

## Therapeutic Aspects of Odontogenic Chronic Osteitis of Jaw

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### Abstract

**Introduction:** Chronic odontogenic osteitis is one of the complications of dental infections. The treatment of chronic osteitis is often complex. The purpose of this study is to describe the therapeutic aspects of chronic odontogenic osteitis in the maxillae.

**Patients and Methods:** This is a retrospective study of 37 cases of chronic odontogenic osteitis over a 24-month period, from September 2015 to August 2017. Thirty-seven patients aged 5 to 62 years were selected. male and 14 females. The established medical and surgical treatments are the parameters studied.

**Results:** All patients received medico-surgical treatment and the predominantly prescribed antibiotic combination was beta-lactam (oxacillin) and imidazole (metronidazole) (45.94%). Twenty bone curettages (54.05%), 17 sequestrectomy (45.94%) and 25 fistulectomies (67.56%) were performed. The extraction of the causal tooth represented the etiological treatment. Thirty patients (81.08%) were cured.

**Conclusion:** The results obtained allow us to conclude that the use of oxacillin and metronidazole associated with surgical treatments offers satisfactory results.

**Keywords:** Antibiotic; Maxillary; Osteitis; Curettage; Sequestrectomy

### Introduction

Odontogenic chronic osteitis is an inflammatory condition of the bone tissue, involving reaction phenomena that occur at the level of a bone bent by a pathogen, secondary to local infections of dental origin and evolving for more than four weeks [1]. Osteitis causes an increase in intraosseous pressure with compromise of bone vascularization and hypoxia of the local environment [2]. Treatment of chronic osteitis is complex and can extend over several months. Some diffuse forms with significant bone decay do not sometimes respond to standard treatments [3].

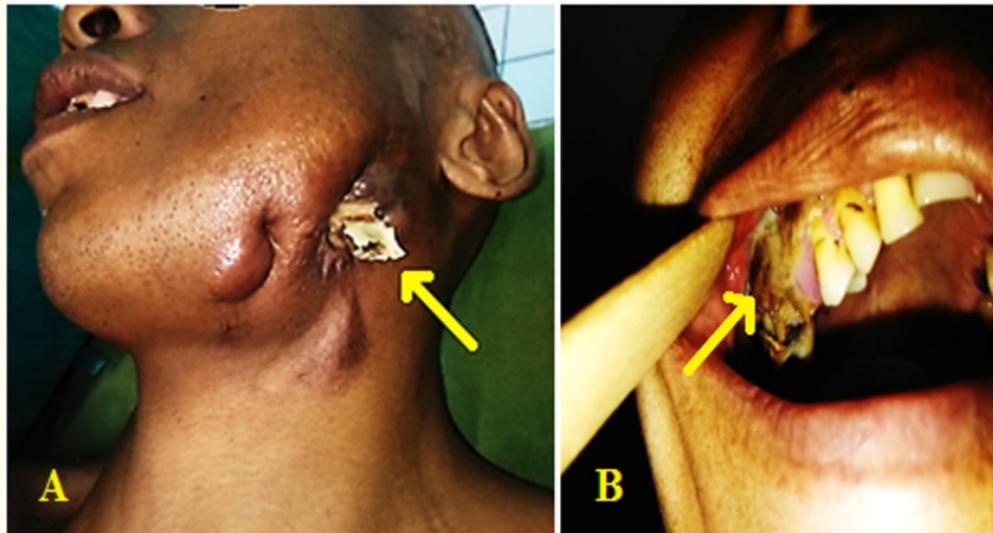
### Aim of the Study

The aim of this study is to describe the therapeutic aspects of chronic odontogenic osteitis of the maxillary in order to improve its management.

## Patients and Method

This is a retrospective and descriptive study, carried out in the Department of Maxillofacial Surgery, of the University Hospital Joseph Dieudonné Rakotovoao Antananarivo. It was conducted from September 1<sup>st</sup>, 2015 to August 31<sup>st</sup>, 2017, on the files of the patients who presented a table of osteitis of the jaws following a dental rabies. We included all cases of chronic osteitis of the maxillary that required antibiotic therapy and surgery. Records of patients with non-odontogenic osteitis were excluded from this study.

