

Supportive Implant Treatment – A Review On “Short In The Arm”

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ABSTRACT

Dental implant therapy does not end with the final prosthetic restoration of the implant. The predictability and long-term achievement of a dental implant and its reconstruction require careful treatment planning, precise surgical and restorative execution, and flawless long-term maintenance, all of which are dependent on patient compliance with home care and professional supportive implant treatment. For this reason, good oral hygiene and regular professional care are essential to maintain implants.

I. Introduction

The establishment and maintenance of a soft tissue seal around the transmucosal portion of the implant will improve implant success.¹ Missing teeth can cause loss of self-esteem and have an impact on social interaction. The diminished masticatory efficiency accompanying tooth loss can compromise nutritional status, putting patients at higher risk for chronic illnesses like diabetes, hypertension, and heart disease. Implant dentistry has evolved into a well-understood clinical science with expansive documented research to validate what, years ago, many believed to be experimental. Theories and techniques have developed and changed, and the types of materials used in implant dentistry have changed dramatically. Implant placement necessitates an interdisciplinary approach in which a team of dental implant specialists including an oral surgeon, prosthodontist, periodontist, and oral radiologist collaborate on implant planning, execution, and maintenance to ensure the best possible outcome.² One area of expansion of knowledge and conflict of views relates to the maintenance of dental implants. Although many of those implants still exist and are functional in patients, research and advances in technology have given us newer materials and advances in implant design and structure that do not necessarily possess the same challenges from a maintenance perspective. A thorough review of mucoepithelial attachment is essential before commencing any maintenance procedures. Before undergoing any implant treatment or maintenance, it is necessary for the clinician to understand the differences between periodontal and peri-implant tissue.

Establishment and maintenance of a soft tissue seal around the transmucosal portion of the implant will enhance the success of an implant. The differences in the supporting structure of the implant make them more susceptible to inflammation and bone loss when plaque accumulates as compared to the teeth. Therefore, a comprehensive maintenance protocol should be followed to ensure the longevity of the implant.

II. Rationale of supportive implant therapy

Frequent recall visits after implant placement and restorations are necessary for evaluation and establishment of good oral hygiene after treatment. Healthy tissue should have no inflammation with a primary etiology of plaque and calculus formation. The recall visit is also an opportunity to detect potential problems and encourage early intervention if one arises. Pocket measurements should be taken with a periodontal probe. Mechanical complication rate of 24.7%, ceramic chipping (20.31%), occlusal screw loosening (2.57%) and loss of retention (2.06%).³ So, relatively infrequent occlusal screw loosening causes accumulation of subgingival gap at implant abutment junction which results in retaining plaque that stimulates inflammatory reaction, leading to peri-implantitis and peri-implant mucositis.

III. Plaque biofilm and dental implants

The differences between tooth and implant biologies make dental implants more susceptible to inflammation and bone loss in the presence of bacterial plaque accumulation. Biofilm is primary causative factor of periodontal disease processes if left undisturbed, mature plaque will form. Bacteria migrates from 1) Teeth to implants or from 2) Implants to implants. Lee *et al* compared microbial changes between patients with a history of periodontal or peri-implant infections and implants that have been in function for a length of time.⁴ This study found a history of periodontitis had a greater impact on the peri-implant microbiota than implant-loading time. The major influence on the peri-implant microbiota was, however, the microbiota on the remaining teeth. A natural tooth serves as a reservoir for periodontal pathogens that may extend their growth to contiguous implants in the same oral cavity. Specific pathogens in pockets >6mm are *Aggregatibacter actinomycetemcomitans*, *Prevotella intermedia* and *Porphyromonas gingivalis*.⁵

IV. Typical maintenance visit:

There have been 7 steps in maintenance therapy that was given by Wilson in 1996.⁶ Update the patient's medical and dental history, Review oral hygiene and modification if needed. Examine implants and peri-implant tissues and record the results- Probe around each implant, Assess the soft tissue using among other parameters bleeding on probing and suppuration, examine prosthetic abutment; this may necessitate removal of the prosthesis on a periodic basis. Carry out an occlusal examination -Check for wear of the prosthesis, examine for loosened occlusal screws or abutment cylinders, locate broken abutment screws, abutments or implants, Evaluate patient complaints in the area of the implant. Evaluate implant stability-manually, with computerized devices. Check and modify behaviour where needed as related to the patient's oral hygiene, remove any implant-retained plaque and calculus, Take radiographs, vertical bite wings, or periapical radiographs once a year. Setting maintenance intervals, Patients with both teeth and implants should see the periodontist as often as necessary to keep the periodontium or peri-implant tissues healthy, totally edentulous patients with implants should be seen at least once per year.

