



## A Case Report of Post-Covid Mucormycosis of Mandible

Mrunmayee Shrikant Durugkar<sup>1\*</sup>, Swati Jadhav<sup>2</sup>, Mahendra Patait<sup>3</sup>, Sushilkumar Bagul<sup>4</sup>

<sup>1,2</sup>Private Practitioner, Department of Oral Medicine and Radiology, Maharashtra, India.

<sup>3</sup>Professor and HOD, Department of Oral Medicine and Radiology, SMBT Dental College and Hospital, Sangamner, Maharashtra, India.

<sup>4</sup>Associate Professor, Department of Oral and Maxillofacial Surgery, SMBT Dental College and Hospital, Sangamner, Maharashtra, India.

### Case Study

**\*Corresponding Author:** Mrunmayee Shrikant Durugkar, Department of Oral Medicine and Radiology, Maharashtra, India.

**E-mail:** [mrunmayeedurugkar@gmail.com](mailto:mrunmayeedurugkar@gmail.com)

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### ABSTRACT

The coronavirus disease 2019 (COVID-19) has affected the world and has been considered a pandemic disease. It came with the risk of co-infections. Mucormycosis is one of them. It is a severe fungal infectious disease. Mucormycosis in COVID-19 patients presented an additional challenge for health care. It is considered that coronavirus disease 2019 patients having uncontrolled diabetes, high-dose steroid therapy, and exposure to mechanical ventilation have developed mucormycosis. Amphotericin B is the drug of choice for mucormycosis, also posaconazole or isavuconazole is used for step-down therapy and salvage therapy. It was commonly seen in paranasal sinuses among which the maxillary sinus was a common site. This case report presents the case of mucormycosis of the mandible in a patient with having history of COVID-19.

**Keywords:** Fungal, COVID Associated Mucormycosis, Mandible, Mucormycosis.

### Introduction

The COVID-19 illness emerged as a mysterious illness and spread rapidly across the world, causing a pandemic.<sup>1</sup> It was caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>2</sup> COVID-19 is especially seen in people with underlying diseases like diabetes mellitus, hypertension, and immunosuppressed states, such as in patients suffering from malignancies, bone marrow suppression, and chronic kidney disease.<sup>1</sup> The use of steroids and antibiotics in immunocompromised patients increased the chances of opportunistic infections.<sup>1</sup> Mucormycosis is an opportunistic fungal infection

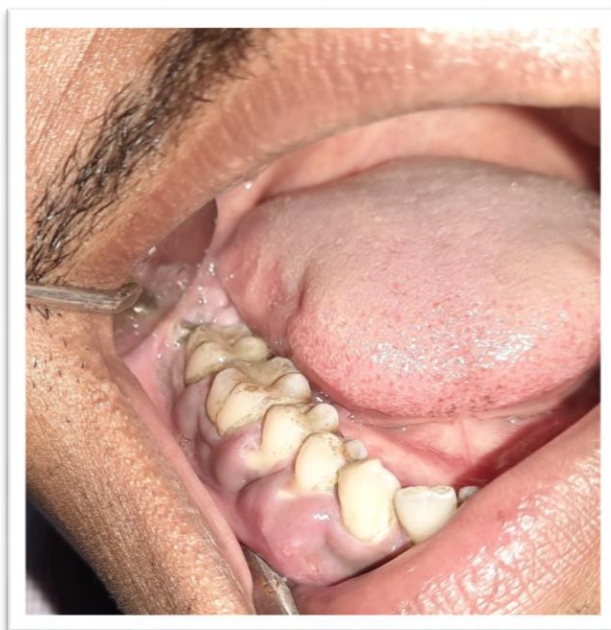
caused by a group of molds of the genus *Rhizopus*, *Mucor*, *Rhizomucor*, *Cunninghamella*, and *Lichtheimia* seen during COVID-19.<sup>3,4</sup> It is characterized by infarction and necrosis of the tissues of the patient which results from the blood vessels by the hyphae. The involvement of the rhino-orbital area is common in COVID-19-induced mucormycosis and it is secondary to inhalation of the spores into the nose and paranasal sinuses of a susceptible host.<sup>5</sup> Here, our case presents a 35-year-old male patient diagnosed with mucormycosis of the mandible after treatment of COVID-19 which is a rare entity.

