

Pneumonia

Dr. Omar Hamdan

Gastrointestinal and liver pathologist

Mutah University

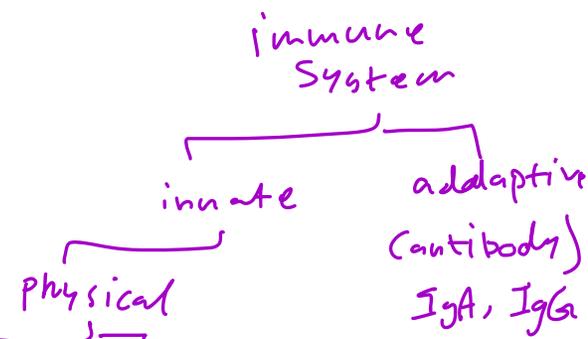
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Overview of Pneumonia

- Pneumonia = infection in the lung parenchyma.
- Responsible for ~1/6 of all US deaths.
- Normally sterile lungs due to strong immune defenses.
- Vulnerability: airborne microbes, aspiration, and reduced local immunity.



Lung Defense Mechanisms

- Innate defenses: mucociliary clearance, macrophages, neutrophils, complement.
- Adaptive immunity: IgA blocks attachment, IgG activates complement, T cells control viral/intracellular infections.

Immune Defects and Susceptibility

- • Innate immunity defects → pyogenic infections.
- • MYD88 mutation → severe pneumococcal infections.
- • IgA deficiency → risk for encapsulated bacteria.
- • Lifestyle (smoking, alcohol) lowers defenses.

Classification of Pneumonia

- By pathogen or clinical setting:
 1. Community-acquired (bacterial, viral)
 2. Nosocomial (hospital-acquired)
 3. Aspiration
 4. Chronic (based to duration → acute → chronic)
 5. Necrotizing/lung abscess
 6. Immunocompromised host.

based on organisms-

atypical

bacteria

↳ Mycoplasma

fungal infection

parasitic infection

Mycobacteria

↳ TB

leprosy

based on acquisition:-

↳ hospital

acquired

(after 48 h)

community

acquired

+

inhaled

acquired

pneumonia

(tuberculosis)

Common Pathogens (Community-Acquired)

- Streptococcus pneumoniae (most common)
- Haemophilus influenzae
- Moraxella catarrhalis
- Staphylococcus aureus
- Klebsiella pneumoniae
- Pseudomonas aeruginosa
- Legionella pneumophila
- Mycoplasma pneumoniae

→ TB (its typical location is lung)

Streptococcus pneumoniae

- Common after viral (URTI.)

→ upper respiratory tract infection.

- Risk: chronic disease, Ig deficiency, asplenia.

- Lobar consolidation pattern.

based in the part involved

lobar broncho

كلور

lobe

involved

بالتهاب

إذا بالأسفة

كانت كلور lung

أيض

- Vaccines available.

في البرناتج الوهن للتعقيم صار موجود

Haemophilus & Moraxella

- *H. influenzae*: COPD exacerbations, epiglottitis in children.
- *M. catarrhalis*: older adults, otitis media in kids, COPD exacerbations.

Staphylococcus aureus

- Secondary after viral infections (flu, measles).
- Complications: ^(cavitatio) abscess, empyema.
- Risk: IV drug use → right-sided endocarditis.

cavitation in lung

-: اسبابها

1. Staphylococcus aureus

*2. Cancer → squamous cell
carcinoma*

Klebsiella pneumoniae

- Gram-negative, affects alcoholics, and malnourished.
- Thick, gelatinous sputum due to capsular polysaccharide.

→ بيبي ال patient
productive cough

Pseudomonas aeruginosa → ^{drug}resistant

- Common in CF, neutropenia, burns and ventilated patients.
- Invades blood vessels → bacteremia and necrosis.

