

Educational Article

The prevalence of odontogenic maxillary osteitis at the Cocody University Hospital's Odontostomatological Consultation and Treatment Center (CCTOS), Abidjan (Ivory Coast): clinical and therapeutic aspects

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Abstract – Maxillary osteitis is a bone tissue disease or condition with a dentoalveolar origin. This condition remains a public health concern in most developing countries, particularly in the Ivory Coast. Without appropriate management, it can alter the patient's overall health owing to aesthetic, functional, and psychological complications. This study aimed to provide a better understanding of odontogenic maxillary osteitis to consequently improve its diagnosis and medical care. Three major etiologies of maxillary osteitis have been reported: infectious, traumatic, and physicochemical causes. According to the literature, osteitis is grouped into two clinical forms, namely circumscribed osteitis and diffuse osteitis. Their diagnosis is based on a rigorous clinical examination as well as radiographic, histological, and bacteriological examinations. At the Cocody University Hospital's Odontostomatological Consultation and Treatment Center (CCTOS), patients with the late stages of the condition present with significant, disabling, and unsightly osteocutaneous-mucous lesions. Treatment of this osteitis is preventive, curative, and restorative. Odontogenic maxillary osteitis is encountered frequently and typically at a late stage at the Cocody University Hospital's CCTOS. To limit aesthetic and functional damage, raising awareness among African people about oral hygiene and the need for regular consultations should be encouraged.

Introduction

Osteitis is an inflammatory condition of the bone tissue [1]. With the introduction of antibiotic treatments, improved asepsis, and early detection, the prevalence of odontogenic maxillary osteitis has declined considerably in developed countries [2]. However, in most developing countries and particularly in the Ivory Coast, this condition remains a serious disease with frequent complications [3–6]. The authors have unanimously identified self-treatment as one of the major causes, as it usually results in late consultations. More than one in three affected patients restore to this practice [7,8], which explains why >25% of the patients present following the formation of bulky bone sequestra and their associated aesthetic, functional, and psychological consequences. This consequently results in an impairment of the patient's overall health [3].

In this article, we describe chronic diffuse osteitis, which is most frequently encountered at the Cocody University Hospital (Ivory Coast). The goal of this educational study is to provide a better understanding of odontogenic maxillary osteitis to thereby improve its diagnosis and management.

Etiopathogenesis

The maxillary bone is mainly composed of richly vascularized spongy tissue. In contrast, the mandible is predominantly composed of compact bone with terminal vascularization. This difference explains the preferential localization of osteitis in the mandible. Maxillary osteitis typically originates from dentoalveolar infections. Other causes, notably traumatic and physicochemical causes, have also been mentioned. The responsible organisms belong to the saprophytic flora of the oral cavity, among which the major ones are *Staphylococcus*, *Streptococcus*, *Enterococcus* [9].

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Infectious causes are the result of the following

- Pulpo-periodontal complications or alveolar traumas. The pulpar or periodontal infection reaches the periapex, spreads to the periosteum, and settles there forming a granuloma or a cyst, showing a radiolucent, unigeodesic, and oval or rounded mass appended to the apex of the necrotic tooth on X-ray imaging. The bacterial dissemination progresses either asymptotically or symptomatically with its consequence being inflammatory signs.
- The pericoronitis of an inferior third molar, most often in disimpaction with a possible superinfection in the pericoronal cap or the follicular sac, which may lead to osteitis.

Traumatic causes

- Maxillo-facial: Any trauma that may or may not have caused an open maxillo-mandibular fracture is likely to subsequently cause maxillary osteitis. This results from bacterial inoculation of the fractured site, improper care of the teeth at the fractured site, or poor osteosynthesis following bone fracture [10].
- Oral healthcare: The friction generated by the use of rotary instruments during dental extractions may cause the bone tissue to heat up. Significant heating without effective cooling can lead to the burning of the alveolar bone—a source of post-extraction osteitis. Similarly, damage may be involuntarily caused by practitioners who leave permanent alveolar-dental debris in the sockets of alveolar fractures.

Finally, the use of a vasoconstrictor during intraseptal anesthesia may disrupt blood clot formation, thereby triggering osteitis [11].

