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Case Report

Post COVID 19- mucormycosis and osteomyelitis of the mandible- A rare case report

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ABSTRACT

Corona virus disease was declared as pandemic in 2020. The second wave of covid 19 in India was completely influenced by the fatal complication of covid 19 called Mucormycosis. It was declared as an epidemic in India after 2^{nd} wave. The use of Corticosteroids in the management of covid 19 and uncontrolled diabetes mellitus with other systemic illness has shown tremendous immunosuppression which has ultimately caused Mucormycosis. Mucormycosis is rare in mandible. We are presenting a case report with brief discussion of 9 patients having post covid Mucormycosis along with osteomyelitis of the mandible, the rarest form of the post covid infection, which was managed surgically as well as with adjuvant antibacterial and antifungal drugs followed by post-operative prosthetic rehabilitation. This fatal infection has to be kept in mind in covid 19 active cases as well as in recovered patients, especially in those having comorbidities and judicious use of cortico-steroids should be recommended.

1. Introduction

Corona virus disease is caused due to severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). It shows symptoms like chronic fever, cold, dry or wet cough, shortness of breath, anosmia, ageusia, diarrhoea, generalised malaise, acute cardiac injury and secondary infections.[1] SARS-CoV-2 infection has shown the increased risk of opportunistic fungal infections, like pulmonary aspergillosis and Mucormycosis with involvement of maxilla, maxillary sinus, nasal turbinate's, ethmoidal, frontal sinuses with massive destruction which ultimately leads to the death of person.[2] Association of fungal infection and covid was found to be from 14.8 to 27% and 33% in severely ill patients of SARS-CoV-2 patients.[3] Mucormycosis of maxilla is more common than mandible. Mucormycosis was first described by Paultauf in 1885 and it is also known as zygomycosis, phycomycosis.[4] Mucormycosis is a life-threatening disease and commonly associated with immunosuppression and uncontrolled diabetes mellitus. During the second wave of covid in India Mucormycosis was declared as epidemic. In the management of covid widespread use of Corticosteroids was done which made immunosuppression of majority of the population which has shown increase numbers of bacterial as well as fungal infections.[5] Even though the Post -covid Mucormycosis of maxilla has become more common, Mucormycosis of mandible is a rare entity, and Mucormycosis along with osteomyelitis itself is a rarest form of the disease. Herein we report a case of Post covid Mucormycosis and osteomyelitis of the mandible.

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2. Case Report

2.1. Case 1

A 48 years old male patient reported to the department of oral and maxillofacial surgery with a chief complaint of active pus discharge from back region of the lower jaw. He was diagnosed with SARS COVID 2 (A nasopharyngeal swab was positive for SARS-CoV-2 by RT–PCR), 40 days back from the date of reporting. During the treatment days of covid -19, he was under steroids (intravenous dexamethasone (6 mg once a day for 14 days), Inj remdesivir ((200 mg on day 1 and 100 mg on days 2–5), 5 liter of oxygen which was tapered gradually, higher antibiotics, Multivitamin, Tab zinc, thromboprophylaxis for venous thrombosis, and maintenance haemodialysis using Inj enoxaparin followed by tab Aspirin 150mg OD was prescribed, During the treatment days only patient started experiencing pain in back tooth region of the lower jaw, but no inventory management was done. The patient was not having any systemic issues. At the time of admission, the respiratory rate was 28 breaths/minute, blood pressure was 120/90 mmHg, and heart rate of 76 beats/minute. The oxygen saturation was 99%. The patient has normal built and gait. Chest radiograph showed no significant changes. The haemoglobin was 112.8 g/dL, His random blood glucose was 110 mg/dL. After radiological and CT reports the HRCT Score for the patient was 5/23. Patient was suffering from body ach, cough and fever. Sputum examination with Gram stain, stain for acid fast bacilli was negative, and fungal smear was positive suggestive of Rhizopus microspore. The in vitro antifungal susceptibility testing (AFST) of the isolate was performed. The minimum inhibitory concentrations (MICs) of the isolate were as follows: amphotericin B, 0.5 lg/mL; itraconazole, 0.03 lg/mL; Posaconazole, 2.0 lg/mL. His symptoms were improved and he was discharged after 40 days of long hospitalization.

