Original Research Paper

VOLUME-6 | ISSUE-3 | MARCH - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

PERIODONTAL MANAGEMENT OF PERI-IMPLANT DISESES: A LITERATURE REVIEW

Dental Science

KEYWORDS: Dental implants, peri-implantitis, peri-implant mucositis, management.

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ABSTRACT

Peri-implant mucositis and peri-implantitis are two of the most common biological dental implant complications. The management of these conditions is essential for maintenance of oral health in patients with implant-retained prosthesis. Various treatment modalities are available, which include infection control, implant surface detoxification and alveolar bone regeneration. This review sheds light on different treatment choices available for treatment of peri-implant diseases.

INTRODUCTION

Peri-implant diseases are the pathological inflammatory changes that occur in tissue surrounding a load bearing implant. It is one of the most common complications in orofacial implantology.[1] Two terms are described in peri-implant diseases: 1) Peri-implant mucositis –it is a condition in which the inflammatory changes are limited to the mucosa surrounding the implant surface. If treated properly, this condition is reversible.2) Peri-implantitis –it includes bone loss leading to reduced bone support for the implant along with presence of peri-implant mucositis. This condition is irreversible.[2] Peri-implant mucositis is characterized by bleeding on probing and peri-implantitis characterized by change in the level of bone crest along with bleeding on probing.[3] Peri-implant mucositis is controlled by T cell and it continues apically limited to the barrier epithelium. Peri-implantitis continuess apically to the pocket epithelium and also consist of abundant amount of lymphocytes, plasma cells, macrophages and PMN cells.[4] The infectious nature of peri-implant diseases was confirmed by The Sixth European Workshop on Periodontology.[1]

Peri-implant mucositis classification as proposed by Ata-Ali et al.[5]

Stage 0A- PPD< 4 mm and BOP or SUP, with no signs of supporting bone loss that support primary bone reconstruction during healing.
Stage 0B-PPD> 4 mm and BOP or SUP, with no signs of supporting bone loss that support primary bone reconstruction during healing.
(PPD=probing pocket depth; BOP= bleeding upon probing; SUP = suppuration)

peri-implantitis classification as proposed by Ata-Ali et al.[5]

Stage I- BOP or SUP and loss of bone < 3 mm above biological bone reconstruction.
Stage II-BOP or SUP and loss of bone>3mm and <5mm above biological bone reconstruction.
Stage III-BOP or SUP and loss of bone> 5 mm above biological bone reconstruction.
Stage IV-BOP or SUP and loss of bone >50% of the implant length above biological bone reconstruction.
(BOP=bleeding upon probing; SUP = suppuration)

There are mainly three concept considered to define the aetiology and pathogenesis of peri-implant diseases:
1) Presence of plaque;
2) Implant micro movement;
3) A compromise host healing that lead to peri-implant diseases.[6]

Various risk factors are responsible for occurance of peri-implant diseases.
1) Past periodontal condition
2) improper plaque removal
3) diabetic condition
4) Smoking
5) genetic factors
6) overhanging restoration
7) occlusal overload.[7]

The common signs and symptoms of Peri-implant diseases are:
1) Bleeding on probing
2) Change in colour of oral mucosa
3) Increased probing depth
4) Pus discharge
5) Peri-implant radiotransparency
6) Continuous bone loss surrounding the implant.[8]

Preventive Strategies

Treatment success depends on prevention, diagnosis and treatment planning.

