

Implant Maintenance Protocol

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Abstract

The dental implant in the mouth is subjected to face oral environment which is full of bacteria. Hence the surrounding tissues may be subjected to inflammatory conditions similar to periodontal disease and so require maintenance. This article discusses the background, aetiology, diagnosis of peri-implant diseases and the maintenance of implant and implant prosthesis.

Introduction

Now a day endosseous implants have become an integral part of the dental treatment both in partially or completely edentulous patients. There is a strong relationship between the success of the dental implant and the health of intra oral hard and soft tissues. Recent knowledge indicates that the maintenance of a healthy soft tissue barrier is as important as osseointegration itself for the long term success of the implant prosthesis¹.

The long term prognosis of an implant is related directly to the routine assessment and effective preventive care by the patient.

Key Words: Dental implant, osseointegration, peri-implantitis, peri-mucositis.

Peri-implant Tissues: When the implant is placed in the bone, soft tissues make a seal around the implant. This biologic soft tissue seal is analogous to the epithelial attachment of the natural teeth. It protects the implant-bone interface by resisting the bacterial activities and the mechanical trauma resulting from restorative procedures, masticatory forces and oral hygiene maintenance¹. The soft tissue (peri-mucosal) seal that forms around the coronal part of a dental implant is about 3mm in coronal-apical direction and consists of two zones; one is of keratinized squamous epithelium and one of connective tissue².

Peri-implant Diseases: Implants are susceptible to bacterial plaque accumulation and calculus deposition. The composition of the bacterial plaque in implants is similar to that of the natural teeth. The mucosa surrounding the implant exhibits an inflammatory response to plaque formation similar to gingiva in natural teeth. If the bacteria are proliferated around implant these may lead to an inflammatory response and may cause peri-implant infection. Peri-implant infection may cause peri-mucositis which on progression may lead to peri-implantitis (Fig. 1). Clinical signs and symptoms of the peri-implant disease include edematous tissues, bleeding on probing, suppuration and mobility of the implant.

Peri-mucositis: Peri-mucositis refers to the reversible inflammation of the soft tissues surrounding the implant and is similar to gingivitis.

Peri-implantitis: It can be defined as an inflammatory process affecting the bone surrounding the osseointegrated implant³.

Maintenance Protocol for Dental Implants: As far as the role of dentist in maintenance of implant is concerned the following factors should be considered at each maintenance appointment -

Evaluation of Home Care : Dentist should

monitor the oral hygiene habits of the patient by routinely assessing the plaque accumulation around the dental implant. By doing so the dentist will be able to know the ability (effectiveness) of the patient to remove the plaque and his interest towards oral hygiene. Many indices have been developed for the assessment of plaque accumulation. Any one of them can be used. If the plaque indices are higher than the acceptable threshold, the dentist should reinforce the oral hygiene instructions and review oral hygiene methods.

Removal of Deposits: Generally calculus does not tend to accumulate easily on the surface of the implant abutment because the implant abutment surface is highly polished. Still if there is any deposit or calculus on the implant surface it should be removed carefully (Fig. 2).

Removal of deposits on the implant should be accomplished with instruments that are implant-safe. Use instruments that are unable to scratch the softer titanium implant surface. It has been proved that the plastic instruments produce insignificant alteration of the titanium implant surface^{4,5}. Therefore, plastic instruments are recommended for scaling titanium implant surfaces⁶ (Fig. 3).

According to Thomson-Neal et al.⁷ use of ultrasonic/sonic scalers roughens the surfaces of the metal which enhances further plaque retention. A variety of implant scalers are available which are similar to curettes. Plastic, resin, graphite and gold-tipped scalers are acceptable for implant debridement. A soft-tip plastic sleeve placed on the tip of a sonic or ultrasonic scaler (use low power and extra water) does not damage the implant surface and is clinically effective in debriding the area. Most deposits of calculus are not firmly attached to the implant due to the smooth nonporous titanium surface. The clinicians can effectively debride the implant with gentle working strokes and light pressure.

