

Pattern and Treatment Modalities of Chronic Osteomyelitis of the Jaws Among a Sample of Sudanese Patients

Amal H. Abuaffan^{1*}, Yousif I Eltohami², Alaa Abd-Allah³, Alaa Mohammed³, Alaa Mubarak³ and Reem Husham³

¹Associate Professor, Faculty of Dentistry, University of Khartoum, Sudan

²Assistant Professor, Faculty of Dentistry, University of Khartoum, Sudan

³Faculty of Dentistry, University of Khartoum, Sudan

*Corresponding Author: Dr. Amal H Abuaffan. Associate Professor, Faculty of Dentistry, University of Khartoum, Sudan.

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Abstract

Background: Osteomyelitis is an infection of medullary portion of the bone. The inflammatory process of the entire bone extends to include the cortex and the periosteum. This is study aim to determine the pattern and treatment modalities of chronic osteomyelitis of the jaws among a sample of Sudanese patients.

Methodology: Descriptive prospective cross-sectional study. A total of 50 patient's records with chronic osteomyelitis (28 female and 22 males) were reviewed for clinical feature and treatment.

Results: The patient's records were reviewed. Female were affected more than male, most of the patients who suffered from the disease were on the fourth decade of age (26%). Forty six percent of patients experienced traumatic extraction. Eighty six percent had healed socket. The most common clinical feature which the patients were presented with is the swelling (32.7%) followed by pain (27.1%). Mandible is most affected side and the first molar was the most common tooth that might lead to the disease (17.9%). Majority of the patients had surgical treatment and antibiotics (80%). The most common received antibiotic was Metronidazole (63.2%).

Conclusion: Swelling was the most common clinical feature. Surgical and antibiotic treatment was the most used treatment modulation.

Keywords: Chronic Osteomyelitis; Mandible; Traumatic extraction; Pain full swelling

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Introduction

The word "osteomyelitis" originates from the ancient Greek words osteon (bone) and muelinos (marrow) and means infection of medullary portion of the bone. The definition extends to an inflammation process of the entire bone including the cortex and the periosteum, recognizing that the pathological process is rarely confined to the endosteum. [1]

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Osteomyelitis was classified according to several factors: duration, site, extension and type of patients. However, the most used clinical classifications is the Topazian RG. Classification which is based on clinical picture, radiology and etiology. [2] Any condition that weaken the immune system such as diabetes, sickle cell disease, HIV, AIDS, rheumatoid arthritis, intravenous drug use, alcoholism, long term use of steroids, hem dialysis , poor blood supply or recent injury will increase the risk of osteomyelitis. [3]

Treatment of osteomyelitis is very complicated and require multidisciplinary treatment approach, included three phases: the first phase is the surgical debridement which consists of decortications or sequestrectomy and saucerization of affected bone and excision with autologous bone replacement, the second phase is the systemic antibiotic for 46 weeks e.g. beta lactam, fluorquinolones and the third phase is the regular follow-up. [4] Chen., *et al.* studied the risk factors of recurrence and life-threatening complications for patients hospitalized with chronic supportive osteomyelitis of the jaw (CSOJ) in China, in the total of 322 patients, age 6-12 years or > 65 years, pre-admission antibiotic administration, a lesion at the mandibular ramus, concurrent maxillofacial space infection (MSI), and conservation of pathogenic teeth were found to be risk factors for recurrence. [5]

Pigrau., *et al.* studied chronic osteomyelitis in 46 cases focused on aspects of antimicrobial resistance in Spain and recorded that the cause was odontogenic in 32 patients, postoperative/post-traumatic in 8, and secondary to osteoradionecrosis in 6 patients. Clinical features were chronic in 91.3% of patients and the infection was polymicrobial in 65.9% of cases. Viridans streptococci were the most commonly isolated agents, and among 26 Viridans streptococci tested, 81% were susceptible to penicillin and 96% to fluorquinolones. [6]

According to our knowledge there is no previous published studies regarding chronic osteomyelitis in Sudan. Therefore, this study had been designed to determine the pattern and Treatment Modalities of Chronic Osteomyelitis of the jaws among a sample of Sudanese patients in Khartoum Teaching Dental Hospital as baseline for further studies.

