Chronic Suppurative Osteomyelitis of the Mandible: A Study of 21 Cases

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Abstract

The present prospective study consists of Chronic Suppurative Osteomyelitis of mandible in 21 patients. This study was conducted in the Department of Dental Surgery, B.P.S Government Medical College for women, Khanpur kalan, Sonepat, Haryana (India) over a period of 18 months from September 2011 to February 2013. The male patients outnumbered the female patients and most of the patients were in their thirties and forties. The majority of the lesions were found in the body of the mandible and had resulted from odontogenic infections, post-extraction complication, inadequate removal of necrotic bone, early termination of antibiotic therapy, inappropriate selection of antibiotics, etc. The most common causes of chronic osteomyelitis of the jaws were directly related to odontogenic infections like infected unhealed socket (52.38%).Treatment included surgical intervention and definitive antibiotic therapy. Sequestrectomy, decortications, saucerisation or resection was done depending upon the nature and the size of the lesion. The external sinus tract was removed. Antibiotics used in this study included Amoxycillin + clavulonic acid, ceftrixone, cloxacillin, gentamycin, cefotaxim and metronidazole.

Key Words: Chronic Suppurative Osteomyelitis, Mandible, Haryana, Odontogenic infections, Sequestrectomy

Introduction

Osteomyelitis is an inflammation of the medullary portion of the bone which extends to the periosteum of the affected area. The infection becomes established in the calcified portion of the bone when pus in the medullary cavity or beneath the periosteum leads to the obstruction of blood supply. The necrosis ensues once ischemia sets in. Alteration of host defence mechanisms is present in most of the patients with the osteomyelitis of the jaw. Various conditions affecting the vascularity of bone include radiation, osteoporosis, osteopetrosis, Paget's disease of bone, bone malignancy, and these seem to play an important part in etiopathogenesis of this condition [1].

Osteomyelitis of the jaw is a common and dreaded disease that needs prolonged therapy which occasionally results in disfigurement and dysfunction due to loss of a major portion of the jaw bone. In the contemporary world, the incidence of osteomyelitis of the jaw has declined because of the widespread availability of newer antimicrobial agents and better dental health care. But still we come across a large number of osteomyelitis cases and this can be attributed to inappropriate and indiscriminate use of antibiotics, less awareness about dental and oral hygiene, malnutrition and developing of certain strains of microorganisms which are resistant to certain antibiotics. Some other factors that also predispose an individual to osteomyelitis of jaw are virulence of the microorganism, compromised vascular intriguing and perfusion in the host bone at the local, regional or systemic level and conditions affecting host resistance or defense [2].

Osteomyelitis of the maxilla is much less frequent than that of the mandible because blood supply to the maxilla is far more extensive. Besides infection, compromise of the blood supply is a critical factor in the establishment of osteomyelitis [2], so osteomyelitis occurs more commonly in the mandible than in the maxilla because of the dense, poorly vascularised cortical plates and the single blood supply from the inferior alveolar neurovascular bundle [3].

Osteomyelitis of the jaws usually requires both medical and surgical treatment. An alteration of host defence mechanisms is present in most patients with osteomyelitis of the jaws. Steps should be taken to identify and correct these host factors that may hasten recovery. Whenever possible, specimens should be obtained for Gram staining, aerobic and anaerobic culture and sensitivity testing. Conventional radiographs and preferably bone scans should be obtained to determine the extent of the disease, the existence of co-morbid factors such as periapical abscess and fractures, as well as presence and site of sequestra. Extremely loose teeth and sequestra that are readily accessible should be removed early in the course of the disease. A suitable course of parental antibiotics should be given along with supportive measures to control the acute infection. Other treatment options include sequestrectomy, debridement, decortications, resection of infected bone, and immediate or late bone graft reconstruction [4].

The aim of the present study was to describe our own experience in the management of chronic suppurative osteomyelitis of the mandible, age and sex distribution, causes site involved, treatment modalities and associated complications.

Materials and Methods

This prospective study was conducted in the Outpatient Department of Dental Surgery at B.P.S Government Medical College for women from September 2011 to February 2013. All patients with discharging sinus (*Figure 1*)., swelling and pain in the jaw and clinically/radio-graphically suspected as a chronic osteomyelitis (*Figure 2*) were admitted in the hospital irrespective of age and sex. Initially, 28 patients were enrolled for the study but 7 patients failed to follow up and thus excluded from the final analysis, therefore, a total of 21 patients were included in the study. Those patients who gave consent to be included in the study were enrolled in the study.