V. Review of the patient's medical history and general health

The patient's medical history must be updated and reviewed at every routine oral evaluation and implant maintenance appointment. To check if there has been any change in the patient's health status that could impact the implants or treatment. The patient's blood pressure should also be measured. Uncontrolled diabetes increases the risk of peri-implantitis and ultimately leads to implant failure.⁷ Overall good general health is one of the keys to the success of implant(s) and may affect the length of time between implant maintenance visits.

VI. Peri-Implant Diagnostic Parameters

The clinical and radiographic parameters routinely used to monitor oral implants during maintenance care should be of high sensitivity and specificity, should be easy to measure, and should yield reproducible data.⁸ Though the primary function of a dental implant is to act similar to a natural tooth root and crown, they are fundamentally different from the natural teeth. Therefore, dental indices are often modified for the purpose of dental implant evaluation. The following are various diagnostic parameters to assess peri implant health.⁸

Plaque and Mucosal Assessment

*Mombelli et al*⁹ and *Apse et al*¹⁰ proposed modified indices for the evaluation of the peri-implant marginal mucosal conditions and plaque assessment index.

Score	Mombelli et al (mPI) ⁹
0	No detection of plaque
1	Plaque only recognized by running a probe across the smooth marginal surface of the implant
2	Plaque which can be seen by the naked eye
3	Abundance of soft matter

Table 2: Plaque and Mucosal Assessment

Peri-implant marginal mucosal index

Score	Apse et al ¹⁰
0	Normal mucosa
1	Minimal inflammation along with color change and minor edema
2	Moderate inflammation with redness, edema, and glazing
3	Severe inflammation with redness, edema, ulceration, and spontaneous bleeding without probing

Table 3: Peri-implant marginal mucosal index

Bleeding on Probing (BOP)

Probing is an appropriate method to assess potential deleterious changes in the peri-implant environment and should be performed every 3 to 4 months for 1 year after prosthesis delivery.

Score	Mombelli et al ⁹
0	No bleeding when a periodontal probe is passed along the mucosal margin adjacent to the implant
1	Isolated bleeding spots visible
2	Blood which forms a confluent red line on mucosal margin
3	Heavy or profuse bleeding

Table 4: Bleeding on Probing (BOP)

Peri-Implant Probing Depth

A plastic-coated probe should be used to reduce the risk of scratching the implant's surface. Plastic probes are also more flexible enabling them to follow the anatomy for a more accurate clinical reading. The junctional epithelial attachment zone has less attachment strength to the implant and the connective tissue zone has only two fiber groups and neither of those is inserted into the implant. As a result, the probe goes beyond the peri-implant sulcus and reaches closer to the bone; hence, less probing force (0.2-0.3 N) is recommended around implants.¹¹ However, to avoid interruption during healing and establishment of the soft tissue seal, it should be avoided during the first 3 months after abutment placement.

Guidelines for proper probing around implants:

Place the probe parallel to the long axis of the implant, identify a location on the restoration as a monitor marker, and gently use a plastic probe to check the clinical parameters.¹² The measurement should ideally read 2.5 mm to 5.0 mm or less, depending on soft tissue depth, and there should be no signs of inflammation.¹²

Pain

Pain or discomfort around an implant may be the first sign of a failing implant, before it is evident on a radiograph. If pain is present- evaluate whether this is due to occlusal trauma or infection.

Mobility

Mobility following osseointegration can be present due to a loose fixed restoration, an infection, a loose or fractured abutment thread, an implant fracture or trauma. If the mobility is due to a loose crown, it may be possible to recement it or rescrew it (depending on the type of abutment). An occlusal adjustment may also be necessary.

Occlusal Evaluation

The occlusal status of the implant and its prosthesis must be evaluated on a routine basis. Any signs of occlusal disharmonies, such as premature contacts or interferences, should be identified and corrected to prevent occlusal overload which can in turn cause a host of problems, including loosening of abutment screws, implant failure, and prosthetic failure.