Materials and Methods

Descriptive retrospective cross-sectional study was carried out in Khartoum Teaching Dental Hospital, which is the main center of Oral and Maxillofacial surgery in Sudan. A total coverage from 2012 to 2016 of 50 patients’ records (22 male and 28 female). 39 patients were affected in the mandible, while 9 patients were affected in the maxilla and 2 patients in both the maxilla and mandible.

Data processing and analysis

Computer program used was Statistical Package for Social Sciences (SPSS) for Windows, version 20 and Microsoft Excel was grouped and analyzed resulting frequencies and percentages, in addition to cross tabulation. All statistical analysis was set at 95% confidence level, 0.2 the width of the confidence interval, and the level of significant alpha is 0.05. Descriptive statistic was conducted for all variables.

Results

Out of the 50 examined patients, 22 were male (44%) and 28 of them were female (56 %).

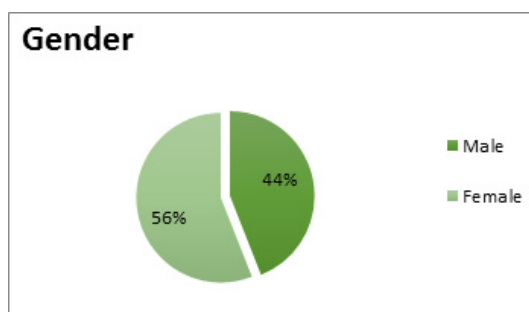


Figure 1: Distribution of the samples according to gender.

Twenty six percent of patients at the age range 41-50 years had chronic osteomyelitis and patients over 70 years were at low risk of the disease.

Age Group Year	NO. of Patient	Percentage
1 -10	6	12%
11-20	6	12%
21-30	7	14%
31-40	4	8%
41-50	13	26%
51-60	7	14%
61-70	5	10%
Over 70 Yrs	2	4%
Total	50	100%

Table 1: Distribution of the sample according to the age.

Most of patients (14) came to the hospital with duration of the disease at range less than 6 month (28%) table 2.

Duration	Patients Number	Percentage
Less than month	11	22%
Less than 6 months	14	28%
Less than 1 year	10	20%
Less than 5 years	13	26%
Not mentioned	2	4%
Total	50	100%

Table 2: The duration of the disease.

It was noted that 46% of patients had history of traumatic extraction as seen in figure 2.

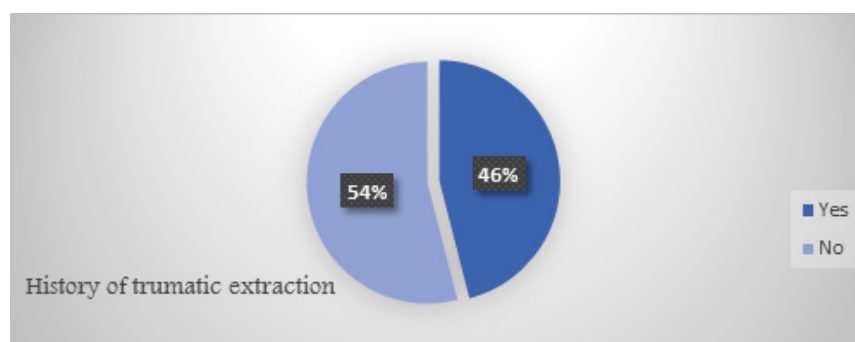


Figure 2: History of traumatic extraction among patients with chronic osteomyelitis.

It was clear that 86% of the patients had healed socket and 14% did not have healed socket as seen in figure 3.

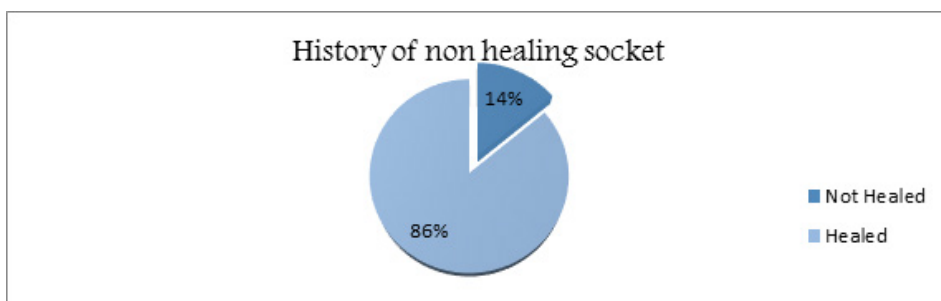


Figure 3: Showed history of non-healing socket.

