

Mucoraceous Molds

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Mucorales

Mucorales includes *Rhizopus*, *Mucor* and *Lichtheimia* molds known for their characteristic black colour and angioinvasive manifestations. Central nervous system mucormycosis is mostly seen as an extension from nose or paranasal sinus with a blackish discharge while acute and rapidly fatal gastrointestinal mucormycosis is seen in patients with extreme malnutrition. Treatment consists of intravenous anti-fungal (lipid formulations of amphotericin B are first-line) and surgical excision of the infected tissue whenever feasible.

Clinical Presentation

Table 3.4: Types of mucormycosis

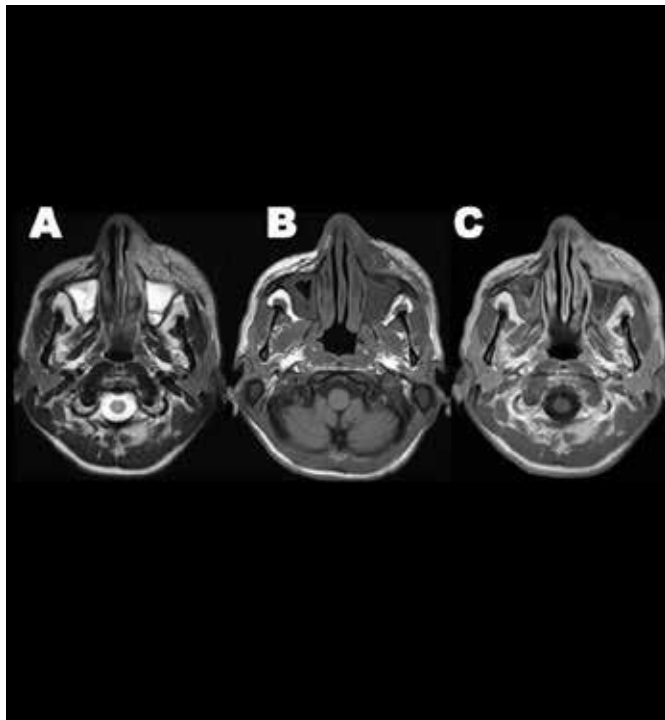
- | | |
|---|--|
| <ul style="list-style-type: none">• Central nervous system mucormycosis• Rhinocerebral mucormycosis• Sinopulmonary mucormycosis• Gastrointestinal mucormycosis• Disseminated mucormycosis | <ul style="list-style-type: none">• Rare:<ul style="list-style-type: none">• Endocarditis• Osteomyelitis• Isolated cerebral, renal and peritoneal disease• Chronic subcutaneous infection |
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Rhinocerebral mucormycosis

Fig. 3.3-1

Pulmonary mucormycosis

Fig. 3.3-2



A. Axial T2-weighted image shows edema and induration of the left cheek and the left nasolabial fold along with diffuse sinus disease.

B (pre-contrast) and C (post-contrast). Axial T1-weighted images show an inflammatory mass with enhancement. Most commonly seen in diabetics. Patients present with facial pain and headache, and development of black ulcers reflects characteristic tissue necrosis.



High resolution CT (HRCT) of chest from a diabetic patient with pulmonary mucormycosis showing consolidation and cavitation in the right middle lobe. Seen mostly in patients with severe immunocompromise. Patients with COPD on chronic steroid treatment are also at risk. Subacute presentation is seen in some patient populations.

Orbital mucormycosis

Fig. 3.3-3

Cutaneous mucormycosis

Fig. 3.3-4



Non-contrast CT of the orbits shows left-sided proptosis and infiltration of the retrobulbar fat. The orbital globe is deformed consistent with necrosis. The patient had poorly controlled diabetes and presented with loss of vision in the left eye along with periorbital ecchymosis and facial pain. Enucleation of the orbit was carried out. Histopathology revealed broad non-septate hyphae consistent with mucormycosis.

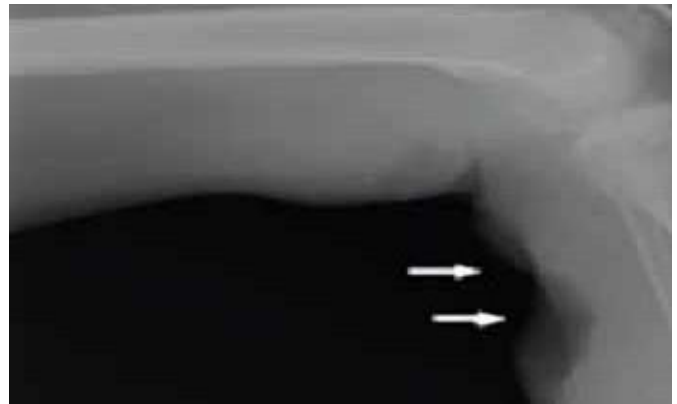
Typical tissue necrosis. Due to angioinvasive nature of mucoraceous molds, there is ischemia, necrosis and gangrene of tissue. Predominantly involves epidermis and dermis.