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Figure 1. *Extra-oral sinus tract.*

Figure 2*. Intra-orally carious (culprit) tooth causing osteomyelitis.*

Patients who were non-cooperative and psychotic were not included.

All patients underwent the following routine investigation

Routine blood test: TLC, DLC, Hb%, BT, CT, Fasting and PP Blood sugar, urine, etc. -Radiological investigation: Orthopantomographs (OPG), Lateral Oblique View of the Mandible, Occipito-mental view/ PNS, X-ray chest PA view.

Histopathological investigation: Bony and soft tissue biopsy was taken for histopathological diagnosis. **Culture and sensitivity test:** Pus was collected from the discharging sinus for microbial culture and sensitivity test.

Data was collected and analysed regarding the maintenance of oral hygiene, cause, age and sex distribution, extra oral findings, clinical presentation, treatment and outcome of the treatment. The patients were grouped into having good, fair and poor oral hygiene in accordance with OHI-S (Oral Hygiene Index-Simplified) by Greene and Vermillion (1964) [5].

Data processing and statistical analysis

The data for each patient was organized and compiled into a raw data form. The data were entered into the software and transferred to SPSS software for analysis.

Treatment Modalities

Definitive antibiotic treatment: (According to culture and sensitivity).

I) Ceftrixone injection-1 g or Amoxyclav 1.2 g IV 12 hourly for 5-7 days followed by capsule cepharadine 500mg- 6 hourly for 3-4 weeks or Cloxacillin injection 250mg 6 hourly for 5-7 days. In case of a drug allergy to any one of the selected antibiotics the other choice of antibiotic was given. In exceptional cases if a patient was allergic to both the antibiotics of choice then a Cefotaxim injection 2g IV was administered 12 hourly. II) Metronidazole IV 100ml/ 500mg orally tds (8 hourly) was given in all study cases for 5-7 days.

III) Other supportive treatments include:

a) Non-narcotic analgesics were given in all cases for pain control in different doses and through different routes.

- Ibuprofen 400mg tds
- Diclofenac SR 100mg bd
- Tramadol 100mg bd
- Paracetamol 500mg tds
- Ibuprofen 400mg + Paracetamol 500mg bd
- Inj i/m voveron 3ml 8 hourly

b) Intravenous fluid and electrolysis therapy for hydration (2 units in 24 hrs).

- Ringer Lactate
- Dextrose 5%
- DNS

c) Nutritious diet- (high protein and vitamins) for malnutrition. High protein diet such as yoghurt, milk, soymilk, cheese, egg white, nuts and seeds, beans, fish etc. High vitamin diets included green leafy vegetables, sprouts, fruits, almonds, carrot, egg, etc.

d) Povidine iodine antiseptic mouthwash was given to maintain good oral hygiene.

- Mouth Rinses in the dilution of 1:2 thrice daily.

Pre-surgical definitive antibiotic coverage was done at least for one week for every patient before final surgical intervention.

Surgical intervention: Sequestrectomy, decortications, saucerisation or resection was done depending upon the nature and size of the lesion (*Figures 3 and 4*). The external sinus tract was removed intra orally, and any source of infected teeth, broken teeth or roots was extracted and curettage was performed on the sinus tract.

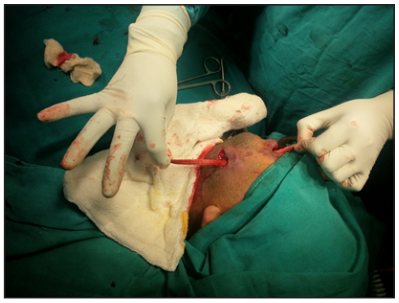

Figure 3*. Surgical freshening up of the tract.*

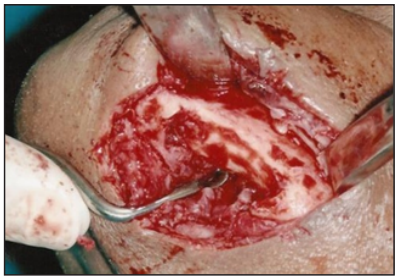

Figure 4*. Sequestrectomy of the lesion.*

Post-surgery antibiotics included mainly amoxicillin 500mg + clavulonic acid 125mg three times a day and metronidazole 500mg three times a day for 5-7 days.

