Lecture Title:
Mycetoma and other Subcutaneous Mycoses

(Musculoskeletal Block, Microbiology)

Lecturer name:

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Lecture Objectives..

1. Acquire the basic knowledge about mycetoma and the clinical features of the disease
2. Acquire the basic knowledge about other common subcutaneous mycosis and their clinical features.
3. Know the main fungi that affect subcutaneous tissues, muscles and bones.
4. Identify the clinical settings of such infections
5. Know the laboratory diagnosis, and treatment of these infections.

SUBCUTANEOUS MYCOSES

- Fungal infections involving the dermis, subcutaneous tissues, muscle and may extend to bone.
- They are initiated by trauma to the skin.
- Are difficult to treat and surgical intervention is frequently employed.
- Diseases in healthy host, however, more severe disease in immunocompromised host.

SUBCUTANEOUS MYCOSES

- 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 bones.

- It is characterized by Swelling , abscess formation, and multiple draining sinuses that exude characteristic grains of clumped organisms .

- It typically affects the lower extremities, but also other areas of the body e.g. hand, back and neck.

- The disease was first described in the Madura district of India in 1842, (Madura foot).

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

  Clinical findings are similar for both.

  Eumycetoma are usually more localized than actinomycetoma

MYCETOMA

- Mycetoma is endemic in tropical, subtropical, and temperate regions.

Sudan, Senegal, Somalia, India, Pakistan, Mexico, Venezuela

- Is more common in men than in women (ratio is 3:1).

- Commonly in people who work in rural areas, framers

MYCETOMA

Mycetoma is acquired via trauma of the skin

Start as a painless subcutaneous swelling (history of trauma)

↓

years later, painless subcutaneous firm nodule is observed

↓

massive swelling with skin rupture, and sinus tract formation

old sinuses close and new ones open, draining exudates with grains (granules)
Grains may sometimes be seen with the naked eye.

MYCETOMA

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

MYCETOMA

Etiology

Eumycetomas

Caused by a several mould fungi
The most common are
Madurella mycetomatis, Madurella grisea, and *Pseudallescheria boydii*

The color of grains is black or white

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)

MYCETOMA

Diagnosis:

Clinical samples:

Biopsy tissue (Superficial samples of the draining sinuses are inadequate)

Pus

Blood (for serology only)

1. Direct microscopic examination

Microscopic examination of tissue or exudate from the draining sinuses

- Histological sections: Hematoxylin-Eosin,
- Smears: Stain with Giemsa , Gomori methenamine silver , or periodic acid-Schiff stain (Fungi)
- Stain by: Gram, ZN (Actinomycetes)

Grains (Observing the size of the filaments , the color of the grain)

e.g.

- White-to-yellow grains indicate *P . boydii, Nocardia* species, or *A. madurae* infection.
- Black grains indicate*, Madurella* species infection.
- Red-to-pink grains indicate *A . pelletieri* infection.