Cutaneous mucormycosis

Fig. 3.3-5

Soft tissue mucormycosis

Fig. 3.3-6



Tissue gangrene. Infection is often secondary to trauma, burn, surgery, systemic infection at any other site, and use of contaminated dressings.

Plain x-ray shows soft tissue defect in the popliteal and infrapopliteal region of the left lower limb.

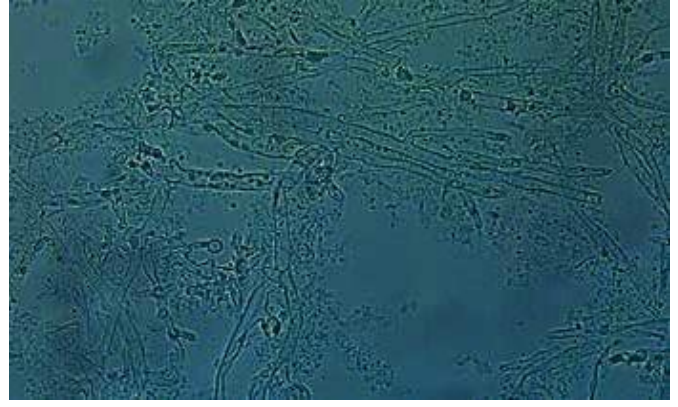
Mucorales, growth on tissue on gross examination

Fig. 3.3-7

Mucorales, microscopy on 10% KOH wet mount smear Fig. 3.3-8

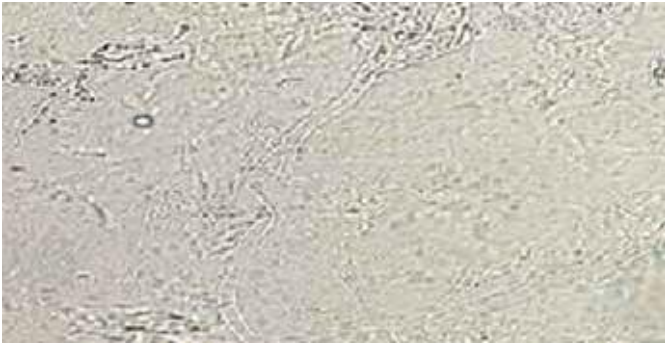


Growth of fluffy mucoraceous molds at tissue incubated at room temperature.



Typical ribbon-like aseptate hyphae. (x40)

Mucorales, microscopy on 10% KOH wet mount smear
Fig. 3.3-9



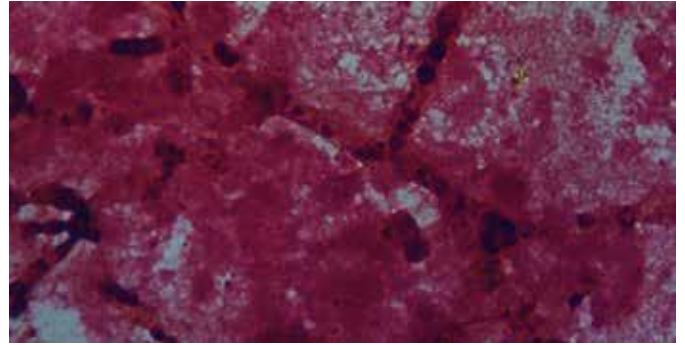
Typical ribbon-like aseptate hyphae. (x40)

Mucorales, H&E stain of tissue

Fig. 3.3-11

Mucorales, Gram stain

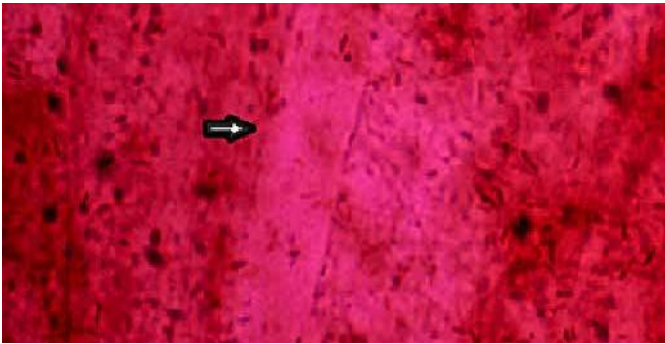
Fig. 3.3-10



Hyphae of mucoraceous molds.(x100)

