Microbiology
TEAM 432

Lecture (4)

# Mycetoma
## and other
# Subcutaneous Mycoses

## Objectives

1. Know the main fungi that affects the subcutaneous tissue, muscles and bones and the clinical settings of such infections.
2. Acquire the basic knowledge about the clinical features, diagnosis, and treatment of these infections.

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# Revision

## For superficial and cutaneous mycoses

**True or False:**

1. Superfecial mycoses Tinea versicolor causes itching (F)
2. Piedra is an infection of the hair shaft (T)
3. Presence of short hyphae and yeast cells in KOH is diagnostic for Tinea versicolor (T)
4. Dermatophytes are opportunistic pathogens (F)
5. Dermatophytoses can be transmitted from animals to humans (T)
6. Skin and nail infections can be caused by fungi other than dermatophytes (T)
7. Tinea pedis is an infection of the nail caused by dertmatophytes (F)
8. Swab is an acceptable sample for diagnosing dermatophytes (F)
9. KOH is usually useful for examining skin, nail and hair samples (T)
10. Oral thrush is an infection of the oral cavity caused by candida (T)
11. Candida is normal flora of skin, gut and oral cavity (T)
12. Shaving the hair will cure Tinea capitis (F)

# Mind map

## (Subcutaneous Mycoses)


- mycoses
  - subcutaneous
    - Mycetoma — Eumycetomas, Actinomycetomas — **Most common**
    - Subcutaneous zygomycosis — Mold fungi of the Zygomycetes
    - Sporotrichosis — Dimorphic fungus of Sporothrix schenckii
    - Chromoblastomycosis — Dematiaceous mould fungi
    - Pheohyphomycosis — Dematiaceous mould fungi
    - Rhinosporidiosis — Obligatory parasitic Fungus of Rhinosporidium seeberi
    - Lobomycosis — Obligatory parasitic fungus of Lacazia loboi
  - cutaneous
  - superficial

Were discussed in lecture 1

# Subcutaneous mycoses

Involves

Dermis | Subcutaneous tissue | muscle | bone

They are initiated by **trauma**, difficult to treat **(surgeries are involved)** and could infect healthy or immunocompromised hosts ( more sever in the 2nd )

**Example**

Sporotrichosis | Chromoblastomycosis | Mycetoma | Pheohyphomycosis | Lobomycosis | Rhinosporidiosis

**Subcutaneous zygomycosis**

| Description | etiology | Diagnosis | Treatment |
|---|---|---|---|
| • Chronic, localized, firm masses<br>• **Appears in:** face, hand, arm, leg or thigh<br>• swelling with intact skin-Distortion. could spread to adjacent bone and tissue. | **Mold fungi of the Zygomycetes** | **Specimen:** Biopsy tissue<br>**microscopy:** stained sections or smears show broad non-septate hyphae<br>**Culture:** on SDA | • Oral KI<br>• Amphotericin B<br>• Posaconazole |

# Subcutaneous mycoses (Cont.)

- Sporotrichosis
- Chromoblastomycosis
- Subcutaneous zygomycosis
- **Mycetoma**
- Pheohyphomycosis
- Lobomycosis
- Rhinosporidiosis

Trauma ➔ painless swelling ➔ painless firm nodules (after years) ➔ massive swelling + skin rupture and sinus formation ➔ draining exudate with **grains (also called granules)**

## Description

- **Chronic**, granulomatous disease
- Characteristics:
  - swelling
  - Abscess formation
  - Draining sinuses
  - Exudate containing grains
- affects the **lower extremities** (e.g. the disease **madura foot** ) hand, back or neck

## Epidemiology

- endemic in tropical, subtropical, and temperate regions. E.g. Sudan
- Men > Women
- Common in rural areas workers and **farmers**

# Mycetoma (Cont.)

## Etiology

Two divisions

### Eumycetomas

- By: mould fungi
- Examples:

1. Madurella mycetomatis
2. Madurella grisea
3. Pseudallescheria boydii

- Color of grains:

black or white

### Actinomycetomas

- By: aerobic Actinomycetes

(gram +ve, filamentous bacteria)

