Osteomyelitis of Maxilla: A Rare Finding from a Radiologist Point of View

Abstract
Osteomyelitis is an inflammatory process of both cortical and medullary bone. In the maxillofacial skeleton, it can be seen more commonly in mandible as compared to the maxilla. Here, we present a rare case of osteomyelitis involving the entire maxillae in a 55-year-old male patient highlighting the clinical findings and radiographic features with treatment modalities.

Keywords: Cone beam computed tomography, diabetes, obturator

Introduction
Osteomyelitis is an inflammatory condition of the bone beginning as an infection of the medullary cavity involving the haversian system and on extension involves the periosteum.[1] It commonly occurs in the fifth and sixth decade of life and patients coming to a tertiary healthcare center invariably report with advanced stages with complications. Osteomyelitis commonly occurs as a complication of odontogenic infections in immunocompromised individuals. Other predisposing factors include malnutrition, diabetes mellitus, leukemia, anemia, syphilis, agranulocytosis, chemotherapy, and radiotherapy. In India, the incidence of maxillary osteomyelitis in rural diabetic population was 45.1%.[2] The most common site is mandible due to nonanastomoses of the inferior alveolar artery and dense cortical plates that prevent discharge of pus through sinus formation and thereby accumulation of infection. It rarely involves maxilla because of extensive blood circulation, thin cortex, and scarcity of medullary tissues.[1] The common radiologic findings include “moth-eaten” appearance, presence of “sequestra”-dead bone and “involucrum”-new bone and sometimes higher imaging modalities like cone beam computed tomography scan (CBCT) could be used in situations with atypical presentation to confirm the presence and extent of the lesion. Maxillary osteomyelitis may result in the infection of cranial cavity. Therefore, earlier diagnosis and prompt treatment are necessary to avoid subsequent dreaded consequences.[1] We report a case of Osteomyelitis of the entire maxilla who was asymptomatic with rare atypical clinical presentation and was diagnosed, treated, and regularly followed up.

Case Report
A 55-year-old male patient reported to the Department of Oral Medicine and Radiology with the complaint of nasal regurgitation for 2 months and spontaneous exfoliation of the upper teeth and bone fragments. Patient-reported no history of pain or numbness of the upper jaw, however, had history of pus discharge from the upper jaw for 1 month for which he responded to antibiotics and became symptom free. The past medical history revealed treated pulmonary tuberculosis 10 years back, a diabetic for 4 years under irregular medication, a chronic smoker for 25 years. There were no significant findings on general physical examination and extraoral examination. Intraoral examination revealed exposed necrotic alveolar bone extending from maxillary right third molar region and crossing the midline up to to the left maxillary first premolar region [Figure 1a], with yellowish denuded bone in the center of hard palate measuring 2.5 cm × 2.5 cm and soft-tissue necrosis [Figure 1b]. Based on the clinical findings, a provisional diagnosis of chronic supplicative osteomyelitis of the maxilla was made with differential diagnosis of mucormycosis and syphilitic gumma.

Address for correspondence:
Jayachandran Sadaksharam, Manikandan Murugesan
Department of Oral Medicine and Radiology, Tamil Nadu Government Dental College and Hospital, Chennai, Tamil Nadu, India
E-mail: manikandan_bds@yahoo.co.in

Access this article online
Website: www.contempclindent.org
DOI: 10.4103/ccd.ccd_566_18
Quick Response Code:

How to cite this article: Sadaksharam J, Murugesan M. Osteomyelitis of maxilla: A rare finding from a radiologist point of view. Contemp Clin Dent 2019;10:394-6.
Radiological investigations with orthopantomogram (OPG) showed ill-defined radiolucency in the alveolar process of entire maxilla with interdental bone loss. There were also multiple missing teeth from maxillary right third molar region and crossing the midline up to the left maxillary first premolar region [Figure 2]. CBCT scan was taken with Field of view 10 × 10 and reconstructions were made in axial, coronal, and sagittal planes. Multiplanar reformation with reformatted OPG was also done. CBCT scan revealed an extensive mixed density lesion involving the entire alveolar process of the maxilla with a moth-eaten appearance. In addition, bilateral breach of the maxillary sinus and floor of nasal cavity by the lesion with soft-tissues intensity of both sinuses suggestive of mucosal thickening and resultant blocked ostium were found [Figure 3a-c].

Other investigations revealed fasting blood glucose of 150 mg/dl, postprandial blood glucose of 320 mg/dl and elevated erythrocyte sedimentation rate. The results of Venereal Disease Research Laboratory, treponema pallidum haemagglutination assay were negative for syphilis. Incisional biopsy of the alveolar segment between maxillary right canine and maxillary right second premolar revealed no growth on fungal culture. Histopathology report of the specimen revealed irregular aggregates of bony trabeculae with empty lacunae establishing a final diagnosis of chronic osteomyelitis [Figure 4].