Patient when reported to us was having active intra-oral pus discharge with obliterated buccal vestibule and inflamed surrounding soft tissue in both the posterior aspect of the mandible, with foul smell and mobility of all the mandibular teeth with no extra-oral any significant findings. Maxillary region was normal, maxillary sinus or any other sinusal involvement was not noted. Present clinical examination revealed the patient to be well oriented to time place and person, afebrile, and in severe pain on right and left side of face with paraesthesia of lower lip. Right and Left submandibular lymph nodes were palpable and tender. CBCT of mandible revealed an osteolytic lesion involving buccal and lingual cortices, loss of trabecular pattern of medullary bone, and multiple small air loculi with evidence of involucrum and sequestrum formation extending from left angle crossing midline and involving the Angle on the right side as well with no involvement of bilateral ramus, coronoid and condylar process of mandible. The lesion was involving whole mandible with no involvement of lower border of the mandible. Considering Clinico-radiographical features acute exacerbation of chronic osteomyelitis was made. (Figures 1, 2, 3 and 4)

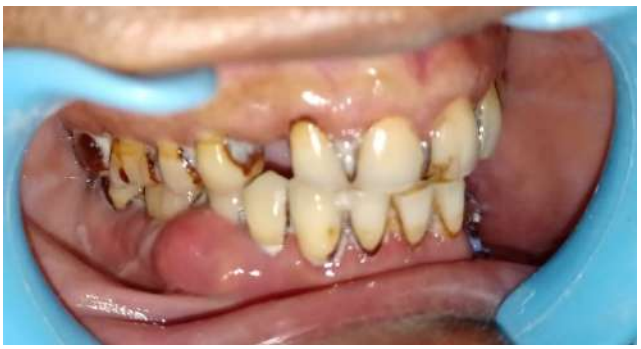

Fig. 1: Preop intra-oral lesion

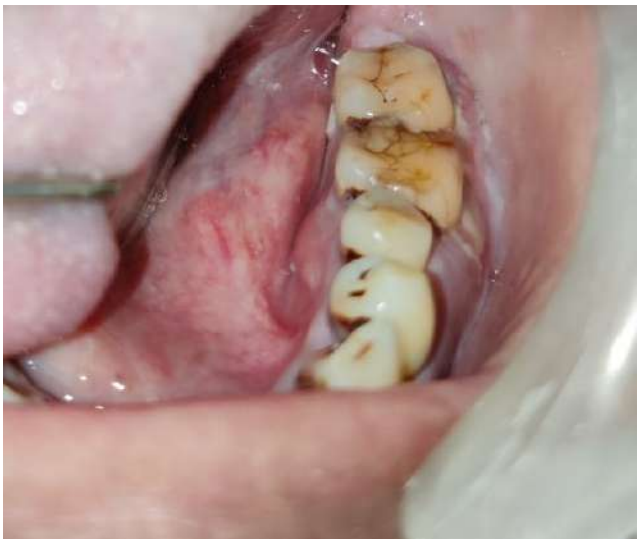

Fig. 2: Pre-op CBCT showing bony destruction

Incisional biopsy and KOH mount was performed. KOH mount report came negative for this patient. Patient was kept on antibiotics and analgesics. Swab collection was done and sent for culture and sensitivity test. Histopathological report came out as a Mucormycosis and osteomyelitis of the mandible. Hence patient was immediately shifted to the tab Posaconazole (300mg BD on 1^{st} day followed by 300 mg OD according to the AIIMS RISHIKESH India Guidelines for the management of Mucormycosis). For fabrication of obturator or prosthesis to be given to the patient post-operatively, preoperatively alginate impression of the lower jaw was taken and cast models were fabricated. Under local anaesthesia full thickness mucoperiosteal flap was reflected from right to left angle region with crevicular incision, complete exposure of the underlying bone till lower border

