

Black Fungus: An Enigma in Management of COVID-19 Patients

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Abstract: *Judicious use of steroids during the COVID treatment plays a vital role in prevention of Mucormycosis.*

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1. Introduction

Since inception of COVID-19, it seems that it is playing a challenge game with health professionals, first SARS COV 2 virus itself, then oxygen and ventilator and now black fungus. First case of black fungus in India was reported on 1st April 2021. In a span of Six weeks on 21st May it has spread into 22 states involving 8848 cases and accounting 100 deaths in Maharastra only. It took all front pages of all newspapers. It has been included under Notifiable Disease under Epidemic Act, making it compulsory to report each case of the black fungus to the state health department. Though it was not new to Medicine, but it forced to go through the text book. Surprisingly one line is found written "One day mucormycosis will destroy the earth". Has the time come? Not at all. We have precautions and solutions. Let us look into it.

2. Black Fungus (Mucormycosis)

2.1 Pathogenesis

It is an acute opportunistic infection caused by group of moulds called Mucormycetes belonging to Phylum Glomeromycota & Sub phylum Mucoromycotina. This fungus is ubiquitously found in nature in wet soil, dirty stagnant water, rotten flower & leaves etc. It gains entry into human body through respiratory tract & skin. In tissues these fungi are seen as broad, non septate hyphae. Normally spores are inhibited from germinating into hyphae by alveolar macrophages. However, in diabetic patients, especially those with elevated blood sugar levels and acidemia, the spores germinate, hyphae develop, and fungi begin an inexorable march through out the lung tissue, invading blood vessels and surrounding tissues. As blood vessels become involved thrombosis occurs, tissue necrosis results and the fungi continue to grow in this devitalized tissue. Progression into brain leads to formation of brain abscess and phlegmon. Cavernous sinus thrombosis is an ominous sign.

An immune-competent body fights well against it. But some co-morbidities and conditions succumb to mucormycosis infection. These are Diabetes, blood cancer, heart and kidney disease, pre-existing immune deficiency diseases, organ & stem cell transplantation burn & malnutrition, use of humidified oxygen at hospital for long duration

mechanical ventilation, over & misuse of steroids and iron overload.

2.2 Symptoms

Most commonly it involves rhino-orbital-cerebral systems or lungs. Mild mucormycosis presents with very common symptoms such as Nasal congestion, Facial numbness, deformity & pain, Black crusts in nose, Toothache, Loss of vision, proptosis & periorbital pain Headache.

Symptoms mainly depend on involvement of organ such as lungs, skin, GI tract and Cranial Nerves.

2.3 Severity and Mortality

They have predilection to invade blood vessels & being angio-invasive in nature thereby leading to extensive necrosis of surrounding areas & forming embolism. Disseminated mucormycosis involving brain become nightmare for doctors. It is frequently a life-threatening infection. A review of published mucormycosis case (By CDC) found an over all cause mortality rate of 54%. The mortality rate varied depending on underlying patient condition, type of fungus, and the body site affected (for example, the mortality rate was 46% among people with sinus infections, 76% for pulmonary infections and 96% for disseminated rhino-cerebral mucormycosis).

The disseminated form has come in a new form a week back when two post-Covid recovered patients in Sir Ganga Ram Hospital, New Delhi started complaining of pain abdomen. On ultrasonography small intestine (jejunum) perforation has been detected. Gastrointestinal mucormycosis is very rare (4-7%) of all cases and most commonly involves the stomach and intestine.

2.4 Management of Mucormycosis

It can be diagnosed through Microscopic examination and culture of biopsy samples from the involved area. Extent of damage can be assessed by CT scan or X-ray. In treatment of mucormycosis control of co-morbidities (especially diabetes) and maintenance of good general condition are utmost important. Dose of steroids is to be reduced and immune-modulators are to be discontinued. Commonly used anti-fungal drugs such as Fluconazole, voriconazole or 5-Fluorocytosine are ineffective in mucormycosis. Liposomal

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Amphotericin B is the drug of choice. In its unavailability or intolerant case Polyene/ Isavuconazole/Posaconazole can be chosen. Duration of treatment can range from 3weeks to 6months. No anti-fungal prophylaxis or combinations of anti-fungal drugs are advised in this case. We can opt for Zinc supplementation, as zinc inhibits in-situ microbial growth.

It is very much important to be watchful for conditions like persisting vomiting, pain abdomen, ptosis, proptosis, and numbness in face, black eschar in mouth in covid and post-covidrecovered cases.

3. Mucormycosis and COVID-19

Its prevalence in increasing numbers in present Covid situation is believed to be due to

- Injudicious use of steroids
- Improper management of co-morbidity
- Prolong hospitalization
- Use of Improperly humidified oxygen
- Lack of proper sanitization
- Personal hygiene problem, e.g. Wearing a mask more than 2weeks

4. Precautions

There are few precautionary measures to protect the mankind from the threat of Mucormycosis in this Covid Pandemic situation like

- Judicious use of steroids during Covid treatment
- Maintaining healthy habits (to remain immune-competent)
- Maintaining normo-glycemic state
- Proper sanitization of the nearby surrounding & premises
- Taking care of water quality which is used in humidification of oxygen for patients

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