- Examples:

1. Actinomadura madurae
2. Streptomyces somaliensis
3. Nocardia brasiliensis

- Color of grains:

yellow, white, brown, pinkish – red

## Diagnosis

**Specimen:**

Biopsy tissue, Pus or Blood (for serology only)

**1.microscopy:**

Two ways

**Of tissue or sinus exudate:**

1. Histological sections:

**Stain:** Hematoxylin-Eosin

2. Smears:

**Stain:** → **Bacteria** (Actinomycetomas): Gram stain

→ **Fungi** (Eumycetomas): Giemsa , Gomori methenamine silver or periodic acid-Schiff

**Of grains:** observe size & color

**2.Culture:**

**Fungi:** SDA medium (identified by: macroscopic & microscopic features)

**Bacteria:** Blood agar (identified by: biochemical features)

**3.Serology:**

Detecting the antibodies (by immunodiffusion, , enzyme-linked immunosorbent assay)

**Note:**
Superficial samples of the draining sinuses are inadequate

Actinomycetoma is different from Actinomycosis (which is caused by anaerobic Actinomycetes)

# Mycetoma (Cont.)

## Treatment

### Eumycetomas:

1.Ketoconazole
2.Itraconazole
3.Voriconazole
4.Amphotericin B

### Actinomycetomas:

**Combining 2 of:**
1.Trimethoprim-sulfamethoxazole
2.Dapsone
3.Streptomycin

Therapy should take several **months to 1-2 years**

Less responsive compared to actinomycetomas

**If the patient is not responsive, (or bone was involved) surgical treatment is employed for eumycetomas**

Generally (for both types), bone involvement requires Radiologic tests then **amputation**

# Other examples of subcutaneous mycoses

| | Sporotrichosis | Phaeohyphomycosis | Chromoblastomycosis | Rhinosporidiosis | Lobomycosis |
|---|---|---|---|---|---|
| **Clinical features** | Subcutaneous or systemic infection<br>Nodular subcutaneous lesions,<br>verrucous plaques or Lymphatic | Subcutaneous or brain Abscess<br>Nodules and erythematous plaques | Subcutaneous Verrucous plaques, cauliflower aspect,<br>hyperkeratotic, Ulcerative | Granulomatous, mucocutaneous polyps | Subcutaneous Nodular lesions, keloids |
| **Etiology Skip !** | Dimorphic fungus<br>Sporothrix schenckii | Dematiaceous (darkly pigmented) mould fungi | Dematiaceous mould fungi | Obligatory parasitic fungus<br>Rhinosporidium seeberi | Obligatory parasitic fungus<br>Lacazia loboi |
| **Clinical sample** | Biopsy tissue | Biopsy tissue | Biopsy tissue | Biopsy tissue | Biopsy tissue |
| **Direct Microscopy** | Elongated yeast cells | Brown setpate hyphae | Muriform cells (sclerotic bodies) | Spherules with endospores | Chains of yeast cells |
| **Treatment** | Potassium iodide (KI)<br>Itraconazole | Surgery<br>(Antifungal therapy) | Surgery<br>(Antifungal therapy) | Surgery | Surgery |

## Bone and joint infections (uncommon)

Result from

- Hematogenous dissemination
- Presence of foreign body
- Direct inoculation of organism (e.g.: trauma, surgery)
- Spared as a result of direct extension of infection to the bone
  e.g.: most common :Aspergillosis, candida, Rhinocerebral zygomycosis, mycetoma

## QUESTIONS

**True or False:**

1. For Subcutaneous zygomycosis , smears show septate hyphae (F)
2. Madura foot is an example of mycetoma, a chronic disease characterized by abscess formation (T)
3. Gram is used to stain the smears of Eumycetoma (F)
4. Actinomycosis is caused by aerobic actinomycetes (F)
5. Direct microscopy for sporotrichosis shows elongated yeast cells (T)
6. The polyps formed by Rhinosporidiosis are treated by surgery (T)