Results

In our study, the male patients (13) outnumbered the female (8) in a ratio of 2:1(approx).

The mean age of the male patients was 36.5 ± 15.2 years and the mean age of female patients was 22.4 ± 15.0 years. Among the male patients, a higher percentage (46.15%) were in the age group 35-51 years followed by 23.07% in the age group 52-68 years, whereas among the female patients, a higher percentage were in the age group 18-34 years (50%) followed by 25% in the age range of 35-51 years.

Regarding the maintenance of oral hygiene, 28.57% of patients maintain good oral heath, 38.09% maintain fair oral hygiene and 33.33% maintain poor oral hygiene (*Figure 5*).

The majority of the lesions were found in the body of the mandible (91%). Right side of the mandible was more involved (56%) as compared to left side (44%). The culprit tooth was most often found to be the mandibular first molar (42.86%) (*Table 3*).

In the case of odontogenic infections, the highest percentage (52.38%) had infected unhealed socket followed by pulpitis (14.28%), peri-coronal infection (9.52%), periodontal abscess (14.28%) and unhealthy gingival condition (9.52%).

Extra oral findings in the study showed there were a higher percentage of patients with discharging sinus (60.1%) followed by swelling (17.2%), tenderness (15.7%), deformity (4.2%) and fracture (2.8%).

Microbial culture and sensitivity tests revealed that the bacteria were 88.2% staphylococcus aurreus, followed by klebsilla 3.1%, mycobacterium tuberculosis (2.9%), actinomycosis 1.7% and streptococcus viridans 1.6%. It was observed that 2.5% patients showed no bacterial growth on cutures and sensitivity tests.

The Patients' hospital stay was uneventful and averaged about 9.24 ± 2.12 days with no complications reported in any of the cases. The patients were reviewed regularly during periodic follow-up visits in the outpatient department. Satisfactory healing was observed and there were no clinical signs or symptoms to indicate persistent infection. Every patient was kept under long-term follow-up for over 12 months and remained symptom-free.

Discussion

Chronic suppurative osteomyelitis is a rare but well-described potential complication of chronic odontogenic infections that dental surgeons may more frequently encounter [6]. Tissue necrosis entails as proteolytic enzymes are liberated with destruction of bacteria along with vascular thrombosis and ischemia. When pus accumulates, intramedullary pressure increases, resulting in vascular collapse, venous stasis, and further ischemia. Pus accumulating beneath the periosteum elevates it from the cortex and thereby further reduces the vascular supply. As this continues to accumulate, the periosteum is breached and mucosal and cutaneous abscesses and fistulae develop [7]. In its acute stage, suppurative osteomyelitis of the mandible is usually characterized by deep-seated intense pain, high intermittent fever, paresthesia of the mental nerve and a clearly identifiable cause. Immediate aggressive antibiotic therapy may prevent progression to the periosteum [8,9]. In established suppurative osteomyelitis, symptoms include deep pain, fever, and constitutional symptoms. Within 10 to 14 days after onset, teeth in the involved area begin to loosen and become sensitive to percussion. Pus exudes around the gingival sulcus and then destroys mucosal and cutaneous barriers leading to fistulae [8,9].

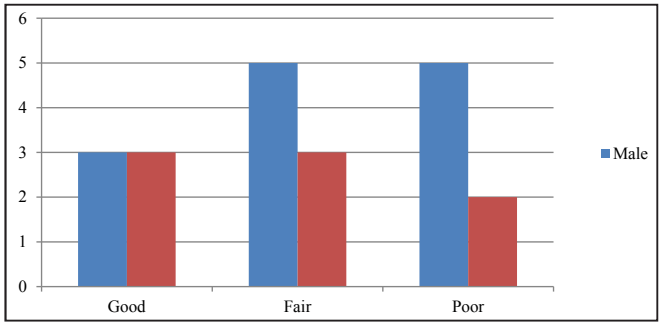

***Figure 5**: Sex-wise status of oral hygiene.*

Clinical presentations in the study included local pain, fever, swelling, purulent discharge, intra-oral and skin fistula, unhealed soft tissue in the oral cavity, neuropalsy in the involved area, pathological fracture and trismus. A diagnosis was made on the basis of presence of painful sequestra and suppurative area in the tooth-bearing jaw bone, culture and sensitivity, bone biopsy and conventional radiography. The differential diagnosis of these lesions includes Paget's disease, hyper-cementosis, fibrous dysplasia and early stage of malignant bone tumor.

