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Review Article

Mucormycosis during Covid 19: A Review Article

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Abstract

Mucormycosis is a fungus that is caused by mucormycetes, a type of mould with environmental contact with its spores. The entry of fungus into the body is through the skin which is injured or cut., it can develop on the skin. It also erodes face structures and travels across the respiratory tract. It is angioinvasive caused by the fungus Mucorales. It is most frequently encountered in immunocompromised patients. Following covid 19 second wave, there is a rapid increase in mucormycosis incidence in post-covid patients in India. If not treated early on, this disease appears to be fatal.

This review article seeks to provide a quick overview of the etiology, pathogenesis, risk factors, dos and don'ts, as well as recent breakthroughs in Mucormycosis diagnostic and therapeutic procedures.

Keywords: Mucormycosis; Covid 19; Diabetes

Introduction

Mucormycosis, formerly known as zygomycosis, is an uncommon fungus infection caused by the mucormycetemould, which can be found in abundance in soil, leaves, rotten wood, and putrefied manue. This hazardous illness causes darkening of the skin, inflammation, redness, ulcers, and fevers, among other symptoms. If left untreated, it can infect the lungs, eyes, and even the brain, proving lethal. The sickness was First reported in 1876 in Germany as haemorrhagic infarct in lungs [1].

As a result, it's critical to understand the causes of Mucormycosis, as well as the most common indications and symptoms, in order to spot any potential warning signs in both COVID-19 patients and other people.

Factors that predispose

- Mucormycosis is a potentially fatal angioinvasive fungal infection that is caused by a genetic predisposition.
- Diabetes [2], corticosteroids, and immunosuppressive medications, whether primary or secondary
- Hematological malignancies, immune deficiency, and haematological transplantation of stem cell [3] cancers of the solid organs, transplantation of organs, iron overload [4], and unlawful intravenous administration of drug Malnourishment, drug use.

Mucormycosis risk factors differ greatly depending on where you live. According to Europe research [6,7], the most prevalent underlying illness was a haematological malignancy, whereas in the United States, the most prevalent underlying disease is diabetes.

It was diabetes mellitus in India [8]. Several investigations have found a link between the underlying condition and the infection site [9].

Pulmonary mucormycosis and diabetes mellitus with sinusitis are linked by haematological malignancies and neutropenia and rhino cerebral illness, but cutaneous mucormycosis is frequently caused by trauma. It is dependent on clinical manifestations It's di-

vided into four categories: rhino orbital cerebral, pulmonary, and cutaneous. gastrointestinal, disseminated, or other, which includes unusual and uncommon forms like endocarditis, osteomyelitis, peritonitis, renal failure, and so forth.

ROCM (Rhino-Orbital-Cerebral Mucormycosis) is a type of mucormycosis that is most commonly encountered in one of the of the complication of SARS-COV-2. It is critical to diagnose this disease as soon as possible because it has shown to be fatal. Multiple cases of mucormycosis linked to healthcare have been mentioned either as individual incidents or as epidemics. 75 cases of mucormycosis were recorded in an Indian magazine 9 percentage cases were nosocomial. Healthcare-Mucormycosis is due to a variety of exposures in the hospital setting. Use of non-sterile items is the most common reason for infection. Bandages, glue, and nitro-glycerine, contaminated Catheters, insulin pumps, tongue depressors, ostomy bags, and probiotics, moulds on the surface and air, Construction sites, poor ventilation Invasive fungal infections are increased by faulty systems and water leakage have all been linked to the infection. An outbreak linked to allopurinol tablets and pre-packaged food has already been reported.

Risk factors include

- Mucormycosis does not affect everyone who has a coronavirus infection and is taking COVID-19 treatment. Certain people are more likely to become infected with the virus.
- People with uncontrolled diabetes mellitus who can't keep their blood sugar levels in check within a reasonable range Those who are receiving immunosuppressive steroid medicines for concomitant illnesses. COVID-19, as well as pre-existing ailments, must be managed over a long period of time.
- Being admitted to a hospital's Intensive Care Unit (ICU) for an extended period of time.
- Having a weakened immune system procedures
- Antifungal medications on prescription are already being used to treat infections.

