

## Osteomyelitis: A Case Overview

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### ABSTRACT

**Background:** Maxillofacial osteomyelitis is not a very common condition encountered in the clinical practice owing to rich blood supply and is predominantly a disease of the mandible, whereas the maxilla by virtue of its vascularity and thin cortical plates is less frequently involved. The early diagnosis is key to the establishment of appropriate intervention. In reported case, multiple interventions were required with improvement in general condition as patient was immunocompromised due to pulmonary tuberculosis.

**Keywords:** Osteomyelitis, Overview, Pulmonary tuberculosis, Circummandibular wiring.

### INTRODUCTION

Maxillofacial osteomyelitis is not a very common condition encountered in the clinical practice owing to rich blood supply of maxilla and mandible. Delayed recognition of the infection may result in a protracted course of treatment and increased surgical morbidity. Osteomyelitis of the jaws is defined as an inflammatory process of the medullary portion of the affected bone<sup>1</sup>. Osteomyelitis of the jaws is predominantly a disease of the mandible, whereas the maxilla by virtue of its vascularity and thin cortical plates is less frequently involved.

### Classification

Acute osteomyelitis (AO) compared to chronic osteomyelitis is differentiated arbitrarily based on time: an acute process occurs up to one month after the onset of symptoms and the chronic process occurs for longer than one month<sup>2,3</sup>. Using the nomenclature discussed by Eyrich *et al.*<sup>4</sup>, primary chronic osteomyelitis (PCO) is defined as chronic non-suppurative osteomyelitis; when PCO occurs in children and adolescents it is termed 'Garre's

osteomyelitis'. This is in contrast to secondary chronic osteomyelitis (SCO), which is chronic osteomyelitis with suppuration, abscess/fistula formation, and sequestration at some stage of the disease due to a defined, infectious aetiology<sup>5</sup>. Specific forms such as syphilitic, tuberculous, brucellar, viral, chemical, *Escherichia coli* and *Salmonella* osteomyelitis are rarely found and are usually associated with any systemic condition predisposing to decreased host response.

### Etiology

Osteomyelitis of the jaws is caused by some inciting focus that enables the infection to propagate. Specific causative factors include odontogenic infection, whether from periodontal disease, periapical abscess, or adjacent soft tissue infection; contaminated facial fractures; or foreign bodies such as implants, wires, or bone plates and screws<sup>1,2,6</sup>. Comorbidities are varied and include malnutrition, alcoholism, substance abuse, smoking, human immunodeficiency virus infection, sickle cell anemia, malignancy, myeloid disorders, hypertension, pulmonary disease, immunosuppression, diabetes mellitus, steroid use,

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heavy metal toxicity, fibrous dysplasia, Paget disease, and osteopetrosis<sup>1,6-9</sup>.

### Clinical findings

Acute osteomyelitis is characterized by intense pain, swelling that is frequently firm and indurated, fever, paresthesia or anesthesia of the inferior alveolar nerve, and a clearly identifiable cause. If the disease is not controlled within 10 to 14 days after onset, subacute suppurative osteomyelitis is established. Along with symptoms of acute osteomyelitis, loosening of the teeth, fistula formation transorally or facially, lymphadenopathy, and pathologic fracture may be found. Pus extends through the haversian canals to accumulate under the periosteum and then may penetrate and extends in to soft tissues. Trismus is not always present, but regional lymphadenopathy is a constant finding. The patient's temperature may reach 101° to 102° F and the patient often is dehydrated<sup>1,2,6</sup>.

Chronic osteomyelitis has as its primary clinical expression deep pain, fever, malaise, and anorexia. The infection is usually attributable to long-standing odontogenic infection or inadequately treated facial fractures. Loose teeth, intraoral or facial fistula formation, trismus, malocclusion, sequestra, and potentially pathologic fracture may be anticipated. Indurated swelling and lymphadenopathy is often associated with chronic osteomyelitis. Exposure or exfoliation of infected bone fragments may be seen in the course of the disease<sup>2,6</sup>.

