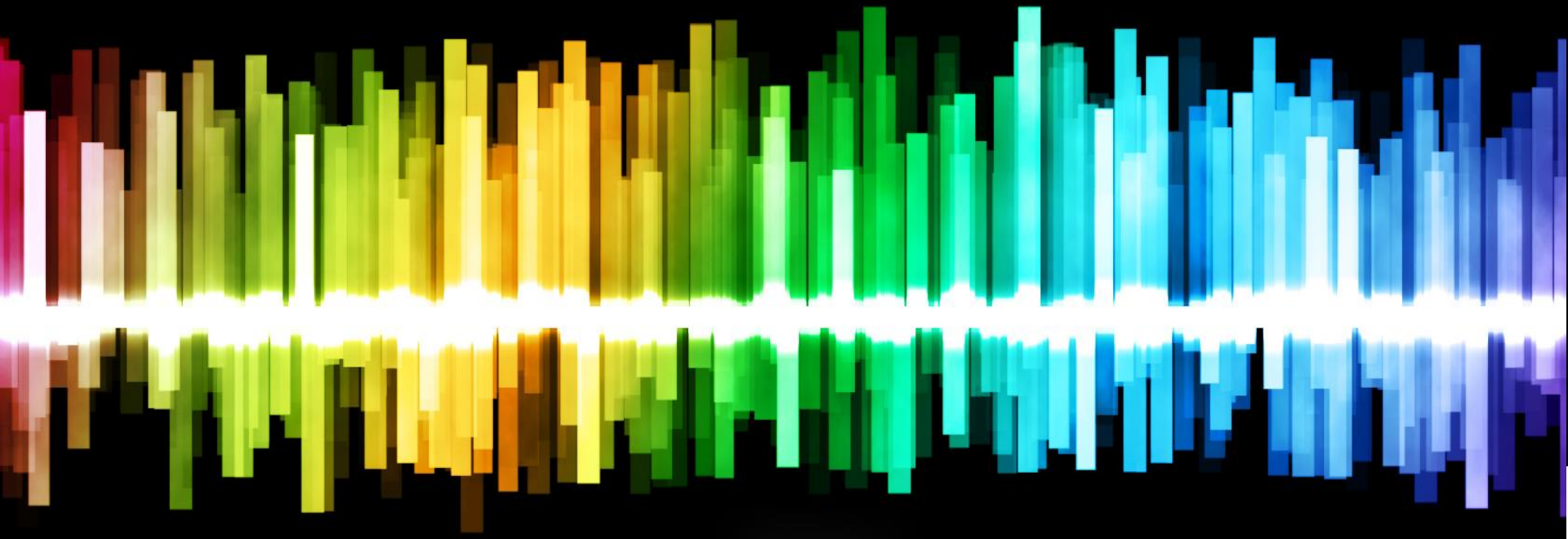
PATHOLOGY
TEAM 433

PATHOLOGY OF LOBAR PNEUMONIA AND BRONCHOPNEUMONIA



Objectives

- At the end of this lecture, the student should be able to:

1) Understand that pneumonia is inflammatory condition of the lung characterized (solidification) of the pulmonary tissue.

