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Osteomyelitis of Maxilla: A Rare Case Presentation with Detailed Radiological Assessment

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ABSTRACT

Osteomyelitis is an infection of the medullary cavity that first affects the haversian system and then spreads to affect the periosteum.Patients who visit a tertiary healthcare facility always report having the disease in an advanced stage with difficulties because it frequently develops in the fifth and sixth decades of life. Osteomyelitis frequently develops in immunocompromised people as a side effect of odontogenic infections. Malnutrition, diabetes mellitus, leukemia, anemia, syphilis, agranulocytosis, chemotherapy, and radiotherapy are additional risk factors. In India, 45.1% of the rural diabetic population had maxillary osteomyelitis.Because to increased awareness, accessibility to antibiotics, and improved oral health care, osteomyelitis of the jaws, which was once a feared illness in the pre-antibiotic period, has decreased in frequency. Common radiologic findings include "moth-eaten" appearance, the presence of "sequestra" (dead bone) and "involucrum" (new bone), and on occasion, more advanced imaging modalities like cone beam computed tomography scan (CBCT) may be used in cases with atypical presentation to confirm the presence and extent of the lesion. Cranial cavities may become infected as a result of maxillary osteomyelitis. Therefore, early detection and fast treatment are essential to averting negative outcomes. We provide a case of osteomyelitis of the entire maxilla that was detected, treated, and underwent frequent follow-up despite the patient's lack of symptoms and unusual clinical presentation.

Keywords: Osteomyelitis; Maxilla CBCT

INTRODUCTION

Osteomyelitis is an infection of the medullary cavity that first affects the haversian system and then spreads to affect the periosteum.[1,2] Patients who visit a tertiary healthcare facility always report having the disease in an advanced stage with difficulties because it frequently develops in the fifth and sixth decades of life. Osteomyelitis frequently develops in immunocompromised people as a side effect of odontogenic infections. Malnutrition, diabetes mellitus, leukemia, anemia, syphilis, agranulocytosis, chemotherapy, and radiotherapy are additional risk factors. In India, 45.1% of the rural diabetic population had maxillary osteomyelitis. [3,4]

Because to increased awareness, accessibility to antibiotics, and improved oral health care, osteomyelitis of the jaws, which was once a feared illness in the pre-antibiotic period, has decreased in frequency. The Latin word "osseous" means "bony," the Greek word "osteon" means "bone," the English word "myelos" means "marrow," and the verb "to be" implies to be inflamed. [5,6] A bone infection that starts in the medullary cavity and Haversian system of the cortex and spreads to the periosteum of the affected area is known as osteomyelitis. It is an inflammatory process that has a propensity to progress. The mandible exhibits a greater prevalence of osteomyelitis due to inadequately vascularized cortical plates. [7,8]

The inferior alveolar neurovascular bundle is the source of the blood supply for the mandible. Because the maxilla is heavily vascularized and receives its blood supply from multiple feeder arteries, its incidence is lower despite being less thick. Mandibular posterior is more damaged than the posterior of the maxilla.. [9,10] Even in mandible,the most common sites are body, symphysis, angle, ascending ramus, and the condyle. The severity and high frequency of odontogenic infections in daily dental practice and the heavy bacterial load of the oral cavity is one of the major reasons why osteomyelitis of the jaw is more common than any other skeletal bone. [11]

Staphylococcus aureus or Mycobacteria are the most specific bacteria causing infection, other causes may include trauma, radiation, or certain drugs. Diminished host defense mechanism whether local or systemic contributes to its emergence. Diabetes, malignancies, autoimmune diseases, malnutrition are some of the other causes that may associate with osteomyelitis. [12,13] Osteomyelitis can be identified by oral inflammation, exposed bone in the mouth that does not heal, an extraction socket that does not heal, the appearance of a fistula from the mouth to the lower skin, or the emergence of sequestra. [14] It begins as an infection of the medullary cavity, progresses to the Haversian system, and then slowly spreads to the periosteum of the diseased area, causing significant tissue and bone loss. Ossification and increasing inflammatory osteoclasia are present.Tooth extraction and implant insertion are not advised in the irradiated area since radiation-related osteomyelitis manifests itself gradually. [15]

