

## Alveolar Osteitis. Current Concepts

Sergio Augusto Luis Fernandes<sup>1</sup> and Mario Utrilla Trinidad<sup>2\*</sup>

<sup>1</sup>Dentist, Oral Surgery Resident Hospital Universitario Fundación Jiménez Díaz Madrid, Spain

<sup>2</sup>Doctor in Dentistry, MBA in Healthcare Management, Director of the Master in Management and Direction of Dental Clinics of Psico Dent, Spain

**\*Corresponding Author:** Mario Utrilla Trinidad, Doctor in Dentistry, MBA in Healthcare Management, Director of the Master in Management and Direction of Dental Clinics of Psico Dent, Spain.

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### Abstract

**Objective:** The objective of this work is to obtain a compendium of the present knowledge on the alveolar osteitis: definition, etiology, prevention and treatment.

**Material and Method:** A bibliographic review has been carried out based on prospective scientific articles and systematic reviews published in PubMed.

**Conclusions:** Alveolar osteitis is the most frequent postoperative complication of extraction and is defined as a lesion produced a few days after a extraction, in which the alveolar bone of the extracted tooth is exposed because it has not been covered by a Blood clot or epithelium in the healing phase, frequently associating with pain.

As for the etiology, it remains unknown. Two theories have been the mainly proposals: the fibrinolytic theory of Birn and the bacterial theory. Another theory has been proposed and is based on the surgical trauma as a cause of alveolar osteitis.

The prevention of alveolar osteitis is more effective than its treatment, based on the application of agents that promote scarring such as chlorhexidine, platelet-rich plasma, fibrin-rich plasma, antibiotics, pastes made from eugenol and Povidone-iodized, as well as avoiding risk factors such as tobacco and the use of oral contraceptives.

Treatment could depend on the experience of each professional because of the complexity of the etiology of alveolar osteitis, there is no gold Standard, procedures such as irrigating with antiseptics or physiological saline, generating bleeding by curettage or rotary instruments, suturing and the application of intra-alveolar medication have been described.

**Keywords:** Alveolar Osteitis; Dry Socket; Tooth Extraction; Bone

### Introduction

Dental diseases and therefore the loss of teeth are among the most common diseases today at global level [1], this can lead to serious problems in the quality of life of people affecting the chewing, diction and aesthetics of Patients, found as main causes of dental loss caries and periodontal disease [2].

One of the most common procedures in the services of oral and maxillofacial surgery is the extraction of third molars as a result of caries, infections, cysts, orthodontic motifs or to prevent or treat periodontal problems of second molars [3].

When performing a extraction, a wound is generated in the alveolus which can be defined as a loss of tissue continuity at both the cellular and anatomical levels [4]. Being the alveolar osteitis a process in which there is a failure in the healing of the wound by disintegrating the blood clot that is formed initially [5].

## Objective of the Study

The objective of this work is to know the current concepts on alveolar osteitis: definition, etiology, prevention and treatment.

## Material and Method

A bibliographical review has been carried out based on prospective scientific articles and systematic reviews published in PubMed between 2005 and 2018.

## Result and Discussion

Alveolar osteitis is an injury which was first described by Crawford in 1896 [6-8] being the most common complication after dental extraction [7,9].

In order to understand this pathology should be understood in the first place that occurs in normal circumstances after a extraction.

It is known that the alveoli are fragile and labile, and vary considerably among individuals so they will depend heavily on local factors [10]. When losing a tooth is generated process that can be divided into three phases: inflammatory phase, proliferative phase and finally remodeling phase [5].

Schematically, they can be explained as follows:

- After the extraction is formed, within the alveolus, a clot of blood containing a network of fibrin, Polymorphonuclear and fibroblasts [5,10].
- Two or three days after the extraction begins to form a granulation tissue [5,10].
- On the fourth day, the epithelium that borders the wound grows and the osteoclasts reabsorb the alveolar crest [5,10].
- On the seventh day a connective tissue is developed that contains some areas of osteoid tissue [5,10].
- La reepithelization It is completed on day 20 and begins the mineralization forming bone tissue to be remodeled [5,10].
- The bony crest is reduced by one third after 40 days after the extraction [5,10].

Angiogenesis is one of the most important processes in the healing of a wound as it provides immune cells, regenerative cells, oxygen and nutrients; Essential factors in healing after a extraction [5].

Alveolar osteitis is a lesion produced a few days after a extraction, in which the alveolar bone of the extracted tooth is exposed after not being covered by a blood clot or epithelium in the healing phase, there can be some healing process with the formation of epithelium around the alveolus [5,6,9].

This lesion is frequently associated with pain due to mechanical stimuli of the affected bone because of the impact of food or contact with the tongue; it is possible to touch the soft tissues associated with the lesion in a careful way without causing pain [5,6,9]. The presence of fever is not associated with this pathology except in cases of immunocompromised patients or who have been treated by radiotherapy. In normal circumstances it is a self-limiting pathology [8].

The prevalence of this pathology is around 1% and 5%, with an increase in this when it is the extraction of the lower third molar (30 - 45%) [5-9].

There is an uncertainty about the cause of alveolar osteitis [5-7]. However, two theories have been proposed: the fibrinolytic theory of Birn and the bacterial theory [11,12] can be the origin a combination of both [12] one of the possible causes is the accumulation of food particles within the alveolus which can dissolve the clot of blood formed after the extraction. On the other hand, it is possible to see a new

formation of a clot of blood due to accumulations of bacterial plaque and of food because the fermentation or antigens can irritate the bone producing bad taste and halitosis, as well as pain [6].

It is known that there are risk factors that could increase the incidence of the pathology such as smoking, use of oral contraceptives and high presence of fibrinolytic activity in the affected area [5,6,9]. As well as the previous infection [5,9].