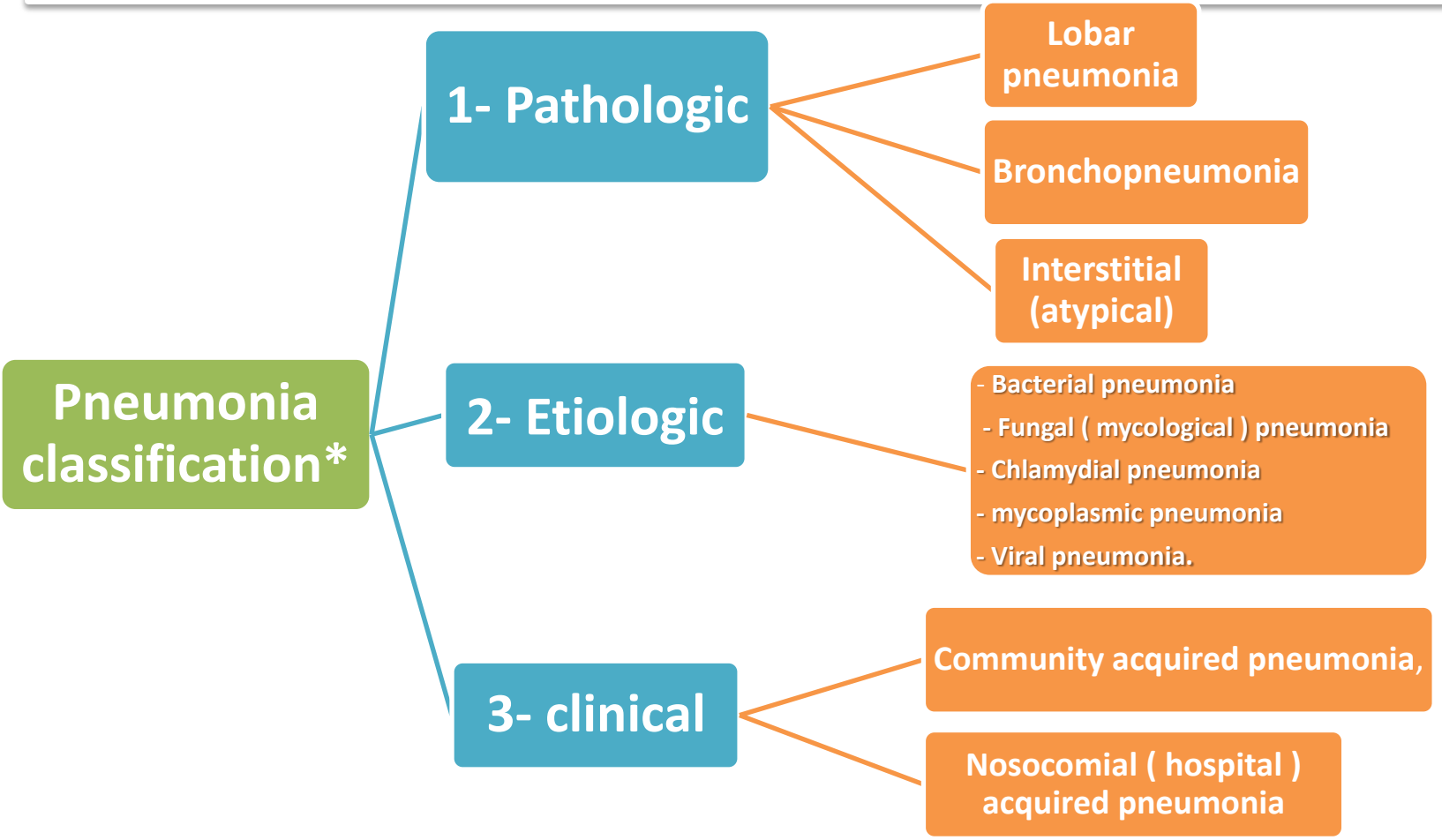
2) Is aware of the pathogenesis of pneumonia and its classification which principally include bronchopneumonia, lobar pneumonia and atypical pneumonia.

3)Is able to appreciate the aetiology and pathogenesis of lung abscess.

Pneumonia:

is an inflammatory process of infectious origin affecting the pulmonary parenchyma or any infection in the lung.

N.B: Pneumonia can be acute or chronic



* We classify in cases of emergency and for behaviour

Pneumonia

Clinical features	Complications	Diagnosis
• Fever • chills. • productive cough (pus) • rusty (bloody) sputum. • pleuritic chest pain. • sounds, dullness to percussion. • elevated WBC count.	• Tissue destruction and necrosis (**abscess).** • Spread of infection to the pleura leading to Empyema* • Bacteremia dissemination/spread to heart valves (infective endocarditis), brain (meningitis), kidneys, spleen or joints(arthritis) etc.	By • **Clinical diagnosis.** • **Chest x-ray:** ○ in lobar pneumonia: there is a radio opaque well circumscribed lobe ○ In bronchopneumonia: there are multiple small opacities usually basal and bilateral • **sputum** gram stain ,culture and blood cultures. • **Autopsy.**

N.B: If the cause bacteria , it is most characteristically associated with neutrophilic leukocytosis with an increase in band neutrophils (“shift-to-the-left”).

