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REVIEW ARTICLE **OPEN ACCESS**

Periimplantitis -"The Current Perspective"

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ABSTRACT
Following dental implant surgery, Periimplant disease which is known as an inflammation of the surrounding hard and soft tissue has developed into a major condition. Peri-implantitis might cause the loss of the implant due to prevalence rates as high as 56 percent if it is not properly detected and managed. Effective preventive strategies include regular check-up intervals and maintenance of proper dental hygiene. Treatment methods for Periimplant disease include both conservative and surgical measures. It is apparent that conservative techniques can effectively treat mucositis. Conservative approach includes manual and surface debridement. In advanced Peri-implantitis cases surgical therapies along with conservative approaches are the recommended treatment options. Reconstructive surgery can be employed to remove the bone defects or peri-implant lesions depending on how the faults are configured, whereas regenerative therapies entail filling in the defects. This review's objective is to give a general summary of the most recent information on diagnosis, avoidance, and various treatment techniques based on the kind of lesion and type of osseous defect.
Keywords: *Periimplantitis, Dental Implant, Laser therapy, Photodynamic therapy*

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INTRODUCTION

Dental implants have evolved as a permanent solution to replace missing teeth and to improve chewing, speaking ability, along with esthetics. The prevalence of implant-related issues has risen in tandem with an increase in the usage of implants as the optimum prosthetic substitute for missing teeth. According to systematic reviews, Periimplant mucositis is present in around 43% of cases (range 19-65%), while periimplantitis is present in about 22% of cases (range 1-47%)[1].

HISTORY

Levignac defined peri-implantitis as periimplant soft-tissue inflammation followed by destruction of bones in 1965. Periimplantitis is an infectious illness with several characteristics similar to chronic periodontitis, according to Mombelli et al. in 198[2-3]. In the 1987, Mombelli et al described that like Periodontitis, Periimplant microbiota, was the initiating component in the etiopathogenesis of Periimplantitis, resulting in inflammatory bone loss

In the consensus report from the inaugural European Workshop on Periodontology in 1993, the term "periimplantitis," which refers to an irreversible inflammatory illness causing destruction around implants in function that results in bone loss, was recognized [4-5] . Periimplant mucositis, according to Albrektsson and Isidor (1994), is a temporary inflammatory reaction in the tissues surrounding a dental implant, while periimplantitis, which affects both the surrounding hard and soft tissues of implants and is linked to bone resorption, is a chronic, irreversible condition [6-7]. At the 6th European Workshop on Periodontology, the definition was modified and collective term was given for both Periimplant mucositis and Periimplantitis as "Periimplant Disease". According to the 7th European Workshop conducted on Periodontology the definition was further updated to include bone level at the crest and presence of Bleeding on probing & Suppuration, with increased Peri-implant pocket depth in order to improve the quality of research on Peri-implant diseases. Periimplantitis is an inflammatory response to the loss of supporting bone following the initial biological remodelling of bone surrounding an implant in function, according to the American Academy of Periodontology definition published in 2013[8-11] The key clinical characteristics of periimplant mucositis have recently been described as bleeding on light probing, redness, edema or suppuration, which may or may not be present.

Etiology of peri-implant disease

The possible biological complications of dental implants are summarised below by Sarmiento HL et al. **[12]**

