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ORIGINAL RESEARCH

Management of Post COVID Mucormycosis –Maxillectomy

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ABSTRACT

Background:Mucormycosis has been increasingly described in patients with covid 19 2nd wave (delta variant) which is a highly contagious disease caused by SARS-COV-2 is the leading cause of global pandemic. AIM AND OBJECTIVES: To evaluate etiology, indications, management options and complications in patients managed with endoscopic and external maxillectomy after mucormycosis, to evaluate the incidence and distribution of cases who had extensive mucormycosis and to evaluate the outcome of the management options.

Materials and Methods: This is a prospective study done in 30 cases at a tertiary care centre.All the patients were subjected to detailed history taking, clinical examination,endoscopic,radiological,pathological,microbiological investigations after taking informed consent. Patients with age group(30yrs -70yrs) who presented with ROM with extensive maxillary sinus involvement and destruction of different walls of the maxillary sinus were managed with different types of maxillectomies.

Results: In this study, 30 cases of post covid rhinoorbital mucormycosis who presented to our hospital were studied,among male 24(80%) & females6 (20%).12 patients (40%) were in 5th to 6th decade and 9 patients (30%) in 4th to 5th decade.Main presenting features were unilateral cheek pain,cheek swelling,nasal obstruction,loosening of teeth, tooth ache, cheek numbness, headache,periorbital edema,visual disturbances being present in 95% of the patients.5% presented with epistaxis,ptosis,diplopia alone.90% patients were known case of diabetes milletus,10% are denovo diabetes.All the patients were subjected to routine blood investigations, microbiological, radiologicalinvestigations.(CT,MRI contrast- PNS,Orbit & Brain).Most commonly seen in males 80%. 1 patient had to undergo orbital exenteration,3 patients underwent palatal resection.

Conclusion: Debridement of sinuses is necessary in all cases of mucormycosis so that the fungal reservoir could be removed and the antifungal therapy can reach the viable areas. Therefore the management of mucormycosis is individualised to each patient based on the extension of the disease and overall general conditon of the patient.

Keywords: Mucormycosis, ROM ie Rhinoorbital mucormycosis.

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INTRODUCTION

Mucormycosis has been increasingly described in patients with covid 19 2nd wave (delta variant) which is a highly contagious disease caused by sars-cov-2 is the leading cause of global pandemic. Main contributing factors include uncontrolled diabetes milletus, diabetic ketoacidosis,over usuage of corticosteroids,oxygen inhalation,usuage of immunomodulating drugs.It is caused by fungi of order mucorales. Rhino orbital cerebral mucormycosis

characteristically begins in the nose,paranasal sinuses,palate and extends into the orbit and intracranially through ophthalmic vein,superior orbital fissure and cribriform plate. Tissue necrosis happens as a result of arterial occlusion.It is often misdiagnosed or the diagnosis is delayed resulting in high rate of morbidity and mortality.Rapid clinical suspicion,appropriate sinus biopsies,rapid microbiological, pathological,radiological diagnosis followed by prompt aggressive surgical debridement,antifungal treatment and management of underlying predisposing metabolic disorders is needed.Radical surgery is the prime mode of management and is individualised to each patient depending on the underlying disease and its extension.The concept of maxillectomy first described by lazars in 1826.after this description it took nearly 3 yrs for syme to perform the first maxillectomy 1829. Maxillectomy is a procedure to remove a primary lesion in maxilla.The procedure involves surgical removal of some of the one,part of roof of mouth possible some of the teeth.[1,2]

LIVERPOOL classification of Maxillectomy.

- CLASS 1: MAXILLECTOMY WITH NO OROANTRAL FISTULA.The removal of alveolar bone not resulting in an oronasal fistula.resections of the ethmoid and frontal sinus cavity defects or removal of the lateral nasal wall,only palatal bone leaving the dental bearing part of maxilla intact.
- Class 2:LOW MAXILLECTOMY. Partial maxillectomy including the alveolus and antral walls but not including orbital rim or the maxillary buttress.
- Class 3: HIGH MAXILLECTOMY.Partial maxillectomy including floor of orbit with or without periorbital & lateral skull base resection.
- Class 4:RADICAL MAXILLECTOMY.Partial maxillectomy with orbital exenteration and lateral skull base resection.[3,4]

CORDEIRO 'S classification of maxillectomy.