Physicochemical causes

The chief physicochemical cause of induced osteitis is osteoradionecrosis. This refers to the occurrence of osteitis following the radiation treatment of a malignant cervico-facial tumor. According to Marx, there are three associated mechanisms [12]: reduction in oxygen intake known as hypoxia, severe damage to arteries known as hypovascularization, and damage to metabolic bone units (osteocytes, osteoblasts, and osteoclasts) known as hypocellularity. Osteoradionecrosis is still relevant. At the maxillo-mandibular level, with the exception of spontaneous osteoradionecrosis, the most common point of origin is eroded bone, which becomes superinfected and results in somewhat significant sequestration.

Together with osteoradionecrosis, arsenical bone necrosis should also be mentioned. This results from faulty therapeutic practices involving the periodontal passage of arsenic applied as an inter-session dressing during pulpectomy. This is why several countries including France have prohibited its use in dental practice. Furthermore, antiresorptive therapies (bisphosphonates, raloxifene, strontium, and denosumab) predispose the patient to maxillary osteitis [13].

Clinical forms of maxillary osteitis

The literature reports several clinical forms of odontogenic maxillary osteitis. They can be grouped into two types: circumscribed osteitis and diffuse osteitis.

Circumscribed osteitis

It is localized osteitis on the one hand and osteoperiostitis on the other.

In terms of localized osteitis, the following are observed:

- Alveolar osteitis following complications of dental extractions.
- Central osteitis developing from a granuloma or a cyst.
- Cortical osteitis resulting from an infection of the mucous membrane surrounding the dental socket.

In case of osteoperiostitis, the following are observed:

- Serous osteoperiostitis or suppurative or chronic AXHAUSEN osteoperiostitis, which is characterized by the inflammation of periodontal ligament.
- Suppurative osteoperiostitis or subperiosteal abscess clinically characterized by a submucosal abscess.
- Chronic osteoperiostitis or GARDE osteoperiostitis most often localized in the mandible and related to endocanal treatment.

Diffuse osteitis

The extension of an initially circumscribed process. Diffuse osteitis affects both the bone and the periosteum, with a tendency toward necrosis of the bone segments, thereby leading to more or less extensive sequestration. This type of osteitis is more frequently observed in Africa and is particularly common in the Ivory Coast [4,7,8].

Diagnosing odontogenic maxillary osteitis

Positive diagnosis

Diagnosing odontogenic maxillary osteitis requires a meticulous clinical examination in addition to X-ray examinations (panoramic X-ray, cone beam computed tomography, and scanner). In case of doubt, histological and bacteriological examinations are conducted.

By interviewing the patient, it is possible to highlight the signs of either neglecting toothache or managing it improperly from the patient's history. The symptomatology depends on the pathological stage.

- At onset, periodontitis with paroxysmal algia, especially at night, which may or may not be linked to mobility, is observed around the infected tooth. Trismus may also be present.
- At the established stage, the general signs include fever, asthenia, and insomnia. Acute, pulsating, continuous, irradiating pain resistant to pain medication may also be

