Mycetoma

and other

Subcutaneous Mycoses

- The RED color for the important points.
- The GREEN color for the points in which the doctor said but didn't write in the slides.
- The BLUE color for explanation only.

Subcutaneous Mycoses

- Fungal infections involving the dermis, subcutaneous tissues, muscle and may extend to bone.
- they are initiated by trauma to the skin. [Very important when taking history of patient to know if they had a trauma].
- Are difficult to treat and surgical intervention is frequently employed.
- Diseases in healthy host, however, more severe disease in immunocompromised host.

Subcutaneous Mycoses Diseases:

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

Mycetoma

Mycetoma is a **chronic**, granulomatous disease of the skin and subcutaneous tissue, which sometimes involves muscle, and If not treated the disease will extend to the bones.

if it reach the bone it's very difficult to treat with medication so surgery is the best solution.

- It is characterized by Swelling called fungal tumor not really a tumor , abscess formation, and multiple draining sinuses that exude characteristic grains microcolonies of the organism 'etiology' of clumped organisms .
- Typically affects the lower extremities, but also other areas of the body e.g. hand, back and neck. Because of exposure
- The disease was first described in the Madura district of India in 1842, (Madura foot).

❖ Madura is a mycetoma

Classified according to the etiology as:

- Eumycetoma: those caused by fungi
- Actinomycetoma: those caused by aerobic filamentous bacteria (Actinomycetes)

❖ Really important to know in the exam the doctor won't write which causes which

Clinical presentation:

- Clinical findings are similar for both.
- Eumycetoma are usually more **localized** than actinomycetoma because bacteria will grow faster

- Actinomycetoma is **less** localized and respond **better** to treatment in comparisons to eumycetoma **why?** Because it's caused by bacteria not fungi

Mycetoma is acquired via trauma (car accident, injury, farmers and maybe surgery of the skin)

1. Start as a painless subcutaneous swelling (history of trauma)
2. Later (years), painless subcutaneous firm nodules are observed in the site of infection
3. massive swelling with skin 'the nodules' rupture, and sinus tract formation the sinus will discharge pus, grains (granules)

- old sinuses close and new ones open, draining exudates with grains (granules)

Grains may sometimes be seen with the naked eye.

❖ Since this process takes years so when you ask the patient "did you had any trauma?" the patient may not remember because it happened years before

Clinical case e.g.:

A farmer from Madina had a mycetoma in his right foot for 45 years and when he was asked if he had a trauma the patient couldn't remember.

❖ Mycetoma is a very chronic disease

Picture of Madura foot:

Swelling of the foot and you can see the abscesses and sinuses

Mycetoma is endemic in tropical, subtropical, and temperate regions. Sudan, Senegal, Somalia, India, Pakistan, Mexico, Venezuela.

➢ In Saudi we had 3 or 4 cases last year in KKUH

- Is more common in men than in women (ratio is 3:1). That's because of exposure if the rate of women working in farms is the same of men's the ratio would be similar
- Commonly in people who work in rural areas, framers very common in farmers

❖ [Late stages may need to amputate the leg]

Etiology

Eumycetomas

Caused by a several filamentous **mould fungi**

<u>The most common are:</u>

- *Madurella mycetomatis is the most common in Saudi Arabia,*
- *Madurella grisea,*
- *Pseudallescheria boydii*

❖ The color of grains **is black or white** if any other color might be other fungi or bacteria

Actinomycetomas

Caused by aerobic filamentous bacteria, gram positive

- *Actinomadura madurae*
- *Streptomyces somaliensis*
- *Nocardia brasiliensis*

❖ Color of grains yellow, white, yellowish-brown, pinkish – red.

Actinomycosis (anaerobic Actinomycetes bacteria) not mycetoma

- If a patient had the clinical presentation of mycetoma (trauma, swelling, abscess, grains..) then in the lab we grow actinomycetes bacteria it is a case of actinomycetoma.
- But if a patient had abscess in the mouth and a sample which was sent to the lab grew anaerobic actinomycetes this is not **mycetoma** it is **actinomycosis**

Extra information

Mycetoma is a big problem in Sudan they diagnose 6-7 new cases every week, therefore they initiate a mycetoma research center.

The Mycetoma Research Centre is a medical research center dedicated to finding a cure for the disease mycetoma. The MRC is located in Khartoum, Sudan. It is part of The University of Khartoum.

Dr. Ahmed Hassan Fahal is the director of the center. There are two dozen staff members at the Khartoum site.

Mycetoma is difficult to treat. It is endemic to the drier areas of the world, including Brazil, Mexico, the Sahel, India and Arabia.