- **TYPE I:** LIMITED/PARTIAL MAXILLECTOMY: One or two walls of maxilla are resected with preservation of palate.
- **TYPE II:** SUBTOTAL MAXILLECTOMY: 5 out of 6 walls of maxilla are resected,preserving orbital floor.
- **TYPE III:** TOTAL MAXILLECTOMY: Resection of all 6 walls of maxilla
- **IIIa:** Total maxillectomy with preservation of orbital contents.
- **IIIb:**Total maxillectomy with orbital exenteration.
- **TYPE IV:** ORBITO-MAXILLECTOMY: Orbital exenteration with resection of upper 5 walls of maxilla, preserving the palate.[12]

Aims & Objectives

- To evaluate etiology, indications,management options and complications in patients managed with endoscopic and external maxillectomy after mucormycosis.
- To evaluate the incidence and distribution of cases who had extensive mucormycosis
- To evaluate the outcome of the management options.

MATERIALS & METHODS

- No of cases 30
- Prospective study
- 6 months
- Tertiary care centre

- All patients were subjected to detailed history taking,clinical examination,endoscopic,radiological,pathological,microbiological investigations after taking informed consent.
- Patients of all age group who presented with ROCM with extensive maxillary sinus involvement and destruction of withdifferent walls of the sinus were managed with different types of maxillectomies.
- Followed up for a period of 6 months to evaluate the outcome

Inclusion criteria

- Patients with age group 30 to 70 yrs
- Patients who have given informed consent.
- Patients who have managed with surgical management.

Exclusion criteria

- Patients who did not give consent
- Age <30 yrs,>70 yrs.
- Patients with poor general condition with intracranial complications who requires multidiciplinary approach.

RESULTS

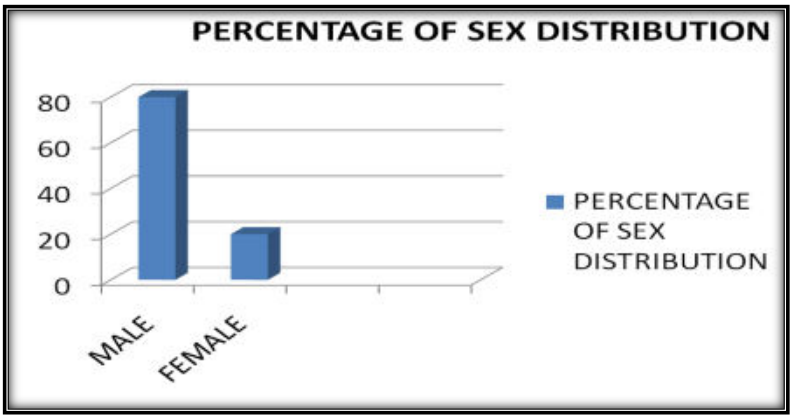

Figure 1: ?

In this study, 30 cases of post covid rhinoorbital mucormycosis who presented to our hospital were studied,among them males were 24(80%) & females were 6 (20%).

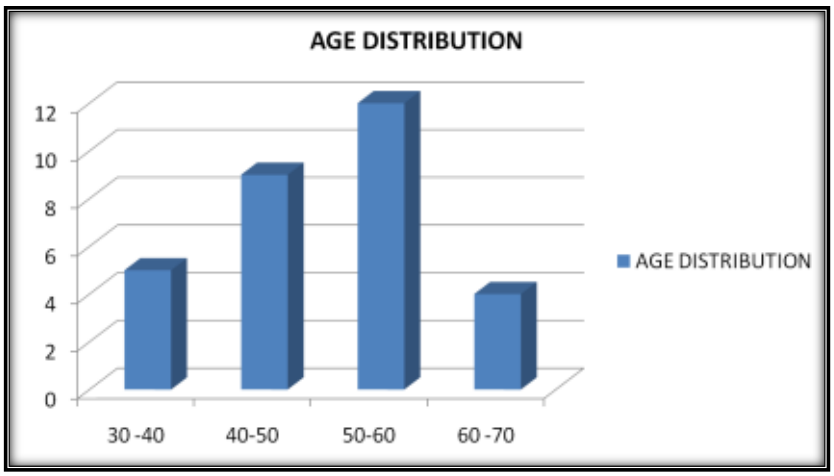

Figure 2: Age distribution.