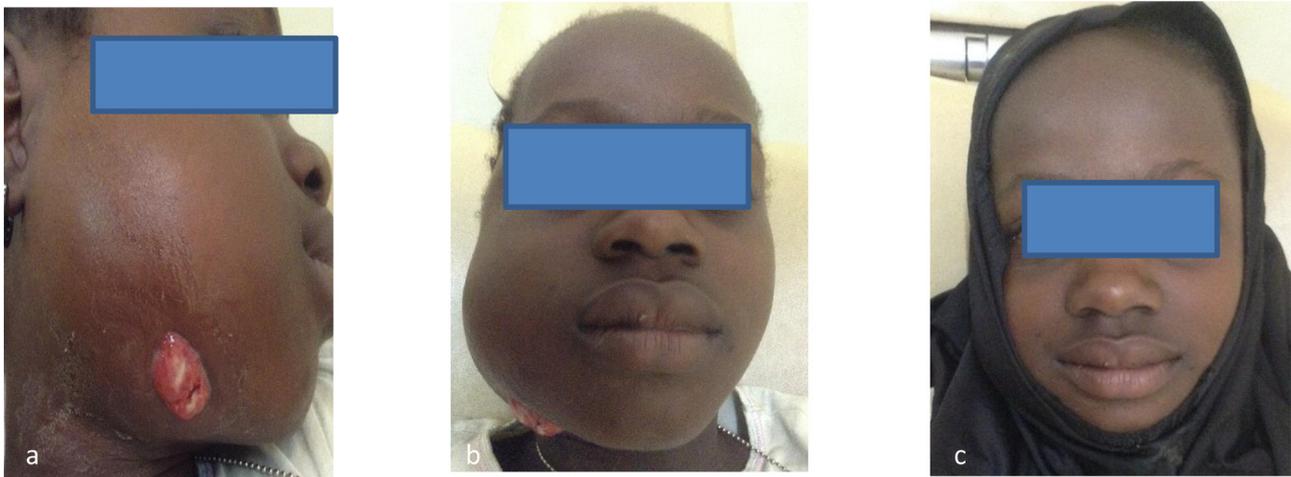


Fig. 1. Diffuse odontogenic mandibular osteitis fistulized below the chin (a). Frontal view of the voluminous swelling (b) and concealment of the swelling (c).



Fig. 2. Voluminous swelling owing to odontogenic maxillary osteitis in a child (a). Intraoral view of the bone sequestrum (b) and operative specimen after sequestrectomy (c).

present. The patient presents with a facial deformity owing to the development of bone swelling and hypoesthesia of the lower lip and chin. This swelling of the bone is the major sign indicating a need for consultation [3]. Mouth opening is somewhat reduced, thereby limiting intraoral examinations. The patient presents with halitosis and hypersalivation. The radiographic examination is generally extraoral and does not reveal any particular signs. In the absence of treatment, osteitis progresses to the stage of sequestration with suppuration, becomes fluctuant, and then fistulizes in one or more cutaneous or mucosal locations (Fig. 1).

- During the sequestration stage, the general signs and pain disappear. The inflammation subsides but the swelling persists. At this stage, radiopaque images surrounded by a radiolucent area defining the bone sequestra are observed. These sequestra can be spontaneously or surgically removed, with or without the teeth entrapped in the sequestrum. The suppuration then dries up and the fistulas close up, marking the beginning of the repair stage (Fig. 2).

- During the repair stage, the newly formed bone fills the bone deficits. The sequelae and complications resulting from bone and tooth loss cause aesthetic and functional problems (Fig. 3).

Differential diagnosis

The differential diagnosis of odontogenic maxillary osteitis can be made based on osteocondensing or osteolytic tumor diseases or on the presence of certain mutilating oral infectious diseases.

Osteocondensing tumor diseases:

- Fibrous dysplasia characterized by dermatological and neurological lesions.
- Cementoma revealed by X-ray images showing radiculo-dental osteocondensation.

Osteolytic tumor diseases:

- Ameloblastoma characterized by its honeycomb-like appearance on X-ray.

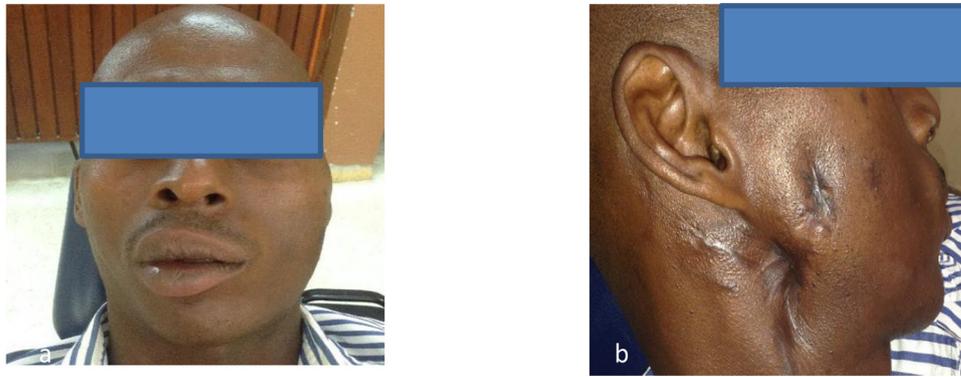


Fig. 3. Sequela of odontogenic mandibular osteitis: facial asymmetry (a) and unsightly scarring from the mandibular angle (b).

