Implant Maintenance: The Periodontist's Perspective

Anjani Kumar Pathak*, Kopal Goel**, Vijay Shakya***, Arunesh Kumari Tiwari****, Sagar Sareen*****

Abstract

Introduction: Although implant placement and maintenance is a multi-disciplinary approach but the role of the periodontist is critical to the successful maintenance and monitoring of dental implants. Long term success of dental implants depends on health of periimplant hard and soft tissues. Early diagnosis and management of periimplant disease is utmost important to prevent failure of implants. This article describes the importance of maintenance therapy in the prevention of failure of the supporting tissue of implants and the role of a periodontist in undertaking safe implant maintenance therapy. *Methods:* A research to provide evidences supporting the feasibility of various implant care methods was carried out using various online and published resources. *Conclusion:* Implants are more susceptible to inflammation and bone loss and the key factors for the long term success of oral implants is the maintenance of healthy tissues around them. Therefore, a tight recall schedule and comprehensive maintenance protocol needs to be followed to ensure long term success.

Keywords: Peri-Implantitis; Peri-Implant Mucositis; Implant Maintenance.

Introduction

Implant placement and maintenance is a multi-disciplinary approach where a team of specialists including prosthodontist, oral surgeon, periodontist and oral radiologist participate in the planning, execution and maintenance of the implants to ensure best possible outcome [1]. Long term success of implant depends upon the long term maintenance of the health of the peri-implant hard and soft tissues [2]. Peri-implant infections are classified as peri-implant mucositis and peri-implantitis depending on the severity. Peri-implant mucositis is defined as a reversible inflammatory reaction in the soft tissues surrounding an implant. Peri-implantitis is an inflammatory reaction with loss of supporting bone in the tissues surrounding an implant [3]. The objective of this paper is to describe the prevention of problems around implants that arise from microbial colonization on implants in the periodontally susceptible patient, the diagnosis of problem and the therapy to peri-implant infections. Implant complications can be due to a number of factors including placement and loading protocol failure, prosthetic failure, surgical failure, esthetic and phonetic failure and biologic failure [4]. In this paper, we are primarily interested in the prevention of failure of the supporting tissue of implants that is biologic failure and will not discuss in detail about prosthetic, material or surgical complications.

Biologic failures involves inflammation of the surrounding peri implant tissues in response to bacterial accumulation. Clinical features and signs of inflammation in peri implant soft tissue is similar to the inflammatory response in gingival and other periodontal tissues.

Etiology

The microbiota associated with healthy peri-implant tissues closely resembles that of the flora associated with gingival health. The organisms associated with mucositis are very similar to that of gingivitis and, unsurprisingly, that of peri-implantitis is very similar to that seen in periodontitis [5]. Failing implant sites harbors large no. of Gram negative

Author's Affiliation: *Assistant Professor, *****Senior Resident, Department of Periodontology **Senior Resident, Department of Prosthodontics ***Assistant Professor, Department of Conservative Dentistry & Endodontics ****Assistant Professor, Department of Oral & Maxillofacial Surgery, Faculty of Dental sciences, King George's Medical University Lucknow.

Reprints Requests: Anjani Kumar Pathak, C-50, Butlar Place Colony, Jopling Road, Lucknow- 226001 Uttar Praesh.
E-mail: dr.anjanipathak@gmail.com

anaerobes namely Actinobacillus actinomycetemcomitans, Prevotellaintermedia, Porphyromonasgingivalis, Fusobacterium species, Campylobacter rectus and Treponemadenticola.

A cause–effect relationship between bacterial plaque accumulation and the development of inflammatory changes in the soft tissues surrounding oral implants has been developed. If this condition is left undiagnosed, it may lead to the progressive destruction of the tissues supporting an implant (peri-implantitis), which may compromise its future and ultimately lead to its failure. An implant patient must always be enrolled in a supportive therapy program that involves recall visits at regular intervals [6].

Diagnosis

Diagnosis of periimplantitis is difficult and it includes radiological evidence for destruction of crestal bone and clinical evidence of pain, bleeding and suppuration on probing, peri-implant pocket formation, possible swelling of the peri-implant tissues and hyperplasia. The diagnostic parameters used for assessing periimplantitis includes clinical indices, bleeding on probing, peri-implant probing, suppuration, mobility, radiographs, microbiological examination, occlusal evaluation and design of prosthesis.

Diagnostic Parameters

Clinical Indices

For the evaluation of the peri-implant marginal mucosa and plaque Mombelliet al [7] and Apse et al [8] proposed modified indices.