In this study, 12 patients (40%) were in 5th to 6thdecade and 9 patients (30%) in 4th to 5thdecade.

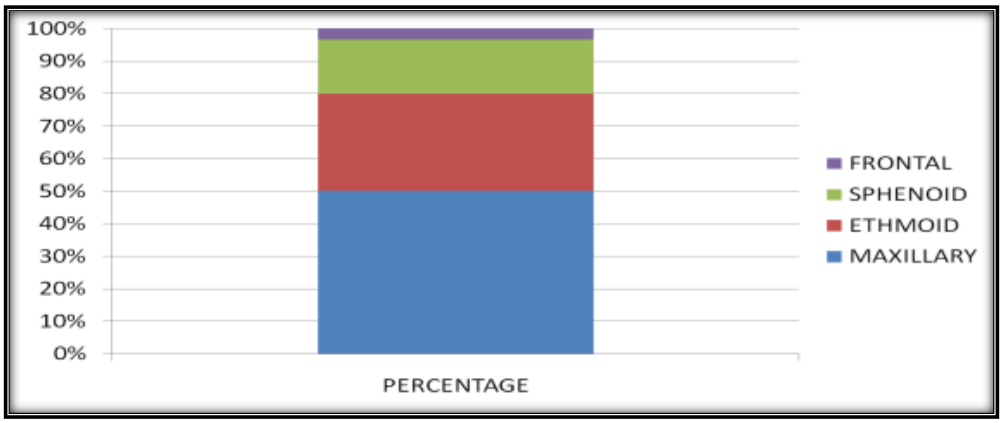

Figure 3: Percentage of sinus involvement-predominantly involved sinus – MAXILLARY SINUS.

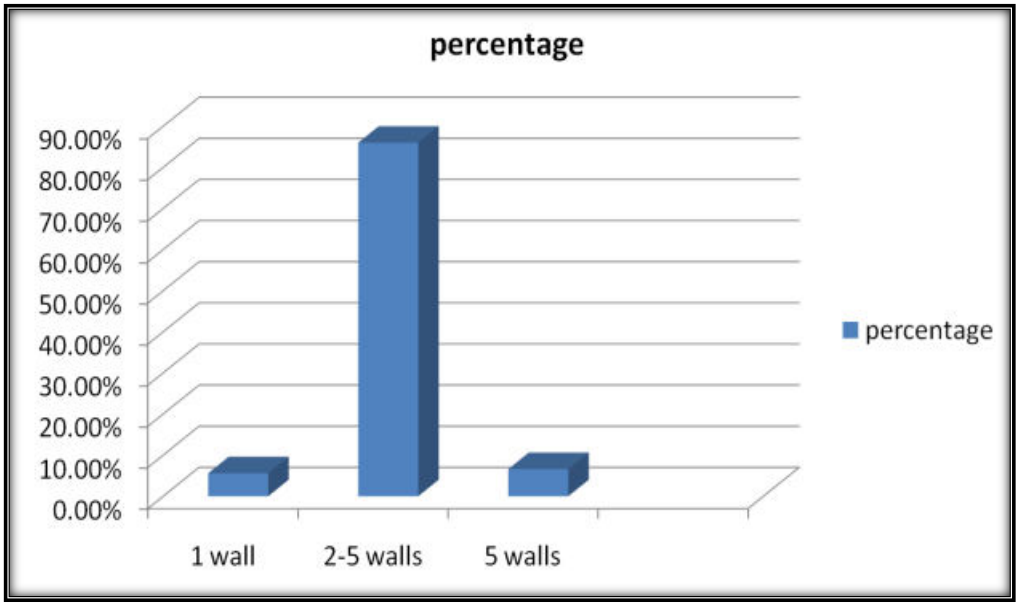

Figure 4: Percentage of maxillary sinus walls involvement.

