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Research Article

Frequency and Outcomes of Rhino-orbital Mucormycosis during COVID-19 Infection: Experience from a Tertiary Care Center of KPK

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ABSTRACT:

Aim: To study frequency and outcomes of rhino-orbital Mucormycosis during COVID-19 infection in a tertiary care setup of KPK.

Study Design: Retrospective, observational cross-sectional study

Settings and Duration: At Rehman Medical Institute, Peshawar from 1st September 2020 to 30th April 2021 (8 months).

Materials and Methods: After taking informed consent and relevant approvals, all patients fulfilling the inclusion criteria underwent history taking to identify risk factors, clinical examination to find extent of infection and laboratory and radiological investigations to diagnose and find management plan. Data readings were save on Excel sheets and analyzed using SPSS v.25.0.

Results: Among 59 patients, 37 (62.71%) were male and 22 (37.29%) female. Most of the patients (42.37%) fell between age categories of 61-75 years. Overall 42 (71.18%) patients survived. Orbital involvement was present in 40 (67.80%) patients and 20 (33.89%) had to underwent exenteration. Among comorbidities, diabetes was most prevalent in 38 (64.40%) followed by hypertension in 11 (18.64%) while 7 (11.86%) patients had no co-morbid state.

Conclusion: Rhino-orbital Mucormycosis is very common infection in patients suffering from COVID-19 and involves either diabetics or patients on corticosteroids therapy. Orbital involvement in Mucormycosis eventually happens in majority of patients and overall survival rate can be improved by strict diabetes control, judicious use of steroids and early diagnosis and treatment strategies.

KEYWORDS
Mucormycosis, COVID-19, Survival rate, Visual outcomes, Diabetes.

1 | INTRODUCTION

Human body has long been known to host a number of fungal infections in almost every part. Among those, a fungus of the order Mucorales causes the uncommon and serious opportunistic fungal infection known as Mucormycosis.[1] the frequency of fungi infections is rising right now. Following aspergillus, Mucormycosis is indeed the second most widespread fungal infection.[2,3] By arterial thromboembolism or the central nervous system involvement, this fungus infection can spread quickly in those who have weakened immune or metabolic systems.[4] Diabetes mellitus, lymphoid cancer, burns, severe trauma, renal failure, and steroid therapy are among the most prevalent co-morbidities and risk factors.[5] Now Mucormycosis has been noted in COVID-19 patients during this century's greatest and deadliest pandemic.

The one of the presentations of Mucormycosis is rhino-orbital in which orbit is involved. The diagnosis is frequently made after the course of infection has already been started and depends on anatomico-pathological and mycological tests, especially in cases where the patient initially presents with atypical symptoms as swelling of the lid, stuffiness in the nose, vision loss, etc.[6] If not diagnosed and treated promptly, rhino-orbital-cerebral Mucormycosis (ROCM) has a high risk of being fatal quickly.[7] To save a life, early diagnosis and then subsequent medical intervention in form of specific broad spectrum anti-fungal drugs is essential.[8]

In COVID-19 treatment guidelines, use of steroids is of particular importance.[9] While steroids help body fighting corona virus disease, they also put such patients at risk of a number of infections by creating an immune deficient state (even in the absence of diabetes mellitus) with Mucormycosis being one of these infections, and if patient is diabetic, then there's more chance of developing such fungal infections.[10] In this study, we aim to elaborate frequency of Mucormycosis cases in COVID-19 patients, its management options, visual outcomes and survival rates and effect of comorbid states on all these variables.

2 | MATERIAL AND METHODS

2.1 | Research Design

It was a retrospective, observational cross sectional research.

2.2 | Population & Sampling

It was done on all 59 patients with Mucormycosis along with COVID-19 infection who first presented to our institution at Rehman Medical Institute, Peshawar from 1st September 2020 to 30th April 2021 (8 months duration).

