



PATHOLOGY TEAM

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PULMONARY INFECTION

PNEUMONIA

1- GENERAL CONSIDERATIONS AND CLINICAL CHARACTERISTICS

- (a) Pneumonia is an inflammatory process of infectious origin affecting the pulmonary parenchyma.
- (b) **Characterized By** chills and fever, productive cough, blood tinged or rusty sputum, pleuritic pain, hypoxia with shortness of breath and sometimes cyanosis.
- (c) **If bacterial**, it is most characteristically associated with neutrophilic leukocytosis with an increase in band neutrophils ("shift-to-the-left").

Note :

Bactiral infection : increase the wbc

Viral infection : increase the lenphocyte

Illergic or tumor : increase esenophils

“ bands neutrophils = immature neutrophils “

2- MORPHOLOGIC TYPES OF PNEUMONIA

➔ *There are three morphologic and clinical patterns:* lobar pneumonia, bronchopneumonia and interstitial pneumonia.

3- BACTERIAL PNEUMONIAS

(a) LOBAR PNEUMONIA:

- ➔ is most often **caused by** Streptococcus pneumonia (the pneumococcus).
- ➔ It is **characterized by** a predominantly intraalveolar exudate and may involve an entire lobe of the lung.

NOTE : lobar usually affect one lobe and associated with plural effusion ... its commenly bacterial disease

(b) BRONCHOPNEUMONIA

- ➔ is **caused by** a wide variety of organisms.
- ➔ It is **characterized by** a patchy distribution involving one or more lobes, with an inflammatory infiltrate extending from the bronchioles into the adjacent alveoli

Note : always associated with pus <fibrin and a lot of leukocyte .. its can be bacterial ,viral and fungal

4- INTERSTITIAL (PRIMARY ATYPICAL) PNEUMONIA

Caused by various infectious agents, most commonly *Mycoplasma pneumoniae* or viruses.

Characterized By diffuse, patchy inflammation localized to interstitial areas of alveolar walls.

(A) MYCOPLASMA PNEUMONIA:

(1) This is the most common form of interstitial pneumonia it usually **occurs** in children and young adults and it may occur in epidemics.

(2) **Onset** is more insidious (sudden) compared to bacterial pneumonia and usually follows a mild, self-limited course.

(3) **Characteristics include** an inflammatory reaction confined to the interstitium, with no exudate in alveolar spaces and intra-alveolar hyaline membranes.

(4) **Diagnosis is by**

- Sputum cultures, requiring several weeks of incubation
- Complement fixing antibodies.

(5) *Mycoplasma pneumoniae* may be **associated with** non specific agglutinins reactive to red cells.

✓ This phenomenon is the basis for a quick and easy laboratory test that can provide early diagnostic information.

Morphologic Variants of Pneumonia: Causative Organisms and Characteristics

Variant	Causative organism	characteristics
LOBAR PNEUMONIA	Most frequently <i>Streptococcus Pneumoniae</i> (<i>pneumococcus</i>)	- Predominantly intra-alveolar exudate resulting in consolidation. - May involve the entire lobe. - If untreated, may morphologically

		evolve through four stages ; congestion → red hepatization → gray hepatization → resolution.
BRONCHOPNEUMONIA	Many organisms including: - <i>Staphylococcus Aureus</i> , - <i>Haemophilus Influenza</i> , - <i>Klebsiella Pneumonia</i> - <i>Streptococcus Pyogenes</i>	- Acute inflammatory infiltrates extending from the bron- chicles into the adjacent alveoli. - Patchy distribution involving one or more lobes.
Interstitial (primary atypical) pneumonia	Most frequently <i>Viruses</i> or <i>Mycoplasma Pneumoniae</i>	Diffuse, patchy inflammation localized to interstitial areas of the alveolar walls. - Distribution involving one or more lobes.

(B) VIRAL PNEUMONIAS

- ➔ are the most common types of pneumonia in childhood.
- ➔ They are **caused most commonly by** *influenza viruses*, *adenoviruses*, *rhinovirus* and *respiratory syncytial virus*, may also arise after childhood ***exanthems (viral eruptions)*** [e.g. rubeola (measles) or varicella (chicken pox)] ***the measles virus*** produces giant cell pneumonia, marked by numerous giant cells and often complicated by tracheobronchitis.