MYCETOMA

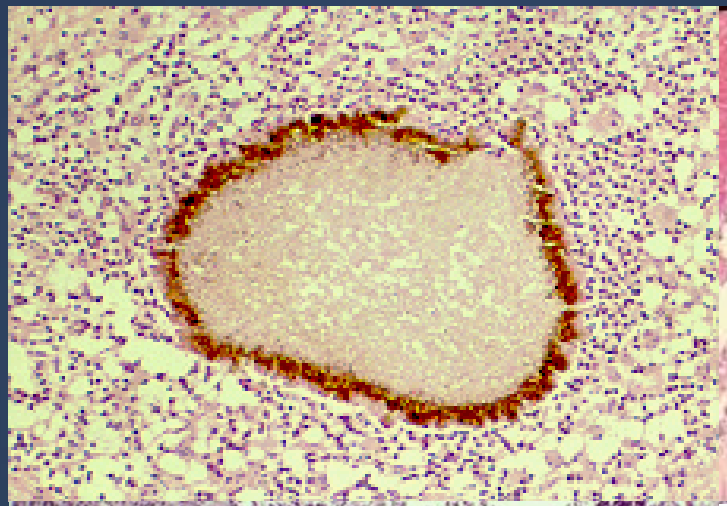
Diagnosis

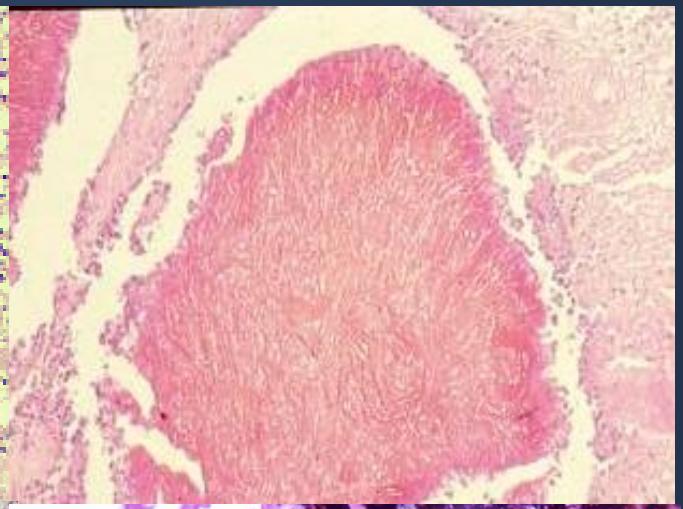
2. Culture

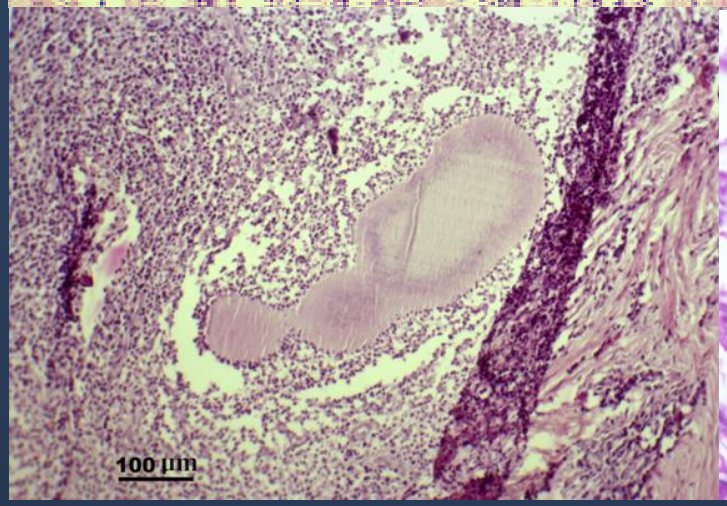
Media such as Sabouraud dextrose agar (SDA) to isolate fungi

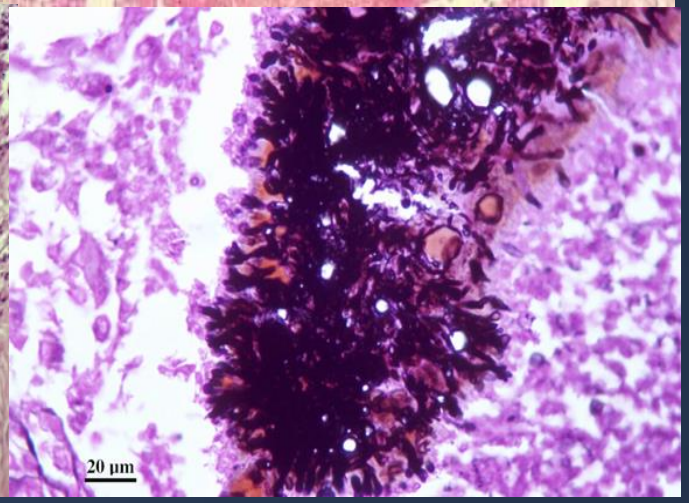
Blood agar to isolate bacteria.

- Fungi are identified based on the macroscopic and microscopic features.
- For Actinomycetes biochemical and other tests are used for identification






100 µm


20 µm

MYCETOMA

Diagnosis

2. Culture

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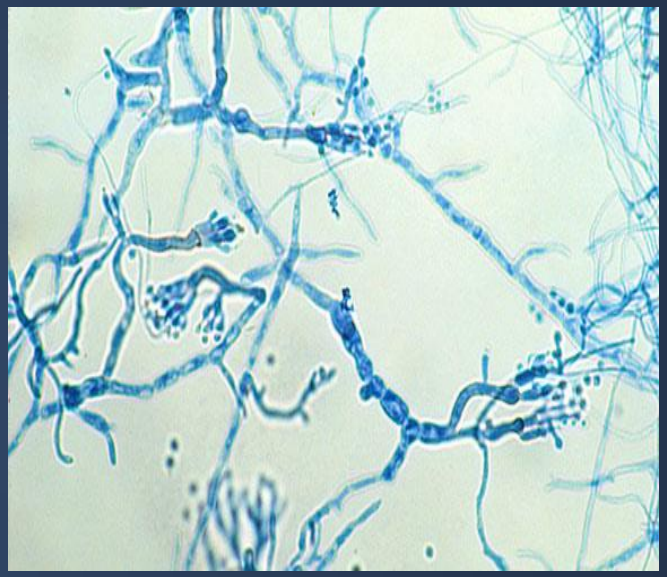
Blood agar to isolate bacteria.

