

Correlation of mucormycosis with duration of steroid and oxygen therapy**Mital R. Nagvadiya¹, Vijay C. Popat², Darshit Kateshiya^{3*}, Jayesh Gojiya⁴**¹Assistant Professor, Department of Pathology, B. J. medical college, Ahmedabad, India²Professor & Head, Department of Pathology, Shri M.P. Shah medical college, Jamnagar, Gujarat, India³Senior Resident, Shri M.P. Shah medical college, Jamnagar, Gujarat, India⁴Third year resident, Shri M.P. Shah medical college, Jamnagar, Gujarat, India

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Abstract

Introduction: Covid-19 patients have many complications after treatment, including fungal infection, disseminated intravascular coagulation, septicemia, cardiac problems, fissures, piles and meningitis. Out of these; Mucormycosis- A lethal fungal infection which is caused by the family of mucorales; is more prevalent in post covid-19 patients. Mucormycosis is well correlated with post covid-19 infection; who underwent prolonged steroid & oxygen therapy during hospitalization. Mucormycosis is more common in covid-19 patients with immunocompromised status like Diabetes mellitus, Hypertension, cancer, organ transplant etc. **Aims & objectives:**(1) To correlate mucormycosis, a fungal infection in covid-19 patients with duration of steroid and oxygen therapy.(2) To correlate mucormycosis with various comorbidities & hospitalization. **Materials&Method:** All radiologically and histopathologically proven cases would be selected for our study. Complete clinical history of patients would be taken. Steroid and oxygen treatment given to the patient would be correlated.Type of study: Prospective & retrospective. Duration of study: 6 months **Inclusion criteria:** (1) Patients aged 18 years & above.(2) Patient with mucormycosis in covid-19 infection with or without hospitalization.(3)All radiologically suggested fungal infection in covid-19 induced pneumonia with active disease in recovery phase. **Exclusion criteria:** (1) Age less than 18 years. (2) Patients with incomplete clinical history. **Conclusion:** Mucormycosis is more common in hospitalized patients with prolonged steroid & oxygen therapy. We may prevent mucormycosis in covid-19 patients by reducing duration of steroid therapy.

Key words: Mucormycosis, COVID 19 patients, Steroid and oxygen therapy, Co – morbidities.

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Introduction

The coronavirus disease 2019 (COVID-19) infection caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)[1] Its may be associated with a wide range of disease patterns, ranging from mild to life-threatening pneumonia[2]. A wide range of bacterial and fungal co-infections may exist and may be associated with preexisting morbidity (diabetes mellitus, lung disease) or may develop as a hospital-acquired infection such as ventilator-associated pneumonia. India has a high prevalence rate of type 2 diabetes mellitus which is a well-known risk factor. We report the case of a patient with COVID-19 infection, who during the course of the treatment, developed rhino-orbital mucormycosis.[3] The overuse of high-dose steroid in management increase the frequency of opportunistic infection.[4]Mucormycosis, previously called zygomycosis [5] has been increasingly recognized as an important invasive fungal infection, particularly in patients with haematological malignancies, haematopoietic stem cell transplantation (HSCT), poorly controlled diabetes mellitus, those treated with the iron chelator, deferoxamine and suddenly surged in India, in patients suffering or recovering from COVID-19. The agents of mucormycosis (Rhizopus, Mucor, Rhizomucor, Cunninghamella and Absidia spp.) are a group of biologically diverse, primarily opportunistic and mostly airborne pathogens of wide ecological distribution.[6] It is caused by exposure to mucor mould which is commonly found in soil, plants, manure and decaying fruits and vegetables. It is ubiquitous and found in soil and air and even in the nose and mucus of healthy people.[7] Patients got heavy doses of steroids and antibiotics during hospitalisation causing decrease in their immunity levels. and

patients those with diabetes had sugar levels several times higher than normal, which severely compromised their immunity. So, such patients got fungal infection[8]. There is high for people living with HIV, and those using immune-modulating drugs, including the anti-fungal voriconazole in some high-risk groups[9].

Mucormycosis is frequently a life-threatening infection. A review of published mucormycosis cases found an overall all-cause mortality rate of 54%[10]. The mortality rate varied depending on underlying patient condition, type of fungus, and body site affected (for example, the mortality rate was 46% among people with sinus infections, 76% for pulmonary infections, and 96% for disseminated mucormycosis).[10]

Aims and Objectives

1. To correlate mucormycosis, a fungal infection in COVID 19 patients with duration of steroid and oxygen therapy.
2. To correlate mucormycosis with various comorbidities and hospitalization.

Materials and Methods**Method:**

- All radiologically and histopathologically proven cases would be selected for our study.
- Complete clinical history of patients would be taken.
- Steroid and oxygen treatment given to the patients would be correlated.

Type of study: Prospective and retrospective**Duration of study:** 6 Months

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Observation and Results

The study was conducted in the department of pathology in the government medical college for a period of about 6 month.

