

Dental-Implant Maintenance: A Critical Factor in Long-Term Treatment Success

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ABSTRACT- Initially when dental implants were first introduced their success was assumed to be dependent mostly on the surgical technique and later their placement. However, without a regular program of clinical reevaluation, plaque control, oral hygiene instruction, and reassessment of biomechanical factors, the benefits of treatment often are lost and inflammatory disease in the form of recurrent periodontitis or peri-implantitis may result. Maintenance of periodontal health is a critical factor in the long-term success of dental implant therapy. This article reviewed the goals, types, and appropriate frequency of periodontal maintenance in dental implant therapy as well as the incidence and etiology of peri-implant disease and strategies for management when the recurrent disease develops during the maintenance phase of treatment.

Key-words- Chemotherapeutic Aids, Dental Implants, Hygiene, Interdental Aids, Maintenance, Peri-implantitis, Peri-implant mucocitis

INTRODUCTION

In the recent past Implant supported restorations have become the more common treatment and a viable option for replacement of teeth in both complete and partially edentulous cases. Clinical findings in healthy dental implants include firm, pink peri-implant mucosa, shallow probing depths (3mm or less); absence of bleeding on gentle probing, absence of purulence or suppuration, and lack of response to percussion ^[1]. Implant-supported restorations should provide comfortable function and appropriate esthetics.

Replacement of the missing teeth with implants provides us with the solution of not utilizing healthy natural teeth as abutments for a fixed prosthesis. After the treatment phase of implant restoration is over it is equally important for the dentist and the patient to strictly abide by the maintenance phase. Many principles and features of maintenance therapy apply to both the natural dentition and to dental implants. As the number of dental implants continues to increase, understanding the importance of maintenance as it relates to long-term implant success becomes more crucial. ^[2] The dental professional's role is to determine the patient's individual and specific home care needs.

Literature Review

Professional Hygiene Maintenance- Frequent recall visits during the first year after implant placement and restoration are necessary for evaluation and establishment of good oral hygiene routines. In patients who are partially edentulous with implant-supported restorations maintenance visits combine traditional periodontal maintenance for the remaining natural teeth and dental implant maintenance. In fully edentulous patients with implant-supported restorations, the focus is on prevention or treatment of peri-implant mucositis or peri-implantitis, because dental caries and endodontic pathologic conditions are not possible ^[1,2]. Data collection includes measurement of probing depths, bleeding upon probing, suppuration, recession, mobility, response to percussion, and clinical appearance of peri-implant mucosa.

Probing- The generalized belief is that a baseline probing depth needs to be established and any signs of change, including bleeding, redness, edema, exudate, pain, or radiographic bone loss, warrant probing. Probing should be done with very gentle force (not to exceed 0.15 N) because excessive force may disrupt the soft tissue attachment and has been shown to overestimate probing depths and the incidence of bleeding upon probing ^[3]. As with natural teeth, inflammation of peri-implant soft tissue results in greater apical penetration of the periodontal probe. Hence, gentle probing has been shown to be an effective means to evaluate the stability of the peri-implant attachment and to detect peri-implantitis.

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Baseline Radiographs- Follow-up periapical radiographs are generally taken 1 year after loading; thereafter the frequency of radiographic evaluation is determined by the clinical findings.^[4] Fixation devices and specific controls should be used to ensure that the radiograph is not distorted. Some implants with bone loss may not exhibit any clinical tissue problems or symptoms.^[5] Radiographs should be taken annually for the first three years after placement and for the life of the implant after the completion of the case.^[6]

Instrumentation- The maintenance of a smooth surface of the titanium without pits and scratches is important to prevent plaque accumulation.^[7] The most important consideration is selecting safe and efficient instruments for removing calculus and plaque.^[8] Standard metal scalers and curettes are not recommended for implant debridement due to the possibility of scratching the titanium surface. While plastic scalers are available, their effectiveness in removing hard deposits is limited; gold, titanium or vitreous carbon tipped instruments are generally more effective^[8]. Ultrasonic or piezoelectric scalers with plastic or carbon tips have also been shown to be effective without damaging implant surfaces.^[9-11] The nonporous titanium surface calculus that forms around implants tends to be softer than calculus adhering to a natural tooth and is mostly supra-gingival. Occasionally, harder deposit around an implant may be found, which can be removed using a product like SofScale (Dentsply Professional, York, PA, USA) before scaling to further reduce the risk of scratching the implant during calculus removal.^[12] Examples of some of the instruments and kits that are available commercially for use on titanium implant surfaces- Brevent implant cleaning kits; Implacare™ (Hu-Friedy) instruments; Rigid plastic implant scaler (3i-Implant Innovations Inc.); Implant-Prophy+™ instrument system (Fig. 1); Premier Implant recall kit (Premier Dental products Company); Straumann Implant Hygiene-System; Steri-Oss scaler system; and so forth.



