Original Article

# Post-Covid Mucormycosis: A Case Series

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## Abstract

**Introduction:** COVID-19, a new coronavirus illness, swiftly spread throughout all continents. However, evidence on all of COVID-19's indications and symptoms is lacking. Patients who have COVID-19 may be more susceptible to fungal infections. Mucormycosis is an uncommon and frequently fatal fungal illness caused by hyphae invading the bloodstream and causing thrombosis and necrosis.

**Materials and methods:** Patients diagnosed with mucormycosis following a recent COVID-19 infection were included in the case series analysis. Surgical therapy was limited to individuals who tested negative for COVID-19 on PCR. To remove the infection, endoscopic, open, and combination techniques were used. For the first month after surgery, survivors were followed up on on a regular basis.

**Result:** About 30 people with a history of Covid-19 were given dexamethasone and remdesivir in this study. Following therapy, these individuals developed mucormycosis, which was treated by Functional Endoscopic Sinus Surgery (FESS). As a consequence, 16 patients (53.34 %) had numerous operations. The most prevalent related condition was diabetes mellitus (60 %). The majority of the patients were men (60 %). Our patients had an average age of 55.53±8.093. 43.34 % of the people died.

**Conclusion:** In conclusion, mucormycosis is a rare but critical problem complicating the later part of the clinical course of COVID-1, possibly due to improper drug usage during Covid treatment.

**Key words:** Mucormycosis, COVID-19, infection

## Introdution

Mucormycosis (formerly known as zygomycosis) is a rare and deadly illness caused by a common fungus belonging to the Zygomycetes class and the Mucorales order (1). Mucormycosis is a potentially deadly illness produced by

Mucorales species of the phylum Zygomycota in immunocompromised hosts, especially those with leukemia, diabetes mellitus, or lymphoma (2, 3). Shortness of breath, cough, loss of smell, fever, and exhaustion have all been reported as symptoms of Coronavirus Disease 2019 (COVID-19) pneumonia. Patients with underlying comorbidities such hypertension, diabetes, or coronary artery disease are more vulnerable to COVID-19 pneumonia-related compilations. Mucormycosis is more likely to occur in those with poorly managed diabetes or those who are immunocompromised (4). Mucormycosis is difficult to diagnose, which has a negative impact on the outcome and a bad prognosis. The importance of early detection and treatment cannot be overstated. A week's delay nearly increases the 30-day death rate from 35 percent to 66 percent. Mucormycosis has a dismal prognosis despite vigorous early surgical and medicinal treatment (5). Corticosteroids, such as Methylprednisolone and Dexamethasone, are thought to slow the progression of respiratory failure in Covid-19 through modulating inflammation-mediated lung damage (6). Long-term use of corticosteroids has been linked to a variety of opportunistic fungal infections, including aspergillosis and mucormycosis; however, even a short course of corticosteroids has been linked to mucormycosis, particularly in persons with diabetes (7). The majority of patients with invasive mucormycosis are immunosuppressed, have underlying conditions like hematologic malignancies, diabetes, or trauma, are transplant recipients. Natural catastrophes have been linked to outbreaks of the fungal illness in the past (8-10). The major goal of this research is to show mucormycosis in relation to the COVID-19 pandemic, as well as its features and management at our facility.

## Materials and methods

A case series research with 30 patients was undertaken. We gathered data on all confirmed mucormycosis cases treated with dexamethasone and remdesivir following COVID-19 between September 1 and December 31, 2021. The study procedure was approved by the individual center's ethical committees. All patients with post-COVID mucormycosis received a clear diagnosis of COVID-19 based on polymerase chain reaction (PCR) and computed tomography (CT) tests. For all of the participants in the study, CT images of the chest and sinuses were acquired. Surgical intervention was not conducted unless two consecutive negative COVID-19 swab findings were obtained. The surgical approach was customised based on the results of each patient and the extent of the illness. To remove infection, endoscopic, open, and combination methods were used, along with serial debridement. Anticoagulants were used to treat cerebral sinus thrombosis in collaboration with neurology experts. Survivors were subjected to monthly ambulatory endoscopic evaluations during the follow-up period to guarantee disease eradication. The following data was collected from the patient records: underlying diseases, such as diabetes mellitus; diagnosis of mucormycosis before or after COVID-19 diagnosis; anatomic site of mucormycosis involvement; diagnostic modalities for mucormycosis, such as histopathology or microscopy, and culture; treatment details, such as surgical therapy and other treatments; immunosuppressive treatment received, such as dexamethasone and remdesivir; and outcome at 6 and 12 weeks.

## Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) version 18.0 was used to conduct the statistical analyses. Continuous variables are expressed as means and standard deviations (SD), whereas discrete variables are expressed as numbers and percentages.