Table 1: Distribution of Mucormycosis cases according to the age and gender of the patients (n=60)

Age group (years)	No. of patients	Male	Female
<40	09 (15%)	6	3
40-60	38 (63.33%)	26	12
61-70	08 (13.33%)	5	3
>70	05 (8.33%)	4	1
Total	60 (100%)	41(68.33%)	19(31.66%)

Total 60 patients were selected for this study; Majority of the patients with Mucor mycosis (63.33%) are between the age of 40 to 60 years. Followed by 15% which are of <40 years of age, while 13.33% patients are between 61 to 70 years of age, patients with age > 70 years are 8.33%. Amongst total 60 patients with Mucormycosis 68.33% patients were male while 31.66% were female.

Table 2: Distribution of Mucormycosis cases based on oxygen therapy and steroid

Variable	Yes	P Value
1) Oxygen therapy given		1
Yes	30 (50%)	
No	30 (50%)	
2) Steroid therapy given		0.03
Yes	38(63.33%)	
No	22(36.66%)	

Among 60 patients with mucormycosis 50% had history of oxygen use for COVID 19 treatment while 50% patients had no history of oxygen use and 63.33% patients with mucormycosis had history of steroid use for COVID 19 treatment while 36.66% patients had no history of steroid use.

Table 3: Distribution of Mucormycosis cases based on use of Remdesivir and co-morbidity(n=60)

Variable	Yes	P Value
1) Remdesivir Given		0.00079
Yes	17 (28.33%)	
No	43 (71.66%)	
Total	60 (100%)	
2) Co – morbidities (DM, HTN, CAD)		<0.00001
Present	51 (85%)	
Absent	09 (15%)	
Total	60 (100%)	

Among 60 patient 28.33% patients with mucormycosis had history of ramdesivir use for COVID 19 treatment while 71.66% patients had no history of ramdesivir use

Among 60 patients, 51 (85%) patients had some co morbidities (eg. DM, HTN or CAD) while 09 (15%) patients had no such history.

Table 4: Duration of Mucormycosis detection after COVID 19 infection (In days) (n=41)

Duration after COVID 19 infection	No. of patients	P Value
<15 days	12 (29.26%)	<0.00001
15 – 30 days	27 (65.85%)	
>30 days	02 (4.87%)	
Total	41 (100%)	

(Note: Amongst total 60 Mucormycosis patients, data for duration - post COVID 19 infection was available for 41 patients while for 19 such patients no data was available.)Among 60 patient 65.85% patients developed mucormycosis infection 15 to 30 days after COVID 19 infection. While 29.26% patients developed it within 15 days of COVID 19 infection.

While after 30 days of COVID 19 infection, only 4.87% patients developed mucormycosis infection.

Discussion

COVID 19 induced mucormycosis had emerged in the near past. We have focused on their causes & correlated with steroid therapy and oxygen therapy use.

Age wise and Gender wise and age wise comparable study of Mucormycosis in Covid 19 positive patients

This study include total 60 patients with mucormycosis 68.33% patients were male while 31.66% were female. Most common age group is affected is 40-60 years. In a study done by S Sharma total of 23 patients presented; 15 of these were male and 8 were female, [11]. Another study done by Poorna priya showed 71.05 % patient were with most commonly affected age-group was that between 41 and 60 years.[12]. Another study done by Sangita Kamath showed 11 (73.3%) were male and four (26.7%) were female patients with age range from 27 to 70 years with mean (±SD) being 50.8 (±12.96)

years [13].

Comparable study based on oxygen therapy use.

This study include total 60 patient with mucormycosis . 30% patients with mucormycosis had history of oxygen use for COVID 19 treatment while 30% patients had no history of steroid use.

In the study done by Deepak Mishra, showed 78.57 % patients has history of oxygen therapy use.[14]

Comparable study based on steroid therapy use

This study include total 60 patient with mucormycosis . 63.33% patients with mucormycosis had history of steroid use for COVID 19 treatment while 36.66% patients had no history of steroid use. In a study done by Deepak Mishra showed 57.14 % patient used steroid therapy developed mucormycosis.[14] In the study done by Manickam Ponnaiah showed 81.72 % uses steroid therapy developed mucormycosis among hospitalized and never hospitalised patients.[15] In a study done by Aditya Moorthy include 18 patient with mucormycosis , 88.88% patients had history of steroid use and 12.12% had no history of steroid use.[16]

Comparable study based on remdesivir use and comorbidities

Among 60 patient 28.33% patients with mucormycosis had history of remdesivir use for COVID 19 treatment while 71.66% patients had no such history. Among 60 patients 51 (85%) patients had some co morbidities (eg. DM, HTN or CAD) while 09 (15%) patients had no

such history. In a study done by Deepak Mishra showed 71.42 % patients have comorbidities (DM) [14]

In the study done by Manickam Ponnaiah showed 43.59 % patients taken remdesivir among hospitalized patient and 68.66 % patient have diabetes among hospitalised and never hospitalized patients. [15]

Conclusion

Mucormycosis is more prevalent in hospitalized COVID 19 patients with immunocompromised status who underwent prolonged steroid and oxygen therapy. We may prevent this lethal fungal infection by prompt management of COVID 19 patients.

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