Mucorales, H&E stain of muscle tissue

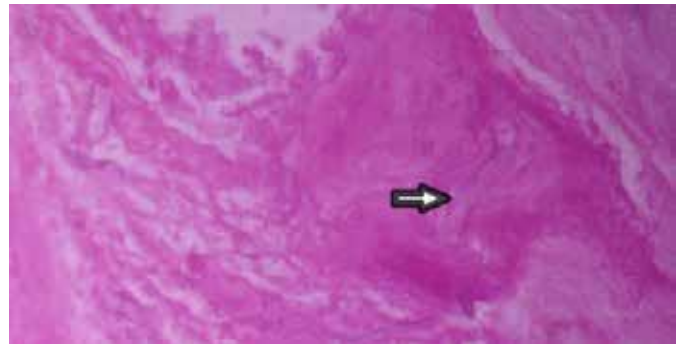
Fig. 3.3-12



Broad aseptate hyphae. (x100)

Mucorales, culture on SDA

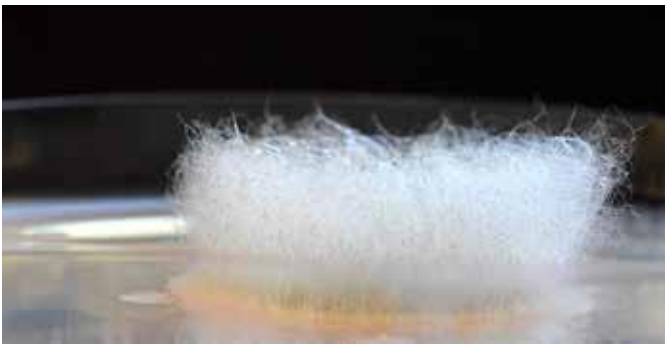
Fig. 3.3-13



Broad aseptate hyphae. (x100)

Mucorales, culture on SDA

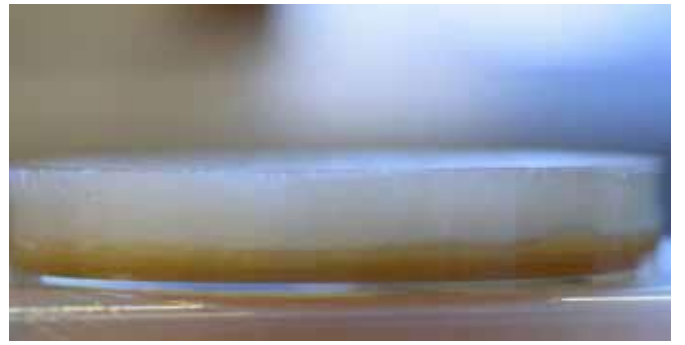
Fig. 3.3-14



Rapid growth of mucoraceous molds within 12 hours of inoculation.

Absidia corymbifera, culture on SDA

Fig. 3.3-15



Rapidly growing lid lifter colonies filling the petri dish.

Mucor spp., culture on SDA

Fig. 3.3-16



White to pale grey colonies.



White to pale grey colonies.

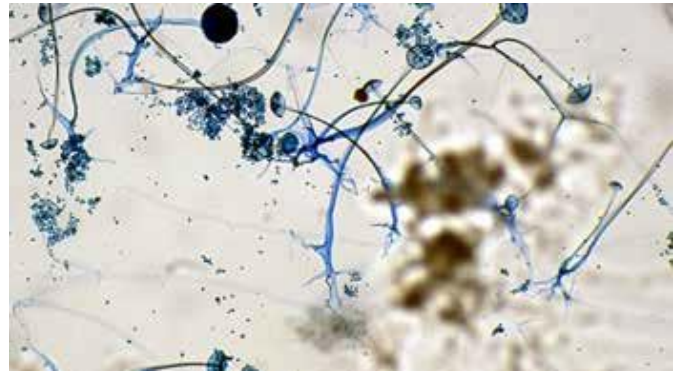
Fig. 3.3-11 Copyright © Wiley Online Library, [Int Wound J 8, 2011, 651-5, doi: 10.1111/j.1742-481X.2011.00839.x.]
Fig. 3.3-12 Copyright © Wiley Online Library, [Int Wound J 8, 2011, 651-5, doi: 10.1111/j.1742-481X.2011.00839.x.]

