

Post coronavirus disease mucormycosis involving the mandible: A case report with brief note on literature

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Abstract

Mucormycosis also termed as phycomycosis or zygomycosis is less commonly seen in oral cavity. However, it is an invasive, life-threatening and aggressive fungal infection. It mostly targets individuals with altered immunological system and diabetes. In this recent pandemic situation, the individuals affected with coronavirus disease 2019 (COVID-19) are also affected with this fungal infection which commonly involves the maxilla. In this case report, we present a case of a 45-year-old female affected with mucormycosis in post-COVID scenario involving mandible which is quite rare situation. The case report covers clinical findings, radiographic investigations and histopathological details with brief on literature review. Since mucormycosis is aggressive fungal infection, it should be handled with multimodal approach to reduce the systemic damage of an individual, morbidity and mortality.

Keywords: Coronavirus disease 2019, coronavirus disease 2019-associated mucormycosis, mandibular mucormycosis, mucormycosis, post coronavirus disease infections

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INTRODUCTION

In coronavirus disease 2019 (COVID-19), approximately, more than 1 million lives have been lost in global scenario. In spite of vaccine administration at present, a proper supportive care holds a major role in battle against COVID-19.^[1]

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the causative agent for COVID-19 which is most commonly associated with various opportunistic bacterial and fungal infections and may also related with preexisting comorbidities, namely, diabetes mellitus, lung disease or any hospital-acquired infections.^[2] Among fungal infections, *Aspergillus* and *Candida* are the important microorganisms considered the important

coinfection in COVID-19 individuals.^[3] Apart from these fungal pathogens, at the present scenario, mucormycosis, especially with regard to India, the infection is evident in larger percentage in COVID-19-affected individuals.^[4]

Zygomycetes group of fungi includes two entities, namely, mucorales and entomothorales with mucorales, causing fungal infections which are life threatening and are especially seen in immunocompromised individuals.^[3] Mucormycosis infection is predominantly controlled by phagocytes as a part of host defense mechanism, but this action is prevented when the individual is under corticosteroid therapy which will reduce the ability of macrophages to prevent the germination of fungal spores.^[5]

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Mucormycosis most commonly affects the maxilla, out of which rhinocerebral type is life threatening, and very rarely, it affects the mandible. Here, we report a rare case of mucormycosis affecting the mandible in a 45-year-old female in post-COVID scenario. Till now, 15 cases have been reported to affect the mandible in post-COVID scenario.

CASE REPORT

A 45-year-old female reported to a private clinic with a chief complaint of pain and pus discharge for the past 12 days in the left lower jaw region. Medical history revealed that she was recently positive for COVID 3 months back and was under treatment with medications (corticosteroid therapy) for the same. She is also diabetic for the past 5 years and is under medication. Routine blood investigation revealed elevated creatinine levels.

Extraoral examination revealed facial swelling on the left side of the face extending till camper line, anteriorly 1 cm in front of symphysis menti, 3 cm below the lower mandibular margin and posteriorly 2 cm beyond angle of the mandible. Intraoral examination revealed root canal treated 36 tooth and soft tissue showing mild swelling extending from 34 to 36 region with pus discharge [Figure 1a].

Past dental history revealed that pain and pus discharge were present in the left mandibular back tooth area for the past 12 days; root canal treatment (RCT) was performed for 36 and 38 tooth after post-COVID period. In spite

of root canal therapy, the pain and pus discharge did not subside. Past dental history revealed RCT was done for 47 tooth [Figure 1b].

Radiographic investigation orthopantomogram (OPG) revealed root canal treated 36 and 38 tooth (recently performed) and RCT treated 47 (performed before), mild radiolucency apical to 36 tooth which extended from 34 to 38 tooth, but no obvious lesion was identified [Figure 1c]. Hence, to confirm further with advanced investigation, magnetic resonance imaging (MRI) neck plain scan was performed. The MRI showed increased signal intensity of medial, lateral pterygoid muscles, temporalis muscle with marrow edema noted in the shaft ramus of the mandible on the left side, increased size of the left submandibular gland, few air pockets on the ramus of the mandible on the left side and bilateral maxillary sinusitis [Figure 2a and b].