**Case Report**

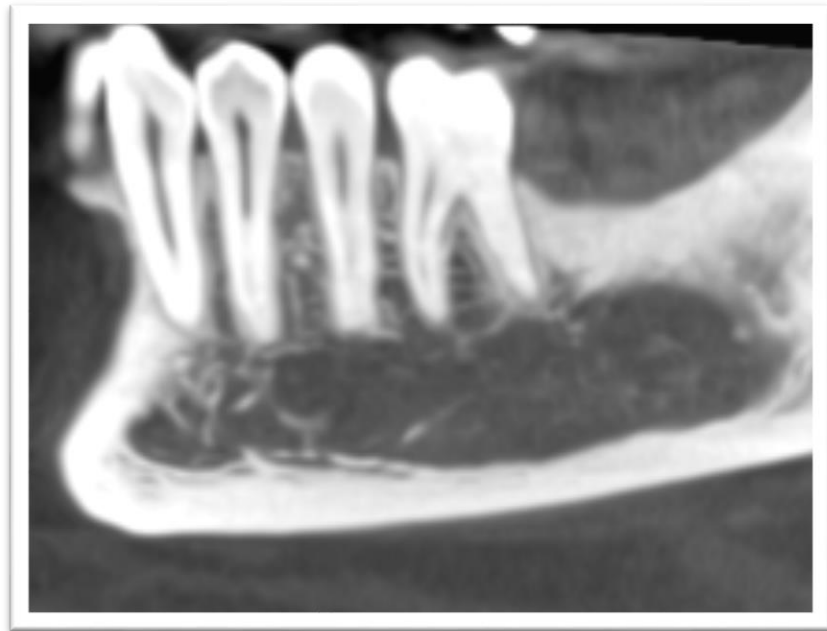
A 35-year-old male patient presented with the chief complaints of pain, swelling, and mobility of teeth in the right side of the lower jaw for 15 days. There was no history of difficulty in mouth opening or swallowing. The patient had a history of COVID-19 infection three weeks before the presentation of the above-mentioned symptoms. He was hospitalized for oxygen support and intravenous steroid support for COVID infection. The steroids were administered on the tenth day of illness in a tapering dose. The patient was an unknown diabetic, and following steroid treatment, his blood sugar levels got deranged, and he was kept on oral hypoglycemic agents (OHA).

After three weeks of COVID-19 infection, he noticed foul-smelling pus discharge from the tooth sockets, mobile teeth, and an inability to chew.

