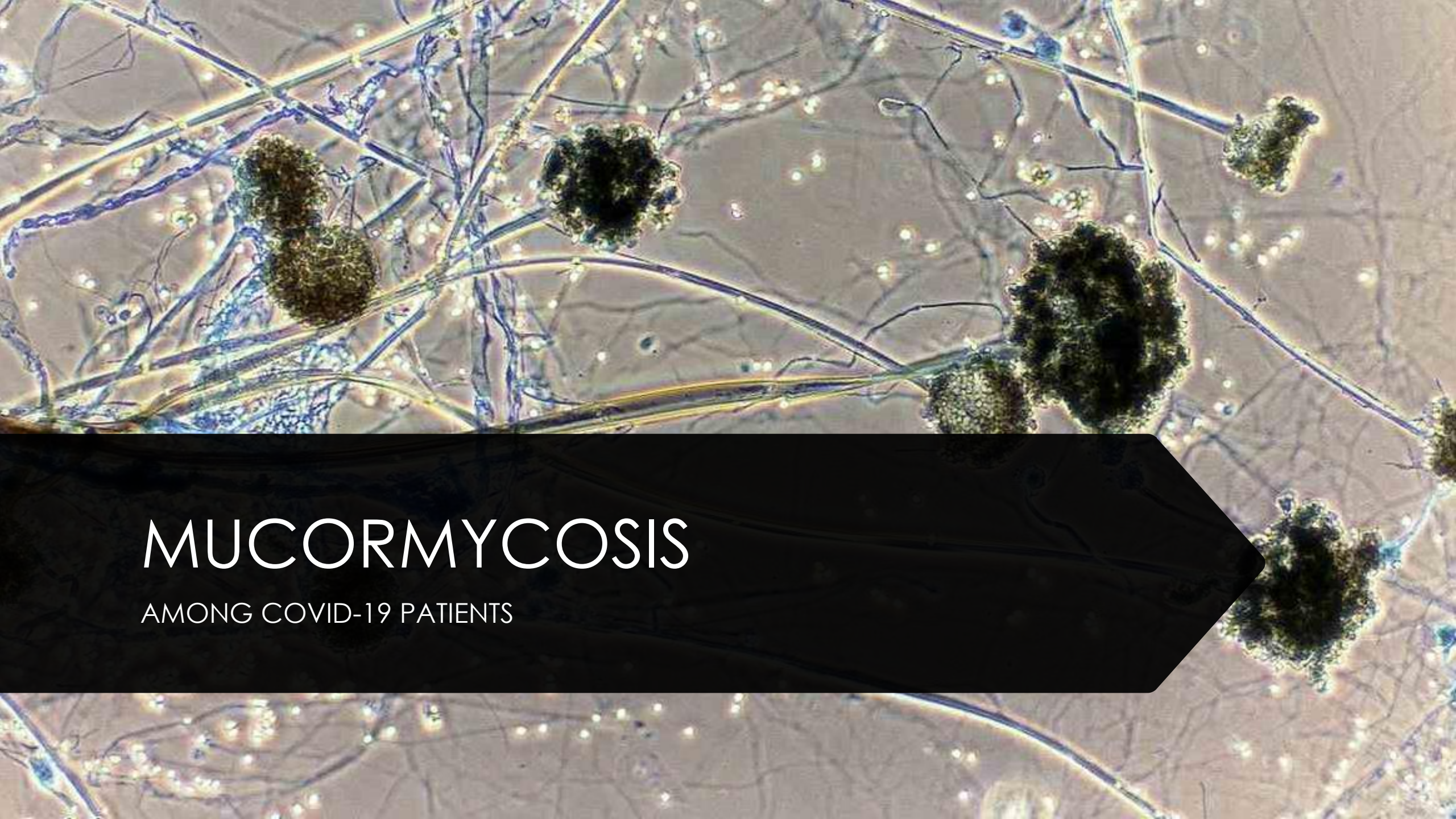


MUCORMYCOSIS

AMONG COVID-19 PATIENTS

MUCORMYCOSIS

Mucormycosis is an aggressive and invasive fungal infection caused by a group of molds called **Mucormycetes**.

An infection occurs when a microorganism enters a person's body and cause harm. The microorganism uses that person's body to sustain itself, reproduce, and colonize. These infectious microscopic organisms are known as pathogens like:

- Bacteria
- Viruses
- Fungi

While a quick diagnosis and treatment can cure the patient, left untreated, it can be fatal.

- Why in News?
- Hospitals across the country started to report a number of cases of mucormycosis, an invasive fungal infection affecting patients who have recently recovered from COVID-19.