Based on history, clinical examination and radiographic finding, a provisional diagnosis of osteomyelitis was arrived. Surgical approach was planned with extraction of 36 tooth and an intraoral deep vestibular incision extending from 42 to 36 tooth was done, and the excised tissue was sent for histopathological examination [Figure 2c-e].

Grossing of the specimen showed a single large hard tissue measuring approximately about 3 cm × 1.5 cm in size,

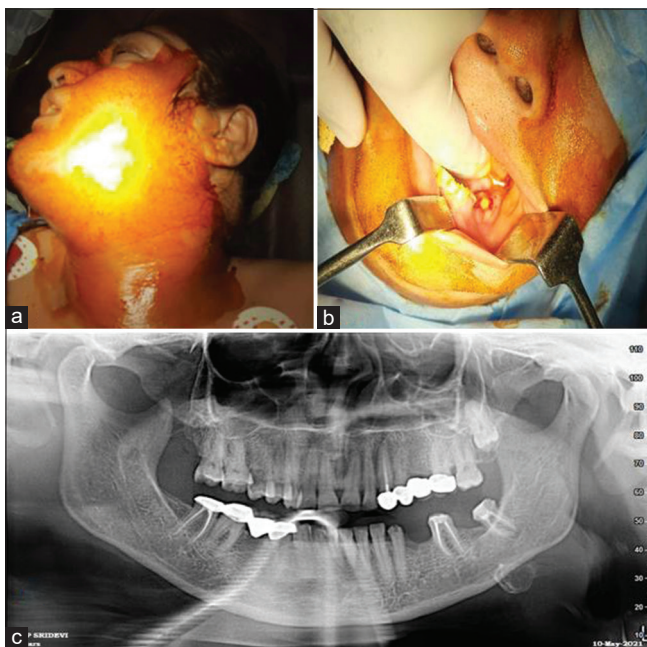


Figure 1: (a) Extraoral view (b) intraoral view (c) Orthopantomogram (Orthopantomogram) showing root canal-treated teeth

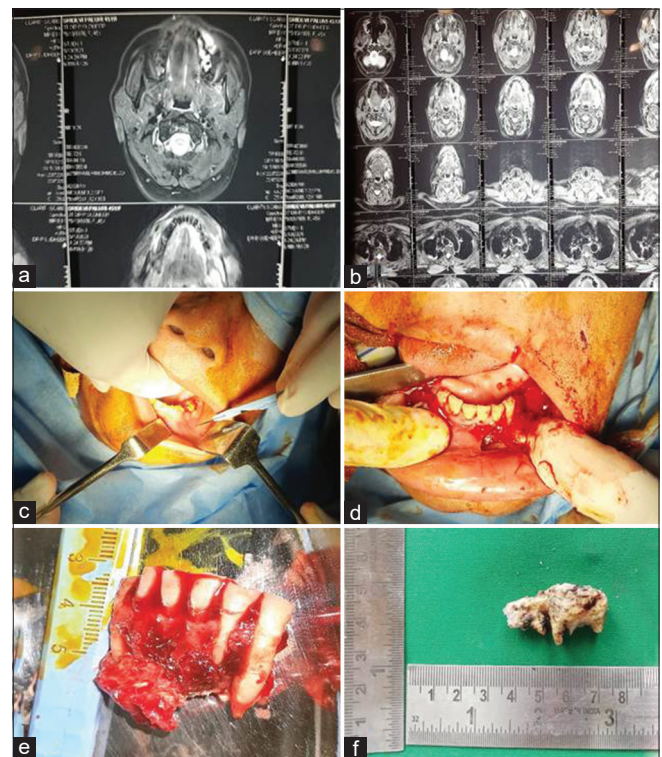


Figure 2: (a and b) Magnetic resonance imaging neck plain scan (c-e) Intraoral operative procedure (f) Specimen grossing picture

dark brown to black in color, appeared porous with the absence of usual bone hardness and few areas appeared necrotic [Figure 2f]. On histopathological examination, H&E sections revealed considerable necrosis with ribbon-like fungal nonseptate hyphae, mostly branched at 90° with sparse inflammatory component in a bony background. To add further, periodic acid–Schiff (PAS) staining showed many broad, aseptate, irregular and ribbon-like folding of fungal filaments with branching at 90° [Figure 3].