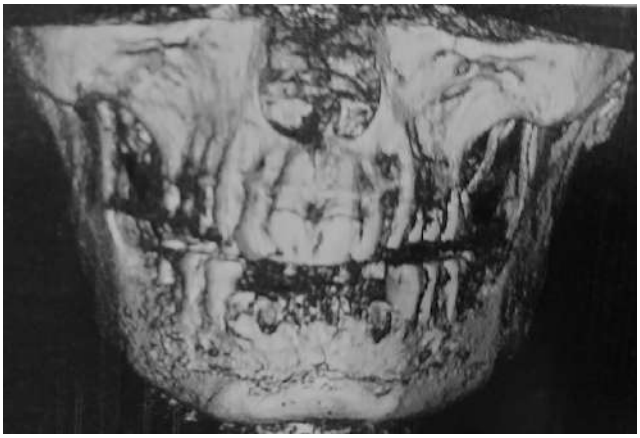

Fig. 3: Intra-op exposure of sequestrum

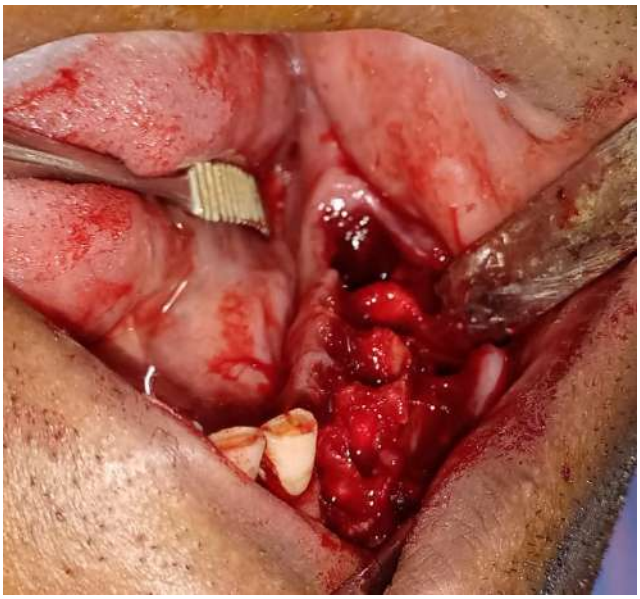

Fig. 4: Sequestrectomy and saucerization on left side ofmandible

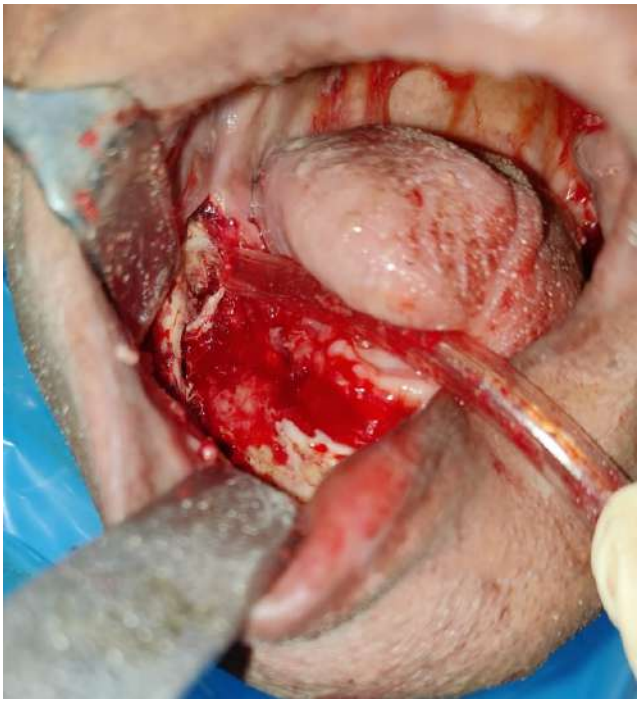

Fig. 5: Sequestrectomy and saucerization one right side of mandible

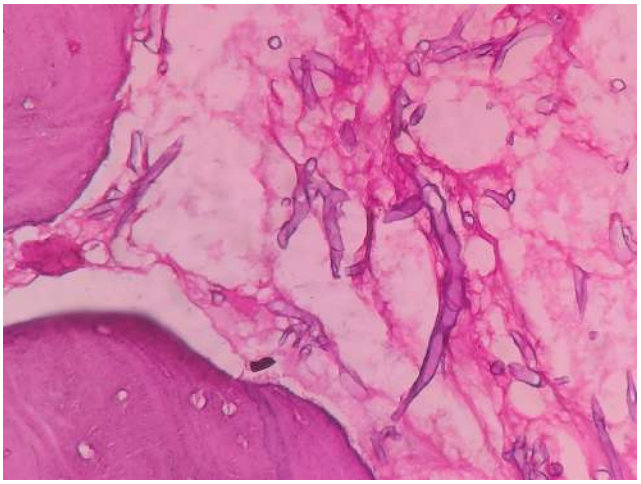

Fig. 6: Completely removed specimen

of mandible was performed. Extraction of all the mandibular teeth was performed. curettage and saucerization of the underlying bone were done. Intraoperative findings revealed completed necrosis of cortex and medullary bone with Gray and green discoloration of medullary region suggestive of Mucormycosis and osteomyelitis of the mandible. (Figures 5 and 6)