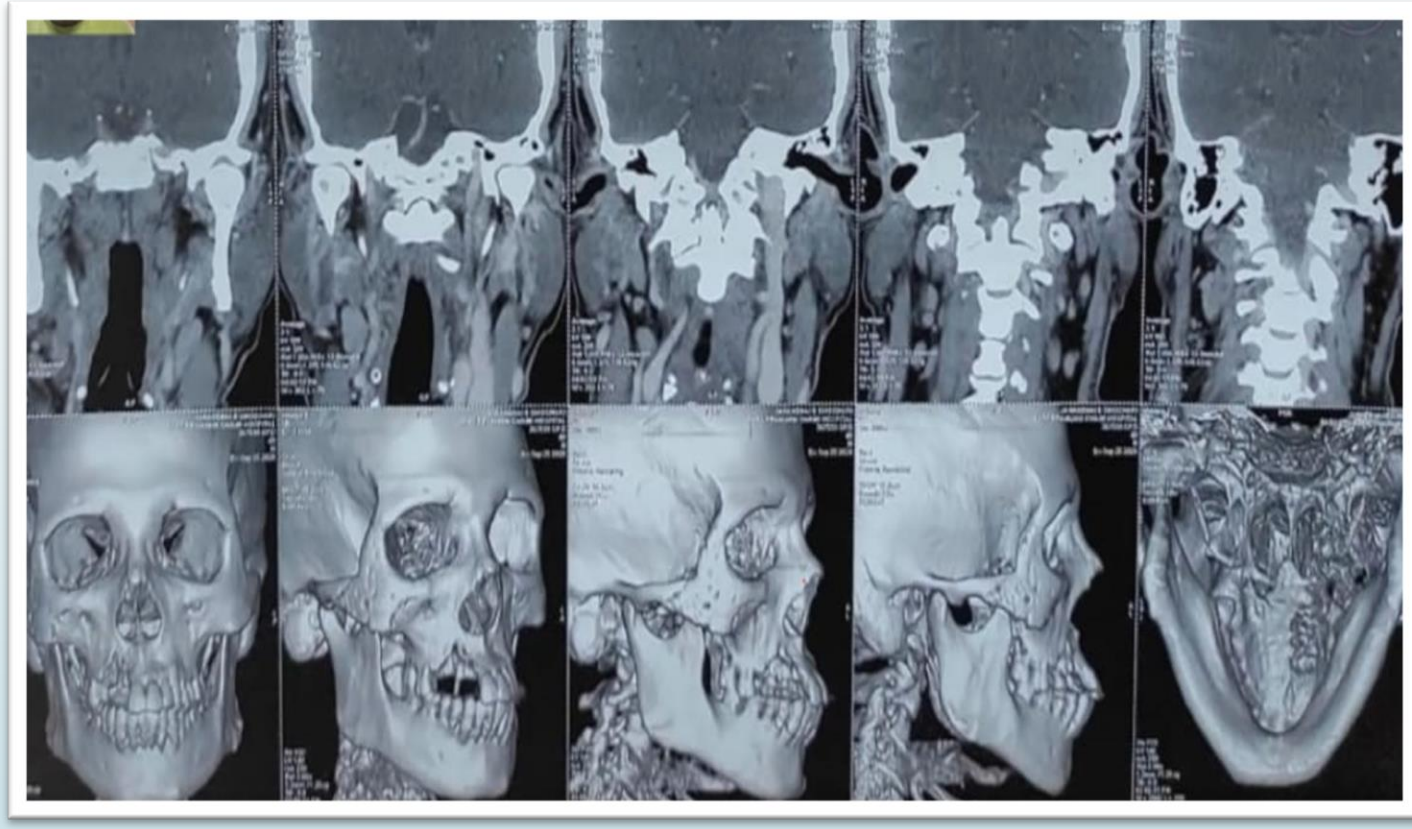
- In common parlance, it also goes by the name '**Black Fungus**' , a direct reference to the blackening that is characteristic of the disease.
- Fungal diseases are often very common in the environment. Most fungi are not dangerous, but some types can be harmful to health. Mild fungal skin diseases can look like a rash and very common.
- Fungal diseases in the lungs are often similar to other illnesses such as the flu or tuberculosis.

The infection usually starts from the nose and spreads to eyes.

As infection spreads, it paralyses muscles around the pupils of the eye, leading to blindness.

If the fungal infection spreads to the brain, the patient can get **meningitis**.

The fungus can also enter the body through open wounds or cuts.



What has happened?