NOTE : you must know that viral pneumonias are interstitial pneumonias (Atypical pneumonia) usually it affects children after common cold but it may affects adults .

(C) RICKETTSIAL PNEUMONIAS

- ➔ Q fever is the most common rickettsial pneumonia;
- ➔ it is **caused by** *Coxiella Burnetii*.
- ➔ It may infect persons working with infected cattle or sheep, who inhale dust particles containing the organism, those who drink unpasteurized milk from infected animals.

(D) ORNITHOSIS (PSITTACOSIS)

- ➔ is **caused by** an organism of the *Genus Chlamydia*
- ➔ **transmitted by** inhalation of dried -excreta of infected birds.

NOTE : you must know that CHLAMYDIA cause PSITTACOSIS –birds fancy disease – affects people who usually get contacted with any kind of birds like chicken .

5- PNEUMOCYTIS CARINII PNEUMONIA

- ✓ is the most common opportunistic infection in patients **with** acquired immunodeficiency syndrome (AIDS)
- ✓ it also **occurs in** other forms of immunodeficiency.
- (a) It is **caused by** *Pneumocystis Carinii* (recently renamed –*Pneumocystis Jiroveci*) which is now classified as a **fungus**.
- (b) **Diagnosis by** morphologic demonstration of the organism in *biopsy* or *bronchial washing specimens*.

NOTE :

Pneumocystis Carinii is the old name and the new name is *Pneumocystis Carinii*

Keep in your mind :

PneumoCYTIS = HIV = AIDS = immunodeficiency disease

6- HOSPITAL-ACQUIRED GRAM-NEGATIVE PNEUMONIAS

(a) These pneumonias are often **fatal occur in** hospitalized patients, usually those with serious, debilitating (weakness) diseases.

(b) **Causes** include many gram-negative organisms, including *Klebsiella*, *Pseudomonas Aeruginosa* and *Escherichia Coli*.

➔ **Endotoxins** produced by these organisms play an important role in the infection.

NOTE :

Hospital acquired disease = Nosocomial disease = Gram –
Gram –ve the most important E.coli , Klebsilla

IMPORTANT FEATURES OF SELECTED BACTERIAL PNEUMONIAS

Organism	Characteristics	Complications
Streptococcus Pneumoniae	Most common in <i>elderly</i> or <i>debilitated</i> patients ((Especially those with cardiopulmonary Disease)) and <i>malnourished persons</i>	May lead to Empyema (pus in the pleural cavity).
Staphylococcus Aureus	Often a complication of - <i>influenza or viral pneumonias</i> - a result of <i>blood-borne infection</i> in intravenous drug users ((seen principally in debilitated hospitalized patients)) - the elderly - people with COPD	Focal inflammatory exudates or abscess formation frequent may lead to - <i>Empyema</i> - <i>Bacterial Endocarditis</i> - <i>Brain And Kidney Abscesses.</i>
Streptococcus Pyogenes	Often a complication of influenza or measles.	Lung abscess.
Klebsiella Pneumoniae	<u>Most frequent in</u> - debilitated hospitalized patients - diabetic or alcoholic patients - high mortality rate in elderly patients.	Considerable <i>alveolar wall damage</i> leading to necrosis ((sometimes with abscess formation))
Haemophilus Influenza	<u>Usually seen in</u> - infants and children - debilitated adults, most often those with COPD	Meningitis and epiglottitis in infants and children.
Legionella Pneumophila	Infection <u>from</u> inhalation of <i>aerosol</i> ((from contaminated stored water most often in AC systems))	

LUNG ABSCESS

1. This is a localized area of suppuration within the parenchyma, usually resulting from bronchial obstruction (often by cancer) or from aspiration of gastric contents may also be a complication of bacterial pneumonia.
2. Patients predisposed to it are those who have aspiration by loss of consciousness *from* alcohol or drug overdose, neurologic disorders, or general anesthesia.
3. Frequent causes include Staphylococcus, pseudomonas, Klebsiella or Proteus ((often in combination with anaerobic organisms.))
4. Clinical manifestations include fever, foul-smelling purulent sputum and radiographic (chest x-ray) showing evidence of a fluid-filled cavity.