25% of patients with no predisposing factors, 16% with systemic disease 8% with local disease and 1% with both Systemic and local figure 4.

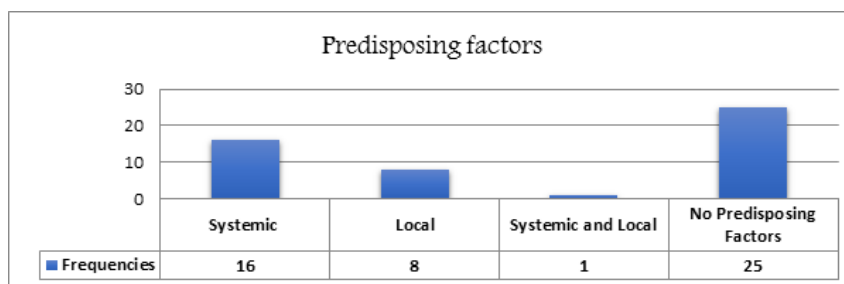


Figure 4: Predisposing factors of chronic osteomyelitis.

The most common site is the mandible (78%) followed by maxilla (18%) and the least site is both maxilla and mandible (4%) figure 5.

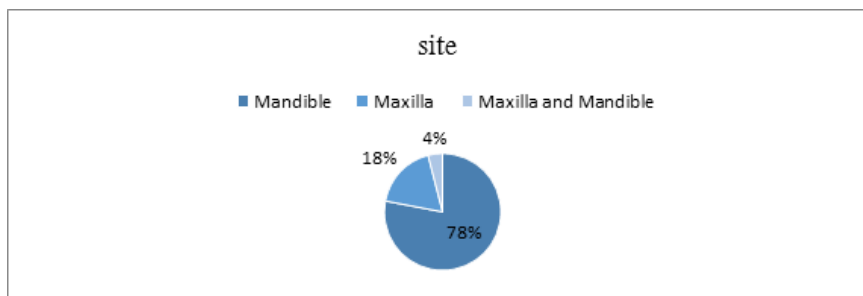


Figure 5: Shows site distribution of chronic osteomyelitis.

It is noted that most of the bone was diseased (58%) and (36%) was normal figure 6.

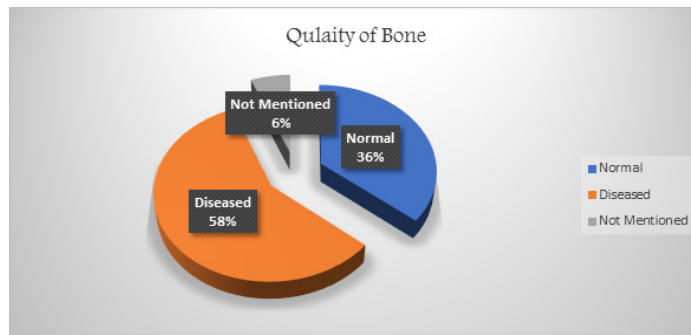


Figure 6: Shows quality of the involved bone.

Table 3 shows the most common clinical feature is swelling (32.7%) followed by pain (27.1%) then discharge (19.6%) and the least clinical feature was trismus (0.9%).

Clinical Features	Frequencies	Percentage
Pain	29	27.10%
Swelling	35	32.71%
Paresthesia	5	4.67%
Discharge	21	19.63%
Bleeding	3	2.80%
Lymphadenitis	5	4.67%
Sequestrum	2	1.87%
Trismus	1	0.93%
Fever	4	3.74%
Difficult mouth opening	2	1.875%
Total	107	100%

Table 3: Shows distribution of the clinical features of the disease.

The most common causative tooth was the first molar (17.9%) followed by second molar (13.4%) table 4.

Causative Tooth	Number	Percentages %
Central incisor	1	1.49
Lateral incisor	1	1.49
Canines	1	1.49
First premolar	2	2.99
Second premolar	4	5.97
First molar	12	17.91
Second molar	9	13.43
Third molar	5	7.46
Deciduous	1	1.49
Not mentioned	31	46.27
Total	67	100%

Table 4: Shows the distribution of the Causative teeth.

