

## Rhino-Orbital-Cerebral Mucormycosis: Battle for Life Continues, Post-COVID

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Mucormycosis is an invasive fungal infection of nose and paranasal sinuses by fungi from family Mucoraceae, is usually seen in diabetic and immunocompromised patients. In patients with COVID-19, the early start of high dose steroids even in mild stage, the use of immunomodulators (Tocilizumab), longstanding oxygen therapy and previous uncontrolled diabetes mellitus are the important factors predisposing to this fulminant infection.

The fungal spores after inhalation, proliferates in nose and paranasal sinuses, invades blood vessels, causing thrombosis and tissue necrosis. It may spread to orbit by direct extension or via haematogenous route and to the brain through cribriform plate, orbital apex or via orbital vessels, mainly arteries.

The common symptoms are periorbital or facial swelling with discoloration, decreased vision, ptosis, proptosis, restricted eye movement in order of decreasing frequency. Headache, nasal obstruction, discharge, eye oedema, redness or dental pain may be present. Nasal or palatal eschar may be visible on examination.

Complete blood count with sugar level and renal function assessment is advisable. Diagnostic nasal endoscopy with biopsy of suspected necrotic tissue from over the turbinate should be sent for both KOH staining and histopathology. KOH stain typically show broad aseptate fungal hyphae with branching at right angles and histopathology will confirm necrotizing vasculitis and fungal invasion of vessel wall. Contrast enhanced Magnetic Resonance Imaging of orbit, nose, paranasal sinuses and brain, is useful to delineate necrotic tissue, extent of disease and helps in determining the extent of resection. Black turbinate sign, refers to non-enhancement and is diagnostic of angioinvasion and necrosis.

Medical therapy with subcutaneous Insulin (sliding scale), Injection Amphotericin B (Liposomal preferred, due to less toxicity and permitted high dose), tapering to oral Posaconazole till clinical resolution and radiological stabilization is achieved.

Early aggressive surgical debridement in the form of trans-nasal endoscopic medial maxillectomy and medial orbital decompression is usually done, along with anterior, posterior ethmoidectomy, sphenoidotomy and frontal recess clearance. If the lesion is extensive nasal septum may be removed, inferior maxillectomy if palate is involved and orbital exenteration in patients with orbital involvement. The debridement removes all necrotic material, reduces fungal load and improves entry of antifungal agent. Serial debridement's may be needed along with post-operative lavage.

Preventive steps to undertake in patients with COVID-19 are blood sugar estimation of patients diagnosed with COVID-19, strict no steroid use for diabetic patients outside the hospital setting (due to lack of blood sugar monitoring) and avoidance in patients with normal oxygen saturation on room air, saline nasal drops may be used to keep nasal passage clear, maintaining hygiene of oxygen tubing, humidifier chamber, mask and early ENT consultation for patients with nasal symptoms. Last but not the least, universal mask usage will reduce exposure to Mucorales and coronavirus too!

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