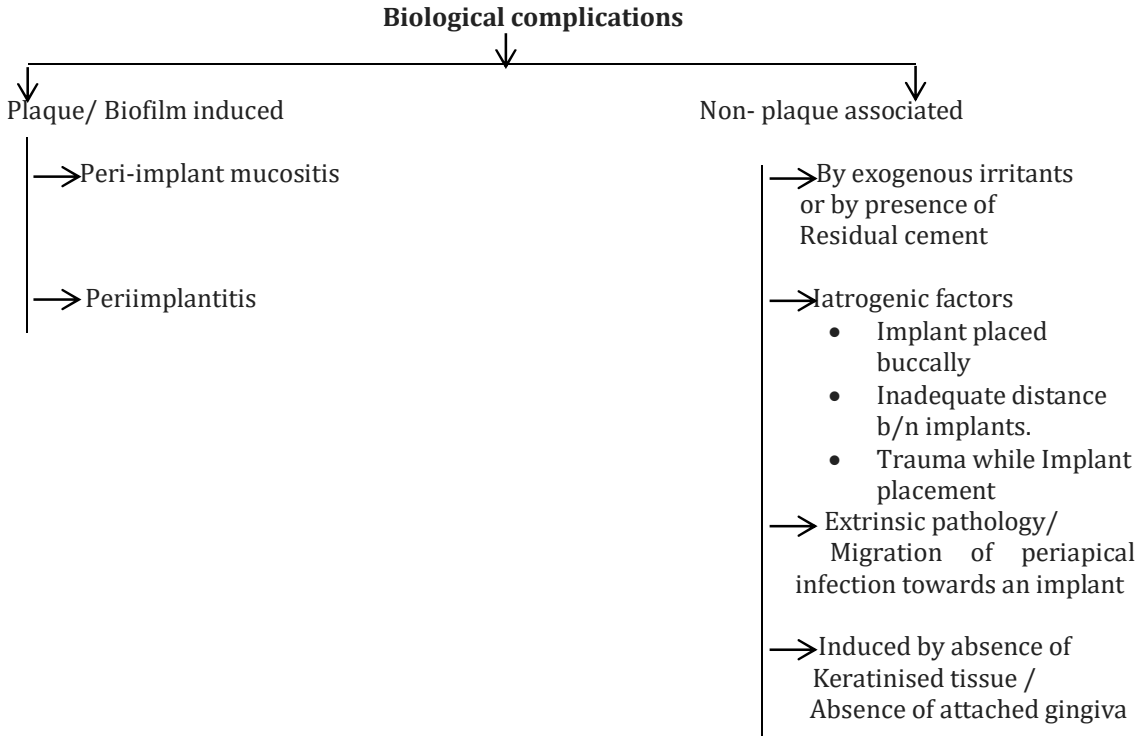

Figure 1 – Etiology of Periimplant Disease

Pathogenesis of Periimplant mucositis and Periimplantitis

In 1987, microbial samples were retrieved from peri-implant pockets >5 mm of depth in seven cases of cylindrical titanium implants that failed to osseointegrate. Thirty-six failed implant sites, in 13 patients with various implant types, were examined for the presence of three gram-negative organisms, *Actinobacillus actinomycetemcomitans*, *Prevotella intermedia*, and *Porphyromonas gingivalis*[13] . According to the literature available on the etiopathogenesis of both periodontitis and peri-implantitis, the biofilm-containing microorganisms are primarily responsible for the disease's onset. Both the diseases were found to be associated with similar kind of microbiota rich in gram-negative bacteria. Clinically the risk factors involved for Periodontitis may be considered as identical to those for Peri-implantitis [14].

Diagnosis of Periimplant Disease: Periimplant probing

Clinical and radiological data collected following prosthesis installation of implants at baseline and compared at follow-up visits can be used to make the diagnosis of Periimplantitis.

The following characteristics are used to make the periimplantitis diagnosis:

1. The presence of bleeding on light probing & suppuration
2. Increase in the probing depth in comparision to earlier findings
3. When bone loss is evident above changes in crestal bone level brought on by initial bone remodelling.

A plastic probe is an essential diagnostic instrument for monitoring the health of the Peri-implant mucosa clinically. In an animal study, it was shown that using a mild force of 0.3 to 0.4 N, which is suggestive of a light probing force (0.2-0.25 N) around the implant, the probe tip stops within the connective tissues at both natural teeth and implants with minimal bleeding and is safe for the nearby soft tissues. The probe almost touches the bone when Periimplantitis is present [15-16]

TREATMENT

Conservative therapy

Conservative therapy can be done manually by the use of ultrasonic scalers, curettes and air polishing systems, laser and photodynamic therapy. During a randomised controlled clinical trial, Sham *et al*. evaluated the efficacy of an air-abrasive device used for non-surgical therapy of peri-implant disease. They found that (I) the result of both treatment procedures were almost similar but observed little gain in clinical attachment level (CAL) at 6 months [17-18].

Drug Therapy

Antibiotics are a supplemental therapy option that might be local or systemic. Clinically, it leads to more effective reduction of Peri-implantitis symptoms when combined with other conservative or surgical treatments. Heitz-Mayfield et al assessed the role of systemic antibiotics Amoxicillin and metronidazole as an anti-infective method of care for Periimplantitis [19].

