



MAXILLOFACIAL MUCORMYCOSIS: OUR EXPERIENCE IN POST COVID ERA

Maxillofacial Surgery

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ABSTRACT

Aim: To evaluate the correlation between different etiological factors to cause maxillofacial mucormycosis after second wave of COVID-19. **Materials and Methods:** A retrospective clinical study was conducted on 60 patients of age range 40-90 years, reporting to us with different signs and symptoms of maxillofacial mucormycosis. All the patients were analyzed for specific characteristics, associated co-morbidities, location, type of lesion, use of steroids and their outcome in people with COVID-19. **Result:** Existence of having triad of diabetes mellitus, COVID infection and over use of corticosteroids is the main reason for causing mucormycosis in such a drastic manner. Early intervention by antifungal drugs like posaconazole and liposomal Amphotericin B should be started along with surgical debridement to reduce fungal load and promote recovery. **Summary:** To reduce burden off a mucormycosis, optimal control of hyperglycemia along with judicious use of corticosteroids should be advised in COVID treatment.

KEYWORDS

Post COVID Mucormycosis, Corticosteroids, Diabetes associated Mucormycosis

INTRODUCTION

The deadly outcome of COVID-19 is speculated during the second wave which not only cause severe morbidity among the infected people but it also lead to emergence of opportunistic co-infection by fungus like *Aspergillus* and *Candida* in COVID patients during treatment in hospital and after discharge in different parts of the country.¹ Recently, in various regions of India, drastic increase in cases of mucormycosis were reported due to irrational use of steroids, broad spectrum antibiotics, prolonged hospital stay in pre-existing comorbid patients of hyperglycemia {uncontrolled diabetes}, haematological malignancies, immune-suppressants, solid organ transplants and chronic use of anti fungal drug voriconazole for skin diseases. During COVID infection treatment, microvascular environment exist in blood due to low oxygen, high glucose (known or unknown cases of diabetes, new onset hyperglycemia, steroid induced hyperglycemia), acidic medium (metabolic acidosis, diabetic ketoacidosis [DKA]), high iron levels (increased ferritins) and decreased phagocytic activity of white blood cells (WBC) which cause autoimmune suppression leading to serious angioinvasion by this non contagious, ubiquitous fungi (commonly found in soil, fallen leaves, compost, animal dung and air) of group mucormycetes. It can be inhaled and then infect the lungs, sinuses and extending to the brain and eyes. Less often, infection may develop when the pores enter the body through an acute or an open wounds.² Globally, the incidence rate of mucormycosis varies from 0.005-1.7 per million population with a fatality rate of 46%, where as in India, prevalence of mucormycosis estimated around 140 per million population, which is about 80 times higher than prevalence in developed countries.^{3,5} On the basis of organs involved, it can be classified clinically either rhinocerebral, pulmonary, disseminated, cutaneous, gastrointestinal. In the maxillofacial region, they can be classified as isolated nasal, rhino-orbital or rhino-orbital-cerebral and maxillary mucormycosis.⁶ Due to its rapidly spreading nature in the maxilla of facial region, prompt diagnosis and treatment should be instituted as the delay in 12 hours may cause its cerebral spread with a fatality rate of 90%.⁷ This has prompted us to conduct a retrospective study of cases of mucormycosis reported to our centre to evaluate various factors related in the treatment and outcome of such patients.

MATERIALS AND METHODS

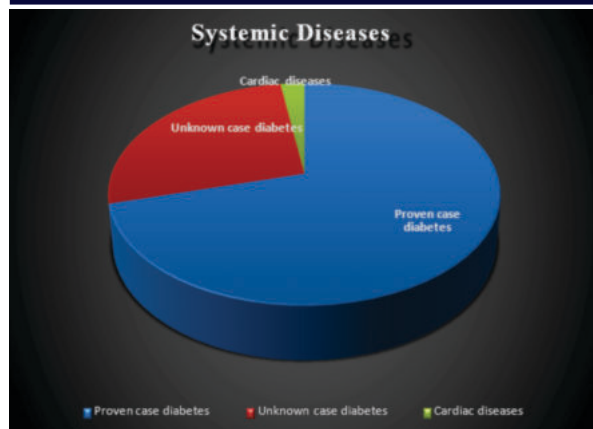
A Retrospective study was conducted on 60 Covid-19 infected patients of age range from 40 – 90 years residing in central India, reported to our centre from March 2021- July 2021 who are diagnosed histo-pathologically as having mucormycosis were included. Detailed clinical and radiological investigations were carried out and various factors causing mucormycosis were studied and evaluated. As per stage of diseased patient and WHO guidelines, prompt surgical debridement under medical coverage was given to the patient. Tab Posaconazole 300 mg BID was started on the day of clinical suspicion and continued for 1 month post operatively. In addition to that, liposomal Amphotericin B 50 mg intravenously was started from the day of surgery till 10th post operative day. Apart from this, antibiotic Tab Amoxycillin 1gm BID, Tab Metronidazole 600 mg BID, Tab Clindamycin 300 mg BID along with analgesics like Tab Paracetamol 650 mg / Tab Diclofenac sodium 75 mg were given for 5 days post operatively. Factors assessed were: type of mucormycosis, signs and symptoms noted, onset of symptoms after diagnosed as covid positive, medicines used for covid treatment, existing comorbidity, blood profile analysis, treatment given and patient outcome, history of covid vaccination.