As our patient had crossed noninvasive approach and CBCT revealed extensive necrosis of the entire maxillary bone, surgical treatment with sequestrectomy under general anesthesia with prosthodontic rehabilitation was planned after glycemic control. The patient underwent sequestrectomy under antibiotic coverage with clindamycin 600 mg intravenous 6th h, Metronidazole 400 mg 8th h and the surgical defect were closed with an obturator [Figure 5a and b]. The patient was under continuous follow-up for 6 months, and no recurrence was seen [Figure 5c].

Discussion
Osteomyelitis of the maxilla is rare because of the extensive blood supply from the internal maxillary artery whose branches form anastomosing loops preventing extensive involvement.[2] Osteomyelitis arises most commonly due to odontogenic infections arising from the pulp in immunocompromised individuals with predisposing factors. Characteristic clinical findings include pain, swelling, foul-smelling discharge with sinus formation. Microbiological etiology is by both Gram-positive and Gram-negative microorganisms including Staphylococcus aureus, Staphylococcus epidermidis, Peptostreptococcus, Pneumococci, Hemolytic streptococci, Escherichia coli and Bacteroides and may also occur secondary to mycotic infections such as Mucormycosis.[3] Osteomyelitis is broadly classified into suppurative and nonsuppurative variants. Suppurative osteomyelitis is mostly due to odontogenic infections characterized by the presence of pus, fistula,
and sequestrations whereas nonsuppurative osteomyelitis is chronic with unknown etiology but does not exclude the presence of the pathogen. According to Mac Beth, maxillary osteomyelitis is classified as traumatic (following surgery or injury with primary site of infection being antrum, teeth, or lacrimal sac), rhinogenic (spontaneous spread of infection from antrum, and postoperative rhinogenic cases) and odontogenic (root sepsis). The pathogenesis may be due to hematogenous or contiguous spread and trauma. Hematogenous spread is commonly seen in pediatric patients, and posttraumatic is common in adults.

Diagnosis is based on clinical presentation, radiographic features, culturing, and histopathologic examination. Imaging modalities include conventional radiographs, CT scans, CT/Positron Emission Tomography scans, CBCT scan, laser Doppler flowmetry, magnetic resonance Imaging, and nuclear scans. The radiographic features in chronic osteomyelitis are mostly “Moth-eaten” appearance due to the enlargement of medullary spaces and widening of Volkmann’s canals due to bone lysis and replacement with granulation tissue. Sometimes bone undergoes destruction forming islands of dead bone known as sequestra with reactionary subperiosteal deposition of new bone forming involucrum. Histopathologically, osteomyelitis is characterized by necrotic bone with irregular aggregates of bony trabeculae with empty lacunae due to the absence of osteocytes, absence of osteoblastic lining, and chronic inflammatory cells such as lymphocytes. Our case exhibits atypical clinical findings but characteristic imaging and histopathologic features.

Acute osteomyelitis is generally treated with antibiotics for 2–6 weeks intravenously followed by oral route; however, chronic cases are treated with long-term antibiotic therapy and surgical procedures like debridement of necrotic tissue, extraction of involved tooth, decortication, sequestrectomy, and saucerization. Gudmundsson et al. recommend amoxicillin/clavulanic acid combined with metronidazole for 2–3 weeks or ciprofloxacin along with clindamycin for patients with penicillin allergy. Linezolid (artificial antibiotic) and protein synthesis inhibitor of oxazolidinone should be reserved for multidrug-resistant cases. Hyperbaric oxygen therapy may be given for refractory cases to promote wound healing. Although various treatment modalities are available to control the infection, care to remove predisposing factors in immunocompromised patients with long-term follow-up is necessary to prevent future recurrence.

**Conclusion**

With the emergence of newer antibiotics and advanced surgical interventions, occurrence of osteomyelitis is rare. However, with cases involving the maxilla, early diagnosis and prompt treatment are necessary to prevent complications such as involvement of the orbit, cranial cavity, and oro-antral communication. Hence, an aggressive approach with combined medical and surgical intervention and follow-ups is the key to prevent morbidities associated with the disease.

**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.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Pattnaik B, Padmavathi BN, Kumari M, Sharma SS. Osteomyelitis of maxilla: A rarity. Ann Int Med Den Res 2017;3:DE07-10.
2. Reddy SS, Prasad K, Chippagiri P, Chauhan P, Poornima E. Osteomyelitis of the maxilla: A case report of three cases. Am J Adv Med Sci 2014;2:34-41.
3. Gupta V, Singh I, Goyal S, Kumar M, Singh A, Dwivedi G. Osteomyelitis of maxilla – A rare presentation: Case report and review of literature. Int J Otorhinolaryngol Head Neck Surg 2017;3:771-6.
4. Gudmundsson T, Torkov P, Thygesen TH. Diagnosis and treatment of osteomyelitis of the jaw – A systematic review (2002-2015) of the literature. J Dent Oral Disord 2017;3:1066.
5. Poonia M, Sidhu SK, Solkhe M, Sihmar SS. Chronic osteomyelitis of maxilla: A rare case report. J Oral Med Oral Surg Oral Pathol Oral Radiol 2016;2:88-90.