

Case Report

# Diagnostic Role of CBCT in Fulminating Mucormycosis of Maxilla

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## ABSTRACT

Mucormycosis is also known as phycomycosis and zygomycosis. It is an opportunistic fungal infection caused by a saprophytic fungus which belongs to a class of phycomycetes. It is an opportunistic infection which occurs in debilitating and immunocompromised patients such as diabetes mellitus, malnutrition hematological malignancies, neutropenia, burns, long term steroid therapy and immunosuppressive therapy. Successful management of this fulminating infection requires early diagnosis of the disease and aggressive medical and surgical interventions to prevent high morbidity and mortality associated with the disease process. In most of the case of mucormycosis Computed tomography (CT) is the cornerstone of modern medical Radiology to diagnose the extension of lesion in Rhinomaxillary region. Cone beam CT (CBCT), which is a comparatively recent scanning technology in dentistry, provides images equivalent to medical CT at reduced costs and radiation doses. The radiation dose to the patient with CBCT is 40 % lesser than that of multi-slice CT dose but is 3-7 times higher than conventional panoramic radiograph exposure dose. CBCT has been considered the examination of choice in various instances, since it give high resolution imaging, diagnostic consistency and risk benefit assessment.

In this case report a case of fulminating mucormycosis involving the maxilla and rhinomaxillary area with extensive tissue necrosis in an uncontrolled diabetes mellitus patient diagnosed with the help of Cone Beam Computed Tomography (CBCT).

**Keywords:** Mucormycosis, Tissue necrosis, uncontrolled diabetes mellitus, CBCT, Rhinomaxillary Mucormycosis

## INTRODUCTION

Mucormycosis (Phycomycosis, Zygomycosis) is considered as the third most common opportunistic fungal infection after candidiasis and aspergillosis. [1] The common genera causing this disease are Rhizopus, Rhizomucor and Absidia. It is recognized as one of the most rapidly progressive lethal form of fungal infection in human beings with a high mortality of 70-100%. [3] It is a life threatening infection that commonly occurs in immune-

compromised patients because of diabetic ketoacidosis. Neutropenia, organ transplantation and increased serum iron levels. [2-4] these fungi gain entry into the body through different portals such as nose, breached skin and tooth extraction sockets. These organisms proliferate in tissues, vessel walls, perineural spaces and have a predilection for muscle layers of arteries, veins and lymphatics causing thrombosis and infarction. This causes invasion of the organism into the orbit and cranial vault

leading to meningoencephalitis and cavernous sinus thrombosis which may present as facial pain, swelling, orbital cellulitis, proptosis, loss of vision, ophthalmoplegia, necrosis of nasal turbinates and palate as well as osteomyelitis of facial bones. [5] Successful management of this fulminating infection requires early recognition of the disease, aggressive medical and surgical interventions to prevent high morbidity and mortality associated with the disease process. [6,7]

Here we report this case to make the clinicians aware of the clinical presentation and Cone Beam Computed Tomography imaging of the disease for early diagnosis and treatment of this potentially fatal fungal infection.

## **CASE REPORT**

A 60 year old male reported to the Department of Oral Medicine and Radiology, Government Dental College and Hospital, Aurangabad with a chief complaint of a painful non-healing wound and bad breath involving the palate since last four months. It was associated with pain and pus discharge. Pain was continuous and throbbing. The patient was diabetic since last six years and was taking medications for the same. The patient gave history of extraction of mobile maxillary anterior teeth after which the socket did not heal completely. There was associated difficulty in eating, drinking and swallowing. The fasting glucose was high and the patient had uncontrolled diabetes. The patient was taking oral hypoglycaemic and insulin injections for the same. Intraoral examination revealed unhealed sockets in maxillary anterior region, generalized signs of severe periodontitis and exposed necrotic maxillary bone and palatal area with a necrotizing ulcer. The ulcer involved the complete hard palate and alveolar bone of the maxillary anterior region. The ulcer was covered by yellowish slough. The ulcer was 5x5 cm in size and had denuded necrosed bone with irregular margins. On palpation