We collected 37 patients, 23 men (62.16%) and 14 women (37.83%). The average age was 27.56 years with extremes of 5 and 62 years. Purulent skin fistulas (91.89%) were the most common physical signs. Exposure of bone sequestrants through the skin and mucosa was found in 8.1% of cases (Figure 1). The results of dental panoramic radiographs showed a clear radiological image in 54.05% of cases, and radiopaque images surrounded by a light-radiated area (bone sequestrants) in 45.94% of cases (Figure 2A). Only 11 patients (29.72%) underwent bacteriological examination with antibiogram. The most frequently isolated organisms were streptococci in 72.72% of cases. Studied parameters were the medical and medical antecedents, the therapeutic data (ant biotherapy, fistulectomy, curettage, sequestrectomy) and the evolutionary data of the patients treated for chronic osteitis of the maxillae.



**Figure 1:** Photos of a patient with bone sequestration removed spontaneously transcutaneous (A) and transmucosal (B).

Source: JDR CHU, Department of Maxillofacial Surgery Befelatanana.

## Results

The symptoms had evolved on average for 9 months, with extremes ranging from one to 48 months (4 years). Oral condition was poor for 89.18% (n = 33) of patients, and average for 10.81% (n = 4) of patients. Two patients, or 5.4% of the patients, were breastfeeding during the course of her disease progression. Self-medication was noted in 23 patients (69.69%). Twenty-six patients had received antibiotic therapy beforehand. It was essentially beta-lactam (Amoxicillin) often associated with an anti-anaerobic (Metronidazole) but inappropriate dosage. These antibiotics were associated with NSAIDs in 17 patients (45.94%). A single NSAID intake was found in 11 patients, or 29.72% of cases (Table 1).

Settings	Squad (No. 37)	Percentage (%)
NSINS alone	11	29,72
Inadequate antibiotic therapy alone	09	24,32
NSA - Inadequate antibiotic therapy	17	45,94
breast-feeding	02	05,40
diabetes	00	00
Aids	00	00

**Table 1:** Medical and drug-like.

Age < 10 years (p < 0.001), delay in management greater than 6 months (p < 0.001) and taking NSAID alone or with inappropriate antibiotic therapy (p < 0.001) were significantly risk factors for the development of odontogenic chronic osteitis (Table 2).

Parameters		Circumscribed Osteitis	Osteitis Diffuse	p
Age	≤10 years	00	04	0,006
	40 years old	04	03	
Sex	Male	14	10	0,51
	Female	09	04	
Tobacco		07	03	0,54
Time to pick up	[1-6] month	20	00	0,0000014
	6 months and more	03	14	
Oral status	Bad	19	14	0,09
	Medium	04	00	
Treatment received before consultation	Inadequate antibiotic therapy alone	08	01	0,057
	Antibiotic therapy and NSA	04	13	0,000009
	NSINS alone	11	00	0,002

**Table 2:** Risk factors for diffuse chronic osteitis.

The predominantly prescribed antibiotic combination was beta-lactam (oxacillin) and imidazole (metronidazole) (45.94%). The second line of antibiotic therapy was the combination of amoxicillin and metronidazole (35.13%). A third type of antibiotic therapy, amoxicillin and clavulanic acid was used in 18.91% of cases (Table 3). The average duration of antibiotic therapy was 7 weeks. There was a significant correlation between the type of antibiotic therapy initiated and the development of chronic diffuse osteitis of the maxillary (p < 0.05) (Table 4).

Twenty-one (56%) patients underwent general anesthesia. Other interventions were under local or locoregional anesthesia in cases where bone lesions were circumscribed (44%). A double approach (exobuccal and endobuccal) was performed in 30 patients (81.08%). The endobuccal approach alone was performed in three patients (8.11%). Bone curettage alone was performed in 20 patients (54.05%), and curettage was associated with sequestrectomy for 17 patients (45.94%) (Figure 2A). Fistulectomy was performed in combination with other surgical means in 25 patients (67.56%). Causal teeth were extracted during the procedure in 32 cases (86.48%). Among the

postoperative complications, we found that 18.91% of cases had secondary ipsilateral labio-mental hypoesthesia, 18.91% delayed skin healing, 10.81% transient facial palsy and 8.1% salivary fistula. Oral sinus communication was observed after curettage associated with sequestrectomy of chronic maxillary osteitis.