The patient was admitted for segmental osteotomy and surgical debridement of the site. The patient showed better improvement after the treatment and is under regular follow-up.

DISCUSSION

Mucormycosis is the general terminology given to diseases that are caused by fungal organisms. It is usually an opportunistic infection of fungal origin which most commonly affects individual who are immunocompromised, uncontrolled diabetes, lymphomas, leukemias, renal failure, organ transplant, corticosteroids, immunosuppressive therapy and rare in healthy individuals, and at the present scenario, COVID-19 is also considered in this list which causes mucormycosis directly or indirectly.^[6]

In global scenario, the occurrence of this fungal infection varies from 0.005 to 1.7/million population and which is 80 times more with regard to India, paving way for India to have the highest reported cases of mucormycosis which is known as diabetes capital of the world. With respect to the Indian scenario, diabetes mellitus is the most common associated risk factor, but hematological malignancies and

organ transplant are the risk factor in the other countries such as the USA and Europe.^[7]

The main causes that facilitate the fungal spores to grow in COVID-19-affected individual are hyperglycemic status, hypoxia, diabetic ketoacidosis, elevated iron level, reduced phagocytic activity, steroid mediated or other existing comorbidities. Hyperglycemic status has been reported in individuals affected with COVID-19, SARS-CoV-1 and also in pneumonia unrelated to SARS-CoV-1.^[8] In COVID-19-infected individual, lymphopenia is usually noted, and in case of severe infections, when viral replication is high, the inflammatory reaction and influx of neutrophil, monocyte into the bloodstream is promoted which causes neutrophil and lymphocyte imbalance and the individual is highly susceptible to systemic fungal infections.^[9] With regard to the present case, the patient is diabetic for the past 5 years and under medication.

Mucormycosis most commonly involves sinus (39%), pulmonary (24%) and cutaneous (19%) based on this involvement; the transmission route can be either inhalation of spore or direct inoculation. At present, the number of mucormycosis cases reported to affect to mandible is minimal accounting for its rarity. According to Agarwal *et al.*,^[10] 15 cases of isolated mucormycosis of mandible have been reported. Based on the risk factors, it was leukemia for 11 cases, uncontrolled diabetes for 4 cases and only diabetes for 2 cases with a history of dental extraction in 4 cases.^[10] It is also seen in patient who are under treatment with immunosuppressive drugs (steroids or methotrexate) as stated by Vinh *et al.*^[11] and Warris and Henriet.^[12] In our case, mucormycosis was present in mandible with a history of dental treatment post-COVID and underlying history of diabetes, and the patient was under corticosteroids as a part of COVID treatment regimen.

Histopathology of mucormycosis usually shows broad, irregularly shaped, nonseptate hyphae with right or obtuse angle branching in H&E staining, but they can be well appreciated with PAS or silver stains. The organism is usually found near the area of necrosis, especially close to the necrotic vessel walls.^[13] PAS and Grocott's methenamine silver stains can be used for further confirmation and usually they show broad, aseptate, irregular and ribbon-like folding of fungal organisms and branching at obtuse angle. PAS staining shows ribbon-like filamentous organism, magenta-colored hyphae at obtuse angles.^[14] In our case, we performed H&E staining which showed nonseptate, ribbon-like fungal hyphae with 90° branching, whereas PAS

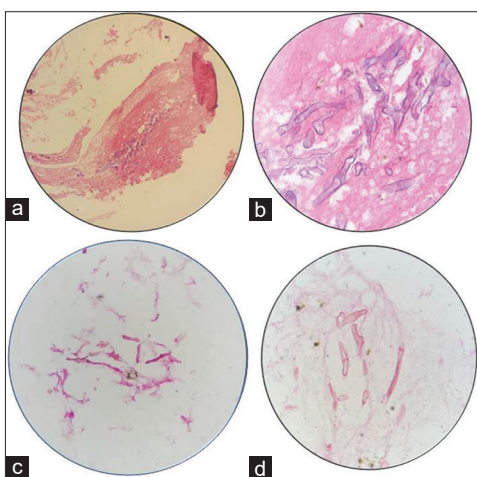


Figure 3: (a and b) Tissue section stained with H&E stain (×4 and ×20 magnification) (c and d) tissue section stained with periodic acid–Schiff stain (×4 and ×20 magnification)

staining showed aseptate, magenta color-stained fungal organisms. Similar features were also reported by Verma *et al.*^[15]

Early intervention with proper medical and surgical approach with complete debridement and clear tissue margins will promote healing of the affected area. Employing radiographic aids such as OPG, MRI, computed tomography scan and proper clinical examination will also help in delivering a proper treatment care to the patients at the present COVID-19 situation.

