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Maintenance of dental implants: A way to long term success: A review

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Abstract

Apart from the professional care taken during surgical phase, professional implant maintenance and patient home care play very important role in deciding the long term success of osseointegrated implants. The patients are to be educated about the importance of proper oral hygiene maintenance and its effect on the dental implant prosthesis. This article reviews about the evaluation of implants and various professional and home care methods of dental implant prosthesis.

Keywords: dental implants, periimplantitis, oral hygiene, maintenance, long term success

1. Introduction

Oral implants have become an integral part of reconstructive dentistry. Implant devices, prosthetic devices and superstructures are different from the normal gingival/ tooth contours and relationships. They create a situation that demands special, detailed instruction and attention in terms of home care procedures. Patients presenting themselves as possible candidates for implant placement are patients with a history of less than optimum home care in the past. In partially dentate patients, both dental and implant abutments are used to reconstruct the compromised dentition. This blend of teeth and implants is critical in the periodontally susceptible patient in whom the sub marginal biofilms may harbor periodontal pathogens which may be involved in the processes associated with the resorption of the bony support for the implant.

Per mucosal seal of the soft tissue to the implant surface is important for the success of implants. Failure to maintain this seal, will cause bacteria and their by-products have a direct entry to the bone surrounding the implant. Poor oral hygiene is a documented risk factor associated with implant failures.

2. Implant and Natural Teeth

Implants are basically different from natural teeth starting from composition to the vascularity. The implant behaves as an ankylosed unit, whereas the natural teeth show physiologic mobility by the viscoelastic properties of periodontal ligament. There is no proprioception with respect to implants due to the absence of ligament receptors. Adaptive capacity in case of implants is less compared to natural tooth where the width of the ligament helps in mobility with increased occlusal forces ^[1]

Gingival fibres are inserted into the cementum above the crestal bone, whereas there is no collagen fibre attachment in case of implants. There is less vascularity in the gingival tissue surrounding the dental implants compared to natural teeth. This reduced vascularity together with parallel oriented collagen fibres adjacent to the body of any dental implant makes implants more vulnerable to bacterial insult ^[2, 3].

Oral implants when evaluated after 10 years of service do not surpass the longevity of natural teeth even of those that are compromised, for either periodontal or endodontic reason. Proper evaluation, monitoring and maintenance is essential to ensure the longevity of the dental implant and its restoration by combining regular check up, professional care and effective home care.

3. Peri implant mucosa

The periimplant mucosa is made of well-keratinized oral epithelium, sulcular epithelium, junctional epithelium and underlying connective tissue. Between the implant surface are hemidesmosomes and basal lamina [4]. The soft tissue interface is formed by the epithelium and the underlying connective tissue which includes the biologic zone known as ‘the biologic width’, which refers to the height of the dentogingival attachment apparatus encircling the tooth. The same relationship stands apt for the bone to the overlying tissues which exist around implants. Any change in the relationship is considered to be one of the reasons for the early crestal bone loss [5].

The proliferative capacity of the junctional epithelium leads to the rapid migration of the epithelial cells as soon as the fibrin clot /granulation tissue start forming at the implant installation. Once the cells reach the implant surface, their attachment occurs rapidly through the basal lamina and the hemidesmosomes [6]. Another mode of attachment that is hypothesized is an indirect epithelium to implant contact [7]. Main factor which stops the epithelium from migrating down apically is the presence of granulation tissue adhering to traansmucosal component surface [8]. Berglundh speculated that the reason for the epithelium not migrating down apically is due to the interaction between the titanium and soft tissue [9].

4. Implant and Periimplantitis

The vitality of an osseointegrated implant depends on the surrounding supporting tissues. The periimplant tissue anchors the implant to the bone and also has the key role of providing a protective permucosal seal.

Periimplantitis is a progressive and irreversible disease of implant-surrounding hard and soft tissues and is accompanied with bone resorption, decreased osseointegration, increased pocket formation and purulence. Zitzmann *et al* quantified the incidence of the development of periimplantitis in patients with a history of periodontitis almost six times higher than in patients with no history of periodontal inflammation [10]. After 10years, 10% to 50% of the dental implants showed signs of periimplantitis [11, 12].

