Guidelines for the Maintenance of Peri-Implant Health and Management of Peri-Implant Diseases

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It has been shown that clinical practice guidelines can serve as an effective health care measure, improving patient quality of care [2]. The objective of this review is to provide clinical guidelines for the clinician maintaining and treating patients presenting dental implant rehabilitations.

Classification System

Peri-implant Health (PIH)

Clinically, PIH is characterized by absence of visual signs of inflammation and bleeding and/or suppuration on probing (BSOP). BSOP can exist around implants with normal or reduced bone support. It is not possible to define a range of probing depths compatible with peri-implant health due to implant positioning and crown format [3].

Peri-implant mucositis (PIM)

PIM is a reversible inflammatory reaction that resides in the peri-implant mucosa [3]. There is strong evidence that microbial plaque is the primary etiological factor for PIM. It’s diagnosis requires presence of BSOP and absence of crestal bone loss (BL) beyond 2 mm [4].

Peri-implantitis (PI)

PI is a pathological condition occurring in the peri-implant tissues, characterized by inflammation in the peri-implant connective tissue and progressive loss of supporting bone [5]. PI progresses in a non-linear and accelerating manner. It’s diagnosis requires presence of BSOP, increased probing depths (PD) when compared to previous exams, or crestal BL to the level of the implant platform ≥ 3 mm (when no previous radiographic exam is present) [4].
Peri-implant hard and soft tissue deficiencies (PIHSTD)

PIHSTD can result from ridge deficiencies caused by tooth extractions, periodontal disease, endodontic infections, root fractures, thin buccal bone plates, poor tooth position, injury and pneumatization of the maxillary sinuses [5], or progression of peri-implant diseases. [6] Use of certain medications and systemic diseases [7] reducing the amount of naturally formed bone also play a role in this category.

Diagnostic Tools

Probing

Dental Implants should be probed at every scheduled examination. Periodontal probing around natural teeth and dental implants remains an efficient and non-invasive method to diagnose loss of attachment, determine presence of diseases, monitor marginal recession, and evaluate positive treatment outcomes. Improper probing can lead to undiagnosed or over diagnosed diseases. [8]

Peri-implant probing should be lightly (0.25 N) using a metal or plastic probe with a round tip and a diameter of 0.4-0.5 mm. After probing a contaminated/infected site, rub the probe in a gauze embedded with 0.12% chlorhexidine before re-using it to probe other sites in the same patient. [8]

The diameter of the crown can affect the probing depth. Wider diameter crowns may result in deeper probing depths. [3] Therefore, when probing, the numbers are not equivalent to the degree of the disease.

Radiographs

Radiographs are indicated when there is a need to identify the position of the implant in relation to the crown, during clinical evaluation of the peri-implant probing depth. Radiographs may show limitations, such as: inability to monitor bone levels on the facial and lingual/palatal aspects of the implant, low sensitivity in the detection of early bone changes, and underestimation of bone loss. [9]

Proposed Therapy

In the presence of BSOP, a routine radiograph is necessary. Next, establish the etiological factors of the disease in order to propose a treatment modality. Below are the proposed non-surgical and/or surgical treatments for each peri-implant diagnosis.

Peri-implant mucositis

Non-surgical therapy (NST)

Non-surgical therapy is always the first choice of treatment. [10] Below are the indications for NST according to the possible etiological factors:

1. Biological factors

Eliminate the etiological factors, such as: microbial plaque (calculus, periodontal pathogenic bacteria), exogenous irritants introduced by technical complications (residual cement and other irritants), extrinsic pathology (untreated pathology, systemic disease). [11] Scaling and root planning may be necessary. Systemic and local antimicrobial therapy may suppress disease progression. [12] Elimination of the biological etiological factors consist of the following treatment:

a. Patient education

Encourage patient to maintain healthy lifestyle. Hyperglycemic patients has a 3.39 times higher risk of developing peri-implantitis compared to normoglycemic (non-diabetic or well-controlled) patients. [13] Controlled diabetes is HbA1C of 5.7-7. [14]

