

Original Research

Oral findings associated with COVID complications- A histopathological evaluation

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ABSTRACT:

Background: Severe acute respiratory syndrome coronavirus 2 (SARS- CoV- 2) virus. (1) COVID-19 is a member of the coronavirus family, including MERS-CoV and SARS-CoV. (10) Both MERS-CoV and SARS-CoV are believed to affect humans and cause interstitial pneumonia, pneumocyte hyperplasia, and acute diffuse alveolar damage. The main sign and symptoms include fever, cough, fatigue, and shortness of breath while headache, sore throat, rhinorrhea are some less common symptoms. **Aim and objectives:** To assess the histopathologic findings of patients with COVID complications. **Materials and methods:** A total of 25 patients with the past history of COVID-19 infection who reported with Mucormycosis post COVID were enrolled in the study. Consents were taken from patients or their relatives before enrolling them into the study. A complete demographic and clinical details of all the patients were obtained and the biopsy specimens were taken for the histopathological examination. **Results:** 60% were males and 40% were females with 64% having uncontrolled diabetics, 16% patients had grade II hypertension while remaining 20% patients were of geriatric age group. Physical examination of the subjects revealed an ulcerated lesion in majority of the patients, samples from these lesions were collected for the histopathological evaluation and the findings revealed non-septate hyphae invading blood vessels in 68% cases while it revealed minimally septated broad, ribbon-like hyphae in 32% cases. **Conclusion:** Prevention of COVID-associated mucormycosis needs to focus on addressing on the risk factors aiming for better glycemic control in those with diabetes, appropriate use of systemic corticosteroids and prevention of unnecessary use of antibiotic, antifungal and other immunomodulators.

Keywords: SARS- CoV-2, Angiotensin-converting enzyme, Mucormycosis

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INTRODUCTION

The novel coronavirus disease (COVID-19) pandemic is one of the most challenging public health crisis that first emerged in Wuhan, China, in late December 2019 and believed to be caused by infection with the severe acute respiratory syndrome coronavirus 2 (SARS- CoV- 2) virus.¹ COVID-19 is a member of the coronavirus family, including MERS-CoV and SARS-CoV. ² Both MERS-CoV and SARS-CoV are believed to affect humans and cause interstitial pneumonia, pneumocyte hyperplasia, and acute

diffuse alveolar damage.³ The disease has spread from China to affect nearly 200 countries all over the world.⁴ and the global spread of the disease was mainly travel-related. This virus is easily transmits via droplets or by bodily fluids of the infected person who come in contact with another person's face, mouth, eyes, or nose.⁵ The Angiotensin-converting enzyme 2 (ACE2), which is expressed on the respiratory tract, acts as a receptor to SARS-CoV-2. The virus invades the cells and causes the destruction and inflammation of different organs that subsequently affects the

vascular supply.⁶ The main sign and symptoms include fever, cough, fatigue, and shortness of breath while headache, sore throat, rhinorrhea are some less common symptoms. Along with this approx. 20% of the patients presented with severe symptoms such as respiratory failure, multiorgan failure and septic shock.⁷ The mean recovery time is two weeks for mild cases and 3-6 weeks for severe or critical cases.⁸ The diagnosis of COVID-19 relies mainly on reverse-transcription polymerase chain reaction (RT-PCR) with some emerging evidence on CT(computed tomography) and laboratory findings.⁹ The diverse histopathological findings associated with COVID 19 infections suggest that multiple organs are affected by the virus, with the pulmonary system is the most common system to be affected. Pneumocytes desquamation, pulmonary edema, and diffuse alveolar damage are the most common microscopic findings.¹⁰ Fungal infections, including mucormycosis, aspergillosis and invasive candidiasis, have been reported in patients with severe COVID-19 or those recovering from the disease and have been associated with severe illness and death. India has reported a recent surge in mucormycosis cases. Prevention of COVID-19 associated mucormycosis needs to focus on aiming for better glycaemic control in COVID-19 patients and monitoring the use of systemic corticosteroids in treating severe cases.¹¹ Outpatient use of systemic corticosteroids/other immunomodulating drugs for mild or moderate patients with COVID-19 should be avoided. Health care facilities need to strengthen their infection prevention and control (IPC) programmes to prevent healthcare-associated outbreaks.¹² The incidence rate of mucormycosis globally varies from 0.005 to 1.7 per million population. In India, prevalence of mucormycosis is estimated as 140 per million population, which is about 80 times higher than the prevalence in developed countries. Following the surge of COVID-19 associated mucormycosis and the Government of India directive, several states in India made mucormycosis a notifiable disease in May

2021.¹³ This will provide better insights into the disease burden, population characteristic, risk factors, clinical spectrum and outcomes of these patients. Current trends indicate that the surge is higher in those with pre-existing diabetes, those on systemic corticosteroids, and is being observed in both people with COVID-19, and those recovering from the disease. Hence; the present study was conducted to assess the histopathologic findings of patients with COVID complications.