CONCLUSION

Mucormycosis is an infection of fungal origin which is uncommon, lethal and aggressive in nature which affects individuals with immunocompromised status, diabetic, hematological malignancies and other varied conditions. Clinician should be able to diagnose a mucormycosis case when an individual with altered immune status presents with bone necrosis after tooth extraction. Hence, multimodal approach with early diagnosis, proper clinical examination, radiographic investigation, histopathological examination and extensive surgical debridement with antifungal therapy will be able to control the spread of the infection and reduce the mortality rate.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Garg D, Muthu V, Sehgal IS, Ramachandran R, Kaur H, Bhalla A, *et al.* Coronavirus disease (COVID-19) associated mucormycosis (CAM): Case report and systematic review of literature. *Mycopathologia* 2021;186:289-98.
- Mehta S, Pandey A. Rhino-orbital mucormycosis associated with COVID-19. *Cureus* 2020;12:e10726.
- Ribes JA, Vanover-Sams CL, Baker DJ. Zygomycetes in human disease. *Clin Microbiol Rev* 2000;13:236-301.
- Song G, Liang G, Liu W. Fungal co-infections associated with global COVID-19 pandemic: A clinical and diagnostic perspective from China. *Mycopathologia* 2020;185:599-606.
- Waldorf AR. Pulmonary defense mechanisms against opportunistic fungal pathogens. *Immunol Ser* 1989;47:243-71.
- Dimaka K, Mallis A, Naxakis SS, Marangos M, Papadas TA, Stathas T, *et al.* Chronic rhinocerebral mucormycosis: A rare case report and review of the literature. *Mycoses* 2014;57:699-702.
- Singh AK, Singh R, Joshi SR, Misra A. Mucormycosis in COVID-19: A systematic review of cases reported worldwide and in India. *Diabetes Metab Syndr* 2021;15:102146.
- Montefusco L, Ben Nasr M, D'Addio F, Loretelli C, Rossi A, Pastore I, *et al.* Acute and long-term disruption of glycometabolic control after SARS-CoV-2 infection. *Nat Metab* 2021;3:774-85.
- Mishra N, Mutya VS, Thomas A, Rai G, Reddy B, Mohanan AA, *et al.* A case series of invasive mucormycosis in patients with COVID-19 infection. *Int J Otorhinolaryngol Head Neck Surg* 2021;7:867-70.
- Agarwal S, Anand A, Ranjan P, Meena VP, Ray A, Dutta R, *et al.* Case of mucormycosis of mandible after self-extraction of teeth incidentally detected to have chronic granulomatous disease: Case report and literature review. *Med Mycol Case Rep* 2020;28:55-9.
- Vinh DC, Freeman AF, Shea YR, Malech HL, Abinun M, Weinberg GA, *et al.* Mucormycosis in chronic granulomatous disease: Association with iatrogenic immunosuppression. *J Allergy Clin Immunol* 2009;123:1411-3.
- Warris A, Henriët SS. Invasive fungal infections in the child with chronic granulomatous disease. *Curr Fungal Infect Rep* 2014;8:37-44.
- Aggarwal P, Saxena S, Bansal V. Mucormycosis of maxillary sinus. *J Oral Maxillofac Pathol* 2007;11:66-9.
- Manjunath NM, Pinto PM. Management of recurrent rhinomaxillary mucormycosis and nasal myiasis in an uncontrolled diabetic patient: A systematic approach. *Int J Appl Basic Med Res* 2018;8:122-5.
- Verma M, Sharma R, Verma N, Verma K. Rhinomaxillary mucormycosis presenting as palatal ulcer: A case report with comprehensive pathophysiology. *J Oral Maxillofac Pathol* 2020;24:558-62.