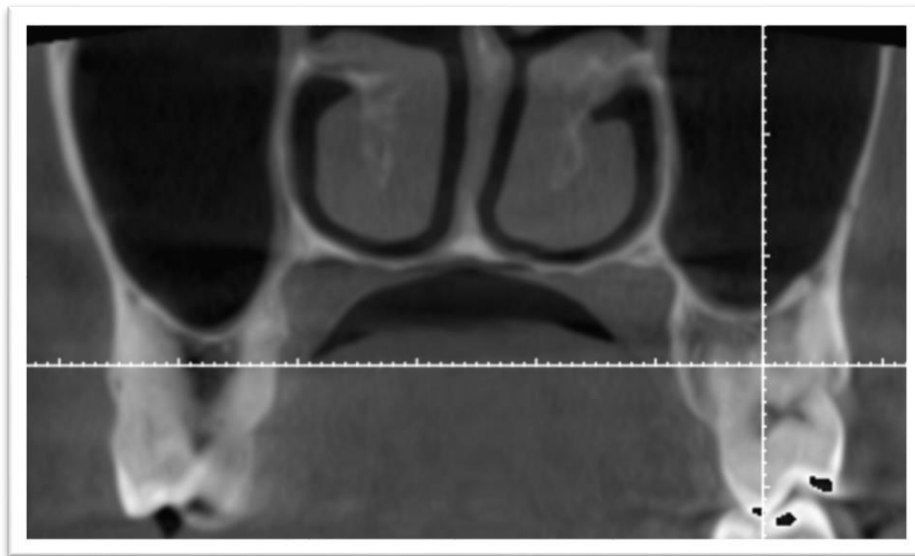
(Figure 1) The upper jaw appeared completely normal. The provisional diagnosis of osteomyelitis was given. The patient was advised a CBCT scan for evaluation of the presence of a bony lesion. The full mouth CBCT demonstrated bony destruction of the alveolar bone of part of the mandible (Figure 2) and there is no involvement of maxillary bone seen (Figure 3). Additionally, there were labial and lingual cortical plate erosions throughout. Here the degenerative bony lesions were confirmed on radiographic examination. The patient was then admitted and planned for inferior marginal alveolectomy and extraction of infected teeth under local anesthesia. On alveolectomy, a dead necrotic cancellous bone was found. The curettage and saucerization of the involved mandible segment and complete teeth extraction of the right side was performed. (Figure4)