MATERIALS AND METHODS

The present study was conducted in a private dental hospital to assess the histopathologic findings of patients with COVID complications. A total of 25 patients with the past history of COVID-19 infection who reported with Mucormycosis post COVID were enrolled in the study. Consents were taken from patients or their relatives before enrolling them into the study. A complete demographic and clinical details of all the patients were obtained and the biopsy specimens were taken for the histopathological examination. The statistical analysis was done by SPSS version 12 and Univariate regression curve was used to determine the level of significance.

RESULTS

A total of 25 patients with Mucormycosis as a post COVID complication were enrolled into the study. The mean age of the subjects were 50 years. Out of these 25 subjects, 60% were males and 40% were females with 64% having uncontrolled diabetes 16% patients had grade II hypertension while remaining 20% patients were of geriatric age group. Physical examination of the subjects revealed an ulcerated lesion in majority of the patients, samples from these lesions were collected for the histopathological evaluation and the findings revealed non-septate hyphae invading blood vessels in 68% cases while it revealed minimally septated broad, ribbon-like hyphae in 32% cases.

TABLE 1: DEMOGRAPHIC DETAILS

Variable	Value
MEAN AGE (YEARS)	50 YEARS
MALES (N)	15
FEMALES (N)	10

TABLE 2: CO-MORBID STATUS OF THE SUBJECTS

Variable	Number	Percentage
Uncontrolled diabetes	16	64%
Grade II hypertension	4	16%
Geriatric age group	5	20%

TABLE 3: HISTOPATHOLOGICAL EVALUATION OF SAMPLES

Variable	Number	Percentage
Non-septate hyphae	17	68
Minimally septated broad, ribbon-like hyphae	8	32

DISCUSSION

The symptoms of mucormycosis depend on where in the body the fungus is growing. The most common presentation is a sinus infection (sinusitis) that is accompanied by nasal congestion, nasal discharge, and sinus pain. A fever and headache may also occur. It is not contagious and does not spread by contact of person to person. This fungus is found in the environment.^{14,15} Transmission occurs through inhalation, inoculation, or ingestion of spores from the environment. Although most cases are sporadic, healthcare-associated outbreaks have been linked to adhesive bandages, wooden tongue depressors, hospital linens, negative pressure rooms, water leaks, poor air filtration, non-sterile medical devices, and building construction.¹⁶ It most commonly affects the sinuses or the lungs after inhaling fungal spores from the air. In such cases, it may spread to brain and eyes. It may also occur on the skin after a cut, burn, or other type of skin injury gets infected. In our study total 25 patients with Mucormycosis as a post COVID complication were enrolled into the study. The mean age of the subjects were 50 years. Out of these 25 subjects, 60% were males and 40% were females with 64% having uncontrolled diabetes, 16% patients had grade II hypertension while remaining 20% patients were of geriatric age group. In a study, a case of probable pulmonary mucormycosis in a 55-year-old man with diabetes, end-stage kidney disease, and COVID-19. The index case was diagnosed with pulmonary mucormycosis 21 days following admission for severe COVID-19.¹⁷ Early recognition, diagnosis and prompt administration of appropriate antifungal treatment and surgical debridement (as needed) are important for improving outcomes for patients with mucormycosis. Diagnostic methods include biopsy and fungal staining (KOH mount), which remains the mainstay of laboratory diagnosis. Facilities where fungal culture and susceptibility testing are available can help to confirm the species of mucormycosis. Treatment initiation, however, should not wait for fungal culture results. Imaging tests such as a CTscan of lungs, sinuses, or other parts of body, depending on the location of the suspected infection, may also be used to support the diagnosis. In the present study, non-septate hyphae invading blood vessels in 68% cases while it revealed minimally septated broad, ribbon-like hyphae in 32% cases. One of the study described a patient with COVID-19-associated mucormycosis and, searched and analyzed current medical literature to delineate the characteristics of COVID-19-associated mucormycosis. They reported a patient developed mucormycosis during post-COVID period. They described a 54-year-old male, hospitalized due to severe COVID-19 pneumonia. He was given long-term, high doses of systemic steroids. He developed maxillo-fascial mucormycosis and died of sepsis.¹⁸

CONCLUSION

Prevention of COVID-associated mucormycosis needs to focus on addressing on the risk factors aiming for better glycemic control in those with diabetes, appropriate use of systemic corticosteroids and prevention of unnecessary use of antibiotic, antifungal and other immunomodulators. IPC measures at the facility level are essential to prevent the environmental spread of this pathogen, which should include the sterilization and disinfection of the equipment used by multiple patients (tracheal tubes, ventilators), ventilation systems (if there is poor ventilation in the hospital that can contribute to dampness and dust); proper wound management (bandage, tape, adhesives, including tapes to secure medical devices such as endotracheal tubes, ostomy devices must be sterilized and changed regularly); proper line management in health facilities

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