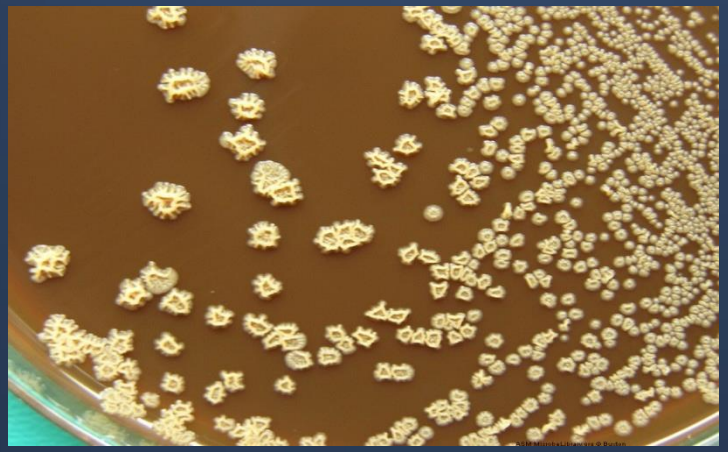
Fungi are identified based on the macroscopic and microscopic features.
For Actinomycetes biochemical and other tests are used for identification

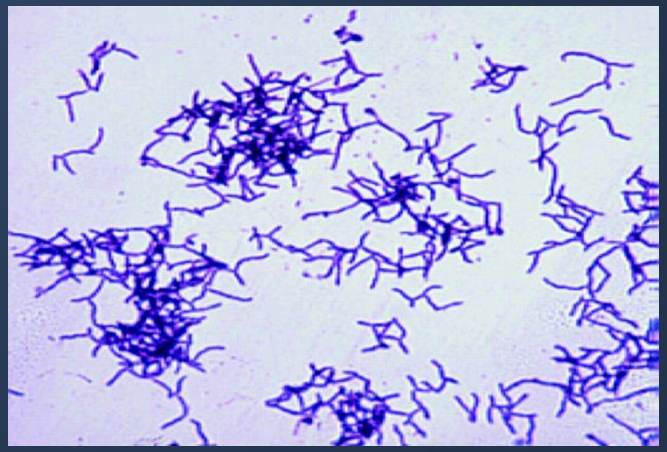
3. Serology:

Detect the antibodies using culture filtrate or cytoplasmic antigens of mycetoma agents
Antibodies can be determined by immunodiffusion, , enzyme-linked immunosorbent assay

Helpful in some cases for diagnosis and follow-up







MYCETOMA

Treatment

Eumycetoma : Itraconazole

Also Voriconazole and Amphotericin B

Actinomycetoma: Trimethoprim-sulfamethoxazole
Dapsone
Streptomycin
Combination of 2 drugs is used

- Therapy is suggested for several months or years (1-2 years or more)
- Actinomycetoma generally respond better to treatment than eumycetoma

- Radiologic tests (bone radiographs) if bone involvement is suspected (Multiple lytic lesions or cavities, Osteoporosis)

Surgical Care: In eumycetoma, surgical treatment (debridement or amputation) in patient not responding to medical treatment alone and if bone is involved.