Assess and motivate your patient for optimal oral hygiene (OH). Mechanical plaque control may involve the use of manual or powered toothbrushes as well as interproximal aids (Figure 1). Access may include fabricating indentations in hybrid restorations that allow patients to identify position of implants to guide the patient during routine OH while threading the floss (Figure 2)

In case of smokers, encourage patient to stop smoking by using the 4A protocol. [15] Ask, advise and assess the patients willingness to quit at every visit. Assist in quitting within 2 weeks with pharmacotherapy or counseling, and arrange follow-up contact in one week after quitting.

b. Proposed mechanical therapy

Sonic-driven polyethersethketone (PEEK) (Scorpion Scaling Tip for use with CLIP PEEK Tip-Scorpion Instruments Dentaires, Romagnant, France) tip curettes have shown superior cleaning effectiveness when compared to air polishing and rubber cups. [10]

Glycine powder air polishing devices with a supra-gingival tip that reaches up to 4mm below the peri-implant tissues. The subgingival tip can be placed at the base of the pocket. [16] Standard powdered air-abrasive system cannot be used for implant instrumentation because they may damage hard and soft tissues as a result of their high abrasiveness. The glycine powder air polishing devices have a specially designed nozzle, consisting of a thin, flexible, plastic tube that is fitted with three orthogonally oriented holes. This specific design is associated with the horizontal exit of the air-powder mixture and reduced pressure, preventing the formation of emphysema in the adjacent tissues. The hand-piece should be used in circular motion, from coronal to apical, parallel to the implant surface in a noncontact mode, and the instrumentation time at each aspect (mesial, distal, buccal, lingual) should be limited to 5s. [17]

In reference to water jet devices, an overview of different interdental cleaning aids and their effectiveness for cleaning around dental implants showed that oral irrigators and interdental brushes are preferred over floss. [18]
Antimicrobials have also been proposed as adjunct to Mechanical therapy.

**c. Use of antimicrobials**

Antimicrobials have been used to prevent recolonization of bacteria after mechanical treatment. It has been suggested to rinse using 10 mL of 0.12% chlorhexidine and to brush twice daily with chlorhexidine gel for 10 days after treatment [20].

**2. Mechanical factors**

Eliminate the induced etiological factor, such as: overload (adjust contact point using shim stock technique, consider need for occlusal guards), and/or torque loose abutment screws (retorque or replace loose screws to the specifications of the specific manufacturer or remake crown).

**3. Iatrogenic factors**

Iatrogenic factors include inadequate restoration or abutment seating, implant malposition, prosthetic therapy conducted by an inexperienced provider. In addition, crown emergence profile above 30 degrees is a significant risk indicator for peri-implantitis. Convex prosthetic profile creates an additional risk for bone-level implants, even though it does not affect tissuelevel implants. A concave emergence profile is preferable to allow access for OH and for the crown not to impinge upon the adjacent biological width invasion (Figure 3) [21].
Peri-Implantitis

Non-Surgical therapy (NST)

Non-surgical therapy of peri-implantitis is not effective in disease resolution. Only limited improvements in the main clinical parameters have been reported and there is a clear tendency for disease recurrence. Such treatment usually provides clinical improvements which includes reduced bleeding on probing, and probing depth (PD) reduction of ≤ 1 mm. In advanced cases, complete resolution of the disease is unlikely. [10] It is recommended to consider surgical interventions when nonsurgical peri-implant therapy is unable to achieve significant improvements in the clinical parameters [22]. Below are suggested NST for each etiological factor for patients presenting peri-implantitis.

1. Biological factors:

Scaling and root planning may be necessary for removal of local factors. Systemic and local antimicrobial therapy may suppress disease progression [12]. Follow directions in the NST under PIM section, followed by the ST section below.

2. Mechanical factors:

Verify looseness of implant crown abutment. Re-torque abutment screw remake the crown/prosthesis if required. Follow directions for treatment of mechanical etiological factors in NST section under PIM section, followed by the ST section below.

3. Iatrogenic factors:

Follow directions for iatrogenic factors in NST section under PIM section, followed by the ST section below.

