

Surviving Mucormycosis: Impact on Psychological Well-Being and Quality of Life

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Mucormycosis is a rare but serious fungal infection commonly affects the sinuses/lungs after inhalation of fungal spores from the air, usually affecting people with a compromised immune system. In the wake of COVID-19 pandemic, a multi-fold rise was seen in cases of mucormycosis or “black fungus” which was earlier a rare entity. This has added a great burden on the patients and their caregivers physically, financially, emotionally as well as psychologically. The high morbidity and mortality rates of mucormycosis can cause psychological impairment and decreased quality of life. Along with the patients and their caregivers, the treating doctors are also in duress as informing the family members about the poor prognosis of such an acute disease takes a toll every day. Most patients require a combined approach of surgical debridement and Liposomal Amphotericin B. The unavailability of Amphotericin B has led to suboptimal dosages in many patients in India. Loss a sense organ(s) like eye in cases of orbital involvement or any other part of the body like maxilla or palate, can lead to dependence on others for care and one’s own perception of themselves as a member of the society. Psychiatric manifestations can be a direct accompaniment in the aftermath of surgical debridement/ resection procedure for Mucormycosis. Addressing psychological functioning sequelae related with Mucormycosis, especially after surgical treatment for the disease; along with rehabilitation and psychotherapeutic sessions should be encouraged as a part of treatment in patients of Mucormycosis such that they continue to be functioning members of the society.

Keywords: Mucormycosis; Black Fungus; COVID-19; Psychological Impairment; Rehabilitation

Mucormycosis is a rare but serious fungal infection caused by moulds belonging to the order Mucorales. These pathogens are widespread in the environment and most commonly affects the sinuses/lungs after inhalation of fungal spores from the air. Infection can also occur via direct inoculation into a skin injury. Mucormycosis usually affects people who have a compromised immune system (due to any reason). It invades blood vessels, leading to necrosis and thrombosis [1,2]. The symptoms depend on the site of fungal growth. Broadly, Mucormycosis is divided into sub-types based on clinical symptoms: Rhino cerebral (Paranasal sinuses

and Brain), Pulmonary (Lungs), Cutaneous (Skin), Gastrointestinal and Disseminated [1,2]. The current rise of *Mucor* cases in India are predominantly of the Rhino-orbito-cerebral Mucormycosis.

All patients need to undergo a Diagnostic Nasal Endoscopy for diagnosis, confirmation of which is done by KOH mount examination of swab or tissue sample from infection site. Treatment of Mucormycosis comprises of medical and surgical management. Medical management entails a course of anti-fungal agents which can be administered orally (Posaconazole, Isavuconazole) or par-

enterally (Amphotericin B, Posaconazole, Isavuconazole) [3]. Surgical management comprises of procedures where infected tissue is removed to curb further spread of the infection [3]. Most patients require a combined approach of surgical debridement and Liposomal Amphotericin B.

Over the last 15 months in India, we have become familiar with many new terms. Examples of which are: quarantine, pandemic, remdesivir, tocilizumab, ventilator, nebulization, etc. One of the latest entrants as a common household name is "Black Fungus". *Mucor* ('Black Fungus') has always been there, just like Coronavirus. The only difference this time around is that both pathogens seem to have over-shot their usual potential. This simple explanation is more valid for Coronavirus but in the case of 'The Rise of the Black Fungus', it is a far more complex relationship.

What was earlier a fairly uncommon occurrence has become quite usual in the wake of the COVID-19 pandemic. While the first wave of COVID-19 led to Mucormycosis cases in 2020, there weren't as many cases reported. It had not become a sensation yet. The second wave in 2021 led to a multi-fold rise in cases of Mucormycosis. It became so commonplace that "Black Fungus" began to overshadow Coronavirus! TV and other forms of media have given generous coverage to Mucormycosis and reported about its high mortality rate, which approaches 50%.

When someone contracts *Mucor* infection and the KOH stain report gives evidence of *Mucor* growth, we are already thinking about the high rate of mortality. We then 're-hear' and 're-see' all those reports of mortality associated with Mucormycosis. This can lead to a state of mind where the individual is apprehensive, anxious, disheartened, helpless and/or hopeless in different permutations and combinations. Such a reaction is expected to any bad news but some individuals may decompensate and be unable to cope well with this new development in their lives. This applies to both patients and their caregivers. Not only are the patients and their caregivers affected, treating doctors are also under constant stress and duress. Patients need constant supervision, frequent monitoring and radical procedures for management. Informing patients and family members about poor prognosis every day takes a toll. Patients and family members repeatedly seek re-assurance looking for a flicker of hope, but doctors have to be honest and not make false promises. This adds to the emotional burden in doctors already facing burn-out in the wake of COVID-19 pandemic.

Amphotericin B, one of the mainstays of treatment of Mucormycosis, has an unfavourable Risk-Benefit Ratio. It has many adverse effects; commonly encountered serious ones are electrolyte imbalance, impairment of kidney function and blood sugar derangements. Many patients also develop an anaphylactic reaction to Amphotericin B. Apart from being expensive, this drug is not readily available and India has faced an acute shortage of the drug. Low availability of Amphotericin B relative to requirement has left the healthcare system with no other option than to either ration or prioritize patients based on prognosis. Rationing leads to sub-optimal dosing of the drug for patients and leads to poorer outcomes. Prioritizing patients will leave some patients without access to this drug. Such practice (forced by circumstances prevalent in India) with Amphotericin B adds on to the stress faced by the already burdened healthcare professionals. Uncertainty about availability of this life-saving drug, long and expensive treatment, adverse effects of the drug being the norm and its own management; all of these add to the psychological as well as economic burden of the patients and their families.

Surgical management requires complete debridement of infected tissue. Patients can lose vital sense organs and even brain tissue in the process. Psychiatric manifestations can be a direct accompaniment in the aftermath of a neurosurgical debridement/resection procedure for Mucormycosis. Other non- neurosurgical debridement procedures can indirectly lead to psychiatric manifestations secondary to parts of body being removed in these life-saving procedures. Loss of sense organs(s) and/or other body parts can lead to dependence on others for care, unemployment and a change in how one perceives oneself.

The high mortality rate of Mucormycosis is rightly highlighted but its morbidity stays in the shadows and remains unaddressed. Those who survive the fungal infection and its treatment suffer great costs. They have impairment in their psychological functioning and also experience a decrease in their quality of life. The psychological toll is paid by one and all- patients, family members, health care professionals and the government.

There is a need to address these psychological and level of functioning sequelae related with Mucormycosis and efforts need to be made to deal with this gap. Routine pre-operative counselling should be supplemented with additional supportive psychotherapeutic sessions. As per need, appropriate pharmacological and

non-pharmacological management should be introduced and mental health professionals (Psychiatrists and Clinical Psychologists) should be added into the treating team. Measures for occupational and vocational rehabilitation need to be taken to ensure that patients surviving *Mucor* infection continue to be functioning members of the society.

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