Evaluation of Implant Stability/Mobility

0	Absence of clinical mobility with 500 g in any direction
1	Slight detectable horizontal movement
2	Moderate visible horizontal mobility up to 0.5mm
3	Severe horizontal movement greater than 0.5mm
4	Visible moderate to severe horizontal and any visible vertical movement

Table 5: Evaluation of Implant Stability/Mobility

An electronic device (**Periotest**) has been recommended to monitor initial degrees of implant mobility, but the prognostic accuracy of Periotest value for the diagnosis of peri-implantitis and early signs of implant failure has been criticized because of the lack of resolution, poor sensitivity, and susceptibility to operator variables.¹³ Recently, a noninvasive device based on the principles of **Resonance frequency analysis (RFA)** was created to assess primary implant stability and track implant stability over time. This method not only evaluates the stiffness of the bone-implant interface but also allows the detection of any increase or decrease in implant stability that otherwise could not be clinically perceived. Other methods include modal analysis, implant test, pulsed oscillation waveform (POWF), and magnetic technology.¹³

Radiographic Evaluation

A radiograph is taken to accurately monitor crestal bone level around the implant(s) using a measurable device and to verify that the restoration is seated properly on the implant following placement of the restoration. A mean crestal bone loss ≤ 1.5 mm during the first year after loading and ≤ 0.2 mm/year thereafter has been proposed as one of the major success criteria.¹⁴ Hence, long-term preservation of peri-implant crestal bone height is extremely crucial. Preventive maintenance appointments should be planned every 3 to 4 months, and a periapical/vertical bitewing radiograph taken at 6 to 8 months should be compared to the baseline to assess crestal bone changes, which are common during the first year of loading. These two previous radiographs should be compared with another vertical bitewing radiograph at 1 year. If no changes or unfavorable clinical signs are apparent, subsequent radiographic examinations may be scheduled every 3 years.¹⁵ If crestal changes are evident, radiographs must be taken and reviewed every 6 to 8 months until the bone is stable for two consecutive periods, besides stress reduction and hygiene modification.¹⁵ Make a periapical or

vertical bitewing radiograph of each implant for one to four implant(s) at prosthesis placement, at six months following delivery, and at one-year intervals. For five or more implants, a panoramic or full mouth radiographic series is recommended at prosthesis placement, at six months following delivery, and at one-year intervals.¹⁵

VII. Oral hygiene instructions - Levels of Therapy

At different levels of surgical and post-surgical phase, the oral hygiene instructions vary depending on the needs and dexterity of the patient.¹⁶ Level 1- During healing periods, when mechanical plaque control is contraindicated, chemical agents (chlorhexidine) should be used. Level 2- In level 2, implant is exposed and healing cuff is placed to promote tissue maturity. At this stage, rinsing with chlorhexidine twice-daily together with the implementation of mechanical debridement with tooth brush is recommended. Level 3 - When tissue has healed and final restoration is delivered, modify and reinforce home care principles depending on the access to implant, dexterity of patient, and design of final restoration. A variety of devices, including soft-bristled brushes, dental floss, and interproximal brushes with a nylon-coated core wire, may be used

Interproximal/Circumferential Cleaning

Flosses, Interproximal cleaners and Water irrigation systems

Floss

Floss choice should be based on the clinical indication.¹⁷

Plastic floss, such as ProxiFloss is an elastomeric material that bends and flexes to remove plaque or to apply chemotherapeutic agents while preventing the floss from collapsing, snagging, or shredding. Braided flossing **cord** are more rigid than conventional floss and suitable for open areas and places where a floss threader may be too fragile to remove denser plaque, debris, and calculus. Satin Floss are particularly appropriate for a single tooth implant with intimate tissue adaptation. Woven are indicated where there are large interproximal spaces or long expanses of a bar retained prosthesis, 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, Dental Tapes are available in different “widths” and are used to clean the exposed abutment.