Mucormycosis signs and symptoms

- Sinusitis and nasal congestion are two common symptoms of sinusitis.
- A discharge of red or blackish mucus from the nose.
- Only one side of the face hurts, and it's numb and bulging.
- On the bridge of the nose, there is a distinct blackish discoloration.
- A lot of discomfort in the teeth and jawbone, and dental structures are deteriorating.
- Teeth can move unexpectedly, especially in the maxillary arch.
- Vision that is hazy, with things that appear blurry or doubled, as well as eye pain
- Abnormal blood clotting or thrombosis of tissues, along with skin injury and damage or
- necrosis of dermal cells

Further deterioration of respiratory functions, with chest pain, Excess fluid build-up in lungs i.e., pleural effusion and coughing up blood or hemoptysis.

Precautions

- What to do and what not to do
- DO's
- Control hyperglycemia in diabetics and after COVID-19.
- Use steroid sparingly - pay attention to timing, dose, duration, and tapering.
- During oxygen therapy, use clean, distilled water free of contaminants for humidifiers.
- Antibiotics and antifungals should be used with caution.
- Antibiotic sensitivity testing is performed on hospitalised patients after the time limit has passed. recommended.

Do not ignore warning signals and symptoms

Do not automatically assume that all occurrences of clogged nose are caused by bacterial sinusitis in the setting of immunomodulator-treated COVID-19 patients

- If necessary, request extensive examinations (KOH staining, for example).
- Do not miss out on the opportunity to begin therapy for mucormycosis [11].

Mucormycosis diagnosis

The following are the stages of Rhino Orbito Cerebral Mucormycosis

Stage 1: Nasal mucosa involvement

- **1a:** Only affects the middle turbinates.
- **1b:** Participation of the inferior turbinates
- **1c:** Nasal septum involvement

Stage 2: The paranasal sinuses are involved.

- **2a:** A single sinus
- **2b:** Two sinuses on either side
- **2c:** Two ipsilateral sinuses, as well as the palatal or mouth cavity.
- **2d:** Zygoma/mandible/bilateral paranasal sinuses

Stage 3: Orbital involvement

- **3a:** Medial orbit involvement, nasolacrimal duct, eyesight unaffected
- **3b:** Orbital involvement is diffuse, but vision is unaffected.
- **3c:** Occlusion of the retinal artery and ophthalmic artery and superior ophthalmic vein thrombosis, involvement of the inferior and superior orbital fissure, orbital apex, vision loss
- **3d:** Orbital engagement on both sides

Stage 4: CNS Involvement

- **4a:** Focal or partial cavernous involvement, as well as cribriform plate involvement
- **4b:** Cavernous sinus thrombosis/diffuse cavernous sinus involvement
- **4c:** 4b plus skull base involvement, internal carotid blockage, and brain infarction
- **4d:** CNS illness that is multifocal or diffuse.

An accurate rapid diagnosis in delivering prompt medical care by a team of specialists is a crucial factor that boosts the success of mucormycosis treatment. This ensures less harm to bodily organs and entirely prevents fungal infection, avoiding serious consequences. problems, and even death. maximising the outcome, reducing morbidity, and in order to improve survival in RCOM, a multi-disciplinary team must work together and respond quickly. A multidisciplinary team made up of professionals in several fields The first step is to make a diagnosis (radiology, microbiology, pathology, molecular biology),

- Surgical (otorhinolaryngology, ophthalmology, neurosurgery
- Oral and Maxillofacial Surgery is a type of oral and maxillofacial surgery.
- An approach taken by a team
- A microbiologist
- Specialist in Internal Medicine
- Intensive care specialist
- Neurologist is a medical specialist who studies the nervous system.
- Otolaryngologist (ENT)
- Ophthalmologist ophthalm
- Surgeon specialising in maxillofacial surgery
- Surgeon, Plastic
- Biochemist is a person who works in the field of biology.
- Rhino Orbito Cerebral Mucormycosis: A Treatment Strategy (ROCM).