SUBCUTANEOUS ZYGOMYCOSIS

- Chronic localized firm Subcutaneous masses
- Facial area or other like hand, arm, leg, thigh.
- Firm swelling of site with intact skin-Distortion. Direct spread to adjacent bone and tissue.
- Acquired via traumatic implantation of spores

  needle-stick, tattooing, contaminated surgical dressings, burn wound

Etiology:

Mould fungi of the Zygomycetes, (Entomophthorales and Mucorales)

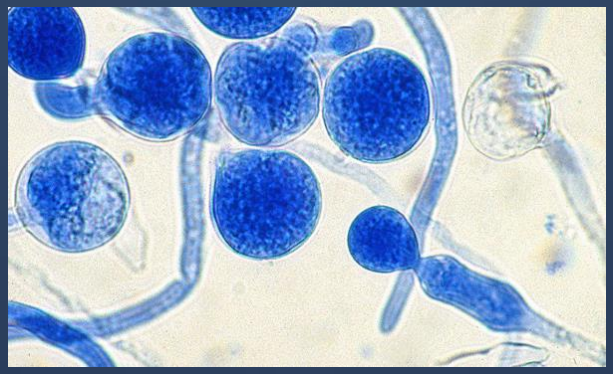
Entomophthorales : *Conidiobolus coronatus, Basidiobolus ranarun*,

Mucorales: *Rhizopus*, *Mucor*

SUBCUTANEOUS ZYGOMYCOSIS

SUBCUTANEOUS ZYGOMYCOSIS

Entomophthorales, Zygomycete
Basidiobolus species and *Conidiobolus* species



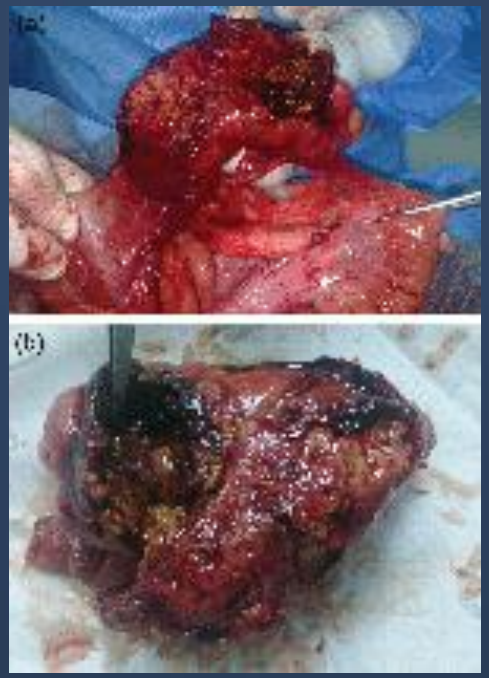
Basidiobolus ranarum

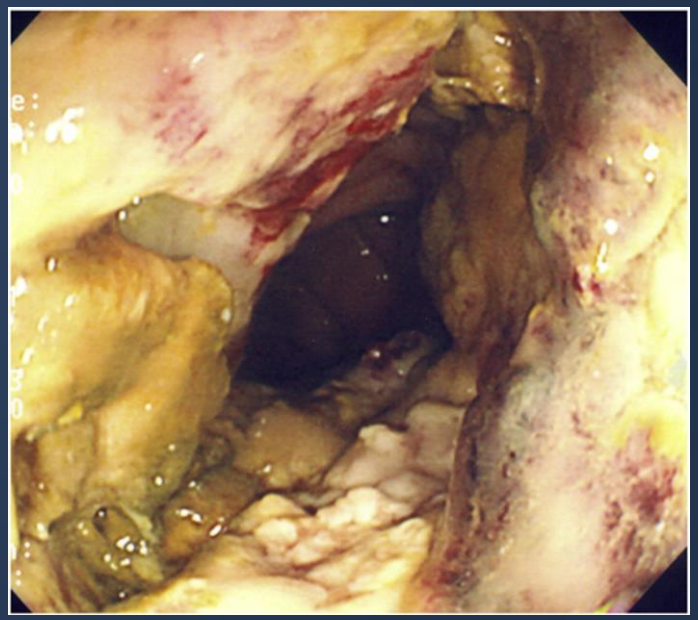
Conidiobolus species

SUBCUTANEOUS ZYGOMYCOSIS

Gastrointestinal

Basidiobolomycosis

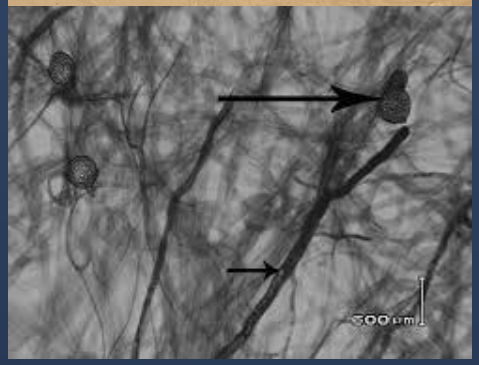




Basidiobolomycosis

Basidiobolomycosis

Basidiobolus species are filamentous fungi that belong to the order Entomophthorales, Zygomycete