Bleeding on Probing (BOP)

Bleeding on probing is a negative predictor that is its absence is an indicator of healthy soft tissue around implants.Lang et al in 1994 demonstrated that both peri-implant mucositis and peri-implantitis sites showed substantially increased BOP (67% and 91% respectively) [9].

Table 1: Peri- implant marginal mucosal indices

Score	Apse et al	Mombelli et al
0	Normal mucosa	No bleeding when a periodontal probe Is passed along the mucosal margin adjacent to the implant
1	Minimal inflammation with color change And minor edema	Isolated bleeding spots visible
2	Moderate inflammation with redness, Edema, and glazing.	Blood which forms a confluent red line on mucosal margin
3	Severe inflammation with redness, edema Ulceration, and spontaneous bleeding Without probing	Heavy to profuse bleeding

Peri-Implant Probing

Soft tissue collar around an implant is 3-3.5mm and the connective tissue attachment is 1-1.5mm [10]. Probing pocket depth of 3mm around implant is considered to be normal [11]. Probing force of 0.2 to 0.3 N is recommended around implants as junctional epithelial attachment zone has less strength to the implant and probe can go beyond the peri-implant sulcus to reach the bone [12].

Suppuration

Suppuration is a definite indicator of the disease activity and is often associated with peri-implantitis. High number of neutrophils are present in the peri implant tissues whenever disease is present. Sosuppuration indicates the need for anti- infective therapy.
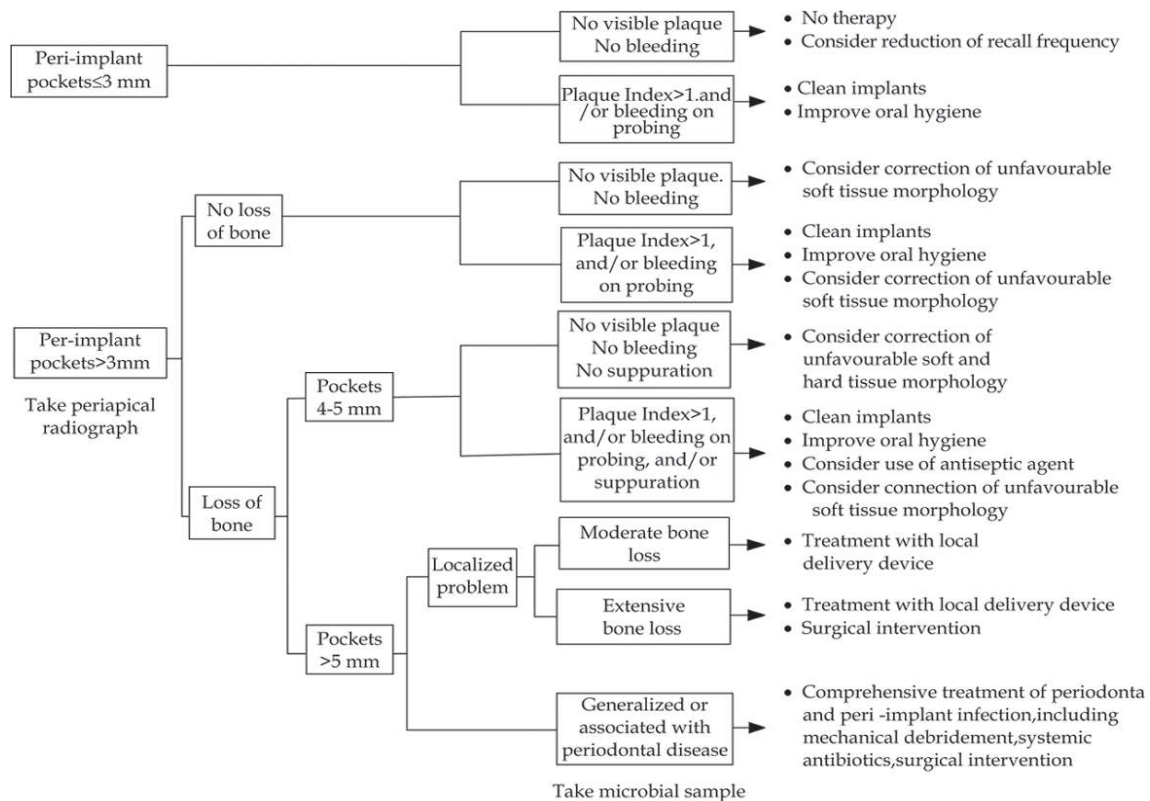
Mobility

Implant mobility is a late sign of lack of osseointegration. Clinically it can be tested with the help of two rigid instruments applying a labiolingual force of approximately 500g. Amplitude of tooth mobility can be checked through implant mobility scale (Table 2) given by Misch [13]. Assessment of implant mobility can easily be done at the clinical level by non-invasive devices such as perio-test and ostell. Recently a noninvasive device based on the principles of resonance frequency analysis (RFA) has been developed to monitor implant stability over time. These noninvasive tests reflect the rigidity of the bone to implant interface.