The role of tobacco in relation to alveolar osteitis is unknown, but it is thought that the clot of blood could be detached due to the suction force performed at Smoking may also influence the formation of a granulation tissue, a decreased local immune response, and increased inflammation [9]. Smoking affects the immune system by decreasing phagocytosis, quimiotaxis of neutrophils and inhibiting the production of immunoglobulins and nicotine absorbed by the oral mucosa decreases blood flow when acting as a vasoconstrictor. It is known the lesser incidence of alveolar osteitis in patients who apply plasma rich in fibrin as it acts as a three-dimensional structure that contributes platelets, leukocytes and cytokines, also stimulating cell migration and favoring the Scarring In addition to stabilizing the blood clot [3].

Moreover Eshghpour and Nejat they have described the relationship between anesthesia and this pathology because epinephrine could reduce the amount of blood and oxygen and increase fibrinolysis, having relation to the amount of anesthesia (three carpules) [9].

It has also been observed that traumatic extractions could increase the risk of causing alveolar osteitis and that the fibrinolysis induced by plasmin seems to be increased in this pathology being able not to be the bacteria the cause of the lesion [6,9].

It is known the fibrinolytic theory of Birn which is based on that the plasminogen, precursor of the plasmin, which circulates in the blood and binds to the clot of blood and to the wounds. Being the plasmin an important molecule because it induces inflammation and is responsible for dissolving blood clots, increase blood capillarity and attract inflammatory cells to the wound. So it has been created the hypothesis that a traumatic extraction or bacterial infection could release factors that convert to plasminogen plasmin and, in this way, induce fibrinolysis and dissolve the clot of blood thus exposing the alveolar bone. It is a controversial issue because by increasing vascular capillarity would increase the amount of blood in the alveolus and thus reduce the likelihood of appearance of alveolar osteitis [6,7].

An alternative theory has emerged based on which in traumatic extractions in which the bone is subjected to large amounts of compressive forces, these activate signals of apoptosis in the osteoblasts and there is a necrosis from which an activity begins fibrinolytic that dissolves the blood clot [6].

Necrotic cells produce the release of factors that convert plasminogen into plasmin for resorption which would increase fibrinolysis and blood flow but an idiopathic ischemia occurs in the lesions of alveolar osteitis, being able to be an explanation that by applying compressive forces in the extraction is occluded the blood vessels or it could also be produced by the scarce of blood vessels in the area there being no scientific evidence about it. This could correlate with the higher incidence of alveolar osteitis in extractions of inferior third molars as they are often traumatic extractions and the mandibular bone is dense [6].

Prevention of alveolar osteitis is known to be more effective than treatment, local application of chlorhexidine or platelet-rich plasma reduces the likelihood of onset of this lesion [9].

In a study by Hita-Iglesias, *et al.* it compares the effectiveness in the prevention of alveolar osteitis of chlorhexidine 0.2% in gel with chlorhexidine 0.12% in solution and they conclude that gel formulation is more likely to reduce the incidence of alveolar osteitis than chlorhexidine in solution [12]. On the other hand, in a study by Rodríguez-Pérez, *et al.* it compares the effectiveness of chlorhexidine gel 1% with chlorhexidine gel 0.2% and conclude that there are no differences in the reduction in the incidence of alveolar osteitis if applied twice a day for seven days [5].

Authors such as Jesudasan, *et al.* have concluded in a study that a paste made based on eugenol placed postoperatively could reduce the incidence of alveolar osteitis to the full while chlorhexidine to 0.2% in gel could reduce the incidence [5].

The use of antibiotics could be effective in preventing alveolar osteitis, but it is a controversial issue due to the possibility of creating resistances [8].

Povidone iodized possesses bactericidal, Sporicides, Viricides, fungicides, anti-inflammatory and hemostatic effects. Studies like that of Mesgarzadeh, *et al.* they test the reduction in the incidence of alveolar osteitis with its use [8].

In relation to age, the highest incidence is found in patients between 20 and 50 years. The reduction of incidence before the twenty could be explained by a better vascular flow, greater bone elasticity and by a better regenerative potential of the tissues. In one study, Blondeau, *et al.* it explains that performing the surgical extraction of the lower third molar before the age of 24 involves fewer complications than in older patients [8].

As for the treatment, this could depend on the experience of each professional because of the complexity of the etiology of the pathology [9]. In a review cochrane Conducted by Daly B., *et al.* there is no evidence to determine the effectiveness of alveolar osteitis treatments [13].

It has been described the possibility of eliminating the remains of food and bacterial plaque by irrigation with chlorhexidine or physiological saline and fill the alveolus with medication. On the other hand, it can be carried out, always respecting anatomical structures such as arteries and nerves, a curettage of the alveolus or making small bony perforations of 1 mm by means of rotary instruments, under local anesthesia, with the aim of inducing bleeding and also suturing to retain the medicine or the new clot of blood creating, in this way, a barrier that prevents the impact of food and allows a better cure. If there is a bony septum protruding from the occlusal surface, it should be reduced to 1 mm below it with rotary instruments [6].

It has also been proposed treatment with chlorhexidine 0.2% in gel placed intra-alveolar as possibly effective [14].

In a study by Parveen, *et al.* the effectiveness of the treatment of pain, inflammation and discomfort after applying turmeric longa in alveolar osteitis lesions has been reported. Being turmeric longa a traditional herb used in Asia and India which possesses action antibacterial, antifungal and anti-inflammatory [4].

## Conclusions

Alveolar osteitis is the most frequent postoperative complication of extraction and is defined as a lesion produced a few days after a extraction, in which the alveolar bone of the extracted tooth is exposed because it has not been covered by a blood clot or Epithelium in the healing phase, frequently associating with pain.

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