

Maintenance – Cornerstone in Implant Therapy

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Abstract

Long term success of dental implants depends on proper supportive care. Some of the early predictors of future implant loss or failure are plaque accumulation, signs of inflammation like Bleeding on Probing, Probing Pocket Depth, bone loss & abscess formation around the dental implants and presence of risk factors like systemic diseases or personal habits like smoking. Periodic recall visit enables early detection and intervention of these factors. Post treatment maintenance care involves initial evaluation to assess the present status of peri-implant tissue. The intervention includes reinforcement of oral

hygiene measures, supportive at home maintenance by patient or supportive care by the dentist (in office maintenance) depending on the peri-implant status.

Keywords: Dental implants, maintenance therapy, peri-implant health & disease.

Introduction

Dental implants have become the most sought-after treatment modality in recent times for replacement of missing natural teeth. Success rate of dental implants depends on various factors of which the integrity of peri-implant tissue is highly important. Post treatment supportive care plays an essential role in maintenance of

this peri-implant tissue health. In addition, maintenance care also helps in increasing the life span of implants by early detection of peri-implant disease.

Supportive Periodontal Therapy

According to JAN LINDHE (1), Supportive Periodontal Therapy refers to “Therapeutic measures to support the patient’s own efforts to control and to avoid re-infection.”

American Academy of Periodontology in a position paper (2) published in 2003, stated that “Periodontal maintenance is the preferred term for these procedures, formerly referred to supportive periodontal therapy or periodontal recall and includes maintenance of dental implants.”

Factors Contributing To Peri Implant Disease

1) Patient Related Factors

- Compliance

Also called Adherence or Therapeutic alliance. It is defined as the extent to which patient’s behavior coincides with medial or health advice. (3)

Generally, implant patients are more compliant. Study done by FRISCH et al (4), showed negative correlation with geographic location(i.e.) patients who stayed farther away from dental clinic reported less often for recall visits.

Patients should often be reminded about the recall schedule. Personalized videos with oral hygiene instructions can act as positive reinforcement and help in improving the oral hygiene practice.

- Risk factors

Inadequate plaque control, history of periodontal disease, presence of any active periodontal disease and smoking are common risk factors for development of peri implant disease. These factors can be kept under control only by regular recall examination.

2) Implant Related Factors

- Restorative margins

Restorative margin around implants plays a significant role in maintenance of soft tissue health. Study by Heitz – Mayfield (5) et al, showed significant probing pocket depth reduction in implants with supra mucosal restorative margin compared to subgingival margin following mechanical debridement in patients with peri implant mucositis.

- Prosthetic designs

Over contoured crowns or non-ideal crown contours due to mispositioned implants interfere with implant maintenance. Implant emergence angle greater than 30 degrees increased chances of peri-implantitis (6).

- Implant surface characteristics

Though studies show that rough surface implants have better osseointegration, they favor plaque retention and thus result in development of peri-implant disease. Hence, maintenance phase becomes essential in complete removal of plaque and biofilm.

- Implant site

Amount of attached keratinized mucosa play an important role in maintenance of peri implant tissue health. Positive correlation is seen between soft tissue thickness and peri implant marginal bone (7). Systematic review shows that sites with thick soft tissue had a mean 0.8mm more bone than sites with thin soft tissue (8). Presence of adequate keratinized tissue width is essential for better oral hygiene maintenance and also help in reducing plaque accumulation, tissue inflammation and probing depths because it causes less discomfort to the patient during brushing.

- Titanium alloy hypersensitivity

One of the rare causes of peri-implant mucositis development is titanium alloy hypersensitivity. This is because of the difference in surface energy when the implant gets exposed to the oral environment. (10)

Implant Maintenance Protocol

During every recall visit, the first factor to be evaluated is the change in medical condition of the patient. This should be followed by clinical and radiographic re-evaluation and finally treatment based on the patient's need.

➤ Patient's history

Current medical status of the patients has to be obtained (especially patients with any systemic illness) and appropriate measures have to be taken. Patient referred to physician if required.

Personal habits like smoking have to be evaluated and counselling & reinforcement to be provided accordingly.