The mandible is the most prevalent site because of nonanastomoses of the inferior alveolar artery and dense cortical plates, which prevent pus from draining through sinus development and leading to infection buildup.Due to the abundant blood circulation, the thin cortex, and the scarcity of medullary tissues, it seldom affects the maxilla. [16]Common radiologic findings include "moth-eaten" appearance, the presence of "sequestra" (dead bone) and "involucrum" (new bone), and on occasion, more advanced imaging modalities like cone beam computed

tomography scan (CBCT) may be used in cases with atypical presentation to confirm the presence and extent of the lesion. Cranial cavities may become infected as a result of maxillary osteomyelitis. [17] Therefore, early detection and fast treatment are essential to averting negative outcomes. We provide a case of osteomyelitis of the entire maxilla that was detected, treated, and underwent frequent follow-up despite the patient's lack of symptoms and unusual clinical presentation.

CASE REPORT

A 55-year-old man who had been complaining of nasal regurgitation for two months as well as spontaneous exfoliation of the upper teeth and bone fragments on the right side visited the department of oral medicine and radiology. The patient denied ever experiencing pain or numbness in the upper jaw, but he did admit to experiencing a month-long history of pus discharge from the area, which was treated with antibiotics to relieve the patient's symptoms. The previous medical history revealed that the patient had been treated for pulmonary tuberculosis ten years prior, that they had been diabetic for four years while taking inconsistent medication, and that they had smoked continuously for 25 years. On the general physical examination and extraoral examination, there were no noteworthy results.. An intraoral examination revealed soft tissue necrosis and exposed necrotic alveolar bone in the maxillary premolar and molar region (Figure 1a), as well as 2.5 cm by 2.5 cm of yellowish denuded bone in the maxilla. A preliminary diagnosis of chronic suppurative osteomyelitis of the maxilla was made based on the clinical symptoms, with mucormycosis and syphilitic gumma being considered as differential diagnoses.

Radiological examinations using an orthopantomogram (OPG) revealed interdental bone loss and ill-defined radiolucency in the right maxilla's alveolar process. In addition, there were numerous missing teeth in the left maxillary first premolar region, spanning the midline from the maxillary right third molar region.(Figure 2). Reconstructions were done in the axial, coronal, and sagittal planes of a CBCT scan with a field of view of 10 by 10. Additionally, multiplanar reformatted OPG was performed. An enormous mixed density lesion with a moth-eaten look that covered the whole alveolar process of the maxilla was discovered by CBCT scan. In addition, there was a lesion that caused a bilateral breach of the maxillary sinus and the floor of the nasal cavity, with soft tissue intensity in both sinuses that suggested mucosal thickness and an associated blocked ostium. (Figure 3a to d). Other studies showed higher erythrocyte sedimentation rate, 150 mg/dl fasting blood glucose, and 320 mg/dl postprandial blood glucose. Treponema pallidum haemagglutination assay findings from the Venereal Disease Research Laboratory were negative for syphilis.

No growth was found on a fungi culture after an incisional biopsy of the alveolar segment between the maxillary right canine and right second premolar. The definitive diagnosis of chronic osteomyelitis was made based on the specimen's histopathology report, which showed irregular clusters of bone trabeculae and empty lacunae (Figure 4).

In order to treat our patient surgically, sequestrectomy under general anesthesia with prosthodontic rehabilitation was planned following glycemic management because our patient had already crossed the noninvasive method and a CBCT revealed significant necrosis of the entire maxillary bone. The patient had a sequestrectomy while receiving

intravenous clindamycin 600 mg on the sixth hour and metronidazole 400 mg on the eighth hour. The surgical defect was then sealed with an obturator. During the patient's six-month period of ongoing follow-up, there was no sign of a recurrence.