Laser Therapy

Low convergence of a beam of radiation with various wavelengths produces a laser, also known as "Light Amplification by Stimulated Emission of Radiation." They are a part of the red infrared light spectrum, which has a number of uses. CO2, Diode, Er-YAG (yttrium-aluminum-garnet doped with erbium), and Er,Cr;YSGG (erbium, chromium-doped: yttrium-scandium-gallium-garnet) Due to their bactericidal mode of action, lasers are being used more frequently to sterilise implant surfaces for the treatment of Peri-implant infections. Nonsurgical treatment of Peri-implantitis was compared by Schwarz et *al***.** He found that an Er:YAG laser is more successful than mechanical debridement utilizing plastic curettes and antimicrobial therapy. They concluded that (i) the investigated clinical parameters showed significant improvement at 6 months follow up in both the therapies, and (ii) Statistically significant higher reduction of BOP was resulted with Er-YAG [20]. The effects of the surface debridement & decontamination techniques on the clinical results during surgical treatment of Peri-implantitis were examined by Schwarz et *al*. The intra-bony areas were assigned at random to either i) surface debridement with an Er-YAG laser or (ii) surface debridement with plastic curettes + 1 cotton pellet + 1 sterile saline (CPS). According to the study, the kind of surface debridement had no appreciable impact on the clinical outcome following combined surgical therapy for advanced Periimplantitis lesions [21].

Photodynamic Therapy

Photodynamic therapy involves the generation of reactive oxygen species by irradiation of photosensitizer with diode laser. The commonly used photosensitizer in Photodynamic therapy are toluidine blue dye and methylene blue dye. Schar D *et al* compared the clinical outcomes of the two treatment modalities (1) peri-implant disease treated non-surgically with either photodynamic therapy or local drug delivery. It was found that in Peri-implant mucositis cases, the treatment protocol incorporating mechanical debridement non-surgically along with photodynamic therapy has similar effects in limiting mucosal inflammation as it was found during the use of minocycline microsphere for six months. Therefore, photodynamic therapy as adjunctive treatment therapy may appear like an alternative treatment option for treating Peri-implant mucositis. But none of the alternative therapy lead to complete eradication of inflammation routinely [22]. For the advanced cases of Peri-implant defects, Schwarz *et al.* examined 2 methods of surface debridement & decontamination procedures and obtained results at 2 years after respective and regenerative therapy. They claimed that after combined surgical therapy for advanced Peri-implantitis, factors other than the technique used for surface debridement & decontamination may have an impact on the clinical outcome in the long run [23]. Bassetti *et al* compared the clinical, microbiological and host-derived outcomes of adjunctive local drug delivery or adjunctive photodynamic therapy in the non-surgical management of Peri-implant mucositis after 12 months. It was determined that adjunctive PDT may seem like a different course of action for the non-surgical management of Peri-implant mucositis [24]. Azizi *et al*. evaluated the efficacy of light-activated disinfection (LAD) and photodynamic treatment (PDT) against a suspension of three different bacterial species that had been present on titanium dental implants for three days. Additionally, they looked for any potential modifications to the implant surfaces brought on by the PDT and LAD [25]. They found that the PDT1 and PDT2 groups had the highest rates of bacterial reduction (PDT (660 nm, 100 mW, 60 seconds) with toluidine blue and phenothiazine chloride dye, respectively) (98.3 percent and 97.8 percent, respectively). According to the study's findings, the PDT1 and PDT2 groups' bacteria levels were statistically significantly less than those of the negative control group (P .05).

Surgical Therapy

In the previously described surgical therapy, the concepts of reconstructive and regenerative techniques are combined with those of the previously mentioned non-surgical therapy. Both bacterial eradication and the removal of the Peri-implant bone defect using methods like ostectomy and osteoplasty are included in reconstructive surgery. Additionally, the implantoplasty procedure can be used to polish and smooth the supracrestal implant surface. According to Serino *et al* analysis, a therapeutic strategy for people with Peri-implant disease may comprise eliminating the surgical pocket, contouring the bone, and treating plaque both before and after surgery. Two years following open reduction of inflammatory peri-implant soft tissue and osseous surgery, 48% of patients had no peri-implantitis symptoms. 77 percent of the time, bleeding or pockets deeper than 6 mm [26]

Regenerative approaches

The majority of retrospective studies found that regenerative methods were more effective than debridement with surface decontamination. The combined use of membranes and bone grafts gave better

results when compared during the use of membranes/bone grafts alone. Schwarz et al. performed access flap surgery on 22 individuals at random and employed nanocrystalline hydroxyapatite rather than heterologous bone material with collagen membrane. Although no discernible difference between the groups were found after six months, both therapies showed a rise in clinical attachment levels and a reduction in probing depth [27]. Effects of two surface cleaning methods on long-term outcomes following combined surgical removal and regenerative therapy of advanced peri-implantitis lesions were examined by Schwarz *et al*. They concluded that combined osseous resection or regenerative therapy for advanced peri-implantitis had no impact on the 4-year clinical outcome [28].