4.1 Risk factors for the development of peri-implantitis-

- Smoking
- History of periodontitis
- Lack of compliance and limited oral hygiene
- Systemic diseases like diabetes mellitus, cardiovascular disease, and immunosuppression.
- Iatrogenic causes
- Soft tissue defects or poor quality soft tissue at the area of implantation
- History of one or more failures of implants [13].

Establishing an adequate oral hygiene should be considered as

the key method of prevention of peri-implant infections. Besides maintaining oral hygiene, regular evaluation of the peri-implant probing depths, supportive professional implant cleaning and oral hygiene training should be an important part of every post-operative care.

5. Implant Failure

Dental implants have a success rate of 90-98%, which in medical terms is significantly high. Implant failures can be either early or late implant failures. Peri-implantitis or infection is one of the main causes of dental implant failure. Bacterial infections and occlusal load have been emphasized as the two main etiological factors leading to implant failures. Early implant failures are the result of events that may jeopardize or prevent osseointegration from occurring and include:

- Improper preparation of the recipient site, which results in undue hard tissue damage such as necrosis of the bone.
- Bacterial contamination and extensive inflammation of the wound that may delay healing of the soft & hard tissues.
- Improper mechanical stability of the implant following its insertion.
- Premature loading of the implant [14]

Late failures occur in situations during which osseointegration of a previously stable & properly functioning implant is lost. Lemming & Renvert in1999 suggested that late failures are the result of excessive load and/or infection [15].

Patients with diabetes, smokers and those with poor oral hygiene are vulnerable to peri-implantitis. Thus, personal oral hygiene must be started at the time of implant placement and should be modified as and when required, using various aids for oral hygiene to effectively clean the peri-implant region before, during and after implant placement.

6. Maintenance

Basically maintenance of dental implants includes the professional cleaning by the dentist and oral home care by the patient itself. Good oral hygiene on the patient’s part is mandatory. The position and design of prostheses that are difficult to manage may limit the effectiveness of mechanical cleaning. The patient should be recalled every 3months during the first year and atleast every 6months thereafter.

Why implants are more maintenance intensive than teeth? Lack of organized fibers in the soft tissue surrounding implants places the bone-implant interface at an increased risk of destruction by the pathogenic bacteria.

6.1 Role in implant maintenance [16]

Apart from the dentist’s clinical role, the patient and the hygienist play an important role in the implant maintenance and success. The roles of the dentist, hygienist and the patient have been mentioned in the table below.

Table 1: Role in Implant Maintenance

Patient’ S Role	Hygienist’s Role	Dentist’s Clinical Role
Maintain plaque control of 85% or better	Check plaque control effectiveness (85%).	Check for 85% plaque control effectiveness.
Use interdental brushes, hand and motorized(Proxa-brush, oral-B brush, Rota-dent)	Check for inflammatory changes	Expose radiographs every 12-18 months if no pathologic condition is present and as needed if pathologic condition is present.
Dip brushes in chlorhexidine, 0.12% solution	If pathologic condition exists, probe gently with plastic probe. No need to probe if no pathologic condition is present	Check to see whether implant needs to be repaired.

Use flosses, yarns, tapes dipped in chlorhexidine at night.	Scale supragingivally only (or slightly subgingivally) with impla-care or similar device.	If implant needs repair, degranulate, detoxify, and graft with guided bone regeneration if necessary.
Use a cotton swab dipped in chlorhexidine for implants with tooth-coloured materials and composites.	Check for problems such as loose suprastructure, broken screws and sore spots.	Educate and motivate the patient in maintenance

6.2 Selection of instruments

Selection of instruments for implant maintenance depends on

- Tip designs that are not bulky and the designs should be easy to be used by the hygienist.
- Instruments should be disposable or able to be sterilized and cost effective.
- Location and tenacity of the deposit to be removed.
- Prosthesis design

Implant maintenance regimes are based on individual's need, home care ability and patient skill. Oral hygiene aids for implant maintenance include manual scalers, sonic and ultrasonic scalers, polishing devices, manual and electric tooth brushes, dental floss, interproximal brushes and antimicrobials.