1) Toothbrushes
For the plaque removal, electro-mechanical toothbrush has been shown to be more efficient than manual toothbrush, mostly in lingual sites of mandible. Only few studies that authenticate the benefit of powered brush particularly near the implant have been done.[9]

2) Dentifrices
There are no studies that compare the effectiveness of different toothpaste formulations surrounding dental implants. Also, there is strong evidence that dentifrices having stannous fluoride and also those which consist of triclosan along a copolymer shows statistically significant antiplaque and antigingivitis effect. A stannous fluoride-sodium hexametaphosphate containing dentifrice has been proved to have excellent antiplaque and antigingivitis effect.[10]

3) Mouthwashes
There are no studies that compare the effectiveness of different mouthwash formulations surrounding dental implants. Also, there is strong evidence that mouthwash formulations having chlorhexidine and essential oil have antiplaque and antigingivitis effect. A 6-month clinical placebo controlled trial concluded that a 0.07% cetylpyridinium chloride mouthrinse was statistically excellent to placebo in reduction of plaque and inflammation of gingiva.[11]

- **MANAGEMENT OF PERI-IMPLANT DISEASES**

It is a known fact that the microbial biofilms play a key role in disease progression, so its removal is required for treatment success. Removal of implant must be considered only when there is implant mobility and more than 60% bone loss in peri-implantitis.[12]

MANAGEMENT OF PERI-IMPLANT MUCOSITIS

In case of peri-implant mucositis, local plaque control is done by plastic instruments and polishing by rubber cup or else by interdental aids. Chemical plaque control is done by topical application of 0.12% chlorhexidine in 8-12 hours for 15 days. Oral hygiene instructions are also given to the patient but if patient has defective prosthesis then correct and recheck prosthesis for proper oral hygiene maintenance. When this primary phase of management is done then recall patient for follow up periodically.[13]

Peri-implant mucositis is mainly treated by carbon fiber equipments and titanium equipments and also to prevent damage to the surface of implant and superstructure usually plastic insert ultrasonics are used. Proper accessibility is necessary for debridement and superstructure adjustment. Several human studies stated that peri-implant mucositis can be successfully treated by scaling and root planning with adjunct such as phosphoric acid, abrasive carbonate air powder or without adjuncts.[13]

1) Non-Surgical Mechanical Debridement

The basic treatment of peri-implant mucositis is scaling and root planning, it is also termed as non-surgical mechanical debridement. A plastic and metal equipment is useful for scraping the subgingival surface of the implant and surrounding parts. Proper oral hygiene instructions to the patient should be given. The main aim of non-surgical mechanical debridement is to disrupt the biofilm on the surface of implant and also helpful in reduction of the inflammation. In some cases, scaling is also combined with chlorhexidine irrigation and topical application. Concerns have been raised regarding roughness of the implant-abutment by scalers which may lead to poor plaque control.[14] Therefore, it is very important that scaling and surface decontamination processes should leave the smooth surface and avoid further plaque formation.

2) Local Antimicrobial Supply

It has become standard practice in treatment of periodontitis to locally administer antibiotics in moderate to severe cases. To maintain a particular antibiotic level at the specific infection site, various sustained release devices such as chip, gel, polymeric fiber and microcapsule has been developed. Also different antiseptics and antibiotics such as doxycycline, tetracycline, minocycline, chlorhexidine, and metronidazole useful for this condition.[15] These devices keep the concentration of the agent raised in GCF for a long period of time before removal. However, Mombelli, et al. stated that advancement of a local delivery device to the bottom of a deep peri-implant pocket was difficult.[16] which indicated the inadequacy of using only periodontal therapy for treating peri-implantitis.

MANAGEMENT OF PERI-IMPLANTITIS

In treatment of peri-implantitis, non-surgical therapy alone is not sufficient. Management of Peri-implantits is more difficult because of its complicated implant design and various characteristics of implant surfaces. The main purpose of management of peri-implantitis, same as periodontitis, is bone regeneration around the implant body fixture, referred as re-osseointegration. Peri-implantitis rarely affects the smooth surface of implants which are also less responsive to re-osseointegration. Removal of biofilm is more important for re-osseointegration and for treatment success, as removal of biofilm from implant having a rough surface is more critical than from implant having a smooth surface.[17]

1) Implant surface decontamination

In peri-implantitis, Photodynamic therapy is useful for reduction of microorganisms. Hand and ultrasonic equipments are not suited for implant surface detoxification. the best way to eliminate endotoxins use high pressure air powder abrasive referred to as prophyjet. Decontamination for hydroxyapatite coated implants, various chemotherapeutic agents such as 40% citric acid for 60 seconds is an effective but chlorhexidine is less effective. For decontamination of Machined titanium surface topical tetracycline is effective. (one capsule of 250 mg mixed with saline or serum till obtaining a creamy consistency).