Figure 1: (a) Exposed necrotic alveolar bone of maxilla. (b) Fistula with denuded bone necrotic alveolar bone of maxilla at right side

Figure 2: Orthopantomogram revealing ill-defined radiolucency in the alveolar process of the right maxilla with multiple missing teeth.

Figure 3 a. 3D reconstruction view on CBCT

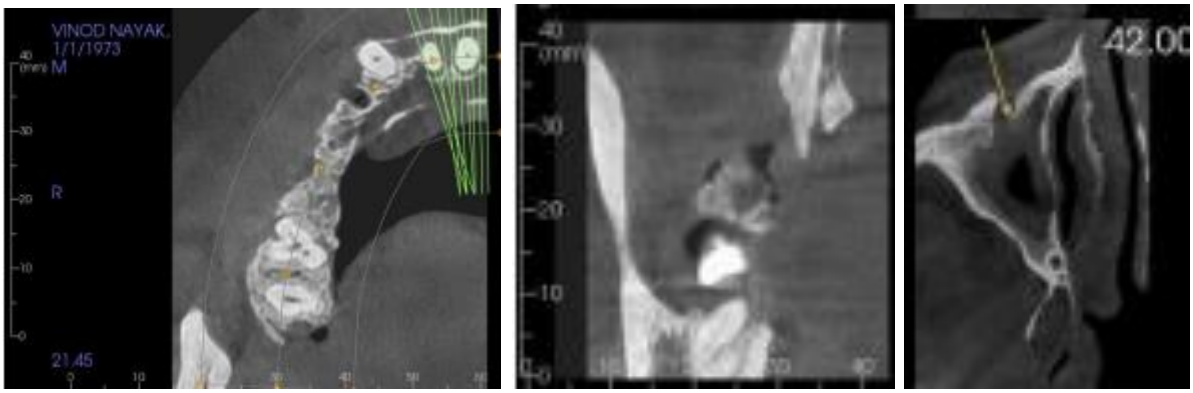

Figure 3b: Axial section in CBCT 3c: Coronal section in CBCT 3d: Sagittal sectional

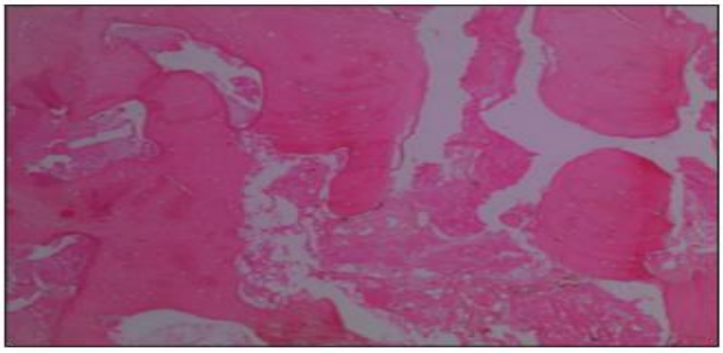

Figure 4: Photomicrograph showing irregular aggregates of bony trabeculae with empty lacunae

DISCUSSION

Because of the internal maxillary artery's substantial blood supply and the anastomosing loops its branches generate to prevent severe involvement, osteomyelitis of the maxilla is uncommon. Osteomyelitis is most frequently brought on by pulp-based odontogenic infections in immunocompromised people with risk factors.[18,19] Pain, swelling, and foul-smelling discharge with sinus development are typical clinical symptoms. Gram-positive and Gram-negative microorganisms such as Staphylococcus aureus, Staphylococcus epidermidis, Peptostreptococcus, Pneumococci, Hemolytic streptococci, Escherichia coli, and Bacteroides, as well as mycotic infections like Mucormycosis, can be the cause of microbiological infections.[20,21]

Generally speaking, there are two types of osteomyelitis: suppurative and nonsuppurative.. While nonsupprative osteomyelitis is chronic and has an unclear origin, it does not rule out the presence of the pathogen. Suppurative osteomyelitis is primarily caused by odontogenic infections, which are distinguished by the presence of pus, fistula, and sequestrations. [19]According to Mac Beth, there are three types of maxillary osteomyelitis: traumatic (occurring after surgery or injury, with the antrum, teeth, or lacrimal sac as the primary site of infection), rhinogenic (infection spreading spontaneously from the antrum, including postoperative rhinogenic instances), and odontogenic (root sepsis). [20] Hematogenous or contiguous spread, trauma, or both may play a role in the etiology. Children frequently experience hematogenous spread, while adults frequently experience posttraumatic stress disorder.

