

## Mucormycosis - The Dark Shadow of Coronavirus

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As the crippling crisis of Covid-19 infection continuous to devastate India new deadly complications of the infection have surfaced. The Coronavirus's new partner in crime is the deadly fungal infection mucormycosis or as the media has named it "Black Fungus".

Mucormycosis is a rare but deadly opportunistic fungal infection, commonly seen in immunocompromised patients. It belongs to saprophytic fungi group - Mucorales order and Zygomycetes class. The mode of infection is usually via the inhalation route and infection begins in the nose and paranasal sinuses with vascular invasion, forming thrombi in the blood vessels, leading to reduced blood supply and tissue necrosis of nearby tissue and osteomyelitis. It is an aggressive and potentially fatal infection more commonly observed in immunocompromised patients.

Clinically, mucormycosis has following six forms, based on various systemic involvement: Rhino-orbito-cerebral, pulmonary, gastrointestinal, cutaneous, disseminated and miscellaneous.

It is predisposed by immunocompromised state like patients with diabetes mellitus, on high dose or long term corticosteroids and immunosuppressive drugs, malignancies, post solid organ transplantation, iron overload etc. There is increasing incidence of rhino-orbito-cerebral mucormycosis in COVID-19 patients in India. It is a rapidly progressive disease and spreads within days. Even a slight delay in the diagnosis or management can lead to devastating morbidity and mortality. However, the disease can be optimized by early diagnosis and aggressive treatment.

Most of these patients have similar presentation with history of recent COVID-19 infection, have received high dose steroids, had Diabetes Mellitus prior or developed after steroid intake and

unmonitored sugars during treatment for coronavirus. Other risk factor is high ferritin levels in covid 19 infection. Hence patients who are infected with coronavirus and has Diabetes Mellitus or is on high dose steroids should be closely observed for early signs of mucormycosis. In case of any suspicion, an immediate otorhinolaryngology and ophthalmology consultation should be sought.

Warning symptoms of mucormycosis are visual disturbances like double vision, restriction of eye movements or sudden loss in vision, eye swelling or pain, jaw or dental pain, facial swelling or pain, nasal block or epistaxis, severe headache, altered sensorium and fever should undergo evaluation for mucormycosis. Patients with suspected mucormycosis should undergo nasal endoscopy and oral examination with biopsy from suspicious area, ophthalmology and neurology evaluation. Otorhinolaryngology examination shows blackish discolouration or necrotic eschar over nasal turbinates, blackish foul smelling crusts or avascular pale nasal mucosa. Ulcer or blackish discolouration over palate or upper alveolus or loosening of teeth is seen if the maxilla is involved.

The specimen taken should be send for fungal KOH (potassium hydroxide) test and fungal culture which will show growth of non-septate irregular, ribbon-like fungal hyphae. Fungal KOH yields faster results for prompt management. Further testing with histopathology shows invasion of tissue by fungal hyphae. Additional pus culture should be done to rule out superimposed bacterial infection.

The radiological investigation of choice is contrast MRI study of the paranasal sinuses, orbit and brain. Ischemia and non-enhancement of involved paranasal sinuses and turbinates is seen on MRI (black turbinate sign). Mucormycosis lesions tends to be isointense or hypointense in MRI.

Blood investigations show low lymphocyte counts reflecting an immunocompromised state and uncontrolled blood sugar levels.

The treatment of mucormycosis is antifungal therapy with surgical debridement of involved area. Antifungal therapy include starting the patient on Injection Liposomal Amphotericin B 5 mg/kg/day for atleast 2 - 3 weeks. Renal impairment can occur with antifungal therapy hence regular monitoring of renal function and dose modification is needed. Daily monitoring of electrolytes, renal function and blood sugar levels is needed. Oral antifungal like posaconazole is later added as adjuvant to amphotericin. Antifungal therapy is expensive and patient usually require hospital stay for weeks adding to the financial constraints of the patient.

Surgical management is early endoscopic debridement of nasal cavity and involved paranasal sinuses and/or total or partial maxillectomy depending on the involved areas and extend of disease. Regular examination of the post-operative cavity is needed. In case of extensive disease of orbit with loss of vision/total ophthalmoplegia - orbital exenteration is done. If there is only limited orbital involvement, retroorbital injection of Amphotericin B with frequent imaging and eye evaluation at regular interval is usually done. They usually require multiple surgeries and morbidity associated with debridement is high. Due to their recent history of covid 19 infection and lung status, most patient requires post-surgery ICU stay with ventilator support. Even after aggressively treating the infection, the mortality rate is 50%.

The danger is higher than ever and is knocking at our doors. As the two infections continue to create havoc, India's healthcare system is on the brink of collapse. Late presentations, shortage of amphotericin, shortage of hospital beds, ICU beds and ventilators for post-operative care are some of the burdens faced by doctors treating the infection. 'Prevention is better than cure' holds more significance than ever in the current scenario. Now is the time to show caution. Limiting the use of steroids in covid 19 infection, strict monitoring of blood sugars in patients receiving steroid therapy, vaccinating the population to reduce the severity of covid 19 infection, creating awareness regarding the early signs and symptoms of mucormycosis, maintaining good oronasal hygiene with avoiding reuse of disposable masks, early diagnosis with prompt treatment are some of the measures that can be followed.

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