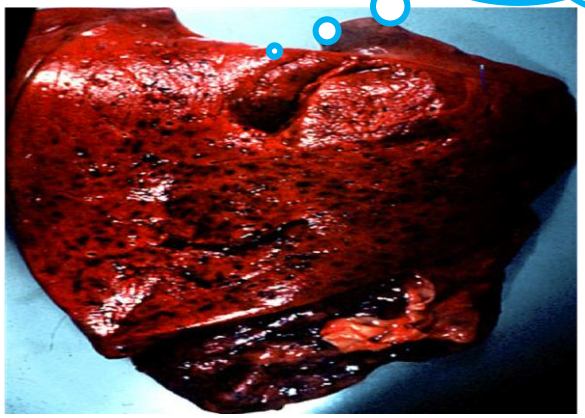
*caused by an infection that spreads from the lung. It leads to a build up of pus in the pleural space.

1-Lobar pneumonia (Community acquired pneumonia):*

It is characterized by a predominantly intra-alveolar exudate and may involve an entire lobe of the lung. 90-95% are caused by **pneumococci(Streptococcus pneumoniae) . Present in immunocompromised patient**

- **How does the patient present?**
- The patient present with high fever
- high WBCs count especially neutrophils it will **shift to the left** (band form or immature neutrophils)
- productive cough
- mucopurulent or rusty (golden-brown) in colour sputum because the bacteria lyses the erythrocyte
- chest pain
- may become hypoxemic.

Red hepatization



- Risk factors :
1. Elders
2. Diabetic
3. Cancer
4. Chronic renal failure
5. immunocompromised

* This disease is rare now because advanced antibiotic and Quick diagnosis.

Classic gross phases of lobar pneumonia

Congestion

- due to congested vessels and erythrocytes and fibrin fluid in the lumen.

Red hepatization

- **alveolar spaces are filled with neutrophils "acute inflammatory exudate", red cells (congestion) and fibrin.**
- **Grossly : the lung is firm/solid red and liver-like.**

Gray hepatization

- Presence of macrophages, decrease number Of neutrophils and fibrin.
- Grossly :the lung is still firm/solid and liver-like but grey

Resolution

- **Cellular debris + macrophages + fibrin**

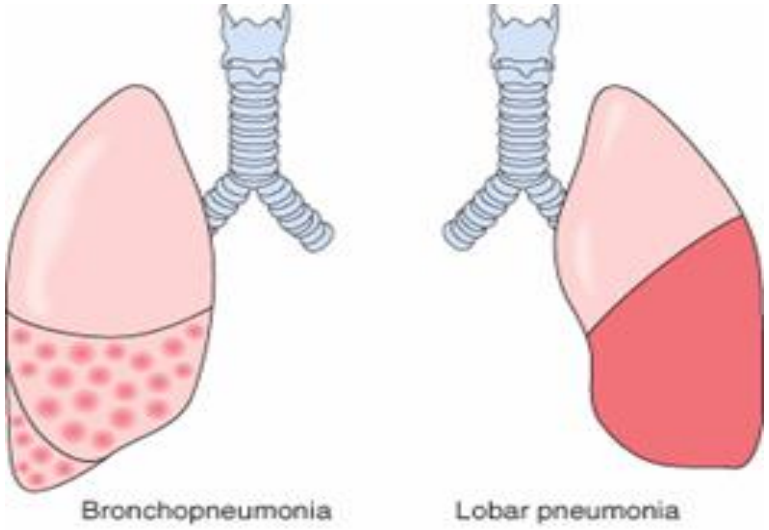
2- Bronchopneumonia

- acute inflammation of the lung caused by many organisms like staphylococcus aureus, klebsiella, haemolytic streptococci and H.influenza .

It is characterized by:

1. patchy distribution **involving one or more lobes**. Usually it involves lower lobes ,because of gravity.
2. inflammatory infiltrate extending from the bronchioles into the adjacent alveoli.

N.B:
Bronchopneumonia could be the terminal event of:
-chronic diseases like cancers, SLE, and chronic renal failure.
-drug over dose.
-aspiration.
-stroke.