## Result

About 30 people with a history of Covid-19 were treated with dexamethasone and remdesivir in this trial. Following therapy, these patients developed mucormycosis, which was treated by Functional Endoscopic Sinus Surgery (FESS). As a result, 16(53.34%) individuals were operated on several times. Table 1 and 2 shows the demographics, clinical data, and comorbidities of the patients. Diabetes mellitus (DM) (60%) was the most common associated disease. Most patients were male (60%). Average age of our cases were 55.53±8.093. 43.34% were died. Table 2 summarises the presenting symptoms and signs, as well as the severity of the condition. Endoscopic results and a CT scan revealed involvement of the Maxillary sinus (83.34 percent), the Paranasal sinus (66.67 percent), and the Sphenoid sinus (50

%).The most prevalent symptoms and indicators are ptosis and eye discomfort (40 %), impaired vision (26.67 %), and headache (20%). In one case, polyps in the current investigation were associated with mucormycosis.

Table 1. Demographic data Mucormycosis patient after Covid-19.

| Variable | Number (30) | percent(%) |
|---|---|---|
| Total Mucormycosis | 30 | |
| Mucormycosis with underlying disease | 24 | 80 |
| Mucormycosis without underlying disease | 6 | 20 |
| Age(Mean±SD) | 55.53±8.093 | - |
| male | 18 | 60 |
| Female | 12 | 40 |
| DM | 18 | 60 |
| HTN | 6 | 20 |
| Survival | 17 | 56.67 |
| Died | 13 | 43.34 |

Table 2. Symptoms and signs of Mucormycosis patient after Covid-19

| Variable | Number (30) | percent(%) |
|---|---|---|
| Headache | 6 | 20 |
| Hemiplegia | 1 | 3.34 |
| Paraesthesia | 3 | 10 |
| Palatine necrosis | 10 | 33.34 |
| Inflation | 5 | 16.67 |
| Blurred vision | 8 | 26.67 |
| Mucosal bleeding | 7 | 23.34 |
| Polyps | 1 | 3.34 |
| Ptosis and eye pain | 12 | 40 |
| Eye involvement | 12 | 40 |
| Maxillary sinus | 25 | 83.34 |
| Ethmoid sinus | 23 | 76.67 |
| Sphenoid sinus | 15 | 50 |
| Septum | 18 | 60 |
| Paranasal sinus | 20 | 66.67 |
| Cavernous Sinus | 2 | 6.67 |

## Discussion

Mucormycosis, according to our research, leads patients to have several surgeries and makes them more likely to die. In diabetics with a weakened immune system, it also causes increased involvement. The sickness was more prevalent in men. Mucormycosis is a fungal infection caused by organisms from the Mucorales order. These organisms are common in nature, but they can cause catastrophic rhino-orbito-cerebral infection in vulnerable patients, as demonstrated in this instance (11, 12). COVID-19, which was present at the time of readmission, could have contributed to mucormycosis susceptibility. COVID-19 causes endothelialitis and microvascular thrombosis in the pulmonary and extrapulmonary vascular beds, which may exacerbate the angioinvasive effects of mucormycosis, which often ends in tissue infarction. Furthermore, COVID-19 has the potential to disrupt immunological function (13, 14). It may therefore predispose to an opportunistic infection like mucormycosis when paired with steroid-induced immunosuppression. As a result of the large number of health-care personnel who became infected during the initial phase of the COVID-19 pandemic, various research studies were conducted to determine the danger of surgical operations and how to reduce it. According to recent recommendations, endoscopic sinus surgery is a very high-risk treatment that should be postponed since it poses a significant risk of infection to all operating and recovery room personnel, as well as a chance of patient recovery being delayed. 37 As a result, all patients with covid and mucor symptoms whithout PCR test results were surgically treated in the current investigation (15,16). In other words, India has the world's highest rate of mucormycosis. Despite this, India already has the world's second-largest diabetes population and was, until recently, the world's diabetes capital (17). The enthodelial receptor glucose regulated protein (GRP 78) and the Mucorales adhesin spore coat protein homologs (CotH) are both induced by acidemic and hyperglycemic conditions, generating a "perfect storm" for enhanced Mucorales adherence and penetration to the endothelium. GRP 78 has been proposed as one of the receptors involved in SARS-CoV-2 infection (18).

## conclusion

In conclusion, mucormycosis is a rare but critical problem complicating the later part of the clinical course of COVID-19, possibly due to improper drug usage during Covid treatment. Clinicians should be aware with the symptoms of this rare but deadly invasive mucormycosis in order to diagnose it quickly in COVID-19-positive patients receiving systemic corticosteroids during the current epidemic. To limit the incidence of deadly mucormycosis, all efforts should be taken to maintain optimum hyperglycemia, and only prudent evidence-based use of corticosteroids in patients with COVID-19 is advocated.

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