After complete surgical debridement using betadine & hydrogen peroxide irrigation was done. Peripheral ostectomy with regional acceleratory phenomenon was achieved from surrounding bone before final closure. Final closure was performed using 3-0 vicryl absorbable suture material. Patient was encouraged to have oral liquid diet on same surgical day post operatively 2 hours after the surgery. Post-operative day was uneventful for the rest of the day. Patient was recalled after every alternate day for regular check-up and irrigation. Complete sequestrum after surgery was sent for histopathological examination which turned out to be the combination of Mucormycosis and osteomyelitis of the entire mandible. (Figures 7 and 8)

Post-operatively after 15 days patient was sent for the prosthetic rehabilitation, Obturator fabrication was done. At present patient is under regular follow up and there is no recurrence noted till date. Total 9 patients diagnosed with Post covid 19 Mucormycosis of the mandible were managed with the same protocol and all the patients were

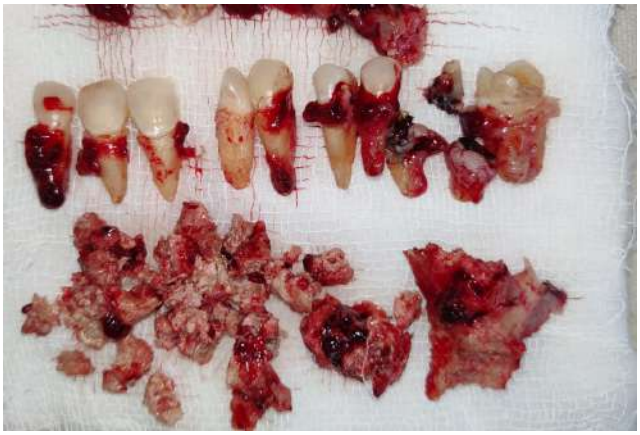

Fig. 7: Post-op Histopathological report with aseptate hyphae

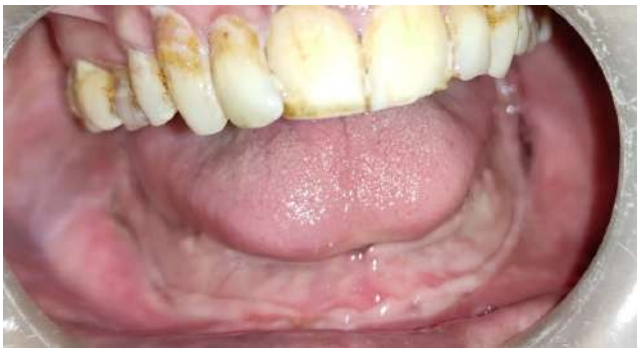

Fig. 8: Post op follow up photograph

prosthetically rehabilitated and are under constant follow up since last 5-6 months with no recurrence noted till date. (Table 1)