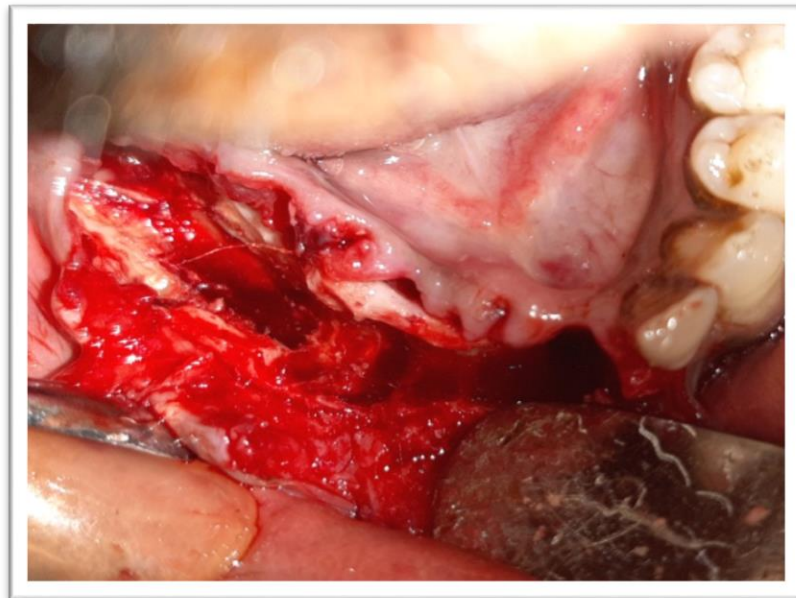
**Figure 1: Multiple Abscess.**



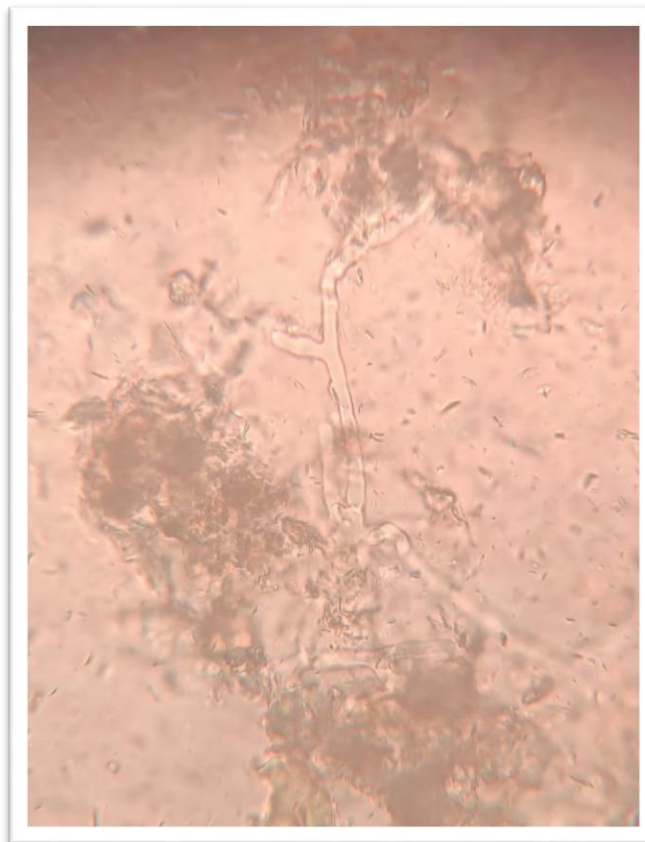
**Figure 2: Bony destruction in mandible.**



**Figure 3: No involvement of maxillary sinus and maxillary bone.**



**Figure 4: Intra-operative picture showing sequestromy and saucerization.**



**Figure 5: KOH mount showing fungal hyphae.**

The necrosed bone was sent for histopathologic examination and KOH mount to rule out the presence of fungal infection. The decalcification report demonstrated connective tissue stroma containing bony trabeculae without osteoblastic rimming and empty osteolytic lacunae. Numerous eosinophilic areas without cellular morphology suggestive of necrosis were seen. At places, eosinophilic, fragmented, ribbon-like structures suggestive of fungal hyphae were seen. At places, those fungal hyphae showed branching at right angles. The septations of fungal hyphae were seen in some places. The areas of extravasation and degeneration were also seen. Also on KOH mount, numerous fungal hyphae were seen (figure 5). Hence the final diagnosis of COVID-induced Mucormycosis of the mandible was made.

### Discussion

The COVID-19 pandemic caused by SARS-CoV-2, severely affected older patients and patients with comorbidities like diabetes mellitus, hypertension, and immunocompromised patients. The common symptoms of COVID-19 disease are fever, nasal congestion, sore throat, shortness of breath, fatigue, muscle pain, headache, weight loss, gastric disturbances, and rashes on the skin.<sup>6</sup> This led to intense inflammatory reaction because of the cytokine storm in moderate-to-severe COVID-19 patients. This, in turn, causes extensive pulmonary damage, and alveolo-interstitial pathology, and leads to respiratory failure and multi-organ dysfunction if untreated for a long time. The steroids are included in the management of COVID-19 to prevent these complications. The use of steroids, broad-spectrum antibiotics, monoclonal antibodies, and preexisting immunocompromised states put patients forward to risk of acquiring secondary infections.<sup>1</sup> Also, COVID-19 causes immune dysregulation due to a reduction in the T-cell count.<sup>7</sup>

The first case of mucormycosis was described by Furbinger in 1876 in a German cancer patient who died because of pulmonary hemorrhage. Fungal hyphae were demonstrated in the lung biopsy,

hence suggesting the diagnosis of mucormycosis.<sup>8</sup> Arnold Paltauf in 1885 described the first case of disseminated mucormycosis and named it "Mycosis Mucorina."<sup>8</sup> After that more cases were identified worldwide, especially in immunocompromised patients. In the COVID-19 pandemic, the highest rise in number of mucormycosis cases was noticed. Mucormycosis, also referred to as "black fungus" due to its dark pigmentation, produces invasive, and potentially life-threatening infections with various clinical features, predominantly found in immunocompromised individuals.<sup>9</sup>

It has no gender relation in non-COVID-19 patients, but male-to-female ratio is 3.91 as more number of male patients being infected with COVID-19. The mean age of affected patients was 52.4 years as higher number of diabetic patients in older adults.<sup>10</sup>