A rubber cup can be used to polish the implant surface with a nonabrasive toothpaste, fine polishing paste or tin oxide⁷. Polishing pastes not recommended include those with medium and course grades.

Evaluation of Peri-implant Soft Tissue

During routine maintenance visits the clinical evaluation of peri-implant tissues should also be performed. Redness, swelling and alteration of colour, contour and consistency of marginal tissues may be sign of peri-implant disease (Fig. 4).

Bleeding on probing is another indicator of inflammation. Signs and symptoms related to soft tissues should be correlated with findings of probing. Several indices have been developed to assess marginal mucosal conditions around the oral implants. Using these indices severity of the inflammation can be documented on different areas around implant.

Probing Depth : Determination of peri-implant probing depth should be done on each maintenance appointment^{8,9}. Plastic probes with lesser force (0.2-0.3N) are recommended for determination of the advent and extant of the peri-implant problems¹⁰ (Fig. 5 and 6). Use of a

fixed reference point on the implant abutment or prosthesis for a reliable measurement of attachment level is recommended¹¹. Probing depth of \leq 3mm indicates successful implant; while probing depth of \geq 5mm indicates proliferation of bacteria and can exhibit signs and symptoms of peri-implantitis¹². During first three months probing is not recommended after abutment connection to avoid natural healing process¹³.

Bleeding on Probing: A positive correlation has been established between bleeding on probing and histologic signs of the inflammation⁷. If there is bleeding on probing it indicates inflammation of the soft tissues around the implant. Several indices have been developed to assess the health of the marginal mucosa around implant.

Radiographic Evaluation: Radiographic evaluation is one of the most valuable measures to assess the health of peri implant alveolar bone¹⁴. It is particularly important when it is not possible to perform probing either due to constricted implant placement or lack of access because of prosthesis. Limitation of this evaluation is that it can not help in detecting the early pathologic process or bone remodelling.

According to Albrektsson, et al. during the first year after abutment connection, 1 mm of marginal bone loss is a normal happening followed by 0.2 mm per year; implant should be considered normal¹⁵.

Failing implants may exhibit a thin radiolucent space and may also exhibit larger saucer like defect at the alveolar crest (Fig. 7). In case of multiunit prosthesis it becomes difficult to examine implant for mobility. In such cases radiographic examination may show significant bone loss.

If the peri-implant supporting bone is severely cratered, bone regeneration may be attempted provided the implant has not yet lost its integration. Remove the super-structure and replace the small healing screw. This will allow the soft tissue to grow over the implant like a primary closure of the soft issue flaps. Bone regenerative techniques are employed usually by placing allograft bone into the defect and covering the implant with a resorbable guided tissue regeneration membrane.

Evaluation of Occlusion: Occlusal status of the implant prosthesis should be evaluated on each recall visit. Discrepancy in occlusion (e.g. Overloading) may cause loosening of abutment screw, prosthetic failure and implant failure. It is a well established fact that abnormal occlusal loading will negatively affect the various components of the implant-supported prosthesis¹⁶. So any occlusal discrepancy should be identified and corrected to prevent overloading.

Evaluation of Prosthesis: All parts of the prosthesis should be evaluated for any mobility on each appointment. Any movement of the prosthesis may be due to failure of the cement bond, screw failure by fracture or loosening, fractured implants and fractured abutments. Prosthetic failure and tooth material failure should also be considered.

Fractured implant screws: The crown and abutment are attached to the implant by a screw. If the screw is fractured it must be carefully removed to prevent damage to the implant and should be replaced.

Loose screws: Make sure that a prosthetic screw is used and not a laboratory screw. Also make sure that the framework does not have a passive fit and the screw is used to compress the framework to the implants, the bridge is retained by implants and natural teeth that are mobile and the occlusion (bite) is off.

Fractured abutments: Some times abutment may fracture (Fig. 8). In some cases the abutment may simply require a new screw. While in other cases remaking of the abutment and/or crown may necessitate.

