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An overview on rare fungal infection "Mucormycosis" incited by covid-19

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Abstract
India is now seeing in COVID-19-induced Mucormycosis or "black fungus" cases in many regions, despite still grappling with second wave of coronavirus infections. Mucormycosis, also known as black fungus, is a severe but rare fungal infection caused by the mucormycetes, a group of moulds. It usually affects those with health problems or who are taking drugs that limit the body's ability to combat germs and illness. The resurgence in black fungus infections may be attributed to the use of steroids in the management of COVID infection, as well as the fact that many COVID patients had diabetes as co-morbidity. Despite its occurrence since the beginning of the pandemic, there are still unanswered concerns regarding the origin of this fungal infection. The existing report of black fungus morbidity during the latest COVID-19 crisis in this study is early detection of this potentially life-threatening illness and timely care was critical in lowering mortality rates.

Keywords: COVID-19, Mucormycosis, Black Fungus, Antifungal

Introduction
Mucormycosis (sometimes called zygomycosis) is a serious but rare fungal infection caused by a group of molds called mucormycetes. These fungi live throughout the environment, particularly in soil and in decaying organic matter, such as leaves, compost piles, or rotten wood.

People get mucormycosis by coming in contact with the fungal spores in the environment. For example, the lung or sinus forms of the infection can occur after someone breathes in spores. These forms of mucormycosis usually occur in people who have health problems or take medicines that lower the body's ability to fight germs and sickness. Mucormycosis can also develop on the skin after the fungus enters the skin through a cut, scrape, burn, or other type of skin trauma.

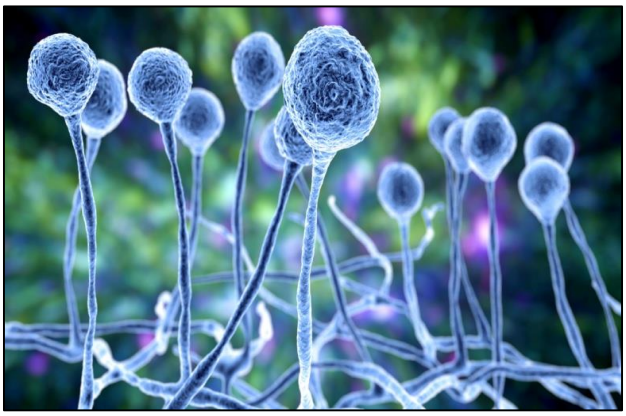

Fig 1

What causes Mucormycosis?
Zygomycetes represent the general class of fungi that cause mucormycosis. Rhizopus arrhizus species from the Mucoraceae family are the most commonly identified cause of mucormycosis in humans. Mucoraceae are found worldwide and in the ecosystem are responsible for initiating and decaying most organic material in the environment.

In general, mucormycosis is an infection not often seen by many doctors because the fungal causes are not readily infectious. Usually, an infection develops because of some unusual circumstance that places the fungi in contact with compromised or injured animal or human tissue. However, once established, the fungi can rapidly multiply in blood vessel walls where it effectively reduces and cuts off blood to tissues, thereby creating its own decaying organic food source resulting in widespread tissue destruction. If this fulminant spread of fungi is not stopped, death is the outcome.

Types of MUCORMYCOSIS:

- **Rhinocerebral (sinus & brain) mucormycosis** is an infection in the sinuses that can spread to the brain. This form of mucormycosis is most common in people with uncontrolled diabetes and in people who have had a kidney transplant.
- **Pulmonary (lung) mucormycosis** is the most common type of mucormycosis in people with cancer and in people who have had an organ transplant or a stem cell transplant.
- **Gastrointestinal mucormycosis** is more common among young children than adults, especially premature and low birth weight infants less than 1 month of age, who have had antibiotics, surgery, or medications that lower the body's ability to fight germs and sickness.
- **Cutaneous (skin) mucormycosis**: occurs after the fungi enter the body through a break in the skin (for example, after surgery, a burn, or other type of skin trauma). This is the most common form of mucormycosis among people who have weakened immune systems.

Disseminated mucormycosis occurs when the infection spreads through the bloodstream to affect another part of the body. The infection most commonly affects the brain, but also can affect other organs such as the spleen, heart, and skin.

Symptoms of Mucormycosis

The symptoms of mucormycosis depend on where in the body the fungus is growing.

Symptoms of rhinocerebral (sinus and brain) mucormycosis include:

- One-sided facial swelling
- Headache
- Nasal or sinus congestion
- Black lesions on nasal bridge or upper inside of mouth that quickly become more severe
- Fever

Cutaneous (skin) mucormycosis can look like blisters or ulcers, and the infected area may turn black. Other symptoms include pain, warmth, excessive redness, or swelling around a wound.

Symptoms of pulmonary (lung) mucormycosis include:

1. Fever
2. Cough
3. Chest pain
4. Shortness of breath

Symptoms of gastrointestinal mucormycosis include:

- Abdominal pain
- Nausea and vomiting
- Gastrointestinal bleeding

Disseminated mucormycosis typically occurs in people who are already sick from other medical conditions, so it can be difficult to know which symptoms are related to mucormycosis. Patients with disseminated infection in the brain can develop mental status changes or coma.

Who gets Mucormycosis?