The clinical presentation, radiographic findings, culture results, and histopathologic analysis all contribute to the diagnosis. Conventional radiography, CT scans, CT/PET scans, CBCT scans, laser Doppler flowmetry, magnetic resonance imaging, and nuclear scans are examples of imaging modalities. The majority of the radiographic characteristics in chronic osteomyelitis have a "Moth-eaten" appearance from the widening of Volkman's canals and the enlargement of medullary gaps brought on by bone lysis and replacement with granulation tissue. [21,22]Sometimes bone is destroyed, resulting in islands of dead bone called sequestra, and fresh bone is then reacted upon subperiosteally to generate involucrum. Osteocytes, osteoblastic lining, and chronic inflammatory cells like lymphocytes are absent, and osteomyelitis is defined histopathologically by necrotic bone with irregular clusters of bony trabeculae and empty lacunae. Although the clinical indications in our instance are unusual, the imaging and histopathologic findings are common. [23]

However, chronic cases are treated with long-term antibiotic therapy and surgical procedures like debridement of necrotic tissue, extraction of the involved tooth, decortication, sequestrectomy, and saucerization. Acute osteomyelitis is typically treated with antibiotics for 2–6 weeks intravenously followed by oral route. For patients with penicillin allergies, Gudmundsson et al. advise ciprofloxacin together with clindamycin or amoxicillin/clavulanic acid mixed with metronidazole for 2-3 weeks. Reserve the use of the synthetic antibiotic linezolid and the protein synthesis inhibitor oxazolidinone for patients who are multidrug resistant. [24]

For resistant cases, hyperbaric oxygen therapy may be used to speed up the healing process. Although there are many different treatment options available to control the infection, immune-compromised individuals must take special precautions to eliminate risk factors with long-term follow-up in order to prevent future recurrence. [25]

CONCLUSION

The occurrence of osteomyelitis is uncommon due to the development of more modern antibiotics and sophisticated surgical procedures. To avoid complications such involvement of the orbit, cranial cavity, and oro-antral communication in cases involving the maxilla, early diagnosis and fast treatment are essential. In order to prevent the disease's morbidities, an aggressive strategy involving a combination of medicinal and surgical treatments and follow-ups is essential.

REFERENCES

1. Topazian RG, Goldberg MH, Hupp JR. Oral and Maxillofacial Infections. 4th. Philadelphia, Pa, USA: WB Saunders 2002.
2. Manimaran K, Suresh Kannan P, Kannan R. Osteomyelitis of maxilla bilateral involvement: a case report. JIADS 2011;**2**(2):57–58.
3. Macbeth R. Osteomyelitis of the maxilla. The Journal of Laryngology & Otology 1952;**66**(1):18–28.
4. Peravali RK, Jayade B, Joshi A, Shirganvi M, Bhasker Rao C, Gopalkrishnan K. Osteomyelitis of maxilla in poorly controlled diabetics in a rural Indian population. Journal of Maxillofacial and Oral Surgery 2012;**11**(1):57–66.
5. Macbeth RG. Osteomyelitis of the maxilla. Proceeding of the Royal Society of Medicine 2001:1030–1032.
6. Singh M, Singh S, Jain J, Singh K. Chronic suppurative osteomyelitis of maxilla mimicking actinimycotic osteomyelitis: a rare case report. National Journal of Maxillofacial Surgery 2010;**1**(2):153–156.
7. Topazian RG, Goldberg MH, Hupp JR. Oral and Maxillofacial Infections. 4th. Philadelphia, Pa, USA: Saunders; 2002. Osteomyelitis of the jaws; pp 214–235.
8. Reddy S, Prasad K, Chippagiri P, et al. Osteomyelitis of the maxilla: a case report of three cases. American Journal of Advances in Medical Science 2014;**2**(3):34–41.
9. Koorbusch GF, Fotos P, Goll KT. Retrospective assessment of osteomyelitis: etiology, demographics, risk factors, and management in 35 cases. Oral Surgery, Oral Medicine, Oral Pathology 1992;**74**(2):149–154.
10. Patel V, Harwood A, McGurk M. Osteomyelitis presenting in two patients: a challenging disease to manage. British Dental Journal 2010;**209**(8):393–396.
11. Neelima Mallick – Textbook of oral and maxillofacial surgery 4th Edn Jaypee Brothers Medical Publishers. New Delhi: 2016.
12. 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(4):1066.
13. Miloro M, Peterson LJ. Peterson's Principles of oral and maxillofacial surgery. PMPH-USA 2012

