

Peri-Implantitis: A Review

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Abstract

Dental implants are widely used now-a-days for rehabilitation of partial & complete edentulous. The prevalence of peri-implant complications will increase as dental implant-retained prostheses become routine. Peri-implant diseases are present in two forms: peri-implant mucositis and peri-implantitis. Peri-implant disease should be diagnosed & treated as soon as possible to prevent implant failure. As untreated periodontitis can eventually lead to loss of natural teeth, peri-implantitis can result in failure of dental implants. This literature review deals with various aspects the pathogenesis, risk factors, diagnosis, and preventive and treatment of peri-implant mucositis and peri-implantitis.

Key Words: *Implants, Osseointegration, Peri-Implantitis, Peri-mucositis*

Introduction

Dental implants have become an indispensable established therapy in dentistry in order to replace missing teeth in different clinical situations. Success rates of 82.9% after 16 years follow-up have been reported.[1] Under care and attention of indications, anatomical and intra-individual limiting factors, insertion of dental implants seems to represent a “safe” treatment option. Nevertheless, in the last decades increasing evidence raised on the presence of peri-implant inflammations representing one of the most frequent complications affecting both the surrounding soft and hard tissues which can lead to the loss of the implant.[2] Peri-implant diseases present in two forms: peri-implant mucositis and peri-implantitis. Both of these are characterized by an inflammatory reaction in the tissues surrounding an implant.[3,4] Peri-implant mucositis has been described as a disease in which the

presence of inflammation is confined to the soft tissues surrounding a dental implant with no signs of loss of supporting bone following initial bone remodeling during healing. Peri-implantitis has been characterized by an inflammatory process around an implant, which includes both soft tissue inflammation and progressive loss of supporting bone beyond biological bone remodeling.[5,6] Peri-implantitis is an inflammatory process affecting the soft and hard tissues surrounding an implant. This disease is associated with loss of supporting bone bleeding on probing and occasionally suppuration.

Etiology

The description of the inflammatory process of periimplant mucositis around an implant is quite similar to gingivitis around natural teeth. Peri-implantitis, like periodontitis, occurs primarily as a result of an overwhelming bacterial insult and subsequent host immune response. Outcomes from animal[7] and human cross-sectional studies[8] have found that the bacterial species associated with periodontitis and peri-implantitis are similar, mainly Gramnegative aerobes. Moreover, *Staphylococcus aureus* may also be an important pathogen in the initiation of peri-implantitis.[8] Basically, similar markers are upregulated between periimplantitis and periodontitis, including proinflammatory cytokines such as interleukin

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(IL)-1, IL-6, IL-8, IL-12, and tumor necrosis factor (TNF)-alpha.[9,10] Although sharing similarities with periodontitis in both the bacterial initiators and key immune components to those insults, the rate of disease progression and the severity of inflammatory signs for peri-implantitis may be different. A number of risk factors have been identified that may lead to the establishment and progression of peri-implant mucositis and peri-implantitis[11] like previous periodontal disease, poor plaque control, residual cement, smoking, genetic factors, diabetes and Occlusal overload.

Diagnosis

Periimplantitis can be diagnosed early or once clear clinical evidence has developed. The most common signs and symptoms are: Color changes in keratinised gum tissue or in the oral mucosa, bleeding on probing, increased probing depth of periimplant pockets, Suppuration and Periimplant radiotransparency and Progressive loss of bone height around the implant. There is no single diagnostic tool that can, with certainty, establish a diagnosis of peri-implantitis. A list of diagnostic considerations for the early detection of peri-implantitis is as follows: Probing, Bleeding, Suppuration, radiographs, and implant mobility. Bacterial culturing, inflammatory markers, and genetic diagnostics may be useful in the diagnosis of peri-implant diseases. Regarding the diagnosis of peri-implantitis, probing of the peri-implant sulcus is an essential element for the diagnosis of peri-implant infections, in the same way as in periodontitis.