Surgical therapy:

Surgical therapy will depend on the etiological factor(s) of the patient with the peri-implantitis diagnosis. The majority of bone loss that occurs during peri-implantitis is related to the inflammatory process. When the etiology is related to the biofilm, non-surgical or surgical therapies, or a combination of both can be used. Below are surgical procedures suggested for each etiological factor:

1. Lack of Keratinized tissues

Soft tissue graft procedures are indicated. These procedures include, but are not limited to free gingival grafts, connective tissue grafts and allogeneic grafts.

2. Bone loss (defect type)

Physical (implantoplasty) [23] and/or chemical [24] dental implant surface decontamination is conducted after flap elevation. A combination of osseous surgery and/or bone augmentation procedures with or without the chemical or physical decontamination [25] protocol is required. The surgical modality of treatment will depend on the graftability of the site [26] and the presence or absence of keratinized tissues [27].

3. Mechanical and biological factors

Follow indications under the NST of PIM section in combination with number 2 of this ST section.

Peri-implant hard and soft tissue deficiencies (HSTD)

The patient presenting this clinical finding will receive surgical therapy. In the absence of attached tissues, soft tissue grafts are indicated (follow protocol number 1 under ST section). When the HSTD results in an unpleasant smile, hard and soft tissue grafts may be required (follow protocol number 2 under ST section).

Recall & Maintenance

It is recommended a minimum of 5-6 months for a recall and maintenance (RM) interval. However, the interval must be tailored to the patient’s risk profiling. Additionally, even patients compliant with the establishment of RM therapy may show biologic complications [28]. Follow the instructions below from 1 to 5 in order to address the patient’s needs during their recall visits: [29]

Professional Maintenance

1. Extraoral and systemic conditions

Encourage patient to maintain healthy lifestyle and to stop smoking according to instructions indicated under NST section. [29]

2. Intra-oral examination

Verify PD, BOP, suppuration, mobility, occlusion & radiographs. [29] If BSOP is detected, follow the proposed protocol according with the diagnosis and etiological factors proposed in this manual.

3. Oral hygiene instructions (OHI)

OHI should be given for existing natural teeth and any restorations. OH intervention (cleaning of natural teeth and restorations), and use of oral topical agents should be conducted as deemed clinically necessary. [29] Follow the protocol indicated in the “assess and motivation for optimal oral hygiene (OH)” under the NST section.

4. Professional cleaning

Biofilm/calculus removal should be conducted as indicated in the propose mechanical therapy under the NST section. The partial removable dental prosthesis should be professionally cleaned extra orally using professionally accepted mechanical and chemical methods [29].

5. Assess esthetics

If esthetics is a concern for the patient during professional recall/maintenance visits, consider the treatment indicated in section “Peri-implant hard and soft tissue deficiencies” in ST section.

At home maintenance
The oral hygiene regimen for patients presenting implant retained prosthesis should include brushing their teeth twice daily, and use of OH aids such as dental floss, water flossers, air flossers, interdental cleaners, and electric toothbrushes [29].

Patients presenting implant supported prosthesis should be educated to cleaning the prosthesis at least twice daily using a soft bristle toothbrush and use the professional recommended denture-cleaning agent [29].

Patients with multiple and complex restorations on existing teeth supporting or surrounding the removable restoration should be advised to use oral topical agents, such as toothpaste containing 5000 ppm fluoride or with 0.3% triclosan. In addition, supplement the regimen with short-term (up to 2-weeks) use of 0.12% chlorhexidine gluconate when indicated [29].

Conclusion

The success of dental implant rehabilitations require specialized treatment planning [30] and long-term maintenance care [31]. The proposed guidelines for the maintenance of health and management of peri-implant diseases may streamline the identification of complications that may occur during a patient routine and/or a non-routine visit by the periodontist. In addition, it details the management of all peri-implant diseases and maintenance of health, serving as a consultation text for hygienists, who may be of significant value in the identification of peri-implant diseases and in the management of non-surgical peri-implant therapy.

References

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