2.3 | Data Collection

Relevant approval was taken from the institution to conduct the said work. All patients provided their written consents in order for this study's findings and any supplemental photos to be published. COVID 19 patients who were admitted in hospital with suspicion of Mucormycosis, of all ages and either sex, whose biopsy samples were sent to laboratory for histological confirmation were included in this study and only those patients were excluded who didn't sign the consent form or whose samples had scant material.A thorough history to identify risk factors and clinical symptoms, ENT, ocular, and neurological examinations to determine the severity of the disease, nasal endoscopy with biopsy, and the findings of laboratory and radiographic tests were all part of the evaluation at presentation along with COVID tests.By histologically examining biopsy samples and discovering strands of the Mucorales order, Mucormycosis was identified. Every patient had rhino-orbital involvement, according to CT and MRI scans. As soon as Mucormycosis was identified, systemic amphotericin B treatment was initiated. The underlying metabolic abnormality was treated as well, and operative debridement was done, wherever necessary.

2.4 | Analysis Technique

All the relevant data was collected through predesigned performa with different variables like frequency of Mucormycosis, different management options taken, visual outcomes and survival rates and effect of comorbid states taken into consideration. Data was put into Microsoft excel sheets and was then analyzed with SPSS v.25.0. Chi-square test was used as main tool for statistical analysis with p-value of less than 0.05 considered as statistically significant. Results in terms of percentages were also used in final composition.

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3 | RESULTS

A total number of patients included in this study were 59 in which 37 (62.71%) were male and 22 (37.29%) female. Most of the patients, 25 (42.37%) fell between age category of 61-75 years. Overall 42 (71.18%) patients survived. Orbital involvement was present in 40 (67.80%) patients and 20 (33.89%) had to underwent exenteration. Among comorbidities, diabetes was most prevalent in 38 (64.40%) followed by hypertension in 11 (18.64%) while 7 (11.86%) patients had no co-morbid state. Detailed results are described below in following tables and figures.

TABLE 1 Statistical Analysis of Age and Gender with Survival

Variables	Characteristics	Survival		Total	Survival Chi-square	Survival Difference	p
		Yes	No				
Gender	Male	26 (70.3 %)	11 (79.7 %)	37	0.041	1	0.840
	Female	16 (72.7 %)	6 (27.3 %)	22			
Age (years)	< 60	15 (68.2 %)	7 (31.2 %)	22	0.499	2	0.779
	60-75	19 (76 %)	6 (24 %)	25			
	> 75	8 (66.7 %)	4 (33.3 %)	12			