Mucormycosis is rare, but it's more common among people who have health problems or take medicines that lower the body's ability to fight germs and sickness. Certain groups of people are more likely to get mucormycosis, including people with:

- Diabetes, especially with diabetic ketoacidosis.
- Cancer, Organ transplant, Stem cell transplant.
- Neutropenia (low number of white blood cells).
- Long-term corticosteroid use, Injection drug use.
- Too much iron in the body (iron overload or hemochromatosis).
- Skin injury due to surgery, burns, or wounds.
- Prematurity and low birth weight (for neonatal gastrointestinal mucormycosis).

How does someone get MUCORMYCOSIS?

People get mucormycosis through contact with fungal spores in the environment.

For example, the lung or sinus forms of the infection can occur after someone inhales the spores from the air. A skin infection can occur after the fungus enters the skin through a scrape, burn, or other type of skin injury.

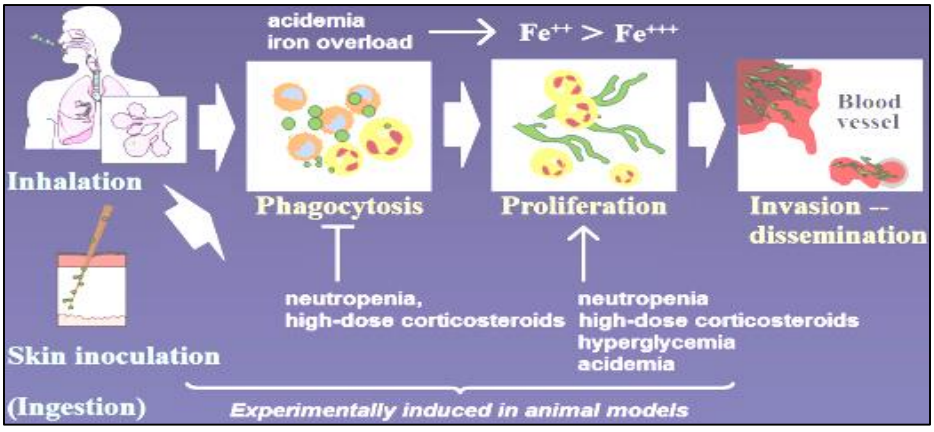

Fig 2

How Mucormycosis diagnosed?

Healthcare providers consider your medical history, symptoms, physical examinations, and laboratory tests when diagnosing mucormycosis. Healthcare providers who suspect that you have mucormycosis in your lungs or sinuses might collect a sample of fluid from your respiratory system to send to a laboratory. Your healthcare provider may perform a tissue biopsy, in which a small sample of affected tissue is analyzed in a laboratory for evidence of mucormycosis under a microscope or in a fungal culture.

You may also need imaging tests such as a CT scan of your lungs, sinuses, or other parts of your body, depending on the location of the suspected infection.

How to lower the risk of MUCORMYCOSIS?

It's difficult to avoid breathing in fungal spores because the fungi that cause mucormycosis are common in the environment. There is no vaccine to prevent mucormycosis. For people who have weakened immune systems, there may be some ways to lower the chances of developing mucormycosis.

- **Protect yourself from the environment**. It's important to note that although these actions are recommended, they haven't been proven to prevent mucormycosis.
  - Try to avoid areas with a lot of dust like construction or excavation sites.
  - Avoid direct contact with water-damaged buildings and flood water after hurricanes and natural disasters.
  - Avoid activities that involve close contact to soil or dust, such as yard work or gardening.

How is MUCORMYCOSIS treated?

- Mucormycosis is a serious infection and needs to be treated with prescription antifungal medicine usually amphotericin B, posaconazole, or isavuconazole. These medicines are given through a vein (amphotericin B, posaconazole, isavuconazole) or by mouth (posaconazole, isavuconazole).
- Other medicines, including fluconazole, voriconazole, and echinocandins, do not work against fungi that cause mucormycosis. Often, mucormycosis requires surgery to cut away the infected tissue.

Do's

- Control hyperglycemia.
- Monitor blood glucose level post-COVID-19 discharge and also in diabetics.
- Use steroid judiciously.
- Use clean, sterile water for humidifiers during oxygen therapy.
- Use antibiotics/ antifungals judiciously.

Don'ts

- Do not miss warning signs and symptoms.
- Do not consider all the cases with blocked nose as cases of bacterial sinusitis, particularly in the context of immunosuppression and/or COVID-19 patients on immunomodulators.
- Do not hesitate to seek aggressive investigations, as appropriate (KOH staining & microscopy, culture, MALDITOF), for detecting fungal etiology.
- Do not lose crucial time to initiate treatment for mucormycosis.

Conclusion

A novel Coronavirus causes a global pandemic that affects nearly the whole world, resulting in a deadly condition with high rate of morbidity. The COVID-19 with black fever or mucormycosis is also emerging, posing a significant threat to the medical community. Community-onset infections have also been linked to natural disasters. One-sided facial swelling, fever, nasal or sinus inflammation, and other symptoms that differ depending on the condition of mucormycosis are all common symptoms of this infection. Infection is most likely in patients on steroids, diabetics, or others who have had a transplant. As a result, early diagnosis, antifungal therapy, and prevention steps can be used to cure the infection.

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