



Main Approaches to the Causes and Treatments of Periimplantitis: A Narrative Review

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Abstract: Periimplantitis is an inflammatory reaction associated with the loss of bone support around the implant, and its main pathological agent is the accumulation of biofilm. The diagnosis is made through radiographic exams, depth of probe, and verification of bone loss, and if the patient presents bleeding and changes in the tissues around the implant, he may already be in the infectious process of periimplantitis. Despite so many treatments offered for peri-implanted, further studies are needed on some aspects of their effectiveness.

Keywords: Peri-implantitis, Infection, Treatment

1. Introduction

In recent times, aesthetic and functional rehabilitation through dental implants has been a great alternative, but just like any dental treatment, the implant can present failures after its installation, being one of the main reasons for peri-implantitis [1]. Some risk factors such as patients with systemic diseases, smoking, history of periodontitis, presence of biofilm, and oral hygiene can compromise the success of the treatment [2]. For an implant to work, it is extremely important that osseointegration (junction of live bone with the implant surface) occurs perfectly and that the tissues around the implant correctly support it [3].

Implants other than natural teeth are not vascularized, so peri-implant tissue responds differently to infections and masticatory forces. Most patients with peri-implantitis have already developed gingivitis, periodontitis, or mucositis, so, before installing the implants, the dental surgeon must pay attention to the way the patient maintains his oral hygiene and whether the current systemic health of the patient is in agreement to receive the implant and have a good result [4].

Periimplantitis, if left untreated, can be an irreversible problem, so after the implant installation, follow-up consultations should be carried out, because the sooner the infection is identified, the easier it is to

be treated, not getting worse and not leading to the loss of the implant., remember that the treatment of the case depends on the diagnosis to know the means [5].

Therefore, this study aimed to perform a bibliographic analysis using the content available in the main databases through works that report on the etiology of periimplantitis, characteristics, and treatments that can be effective in resolving the infectious condition.

2. Methods

2.1. Study Design

The present study followed a review model. After literary search criteria using the MeSH Terms that were cited in the item below on "Search strategies", a total of 65 clinical studies were compared and submitted to the eligibility analysis and, after that, 22 studies were selected.

2.2. Search Strategy and Information Sources

The search strategy was carried out in the databases Medline, Embase, Pubmed, Ovid and Cochrane followed the following steps: search by MeSH Terms: *peri-implantitis, infection and treatment,*

and use of Booleans “and” between mesh terms and “or” among historical findings.

2.3. Risk of Bias

According to the Cochrane model for the risk of bias in the present study, the global assessment resulted in 3 studies with a high risk of bias and 5 studies with uncertain risk. In addition, there was an absence of the funding source in 2 studies and 3 studies did not disclose information about the declaration of conflict of interest.

3. Literature Review and Development

3.1. The implant

To rehabilitate the patient's aesthetic and masticatory function, many dental surgeons indicate the dental implant as a solution. Despite being a great alternative, the procedure must be carefully analyzed to see if the patient can do the same and the chances of success. The implant, becoming Osseo integrated (fixed in the bone) and presenting good shape in contact with the gingival tissue, can then receive the prosthetic element [6].

To install the implant, some factors must be taken into account, such as; the type of implant to be used, the quality and quantity of bone, hygiene, and medical history of the patient. After its installation, a follow-up should be done, as the implants remain anchored in the bone and are exposed to the oral cavity through the mucosa, thus being susceptible to forming the bacterial biofilm [6]. Probing should be avoided within the first three months after the insertion of the healer [7].

3.2. Periimplantitis

Around the implant, a peri-mucosal seal forms, which connects the connective tissue with the implant, an inflammation of the tissues that support the implant occurs and, consequently, a complication in our Osseo integrated tissue. Peri-implantitis begins with the coronary portion of the implant and, if left untreated, can progress to the most apical portion and cause the failure of the implant installation [8]. Just like natural teeth, the implant can also have the accumulation of biofilm, which is the main factor of peri-implant and periodontal disease, despite being a multifactorial disease [3]. This bacterial inflammation that occurs around the implant and compromises the tissues and its loss, can present biomechanical factors where

excessive loads are directed on the implant and the bone, presenting slow and asymptomatic symptoms [7].