- As India reels under the second wave of Covid-19 , Doctors are reporting multiple cases of deadly fungal infection Mucormycosis in the recovering coronavirus patients.
- The Black fungal infection , triggered by Covid-19, is being reported in almost everywhere across country. Black fungus is causing many of the patients to lose their eyesight.
- Many states are still reporting more than 100 cases daily. The infection is typically pushing Covid-recovered back into ICUs and surgical wards. Those with uncontrolled diabetes and heavy use steroid to survive Covid-19 complications are worst affected.
- This alarming affliction, although rare, is not new. However, it is the rapid increase in the numbers seen in unsuspected recovering COVID-19 patients that is causing the grave concern.

How is it Linked to COVID-19 and factors causing Mucormycosis?

- Fungal infection triggered most in the patients who have recovered from COVID-19.
- Mucormycosis mainly affects people with compromised immunity, who have some health problems, conditions that lower the body's ability to fight germs and sickness.
- For the diagnosis of COVID-19, steroids were proven the most effective drugs. But the use of steroids in excess can weaken our immunity. Along with that, people suffering from Diabetes Mellitus, or contaminated humidifiers during oxygen therapy , unhygienic practices , all the factors can put people recovering from Covid-19 or post-covid issues at high risk.
- However, Mucormycosis is **not** contagious.
- The Black fungal infection is very rare , but deadly disease if not cured at time. Hence, the mortality rate is recorded to be 54%.

Diabetes Mellitus is the most common underlying cause, followed by haematological malignances and solid-organ transplants, according to a comparative study of several papers on the incidence of mucormycosis in India, published in a recent issue of microorganisms.

Diabetes Mellitus was reported in 54% to 76% of cases according to a report. What seems to be triggering Mucormycosis in patients post Covid-19 is an indiscriminate use of a high dose of steroids in Covid-19patients, sometimes even in minimally symptomatic patients.
This leads to spikes in the sugar level among diabetics, which, in turn, renders them vulnerable.

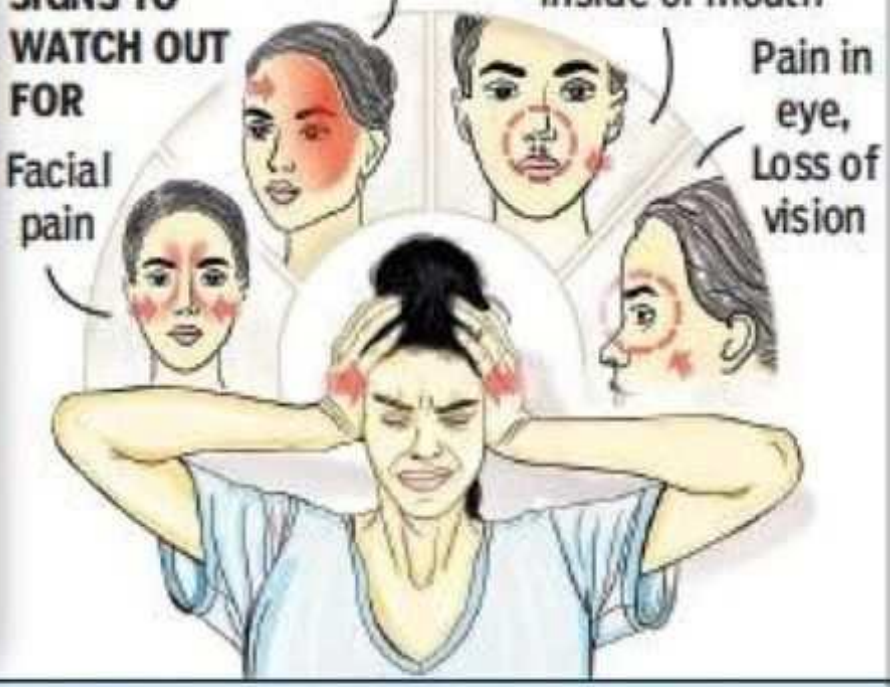
Many monoclonal agents like Tocilizumab may be a factor, too. While the fungi are present in the environment, the use of nasal prongs and other devices for oxygen delivery and possiblebreach of sterile conditions can possibly lead to cross-infection and hospital acquired infection.

MUCORMYCOSIS AFTER COVID-19

WHO ARE AT MM RISK

- Diabetics most vulnerable as fungus feeds on sugar
- Heavy steroid use in Covid-19 treatment
- Patients kept on humidified oxygen

SIGNS TO WATCH OUT FOR



CAUTION

Diabetics should be extra-cautious and bring sugar under control

Doctors should avoid rampant use of steroids unless deemed life saving in Covid

Symptoms

- The symptoms of mucormycosis depend on where in the body the fungus is growing, it can primarily impact any part.
- Usually, the fungal infection is of two types :

- Rhino-orbital-cerebral Mucormycosis
  - 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

- Pulmonary Mucormycosis
  - Fever
  - Coughing out blood
  - Chest pain
  - Shortness of Breath

At least one out of the five such cases is related to eyes. Several of them (patients) are suffering from blindness. Mucormycosis is an aggressive and invasive fungal infection. It can cause a lot of damage internally and can be fatal if not detected early.