Radiologically, the presence of sequestra and lamination of periosteal new bone is the most useful distinguishing feature of chronic osteomyelitis [10]. Histopathologically, an increased number of osteoblast, thickened bone trabecula and fibrous marrow replacement were apparent. Pathological bone remodelling and the presence of chronic inflammatory cells are often cited as indicators of chronic osteomyelitis. In this study, most cases showed local or widespread sequestrum with the infiltration of chronic inflammatory cells.

In our study, the male patients (61.9%) outnumbered the female patients (38.1%) (*Table 1*). The mean age of the male patients was 36.5 ± 15.2 years and the mean age of female patients was 22.4 ± 15.0 years (*Table 2*). It was evident that among male patients the highest % (46.15%) was in the age

***Table** 1. Sex-wise distribution of patients.*

Sex	Total	Percentage
Male	13	61.9
Female	8	38.1

***Table 2**. Age-wise distribution of patients.*

Age group	Male		Female	
	Total	Percentage	Total	Percentage
1-17 years	1	7.69%	1	12.5%
18-34 years	2	15.38%	4	50%
35-51 years	6	46.15%	2	25%
52-68 years	3	23.07%	1	12.5%
68 above	1	7.69%	nil	-

group 35-51 years while among the female patients; highest percentage was in the age group 18-34 years (50%). In the study of SU-Gwan Kim et al. [10] it was shown that the percentage of chronic osteomyelitis among male patients was 63.3% and among female patients it was 36.3% and the highest age group was 50-59. However, our study revealed that chronic osteomyelitis patients are of a much younger age group.

The most common causes of chronic osteomyelitis of the jaws were directly related to odontogenic infections (91.5%) such as infected unhealed socket (52.38%), pulpitis (14.28%), pericoronal infections (9.52%), periodontal abscess (14.28%) and unhealthy gingival condition (9.52%) (*Table 4*). This finding differs with that of SU-Gwan Kim et al. [11] as he found that chronic osteomyelitis had odontogenic causes only 38% of the time. This difference could be attributed to lack of awareness, poverty, illiteracy and possibly maltreatment leading to late presentation of the patient.

Cultures and sensitivity tests revealed that the bacteria consisted of 88.2% staphylococcus aureus, followed by klebsilla 3.1%, mycobacterium tuberculosis (2.9%), actinomycosis 1.7% and streptococcus viridans 1.6%. This finding corresponded with the observations made by Kim at al. [11] (*Table 5*).

Management included a course of antibiotics in combination with surgical debridement. This is consistent with the published protocols of van Merkesteyn et al. [12] Kim and Jang [11] and Koorbusch et al. [7]. The minimum duration of antibiotic therapy to treat Chronic suppurative osteomyelitis should be at least two weeks [13]. However, it has been suggested by Bamberger [14] that a minimum of four weeks is needed. Some reports have also advocated the use of hyperbaric oxygen in the treatment of this condition, especially in the irradiated mandible [15-17]. In the present study, the patients were prescribed a pre-operative and post-operative course of antibiotics, which in combination with surgical debridement was successful.

From the outcome of the present study it can be concluded that combination of surgery with definitive antibiotic treatment for at least 1-2 weeks after surgery is effective in the treatment of chronic osteomyelitis of the jaws, and the selection of antibiotic should be based on culture and sensitivity tests.

***Table 3**. Culprit tooth leading to osteomyelitis of mandible.*

Tooth involved	Total	Percentage
Incisors	3	14.28
Canine	1	4.76
Premolars	2	9.52
Mandibular 1st molar	9	42.86
Mandibular 2nd molar	4	19.04
Mandibular 3rd molar	2	9.52

***Table 4**. Underlying odontogenic cause in the patients.*

Underlying cause (Odontogenic infection)	Total	Percentage
Infected unhealed socket	11	52.38
Pulpitis	3	14.28
Periodontal Abscess	3	14.28
Peri-coronal infection	2	9.52
Unhealthy Gingival condition	2	9.52

***Table 5.** Bacterial growth on cultures and sensitivity tests.*

Sr.no	Bacteria	Percentage
1	Staphylococcus aureus	88.2
2	Klebsiella	3.1
3	Mycobacterium tuberculosis	2.9
4	Actinomycosis	1.7
5	Streptococcus viridians	1.6
6	No growth	2.5

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