Basidiobolus ranarum

SUBCUTANEOUS ZYGOMYCOSIS

Rhinofacial

Conidiobolomycosis

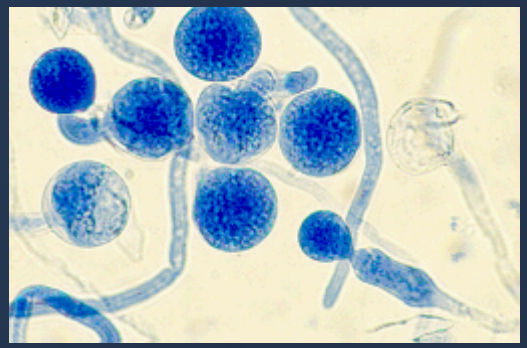
SUBCUTANEOUS ZYGOMYCOSIS

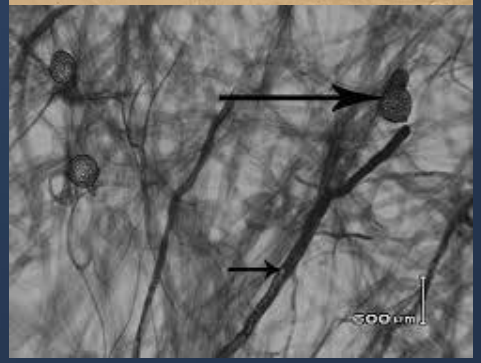
Laboratory Diagnosis:

Specimen: Biopsy tissue

Direct microscopy:
stained sections or smears: broad non-septate hyphae

Culture: Culture on SDA





Basidiobolus ranarum

Treatment:

Oral Potassium iodide (KI)
Amphotericin B
Posaconazole

PHAEOHYPHOMYCOSIS

Is a group of fungal infections caused by dematiaceous (darkly pigmented) fungi widely distributed in the environment

Subcutaneous or brain Abscess

Presents as nodules or erythematous plaques with no systemic involvement

Affected site: Thigh, legs, feet, arms

Etiology

Dematiaceous mold fungi.

common: *Cladosporium, Exophiala, Wangiella, Cladophialophora*, *Bipolaris*

Diagnosis

Specimens: Pus, biopsy tissue

Direct Microscopy: KOH & smears will show brown septate fungal hyphae

Culture: On SDA

Treatment

The treatment of choice is Surgical excision of the lesion

Antifungal (Itraconazole, Posaconazole)

SPOROTRICHOSIS

Subcutaneous , deep cutaneous or systemic fungal infection

Inoculaion into the skin
Can present as
- plaque (subcutaneous nodules)
- Lymphanginitic
- Dissiminated

Etiology: *Sporothrix schenckii*.
Dimorphic fungus

- **Laboratory Diagnosis:**

Specimen: Biopsy tissue, ulcerative material
Direct Microscopy: smear will show Finger-like yeast cells or Cigar shaped
Culture: On SDA at room temperature and at 37^{o}C

Treatment
Itraconazole, KI

CHROMOBLASTOMYCOSIS

- Subcutaneous chronic fungal infection different dematiaceous fungi
- The initial lesion is single nodule, then new nodules appear
- The lesions become large with a cauliflower aspect and black dots, hyperkeratotic,Verrucous, Ulcerative

Other subcutaneous fungal infections

	Sporotrichosis	Phaeohyphomycosis	Chromoblastomycosis
Clinical features	Subcutaneous or systemic infection Nodular subcutaneous lesions, verrucous plaques or Lymphatic	Subcutaneous or brain Abscess Nodules and erythematous plaques	Subcutaneous Verrucous plaques, cauliflower aspect, hyperkeratotic, Ulcerative
Etiology	Dimorphic fungus *Sporothrix schenckii*	Dematiaceous (darkly pigmented) mould fungi	Dematiaceous mould fungi
Clinical sample	Biopsy tissue	Biopsy tissue	Biopsy tissue
Direct Microscopy	Elongated yeast cells	Brown setpate hyphae	Muriform cells (sclerotic bodies)
Treatment	Potassium iodide Itraconazole	Surgery (Antifungal therapy)	Surgery (Antifungal therapy)

Thank You ☺

(Musculoskeletal Block, Microbiology)

Dr. Ahmed M. Albarrag