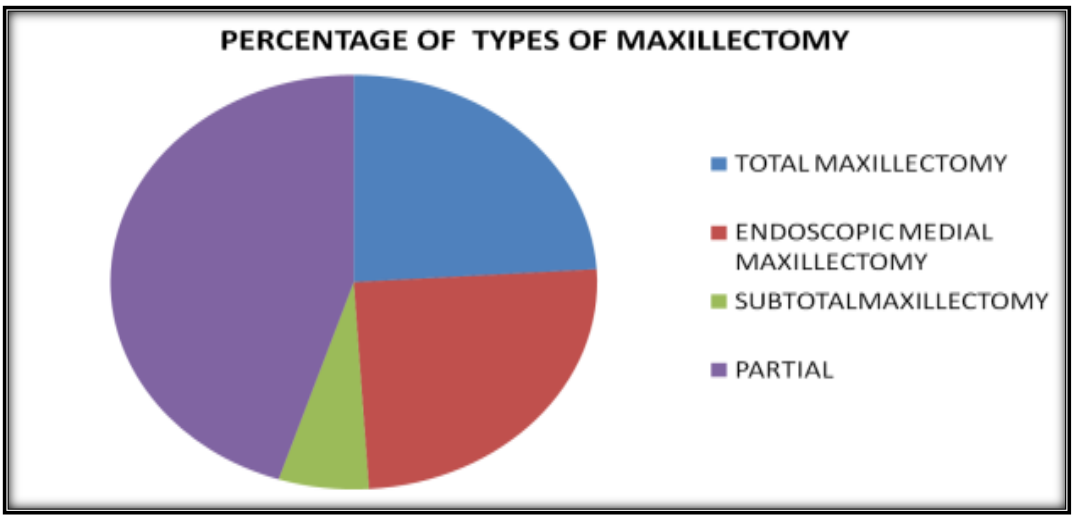

Figure 5:Types of Maxillectomy

Based on the extent of the lesion - 13 uderwent partial maxillectomy 8 underwent total maxillectomy 7 underwent endoscopic medial maxillectomy 2 underwent subtotal maxillectomy.

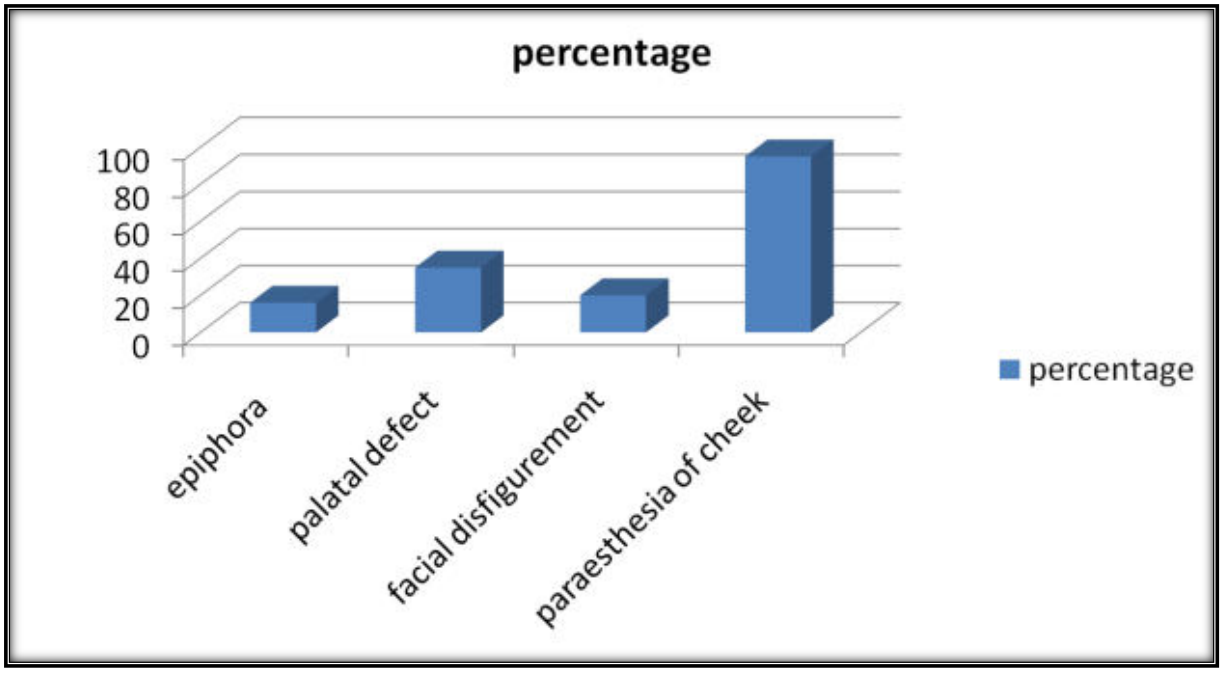

Figure 6: Complications of surgery-Most common complication is paraesthesia of cheek

Complications such as paraesthesia of the cheek seen in 95% of patients followed by 35% of patients having palatal defect.