Periodontitis is very similar to peri-implantitis, as the same types of bacteria are found, but the microbiota of peri-implantitis is similar to that of a bag with chronic periodontitis. Some studies show that implants installed, after 14 days, already have periodontal pathogens, but these pathogens vary over time and after 28 days it changes to a flora similar to chronic periodontitis [9]. The colonization process begins with the saliva that, associated with poor hygiene, generates the infection [9-13]. The mobility of the implant only occurs in the final stage of the disease, and the patient is unlikely to have pain. If the patient already has pain, a sign that he may already have some acute infection [14-16].

The disease can be classified at an early stage; in which it presents 4mm with bleeding after probing and bone loss, moderate phase; 6mm with bleeding on probing and bone loss, and severe; 8 mm with bleeding after probing and radiographically visible bone loss [17].

3.3. Etiology

Despite being the main cause of peri-implantitis, biofilm can be associated with other factors that can lead to implant loss, such as; smoking, lack or limitation of oral hygiene, systemic diseases (decompensated diabetes, immunosuppression), genetic factors, among others [8]. A poorly adapted prosthesis, occlusal overload, and lack of correct planning are also factoring that can lead to implant failure [3].

Smoking and diabetes alter the individual's defense system, leading to poor healing and impaired osseointegration [9]. For smoking patients, it should be advised to stop using tobacco one week before surgery and two months after surgery, since with this pause there is a greater possibility of osseointegration [18]. Diabetes patients, if not controlled, may also decrease the potential for bone remodeling and increased infection. In patients with a history of periodontitis, peri-implantitis can be approximately six times greater, forming exudate on mucosal tissues [19].

Osteoporosis is a major challenge for osseointegration, in which case the implants need to be wider and coated with hydroxyapatite to increase contact with bone [20]. The disease can be diagnosed

through clinical and radiographic examinations, in which in the clinical examination if the patient presents bleeding on probing, increased probing depth, visible bone loss, and altered soft tissue contour and consistency, a sign that is in the context of periimplantitis. Pain is not a sign of the disease, but if the patient has pain, it may be that he has an acute infection and may present with exudate and suppuration [21].

3.4. Treatments

To carry out the treatment, it is initially necessary to remove the agent that causes the infection. The treatment aims to improve the oral hygiene of the patient, removal of the biofilm and decontamination of the implant surface [9], and its choice depends a lot on the stage of the disease, the degree of infection and varies from patient to patient, and can be divided into surgical treatment. and non-surgical. Non-surgical treatment, when the infectious condition is in its initial stage, can be done with the cleaning and removal of the biofilm and irrigation with 0.12% chlorhexidine (irrigation with chlorhexidine will only be effective when the probing depth is up to 3mm) [3]. In moderate cases, scraping with plastic curettes is recommended to avoid damaging the implant surface, bicarbonate jets, polishing with rubber cups and pumice.

The surgical process should only be performed when there are bone loss and a peri-implant pouch, with instrumentation done with an open flap, removing bacteria, and decontaminating the implant surface. Treatment can be associated with the use of low-level laser therapy that significantly helps [7], generating a lethal effect on bacteria through cellular apoptosis without harming the implant [20-22], and the use of medications such as metronidazole and amoxicillin when applicable bleeding during probing (to eliminate bacteria), helping soft tissue healing, as well as regenerative surgeries with membranes and bone grafts in more severe cases of inflammation as part of the surgical treatment to recover bone support and remodel soft tissues and bone structure [15].

Some studies show the use of enamel matrix protein derivatives, marketed as (EMDs), as they inhibit the growth of Gram-negative bacteria. The results were positive, but it is still seldom used in treatments [22].

4. Conclusion

It was concluded that peri-implantitis is a complication in the Osseo integrated implant and that to avoid it, it is necessary to initially plan the case and preventive measures before, during, and after the operation. The means of treatment depends a lot on the diagnosis for the realization and the stage of the disease, but in all cases, the infection control, mechanical cleaning, removal of the peri-implant pouch must be done together with the hygiene instructions. In other cases, the use of a low-level laser can contribute to treatment. The sooner periimplantitis is diagnosed and treated, the chance of success will be greater. The dental surgeon must be aware of the factors that may be relevant to the failure of the implant, such as; smoking, systemic conditions, occlusal balance, surgical procedure, and bone quality and quantity.

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Ethics Approval

Approval was sought and granted by the Departmental Ethics Committee.

Informed consent

Informed written consent obtained from the participant

Conflict of interest

The authors declare no conflict of interest.

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