RESULTS

Descriptive analysis was carried out after collecting patient's data. Among the confirmed cases of mucormycosis reported to us, 42 patients were male and 18 patients were female of age range from 30-90 years. Out of 60 patients (n=60), 58 patients had existing hyperglycemia (42 proven cases and 16 unknown case of diabetes). 2 patients were taking oral anticoagulants for cardiac diseases (Table 1, Graph 1)

Table 1:- Gender-wise Distribution Of The Patients With Mucormycosis

Gender	Frequency	Percentage
Male	42	70%
Female	18	30%
Total	60	100%



Graph 1:- Patients With Systemic Diseases

All the patients had history of prednisolone or dexamethasone intake for 7-10 days during their hospital stay along with use of remdesivir and tocilizumab for covid treatment. 38 cases were diagnosed after 3rd - 4th week and 22 cases reported after 5th -6th week of covid infection. 10 patients had severe type whereas 45 patients had moderate type and 5 had mild variant of covid infection (as noted on HRCT score). 12 cases reported with rhino-orbito-cerebral type of mucormycosis requiring extensive surgical treatment of maxillectomy, ethmoidectomy with orbital exenteration. 16 cases reported with bilateral maxillary osteomyelitis with involvement of maxillary sinus. 29 cases reported with unilateral involvement of maxillary sinus along with alveolar part of maxilla (18 left side and 11 right side). 3 cases reported with mobility of anterior segment of maxilla only with no tissue necrosis. (Figure 1)



Figure 1:- Different Clinical Features Of Mucormycosis Reported

- Extraoral swelling seen on right half of face with chemosis of right eye.
- Extraoral swelling seen on right side of face with periorbital edema, blood tinged nasal discharge from right nostril.
- Intraoral necrosis of right maxillary alveolus in the region of premolars and 1st molar along with pus discharge.
- Multiple alveolar abscess with draining sinus.
- Necrosis on left side of maxilla with segmental mobility along with palatal soft tissue necrosis.
- Multiple soft edematous gingival swelling along with mobility of maxillary teeth like chronic generalized periodontitis.
- Blackish discoloration of palatal mucosa along with necrosis of buccal mucosa.
- Draining sinus with erythematous alveolar mucosa with no teeth mobility.

When clinical signs and symptoms were assessed, all the patients had tissue necrosis in some regions of maxilla mainly in periapical area of premolar and 1st molar area. Multiple punched out lesions in maxillary alveolus with fetid odour or pus discharge noted in 54 cases. Palatal necrosis noted along with mobility of maxilla (same as noted in Le fort I fractures) in 32 cases were reported in maxillary type of mucor. In Rhino-Orbito-Cerebral type of mucor cases, periorbital swelling, blurring of vision/diplopia, chemosis, conjunctival infection along with nasal crusting and nasal discharge seen. Headache, pain over the sinuses, paresthesia, facial palsy were also noted in some cases. When blood profile were assessed levels of HbA1C, ESR, D-dimer, CRP, LDH, ferritin along with reduced to normal level of platelet count and neutropenia were reported in all confirmed cases. None of the reported patients received even a first dose of covid vaccine. Radiological assessment of CT Scan, MRI, PNS with orbital view (plain or contrast) show mucosal thickening of maxillary sinus and the involved sinuses along with osteolytic lesion of involved bone. (Figure 2)