CONCLUSION

Early identification of Periimplant disease is now achievable thanks to the existing agreement on the criteria of Periimplant diseases. Hence it brings progression of the disease progression to a halt. No ideal approach to "absolute peri-implantitis therapy" has been described because there are very less prospective randomized studies with long term follow up. In non-surgical therapy, the options mentioned are air polishing systems and mechanical debridement with curettes. For short-term bacteria elimination local or systemic antibiotics and antiseptic rinses are effective therapy. Additional treatment options include laser and photodynamic therapy. However, long-term benefits of these methods have not been concluded. When non-surgical treatment is not found to be a definitive resolution to peri -implantitis, then other treatment options are resective and augmentative procedures.

In order to repair Periimplant abnormalities, improve hygienic performance, or an attempt to stop the progression of Peri-implantitis, resective surgery may be used. Regenerative methods produce positive outcomes, such as when xenograft materials are combined with a resorbable membrane. Numerous studies have indicated positive short-term results, but they have also observed lack of disease resolution, and implant loss despite treatment. Therefore, the most important part is prevention which depends on correct treatment planning, implant insertion as atraumatically as possible and regular follow up with maintainence of good oral hygiene.

REFERENCES

1. Jepsen S, Berglundh T, Genco R, et al. (2015). Primary prevention of periimplantitis: Managing peri-implant mucositis. J Clin Periodontol. 42: S152–S157
2. Tallarico M, Monje A, Wang HL, Galindo Moreno P, Xhanari E, Canullo L. (2016). A systematic review on the definition of periimplantitis: limits related to the various diagnoses proposed. J Oral Science Rehabilitation. ;2(4):42–53.
3. Mombelli A, Van Oosten MAC, Schu¨ rch E, Lang NP. (1987). The microbiota associated with successful or failing osseointegrated titanium implants. Oral MicrobiolImmunol : 2: 145–151.
4. Poli PP, Cicciu M, Beretta M, Maiorana C. (2017). Peri-Implant Mucositis and Peri-Implantitis: A Current Understanding of Their Diagnosis, Clinical Implications, and a Report of Treatment Using a Combined Therapy Approach. J Oral Implantol. 43(1):45-50.
5. Lang NP. (1994). Proceedings of the 1st European Workshop on Periodontology, Charter House at Ittingen, Thurgau, Switzerland, February 1–4, 1993. London: Quintessence; 478 p.
6. Albrektsson, T. and Isidor, F. (1994) Consensus Report of Session IV. In: Lang, N.P. and Karring, T., Eds., Proceedings of the First European Workshop on Periodontology, Quintessence Publishing, London, 365-369.
7. Lindhe J, Meyle J; (2008). Group D of the European Workshop on Periodontology. Peri-implant diseases: Consensus report of the sixth European Workshop on Periodontology. J Clin Periodontol.35 (8):282-5.
8. Lang NP, Berglundh T; (2011). Working Group 4 of the Seventh European Workshop on Periodontology. Periimplant diseases: where are we now?—Consensus of the Seventh European Workshop on Periodontology. J ClinPeriodontol. 38:178–81.
9. American Academy of Periodontology. (2013). Academy report: peri-implant mucositis and peri-implantitis: a current understanding of their diagnoses and clinical implications. J Periodontol. 84(4):436–43.
10. Renvert S, Persson GR, Pirth Q, et al. (2018). Peri-implant health, peri-implant mucositis, and peri-implantitis: Case definitions and diagnostic considerations. J Clin Periodontol. 45(20): 278–285.
11. Renvert S, Persson GR, Pirth Q, et al. (2018). Peri-implant health, peri-implant mucositis, and peri-implantitis: Case definitions and diagnostic considerations. J Periodontol. ;89(1):S304– S312.
12. Sarmiento HL, Norton MR, Fiorellini JP. (2016). A Classification System for Peri-implant Diseases and Conditions. Int J Periodontics Restorative Dent;36:699–705.
13. Becker W, Becker BE, Newman MG, Nyman S. (1990). Clinical and microbiologic findings that may contribute to dental implant failure. Int J Oral MaxillofacSurg: 5: 31–38.
14. Smeets R, Henningsen A, Jung O, Heiland M, Hammächer C, Stein JM. (2014). Definition, etiology, prevention and treatment of peri-implantitis – a review. Head Face Med 10, 34 .
15. Serino G, Turri A, Lang NP. (2013). Probing at implants with peri-implantitis and its relation to clinical peri-implant bone loss.Clin Oral Implants Res. 24:91–95.