Management

The principal objectives of the treatment of peri-implantitis are to reduce bacterial colonization of the surface of the implant, mechanically eliminate the bacterial microbiota, and introduce ecology capable of suppressing the subgingival anaerobic flora. Both surgical and nonsurgical techniques have been developed to this effect.[12] The treatment protocol will differ depending on whether it is peri-implant mucositis or peri-implantitis. If there is no bone loss, i.e. in the case of mucositis, bacterial plaque and calculus should be removed and chemical plaque control is achieved with 0.12% chlorhexidine applied topically, every 8-12 h for 15 days; the patient must be given oral hygiene instructions. Prosthetic design should also be checked and modified if necessary, in order to correct design defects that impede proper hygiene, as

well as to correct biomechanical stress factors involved. Once this initial phase is completed, periodic check-up must be scheduled, gradually reducing the interval between maintenance visits.[13] For management of peri-implantitis, both non-surgical as well as surgical approaches can be employed.

Conventional hand and ultrasonic instruments are not suitable for the preparation and detoxification of the implant surface. Prophy jet, the use of a high pressure air powder abrasive (mixture of sodium bicarbonate and sterile water), has been advocated, as this removes the microbial deposits, does not alter the surface topography and has no adverse effect on cell adhesion. Various chemotherapeutic agents like contact with a supersaturated solution of citric acid (40% concentration; pH 1) for 30-60 seconds have been used for the preparation of the implant surfaces, as they have the highest potential for the removal of endotoxins from both the hydroxyl apatite and the titanium implant surfaces. Soft laser irradiation has also been used for the elimination of the bacteria which are associated with peri-implantitis.[14] Additionally, the systemic administration of antibiotics that specifically target gram-negative anaerobic organisms has shown an alteration in the microbial composition and a sustained clinical improvement over a 1-year period.[15]

Alternatively, a local delivery device, Actisite (fibers containing polymeric tetracycline HCl) has been tried and this resulted in significantly lower total anaerobic counts.[16] The type of osseous defects should be identified before deciding on the surgical treatment modality. If the defect is in the unaesthetic zone and is mainly of the horizontal type, the management can focus on the correction of the soft tissue portion of the periimplant pocket. Standard techniques such as gingivectomy and apically displaced flaps are used in these situations to reduce the pocket and to improve the access for oral hygiene.

If the vertical (< 3mm) 1 to 2-wall defects are found, then the respective surgery can be used to reduce the pockets, to smoothen the rough implant surfaces, to correct the osseous architecture and to increase the area of the keratinized gingival.[17] To arrest the progression of the disease and to achieve a maintainable site for the patient, all implant surfaces that are smooth and clean coronal to the bone level are preferred. Therefore, the surface with

threads or roughened topography such as hydroxyapatites, are indicated for alteration with high speed diamond burs and polishers to produce a smooth continuous surface. [18] Surface modifications are not performed during a regeneration surgery, where metal particles can interfere with the regeneration of bones.

Various bone graft techniques and guided bone regeneration (GBR); even in conjunction with platelet rich plasma (PRP), have been successfully used for the regeneration of lost bones in 3 wall or circumferential defects. It is advisable to remove the prosthesis at the time of regenerative surgery; nevertheless, perigingival regenerative therapy for one stage implants or for implants with non-retrievable prosthesis can also be done. A thorough preparation of the implant surface should be followed by an elaborate rinsing with saline solution. Roughening of the bone surface can be done by penetration with round burs to increase the accessibility to the osteogenic cells. The membranes which are placed should ensure the complete coverage and the isolation of the bony defect. The reflected flap should be closed primarily over the site with a mattress and interrupted sutures. The membrane should be left undisturbed for 4-6 weeks. Intra-oral autogenous bone grafts are the most preferred types of grafts for GBR therapies.[19]

Conclusion

Implant failure is one of the main concerns in modern dentistry. A precise evaluation of each case by the clinician is essentially very critical point in long term success of implant stability. The patient should be fully educated with absolute information and be made entirely conscious of the risk of treatment failure, as well as probable complications, limits to the procedures, and the fact that successful outcome will also depend upon the regular home oral hygiene measures. The bacterial status is of supreme significance to ensure the success of implant outcome since the key source of implant failure is bacterial contamination.

Long term success of an implant depends on regular maintenance program. During maintenance phase, peri-implant tissue should be evaluated for inflammation. Regular radiographs will give the status of bone around implants. New treatment modalities need to be evaluated using long-term randomized-controlled studies to identify predictable and successful treatment of peri-implantitis.

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