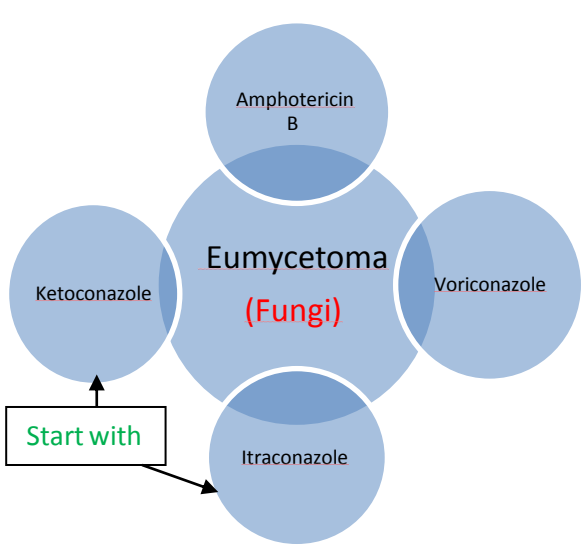
Diagnoses

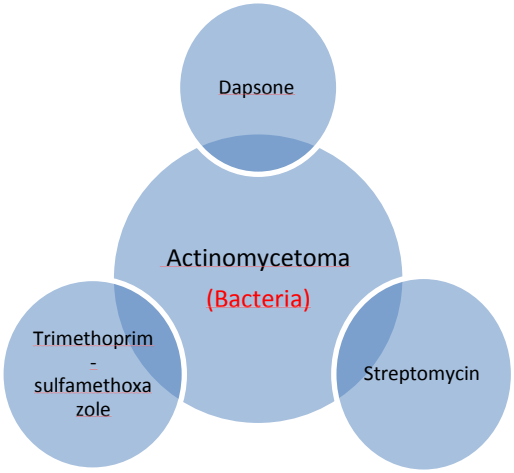
No skin scrapping; might give a negative result

- Clinical sample
  - Biopsy (Superficial samples of the draining sinuses are inadequate)
  - Pus
  - Blood (only for Serology)
- Direct microscopic examination
  - of tissue or exudate of the draining sinuses
    - Histological section
      - hematoxylin & Eosin
    - Smears
      - Giemsa
      - Gomori methenamine silver
      - periodic acid-Schiff
    - Actinomycetes
      - Gram
        - Only when suspecting bacteria
      - ZN (type of acid fast staining)
        - usually for actinomyosin (mainly Nocarida), to difrentiate Nocardia from other actinomyocetes
  - Grains (size of filaments, color, &grain)
    - white-yellow
      - *P . boydii*, *Nocardia* species, or *A. madurae* infection
    - Black
      - *Madurella* species infection
    - Red-to-pink
      - *A . pelletieri* infection
- culture
  - SDA (Isolate fungi)
    - identified via macrascopic & microscopic features
  - Blood Agar (Isolate Bacteria)
    - Actinomycetes biochemical and other tests are used for identification
- Serology
  - Detect antibodies
    - culture filtrate or cytoplasmic antigens of mycetoma agents
  - Determine antibodies
    - immunodiffusion, ELISA (enzyme-linked immunosorbent assay)

Gram stain and KOH not used, usually start with giemsa or silver stain

Treatment





Combination of 2 drugs is used

- Therapy for several months or years (1-2 years or more), antibiotics 1-10 days
  Prescribe ketoconazole, itraconazole for 1 week for a patient with mycetoma.
- Actinomycetoma respond to treatment better than Eumycetoma
- Radiological tests are done if bone involvement is suspected (such as lytic lesions or cavities, osteoporosis)
- Surgical intervention in patient not responding to medical treatment alone and if bone is involved
  (Eumycetoma debridement or amputation is done)


- Caused by trauma (direct injury)
- No abscesses or sinuses, & swelling (this is how we diffrenciate between it and mycetoma
- skin distortion and black necrosis because in the site of infection because the fungi zygomycin which causes thrombosis
Chronic localized firm, Subcutaneous masses
Firm swelling of site with intact skin-Distortion
Direct spread to adjacent bone and tissue
Site & Acquirment
Acquired via traumatic implantation of spores (needle-stick, tattooing, contaminated surgical dressings, burn wound)
Facial area, hand, arm, leg, &thigh
Difference between zygomycete and dematecous fungi is that they are fast growing
Subcutaneous zygomycosis
Caused by zygomycete Not by mycetoma
Etiology
Basidiobolus ranarun
Conidiobolus coronatus
few mucorale
Labratory Diagnoses
Specimen
Biopsy tissue
Direct microscopy
stained sections or smears: broad non-septate fungal hyphae
When we see this it is zygomycin
Culture on SDA
Treatment
Oral Potassium iodide (KI)
Posaconazole
Amphotericin B
Zygomycetes is resistant to all treatments except Amphotericin B

Phaeohyphomycosis

- Fungal infections caused by dematiaceous fungi (darkly pigmented), no systemic involvement.
- Widely distributed in the environment
- Subcutaneous or brain abscess
- Site of infection: thigh, legs, feet, & arms.