maxillary arch was mobile. The lymph nodes were not palpable. Based on the clinical findings and history a provisional diagnosis of deep fungal infection, avascular necrosis of maxillary bone was considered. On biochemical investigation, a raised fasting blood sugar level and decreased haemoglobin % (8 g%) was observed and HbA1c level was 8.7%. Further, cytological smear was taken from alveolar and palatal region. For understanding the extent of the lesion the patient was sent for radiographic examination panoramic radiograph was taken revealed discontinuity in rhinomaxillary area with moth eaten appearance in maxillary anterior region extending from maxillary second molar to left maxillary left first molar region with haziness in bilateral maxillary sinus. To diagnose the extent of lesion patient was scanned using Cone Beam Computed Tomography 9300CS 3D imaging system at 90 KVp and 8mA. CBCT revealed erosion of the maxillary bone with moth eaten appearance. Discontinuity noted in maxillary sinus walls bilaterally involving nasal concha and septum, bilateral obliteration of maxillary sinus noted. Osteolytic lesions involving the maxillary alveolar bone was present with extending from maxillary second molar to left maxillary left first molar region. Perforation of the palate with involvement of the maxillary sinus was present. Based on radiological and histopathological results, a final diagnosis of mucormycosis of the rhinomaxillary area was given. The patient was referred to physician for elevated blood sugar levels and decreased haemoglobin. Oral hypoglycaemic medications were changed. Further, surgical excision of the maxilla with debridement of the nasal vault was performed, and an obturator was given. Oroantral communication was treated with primary closure and healing was normal. The excisional biopsy also revealed similar histopathological findings as that of incisional biopsy.



**FIGURE 1**

**Figure 1:** Unhealed sockets in maxillary anterior region, generalized signs of severe periodontitis and exposed necrotic maxillary bone and palatal area with a necrotizing ulcer. The ulcer involving the complete hard palate and alveolar bone of the maxillary anterior region. The ulcer covered with yellowish slough. Aprox. 5x5 cm in size with denuded necrosed bone with irregular margins.



**FIGURE 2**

**Figure 2:** Showing maxillary segment detached from the Nasal component and zygomatic region.



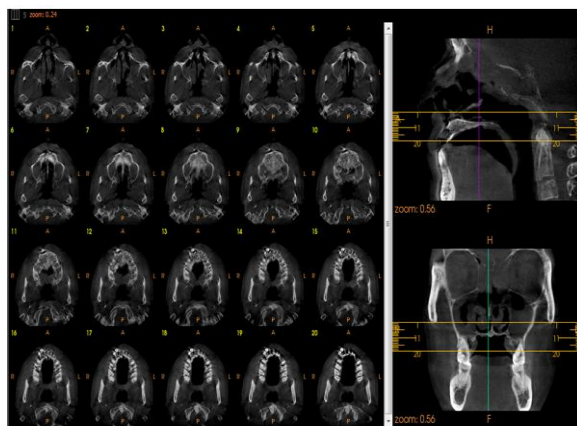
**FIGURE 3**

**Figure 3:** Panoramic radiograph showing discontinuity in rhinomaxillary area with moth eaten appearance in maxillary anterior region extending from maxillary second molar to left maxillary left first molar region with haziness in bilateral maxillary sinus.



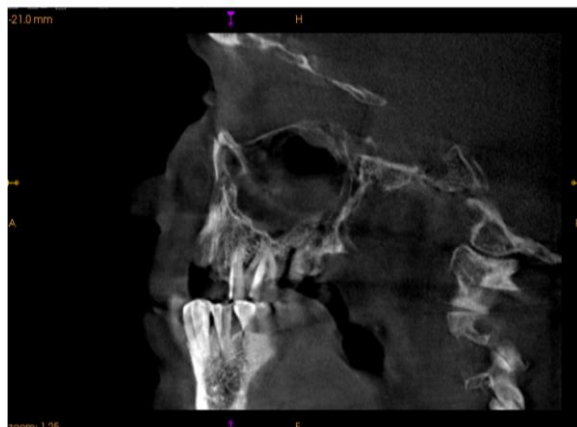
**FIGURE 4**

**Figure 4:** Coronal plane showing discontinuity in maxillary sinus walls bilaterally involving nasal concha and septum, bilateral obliteration of maxillary sinus.