Interproximal Cleaners

Interdental aids can be selected and recommended considering the size and shape of the embrasure, when patients are unable to use floss.¹⁷ Foam tips, interproximal brushes, and disposable wooden picks are among the many auxiliary devices that can assist in plaque removal and delivering antiseptic rinses to enhance their effectiveness. Chemotherapeutic agents can also be applied interdentally and site specifically using foam tips and Proxi-Tip which acts as an interproximal brush and rubber tip in one design.¹⁷

Water Irrigation

A water irrigation unit such as the Hydro Floss is also beneficial in implant maintenance.¹⁸ However, care must be taken to direct the stream interproximally and horizontally between implants, as improper positioning can cause inadvertent damage to the peri-implant seal and bacteremia.¹⁸

Professional Hygiene Care

Implants necessitate intensive care that goes far beyond mere brushing of teeth. Natural teeth are anchored to the socket via periodontal ligament, which has an inherent protective defense mechanism, and hence are better protected against outside attacks than the implant. Stainless steel-tipped instruments, as well as metallic sonic and ultrasonic scalers gouge titanium and are contraindicated for implant instrumentation as scratching or roughening the implant surface can cause bacteria to adhere more easily, with an increased risk of inflammation.¹⁹ The appropriate instruments for implant maintenance are plastic, graphite, or solid titanium scalers and cures. These have been proven to be safe and effective for the removal of plaque and other deposits on titanium implants.¹⁹

Scaling

Plastic instruments produce insignificant alteration of the implant surface and are, thus, recommended for scaling implants, even though residues from the instruments are left behind. Plastic instruments reinforced with graphite and gold-plated cures are more rigid and can be sharpened and can as well be used. Upon insertion of the instrument, the blade should be closed against the abutment and then opened past the deposit, engaging it apically with the stroke extending coronally. Depending on the location of the deposit, horizontal, oblique, or vertical, short working strokes and light pressure should be used to prevent trauma to the delicate peri-implant sulcus. Prostheses can sometimes limit access of the scaler, and, in such cases, an ultrasonic or sonic scaler covered with a plastic sleeve can be used to remove deposits. Several manufacturers have developed implant power scaler tips and silicone covers to place on ultrasonic scaler tips to prevent possible scratching of the implant surface. Solid titanium scalers and cures are also now available that can be used to scale on "like metal" titanium implants, are thinner than plastic or graphite instruments and provide more strength to dislodge calculus. (Nordent Implamate™).²⁰

VIII. CIST PROTOCOL FOR MANAGEMENT OF RECURRENT DISEASE DURING MAINTENANCE OF DENTAL IMPLANTS

Lang et al suggested a novel, systematic stepwise approach for the prevention and treatment of peri-implant diseases referred to as the cumulative interceptive supportive therapy (CIST) protocol.²¹ This system is based on periodic monitoring with implementation of treatment as thresholds for a particular condition are met.

There are 4 protocols-A B C D²¹

Protocol A is used to control the inflammation in peri-implant mucositis that is implants with minimal increase in pocket depth, slight (+) bop, marginal erythema, plaque and or calculus .The therapeutic end point is to resolve inflammation with cautious mechanical debridement (using plastic curettes and rubber cup prophylaxis), twice daily swabbing with 0.12% chlorhexidine and a review of home care and motivation.

Protocol B is initiated for condition that exhibit similar mucositis features but with deeper pocket depths however there is still no loss of supporting bone.The treatment should include the therapies of protocol **A** plus locally delivered antibiotic-minocycline microspheres, doxycycline gel at the infected implant sites.

Management of early peri-implantitis,

Protocol C requires a more robust approach and is used in conditions with evidence of osseointegrated bone loss of <2mm and pocket depths >5mm. The strategy should include the modalities from Protocols A and B, as well as systemic antibiotic therapy (metronidazole 250mg t.i.d.) for 7 days or amoxicillin 500mg t.i.d for 10 days

Protocol D is initiated in circumstances of frank peri-implantitis that reveal probing depths >5mm,+ bop, plaque/calculus and peri-implant bone loss of >2mm.This strategy requires periodontal surgical intervention for chemical disinfection, osseous resection and/or guided bone regeneration

GBR will attempt to salvage the implant through bone regeneration techniques with the use of resorbable or non resorbable semipermeable membranes and a bone replacement graft.

Later, it was modified and called AKUT-concept where no therapy was indicated for patients having probing depth of less than 3mm with no plaque or bleeding present.²¹

IX. Conclusion

The long-term success of dental implants necessitates the preservation of healthy peri implant tissues. Clinical success requires regular clinical evaluation of the implant fixture, prosthesis, and surrounding tissue.The preservation of healthy peri implant tissues is required for the long-term success of dental implants. Regular clinical evaluation of the implant fixture, prosthesis, and surrounding tissue is required for clinical success.

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