Image 1: Clinical Presentation of Mucormycosis ie palatal perforation, black eschar on face, right orbital swelling.

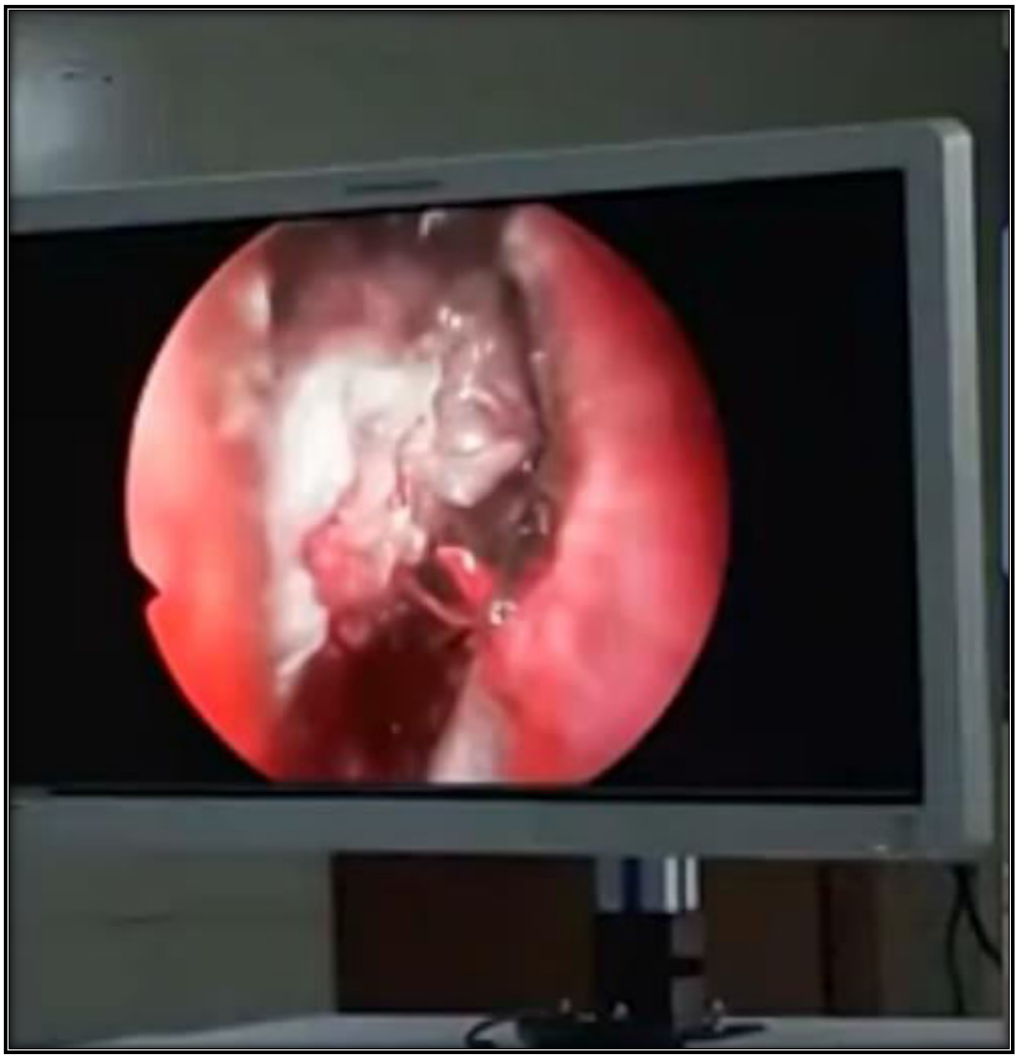

Image 2:Necrotic Middle Turbinate seen on diagnostic nasal endoscopy

Image 3: weber ferguson incision for total maxillectomy.

