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Mucormycosis in Covid 19 Patients: A Systemic Review of Cases Reported At Tertiary Care Center Hospital In Eastern Tamilnadu

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Abstract

The covid 19 pandemic has caused significant destruction, claiming over three million lives worldwide. Post-SARS-COV-2 invasion, the medical fraternity all over the world, saw a rise in numerous opportunistic infections. These opportunistic infections can be attributed to the factors such as immunosuppression, uncontrolled diabetes, and irrational use of steroids. One of those infections is mucormycosis in COVID-19 patients. Mucormycosis is a serious fungal infection caused by a group of molds called mucoromycetes. The rise of COVID-19-associated mucormycosis has made healthcare professionals fear an epidemic alongside a pandemic. This article geographically reports the cases of mucormycosis in COVID-19 patients at a tertiary care center in eastern Tamilnadu. This study aims to determine the risk factors including co-morbidity such as diabetes mellitus in COVID-19 patients with mucormycosis infection.

Keywords: Mucormycosis; COVID-19-associated mucormycosis; SARS-CoV-2

Introduction

India reported 44 million cases of Coronavirus disease 2019 (COVID – 19) as on July 25, 2022, accounting for over 5.26 lakh death. COVID – 19 caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been associated with a wide range of opportunistic bacterial and fungal infections**(1)**. Both Aspergillosis and Candida have been reported as the main fungal pathogens for co-infection in patients with COVID – 19**(2).** But later, several cases of mucormycosis in people with COVID – 19 have been increasingly reported worldwide, particularly in India **(3).** Mucormycosis is a fatal fungal infection that mainly occurs in immunosuppressed hosts, including those with hematological malignancies, transplant recipients, and people with uncontrolled diabetes mellitus **(4)**Globally, the prevalence of mucormycosis varied from 0.005 to 1.7 per million population, while its prevalence is nearly 80 times higher (0.14 per 1000) in India compared to developed countries. In other words, India has the highest cases of mucormycosis in the world **(3)**. Diabetes mellitus (DM) has been the most common risk factor linked with mucormycosis in India, although hematological malignancies and organ transplant takes the lead in Europe and USA **(5)**. While long term use of corticosteroids has often been associated with several opportunistic fungal infections including aspergillosis and mucormycosis, even a short course of corticosteroids has recently been reported to link with mucormycosis, especially in diabetes patients **(3).**

Materials And Methods:

This is a retrospective study that included all cases of mucormycosis in COVID-19 patients reported in the Department of Pathology, Government Thiruvarur Medical College over 3 months from June 2021 to

August 2021. The biopsy samples were received in our department from the Department of ENT, Government Thiruvarur Medical College, Thiruvarur, processed by standard procedures using 10% buffered formalin and paraffin technique and stained by Hematoxylin and Eosin. The patient's characteristics, covid status, co-morbidities, and management were obtained, recorded, and analyzed. The observation findings were compared to similar studies reported worldwide. A literature search was conducted in the electronic databases using the keywords "COVID-19 and Mucor", "SARS-CoV-2 and mucormycosis", "Mucorales", "Rhizopus", and "Mucormycosis" to look for similar case series and the findings were compared.

Results:

Of 32 cases, 22 (69%) were males and 10 (31%) were females. Age ranges from 33 to 69 years with a mean of 54.9 years. Associated comorbidities were noted in 27 patients with uncontrolled DM (24 patients; 89%) being the most common. Corticosteroid for the treatment of COVID-19 was administrated in 26 patients (81%). Nasal oxygen was used as a part of the treatment in 21 patients (66%). Out of 32 patients, 14 (44%) were active COVID-19 positive, and 18 (56%) were recovered, patients.

Fig 1 and 2 – Broad pauciseptate fungal hyphae, branching at 90o angle

Fig – 1

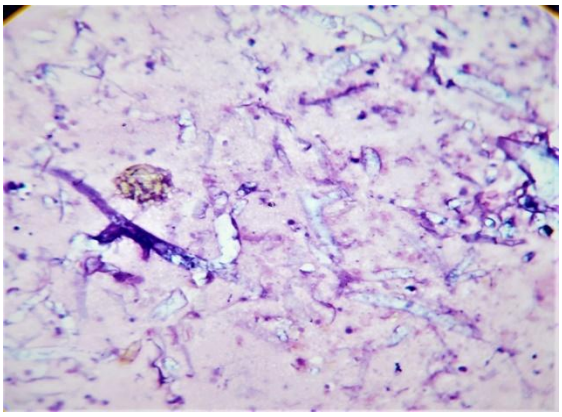

Fig – 2

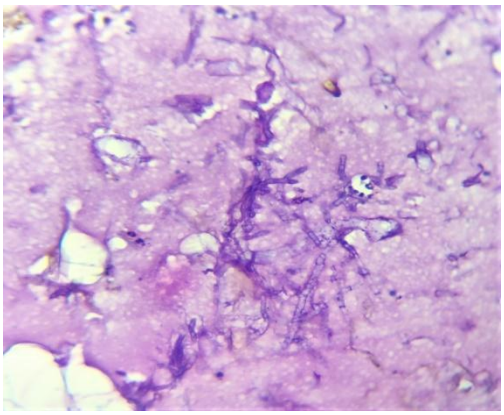

Table: Characteristics of COVID positive patients with Mucormycosis

Total number of cases - 32		
	No. of cases	**Percentage(%)**
Age group:		
31 – 40	1	3
41 – 50	7	22
51 – 60	15	47
61 – 70	9	28
Sex:		
Male	22	69
Female	10	31
Status:		

