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Original Research Article

Profile of rhino-orbital-cerebral mucormycosis at a tertiary care center in Dehradun

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ABSTRACT

Aims: Aims of this study to determine the predisposing factors and common presenting complaints of ROCM patients, the knowledge of which will assist in formulation of effective preventive measures at our local level.

Materials and Methods: A retrospective, hospital record-based study was conducted comprising 30 patients that presented to our tertiary care centre from 1st February to 31st July, 2021, admitted under a Multidisciplinary mucormycosis team. Detailed history and examination was supplemented with histopathological and radiological investigations.

Results: Preponderance for middle aged to elderly was seen. Only one patient had bilateral presentation. Diabetes mellitus was found to be the primary associated comorbidity. Duration of COVID infection emerged as a significant factor with 70% of cases observed to have a duration > 28 days. Primary presenting complaint was facial edema followed by proptosis and Diminution of vision. Corticosteroid use was the prevailing predisposing factor. All patients received parenteral therapy with Amphotericin B. Of the 30 cases, 76.67% required primary functional endoscopic debridement, and four reported mortality as the final outcome. 10% patients required re-debridement with retrobulbar amphotericin B injection, and only two ended in Orbital exenteration.

Conclusions: High index of clinical suspicion in elderly and diabetics especially in corticosteroids and/or oxygen therapy is required. Due attention to warning symptoms and signs, early diagnosis and apt treatment may help optimize the outcome of ROCM in the setting of COVID-19.

1. Introduction

Rhino–orbital-cerebral Mucormycosis (ROCM) is not an unknown entity in the medical world. It is an infectious disease caused by a fungus of the class Glomeromycetes and the order of Mucorales.[1] It is an aggressive opportunistic infection that usually occurs in debilitated patients, particularly individuals with uncontrolled diabetes mellitus associated with ketoacidosis, immunocompromised individuals, and patients with chronic renal disease. In ordinary circumstances, healthy persons are rarely affected due to normal containment by phagocytes.[2] However, in the wake of the COVID pandemic we have witnessed a paradigm shift in the presentation of mucormycosis. A review of existing literature indicates 81% of the cases of COVID-19-associated ROCM were witnessed in India.[3] The first series observed in India was reported in February 2021. Since then, there has been a remarkable surge in ROCM cases in conjunction with the second wave of COVID-19.[3]

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Like any other disease, the pattern of ROCM differs from one region to another depending upon the level of healthcare facilities available, accessibility of such facilities, extent of involvement and patient awareness.

We are a tertiary health care centre in a rural-centred state, surrounded by hilly terrain where factors like transportation delay, scarcity of medical facility and lack of awareness have a cardinal role to play. Bearing in mind the above elements, a retrospective study was conducted, to compile and analyse the data of all patients presenting with mucormycosis from both urban and rural areas to our tertiary health care centre. This was done with the objective of eventual formulation of effective preventive measures at the local level.

2. Materials and Methods

This is a retrospective cross-sectional, hospital record-based study of 30 patients of Mucormycosis, admitted at our centre from 1^{st} February to 31^{st} July 2021, under a Multidisciplinary mucormycosis team (MMT) comprising senior consultants from ophthalmology, otorhinolaryngology, infectious diseases, neurosurgery, critical care, microbiology, radiology and pathology departments. Ethical approval for this study was taken from Ethical committee of hospital and confidentiality of patient's was ensured. After obtaining a detailed ocular and systemic history, each patient underwent a comprehensive and thorough ocular examination including assessment of best-corrected visual acuity, slit-lamp biomicroscopy, and fundus examination with +90 D and Indirect ophthalmoscope. The diagnosis was based on histopathological examination, and KOH preparation of biopsy specimen from the nasal cavity. Extent of involvement was assessed by radiological investigations including contrast-enhanced magnetic resonance imaging (MRI), or computed tomography (CT) scan. On establishing the diagnosis of mucormycosis, patients were medically managed with systemic Amphotericin B and adjuvants. If required, this was supplemented with surgical measures including debridement / TRAM- B (transcutaneous Amphotericin B) injection/ exenteration as deemed appropriate by MMT depending upon severity and extent of the disease.

All patients with a clinical diagnosis of rhino-orbital mucormycosis were included in this study. Exclusion criteria included cases of ROCM not associated with COVID-19 or those with proven non-mucor fungal infections on histopathological examination. The demographic and clinical data were collected and analysed with the objective of methodically surveying incidence and prevalence, and to assess the profile of patients presenting with ROCM at our hospital. A total of 30 patient records were analysed.

3. Result

30 cases of rhino-orbital mucormycosis presented to our institute from surrounding urban and rural areas of Uttarakhand in the time period of 1^{st} February to 31^{st} July 2021. The majority of patients in our series were in the age group of 50-75 years. Seventeen patients were male (56.66%) and thirteen were female (43.33%). All the cases were unilateral with the exception of one case with bilateral presentation.

Uncontrolled diabetes mellitus was the most common underlying predisposing factor. 86.6% patients were diabetic, while 26.6% were suffering from hypertension and 6.66% had evidence of renal disease.

Twenty-four presented with facial edema, thirteen with proptosis, seven with diminution of vision, six with ptosis, three with chemosis and two with restriction of movement. RAPD was noted in 7 patients.