6.3 Professional Cleaning

A variety of materials are used for the fabrication of manual periodontal scalers for cleaning dental implants, including plastic, Teflon, gold-plated metals and wood.

6.3.1 Sonic and ultra-sonic scalers

Use of sonic and ultrasonic scaler tips may lead to micro roughness and plaque accumulation on implant surface. Stainless Steel tip can also lead to gouging of the implant's polished collar. To prevent this, special attachments, like nylon sleeves and plastic inserts, can be used with metal sonic and ultrasonic instruments for scaling around dental implants [17, 18]. By this approach, effective cleaning is done with less damage to the implant. Because of the delicacy of the perimucosal seal, short working strokes with light pressure.

6.3.2 Plastic or teflon coated curettes

They can treat the sub gingival area effectively without changing the surface topography of implants. Surfaces treated with plastic and titanium curets showed greater numbers of attached cells than stainless steel curet treated surfaces. Depending on the location of the calculus, a horizontal, vertical, or oblique stroke may be used and should be performed with an exploratory-type stroke to avoid tissue trauma [19].

6.3.3 Polishing devices

Air powder polishing units have the possibility of damaging implant surface and therefore should be avoided. The air pressure can detach the soft tissue connection with the coronal portion of the implant, leading to emphysema. Also, the use of baking powder in these units can strip off any surface coating on the implant [20]. Titanium or titanium alloy surfaces of dental implants can be polished using a rubber cup with a non-abrasive polishing paste or gauze strip with tin oxide [16].

6.3.4 Oral irrigators

Sub gingival irrigation with or without antimicrobials is recommended using oral irrigators. Oral irrigators with chlorhexidine gluconate can be used for oral irrigation. The cannula should not be inserted to the base of the sulcus, to avoid fluid distention into the surrounding tissues [17, 18]. Patients are to be instructed to use at the lowest setting

possible in order to avoid undue pressure to the implant tissue cuff. Incorrect use of it can cause trauma which in turn can lead to bacteremia [19].

6.4 Home Care and Maintenance

6.4.1 Manual tooth brushes-

Manual tooth brushes with bristles made of synthetic material and rounded ends is recommended for implants because implants are considerably more sensitive in terms of erosion through mechanical force. A medium sized short head soft tooth brush is ideally preferred for the cleaning of dental implants. Brushes with hollow bristles should not be used, as they act as niches for bacterial colonization and growth. Modified bass technique of brushing is to be followed [17, 18, 20]. Tufted brush easily maneuvers in hard to reach areas and may be bent to accommodate patient needs. Especially useful in posterior lingual regions where a conventional tooth brushes might not reach.

6.4.2 Mechanical tooth brushes

They are superior to manual brushes, as they are better in plaque removal. Automated mechanical tooth brush is suggested as a daily mode of tooth cleansing. These devices may have rotary, reciprocating or sonic action [17].

6.4.3 Dental floss

Patients usually find difficulty in cleaning the interdental areas. Dental floss acts as an effective aid in such cases. For example Proxi-Floss Disposable Elastomeric Cleaning Appliance has a textured surface designed to carry medicaments to the implant surface and surrounding tissues. Super-floss is considered to be excellent for all types of implants. Gentle insertion and motion is advocated to avoid trauma to the tissue. Woven flosses with threaders help access and cleanse larger embrassure spaces and under connector bars [19].

Yarns can be used as same as flosses but if there is the possibility of fibers being retained on rough surfaces or around restorations they are not to be considered. Yarns are a cost-effective alternative to woven floss. They are available in different widths. Around the implant post, they are used in a "shoe-shine rag" fashion [19].

6.4.4 Interproximal brushes-

They should be used by implant patients only after being shown their proper use. They are available with interchangeable tips of various shapes. The brushes may have an exposed tip of metal wire that can scratch the titanium surface of the abutment and if enough pressure is exerted or if the brushes are worn, the wire can scratch the implant or abutment surface. Hence they are to be used with caution. Plastic coated wire brush is recommended to sort out this problem [17, 21]

6.4.5 Antimicrobials

Use of an antimicrobial mouth rinse, such as chlorhexidine gluconate or Listerine has been found to be effective means of maintaining oral care [17]. They help in reducing plaque around the implants. Long term uses of antimicrobials such as

chlorhexidine gluconate and cetylpyridium chloride or phenolic compounds tend to cause staining. Hence they are recommended to be used along with brushes and floss to reduce staining [16] Foam tips can be used to apply chemotherapeutic agents interdentially and site specifically.