It is clear that in table 5 the most common investigation done was the X-Ray (72.5%) and the C-reactive protein was the least one.

Investigations	Frequencies	Percentage
X-Ray	50	72.5%
Blood Culture	9	13%
ESR	2	2.9%
Biopsy	7	10.2%
C-reactive protein	1	1.4%
Total	69	100%

Table 5: Types of investigations done for the patients.

Table 6 showed that the most common used type of radiographic investigation was DPT (79.7%).

Radiographic Investigation	Frequencies	Percentage
DPT	43	79.7%
Periapical	1	1.8%
CT Scan	6	11.2%
Occlusal view	1	1.8%
3D scan	2	3.7%
Not mentioned	1	1.8%
Total	54	100%

Table 6: Shows distribution the radiographic investigations.

Majority of the patients were treated with both surgery and antibiotics (80%) and (12%) were treated by antibiotics only.

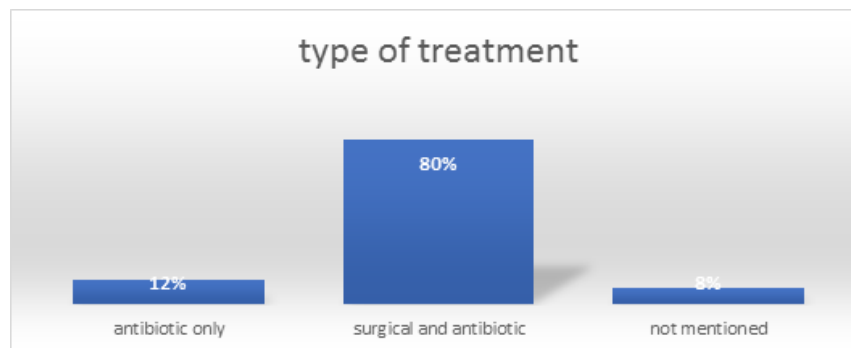


Figure 7: Showed distribution of types of the treatment.

The most common type of surgical treatment reported was sequestrectomy for (46%) of the patients followed by decortications (12%) table 7

Surgical Treatment	No. of the Patients	Percentage
Decortications	6	12%
Sequestrectomy	23	46%
Saucerization	5	10%
Resection	4	8%
Enculeation	2	4%
Not surgical (antibiotic)	6	12%
Not mentioned	4	8%
Total	50	100%

Table 7: Shows the distribution of patients according to the surgical treatment.

Table 8 showed that the oral antibiotics were prescribed to 60% of the patients and 32% had the antibiotic intravenously.

Antibiotic Treatment	Number of the Patients	Percentages
Oral	30	60%
IV	16	32%
Not mentioned	4	8%
Total	50	100%

Table 8: Shows the route of antibiotic administration.

In table 9 it clear that the most common type of antibiotic described for the patients was metronidazole (63.2%).

Type of Antibiotic	Frequencies	Percentage
Metronidazole	36	63.2%
Augmentin	4	7.0%
Cefuroxime	9	15.8%
Ceftriaxone	3	5.3%
Clindamycin	1	1.8%
Doxacyclin	1	1.8%
Amoxicillin	1	1.8%
Penicillin	1	1.8%
Ciprofloxacin	1	1.8%
Total	57	100%

Table 9: Showed distribution of the type of antibiotic used in the treatment.

Discussion

The present study was a descriptive retrospective cross-sectional study carried out in Khartoum Teaching Dental Hospital, which is the main center of Oral and Maxillofacial surgery in Sudan. All the patients' records from year 2012 to 2016 were reviewed for the osteomyelitis. Only 50 patient's files with chronic osteomyelitis were found, 28 female and 22 males. 39 patients out of the 50 were affected in the mandible, while 9 patients in the maxilla and 2 patients had the disease in both the maxilla and mandible. In the present study female (56%) were more affected than male, this finding was similar to the finding of previous studies in which female were more

affected. Caroline Berglund et al, the percentage of females was 66%, Otto S., *et al.* found that 73% of the patients examined were females and Waldron., *et al.* 89% of patient were females. [8,22]

Twenty six percent of the patients reviewed in the current study appeared to be ranging between the age of 41-50 years old which was the highest percentage, while the patients over 70 years old were the least common affected by the disease (4%), these findings were different from the results obtained by Chen., *et al.* who found that patients with chronic osteomyelitis are in two different age group, older than 65 years old and between 6-12 years. Otto S., *et al.* found that the mean age affected by osteomyelitis was 67 years old. In contrast, Caroline Berglund found that the mean age was 18 years old. Whereas, Kim SG1., *et al.* carried study in Kwangju cit, Korea and found that patients with chronic osteomyelitis are in the age group between 11-79 years old, [5,8, 10,16].