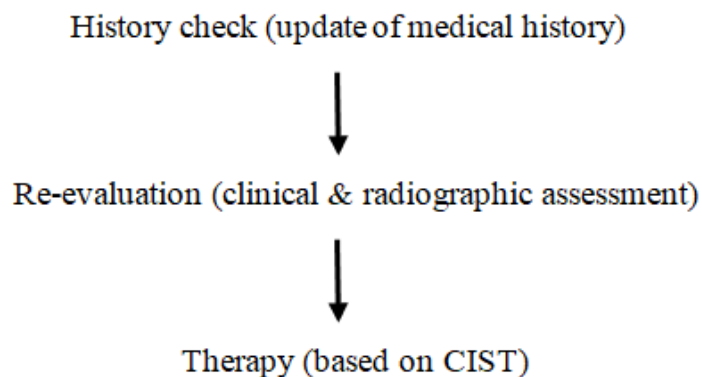
➤ Clinical parameters to be assessed

- 1) Full mouth plaque index (modified plaque index - Mombelli et al)
- 2) Full mouth bleeding on probing (modified sulcus bleeding index - Mombelli et al)
- 3) Soft tissue evaluation around implants – for redness, swelling or suppuration.
- 4) Occlusal and physical integrity of prosthesis – any signs of occlusal premature contacts or discrepancies should be identified and treated appropriately to prevent occlusal overload.
- 5) Probing depth around implants (plastic probes with force less than 20Ncm) – osseointegrated implants generally have probing depth of 3mm. Probing pocket depths of 5 mm or more are generally an indication of inflammation around the implant.
- 6) Radiographic parameters to be assessed

Mean crestal bone loss for osseointegrated implants is 1.5mm in the first year and 0.2mm/year after that (12). Crestal bone height preservation is very crucial for long term success of implants. This change can be assessed by radiographic evaluation during recall visits.

Comparison of radiographic bone levels at 6 or 8 months with baseline radiographs is recommended.

All these parameters should be assessed before starting any treatment.



Cumulative Interceptive Supportive Therapy

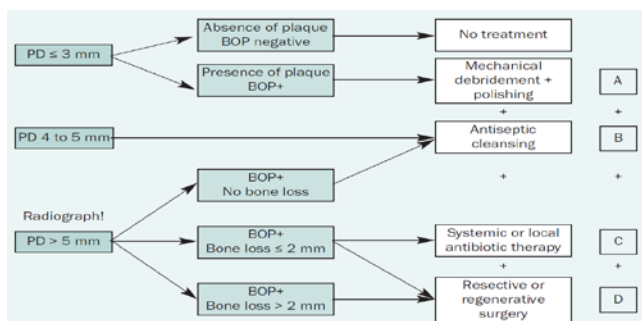


Figure 1

- Consensus Statements and Recommended Clinical Procedures Regarding Implant Survival and Complications - Niklaus P. Lang et al

Cumulative Interceptive Supportive Therapy consists of four treatment protocols based on the clinical parameters – Probing depth, bleeding on probing, presence of plaque and radiographic bone loss.

Protocol A is mechanical debridement and polishing.

Protocol B is antiseptic cleansing. Chlorhexidine is the most commonly used antiseptic. It can be used as mouth rinse or local application in gel form.

Protocol C is antibiotic therapy. Antibiotics can be given systemically or locally. Most commonly prescribed antibiotics are metronidazole, ornidazole or combination of amoxicillin and metronidazole. Local drug delivery like tetracycline fibres, minocycline microspheres are also done.

Protocol D is surgical therapy. Regenerative therapy or respective surgery is done according to requirement.

Score	Modified Plaque Index – Mombelli (11)
0	No detection of plaque
1	Plaque recognized by running the probe across smooth marginal surface of implant
2	Plaque seen by naked eye
3	Abundance of soft matter

Score	Modified Sulcus Bleeding Index (11)
0	No bleeding when periodontal probe is passed along the mucosal margin adjacent to the implant
1	Isolated bleeding spots visible
2	Blood forms a confluent red line on the margin
3	Heavy or profuse bleeding

Thereafter, For patients with risk factors, a shorter recall visit is necessary to aim in early re-treatment.

During each visit, patients have to reinforced about the oral hygiene maintenance and the importance of regular recall visit.

According to YULAN WANG ET AL (13)

Single tooth crown or bridge with 2 implants	Once a year
Bridge with more than 2 implants or implant retained dentures	Every 6 months
Patients at high risk for development of peri implant disease (smokers, genetic factors, systemic disease)	Shorter time (half the suggested time)
Infection or attachment loss around peri implant soft tissue	Every 12 weeks

In all the mentioned type of implants, radiographs are generally taken at the time of prosthesis and 1 year after

that. Subsequent radiographs are taken when clinical signs or symptoms develop.

Measures Taken By Patient

Patient's self-management plays an important role in prevention of biofilm and plaque/calculus formation. Mechanical and chemical plaque control methods help in accomplishing this.

1) Mechanical methods

- Tooth brushing

Both manual and powered toothbrushes are equally effective in biofilm removal. In general, aged patients and patients with poor dexterity are advised to use powered toothbrush. Various toothbrushes that have shown effective plaque removal are

- Manual squish grip brush (14)
- Ionic toothbrush
- Counter rotational powered toothbrush (15)
- Interdental cleaning



Figure 2

Width of the interdental space determines the type of the interdental aid to be used. Patients have to educated properly about usage of interdental aids. Aggressive use may result in damage to gingival tissues. Interdental brush / proxa brush – should be inserted interproximally and used with gentle rotatory motion.

Braided nylon floss (16) – specifically designed for implants and are more abrasive than other types of floss. It is used in shoe shine type of motion.