3. Discussion

Covid 19 pandemic disease transmitted from person to person through aerosol via inhalation from an infected person. The Human race is threatened by this deadly disease. In India during second wave, it has shown more mortality and has given a birth to scary and lethal fungal infection called Mucormycosis.[6,7] Fungi are always considered more infectious and harmful to human body than bacterial infections.[4] Fungi are avirulent and becomes pathogenic when host resistance decreases or immunosuppression takes place. Mucormycosis belongs to Mucorales a subtype of zygomycetes and is associated with tissue necrosis as its angiotrophic in nature and lethal fungi. Invasive Mucormycosis causes tissue necrosis due to incursion of blood vessels, ensuing thrombosis. Hyperglycaemia, immunosuppression provides favourable environment for the growth of Rhizopus oryzae fungi responsible for rhino-orbital Mucormycosis as in uncontrolled diabetic patients diabetic keto-reductase enzyme allows fungi to use more ketone bodies for their growth and proliferation. COVID 19 patients are treated with high dosages of corticosteroids which causes increased blood sugar level, and COVID 19 is responsible for coagulation of blood, incursion of blood vessels and thrombosis leads to decreased or no blood supply to the jaw bones.[8] It has been established that diabetic ketoacidosis momentarily disrupts the ability of transferrin to bind iron and this alteration permits the growth of Rhizopus oryzae[9] Majority of the Mucormycosis cases are found in maxilla than mandible. Mucormycosis along with osteomyelitis is the rarest variety encountered in literature. During 2^{nd} wave of COVID 19, Post covid Mucormycosis was declared as epidemic and patients cured from covid died due to rhino-orbito Mucormycosis at an early age. Management of such post covid Mucormycosis should be early diagnosis, reversal of the underlying cause, controlling blood sugar level, surgical debridement of the infected bone and medicinal management includes Antifungal drugs like Inj Amphotericin B deoxycholate with maximum tolerated dose being, 1 to 1.5mg/kg/day for 21 days dose depending on patients' body weight, Tab/syrup Posaconazole 300mg BD, Day 1 followed by 300mg OD for 2 weeks.[10] Hyperbaric oxygen therapy should also be considered which increases oxygen pressure at infected or necrosed bone region and increases neutrophil capacity for phagocytosis as well as causes neo angiogenesis and also it reverses Lactic acidosis and hence increases the rapid recovery hence 100% oxygen saturation for about 90-120 minute with pressure of about 2.0 to 2.5 atmospheric pressure is recommended.[11] Patients diagnosed with COVID 19 should be timely evaluated for the blood coagulation profile, all the patients should keep on anticoagulant as in COVID 19 patient thrombosis is the main reason which hampers the blood supply to the jaw bone and other body parts as well. Hence all routine blood investigations like BT, CT, INR, D-DIMER all should be evaluated. Oral prophylaxis should be done routinely along with use of Betadine mouth wash should made compulsory for all the patients.[12] The development of Mucormycosis in COVID 19 patients is significantly found in association with use of cortico-steroids which leads to hyperglycaemia. Acute respiratory distress syndrome due to covid needs timely monitoring via diagnostic imaging and testing. Patients kept for prolonged intubation are not in condition to maintain a good oral hygiene and hence makes the environment suitable for opportunistic growth of the fungi.[13] Hence judicious use of steroids is indicated. Use of tocilizumab should be avoided as many studies has shown association of tocilizumab with Mucormycosis in COVID 19 patients.[14] Patients with COVID 19 are found to be associated with aspergillosis, candidiasis as well as Mucormycosis and it can show multi-organ involvement as well. Hence high degree of clinical suspicion is required

Table 1: Other cases

S. No	Age/sex	Medical History	Covid 19 infection date	Time of presentation	Mucormycosis type	Histopathology report	Fate
Case 2	46/m	DM, HTN	Jan 2021	21 days post covid	Mandibular	Mucormycosis with osteomyelitis	Alive
Case 3	48/m	DM	March 2021	48 days post covid	Mandibular		Alive
Case 4	41/m	NIL	April 2021	30 days post covid	Mandibular		Alive
Case 5	45/m	DM	May 2021	15 days post covid	Mandibular		Alive
Case 6	39/m	NIL	May 2021	23 days post covid	Mandibular		Alive
Case 7	45/m	HTN	May 2021	10 days post covid	Mandibular		Alive
Case 8	60/m	DM, HTN	June 2021	14 days post covid	Mandibular		Alive
Case 9	57/m	DM	July 2021	9 days post covid	Mandibular		Alive

for the early diagnosis and management of the covid 19 associated Mucormycosis. [15]

4. Conclusion

Mucormycosis is a rare and occasionally fatal opportunistic infection. In the COVID-19 era in second wave, the rate of Mucormycosis was increased. Early Diagnosis is the key for the better management of the Mucormycosis. It is commonly found in Rhino-Maxillary-orbital region and rarely involves mandible. A standard dose recommended by the World Health Organization based on the RECOVERY trial that is 6 mg of dexamethasone once daily for no more than 7–10 days should be strictly adhered to and lower doses should be considered in immunocompromised or diabetic patients to avoid Post operative complications.

5. Source of Funding

None.

6. Conflict of Interest

The authors declare no conflict of interest.

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