



Respiratory Fungal Infections

Respiratory fungal infections

- Respiratory System
- Rout of infection?
- Oral Cavity, any role?
- Respiratory fungal infections are less common than viral and bacterial infections.
- Have significant difficulties in diagnosis and treatment.

Respiratory fungal infection - Etiology

➤ YEAST

- Candidiasis (*Candida* and other yeast)
- Cryptococcosis (*Cryptococcus neoformans*, *C. gattii*)

➤ Mould fungi

- Aspergillosis (*Aspergillus* species)
- Zygomycosis (*Zygomycetes*, e.g. *Rhizopus*, *Mucor*)
- Other mould

Opportunistic

➤ Dimorphic fungi

- *Histoplasma capsulatum*
- *Blastomyces dermatitidis*
- *Paracoccidioides brasiliensis*
- *Coccidioides immitis*

Primary infections

Primary Systemic Mycoses

- Infections of the respiratory system, (Inhalation)
- Dissemination seen in immunocompromised hosts
- Common in North America and to a lesser extent in South America. Not common in other parts of the World.

Etiologies are dimorphic fungi

In nature found in soil of restricted habitats.

Primary pathogens

They are highly infectious

They include:

Histoplasmosis,

Blastomycosis,

Coccidioidomycosis,

Paracoccidioidomycosis

Aspergillosis

Aspergillosis is a spectrum of diseases of humans and animals caused by members of the genus *Aspergillus*.

These include

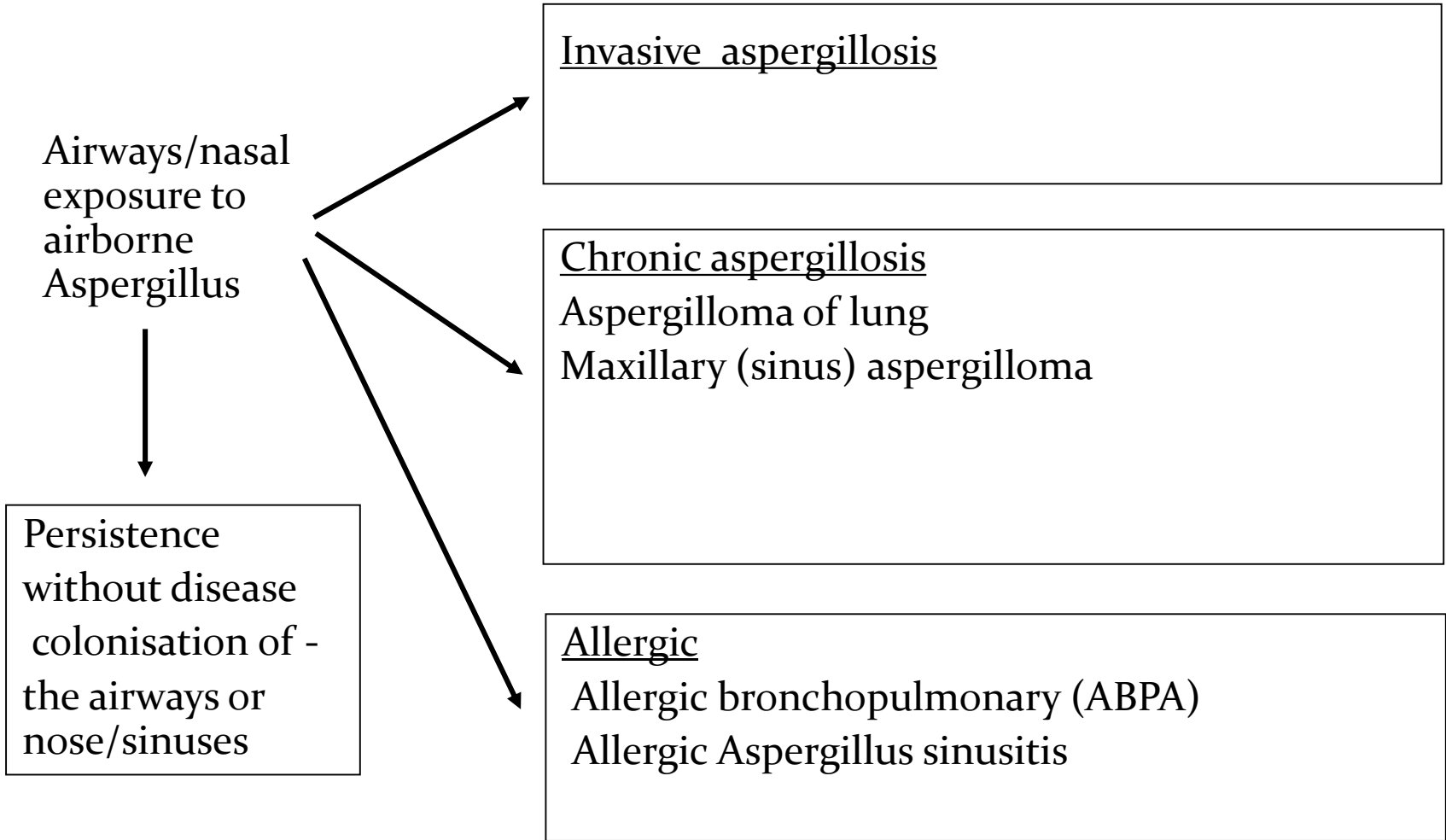
- (1) Mycotoxicosis
- (2) Allergy
- (3) Colonization (without invasion and extension) in preformed cavities
- (4) Invasive disease of lungs
- (5) Systemic and disseminated disease.