Figure 3

Chemical methods

These are used as adjuncts to mechanical methods and includes

- Essential oil mouth rinse – Listerine
- Fluoride containing mouth rinse – Amine fluoride or Stannous fluoride containing mouth rinse. They are shown to reduce pro inflammatory molecules in peri implant sulcular fluid. (17)
- Chlorhexidine mouth rinse – 0.12% for 30 seconds twice a day for 5 to 7 days is generally recommended. 0.06% chlorhexidine can be used along with oral irrigators.

Oral irrigators

In areas of difficult access, oral irrigators are very effective. They are used in low to medium speed with the tip of the irrigators angled perpendicular to the long axis of the implant. Magnuson et al. found oral irrigators reduce bleeding around implants by 81% in contrast with flossing where only 33% is reduced. (18)



Figure 3

Measures by The Health Care Professional

1) Mechanical debridement

- Curettes – various types are curettes are available which include titanium coated curettes, nonmetal curettes like carbon fiber curettes, Teflon curettes, plastic curettes, amorphous resin scalers. Non-metal curettes are commonly preferred as they do not alter the surface of implants. Metal curettes (stainless steel) can be safely used for zirconia implants.
- Ultrasonic devices – metal scaler tips are effective in reducing the bacterial load compared to plastic and carbon scaler tips (19). Also implant temperature is not increased when proper cooling system is used with ultrasonic devices (20). Ultrasonic devices with special tips made of polyetheretherketone-coated tips are also used which are resistant to shredding compared to plastic tips.
- Prosthesis removal - Implant supported full arch prosthesis need not be removed at regular recall intervals unless there are any signs of inflammation. Disinfection of removed prosthesis is done using various cleansers like sodium hypochlorite, chlorhexidine, glutaraldehyde or sodium perborate.

Ultrasonic baths and pressurized steam cleansers can also be used. Polishing protectors are required to protect the restorative interface of hybrid prosthesis during polishing.



Figure 4

2) Adjunctive antibiotics

Use of antibiotics enhance the effect of mechanical debridement and prevent bacterial recolonization. Local application of minocycline or tetracycline, amoxicillin, metronidazole and their combinations are effective in reducing BOP, plaque and probing pocket depth compared to systemic usage.

Tetracycline capsules are mixed with saline to form a paste and burnished over the implant surface for 60 seconds and finally rinsed thoroughly with saline.

Minocycline microspheres on subgingival application has shown to reduce pocket depth. (19)

3) Non-surgical methods for implant surface decontamination

• Air abrasive system

Various materials used are sodium bicarbonate, calcium phosphate, erythritol-chlorhexidine and amino acid glycine. The air powder mixture exits through a specially designed nozzle. The nozzle should be moved in a circumferential motion around the implants for surface

decontamination. Though they are effective in biofilm and calculus removal, they increase the implant surface roughness and leave remnants on implant surface.



Figure 5



Figure 6

• Lasers

Diode laser, Nd: YAG laser, Er: YAG and Carbon dioxide lasers are used in peri implant decontamination. Photo biomodulation of Er: YAG have provided promising results in the treatment of periimplantitis. Laser beam is directed at the sulcus with noncontact overlapping strokes. This disrupts the biofilm and decontaminates the pocket epithelium.

4) Surgical methods

This is the last resort when non-surgical management becomes ineffective. Surgical techniques are generally limited to moderate and severe peri-implantitis.

• Apically positioned flaps

This procedure is indicated in non-esthetic zones. It helps in better oral hygiene performance by the patient.

Procedure - Internal bevel incision is made based on the pocket depth and thickness of the peri-implant mucosa. Mucoperiosteal flap is raised both buccally and palatally/lingually. The infected tissue is removed and implant surface is thoroughly decontaminated. Flaps are sutured in such a way that the affected part is exposed to the oral cavity thus aiding in oral hygiene maintenance by the patient. Implantoplasty is done to smoothen the exposed part of the implant surface in order to prevent the post-surgical contamination.

- Access flap surgery

This is indicated when peri implant bone loss is minimal. This procedure maintains the soft tissue around implant.

Procedure - Intrasulcular incision is made around the implant and buccal & palatal/lingual mucoperiosteal flap is elevated. Implant surface is degranulated and decontaminated (mechanical or chemical methods are used). Finally, flap is repositioned and sutured.

- Regenerative procedures

These procedures are done with the aim of enhancing re-osseointegration.

Procedure – intrasulcular incision is made and buccal & palatal/lingual flap is elevated. Degranulation and decontamination are done. This is followed by placement of bone graft, either autogenous or bone substitutes. Non resorbable or resorbable membrane is placed over the graft. Finally, the flap is coronally positioned and sutured.

Conclusion

The best treatment for any disease is PREVENTION. Peri-implant disease can best be prevented by regular recall visit and proper oral hygiene maintenance. Treatment should be aimed at eliminating the etiology and reinforcing the patient for regular recall visits, thereby preventing the peri-implant disease. Earlier the disease identification, earlier the treatment and hence better the prognosis.

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