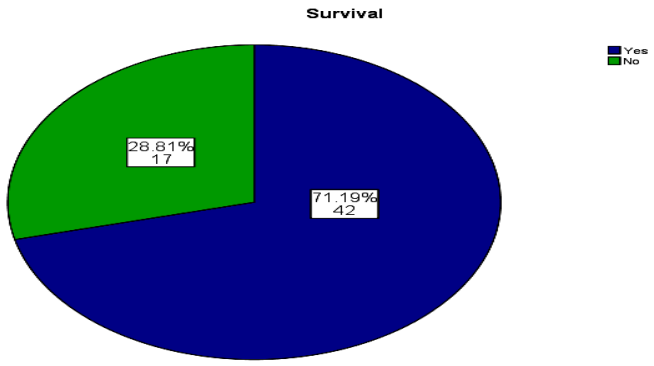

FIGURE 1: Pie Chart Showing Overall Survival Rate

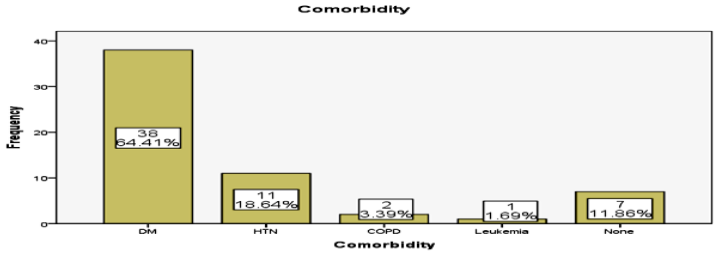

FIGURE 2: Bar Chart Showing Related Co-Morbidities

TABLE 2 Statistical Analyses of Different Aspects with Survival

Variables	Response	Total	Percentage	Survival Chi-square	Survival Difference	Survival Significance
Orbital Involvement	Yes	40	67.8%	0.823	1	0.364
	No	19	32.2%			
Visual Impairment	Yes	29	49.2%	4.390	1	0.036
	No	30	50.8%			
Anatomic Deformity	Yes	25	42.4%	15.632	1	0.000
	No	34	57.6			
Exenteration	Yes	20	33.9%	10.115	0	0.001
	No	39	66.1%			

4 | DISCUSSION

It has been more than 3 years since COVID-19 virus outbreak in the city of Wuhan in China. To this day, definitive treatment is still lacking.[11] However, corticosteroids has been shown to reduce the mortality rate in patients suffering from this virus.[12] As with other medicines, corticosteroids also bring harmful effects with themselves of which the most worrisome is the suppression of immunity.[13] This exposes the individual to various fungal infections. Mucormycosis is a debilitating infection caused by the group of fungi called mucormycetes. It can affect any individual but mostly affects the immunocompromised.[14]Although there is no preliminary data available to evaluate the exact load of fungal diseases in Pakistan, the country reported a relatively higher number of Mucormycosis infections (14/100,000) even before the start of the COVID-19 pandemic.[15] Even though superadded cases of Mucormycosis in COVID-19 patients have been reported from all over the world but most of the literature comes from sub-continent especially India.

In our study, we came across 59 individuals who developed Mucormycosis during COVID-19 infection. Majority affected population were males (62.7%). This is in accordance to a study conducted in India in which predominantly the male population was affected with a percentage of 78.9%.[16] In fact majority of studies narrated male predominance. Mean age in our study was around 65 years which was augmented by study of Bhatt et al i.e. 69 years.[17] 40 patients (67.80%) had orbital involvement. 29 (49.2%) had visual impairment. 20 (33.9%) of the patients underwent exenteration. The survival rate was 71.2% of our study. A Similar study in India showed 43.75% orbit without orbital apex, 68.75% orbit along with orbital apex involvement and 25% orbital exenteration.[18]Another study conducted in India showed 54.4 % orbital involvement and survival rate of 82.3 %.[19]

Patients also had different co-morbidities of which the main chunk was suffering from Diabetes Mellitus (64.41%). Diabetes Mellitus plays an important role in the development of Mucormycosis as shown in another study conducted

in India in which 72 out of 90 patients at the time of presentation had pre-existing Diabetes Mellitus.[9] Fatality rate in diabetic patients in our study was found to be at 36.8% in contrast to a study which showed 90.9% death rate in diabetics who develop Mucormycosis in COVID-19 infection.[20]

5 | LIMITATIONS AND FUTURE DIRECTIONS

This study's main limitation is small sample size and smaller duration. To observe the exact prevalence of Mucormycosis in COVID-19 patients, a multi-center study with large sample size is required. Although lack of resources is there but diagnosis at earliest possibility can save precious lives and limit complications related to orbital Mucormycosis.

6 | CONCLUSION

Mucormycosis is fairly common superadded fungal infection in patients suffering from COVID-19 infection and seems to involve male population more than the female one. Most of the patients suffering from Mucormycosis are either diabetics or using corticosteroids as main therapy for COVID-19. Orbital involvement in Mucormycosis does happen in majority of patients and as a final option, up to one third patients may need Exenteration. Owing to all these aspects, strict diabetes control, judicious use of steroids and early diagnosis and subsequent treatment of Mucormycosis may increase

Ethical Approval
No approval from Institutional Review Board was required for this observational study.

Conflict of Interests
None declared.

Source of Funding
None

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