These variations in the age group mean that chronic osteomyelitis can affect any age group. The commonest disease duration was found throughout this study less than 6 month (26%), this finding was not mentioned in any of the previously reviewed studies about chronic osteomyelitis.

Half of the patients reviewed had no predisposing factors to the disease, while 32% had systemic disease that may be a leading cause to the disease. One patient out of the fifty patients examined in the current study had sickle cells disease before developing osteomyelitis. A study by Nwadiaro HC., *et al.* was held on 24 patients who had sickle cell disease before developing chronic osteomyelitis, thus patients with sickle cell disease have higher susceptibility to chronic osteomyelitis. [7]

In the present study the most common site of the disease was the mandible (78%) followed by the maxilla (18%) which in agreement with these finding by Theologie-Lygidakis N., *et al.* [9], in which the mandible was the most affected site 80% and the maxilla 20 %. In contrast Bagan JV et al recorded that both mandible and mad maxilla affected equally (50%). [13]

Fifty eight percent of the reviewed patients had diseased bone, 10% of the patients reviewed appeared to have florid cementosseous dysplasia which was complicated by chronic osteomyelitis of the jaw. A study held by Melrose., *et al.* found that chronic osteomyelitis may infrequently complicate florid cementosseous dysplasia [23].

The most commonly found clinical feature among the 50 Sudanese patients were swelling (32.7%) followed by pain at the site of the swelling (29%), while the least one was fever (3.7%). Which differ from the study held by Edelstein H1., *et al.* who found that fever was the most common clinical feature, followed by pain and swelling [15].

In the current study the most frequent used investigation carried out was DPT (79.7%), which disagree with the results of Frid P1., *et al.* who recorded that PCR and biopsies are the most used diagnostic methods [18]. A noteworthy, the vast majority of the patients reviewed received surgical and antibiotic treatment (80%).Whereas, antibiotic treatment only was recorded for (12%). However, Kim SG., *et al.* reported that treated 39 patients had surgical and antibiotics and 10 patients had surgery only, and the results showed improvement of all patients except for one patient who needed second operation and 8 weeks of antibiotics [16].

Van Merkesteyn JJP1., *et al.* treated 16 patients with simple protocol of sequestrectomy or decortication, IV antibiotics for one week and oral penicillin for three weeks, all patients showed improvement except for one patient who showed recurrence [17].

This variation in the treatment showed that, the decision of the treatment protocol for each patient varies according to the severity of disease and the patient's health.

Notably, thirty six out of the fifty patients reviewed in this study were received metronidazole as antibiotic treatment for the chronic osteomyelitis which has good effect on anaerobic microorganisms. This finding was different from a study held by Pigrau, *et al.* in Spain who found that beta lactam was the antibiotic of choice for chronic osteomyelitis [6]

Chronic osteomyelitis can be surgically treated by means of, sequestrectomy, decortications and resection. The frequent one used in this study for treatment was sequestrectomy; a sequestrum is a piece of dead bone tissue formed within a disease or injured bone, typically in chronic osteomyelitis. The present study results showed that twenty three out of fifty patients had sequestrectomy as a surgical treatment. This finding was online to Nwadiaro HC., *et al.* results in which 15 out of 24 Nigerian patients had operation and 11 out of the 15 patients, had sequestrectomy [7]. Thus the most commonly used surgical treatment for chronic osteomyelitis of the jaw was sequestrectomy, while the least used surgical treatment was Encucleation.

Conclusion

Females are more susceptible to the disease than males. The most affected site of the disease is the mandible and the commonest causative tooth was first molar. Local factors have higher influence on the course of the disease than systemic disease which is traumatic extraction. Swelling appears to be the most common clinical feature. Radiographs were the most diagnostic aids used for chronic osteomyelitis. Surgical and antibiotic treatments were the main treatment modularity. Metronidazole was the most frequent drug subscribed for the treatment of chronic osteomyelitis.

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