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Original Research Article

Revisiting COVID Associated Mucormycosis: Challenges Posed and Lessons Learnt

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Abstract

Background: Mucormycosis emerged as catastrophe in an already devastatating scenario of COVID-19. Rhino-orbito-cerebral form was found to be most common, combined with heavy corticosteroid use and coexisting diabetes mellitus, it posed a difficult and novel situation to clinicians and surgeons worldwide. Looking back and reassesing clinical and surgical practices was needed to prepare better for such scenarios in future.

Methods: A retrospective observational study was done at Department of ENT, AIIMS Patna assessing patients admitted for COVID associated Mucormycosis during May 2021 to July 2021. Data was collected via a google form extracting clinical records of patients and was analysed in a descriptive format using simple statistics.

Results: A total of 130 patients were analysed, diabetes mellitus being the most common comorbidity. Maxillary sinus was the most common subsite involved, most of them needed open surgical debridement, craniotomy was done for 3 patients. An endoscopic approach was used in 44 patients. Orbital exentration was needed in 8 patients. Corticosteroid use was seen to be significantly associated with development of the disease.

Conclusion: COVID associated mucormycosis posed a unique and serious challenge to ENT surgeons, use of corticosteroids in managing COVID-19 further complicated the disease progression. Both open and endoscopic surgical debridement were appropriate and helpful in reducing disease burden and better penetration of antifungal drugs.

Keywords: Mucormycosis, Covid-19, CAM, Endoscopic Surgical Debridement.

Introduction

While India was still battling the second wave of COVID pandemic, an unprecedented rise in number of mucormycosis cases in a short span of time shook our already overburdened health system. Mucormycosis was declared a notifiable disease in India [1].

Mucormycosis is a form of invasive fungal disease caused by few genera of fungi in order mucorales. Common species include Rhizopus spp., Rhizomucor spp., Mucor spp. etc. Rhizopus arrhizus is found to be predominant agent causing Covid associated mucormycosis(CAM) in India [2]. Rhino-orbito-cerebral infection is the most typical presentation where there is invasion of fungal infection from paranasal sinuses to orbit and brain[3]. In this pandemic, rhino- orbito cerebral form is found to be most common followed by pulmonary mucormycosis.

COVID infection has now been well known for altering host immune response with reduced T lymphocytes and is probably the reason behind this rise in paranasal mucormycosis cases. Uncontrolled diabetes mellitus and indiscriminate use of corticosteroids and other immunosuppressant drugs used during the treatment of COVID 19 disease are also implicated as predisposing factors. Furthermore high serum ferritin levels also help entry of mucorales into host tissue and their growth.

Rhino-orbito-cerebral mucormycosis(ROCM) may present as facial pain, numbness, brownish or blackish discharge with nasal blockade. There may

be palatal ulcers or swelling, loosening of maxillary teeth, difficulty jaw movement. Orbital symptoms include blurring of vision, diplopia, ptosis, swelling of eyelids. With cranial involvement, patient may have cranial nerve palsies, altered sensorium, fever, vomiting and may present with coma.

Radiological imaging plays an important role in early diagnosis and staging the disease as well as in planning revision surgeries if needed. Gadolinium enhanced MRI of paranasal sinuses, orbits and brain is most informative, non-enhancing areas denoting necrosis with the classical black turbinate sign often present.

Demonstration of broad aseptate or pauciseptate fungal hyphae of mucorales in various clinical specimens confirms the diagnosis. Endoscopic nasal samples like swabs, tissue biopsies, crusts, eschar etc can be sent for wet mount examination with KOH. PCR based techniques for detection of mucorales DNA can also be done. Histopathological examination with fungal staining shows angioinvasion, thrombi and necrosis of tissues.

Invasive mucormycosis is an emergency condition and should be treated at earliest as it has been seen a more than 6 days delay can result in two fold increase in mortality at 12 weeks [4]. Both surgical debridement and antifungal therapy in appropriate doses are needed to effectively control the disease. Since the rise in mucor cases was unprecedented, India faced an acute shortage of antifungal drugs as well as a delay in surgical treatment was also unavoidable due to overburdened hospitals and active covid infection in many of the patients.

We share our experience of managing cases of CAM (Covid associated Mucormycosis) at our institute with combined efforts of several departments. They underwent surgical debridement and received antifungal treatment at our hospital and were followed up later on OPD basis.

Aim of the study:

a) To understand the factors involved in this sudden rise of mucormycosis cases

b) To assess the role of surgical debridement in improving survival and decreasing the duration and doses of antifungal therapy

Material and methods:

A retrospective observational study was conducted at Department of ENT at AIIMS Patna on mucormycosis patients admitted during May 2021 to July 2021. Data was collected with the help of a google form created to extract details regarding demographic characteristics, comorbidities, history of covid infection or flu like illness in past, use of zinc, oral or intravenous steroids, remdesivir, tocilizumab, hospital admission, oxygen support, ICU stay, presenting complaints, clinical examination details, microbiological and/or pathological reports, radiological imaging features, intraoperative findings, antifungal treatment dosage and duration, postoperative complications, recurrence or residual disease status, revision surgeries and long term complications and comorbidities. Collected data was analysed in descriptive format using simple statistics.