3- Interstitial (primary atypical) pneumonia

It is characterized by patchy inflammation localized to interstitial areas of alveolar walls, and involving one or more lobes.

It is caused by various infectious agents, most commonly **Mycoplasma pneumoniae** or viruses.

A -Viral pneumonia (community acquired pneumonia):

the most common types of pneumonia in childhood. They are cause most commonly by "**influenza viruses,** corona .v, rass .v, rhino .v, adeno .v, respiratory syncytial virus."

marked by **interstitial infiltrate "chronic inflammatory infiltrate + alveoli is broad"**

It could lead to secondary infection by **staphylococcus**

Predisposing factors:

Chronic obstructive airway diseases, smokers and Crowded places.

B- Mycoplasmic pneumonia:

most common in children and young adults , community acquired pneumonia. Mycoplasma is special type of bacteria

Diagnosed by:

1- **Cold agglutinant test** :Taking the Patient serum + sheep erythrocytes and there will be agglutination .

2- **Polymerase chain reaction (PCR):** molecular technique to look for the DNA, RNA of the organism.

C- **Chlamydial pneumonia:**

effect avian especially (parrot) then transmits to the people by feces and cause interstitial (atypical) pneumonia, parrot's disease (**psittacosis**).

- Interstitial disease that affect immunocompromised *patient :

A- Pneumocystis carinii pneumonia (jiroveci):

It is usually the final event of a lot of people who have **AIDS** (HIV).

Symptoms: COPD, restrictive lung disease, fever, chest pain, persistent cough. Normal WBCs.

Investigation: lung biopsy or bronchialveolar lavage

Microscopic finding: soap-bubble like (froth-like) exudates+ vascular congestion .

we use methenamine silver stain "GMS" to see the organism (pneumocystis carinii) cyst form of fungi and its **comma shaped**.

* Decrease humeral immunity or cellular mediated immunity because chronic diseases, immunosuppressant drugs ,HIV "RNA virus lymphotropic" or transplantation.

B- Aspargillus pneumonia:

fungi become active in the blood vessels and it's called **"invasive fungal infection".**

It may has the same bronchopneumonia symptoms

In some cases it is latent in cavity **(Found especially in TB cavitation)**

Investigation : bronchi lavage , sputum

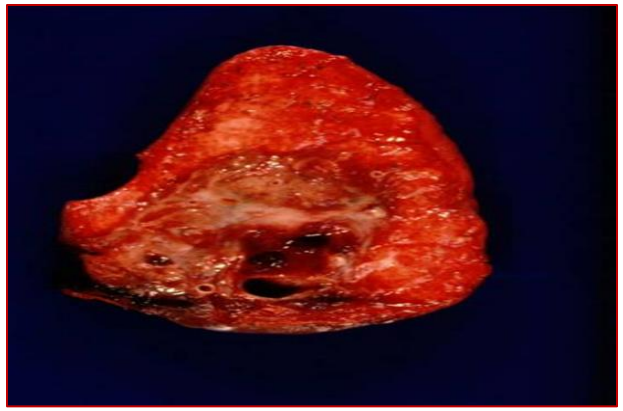
Culture : you find hyphae "dichotomous branching in acute angle"

- Nosocomial Pneumonia (Hospital acquired Pneumonia):

- These pneumonias are often fatal and occur in hospitalized patients.
- Common in patient with sever underlying conditions e.g. immunosuppression, prolonged antibiotic therapy, intravascular catheter and patient with mechanical ventilator
- Gram-negative organisms like Klebsiella, Pseudomonas aeruginosa and E. coli have been implicated.

Lung abscess

•Is a cavity lined by vascular granulation tissue containing fibrin, neutrophils and colonies of bacteria . It is complication of pneumonia.