7. Conclusion

Daily self-care (oral hygiene) and adherence to a maintenance recall schedule is absolutely required for long term success. This is best discussed and conveyed to the patient at the consultation visit. Recall maintenance visit should always include the evaluation of soft and hard tissue health, patient's level of oral hygiene compliance and plaque control and the prosthesis integrity and stability. Long term success of both periodontal and implant therapy depends on an effective partnership between the patient and practitioner.

8. References

1. Rita chandi, Munniswamy Kala. Natural tooth versus Implant: A key to treatment planning. *Journal of oral implantology*. 2012; xxxviii/no.one/
2. Palacci P, Ericsson I. *Esthetic implant dentistry. Soft and hard tissue management*. Quintessence, 2001.
3. Wolfinger GJ. *Esthetic implant dentistry. Soft and hard tissue management*. *Journal of prosthodontics*. 2002; 11(1):63-64.
4. James RA, Schultz RL. Hemidesmosomes and the adhesion of the junctional epithelial cells to metal implants- a preliminary report. *Oral Implantol*. 1974; 4(3):294-302.
5. Oh TJ, Yoon J, Misch CE, Wang HL. The causes of early implant bone loss: myth or science? *J Periodontol*. 2002; 73(3):322-333.
6. Listgarten MA, Lai CH. Ultra structure of the intact interface between an endosseous epoxy resin dental implant and the host tissues. *J Biol Buccale*. 1975; 3(1):13-28.
7. Kawahara H, Kawahara D, Mimura Y. morphological studies on the biologic seal of titanium dental implants. Report 2. In vivo study on the defending mechanism of epithelial adhesion/attachment against invasive factors. *Int J Oral Maxillofac Implants*. 1998; 13(4):465-73.
8. Listgarten MA. Soft and hard tissue response to endosseous implants. *Anat Rec*. 1996; 245(2):410-425.
9. Berglundh T, Lindhe J, Ericsson I. the soft tissue barrier at implants and teeth. *Clin Oral Implant Res*. 1991; 2(2):81-90.
10. Zitzmann NU, Walter C, Berglundh T, Atiologie. Diagnosti und therapie der periimplantitis-eine ubersicht. *Deutsche Zahnarztliche Zeitschrift*. 2006; 61:642-649.
11. Roos-Jansåker AM, Renvert H, Lindahl C, Renvert S. Surgical treatment of peri-implantitis using a bone substitute with or without a resorbable membrane: a prospective cohort study. *J Clin Periodontol*. 2007; 34:625-632.
12. Behrens E, Kolenda I, Terheyden H, Wiltfang J. Langzeitergebnisse des ITI-Implantatsystems. *Implantologie*. 2004; 12:133-147.
13. Ralf Smeets, Anders Henningsen, Ole Jung. Definition, etiology, prevention and treatment of peri-implantitis – a review. *Head & Face Medicine*. 2014; 10:34.
14. Jan Lindhe, Niklaus P. Lang, Thorkild Karring. *Clinical Periodontology and Implant Dentistry*. 5th edition.
15. Flemming T, Renvert S. Consensus Report.Maintenance and complications. *Quintessence*, 1999, 347-351.
16. *Contemporary implant dentistry*; Carl E Misch; 3rd edition.
17. Silverstein L, Kurtzman G. Oral hygiene and maintenance of dental implants. *Dentistry Today*. 2006; 25(3):70.
18. Suvarna H Patil, Veena HR, Mahantesha Chkrasali, Abhishek C Shah. *Dental Implant Maintenance-A Review*. *International Journal of Dental Clinics*. 2012; 4(1).
19. Charles Babbush. *Dental implants- The art and science*. 2nd edition.
20. Humphrey S. *Implant maintenance*. *Dental Clinics of North America*. 2006; 50(3):463.
21. Hwang JW. *Practical Implant Dentistry*. *Journal of Prosthodontics*. 2006; 15(3):214-6.