

# COVID19-associated mucormycosis (CAM)



Fungal Infection Study Forum (FISF) recommendation

<http://www.fisftrust.org>

Since the onset of the COVID 19 pandemic there have been multiple reports across country of very high incidence of mucormycosis among patients with COVID 19 especially in those who are diabetic and those who have received steroids.

Covid-associated mucormycosis (CAM) has been associated with high morbidity and mortality, exorbitant treatment costs and has led to shortage of antifungal drugs.

## When and how to suspect CAM

- **Patients with Covid-19 illness (active/recovering/post-discharge) – common presentation: rhino-orbito-cerebral mucormycosis (ROCM)**
  - Initially – nasal blockage or congestion, nasal discharge (bloody or brown/ black), local pain
  - Facial pain or numbness or swelling
  - Headache, orbital pain
  - Toothache, loosening of maxillary teeth, jaw involvement
  - Blurred or double vision with pain; paresthesia, fever, skin lesion, thrombosis & necrosis (eschar)
- **Pulmonary mucormycosis:**
  - Fever, cough, chest pain, pleural effusion, hemoptysis, worsening of respiratory symptoms
  - Lung CT – confused with COVID-related shadows; suspect mucormycosis in patients with thick-walled lung cavity (need to differentiate from covid-associated pulmonary aspergillosis), reverse halo sign, multiple nodules, pleural effusion
  - Repeated negative galactomannan & beta-glucan tests

## How to diagnose mucormycosis:

**Mucormycosis is a medical emergency even when clinically suspected.**

Suspected patients should undergo appropriate **radio-imaging study:** MRI - PNS with brain contrast study for ROCM, plain CT thorax for pulmonary mucormycosis.

### Rhino-orbito-cerebral

- Consult ENT surgeon for endoscopic collection of debrided tissue/biopsy – one portion in sterile saline for microscopy & culture, other portion in formal saline for histopathology

### Pulmonary

- Broncho-alveolar lavage (BAL), Mini BAL, non-bronchoscopic lavage, transbronchial biopsy, CT guided biopsy from lung – process for microscopy & culture
- Chest X-ray and/ or HRCT – reverse halo sign, thick-walled cavity (need to differentiate from Covid associated pulmonary aspergillosis), multiple nodules, pleural effusion
- Repeated negative galactomannan & beta-D-glucan tests

## Treatment of CAM

Team approach is required with infectious disease specialist, microbiologist, histopathologist, intensivist, neurologist, ENT specialist, ophthalmologist, dentist, surgeons, radiologists etc.

1. Control of diabetes & diabetic ketoacidosis
2. Reduce steroids (if patient is still on) with aim to discontinue rapidly
3. Discontinue other immunomodulating drugs if patient is taking like: Baricitinib, Tofacitinib
4. Surgical debridement: Extensive, to remove all necrotic material; if eye involved, exenteration of eye; in pulmonary, if the lesion is localized or in one lobe.
5. Medical treatment
  - a. Insert peripherally inserted central catheter (PICC line) or central venous catheter
  - b. Maintain adequate systemic hydration, infuse normal saline IV before amphotericin B infusion
  - c. Antifungal therapy
    - i. Liposomal amphotericin B (L-AmB) (preferred treatment) 5mg/kg/day, dilute in 200 cc 5% dextrose over 2-3 hours infusion (avoid slow escalation; higher dose 10mg/Kg/day may be given in brain involvement)
    - ii. Amphotericin B deoxycholate (D-AmB): only if cost and availability of L-AmB is an issue; 1mg/kg/day in 5% dextrose, slow infusion for 6-8 hours. Pre-medication may be required to avoid infusion reaction
    - iii. Monitor renal function & potassium level while treating with amphotericin B
    - iv. Patients who are intolerant to amphotericin B, alternative agents are posaconazole or isavuconazole (injection/tablets)
    - v. Tab posaconazole: 300mg twice a day on first day, followed by 300mg once a day. Check posaconazole trough level after 7 days of therapy & avoid interacting drugs.
    - vi. Tab isavuconazole: 200mg three time a day for two days, followed by 200 mg once a day.
6. Monitor patients clinically, with radio-imaging for response / disease progression & microbiologically
7. After 3-6 weeks of amphotericin B therapy, consolidation therapy (posaconazole/isavuconazole) for 3-6 months
8. Read global guideline on treatment of mucormycosis for further detailed information ([Lancet Infect Dis.](https://pubs.rsos.royalsocietypublishing.org/doi/10.1098/rsos.201919) 2019; 19: e405-e421)

## How to prevent this infection

- As poorly controlled diabetes is the major issue, **good glycemic control** during management of COVID 19 patients is required
- **Systemic steroids should only be used in patients with hypoxemia**
- **Oral steroids are contra indicated in patients with normal oxygen saturation on room air**
- **If systemic steroid is used, blood sugar should be monitored**
- **The dose and duration of steroid therapy should be limited to dexamethasone (0.1mg/kg/day) for 5-10 days**
- Universal masking reduce exposure to Mucorales; avoidance of construction sites
- During discharge of the patients, advice about the early symptoms or signs of mucormycosis (facial pain, nasal blockage and excessive discharge, loosening of teeth etc., chest pain, respiratory insufficiency)

## Misinformation & misleading

1. **Mucorales are not black fungi.** Black fungi are different category of fungi having melanin in the cell wall.
2. **Mucormycosis is not contagious.** It does not spread from one person to another.
3. Mucormycosis is not spread by oxygenation, humidifier, and water. The fungi remain in the indoor & outdoor environment. The spores enter the respiratory tract via air.
4. **No antifungal prophylaxis is recommended** as the incidence is not more than 10% in any COVID-19 cohort.

## References

1. RECOVERY Collaborative Group. Dexamethasone in Hospitalized Patients with Covid-19. N Engl J Med. 2021 Feb 25;384(8)
2. WHO Rapid Evidence Appraisal for COVID-19 Therapies (REACT) Working Group. Association Between Administration of Systemic Corticosteroids and Mortality Among Critically Ill Patients With COVID-19: A Meta-analysis. JAMA. 2020 Oct 6;324(13):1330-1341
3. <https://www.mohfw.gov.in/pdf/ClinicalGuidanceonDiabetesManagementatCOVID19PatientManagementFacility.pdf>
4. Global guideline for the diagnosis & management of mucormycosis. Lancet Infect Dis 2019; 19: e405-e421