Antibiotic protocol	Squad (N -37)	%	Average length
Oxacillin (3g/j) + Metronidazole (1,5g/j)	17	45,94	06 weeks
Amoxicillin + Ac. Clavulanic (3g/d)	07	18,91	04 weeks
Amoxicillin (3g/d) + Metronidazole 1,5g/j	13	35,13	11 weeks

Table 3: Distribution according to the antibiotherapy regimens.

Antibiotic protocol	Diffuse osteitis (evolution)		p
	Good	Bad	
Amoxicillin-metronidazole	01	04	0,036
Oxacillin-metronidazole	07	02	
Amoxicillin-clavulanic acid	00	00	

Table 4: Antibiotic therapy and evolution of diffuse chronic osteitis of the maxilla.

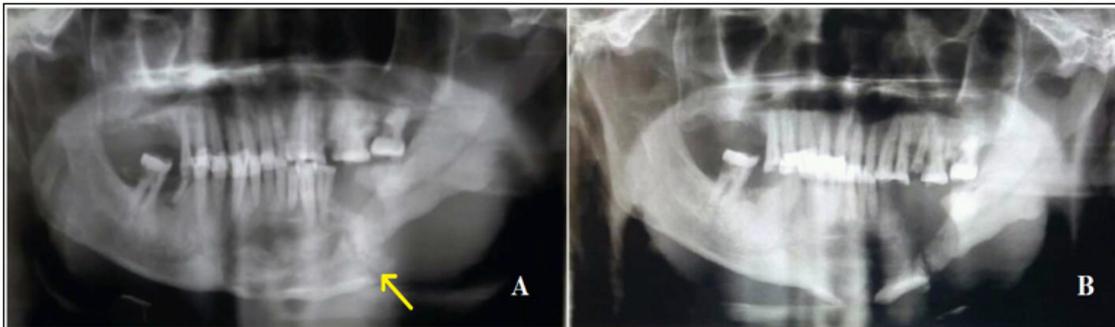


Figure 2: A: Picture of a bone sequestrum with a preoperative pathological fracture.

B: Radiological appearance after curettage and sequestrectomy.

Source: JDR CHU, radiology department Befelatanana

The delay in healing of skin wounds is marked by the absence of healing beyond the 10th day postoperatively. And regardless of the stage of osteitis, tobacco patients ( $p < 0.001$ ) treated with amoxicillin and metronidazole antibiotics ( $p < 0.001$ ) were significantly more likely to develop delayed operative wound healing than the others. patients (Table 5).

Eighty-three percent of patients had a good evolution of oral opening limitations after mechanotherapy sessions. The average duration of mechanotherapy was six weeks for mouth opening less than 20 mm.

Settings	Good healing	Delayed healing	p
Oxacillin-metronidazole	14	01	0,07
Amoxicillin-metronidazole	07	06	0,003
Amoxicillin-clavulanic acid	06	00	0,16
Smoking	05	05	0,004

**Table 5:** Correlation between the type of antibiotic therapy, smoking and rhyming disorder of surgical wounds.

In total, osteitis was cured in 81.08% (n = 30) of cases after 4 to 12 weeks of antibiotic therapy and 6 weeks of mechanotherapy. Seven patients, 18.91% of the cases had a recurrence of a purulent collection at the operative site after 6 weeks of recul. Failure in the treatment of odontogenic chronic osteitis in the maxillae is significantly correlated with the diffuse state of bone lesions ( $p < 0.001$ ), the existence of sequestering lesions ( $p < 0.001$ ), surgical techniques such as bone curettage alone ( $p < 0.001$ ), sequestrectomy ( $p < 0.001$ ), and the use of metronidazole-associated amoxicillin ( $p < 0.001$ ) (Table 6).