Aetiological Agents: *Aspergillus species*,

common species are:

A. fumigatus, A. flavus, A. niger, A. terreus and A. nidulans.

CLASSIFICATION OF ASPERGILLOSIS



Risk factors

Bone marrow/ organ transplantation

Cancer: Leukemia, lymphoma,.. etc

AIDS

Drugs: Cytotoxic drugs, steroids,.. etc

Diabetes

Others

Aspergillosis

Chronic Aspergillosis (Colonizing aspergillosis)

(Aspergilloma OR Aspergillus fungus ball)

- Signs include: Cough, hemoptysis, variable fever
- Radiology will show mass in the lung , radiolucent crescent

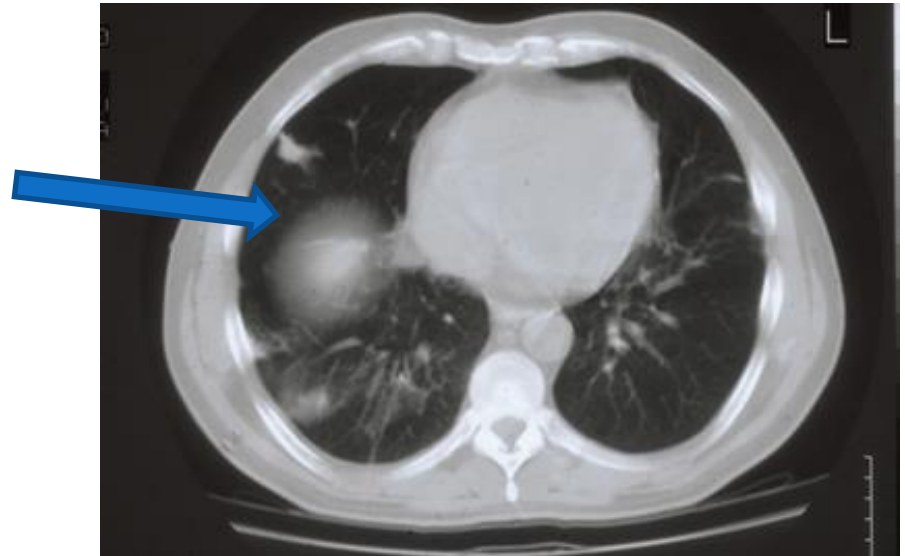
Invasive pulmonary Aspergillosis

Signs: Cough , hemoptysis, fever, Leukocytosis

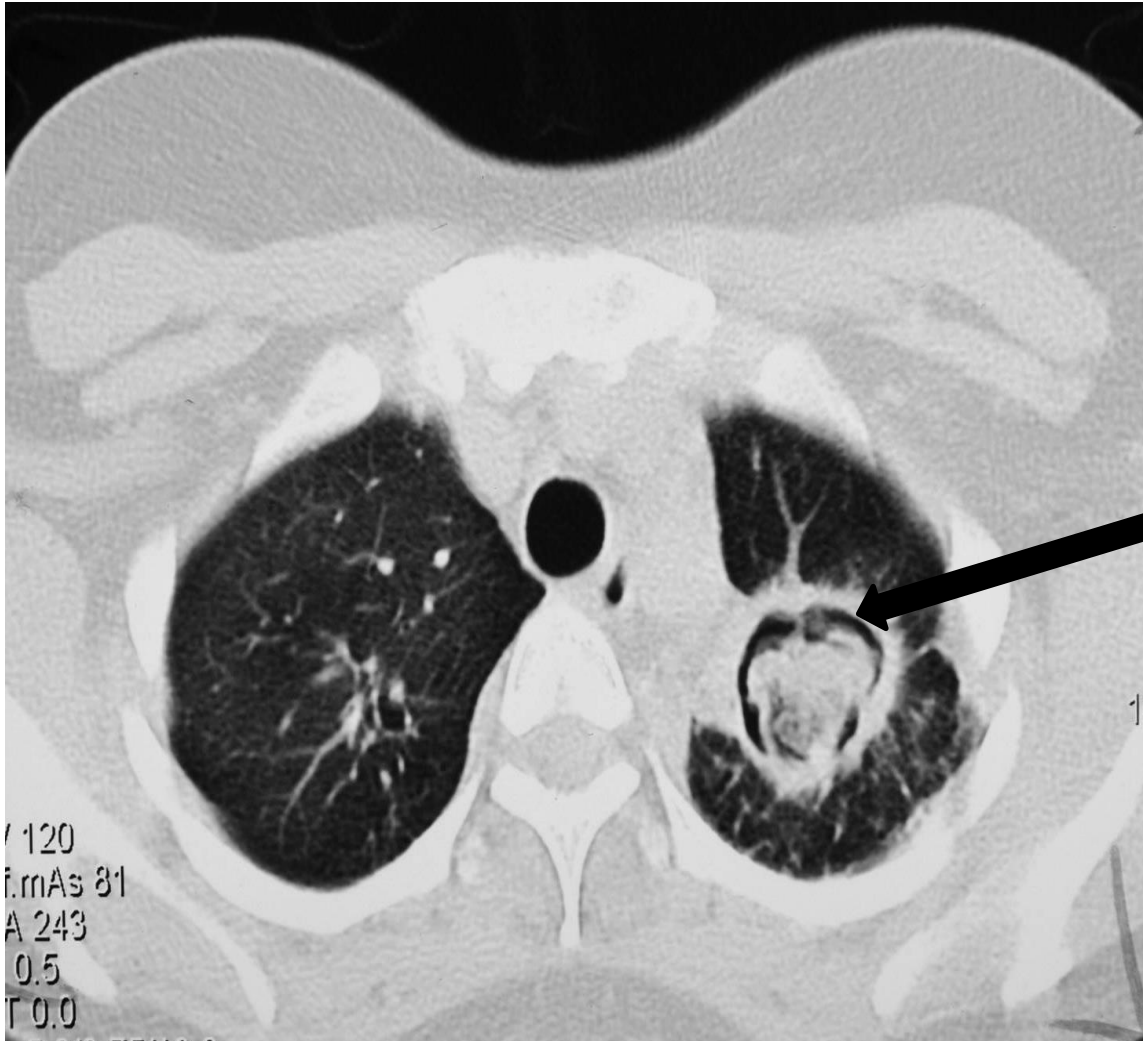
Radiology will show lesions with halo sign

Invasive pulmonary aspergillosis

Note the Halo sign



Simple (single) aspergilloma



**Note the Air
crescent**

Allergic bronchopulmonary (ABPA)

- Symptoms of Asthma
- Bronchial obstruction
- Fever, malaise
- Eosinophilia
- Wheezing +/-

Also:

- Skin test reactivity to *Aspergillus*
- Serum antibodies to *Aspergillus*
- Serum IgE > 1000 ng/ml
- Pulmonary infiltrates

Common airborne Fungi



Aspergillus niger



Aspergillus fumigatus



Fungal sinusitis

Fungal sinusitis

Clinical:

- Nasal polyps – and other symptoms of sinusitis
- In immunocompromised, Could disseminate to – eye → cranium (Rhino cerebral)
- The most common cause in KSA is *Aspergillus flavus*
- In addition to *Aspergillus*, there are other fungi that can cause fungal sinusitis
- *Aspergillus* sinusitis has the same spectrum of *Aspergillus* disease in the lung

Diagnosis

- Clinical and Radiology
- Histology
- Culture

- Precipitating antibodies useful in diagnosis
- Measurement of IgE level, RAST test

Treatment : depends on the type and severity of the disease and the immunological status of the patient

Diagnosis of Aspergillosis

Specimen:

- Respiratory specimens: Sputum, BAL, Lung biopsy,
- Other samples:
- Blood, etc.

Lab. Investigations:

➤ Direct Microscopy:

Giemsa Stain, Grecott methenamine silver stain (GMS)

Will show fungal septate hyphae

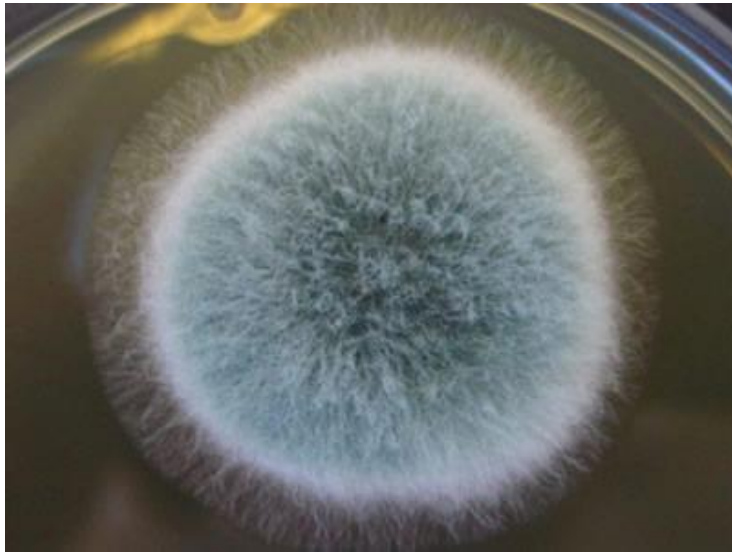
➤ Culture on SDA

➤ Serology:

Test for Antibody

ELISA test for galactomannan Antigen

➤ PCR: Detection of Aspergillus DNA in clinical samples



Cultures of Aspergillus



Smear: Septate fungal hyphae. Aspergillosis

Choice of antifungal for aspergillosis

➤ Voriconazole

➤ Alternative therapy

Amphotericin B, Itraconazole, Caspofungin

Zygomycosis

- Pulmonary zygomycosis
- Rhinocerebral zygomycosis

Risk factors

Transplant patients

Malignancy

AIDS

Diabetic ketoacidosis

Many others

Pumonary Zygomycosis

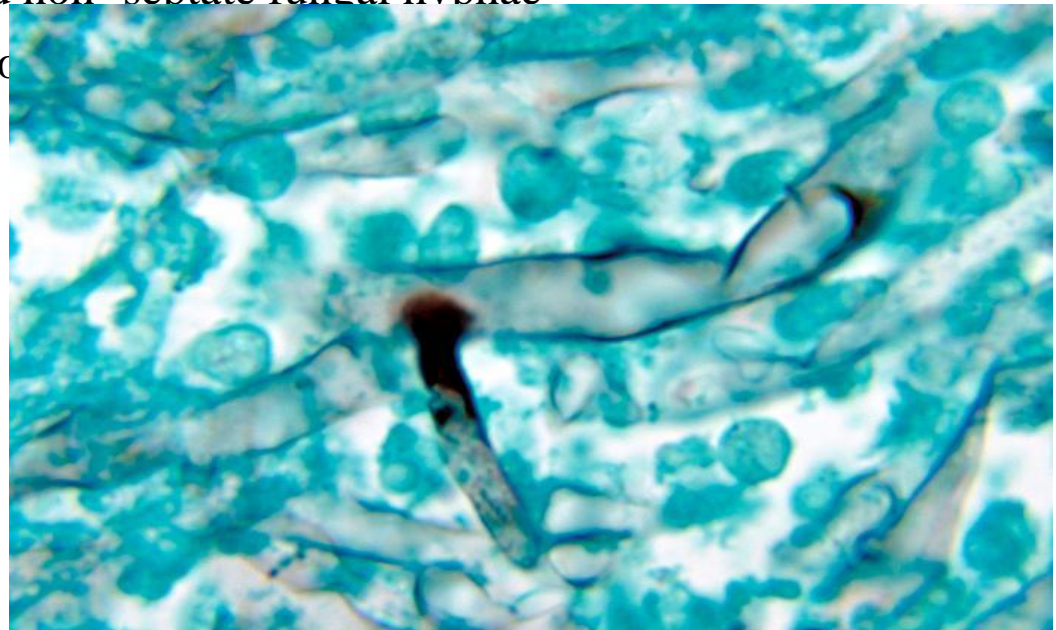
- Acute
- Consolidation , nodules, cavitation, pleural effusion, hemoptysis
- Infection may extend to chest wall, diaphragm, pericardium.
 - Pulmonary infractions and hemorrhage
 - Rapid evolving clinical course

Early recognition and intervention are critical

- Etiology:
Zygomycetes , **Non-septate hyphae**
e.g. Rhizopus,

Diagnosis

- **Specimen:**
 - Respiratory specimens: Sputum, BAL, Lung biopsy,
 - Other samples
- **Lab. Investigations:**
 - **Direct Microscopy:**
 - Giemsa, Grecoth methenamine silver stain (GMS)
 - Will show broad non- septate fungal hyphae
 - **Culture on SDA** (no cyclo)
 - **Serology: Not available**



Treatment:

Amphotericin B

Surgery

Pneumocystosis (PCP)

Pneumocystis pneumonia (PCP)

Opportunistic fungal pneumonia

- It is interstitial pneumonia of the alveolar area.
- Affect compromised host
- Especially common in AIDS patients.

➤ **Etiology:**

Pneumocystis jiroveci

- Previously thought to be a protozoan parasite, but later it has been proven to be a fungus
- Does not grow in laboratory media e.g. SDA
- Naturally found in rodents (rats), other animals (goats, horses), Humans may contract it during childhood

Pneumocystosis

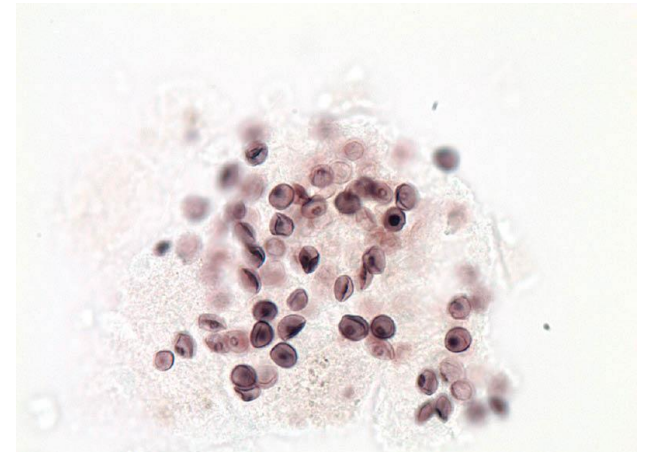
Laboratory Diagnosis:

- Patient specimen: Bronchoscopic specimens (B.A.L.), Sputum, Lung biopsy tissue.
 - Histological sections or smears stained by GMS stain.
 - Immunofluorescence (better sensitivity)
- If positive will see cysts of hat-shape, cup shape, crescent

Treatment:

Trimethoprim – sulfamethoxazole

Dapsone





Thank you