14. Shin JW, Kim JE, Huh KH, et al. Clinical and panoramic radiographic features of osteomyelitis of the jaw: A comparison between antiresorptive medication-related and medication-unrelated conditions. Imaging Sci Dent 2019; 49(4):287- 294.
15. Park MS, Eo MY, Myoung H, Kim SM, Lee JH. Early diagnosis of jaw osteomyelitis by easy digitalized panoramic analysis. Maxillofac Plast Reconstr Surg 2019;41(1):6
16. Goldblatt LI, Adams WR, Spolnik KJ, et al. Chronic fibrosing osteomyelitis of the jaws: an important cause of recalcitrant facial pain. A clinicopathologic study of 331 cases in 227 patients. Oral Surg Oral Med Oral Pathol Oral Radiol 2017;124(4):403- 412.e3
17. Nezafati S, Ghavimi MA, Yavari AS. Localized osteomyelitis of the mandible secondary to dental treatment: report of a case. J Dent Res Dent Clin Dent Prospects 2009;3(2):67-69.
18. Grecchi F, Zollino I, Candotto V, et al. A case of mandible osteonecrosis after a severe periimplant infection. Dent Res J (Isfahan) 2012;9(2):S233-S236.
19. Agarwal A, Kumar N, Tyagi A, De N. Primary chronic osteomyelitis in the mandible: a conservative approach. BMJ Case Rep 2014:bcr2013202448.
20. Sasaki H, Furusho H, Rider DB, et al. Endodontic Infection-induced Inflammation Resembling Osteomyelitis of the Jaws in Toll-like Receptor 2/ Interleukin 10 Double-knockout Mice. J Endod 2019;45(2):181-188.
21. Mehra H, Gupta S, Gupta H, Sinha V, Singh J. Chronic suppurative osteomyelitis of the mandible: a case report. Craniomaxillofac Trauma Reconstr 2013;6(3):197-200.
22. Shibahara T. Imaging modalities for drug-related osteonecrosis of the jaw (2), Overview of the position paper on medication-related osteonecrosis of the jaw, and the current status of the MRONJ in Japan. Jpn Dent Sci Rev 2019;55(1):71-75.
23. Gill GS, Pulcini M. Maxillary Osteomyelitis in a Patient with Pansinusitis and Recently Diagnosed Focal Segmental Glomerulosclerosis. Cureus 2019;11(8):e5347.
24. Tellez-Rodriguez J, Lopez-Fernandez R, RodriguezJurado R, Moreno-Sandoval HN, MartinezPerez F, Gonzalez-Barrios JA. Mycobacterium tuberculosis as a cause of mandibular osteomyelitis in a young woman: a case report. J Med Case Rep 2016;10(1):366.
25. Monsour PA, Dalton JB. Chronic recurrent multifocal osteomyelitis involving the mandible: case reports and review of the literature. Dentomaxillofac Radiol 2010;39(3):184-190.