

Lecture 2



Respiratory fungal infections

- Additional Notes
- Important
- Explanation
- Examples

OBJECTIVES:

- Know about primary systemic mycoses
- Know about Aspergillosis
- Know about Aspergillosis classifications
- Know about fungal sinusitis
- Know about Zygomycosis
- Know about Pneumocystosis

Respiratory Fungal infections

- It is fungal infection that affects respiratory system. It's route is by **inhalation**
- There are 74 different types of fungi in oral cavity of a healthy person.
- It is less common than viral and bacterial infections
- Etiology:
 - Yeast: **"opportunistic infection"**
 - ✓ Candidiasis "Candida"
 - ✓ Cryptococcosis "Cryptococcus neoformans"
 - Pneumocystosis **"opportunistic infection"** "Pneumocystis jiroveci"
 - Mould fungi: **"opportunistic infection"**
 - ✓ Aspergilloosis "Aspergillus species"
 - ✓ Zygomycosis "Zygomycetes"
 - Dimorphic fungi: **"primary infections"**
 - ✓ Histoplasma capsulatum
 - ✓ Blastomyces dermatitidis
 - ✓ Paracoccidioides brasiliensis
 - ✓ Coccidioides immitis

Primary Systemic mycoses

- Infection of the respiratory system. Occurs by **inhalation**.
- It may disseminate in immunocompromised patients from the lungs to other organs.
- It is most common in North and South America.
- It is caused of dimorphic fungi:
 - ✓ Found in soil
 - ✓ Some are highly infectious. **E.g. Coccidioidomycosis.**
 - ✓ Primary pathogens
- Dimorphic fungi includes:
 - ✓ **Histoplasmosis**
 - ✓ **Blastomycosis**
 - ✓ **Coccidioidomycosis**
 - ✓ **paracoccidioidomycosis**

Aspergillosis

- Aspergillosis is a spectrum of diseases of humans and animals caused by *Aspergillus*.
- It may cause:
 - ✓ Mycotoxicosis
 - ✓ Allergy⁽¹⁾
 - ✓ Colonization in performed cavities
 - ✓ Invasive, inflammatory, granulomatous, necrotizing disease of lungs
 - ✓ Systemic and disseminated disease.
- The type of disease and severity depends upon the physiologic state of the host and the species of *Aspergillus* causing the disease.
- Common species internationally: *A.fumigatus*
- Common species in Saudi Arabia: *A.flavus* “80% of the cases”

⁽¹⁾Aspergillus allergen is one of the strongest allergens.

Classifications of Aspergillosis

1. Chronic Aspergillosis: “**aspergilloma, fungal ball**”
 - ✓ Symptoms: cough, hemoptysis, variable fever
 - ✓ Radiology will show mass in the lung, **radiolucent crescent**
2. Invasive pulmonary aspergillosis:
 - ✓ Symptoms: cough, hemoptysis, fever, Pneumonia, Leukocytosis
 - ✓ Radiology will show lesions with **halo sign**
3. Allergic Aspergillosis: ABPA
 - ✓ Symptoms: bronchial obstruction, fever, eosinophilia, wheezing
 - ✓ Skin test positive to aspergillus
 - ✓ Serum antibody positive to aspergillus
 - ✓ Serum of IgE is high

Fungal Sinusitis

- It has same symptoms of sinusitis as well as **nasal polyps**
- 30% of adenoid cases is caused because of fungal sinusitis
- In **immunocompromised** patients may disseminate to the eye and brain and cause **“Rhino cerebral aspergillosis”**
- The most common cause in KSA **A.flavus**
- There are other fungi that can cause fungal sinusitis
- Diagnosis:
 - ✓ Clinical and Radiology
 - ✓ Histology of mucosa⁽¹⁾
 - ✓ Culture
 - ✓ Measurement of IgE level
- Treatment:
 - ✓ Depends on the type and severity of the disease

⁽¹⁾Important to determine disease classification and management

- Pulmonary zygomycosis:
 - ✓ Clinical features:
 - Acute
 - Consolidation, nodules, cavitation, pleural effusion
 - It may invade other tissues. Such as: diaphragm, pericardium.
 - ✓ Early recognition and intervention are critical.

- Pneumocystosis “PCP”:
 - ✓ You may acquire fungi from the soil during childhood.
 - ✓ **Commonest fungal infection in HIV patients.**
 - ✓ It was thought to be a protozoan parasite, but later on it has been proven to be a fungus.
 - ✓ Diagnose by **microscope only**, it doesn't grow in laboratory media.

	Risk factors	Organism	Diagnosis	Microscopy	Serology	Treatment
Aspergillosis	-Transplant patients -Malignancy -AIDS -Diabetes	Aspergillus species e.g. <i>A.flavum</i> , <i>A.fumigatus</i>	-Sputum -BAL ⁽¹⁾ -Lung biopsy	Giemsa Stain -Septate fungal hyphae	Primarily test for antibodies	-Voriconazole -Alternative therapy: Amphotericin B, Itraconazole, Caspofungin
Zygomycosis "Pulmonary zygomycosis, Rhinocerebral zygomycosis"		Zygomycetes e.g. Rhizopus	-Sputum -BAL ⁽¹⁾ -Lung biopsy	Giemsa stain -Non-septate fungal hyphae	Not available	-Amphotericin B + Surgery ⁽³⁾
Pneumocystosis		Pneumocystis jiroveci	-Sputum -BAL ⁽¹⁾ -Lung biopsy	-Giemsa stain -I.F. ⁽²⁾ better sensitivity		- Trimethoprim/sulfamethoxazole ⁽⁴⁾

⁽¹⁾ Bronchioalveolar lavage

⁽²⁾ If positive will show cysts oh hat-shaped.

⁽³⁾ Without surgery fungi might invade to other organs.

⁽⁴⁾ We use antibiotics not antifungal because it's structure is not 100% fungi structure.

Quiz

1. Which one of the following is the drug of choice of aspergillosis?

- a. Amphotericin B b. Dapsone c. Voriconazole

2. The commonest fungal infection in AIDS patients is:

- a. Pneumocystosis b. Aspergillosis c. Zygomycosis

3. Chronic Aspergillosis will show:

- a. Radiolucent crescent b. Halo sign c. Tumor

4. The most common cause of fungal sinusitis in Saudi Arabia is:

- a. *A.fumigatus* b. *A.flavum* c. *A.niger*

5. Zygomycetes will show broad septate hyphae in microscope.

- a. T b. F