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# Post- COVID mucormycosis- A case report

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**Abstract**
Mucormycosis, caused by a group of moulds called mucormycetes, is a rare but potentially fatal infection if inadequately treated. It is often referred to as the so-called black fungus, the incidence of mucormycosis has risen more rapidly during the second wave compared with the first wave of COVID-19 in India. We reported a case of mucormycosis in a 50 years old male patient.

**Keywords:** COVID-19, Mucormycosis, Opthalmoplegia

## Introduction
Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been associated with a wide range of opportunistic bacterial and fungal infections [1]. As India continues to achieve stability over the existing situation, another imminent threat has emerged as a challenge to India in the form of coronavirus disease-associated mucormycosis [2]. Both Aspergillus and Candida have been reported as the main fungal pathogens for co-infection in people with COVID-19. Recently, several cases of mucormycosis in people with COVID-19 have been increasingly reported world-wide, in particular from India [3, 4].
Mucormycosis, caused by a group of moulds called mucormycetes, is a rare but potentially fatal infection if inadequately treated. Often referred to as the so-called black fungus, the incidence of mucormycosis has risen more rapidly during the second wave compared with the first wave of COVID-19 in India, with at least 14872 cases as of May 28, 2021 [5]. The primary reason that appears to be facilitating Mucorales spores to germinate in people with COVID-19 is an ideal environment of low oxygen (hypoxia), high glucose (diabetes, new-onset hyperglycemia, steroid-induced hyperglycemia), acidic medium (metabolic acidosis, diabetic ketoacidosis [DKA]), high iron levels (increased ferritins) and decreased phagocytic activity of white blood cells (WBC) due to immunosuppression (SARS-CoV-2 mediated, steroid-mediated or background comorbidities) coupled with several other shared risk factors including prolonged hospitalization with or without mechanical ventilators [6]. We reported a case of COVID associated mucormycosis in 50 years old male patient.

## Case report
A 50-year-old male was admitted to a tertiary care center with a complaint of swelling and pain in the left eye. Patient had COVID-19 infection 1 month before and had recovered from it. The patient had history of diabetes. There was no relevant family history. On clinically examination, there was malaise, proptosis, chemosis, periorbital cellulitis and restricted medial gaze (Fig- 1). Visual acuity was 6/6 with partial opthalmoplegia and no nasal discharge was seen.
Following investigations were done- Neutrophil count 83.1%, Lymphocyte count 9.5%, fasting blood sugar (FBS) 98 mg/dL, post-prandial blood sugar (PPBS) 146 mg/dL, HbA1c 6.9%, serum Interleukin-6 37.93 pg/mL, CRP 201 mg/L, D-Dimer 460 ng/mL. Patient underwent CT scan head and neck region which revealed mild mucosal hypertrophy in bilateral frontal sinus, left maxillary antrum showed opacification and area of hyperdensities, marked soft odema in left maxillary, nasoethmoid, zygomatic and pre-septal region. Blockage of OMU with thinning and erosion of medial wall of maxillary sinus. Disruption of lamina papyracea on left side suggestive of parasinusitis with left superadded fungal infection.
FESS was done for right & left maxillary sinus and left ethmoid sinus. Crusting was noted

over posterior aspect of inferior turbinate, septum and conchae. The sinuses were debrided and the specimen obtained was sent for culture sensitivity and histopathology. Inj. Piptaz 4.5 g-8hourly, Inj. Metronidazole 500 mg-8hourly and Inj. Fluconazole 200 mg 12hourly was started postoperatively. On histopathology examination, aseptate broad based hyphae and gram-positive bacilli were seen and hence Mucormycosis suspected. The medical regime changed to Inj. Amphotericin B 300 mg/day, eyedrops Tobramycin BD and Nepalact TDS. Surgical debridement was planned under general anesthesia. Lateral canthotomy and inferior cantholysis was done. Debridement and Amphotericin B lavage (1 mg/mL) was done. Closure was done with 6-0 resorbable suture.