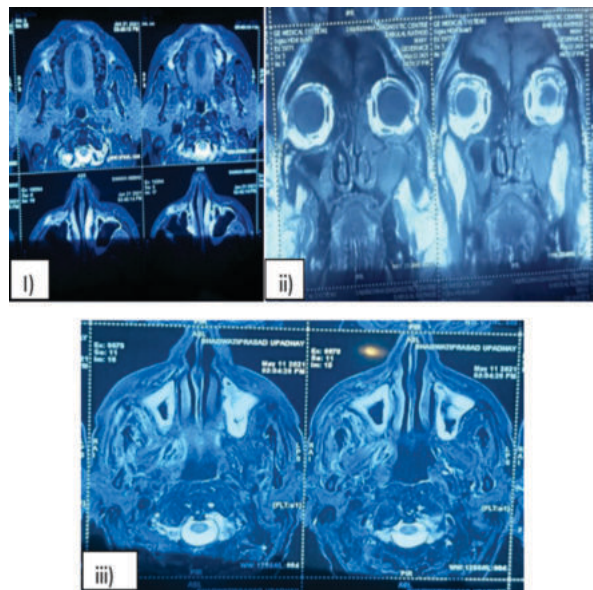


Figure 2 :- Radiological Features

- MRI PNS shows osteolytic lesion on right maxillary alveolus near premolar and molar region along with ill defined signal intensity in subcutaneous region of right malar, bilateral maxillary area.
- MRI PNS WITH ORBITS shows mucosal thickening with moderate enhancement in bilateral maxillary sinus, left ethmoidal sinus with blockage of bilateral osteomeatal unit. Ill defined STIR hyperintense signals noted in around masticatory muscles with extension in left extraconal compartment.
- MRI PNS shows mucosal thickening of bilateral maxillary sinus and right ethmoid sinus involving right anterior osteomeatal unit complex with altered marrow signal noted on anterior and lateral wall of right side of maxillary sinus.

Treatment depend on extent of spread of disease which is evaluated by clinical and radiological study which ranges from early surgical debridement of necrotic tissue along with extraction of involved teeth, removal of sinus lining to sub total maxillectomy, ethmoidectomy and orbital exenteration followed by surgical site closure primarily or by use of local flaps. (Figure 3)

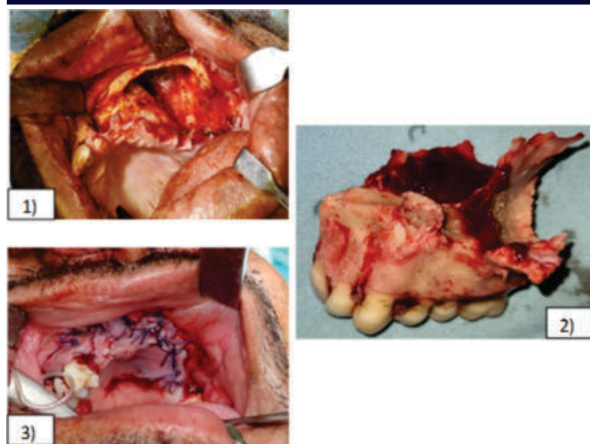


Figure 3 :- Intraoperative View

- 1) Intra operative view after maxillectomy and ethmoidectomy.
- 2) Gross specimen.
- 3) Primary closure of surgical site.

In 2 patients, flap dehiscence was noticed on 5th post operative day which heals by secondary intention.

DISCUSSION

After the surge of second wave of Covid 19 in India, there was increased number of cases reported of mucormycosis which is one of the most rarest diseases seen before covid era. The main etiological factors what we found by retrospectively analysing the patients are middle to old aged patients who got hyperglycemic, diabetic ketoacidosis state due to overzealous use of corticosteroids, remdesivir, tocilizumab during covid treatment leading to immune suppression which might had promoted fungal colonization in nose, para nasal sinuses maxilla of head and neck region, typically, mucormycosis noticed in post recovery phase of covid infection within 4-6 weeks. Misdiagnosis of early symptoms of mucormycosis like pain, fetid odour, heaviness over the sinuses as residual covid disease symptoms lead to rapid spread and late presentation to hospital leading to drastic raise in number of such cases with increased fatality. Team of maxillofacial surgeon, dentist, ENT fellows should be there in each covid care ward to diagnose early clinical features of mucormycosis like multiple punched out lesions with draining sinus openings in maxilla, sudden onset of generalized periodontitis, segmental mobility of maxilla, blackish discoloration of palatal, alveolar mucosa. Early recognition and confirmation by taking biopsy and KOH mount, CT, MRI evaluation to detect osteomyelitis at early stages should be carried out routinely in every covid suspected patient to reduce mortality, morbidity of such a deadly disease in future.

CONCLUSION

A multidisciplinary team approach should be there to give prompt diagnosis and treatment to mucormycosis diseased patient to prevent its fatal spread to central nervous system. By seeing such drastic result of using steroids in diabetic patients, we should learn to modify our existing covid treatment guidelines to stop and prevent immune suppression in the future.

Declaration Statements

Ethical Approval And Consent To Participate:

All the participants had given written informed consent for this clinical trial.

Consent For Publication:

All the participants of this study had given consent to use clinical data conducted on them and in every manner, patient identity was concealed.

Availability Of Data And Material:

All the material used in this study was obtained by institution for research purpose. The data sets generated during and or analyzed during current study are not publicly available

Conflict Of Interest: All the contributing authors to this article had no conflict of interest in any form.

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