DISCUSSION

During the current pandemic of COVID, numerous manifestations and complications have occurred, including increased risk of fungal infections.[5] Mucormycosis is a fungal infection

caused by fungi of the order Mucorales. It has a remarkable high morbidity and mortality, and its incidence is in the ascendant. In healthy individuals, growth of mucor spores is usually resisted by phagocytes, however in immunocompromised individuals where the host response is compromised, fungal infection exacerbates.The mucor hyphae have an affinity to blood vessels, they invade them, proliferate, and spread within the vessel walls, causing a series of events such as thrombosis, ischemia, necrosis, and finally sequestration of the involved tissue.[6]

In this study, 30 cases of post covid rhinoorbital mucormycosis who presented to our hospital were studied,among male 24(80%) & females6 (20%).[12]Patients (40%) were in 5th to 6th decade and 9 patients (30%) in 4th to 5thdecade.

Main presenting features were unilateral cheek pain,cheek swelling,nasal obstruction,loosening of teeth, tooth ache,cheek numbness,headache,periorbital edema,visual disturbances being present in 95% of the patients.5% presented with epistaxis,ptosis,diplopia alone.90% patients were known case of diabetes milletus,10% are denovo diabetes.All the patients were subjected to routine blood investigations, microbiological,radiological investigations.(CT,MRI contrast- PNS,Orbit&Brain) Most commonlyseen in males 80%.1 patient had to undergo orbital exenteration,3 patients underwent palatal resection.

Mucormycosis occurs after the inhalation of the fungal spores and invasion of the paranasal sinuses, causing necrosis of the nasal mucosa, turbinates, and palate. If untreated or unnoticed, the disease has the ability to spread through the whole face, resulting in facial bone necrosis and penetration of orbits and cranium causing mortality. Osteomyelitis of the maxilla is usually rare due to its rich blood supply and presence of thin cortical plates, however, the high angio-invasiveness potential of mucor fungi affects the endothelial lining of blood vessels, causing vascular insufficiency and bone necrosis resulting in mucormycosis osteomyelitis.[7]

In this study, All the patients were treated with intravenous liposomal amphotericin B 5mg/kgBW,antibiotics preoperatively & postoperatively monitoring renal parameters and serum electrolytes.Step down to oral posacoazole 300mg BD on day 1 followed by 300mg OD for next 3 months.

In this study, All the patients were provided with liposomal amphoterecin B irrigations in the cavity intraoperatively.Among the 30patients, 80% complete disease clearence, 15% polypoidal changes and 5% recurrence.

Recurrence is due to inadequate surgical debridement of disease,inappropriate follow up, inadequate postop suction clearence,inadequate usuage of antifungals due to non-availability of drug, difficulty in addressing anatomical areas like ant wall of maxilla,infratemporal fossa,pterygopalatine fossa, infraorbital and intracranial extension of disease. Mucormycosis risk factors include immunosuppressive conditions, diabetes mellitus, liver transplantation,usuage of immunomodulatory drugs and leukemia. Acidosis and hyperglycemia in diabetic patients lead to suppressed phagocytic capacity of granulocytes, deteriorated antioxidant system, and increased serum free iron, favoring fungal growth and proliferation.[8] Patients with COVID-19 infection may suffer from hypoxia, and during quarantine they can become malnourished and debilitated, resulting in disruption of their immunity.[9] Also, COVID-19 is known to have the ability to cause thromboembolism, which may result in closure of blood vessels, ischemia, and subsequently tissue necrosis.[10] Furthermore, it has been reported that some individuals with COVID-19 develop a diabeteslike syndrome.[11]

Nithyanandam et al in his cohort study of patients with mucormycosis found out that 100% had diabetes as risk factor and patients who had stage 1mucormycosis had 91% disease clearence with sinonasal debridement alone and among the cases who had stage 2 had 100% disease clearence with sinonasal debridement alone and 11.1 % had disease clearence with

debridement and orbital exenteration combined. Songu et al reported that in 3 cases that underwent debridement and local Amphoterecin B irrigation in addition to systemic treatment,spread of the fungalinfection was successfully halted and none of the cases needed exenteration.

CONCLUSION

ACUTE Invasive fungal rhino sinusitis is a rare aggressive disease with high morbidity and mortality as its clinical presentation is unspecific,with diagnostic delay.Immunocompromised state along wih recent covid wave set a tremendous role in surge of mucormycosis. Covid patients who were on prolonged oxygen support,excess steroid usuage,in uncontrolled Diabetes patients and in those who were on immunomodulating drugs.