Results and observations:

A total of 130 case details were analysed, out of them 90 male and 40 females. Average age of patients was 42.6 years.

Figure 1: Chart showing age distribution of patients

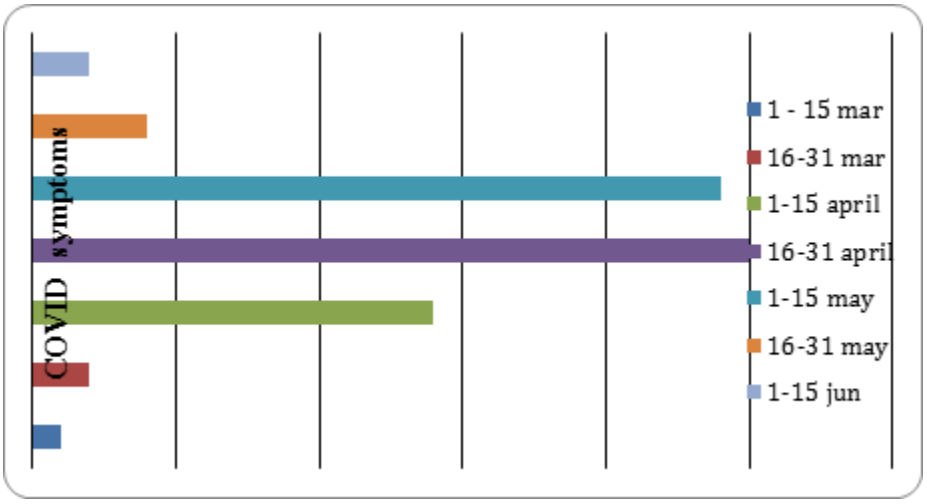

Figure 2: Chart showing distribution of patients according to date of initial covid symptoms

Table 1: Showing involvement of various subsites and their laterality

Subsite	Right	Left	Bilateral
Middle Turbinate	18		
Maxilla	46	49	27
Ethmoid	38	41	26
Sphenoid	20	23	23
Frontal	7	6	2
Septum	33		
Hard Palate	36		
Orbit	21		

Table 2: Showing different approaches used for debridement in patients

Surgical approach	Number of patients	Percentage
Endoscopic Sinus Surgery	44	
Denker's	16	
Open surgical maxillectomy	68	
Orbital Exentration	8	
Craniotomy	3	

Table 3: Showing number of patients in various stages

Stage	Number of patients
1	1
2	75
3	14
4	16

Discussion

Mucormycosis is an oppurtinistic invasive fungal infection seen in immunocompromised patients often secondary to diabetes mellitus. Its association with COVID is being studied worldwide after a sudden spike in number of cases with Covid and mucormycosis. India has reported maximum number of such cases [5] with Bihar too having a significant patient load. Our institute being one of the tertiary care centres designated for Mucormycosis treatment geared up and made necessary arrangements to provide safe and appropriate treatment to all.

Majority of the patients were male and belonged to adult and elderly group with each one having a history of documented COVID or Flu like symptoms in the past few months. These demographic details do not correlate with study done by Pal et.al. [6] , who report average age of patients being 53.2 years. This can be due to poor health awareness and illiteracy in our state resulting in even more younger adults affected by this disease.

Diabetes mellitus was the most common comorbidity followed by Hypertension, use of corticosteroids in past few months was seen in significant number of patients. SARS-COV- 2 has been shown to damage islet cells leading to reduced endogenous insulin production and creating a diabetic state in in previously non diabetic patients [7]. Uncontrolled hyperglycemia and Diabetic

ketoacidosis make ideal environment for mucor growth. Injudicious use of corticosteroids for management of mild and moderate COVID has undoubtedly flared the risks of mucor infection amongst patients with borderline diabetes.

Rhino-orbital form was the commonest presentation with few patients having intracranial involvement too. Maxillary sinus was the most common subsite affected, palatal involvement was seen in a substantial number of patients. These findings were in correlation to studies done by Singh et.al. [5]

Based on the radiological and endoscopic findings, patients were planned for endoscopic or open approach debridement. Endoscopic debridement was done in patients with disease limited to paranasal sinuses with no extension to facial spaces or to hard palate. A vast majority of patients had extensive involvement and needed debridement by open approaches like lateral rhinotomy, weber ferguson, midfacial degloving etc. Few of the patients with no perception of light and complete opthalmoplegia needed orbital exentration in view of preventing intracranial spread through orbit. Craniotomy was done in patients with intracranial absceses.

Conclusion

Rhino-orbital mucormycosis is not a new entity for ENT surgeons but CAM posed a different challenge in terms of overwhelming patient load, scarcity of antifungal drugs and coexistent risk of SARS- COV-2 infection. Appropriate and timely surgical intervention helps reducing disease burden and better penetration of drugs. Both endoscopic and open surgical approaches cater in reducing disease burden depending on extent of spread. Use of corticosteroids has to be monitored with strict blood sugar control to help slow disease progression.

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