**Fig 1:** Eschar on left maxillary, zygomatic, nose, left eye region

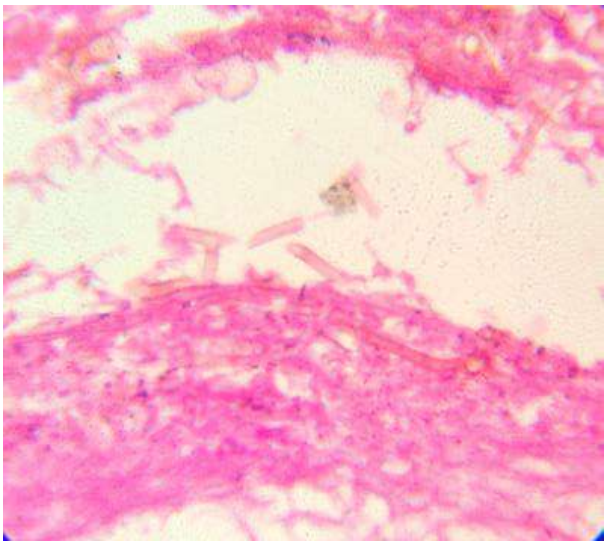

**Fig 2:** Histopathology showed broad non-septate fungal hyphae with morphology suggestive of mucormycosis

## Discussion

Phycomycosis or zygomycosis was first described in 1885 by Paltauf and later coined as Mucormycosis in 1957 by Baker an American pathologist for an aggressive infection caused by Rhizopus. Mucormycosis is an uncommon but a fatal fungal infection that usually affects patients with altered immunity [7]. Mucormycosis is an angio-invasive disease caused by mold fungi of the genus Rhizopus, Mucor, Rhizomucor, Cunninghamella and Absidia of Order-Mucorales, Class- Zygomycetes. The Rhizopus Oryzae is most common type and responsible for nearly 60% of mucormycosis cases in humans and also accounts for 90% of the Rhino-orbital-cerebral (ROCM) form. Mode of contamination occurs through the inhalation of fungal spores [8].

A complex interplay of factors, including pre-existing diseases, such as diabetes mellitus, previous respiratory pathology, use of immunosuppressive therapy, the risk of hospital-acquired infections, and systemic immune alterations of COVID-19 infection itself may lead to secondary infections, which are increasingly being recognized in view of their impact on morbidity and mortality [9]. There are specific pathophysiologic features of COVID-19 that may permit secondary fungal infections, including a propensity to cause extensive pulmonary disease and the subsequent alveolo-interstitial pathology that may enhance the risk of invasive fungal infections. Second, the immune dysregulation associated with COVID-19, with reduced numbers of T lymphocytes, CD4+T, and CD8+T cells, may alter innate immunity [10].

Maini *et al.* [11] reported a case of post COVID-19 Sino-orbital Mucormycosis infection caused by Rhizopus oryzae and its management. Following recovery, on the 18th day, the patient developed chemosis and pain in the left eye. A diagnosis of mucormycosis was established after Magnetic Resonance Imaging (MRI) and Functional Endoscopic Sinus Surgery (FESS). Initially, conservative management with intravenous (IV) Fluconazole & Amphotericin B was done and later on with surgical debridement. The patient recovered with minimal residual deformity.

The mold usually gains entry into the host through the respiratory tract and exhibits a remarkable affinity for arteries and grows along internal elastic lamina causing thrombosis and infarction. The progression of the disease from nose and sinuses is either direct or through vascular occlusion. Intracranial involvement also occurs by invasion through superior orbital fissure, ophthalmic vessels, cribriform plate, carotid artery or possibly via a perineural route [12]. Waiting for cultures is impractical and may lead to delay in initiation of treatment. If clear clinical picture of mucormycosis exists, positive direct smears may be sufficient for initiating treatment. The Indian Council of Medical Research released guidelines for the screening, diagnosis, and management of mucormycosis in patients with COVID-19 [13]. The most common causes attributed to the rise of mucormycosis in COVID-19 patients are uncontrolled diabetes, the excessive use of corticosteroids for immunosuppression, and long-term stays in the intensive care unit. Even though no official figures about mucormycosis in COVID-19 cases were released by the Union Health Ministry during the first wave of COVID-19, India contributed to approximately 71% of the global cases of mucormycosis in patients with COVID-19 based on published literature from December, 2019, to the start of April, 2021 [14].

Singh *et al.* [15] conducted a systematic review of literature to find out the patient's characteristics having mucormycosis and COVID-19. Overall, 101 cases of mucormycosis in people with COVID-19 have been reported, of which 82 cases were from India and 19 from the rest of the world. Mucormycosis was predominantly seen in males (78.9%), both in people who were active (59.4%) or recovered (40.6%) from COVID-19. Pre-existing diabetes mellitus (DM) was present in 80% of cases, while concomitant

diabetic ketoacidosis (DKA) was present in 14.9%. Corticosteroid intake for the treatment of COVID-19 was recorded in 76.3% of cases. Mucormycosis involving nose and sinuses (88.9%) was most common followed by rhino-orbital (56.7%). Mortality was noted in 30.7% of the cases.

**Conclusion**

The cases of mycormycosis are not new however; a spike in such cases has been reported during COVID era. The rise in cases of mycormycosis is due to COVID-19 remain associated with impaired immune system of infected patient. Prevention of fungal infections should be considered in patients after COVID-19.

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