Fractured implants: Selecting the wrong type, size, quantity, position or length of implant, thereby causing over loading, may result in implant failure. It is imperative that the fractured implant be removed as atraumatically as possible.

Prosthetic failures: The initial design of the prosthesis plays a major role in the serviceability of the implant. Large multi-unit cases should be screw retained. Although they are more costly and complex initially, they generally do not have to be completely remade in the event a repair is necessary.

Tooth material failures: It is also one of the major cause of implant failure (Fig. 10). Often the patient is better served by the use of a acrylic surface in large prosthetic case rather than using porcelain. The physical properties of which are more forgiving than hard porcelain. This acts as a shock absorber to reduce the load on the implants.

Home Care Instructions: The patient should be educated by telling them-

1. The home care needed for dental implants is probably more important than that required for the natural teeth.

2. The appliances that are fabricated on top of dental implants are wonders of engineering but unfortunately, can not be designed to be maintenance free.

3. There are many areas around the implants and the prosthesis that need special attention to make sure that dental plaque may not accumulate.

4. As with your own teeth, plaque, a sticky

substance that adheres to teeth and is a breeding area for bacteria, must be removed at least every 12 hours to avoid potential peri-implant disease.

5. Home plaque control is a critical component of your implant care.

The following devices have proved extremely helpful in plaque removal and as tools in the proper maintenance of dental implant/prostheses-

- Soft tooth brush, End tuft brush (Fig. 11), Proxa Brush (Fig. 12).
- Dental Floss (Fig. 13) (i.e. Post care dental implant floss, Super floss)
- Rotadent.
- Oral Irrigation Devices (i.e. Water Pik)

Mouthwashes containing 0.12% chlorhexidine.

Instructions for the patients: Maintain plaque control of 85 % or more.

- Use a small tooth brush or special interdental brush to clean the abutments.
- Use a brush with a bent handle to reach behind your teeth to clean the abutment.
- Use gauze or special floss with a foam coating to clean around the gums, abutments and prosthetic teeth.

Brushes and flosses should be dipped in 0.12% chlorhexidine.¹⁷

Dentist's Role: Assessment of plaque control effectiveness of the patient.

- Check for any inflammatory changes, if present probe with plastic probe.
- If deposits are present, scale supra-gingivally with plastic or Teflon coated instruments.

Radiographic evaluation after every 1 or 1.5 year for any pathological changes

Patient Recall: It is recommended that the patient should be recalled after every 3 months in the first year so that if any disease is started it can be limited and cured at an early stage. If the clinical condition of the implant is good after the first year, recalled visits can be extended to 6 months¹⁷.

Conclusion:

Long-term implant failure due to peri-implantitis occurs commonly in patients with poor oral hygiene and those who do not attend periodic maintenance visits. Hence patients should be advised and By carefully and routinely evaluating patients' soft tissue health and the stability of the prosthesis at the professional recare appointment, the team can further ensure

long-term success of the implant supported prosthesis and a continued high level of patient satisfaction.

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Legends

- Fig. 1: Peri-implantitis and calculus deposition around implants.
- Fig. 2: Any deposit or calculus on the implant surface should be removed carefully.
- Fig. 3: Implant-safe plastic instrument (scaler tip); it does not scratch the softer titanium implant surface.
- Fig. 4: Redness, swelling and alteration of colour and contour may be sign of peri-implant disease.
- Fig. 5: Plastic probe is used for determination of peri-implant problems
- Fig. 6: Probing around implant with plastic probes.
- Fig. 7: IOPA x-rays showing bone loss around implants (Arrows).
- Fig. 8: IOPA x-ray showing fractured implant abutment (arrow).
- Fig. 9: Fractured implant
- Fig. 10: Fractured porcelain leading to implant failure..
- Fig. 11: End tuft brushing helps to keep abutments plaque free.
- Fig. 12: Interproximal brushing is helpful in keeping the implants clean.
- Fig. 13: Flossing around implant.