How prevalent is the disease?

The Centers for Disease Control and Prevention, U.S., calls it a serious but rare disease.

Without population-based estimates, it is difficult to determine the exact incidence and prevalence of mucormycosis in the Indian population, but a computational model-based is used and estimated a prevalence of 0.14 cases per 1000 individuals in India.

Acc. to an estimate , more than 41,000 people are infected in India , and around 3,000 people are already dead due to Mucormycosis.

All India Institute of Medical Sciences, New Delhi
Covid-19 Infection and Rhino-orbito-cerebral Mucormycosis
Treatment Organization & Guidance

ORGANIZATION OF CLINICAL SERVICES

- A multispecialty Mucormycosis Clinical team to be in place.
- To categorize patients as Covid +ve & Covid –ve.

Admission as per above categorization

Many patients with Mucor are noted to be Covid RTpcr +ve at >10 days from onset

This may represent immunecompromise related persistence of Covid infection.

Why the surge in Mucormycosis

- COVID-19 has tendency to worsen diabetes and also precipitate diabetes in previously normal individuals
- The Covid 19 infection itself is associated with leucopenia and may lead to immune compromise caused by impaired or inappropriate immune responses.
- Immunosuppressive treatments are being widely used for treatment of Covid-19 infection .
- The severity of Mucor infection is largely dependent on the patient's immunity and general health.
- Coexistence of Covid – 19 infection with high blood sugar levels, and immunosuppressive treatments would expectedly increase incidence and severity of Mucormucosis.
- Mucor infection may occur during Covid-19 infection , or after a few weeks of apparent recovery from it.

Checklist of sentinel signs/ symptoms to be monitored in patients admitted with Covid-19

➢ Nose and sinuses Mucor infection (relatively early disease)

Early detection at this stage can enable early treatment and minimize complications.

- Headache and nasal obstruction- especially if persistent or severe and not responding to pain medicines.
- Nasal crusting and nasal discharge which could be brownish or blood tinged
- Pain or loss of sensation on face
- Discolouration of skin of face / localised Facial puffiness
- Loosening of teeth/ discoloration or ulceration of palate

➢ Eye / Orbital Mucor infection (moderately advanced disease
  - Eye swelling or redness, double vision, loss of vision, Eye pain, drooping eyelid

➢ Intracranial infection (very advanced disease)-
  - II-VI Cranial nerve palsies (Cavernous sinus involvement) ; signs of MCA thrombosis

Treatment principles-

Urgent intervention to minimize progression and mortality/ loss of eye

- Treatment of co-morbid illness/ blood sugar control & of Covid illness
- To review Covid treatments to minimize immunocompromise
- Twice daily evaluations as per Mucor Checklist above for progression to orbital/ intracranial involvement.
- Confirmation of Diagnosis by
  - KOH Smear/ Biopsy of involved lesion with appropriate precautions.
  - Radiology – CT/ MR for assessment of disease extent.

  Radiological signs in the initial phase may often be subtle and minimal and may not demonstrate florid sinusitis and bone erosion. Lack of these signs does not exclude the diagnosis
- Antifungal treatment with Amphotercin B/ Posaconazole.

  In situations of high clinical suspicion consider initiation of anti-fungal chemotherapy prior to microbiological confirmation
- Early surgical debridement after stabilization of systemic illness and ensuring facilities for post surgical care/ ventilation as anticipated.

For supplementary notes visit : https://drive.google.com/file/d/1Y8ENajpHbqWslZ3g6e60xJNdpf54PbQS/view?usp=sharing

TREATMENT

- The firm, Bharat Serums and Vaccine Limited, became the first company in India to receive the approval from Drug Controller General of India(DCGI) to use anti-fungal medication-
- **Liposomal Amphotericin B** or **LAmB** – as a medical intervention in patients of mucormycosis. It is given over an extended period of time under the strict observation of a physician.
- The anti-fungal medications can prevent the patients suffering from black fungus from progressing the stage of surgery.
- Surgery to remove the fungus growth might also be warranted.

How can Mucormycosis be prevented?

- Following appropriate treatment protocols as recommended by the WHO for Covid-19, including rational use of steroids and monoclonal antibodies only when they can help the patient, is important.
- It is important to keep blood sugar levels under control and ensure that appropriate calibration of oral drugs or insulin is done from time to time.
- Recognizing the symptoms and seeking treatment early if there are two or three symptoms at a time is key. If detected early , Mucormycosis can be cured.

THANK YOU