* Cavitation جو نقص *

Legionella & Mycoplasma

- Legionella → severe, waterborne, immunocompromised.
- Mycoplasma → young adults, closed communities.

* الأستخاضة التي يسفلوا
→ المكعبات كَمَبِير
أكثر عُرضة

Morphologic Patterns



1. Bronchopneumonia – patchy consolidation.

2. Lobar pneumonia – entire lobe involved.

Term: consolidation = alveoli filled with exudate.

↳ whiteness

Lobar Pneumonia Stages

1. Congestion: Heavy, red lung.
↳ Vascular space dilatation
2. Red hepatization: Neutrophils + fibrin.
↳ exudate
3. Gray hepatization: Disintegration of RBCs.
(hemolysis of RBCs → gray color)
4. Resolution: Macrophage cleanup & repair.

grossly lung looks like liver

* كل مرحلة من هاتى المراحل من 1-2 days

Clinical Features

- Abrupt fever, chills, productive cough, Pleuritic pain, radiographic consolidation.
- Treated → recovery in 48–72 hrs.
- Mortality <10%, complications: empyema, and meningitis, hospital acquired/ age ≥ 65

ال pleura تتكون ملتزقة
بلا lung بالتالي بهير
pain من آف حركة

Viral Pneumonia

- Common agents: Influenza, RSV, parainfluenza, and adenovirus.

- Interstitial inflammation → clear alveoli. ⇒ bacterial pneumonia

- Can predispose to bacterial infection.

bacterial ← via Viral Inj.

Viral Pneumonia Pathology

thin ← Septum
bacterial ↓ ↓ ↓
viral ↓ ↓ ↓

- Septal thickening, lymphocytes, and macrophages.

- Severe cases → diffuse alveolar damage + hyaline membranes.

↓
bacterial
viral ↓ ↓ ↓

Influenza Pathogenesis

- RNA virus (A, B, C) – Type A causes pandemics.
- Antigenic drift = mutations → epidemics.
- Antigenic shift = recombination → pandemics.
- H and N antigens define subtypes (e.g., H1N1).

Hospital-Acquired Pneumonia

لازم لايكونه
بالمستشفى
يومين اول
التي

• Nosocomial (during hospital stay).

• Risk: intubation, immunosuppression, and antibiotics.

كـ لانه
Resistent
بـير عني

• Pathogens: Gram-negative rods, and pseudomonas, MRSA.

Aspiration Pneumonia

- Inhalation of gastric/oral contents. →
- Chemical + bacterial.
- Necrotizing → abscess.
- Common in debilitated/unconscious patients.

بدل سے مراد
GI tract
اس سے اس
DS tract

Lung Abscess

- Localized necrosis forming cavities.
- Causes: aspiration, necrotizing pneumonia, obstruction, and septic emboli. → Right side heart failure
- Sx: foul sputum, fever, and clubbing. → Cancer ال سرطان
بؤدي ال
-
- Complications: empyema, and brain abscess.

Chronic Pneumonia

- Localized lesion, granulomatous inflammation.
- Agents: Mycobacterium tuberculosis, and fungi.
- In immunocompromised → disseminated disease. → systemic TB (بعضی با Lung و بیشتر لباتی ال organs)

Tuberculosis Overview

- Caused by *M. tuberculosis*.
- Spread by inhalation.
- Pathology = caseating granulomas.
- Hypersensitivity = tissue destruction.

Summary of Acute Pneumonias

- *S. pneumoniae*: lobar pattern.
- Lobar stages: congestion → resolution.
- Viral pneumonia: interstitial, and non-exudative.
- Bacterial: neutrophilic exudate, and consolidation.

↳ infection in alveoli

لَا إِلَهَ إِلَّا اللَّهُ وَحْدَهُ لَا شَرِيكَ لَهُ
لَهُ الْمُلْكُ وَلَهُ الْحَمْدُ وَهُوَ عَلَى كُلِّ شَيْءٍ قَدِيرٌ