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Active	14	44
Recovered	18	56
Diabetic status:		
Diabetic	24	75
Non diabetic	8	25
Treatment:		
Nasal O2	21	66
Steroids	26	81

Discussion:

Our case series highlights the increased risk of mucormycosis in COVID-19-positive patients who were diabetic and on treatment with steroids and nasal oxygen. From the pathogenesis of mucormycosis, we know that mononuclear and polymorphonuclear phagocytes of normal hosts kill Mucorales by the generation of oxidative metabolites and defensins, hence neutropenic patients and those with dysfunctional phagocytes are susceptible to developing invasive mucormycosis **(6, 7)**. In COVID 19 there is profound lymphopenia. In advanced infections, viral replication accentuates the inflammatory response resulting in the influx of neutrophils and monocytes in the peripheral blood **(8)**. This leads to an imbalance between neutrophil and lymphocyte action making the patient more susceptible to systemic fungal infections **(9)**. Histopathological evaluation remains the mainstay for diagnosis of mucormycosis, which appears as broad, aseptate, or minimally septate ribbon-like hyphae ranging from 5 to 20 microns, invading the blood vessels. These organisms are seen in the areas of suppurative tissue necrosis. Special stains like Periodic acid – Schiff (PAS) or Grocott Methenamine Silver (GMS) can highlight the fungus. In our study, the mean age group was 54.9 yrs which coincides with other studies. In the study conducted by Neha Mishra et al, Teny M. John et al and Mrittika Sen et al, the mean age was 55.8 yrs, 55 yrs, and 51.9 yrs respectively **(9, 10, 11).** Our study showed male preponderance (69%); which is similar to other studies conducted by A.Patel et al (69%) **(12)**, Teny M. John et al (83%) **(10),** and Mrittika Sen et al (71%) **(11)**.In Awadhesh Kumar Singh et al **(3)** study, 80% of cases had DM and 76.3% received a course of corticosteroids. In the study conducted by Neha Mishra et al **(9)**, 80% were diabetic and 60% received steroids. In Teny M. John et al **(10)** study, 94% were diabetic and 88% received corticosteroids. Similarly, A.Patel et al (69%) **(12)** showed that 73.5% were diabetic, and Mrittika Sen et al **(11)** has shown that 78% were diabetic. The above-mentioned studies coincide with our present study, where 89% of cases had DM and 81% of cases received corticosteroids. In our study, 66% of patients received nasal oxygen which is similar to Mrittika Sen et al (57%) **(11)** study.

Conclusion:

Histopathology is the gold standard for the diagnosis of mucormycosis. Complete clinic pathological correlation will help us to efficiently treat the patients. Immunosuppressed individuals should be carefully monitored. Steroids and other immunosuppressive drugs should be optimally used. The uptrend in mucormycosis was mainly due to the triad of uncontrolled DM, rampant use of steroids, and COVID-19 pathophysiology. All efforts should be made to control blood glucose levels, to appropriately use the steroids, and finally early detection of mucormycosis both clinically and histopathologically.

References:

1. Kubin CJ, McConville TH, Dietz D, et al. Characterization of Bacterial and Fungal Infections in Hospitalized Patients with COVID-19 and Factors Associated with Healthcare-associated Infections, Open Forum Infectious Diseases, 2021, ofab201, https://doi.org/10.1093/ofid/ofab201

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2. Song G, Liang G, Liu W. Fungal Co-infections Associated with Global COVID-19 Pandemic: A Clinical and Diagnostic Perspective from China. Mycopathologia. 2020 Aug;185(4):599-606.
3. Awadhesh Kumar Singh, Ritu Singh, et al. Mucormycosis in COVID-19: A systematic review of cases reported worldwide and in India. 2021; https://doi.org/10.1016/j.dsx.2021.05.019
4. Farmakiotis D, Kontoyiannis DP. Mucormycosis. Infect Dis Clin North America 2016; 30:143-63
5. Prakash H, Chakrabarti A. Global epidemiology of mucormycosis. J Fungi;2019;5:26.
6. Waldorf AR. Pulmonary defense mechanisms against opportunistic fungal pathogens. Immunol Ser. 1989;47:243-71.
7. Waldorf AR, Ruderman N, Diamond RD. Specific susceptibility to mucormycosis in murine diabetes and bronchoalveolar macrophage defense mechanisms against Rhizopus. J Clin Invest. 1984;74(1):150-60.
8. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, transmission, diagnosis, and treatment of coronavirus disease 2019 (COVID-19): a review. JAMA. 2020;324(4):782-93.
9. Neha Mishra, Venkata Sai Shashank Mutya, et al. A case series of invasive mucormycosis in patients with COVID-19 infection. Int J Otorhinolaryngol Head Neck Surg. 2021 May;7(5):867-870
10. John TM, Jacob CN, Kontoyiannis DP. When uncontrolled diabetes mellitus and severe COVID-19 converge: The perfect storm for mucormycosis. J Fungi 2021;7:298.
11. Sen M, Honavar SG, et al. Epidemiology, clinical profile, management, and outcome of COVI-19- associated rhino-orbital-cerebral mucormycosis in 2826 patients in India – COSMIC; Ind J Ophthalmology; July 2021; Vol 69 issue 7
12. Patel A, Kaur H, Xess I, et al. A multicentre observational study on the epidemiology, risk factors, management and outcomes of mucormycosis in India. Clin Microbiol Infect. 2020;26(7):944.e9-944.e15.

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