### Etiological agents

Rhizopus species and the Mucor species are the most common etiologic agents. Along with that Lichtheimia, Apophysomyces, Saksenaea, Cunninghamella, Rhizomucor, and Syncephalastrum are some other types of Mucorales fungi causing mucormycosis.<sup>11</sup>

### Etiopathogenesis

In normal functioning immune cells, the spores and hyphae are usually taken up and destroyed by mononuclear and polymorphonuclear phagocytes. In patients with low phagocyte count, impaired phagocyte function, neutropenia, or poorly controlled DM the individuals are easily susceptible to invasive mucormycosis.<sup>12</sup> COVID-19 patients show higher levels of inflammatory cytokines like interleukin (IL)-2R, IL-6, IL-10, and tumor necrosis factor-alpha, also impaired cell-mediated immune response and affect both CD4+ T- and CD8+ T-cells.<sup>2</sup> In patients with poorly controlled DM, the impaired neutrophil function is due to long-standing elevated blood glucose levels.<sup>13</sup> Hence, they are more susceptible to fungal infections.

### Signs and symptoms

The day of presentation of signs and symptoms ranged from zero to 90 days; the median duration was 14 days after hospital admission for the treatment of COVID-19.<sup>1</sup> The common symptoms of mucormycosis are sinus headache, facial pain, stuffy nose, bloody nasal discharge, blurring of vision, double vision, tooth pain, loosening of teeth, and obtundation. The common signs are facial swelling, facial skin discoloration, ptosis, proptosis, eye movement restriction, palatal discoloration, palatal necrosis, and brownish discharge from the nose.<sup>2</sup>

### Risk factors for mucormycosis

The highest number of cases of mucormycosis was observed in India because of uncontrolled diabetes mellitus and in trauma patients. The rhinocerebral type of mucormycosis is mainly seen in diabetic ketoacidosis conditions and pulmonary mucormycosis is most common in patients suffering from hematological malignancies. Other risk factors include AIDS, hematological disorders, liver cirrhosis, organ transplant, and high doses of steroids. Most occasional cases of mucormycosis are reported in hospital lines, tornados, building construction, wooden tongue depressors, and adhesive bandages.<sup>6</sup> When particularly talking about COVID-induced mucormycosis the risk factors are diabetes mellitus, treatment with corticosteroids, immunomodulators (tocilizumab and itolizumab), patients treated with mechanical ventilation, long-standing oxygen therapy, patients with malignancy and organ transplants.<sup>2</sup>

### Types of Mucormycosis<sup>14</sup>

1. Rhinocerebral (30%–50%)
2. Cutaneous
3. Pulmonary
4. Gastrointestinal
5. Disseminated mucormycosis

### Investigations<sup>[2]</sup>

1. Complete blood count
2. Blood sugar Renal function tests (serum urea and creatinine)

3. Deep nasal swab-KOH staining
4. Nasal endoscopy-biopsy
5. MRI to know the extent of involvement
6. CT scan of paranasal sinuses

### Treatment

The prompt diagnosis, proper control of hyperglycemia, early treatment with amphotericin B and surgical debridement are essential parts for successful management. It is important to keep clean margins during the surgical debridement to stop the spread of this fungal infection.

During the administration of amphotericin B, it is important to monitor renal function because of the risk of nephrotoxicity. In case of extensive disease, a combination of echinocandins and amphotericin B is considered as the second line of therapy.<sup>2</sup>

### Conclusion

COVID-related mucormycosis appeared to affect the maxilla more commonly, it was fatal in many cases and hence required prompt diagnosis and treatment. The COVID-related mucormycosis of the mandible was less common but did show an invasive course and had a negative impact on the lives of many patients. Hence more study has to be done to know the way of spreads mucormycosis to the mandible or to know, whether it is an underlying disease that showed up due to decreased immunity.

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