### Radiologic considerations

Available modalities for imaging evaluation of patients with maxillofacial osteomyelitis include conventional radiography, supplemented as needed by computed tomography (CT), magnetic resonance imaging (MRI) and radionuclide imaging (scintigraphy). Proper imaging aids in disease detection and staging, differential diagnosis, and monitoring of treatment response. Because pretherapeutic symptom duration is one of the most significant factors influencing the curability of mandibular osteomyelitis, accurate early diagnosis is critical in the management of maxillofacial osteomyelitis.

Radiographic findings in acute osteomyelitis reflect demineralization and destruction of trabeculae within cancellous bone and include ill-defined lucency adjacent to either an extracted tooth socket or a carious or restored tooth with a lucent periapical inflammatory lesion. Additional findings may include widening of the periodontal ligament space, loss of the lamina dura and loss of sharp margination (with apparent widening) of the mandibular nerve canal and mental foramen. Subacute findings may include sequestra (radiodense intraosseous necrotic bone fragments) and periosteal new bone formation, but these are often difficult to appreciate on plain radiographs. In chronic suppurative osteomyelitis, plain radiographs demonstrate variably mixed mandibular lucency and sclerosis and bone enlargement related to cortical thickening by appositional periosteal new bone formation.

Once osteomyelitis has become well established, radiographic changes demonstrate one of the following group of characteristics<sup>1</sup>:

1. Scattered areas of bone destruction vary in size and number, are separated by variable distances and by bone with normal or nearly normal appearance. Bone has "moth-eaten" appearance because of enlargement of medullary spaces and widening of Volkmann's canals resulting from destruction by lysis and replacement with granulation tissue.
2. Bone destruction of varying extent, in which there are "islands", that is, sequestra, with evidence of a trabecular pattern and marrow spaces. A sheath of new bone (involucrum) often is found, separated from the sequestra by a zone of radiolucency.
3. Stripped or granular densification of bone caused by subperiosteal deposition of new bone obscuring the intrinsic bone structure or deposition of new bone on surfaces of existing trabeculae at the expense of marrow spaces. The central sequestra usually present in osteomyelitis help to distinguish it from fibrous dysplasia.

### Treatment<sup>1</sup>

Osteomyelitis of the jaws usually requires medical and surgical treatment, although occasionally

antibiotic therapy alone is successful. The principles of treatment are:

1. evaluation and correction, to the extent possible, of compromised host defenses,
2. Gram staining and culture and sensitivity testing,
3. Imaging of the region to determine the extent of the lesion and to rule out the presence of tumors,
4. Empirical administration of Gram stain-guided antibiotics,
5. Removal of loose teeth and sequestra,
6. Prescription of culture-guided antibiotic therapy,
7. Possible placement of irrigating drains/ polymethylmethacrylate antibiotic beads,
8. Sequestrectomy, debridement, decortication, resection or reconstruction as indicated.

Intermaxillary fixation should be considered when the continuity of the mandible is questionable and possibility of pathological fracture exists. The role of adjunctive hyperbaric oxygen (HBO) treatment for nonradiation osteomyelitis has not been well defined but may be considered, especially in refractory cases and in patients who are seriously medically compromised with no HBO contraindications.

### CASE REPORT

The patient, a 60 year old male reported with pain and swelling in left mandibular body region for one month. Patient got his teeth extracted for same complain before 1.5 month but was not relieved of symptoms.

On examination, there was swelling in the left body and angle region with an extraoral draining sinus tract. The swelling was firm and tender on palpation with submandibular lymph nodes palpable and tender. On intraoral examination, pus discharge from mandibular left premolar and molar region was present. A step deformity was palpable in the affected region with mobility of segments. There was history of chronic cough and patient was deaf and mentally challenged with habit of clenching teeth. Collected Pus sample was reported as *Staphylococcus aureus*. IV antibiotics were started at once for limiting the disease. A Mantoux test was also prescribed due to his history of chronic coughing. The test was reported as positive and anti tubercular drugs were started immediately under the observation of a physician.



Fig 1: Extraoral sinus tract.



Fig 2: Intraoral view.

A plain film orthopantomogram and CT scan with 3-D reconstruction were carried out which showed fracture of mandible in body region with osteomyelitic changes. There was no history of trauma.