Etiology:

- Dematiaceous mold

Common

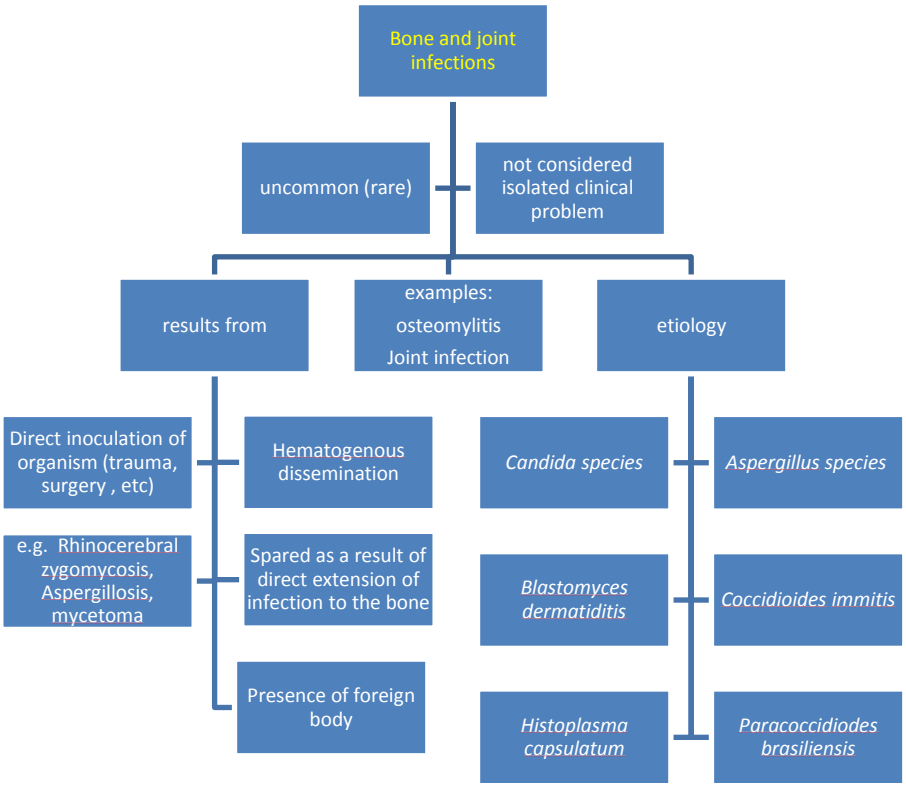
Cladosporium	*Bipolaris*	
Cladophialop	*Wangiell*	*Exophiala*

Diagnosis:

- Specimens: pus, Biopsy tissue
- Direct Microscopy: KOH
- Culture On SDA

Treatment:

- Surgical Excision of the lesion
- Antifungal (Itraconazole, Posaconazole)



Seen in people that work in farms or gardens

	Sporotrichosis	Phaeohyphomycosis	Chromoblastomycosis	Rhinosporidiosis	Lobomycosis
Clinical features	Subcutaneous or systemic infection (Mainly in hand) Nodular subcutaneous lesions, verrucous plaques or Lymphatic	Subcutaneous or brain Abscess Nodules and erythematous plaques	Subcutaneous Verrucous plaques, cauliflower aspect, hyperkeratotic, Ulcerative	Granulomatous, mucocutaneous polyps	Subcutaneous Nodular lesions, keloids
Etiology	Dimorphic fungus (yeast and mould) *Sporothrix schenckii*	Dematiaceous (darkly pigmented) mould fungi	Dematiaceous mould fungi	Obligatory parasitic fungus *Rhinosporidium seeberi*	Obligatory parasitic fungus *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 Itraconazole	Surgery (Antifungal therapy)	Surgery (Antifungal therapy)	Surgery	Surgery

MCQs

1. Which of the following is untrue about mycetoma?
   a) It may be caused by *Nocardia, Madurella, Actinomadura, Streptomyces* and *Pseudallescheria boydii*
   b) Fungi enter through trauma and produce small subcutaneous swellings
   c) The discharge contains granules of fungal spores
   d) It is exclusively a disease of the lung

2. Actinomycotic mycetoma is different from Eumycetoma?
   a) Color of grains are yellow or red
   b) Less localized
   c) Caused by bacteria
   d) All of the above

3. What is the most useful clinical sample for the subcutaneous skin infection?
   e) Skin Scraping
   f) Blood sample
   g) Skin Biopsy
   h) Hair shaft

4) what is the drug of choice for zygomycin?
A) itrocenazole
b) Voriconazole

c) fluconazole

d) Amphotericin B