Most commonly found in males with a side predilection to left side.The timing of surgical debridement to limit the disease extension and to maximise the results is not clearly defined although the sooner as possible is the best option. Endoscopic surgery or external approaches combined with endoscopic surgery enable accessing ethmoidal cavities and the base of the skull to remove affected tissues,have less morbidity and comparable results to standard techniques.Chances of complications such as cheek numbness were found to be similar in patients with external approach compared to endoscopic approach, although the scar and facial deformity were found in external approach.Regardless of the approach repeated debridement, postop suction clearence is required in any of the surgery done. Debridement of sinuses is necessary in all cases of mucormycosis so that the fungal reservoir could be removed and the antifungal therapy can reach the viable areas.

Therefore the management of mucormycosis is individualised to each patient based on the extension of the disease and overall general conditon of the patient.

Preventive measures: Maintaining dequate host defence,Strict glycemic control,steroids to be given only during hypoxia in covid,early diagnosis and management,frequent ent visits in suspicious patients,monitoring patients clinically,microbiologically,radiologically for response and disease progression.

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REFERENCES

1. Ibrahima A,Kontoyiannis D.update on mucormycosis pathogenesis.Curr Opin Infect Dis.2013:26:508-15.
2. Mousa S,Peyman B.Rhinocerebral mucormycosis:pathways of spread.Eur Arch Otorhinological.2005:262:932-8.
3. Saedi B,Sadeghi M,Seilani P.Endoscopic management of rhinocerebral mucormycosis.A retrospective analysis of clinical features and treatment outcomes.Indian J Ophthalmol.2003:51(3):231-6.
4. Abedi E,Sismanis A,Sismanis A,Choi K,Pastore P.Twenty- five years experiencing treating cerebro- rhino- orbital mucormycosis.Laryngoscope.1984;94(8):1060-2.
5. Werthman-Ehrenreich, A. Mucormycosis with orbital compartment syndrome in a patient with COVID-19. Am. J. Emerg. Med.2021, 42, 264.e265–264.e268. [CrossRef] [PubMed]
6. Hingad, N.; Kumar, G.; Deshmukh, R. Oral Mucormycosis Causing Necrotizing Lesion in a Diabetic Patient: A Case Report. Int.J. Oral Maxillofac. Pathol. 2012, 3, 8–13.
7. Jones, A.C.; Bentsen, T.Y.; Freedman, P.D. Mucormycosis of the oral cavity. Oral Surg. Oral Med. Oral Pathol. 1993, 75, 455–460. [CrossRef]

8. Ibrahim, A.S. Host cell invasion in mucormycosis: Role of iron. Curr. Opin. Microbiol. 2011, 14, 406–411. [CrossRef] [PubMed]
9. Li, T.; Zhang, Y.; Gong, C.; Wang, J.; Liu, B.; Shi, L.; Duan, J. Prevalence of malnutrition and analysis of related factors in elderly patients with COVID-19 in Wuhan, China. Eur. J. Clin. Nutr. 2020, 74, 871–875. [CrossRef] [PubMed]
10. Zhang, S.; Liu, Y.; Wang, X.; Yang, L.; Li, H.; Wang, Y.; Liu, M.; Zhao, X.; Xie, Y.; Yang, Y.; et al. SARS-CoV-2 binds platelet ACE2 to enhance thrombosis in COVID-19. J. Hematol. Oncol. 2020, 13, 120. [CrossRef] [PubMed]
11. Roberts, J.; Pritchard, A.L.; Treweeke, A.T.; Rossi, A.G.; Brace, N.; Cahill, P.; MacRury, S.M.; Wei, J.; Megson, I.L. Why Is COVID-19 More Severe in Patients With Diabetes? The Role of Angiotensin-Converting Enzyme 2, Endothelial Dysfunction and the Immunoinflammatory System. Front. Cardiovasc. Med. 2020, 7, 629933. [CrossRef] [PubMed]
12. Cordeiro PG,Santamaria E.A classification system and algorithm for reconstruction of maxillectomy and midfacial defects.Plastic Reconstr Surg 2000;105:2331-2346,discussion:2347-8.