Parameters	Purulent Collection	Full scarring	p
Osteitis diffuse	06	08	0,007
Sequent shape	07	10	0,002
Curettage alone	01	19	0,007
Fistulectomies	06	19	0,41
Curettage and sequestrectomy	07	10	0,002
Amoxicillin-Metronidazole	07	06	0,003

**Table 6:** Therapeutic failure factors.

## Discussion

Chronic osteitis of the maxillae should be clinically suspected in the presence of a history of acute episode, inflammatory swelling of the face that has been evolving for more than 4 weeks, purulent fistula of the skin or mucosa, facial or endosseous pain, trismus, and tooth mobility [4]. Exposure of bone sequestrants through the skin or through the mucosa is a pathognomonic sign of chronic osteitis of the maxillae [5].

The advantage of a radiological examination, in particular panoramic dental X-ray, is to detect a bone lesion, to evaluate its loco-regional extension and to assess the efficacy of the treatment that has been instituted [6].

The most frequently identified organisms are *Staphylococcus aureus* (75 to 88% of cases), *Streptococci* and Gram-negative bacilli (B.G.N) [2,7]. But some studies like ours agree that streptococci are the most frequently isolated organisms in chronic odontogenic osteitis [8,9]. Bacteria or their toxins in dental plaque can migrate from the periodontal lesion to the circulation intraosseous blood or cause diffuse inflammatory reactions and be associated with obstruction of arterioles [10]. Smoking is a proven risk factor for having a decrease in the density of bone mass. Carbon monoxide results in decreased tissue oxygenation and poor blood microcirculation. The vasoconstrictor and thrombogenic action of nicotine results in decreased blood flow and nutrient supply to bone tissue [11].

In addition, according to the literature, risk factors for chronic osteitis of the maxillae were inappropriate use of antibiotics, poor oral hygiene, malnutrition, virulence of certain strains of microorganisms, compromised bone vasculature and immunosuppression [12]. According to our analytical study, the age of less than 10 years, the delay in management of more than six months, and the taking of NSAIDs

alone or associated with inappropriate antibiotherapy were significantly risk factors for the spread of chronic osteitis. odontogenic. The lack of information of patients about the severity of bone infection in the jaws and the value of early consultation, as well as the difficult access to health facilities, considerably lengthen the consultation time and cause a delay in taking in therapeutic charge. Thus, the high frequency of diffuse forms is explained by self-medication, the particular virulence of germs and late consultation [12].

Most authors recommend the combination of beta-lactams (penicillin A, 3<sup>rd</sup> generation cephalosporin) or macrolides (lincosamides) with nitroimidazoles [5,13]. Sunita Malik also had a good result using penicillin M (cloxacillin) combined with metronidazole [2]. Antibiotic therapy must first be probabilistic and empirical until the results of microbiological cultures are obtained, which then make it possible, if necessary, to switch to targeted antibiotic therapy. This can be achieved with any antibiotic that is effective against the spectrum of bacteria in the oral cavity, while having good bone penetration [8,14]. The combination of a broad-spectrum penicillin (amoxicillin) with a penicillinase inhibitor (clavulanic acid) is currently the first-line empirical treatment for osteitis of the maxillary odontogens. Alternatively, it is possible to use clindamycin [8,14].

There was a significant correlation between the type of antibiotic therapy initiated and the development of chronic diffuse osteitis of the maxillae. Particularly for cases treated with metronidazole-associated oxacillin, the outcome was favorable in 88% of cases. Therapeutic protocols vary in the literature and the duration of antibiotic therapy ranged from 2 weeks to 8 weeks [2,5,13]. Both in our study and in most literature studies, the increase in amoxicillin failure rates even with metronidazole explains why amoxicillin was only used in combination with acid clavulanic for the treatment of chronic osteitis [15].