Fig. 1: Implant-Prophy+™ instrument system

Polishing- The main indication for polishing an implant is for plaque removal, since titanium surface of an implant abutment is highly polished and with proper care

will rarely lose its manufacturer's polished finish.^[12] Rubber cup polishing with toothpaste, fine prophy paste, commercial implant polishing pastes, and tin oxide have been shown not to alter titanium surfaces.^[8] Before polishing, calcified deposits should be removed. An antibacterial solution such as chlorhexidine may be used, when no polishing agent is desired. When only soft debris is present, deplaquing the surface is beneficial. Coarse abrasive polishing pastes, flour or pumice for polishing, are contraindicated, as is air polishing.^[12] Implant polishing pastes available are Hawe implant paste (Kerr) (Fig. 2); Proxyt (ivoclarvivadent).



Fig. 2: Hawe implant paste

Subgingival irrigation- Irrigation of the implant sulcus by chemotherapeutic agents may be useful as a long-term maintenance procedure. A cannula should have nonmetallic, rounded tip with side escape portals, and care should be taken while inserting it to the base of the implant sulcus to prevent fluid distention into surrounding tissues and to avoid gouging the surface.^[13] A study by Renvert *et al.*^[14] on nonsurgical mechanical treatment on sites with Peri-implantitis lesions with microencapsulated minocycline (Arestin) and 0.12% chlorhexidine gel found reductions of pocket depths and bleeding on probing for as long as 12 months.

Oral hygiene education and home care- Partially or completely edentulous patients that have dental implants generally have a history of improper dental home care. These patients may moreover have improper oral hygiene practice due to postsurgical fear of causing damage, on the one hand, or overzealous home care trying to stay absolutely plaque free, on the other hand. Either of these situations can lead to detrimental consequences.^[15] Home care for dental implant-supported restorations similar to traditional oral hygiene procedures, with some minor modifications are as follows.

Tooth brushes- There are a vast number of manual and automatic toothbrushes available commercially. Twice daily cleaning of implants should be accomplished using a soft or extra soft toothbrush, e.g. Nimbus microfine to remove bacterial plaque accumulations without

traumatizing the tissue. Several motorized and automated toothbrushes such as the Rodent (Pro-Dentec) or the Sonicare (Optiva Corporation) (Fig. 3) are available that can be used. These brushes are considered superior to a manual toothbrush in removing plaque and they contribute to the improved interproximal cleaning due to the combination of their bristle shape (scalloped) and fluid penetration.^[16] Tufted brushes may also be advantageous in hard-to-reach areas or for more site specific purposes. They are especially useful in posterior lingual regions where a conventional toothbrush may not reach.^[17]



Fig. 4: Glide dental floss



Fig. 3: Sonicare toothbrush

Flosses- Patient instruction for using floss should be aimed at gentle insertion and motion to avoid trauma to tissue. A threader along with woven flosses may need to be used to access bridgework or around connector bars.^[17]

Types of flosses used for plaque removal ^[12-13,18-19]

- I. Plastic floss, such as ProxiFloss
- II. Braided flossing cord, such as PostCare
- III. Satin Floss (Oral-B) or Glide (Fig. 4)
- IV. Woven, such as Thornton Bridge and Implant Cleaners or GUM Expanding Floss
- V. Yarns can be used to access and cleanse larger embrasure spaces and under connector bars, but these should not be considered if there is the possibility of the fibers being retained on rough surfaces or around the restorations
- VI. Dental Tapes are available in different “widths” and are used to clean the exposed abutment
- VII. Traditional flossing of the mesial and distal surfaces is required, but it is often indicated to use the floss on the facial/lingual surfaces as well following the looping technique.^[12]

Oral irrigation- A water irrigation unit such as the Hydro Floss (Hydro Floss, Inc.) (Fig. 5) is also beneficial in implant maintenance. However, care must be taken to direct the stream inter-proximally and horizontally between implants, as improper positioning can cause inadvertent damage to the peri-implant seal and bacteremia.^[12-13]



Fig. 5: Hydrofloss

Interdental Aids- Many companies manufacture interdental brushes. It is important that the wire is plastic or coated with nylon to prevent scratching of the titanium components. Patients should also be instructed to inspect and change the brush when signs of wear are evident. Common brush designs include- straight and cone shaped. Foam tips (Oral-B) and Proxi-Tip (AIT Dental) can also be used to apply chemotherapeutic agents interdentally.^[13,17] Some of the interdental brushes available commercially are GUM proxabrush go between cleaners (Sunstar) (Fig. 6); Oral B interdental brush; Colgate interdental brush.



Fig. 6: GUM proxabrush

Chemotherapeutic agents- Chlorhexidine gluconate has been shown to be a major asset in reducing plaque in the oral cavity and around dental implants. Long-term use of antimicrobials may be used with brushes and floss to avoid stain accumulation. ^[17-19]

CONCLUSIONS

Successful implant therapy implies healthy and stable peri-implant conditions. This requires both professional maintenances on the part of the dentist and diligent home care by the patient to ensure the long-term success of the implants. With the continuing research in the field of dentistry, newer techniques and aids will keep developing for the long-term maintenance of implants.

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