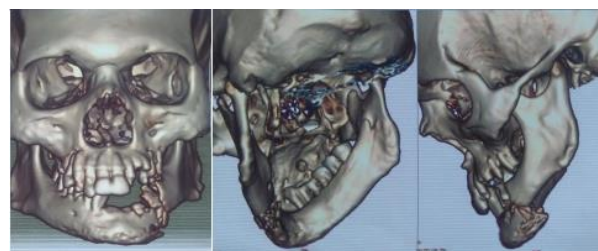


Fig 3: 3D CT Scan showing step deformity and osteomyelitic changes.

After consulting Anesthetist and course of Antitubercular drugs for 1 month surgery was planned. Under General anesthesia, Surgical debridement was carried out along with reconstruction of mandible with a 2.7 mm reconstruction plate and bicortical screws. Patient

was discharged after 1 week of admission with frequent follow ups and continuation of Antitubercular drugs. Healing was uneventful.



Fig 4: Exposure of fracture site.



Fig 5: Surgical debridement done.



Fig 6: Reconstruction plate adapted and fixed.

After 3 months, on examination there was an intraoral pus discharge and step deformity in the operated area. Radiographic examination with orthopantomogram revealed an implant failure with step deformity. The implant (reconstruction plate) was removed and surgical curettage was done to remove dead necrotic bone and soft tissue. Circummandibular wiring with a cap splint was done under local anesthesia to stabilize the fractured segments for 6 weeks. Antibiotics were continued till relief of symptoms. Patient was kept under regular follow-up. After a 1 year follow-up, patient is symptoms free and there are no signs of disease progression.



Fig 5: Reconstruction plate removed.



Fig 6: Circum mandibular wiring.



Fig 6: Circum mandibular wiring with cap splint.

## DISCUSSION

Maxillofacial osteomyelitis is not a very common condition encountered in the clinical practice owing to rich blood supply of maxilla and mandible. Delayed recognition of the infection may result in a protracted course of treatment and increased surgical morbidity. Osteomyelitis of the jaws is defined as an inflammatory process of the medullary portion of the affected bone. Osteomyelitis of the jaws is predominantly a disease of the mandible, whereas the maxilla by virtue of its vascularity and thin cortical plates is less frequently involved<sup>2,9</sup>.

Acute osteomyelitis (AO) compared to chronic osteomyelitis is differentiated arbitrarily based on time: an acute process occurs up to one month after the onset of symptoms and the chronic process occurs for longer than one month<sup>2,3</sup>. This patient was diagnosed with Acute suppurative osteomyelitis.

The early diagnosis of osteomyelitis is key to the establishment of antibiotic therapy and appropriate surgical intervention. Clinical findings suggestive of osteomyelitis along with a high index of diagnostic suspicion on the part of the treating surgeon are the first step in the treatment path of the disease<sup>10</sup>.

Orthopantomographic imaging will undoubtedly offer some information in the diagnostic process. More definitive imaging can be used, such as scintigraphy, MRI, and CT. Scintigraphy and MRI are both sensitive but nonspecific. The imaging technique with the best combination of sensitivity

and specificity seems to be CT (HRCT). Comparative studies of the various modalities are not currently available<sup>10</sup>.

Surgical intervention should be early and aggressive. Multiple surgical procedures may be required to remove all devitalized bone and necrotic soft tissue at the affected site. The early removal of foreign body (bone plates, screws, implants) is essential in view of the contemporary concepts of the role of biofilms in infection.

Chronic systemic diseases which compromise host defenses and alter the vascularity of bone are all factors that predispose patients to osteomyelitis. In past studies, tobacco use, alcohol abuse, diabetes mellitus, malignancy, malnutrition, acute and chronic anemias, osteopetrosis, intravenous drug abuse, and AIDS have been implicated as predisposing the host to osteomyelitis of the jaws<sup>1,5,11,12</sup>. In above described case, patient had long standing pulmonary tuberculosis, Antitubercular drug treatment was started and patient was asymptomatic but surgical treatment failed and reconstruction plate had to be removed. Upon completion of Antitubercular treatment and improvement in general condition of patient, the patient has been symptoms free till date.

## CONCLUSION

In osteomyelitis, early diagnosis and intervention along with management of general condition of patient are key to successful results.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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