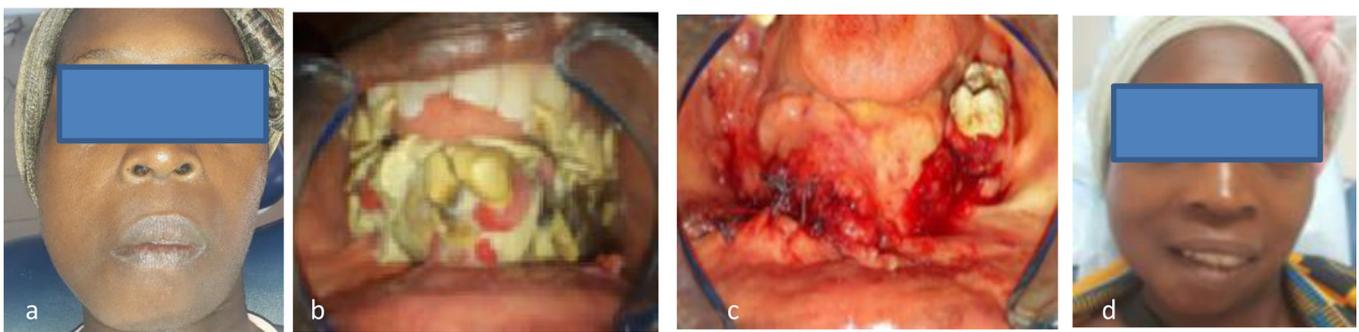


Fig. 4. Simple ablation of bulky sequestra (pulled out) and prosthetic rehabilitation. Right facial asymmetry (a). Intraoral view of the sequestrum (b) and after sequestrectomy (c). Prosthesis in place (d).

– Osteoradionecrosis of the maxillae with signs of radiation therapy.

Mutilating oral infectious diseases like noma, which mainly affects children suffering from malnutrition, combined with poor oral hygiene.

Management

The management of odontogenic maxillary osteitis is preventive, curative, and restorative. Prevention involves recommending regular odontostomatological consultations and adopting a good oral hygiene routine. The curative aspect comprises the earliest possible management (medical or medico-surgical treatment) to prevent progression to the formation of bone sequestra and other complications. Curative antibiotic therapy that complies with the best practice recommendations of the working group of the National Agency for the Safety of Medicines and Health Products (ANSM) is administered [14]. Subsequently, surgical and restorative management is performed, which comprises sequestrectomy followed by prosthetic rehabilitation (Fig. 4). In our clinical setting, >15% of the patients present with aesthetic and functional complications [3].

Conclusion

Odontogenic maxillary osteitis is an inflammatory and infectious bone disease that most often follows an untreated or poorly treated tooth infection. The preventive treatment of odontogenic maxillary osteitis involves the effective management of infected oral sites. When they occur, early treatment is required to limit the complications and aesthetic and functional sequelae. Unfortunately, these sequelae are quite common in African countries owing to the low socioeconomic status of the population and the remoteness of health infrastructure. Today, the epidemiological profile of patients presenting with this pathology have brought the effects of late consultation and poor oral hygiene to the forefront. Patients present to the first consultation during the stage involving the formation of significant bone sequestra requiring surgical excision and removal of a significant portion of the alveolar bone and teeth. The treatment of sequelae involves reconstructive surgical procedures supplemented by dental prosthetics. Hence, awareness of oral hygiene and regular consultations may guarantee of the prevention of maxillary osteitis, which remains a cause for concern in some developing countries.

Authors contributions

Aye Marcellin: Méthodologie; Kouame Patrice Attogbain: Rédaction du brouillon original; Kouyate Vazoumane, Atse Koboh: Visualisation, Investigation; Kouame Patrice Attogbain Amantchi Daniel: Rédaction – Révision et édition.

Informed consent

The authors declare that informed consent not required.

Ethical committee approval

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