**FIGURE 5**

**Figure 5:** Axial plane of CBCT image showing osteolytic lesions involving the maxillary alveolar bone extending from maxillary second molar to left maxillary left first molar region.



**FIGURE 6**

**Figure 6:** Sagittal plane of CBCT image shows perforation of the palate with involvement of the maxillary sinus present.



**FIGURE 7**  
Figure 7: CBCT revealed erosion of the maxillary bone with moth eaten appearance in three dimensional view.

## DISCUSSION

Mucormycosis is an opportunistic fungal infection which usually occurs in immunocompromised patients but can infect healthy individuals as well. Infection arises through inhalation of spores and contamination of traumatized tissue, infection and direct inoculation. These fungi have a tendency to erode and invade small blood vessels and lead to thrombosis, ischemia and tissue necrosis. [8] Uncontrolled diabetes is the single most common predisposing factor specially when associated with ketoacidosis. Most common sites for the manifestations of mucormycosis infection are the nasal cavity, orbit and cerebral tissues. Other systemic sites of involvement are pulmonary, gastrointestinal, cutaneous and disseminated forms. [9]

Attributable factor in our case was uncontrolled diabetes mellitus. The portal of entry in this case could be through the extracted tooth socket due to extraneous contamination. Vascular invasion is the key pathophysiological feature of human Mucorales infection. [10] Spores or vegetative forms of Mucorales invade the arteries and form a thrombus within the vessel resulting in ischemic infarcts and subsequently necrosis of regional hard and soft tissues. [11-13]

In case of Diabetes Mellitus the primary contributing factors are deranged granulocyte-phagocytic ability scattered

polymorphonuclear leukocyte response. [14] Second contributing factor is microangiopathy and atherosclerosis resulting in local tissue ischemia and red vulnerability to infection. [15]

Clinical differential diagnosis of the lesion includes chronic granulomatous infection such as Tuberculosis, tertiary syphilis, midline lethal granuloma Wegener's granulomatosis, Osteomyelitis other deep fungal infections, carcinoma of palate and on bisphosphonate therapy such patients present as chronic ulcers with raised margins causing exposure of underlying bone. When diagnosed before time, mucormycosis can be cured by a combination of surgical debridement of the infected area and systemic administration of Amphotericin B for up to three months. Appropriate management of the underlying disorder is an important part affecting the final result of treatment. Hyperbaric oxygen therapy has also been used to treat mucormycosis.

In most of the case of mucormycosis Computed tomography (CT) is the cornerstone of modern medical Radiology to diagnose the extension of lesion in Rhino maxillary region. Cone beam CT (CBCT), which is a comparatively recent scanning technology in dentistry, provides images equivalent to medical CT at reduced costs and radiation doses. The radiation dose to the patient with CBCT is 40 % lesser than that of multi-slice CT dose but is 3-7 times higher than conventional panoramic radiograph exposure dose. CBCT has been considered the examination of choice in various instances, since it give high resolution imaging, diagnostic consistency and risk benefit assessment. [16]

## CONCLUSION

Early and quick diagnosis of this disease is important for successful treatment. Oral physicians play an important role in early diagnosis of mucormycosis and its proper referral if areas other than oral cavity are involved. An immunocompromised patient having bone necrosis

following tooth extraction should alert a clinician of possible mucormycotic infection. In such cases, goal of treatment is directed towards improving the quality of life which can be achieved successfully with a multidisciplinary approach involving a team of doctors from different specializations. Cone Beam Compute Tomography imaging serves an important diagnostic tool for early diagnosis of the association of bony components of the jaws and nasal component as well.

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