Rhizopus spp., culture on SDA

Fig. 3.3-17

Rhizomucor spp., LPCB wet mount preparation

Fig. 3.3-18



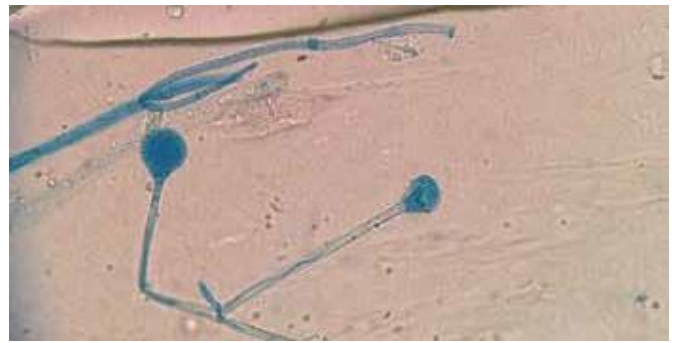
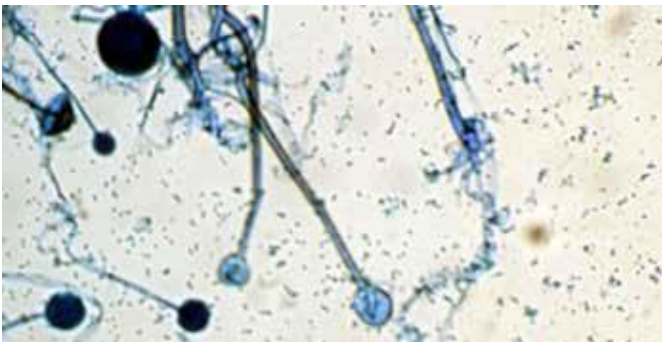
Grey-to-black older colonies around the rim of the plate. Round sporangia and internodal rhizoids. (x40)

Rhizopus spp., LPCB wet mount preparation

Fig. 3.3-19

Absidia spp., LPCB wet mount preparation

Fig. 3.3-20



Round sporangia and nodal rhizoids. (x10)

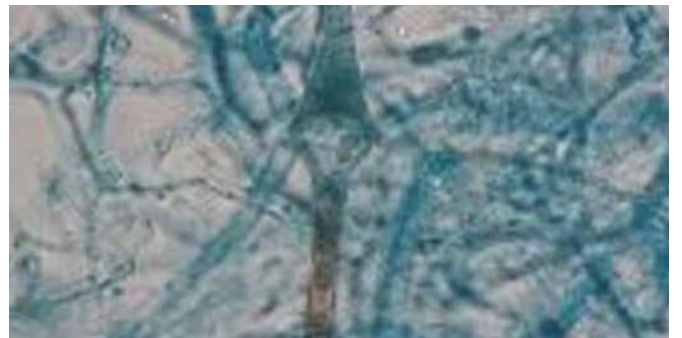
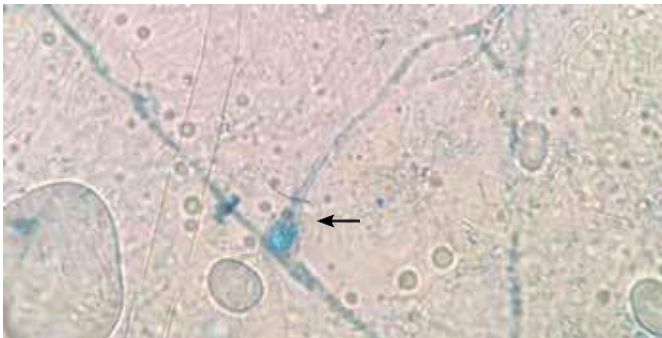
Small pear-shaped sporangia. (x10)

