

Black Fungus- A Review

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ABSTRACT

Now a days during the pandemic condition such as Covid-19 Many fungal infections are happening to the peoples. Mucormycosis is one of the fungal infections which occurs in the patient who suffers from Corona virus infection. Mucormycosis is also called as black fungus as well as Zygomycosis & is rare but serious infection. There are different types of Mucormycosis which attack on different region of the body such as sinus, brain, skin, lung etc. Doctors confirms that Mucormycosis, which has as overall capture rate of about 50-60%, mainly increase due to the consumption of steroids during the treatment of covid-19. Steroids decreases inflammation in the lungs of covid patient which results in the weakened of immune system. Between the month of December 2020 & February 2021, 58 cases are found who suffers from Mucormycosis infection. Most of them lose eye, most of them died. Some symptoms are unique in the Mucormycosis fungal infection from which one can detect the patient suffering from Mucormycosis Infection. In this article all the initial information about Mucormycosis, its types such as Rhinocerebral, Pulmonary, Gastrointestinal, Cutaneous etc., sign & symptoms, Causes, Diagnosis, Risk & Prevention, Treatment such as Amphotericin B, Posaconazole, Isavuconazole all are given in detailed.

Keywords: Mucormycosis, Zygomycosis, Mucormycetes, Fungal Infection, Covid-19.

I. INTRODUCTION

Mucormycosis is a fungal infection also called as Black Fungus. It is relatively rare but also very serious infection. It is also known as Zygomycosis, this infection mostly occurs if you have weakened immune system from an illness or health condition.[1] Zygomycosis is a serious but a rare fungal infection caused by the groups of molds called Mucormycetes. The fungi live in their environment, particularly in the soil, and in

decaying inorganic matter, such as leaves, compost piles, or rotten wood.[2] In the recent pandemic, it is common in covid-19 patients due to indiscriminate use of steroids and antibiotic in the treatment of covid-19 management. It is very commonly seen in diabetic patients with uncontrolled blood sugar. [3]

TYPES OF MUCORMYCOSIS

1. Rhinocerebral (sinus and brain) Mucormycosis:

This is an infection of sinuses that can spread to the brain. This form is most common in patient having uncontrolled blood sugar or had a kidney transplant. Complications mainly seen in this type like multiple cranial palsies, visual loss, frontal lobe abscessed etc. Diagnosis is mainly done by CT scan or MRI of head reveal air-fluid level in the sinuses and involvement of deep tissues. [4,5,6]

2. Pulmonary(lung) Mucormycosis:

It is the most common type of Mucormycosis in people with cancer and people having organ transplant or stem cell transplant. Symptoms are dyspnea, cough, fever, chest pain. It is diagnosed by CT scan.

3. Gastrointestinal Mucormycosis:

It is seen more common in young child than in adults, especially premature or low birth weight infants less than 1 month of age, who have had antibiotics, surgery, or medications that lowers the bodies ability to fight germs and sickness. [7,8]

4. Cutaneous Mucormycosis:

Trauma is the predisposing factor, Invasive locally. Surgical debridement.[6]

5. Miscellaneous Mucormycosis:

Endocarditis, pyelonephritis-in IV drug uses.[6]

SYMPTOMS

It is present itself as either a respiratory or a skin infection. Symptoms of a related respiratory infection or sinus may include:

- Cough
- Fever

- Headache
- Nasal congestion
- Sinus pain [1]

With a skin infection Mucormycosis can develop within any part of your body. It may initially occur at the site of skin trauma. But it can quickly spread into another area, with symptom such as:

- Fever
- Blisters
- Tenderness
- Ulcers
- Blackened skin tissue
- Swelling [1]

Although the symptoms also depend upon where in the body the fungus is growing. Contact your doctor if you are having symptoms like:

- One sided facial swelling
- Black lesions on nasal bridge or upper inside of mouth that quickly become more severe.
- Shortness of breath
- Abdominal pain
- Gastrointestinal bleeding [9,10]

CAUSES

Mucormycosis caused by exposure to Mucormycetes molds. The organisms mainly occur in:

- Leaves
- Soil
- Rotting wood
- Piles of compost

Breathing in affected spores un the air can also cause Mucormycosis. In turn you may developed the symptoms in your:

- CNS
- Eyes
- Face
- Lungs
- Sinus[1]

The fungus can also infect your skin via cut or burn (cutaneous exposure). In this case the wound or burn ends up becoming the area of Infection. If you are having weakened immune system that may increase risk include:

- Burns
- Cut and scrapes
- Cancer
- Recent organ transplant
- HIV or AIDS
- Diabetes

- Surgery

DIAGNOSIS

People who have Mucormycosis often don't know they are suffering from such dangerous disease. You may diagnose it by lung sinus, or skin infection. It is diagnosed by the tissue sample in the lab. The sample of phlegm or nasal discharge has collected.[1]The major problem in the management of Mucormycosis remains challenging and is a major unmet need, causing a bottleneck in devising innovative, effective clinical trials. This is important because delayed treatment clearly impacts the outcome of Mucormycosis.[11]

There are various methods for diagnosis of Mucormycosis are as follows:

✚ **Microscopic study of culture:** Optical brighteners such as Blankophor [12] and calcofluor [13] white used for direct microscopy of a clinical specimens, which allows a rapid presumptive diagnosis of Mucormycosis.[14]

✚ **Antifungal susceptibility testing & Species identification:** Better epidemiological understanding of Mucormycosis can be done using species identification testing and may be of value for outbreak investigation. Mucorales fungi can easily be differentiated from aspergillus fungi on culture. [15]

✚ **Serology:** Enzyme linked Immunosorbent assays, immunoblots, and immunodiffusion tests have been evaluated with variable sources. In three hematological patients who developed invasive Mucormycosis found with Mucorales specific T cell was observed by an enzyme-linked immunospot (ELISpot) assay. [16-19]

✚ **Molecular assay:** Molecular assay include conventional polymerase chain reaction (PCR), restriction fragment length polymorphism analysis (RFLP), DNA sequencing of defined gene regions, and melt curve analysis of PCR products. [20-24]

RISK AND PREVENTION

One can't get Mucormycosis infection from an infected person because Mucormycosis isn't contagious. To prevent this type of infection self-care measures are the best way. If a person having weakened immune system, it's important to keep yourself safe outdoors. To

prevent fungal infections, wearing a mask while bandaging all wounds is important. [1]

Following are the habits that can lower the risk of Mucormycosis:

PROTECT YOURSELF FROM THE ENVIRONMENT: [25,26]

It is important to attention that although all the actions are recommended, they have not proven to prevent Mucormycosis completely.

- Try to avoid areas with a lot of dust like construction or excavation sites. If you can't avoid these areas, wear an N95 respirator while you are there.
- Avoid direct contact with water-damaged buildings or flood water after hurricanes and natural disasters. [27]

Antifungal medication

If you are at high risk of developing Mucormycosis for example (stem cell or organ transplant), your healthcare providers prescribe you a medication to prevent Mucormycosis and other mold infections. [28,29]

Treatment

The first step in treating Mucormycosis are receiving intravenous (IV) antifungal medications and having surgical debridement, it involves cutting away all infected tissue. If you respond well to IV therapy and tissue removal, then your doctor will likely remove your IV and give you oral medication to take. [1]

Common antifungal medications that doctor prescribes for Mucormycosis are:

- Amphotericin B (IV)
- Posaconazole (IV and Orally)
- Isavuconazole (IV or Orally) [1]

MUCORMYCOSIS- AN INDICATION OF EMERGENCY SURGERY

Current guideline recommended antifungal treatment, surgical debridement, and correction of risk factors [30,31]. Surgical debridement has to be extensive, involving all necrotic areas for rhino-oculo-cerebral infection, and repeated surgical procedures are recommended to achieve local control and improve outcome. [32]

Antifungal Treatment

Amphotericin B (Amb) and its lipid formulations and Posaconazole were the only antifungal drugs available with in vitro activity against Mucorales [33,34] the first line

recommended antifungal agent is liposomal Amb (L-Amb) or Amb lipid complex (ABLC) [31].

Immunostimulating drugs

A case report has recently reported the benefits of treatment with the checkpoint inhibitor nivolumab and interferon- γ for an immunocompetent patient with extensive abdominal Mucormycosis unresponsive to conventional therapy. [35]

II. CONCLUSION

Mucormycosis is one of the rare but very serious fungal infection. Many of the patient who suffered from Covid-19 also suffers from Mucormycosis fungal infection. More of the peoples are unaware about this fungal infection & due to improper treatment patient leads to fatal condition. In this article all the necessary information of Mucormycosis fungal infection is given. From the above-mentioned information about Mucormycosis, one can conclude that even though there are different kinds of sign & symptoms one can cure from this fungal infection with the proper treatment.

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