Continuous application of citric acid on hydroxyapatite surfaces is not recommended, because it leads to unability to bond with the implant body.[18]

Various soft laser irradiation such as semiconductor 809 nm, the CO2 and erbium-doped:yttrium, aluminum and garnet (ER: YAG) lasers can also be used as a method of decontamination for different implant surfaces.[18]

2) Anti-infective therapy

Management of peri-implantitis by mechanical non-surgical debridement by plastic curettes along with antibiotic therapy (0.2% chlorhexidine) useful for improvement in deep peri-implant lesions in which Pocket probing depth is less than 5 mm.

Local-drug delivery devices, Actisitie (fiber containing polymeric tetracycline HCl) has been significantly effective in patients with localized peri-implant problems.[19]

The oral antibiotic treatment consists of: amoxicillin, amoxicillin with clavulanic acid, erythromycin, amoxicillin plus metronidazole or, in allergic to penicillin patients and tetracycline can be used If the problem is generalized. The ideal time for treatment is 7 and 10 days.[19]

3)Various surgical management

The main aim of this surgical management is flap access, granulation tissue removal and decontamination of implant surface. Also, there are variety of surgical ways to treat peri-implantitis. Non-surgical mechanical debridement techniques , titanium scalers and rotating titanium bristle brush which is described above have been use for surgically debriding implants. The various surgical treatments are available such as surface decontamination and conditioning, adjunctive antimicrobials, respective and regenerative procedures and submerged versus non-submerged healing techniques.[20]

a. Surface decontamination and conditioning

The plaque biofilms removal is not properly done in rough surface of implants, so various adjuncts and alternatives are used for mechanical debridement. gauze soaked alternately in saline or chlorhexidine are more effective than subgingival irrigation with chlorhexidine , Er:YAG laser and air-powder abrasive unit, with and without citric acid.[21]

b. Adjunctive antimicrobial therapy

It is used in with surgical approch, various antibiotics are used as a adjunct for reduction of bleeding upon probing and also probing pocket depths. More better and successful result has been produce by the use of 50 mg/ml tetracycline on the implant surface which is already debrided, with systemic amoxicillin and metronidazole, for the implant surface disinfection.[22]

c. Regenerative and resective

Various studies have been done to examine the effectiveness of different regenerative methods. Wide variety of regenerative methods used for peri-implantitis management but are unreliable. The permanent results for treatment of bony-defects are provide by the use of autogenous bone graft plus a resorbable membrane and also with and without xenograft.

Implantoplasy is use with the bony defect surgery for achieve a smooth implant surface and produce a good surgical procedure that prevent chronic peri-implant infection.[22]

d. Submerged versus non-submerged healing

It is also called as open and closed healing. Schwarz et al[23] stated that in submerged healing and open flap debridement, the implants and its surfaces are completely coated by the tissues and not in contact with the oral environment so it was more effective than non-submerged healing and open flap debridement. In aesthetic concern and implant required as bridge abutment, submerged healing is not always useful. There are very less studies on patient-centred outcomes for peri-implantitis treatment.

CONCLUSION

The implant design, diameter, location, degree of roughness, excessive mechanical load, tissue status surrounding implant and improper surgical placements are responsible for occurence of peri-implant diseases. Also, Gram negative anaerobes play a key role in this disease. various treatment options are available to treat peri-implant diseases. But there is still limited data to support an ideal treatment for treating peri-implant diseases. Further studies are

VOLUME-6 | ISSUE-3 | MARCH - 2017 • ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

required for the betterment of the results and introducing advanced techniques to treat peri-implant diseases.

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