Possible mucormycosis

Diagnosis

A patient with concurrent or recently (within 6 weeks) treated COVID-19, diabetes mellitus, use of systemic steroids and tocilizumab, mechanical ventilation, and other symptoms and signs of MUCORMYCOSIS. or the use of supplementary oxygen is thought to be a possible ROCMROCM is improbable/or when there is no supportive data on diagnostic nasal endoscopy and/or when there is no supportive data on diagnostic nasal endo No evidence on direct microscopy or culture, and no contrast/enhanced MRI/CT scan molecular diagnostics or histopathology using specific stains Management: Three weeks of observation were carried out.

Mucormycosis probable

When diagnostic nasal endoscopy confirms the clinical symptoms and indications, the diagnosis is made.

Direct microscopy, culture, MRI or CT scan findings, but evidence on direct microscopy, culture, the patient is classified as Probable based on histology with specific stains or molecular diagnostics.

ROCM. Immediate intravenous amphotericin B 5-10 mg is recommended.

With proper metabolic management/kg body weight If Amphotericin B is not recommended due to a medical condition, Because of reduced renal function, amphotericin B is not recommended. Isavuconazole IV 200 mg thrice daily on days 1 and 2, and 200 mg once daily on day 3; or Posaconazole IV 300 mg twice daily on day 1 and 300 mg once daily on day 2. In this situation, surgery should be prioritised [10,11].

Mucormycosis that has been proven

When diagnostic nasal endoscopy confirms the clinical symptoms and indications, the diagnosis is made.

Confirmation on direct microscopy or culture, or a contrast-enhanced MRI or CT scan the patient is regarded Proven after histology with specific stains or molecular testing. ROCM. It is suggested that patients receive immediate induction therapy with intravenous liposomal amphotericin B (5-10 mg/kg body weight) and strict metabolic control. Isavuconazole IV 200 mg thrice a day on days 1 and 2 and once a day on days 3 and 4 if Amphotericin B is not indicated due to impaired renal function. Surgery or posaconazole IV (300 mg twice a day on day 1 and 300 mg once a day on day 2) should take precedence at this time.

Strategies for prevention

Simple infection prevention measures can also help to lower the risk of infection. After recovering from COVID-19, developing mucormycosis, such as: Simple preventive actions, such as personal hygiene of the body completely, go a long way in minimising the odds of contracting mucormycosis post recovery of COVID-19.

Face masks and face shields should be worn when visiting contaminated locations such as locations of construction Wearing fully covered apparel such as disguised shoes, long pants, and long-sleeved shirts is essential. When working with soil, moss, or manure, such as in gardening, wear shirts and gloves.

Conclusion

Activities Mucormycosis is a difficult-to-diagnose uncommon disease with a high rate of morbidity and mortality. Diagnosis is frequently delayed, and the disease progresses quickly. Urgent surgical and medicinal procedures are required. Intervention can save someone's life. Guidance on difficult multidisciplinary management has the potential to be beneficial. In order to enhance prognosis, different approaches are used in different health-care settings. When there is a suspicion of mucormycosis, imaging is strongly advised.

This is followed by a strongly suggested surgical operation to document the extent of the condition.

In suspected mucormycosis, proper imaging is used to document the disease extension, then surgical procedures follow. The first-line treatment is liposomal amphotericin B is suggested, whereas Isavuconazole is given intravenously, and posaconazole is given intravenously or as a delayed-release pill. Moderate strength is recommended. Salvage of both triazoles is strongly advised.

Treatments. Because of significant side effects, amphotericin B deoxycholate is not suggested toxicity, but in resource-constrained situations, it may be the only option. Early diagnosis and recognition of illness patterns are critical in the treatment of mucormycosis.

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