Table 1: Showing age distribution

<25 years	1
25-50 years	11
50-75 years	14
>75 years	4

Table 2: Showing Sex distribution

Male	**Female**
17	13

Table 3: Showing Co-morbidities

Diabetes Mellitus	26
Hypertension	8
Renal Diseases	2
Malignancy	-
Transplant	-
Liver Diseases	-

Table 4: Showing duration since when COVID was diagnosed

0-7 days	-
7-14 days	1
14-21 days	3
21-28 days	5
>28 days	21

Table 5: Frequency of predisposing factors

Oxygen Use	23
Steroid Use	26
ICU stay	17
Ventilator support	4

Table 6: Presenting Complaint

Ptosis	6
Proptosis	13
Chemosis	3
Restriction of movements	2
DOV	7
RAPD	4
Facial Edema	24

Table 7: Showing outcome

Debridement	23
Tram+debridement	3
Exenteration+debridement	2
Mortality	4

Twenty-six under our study had a chronic history of diabetes mellitus and eight had hypertension. Chronic renal failure was noted in two patients.

26 patients needed corticosteroids, while 23 required oxygen support. 17 were admitted to ICU with 4 on ventilatory support.

Out of 30 patients who were affected with ROCM, 21 presented >28 days after they were first diagnosed with COVID; 5 within 21-28 days followed by 3 in 14-21 days and 1 in 7-14 days.

All patients received parenteral therapy with amphotericin B. Primary functional endoscopic debridement was performed in twenty-three patients. Three patients needed secondary debridement with a retrobulbar injection of amphotericin B. Two patients showed deterioration, eventually requiring orbital exenteration whereas mortality was noted in 4 patients.

4. Discussion

Mucormycosis is a disease characterized by a fulminant course and a high mortality risk. The majority of patients in our series were in the age group 50-75 years. A similar observation has been noted by Prakash et al.[2] The disease takes a rapidly progressive and fulminant course in elderly where immune system is physiologically compromised. With a wide spectrum of co-existing morbidities in this age group, the prognosis worsens.

Of the 30 patients, 17 (56.66%) were male and 13(43.33%) were female.

Most patients were diabetic (86.6%), which is in concurrence with pre-existing literature.[4] Hyperglycemia permits various innocuous organisms to thrive in acid-rich environment by decreasing the chemotaxis and phagocytic efficiency and also stimulates fungal proliferation.[5,6] 26.6% were Hypertensive and 6.66% had renal disease.

Most patients who were affected with ROCM presented >28 days after first being diagnosed with COVID. Thus, emphasis should be laid on thorough counselling of these at-risk patients by healthcare personnel at the time of discharge. Information sheet can be given enlisting the symptoms and signs of ROCM in detail which will help in early reporting. Educational and informative videos regarding COVID and ROCM explaining all the risk factors and early signs and symptoms can be played in the waiting areas to spread awareness.

86.6% of patients were on corticosteroids. Corticosteroids are a double-edged sword. Being one of the mainstays of treatment for Covid -19, steroids also have a role to play in the surge of the RCOM incidence.[7] Thus judicious use of steroids is a must. All treating doctors are urged to follow guidelines and protocols.

76.6% of patients needed oxygen by prongs/mask.56.6% were admitted to ICU with 13.3% on ventilatory support. Depending on the type of surface the COVID-19 virus remain infective from eight hours to several days.[8] Hence decontamination of health care environment is essential to control the spread. Equipments used for respiratory therapy items should be cleaned and then receive high-level disinfection.[9]

The most common primary sign observed was facial edema (80%), followed by proptosis (43.3%). Diminution of vision (23.3%) was mainly due to direct infiltration of a central retinal artery by angio-invasive fungal infection from the orbit. Other less common presentations included Ptosis (20%), and chemosis (10%), RAPD (13.3%) and restriction of movement (6.6%). Sen et al[3] reported orbital/facial pain (23%), orbital/facial edema (21%), loss of vision (19%), ptosis (11%), and nasal block (9%).

Primary medical management with amphotericin B was initiated in all patients, primary functional endoscopic debridement was performed in 76.6%s of patients.10% of patients underwent secondary debridement with a retrobulbar injection of amphotericin B.[9,10] Orbital involvement in a high-mortality infection like mucormycosis may necessitate the decision to perform exenteration.[11] This difficult decision is made when the extent of the disease and the risk of mortality outweigh the desire to keep the patient's globe in place. 6.6% of patients underwent orbital exenteration. Mortality was reported in 13.3% of patients. Whereas a study done by Sen et al.,[3] reported mortality in 6% cases.

The limitation of this study is that even though it is a reflection of the present times, it only documents the cases of Mucormycosis associated with the second wave. How the numbers will be affected in subsequent waves, is yet to be documented. Since it is a hospital record based study, vaccination status of the patient was not noted and analysed which would have brought up some more facts and correlations.

Though it may not be a representative of general population but strength of our paper lies in the fact that data was collected at the time when RCOM cases were

at their peak and most of the patients with any suspicious symptom presented to hospital because of fear. Also there is no memory bias as this was ongoing disease.

5. Conclusion

Individuals with predisposing factors such as duration of COVID >28 days , diabetes mellitus, corticosteroid use require thorough counselling regarding warning signs and mask hygiene on discharge and a high index of clinical suspicion.

Early diagnosis is essential using diagnostic nasal endoscopy and direct microscopy of the high nasal swab or an endoscopically guided nasal swab, supplemented with contrast enhanced MRI or CT scan.

Delay in dispensing treatment can be prevented by initiation of full dose liposomal Amphotericin B while awaiting the results of culture and histopathology, timely identification of indications for paranasal sinus surgery and orbital exenteration and meticulous post-surgical management. Graduated step-down oral antifungals until clinical and radiologically monitored resolution and beyond, may help optimize the outcome of ROCM in the settings of COVID-19.

Being a rapidly progressive disease, even a marginal delay in diagnosis can alter the prognosis and management substantially while also having devastating implications on patient's survival.

6. Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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None.

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