16. Luterbacher S, Mayfield L, Brägger U, et al. (2000). Diagnostic characteristics of clinical and microbiological tests for monitoring periodontal and peri-implant mucosal tissue conditions during supportive periodontal therapy (SPT). Clin Oral Implants Res. 11:521–529.
17. Passi D, Singh M, Dutta SR, Sharma S, Atri M, Ahlawat J, Jain A. (2017). Newer proposed classification of periimplant defects: A critical update. Journal of Oral Biology and Craniofacial Research, 7(1): 58-61.
18. Sahm N, Becker J, Santel T, Schwarz F: (2014). Non-surgical treatment of peri-implantitis using an air-abrasive device or mechanical Smeets et al. Head & Face Medicine, 10:34 Page 11 of 13 http://www.head-face-med.com/content/10/1/34.
19. Persson GR, Salvi GE, Heitz-Mayfield LJA, Lang NP. (2006). Antimicrobial therapy using a local drug delivery system (Arestin s) in the treatment of peri-implantitis. I: microbiological outcomes. Clin. Oral Impl. Res. 17:386–393.
20. Schwarz F, Sculean A, Rothamel D, Katja Schwenzer K, Georg T, Becker J. (2005). Clinical evaluation of an Er:YAG laser for nonsurgical treatment of peri-implantitis: a pilot study. Clin Oral Implants Res;16(1):44-52.
21. Schwarz F, Sahm N, Iglhaut G, Becker J. (2011). Impact of the method of surface debridement and decontamination on the clinical outcome following combined surgical therapy of peri-implantitis: a randomized controlled clinical study.J Clin Periodontol. ;38(3):276-84.
22. Scha¨r D, Ramseier CA, Eick S, Arweiler NB, Sculean A, Salvi GE. (2012). Anti-infective therapy of peri-implantitis with adjunctive local drug delivery or photodynamic therapy: six-month outcomes of a prospective randomized clinical trial. Clin. Oral Impl. Res. 12: 1–7.
23. Schwarz F, John G, Mainusch S, Sahm N, Becker J. (2012). Combined surgical therapy of peri-implantitis evaluating two methods of surface debridement and decontamination. A two-year clinical follow up report. J Clin Periodontol 10; 80-89.
24. Bassetti M, Scha¨r D, Wicki B, Eick S, Ramseier CA, Arweiler NB, Sculean A, Salvi GE. (2014). Anti-infective therapy of peri- implantitis with adjunctive local drug delivery or photodynamic therapy: 12-month outcomes of a randomized controlled clinical trial. Clin. Oral Impl. Res. 25: 279–287.
25. Azizi B, Budimir A, Mehmeti B, Jakovljević S, Bago I, Gjorgievska E, Gabrić D.(2018). Antimicrobial Efficacy of Photodynamic Therapy and Light-Activated Disinfection against Bacterial Species on Titanium Dental Implants. Int J Oral Maxillofac Implants;33(4):831-837.
26. Serino G, Turri A. (2011). Outcome of surgical treatment of peri-implantitis: results from a 2-year prospective clinical study in humans. Clin Oral Implants Res. 22(11):1214-20.
27. Mahato N, Wu X, Wang L. (2016). Management of peri-implantitis: a systematic review, 2010-2015. Springerplus ; 1:5:105.
28. Schwarz F, John G, Mainusch S, Sahm N Becker J. (2012). Combined surgical therapy of peri-implantitis evaluating two methods of surface debridement and decontamination. A two-year clinical follow up report. J Clin Periodontol. 39(8):789-97.

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