The extraction of causal teeth is the only reliable treatment to prevent recurrence of reinfection. Also, if they are not extracted, they can maintain the infection and thus prevent its healing [16]. Surgical treatment of chronic maxillary osteitis consists of an incision and drainage of the purulent collection, curettage, decortication, sequestrectomy, saucerization, or interruptive resection [2,16]. Curettage consists in removing the pathological area with a curette until the bone tissue is normally haemorrhagic and macroscopically sound, whereas sequestrectomy consists in removing a bone sequestrum. Both of these surgical techniques are the most common in most published series [4,8].

Surgery should always be combined with effective antibiotic therapy, but in some cases we often use long-lasting combination therapy for exclusively medical treatment. This is often the case in children in whom aggressive surgery is considered only if this is necessary because an iatrogenic lesion in the condylar growth cartilage may result in stopping or slowing of unilateral condylar growth. The healthy side developing properly, one can end up with a facial asymmetry by unilateral mandibular growth disorder [2,10]. The excision of the cutaneous fistulas consisted of a spindle incision parallel to the lines of tension of the face (wrinkles) carrying all the scar and peri-orificial granulation tissues. The surgical correction of the cutaneous depression consisted of a release of the adhesions under cutaneous, then direct suture in two planes, banks with banks by simple points and separated to have a linear scar.

A good evolution of the cicatrization was obtained in 50% of the cases. In contrast, we found that patients treated with amoxicillin and metronidazole were significantly more likely to develop operative wound healing disorders. These disorders of the healing of surgical wounds are linked either to the bacterial polymorphism of chronic osteitis of the maxillary jaws, or to a superinfection of the cutaneous wound, some of which, like *Staphylococcus*, is resistant to the combination of amoxicillin with metronidazoles. resistance to germs with amoxicillin which is the first molecule of inadequate premedication [12]. Oxacillin is a good molecule to prevent healing disorders because it is both effective in treating bone infection and prevents superinfection of wounds by cutaneous saprophytic bacteria (mainly staphylococci).

Functional rehabilitation is always essential to obtain the best result after surgery [17]. It starts two weeks after surgery. Indeed, these surgical procedures modify the anatomical structures involved in mastication (masticatory muscles and its aponeuroses) and can lead to

tissue fibrosis, spasms and muscle contractures, responsible for functional sequelae. Rehabilitation will be offered to patients in order to improve the local trophicity of the tissues and to relax the capsulo-ligament and muscular structures [17].

Early diagnosed and properly treated, the bone infection can be cured but its awakening is unpredictable. Montonen., *et al.* reported that the causes of treatment failure were inadequate antibiotic therapy, curettage or incomplete resection and retention of bone sequestrants [18].

The analysis of our therapeutic results shows that patients with diffuse chronic osteitis, with sequestering lesions, who had undergone curettage alone, probably incomplete sequestrectomy, and who had been treated with amoxicillin associated with metronidazole, had significantly more risk of having a bad therapeutic result than others. Freiman., *et al.* have shown that the incidence of postoperative complications, particularly complications of the operative site, is higher in smokers than in non-smokers. They found in smokers delays of healing and infections of operative wounds, delays of bone consolidation, lapses of sutures, hypertrophic scars [19]. Tobacco smoke affects different types of cells and different stages of the healing process. Carbon monoxide causes a decrease in tissue oxygenation [11]. The vasoconstrictor and thrombogenic action of nicotine results in a decrease in blood flow and the supply of nutrients necessary for the healing of tissues. Decreased cutaneous microcirculation and hypoxia are the main causes of the harmful effect of smoking on skin scarring and deep tissue [20]. On the other hand, considering these factors of poor evolution and appropriate management, 81.08% (n = 30) of our cases were cured. Our results are consistent with those of the various published series that have found a clinical cure rate of between 75% and 90% [8,21].

### Conclusion

Chronic odontogenic osteitis of the maxillae is still common in our country. Treatment is based on effective antibiotic therapy combined with surgical treatment. The hope of seeing this pathology with serious unsightly and functional consequences recede is based on the intensification of the prevention of dental caries policy, the promotion of oral hygiene, as well as awareness raising on the elimination of self-medication and early consultation in case of oral injury.

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