Complications

- Bronchopleural fistula and pleural involvement ,resulting in empyema
- Massive hemoptysis, spontaneous rupture into uninvolved lung segments
- Non-resolution of abscess cavity
- Bacteremia could result in brain abscess and meningitis With antibiotic therapy 75% of abscess resolve

MCQs

1- The most common etiological agent causing Nosocomial Pneumonia is?

a) Pseudomonas aeruginosa
b) E.coli
c) S.Aureus
d) All of them

2- Atypical Pneumonia is also known as?

a) Lobar Pneumonia
b) Bacterial Pneumonia
c) Interstitial Pneumonia
d) Community acquired Pneumonia

3- Hospital acquired Pneumonia is usually caused by?

a) Gram +ive Bacteria
b) Gram –ive Bacteria
c) Aerobic Bacteria
d) Fungi

MCQs

4- A patient came to the ER with High fever, dyspnea and a rusty cough. Histological investigations showed high neutrophils count and left shift in neutrophil count. What is the most likely diagnosis?

a) Bronchopneumonia
b) Aspergillus Pneumonia
c) Mycoplasma Pneumonia
d) Lobar Pneumonia

5- A patient diagnosed with lobar Pneumonia. Sputum cytology showed fibrin and neutrophils. Which Pathological stage is the patient in?

a) Gray hepatization
b) Red hepatization
c) Congestion
d) Resolution

MCQs

6- A patient diagnosed with lobar Pneumonia. Sputum cytology showed increase number of macrophages and decreased neutrophils. Which Pathological stage is the patient in?

a) Red hepatization
b) Congestion
c) Gray hepatization
d) Resolution

7- A patient diagnosed with lobar Pneumonia. Which of the following is true?

a) Acute inflammatory exudate in the Bronchi
b) Normal lung X-ray
c) Chronic inflammatory exudate in the Alveoli
d) X-ray shows Consolidated lobe

8- lobar Pneumonia is?

a) A common disease
b) Only affect children
c) Affect people with predisposing factors

MCQs

9- Which of the following is found in the resolution stage in lobar Pneumonia?

a) Eosinophils
b) Plasma cell
c) Macrophages
d) Neutrophils

10- Which of the following is true about viral Pneumonia?

a) Caused by Corona Virus only
b) Mostly affect children
c) Affect immune-compromised people only

11- A patient diagnosed with Viral Pneumonia. After period of time he developed Secondary bacterial infection. What is the most common etiological cause?

a) E.coli
b) streptococcus
c) Influenza A
d) staphylococcus

MCQs

12- A Doctor diagnosed an immune-compromised patient with Pneumonia. What is the most likely type of Pneumonia the patient has?

a) Bronchopneumonia
b) lobar Pneumonia
c) Mycoplasma Pneumonia
d) Pneumocytis carinii pneumonia

13- In the previous Question the Doctor ordered a bronchial lavage. What will in most likely show?

a) Bubble gum transudate
b) Soap bubble exudate
c) Triple bubble Exudate
d) Double bubble transudate

14- Which of the following is true about Fungal Pneumonia's Hyphae?

a) Acute angle
b) Wide angle
c) Right angle

MCQs

15- What is the old test used in case of Mycoplasma Pneumonia?

a) Hot Agglutinin test

b) Worm Agglutinin test

c) Cold Agglutinin test

d) polymerase chain reaction

16- Terminal event of liver failure, diabetes, cancer , stroke, and pulmonary embolism are?

a) Lobar pneumonia

b) Bronchopneumonia

c) Viral pneumonia

d) All of them.

17- Bronchopneumonia usually distribute in?

a) Upper lobe.

b) Lower lobe

c) Both

Answers : 1-D 2- C 3- B 4-D 5- B 6-C 7- D 8-C 9-C 10- B
11-D 12- D 13-B 14- A 15-C 16-B 17-B

Questions

1- Why we found Rusty sputum in pneumonia ?

Because lyses of RBCs.

2- Why lobar pneumonia is rare now?

Because advanced antibiotic and quick diagnosis.

3- When do we give antibiotic in viral pneumonia condition ?

We give if there is secondary infection from bacteria.

4- Why bronchopneumonia usually distribute in lower lobe?

Because it is affected by gravity.

5- Why in Pneumocystis carinii pneumonia there is no immune response or little?

Because it affects immunocompromised patient especially HIV patient.

6- Why culturing of mycoplasma is difficult ?

Because some of them gram –ive and the other gram +ive and may be it is anaerobes or aerobes.

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