Apophysomyces spp., LPCB wet mount preparation

Fig. 3.3-21

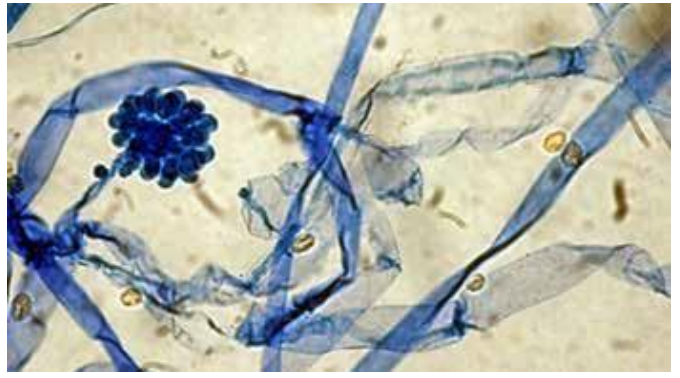
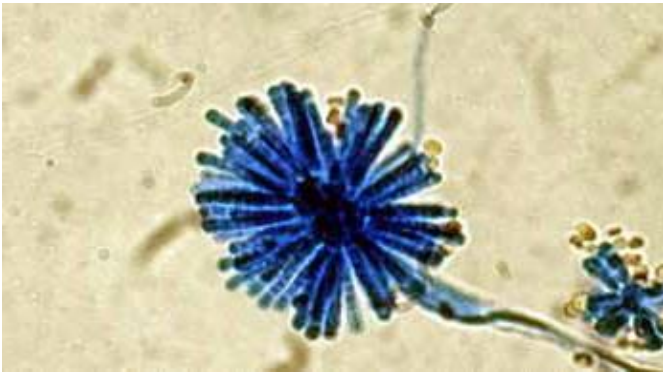
Saksenaea vasiformis, LPCB wet mount preparation

Fig. 3.3-22



Pear-shaped sporangia and prominent apophysis (arrow). This mold is very difficult to sporulate. (x40)

Flask-shaped sporangia. This mold is very difficult to sporulate. (x40)



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Finger-like tubular sporangia arranged on a vesicle. (x40) Vesicles covered with spine-like denticles. (x40)

Entomophthorales

In immunocompetent hosts, *Entomophthorales* cause distinct cutaneous syndromes (entomophthoromycosis). In immunocompromised hosts, the species causes rare opportunistic pulmonary and disseminated infection similar to that of Mucorales fungi. Some species have a predilection for certain sites:

- *Basidiobolus ranarum* is a cause of subcutaneous infection, also known as basidiobolomycosis.
- *Conidiobolus coronatus* or *Conidiobolus incongruus* is the most common cause of rhinofacial infection, also known as conidiobolomycosis.

Clinical Presentation

Subcutaneous entomophthoromycosis

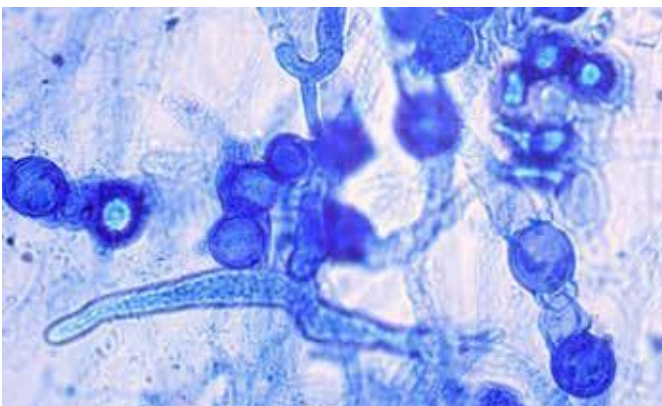
Fig. 3.3-25



Extensive tissue ischemia and necrosis secondary to infection with *Basidiobolus* spp.

Basidiobolus spp., LPCB wet mount preparation

Fig. 3.3-27



Club shaped spores and intercalary zygosporangia. (x100)

Basidiobolus spp., wet mount preparation

Fig. 3.3-29

Chronic subcutaneous infection

Fig. 3.3-26



Visible deformation of facial contours secondary to infection with *Conidiobolus* spp.

Conidiobolus spp., culture plate

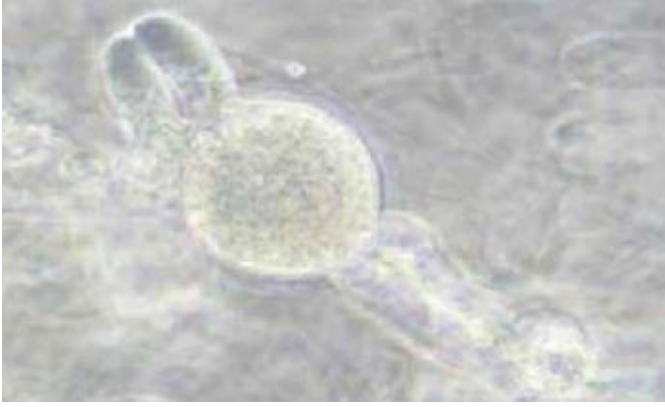
Fig. 3.3-28



White colonies.

Conidiobolus spp., LPCB wet mount preparation

Fig. 3.3-30



Direct microscopy from tissue biopsy reveals parrot beak shaped zygosporangium. (x40)