Table 2: Clinical implant mobility test

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

Graph 1:

Radiographic Evaluation

After an initial remodeling in the first year that results in 1.0-1.5mm of bone reduction the bone level around healthy functioning implant remains stable for many years allowing implants to be a predictable means for tooth replacement. The annual bone loss after the first year in function is expected to be 0.1mm or less [14]. Conventional radiograph (periapical, occlusal and panoramic) may be used to evaluate the bony structure around implants. Maintenance appointment should be scheduled every 3 to 4 months and a radiograph at 6 to 8 months should be compared with the baseline to assess crestal bone changes. If no unfavourable clinical signs are evident, subsequent radiographic examination should be scheduled every 3 years. However if crestal changes are apparent, radiograph must be taken every 6 to 8 months until the bone is stable for two consecutive periods [13].

Occlusal Evaluation

Occlusal evaluation of the implant and its prosthesis must be done routinely to avoid occlusal overload which may lead to its failure. Occlusal disharmony such as premature contact or interferences should be identified and corrected to prevent loosening of abutment screw, implant failure and prosthetic failure.

Design of Prosthesis

Prosthesis design is important for the long term care of the dental implant. It should be such that

• Lack of subgingival extension

• Open embrasures

• Complete accessibility of implant neck with oral hygiene procedures

Implant Maintenance

A maintenance program should be initiated after successful implant therapy which include a regular recall visits to provide optimal disease prevention. This recall visit is similar to that of a periodontal maintenance programwhich includes examination, diagnosis, motivation and treatment. Careful evaluation of implant site and periimplant soft tissues should be done at each recall visit using previously mentioned diagnostic parameters. If probing pocket depth is less than 3mm, no bleeding on probing, no any signs of inflammation and no radiographic bone loss is present then no professional therapy is required and only personal implant care is to be followed.

Personal Implant Maintenance

The patient must initiate the implant care regimen immediately after surgical placement with one-stage system, after exposure of the implant site in the two-stage system.

During healing period when mechanical plaque control is contraindicated, chemical agents (chlorhexidine) should be used [12]. Twice daily brushing of implant to remove bacterial plaque should be accomplished using a soft tooth brush or gentle powerbrush. Patient should be instructed in circular brushing according to the BASS technique using small, soft-bristled brushes [15]. In difficult-to-access areas smaller-diameter toothbrush heads such as end-tufted brushes or tapered rotary brushes may be of benefit [12]. For interproximal cleaning dental floss, interdental cleaning aids should be recommended considering the size and shape of embrasure. Dental floss is appropriate for implant with intimate tissue adaptation. Dental floss can also be used to deliver antiseptic agents to the implant on a daily basis. With all types of flossing materials, it is important to instruct the patient to gently place floss subgingivally until resistance is met. Interdental brushes should be chosen according to interproximal areas. In case of implant, an interproximal brush with a plastic coated wire is usually recommended [15]. For those implant patients prone to occasional inflammation, daily cleansing with chemotherapeutic agents (chlorhexidine) in the form of gels or rinses is also recommended.

Professional Implant Maintenance

Maintenance procedures of dental implants are similar to those for patients with natural teeth, with certain differences 1) plastic, titanium tipped or gold coated instruments should be used for calculus removal because they will not damage the implants. 2) Only light handed scaling should be done to avoid disrupting peri-mucosal cuff seal. 3) Acidic fluoride prophylactic agents, ultrasonic scaler, air abrasion, stainless steel instruments should be avoided and 4) Nonabrasiveprophy pastes should be used. The instrument should be disposable or able to be sterilized, and effective in removing plaque and calculus without damaging the implant surface. Oral irrigating devices can also be used to remove supragingival plaque around the implants.

If there are pockets over 3mm and no bone loss, one should assess plaque and bleeding. An absence of both indicates no therapy is required. The presence of one or both indicates a need for oral hygiene instruction, local debridement and surgical resection to reduce the depth of the peri-implant pocket. When bone loss is present it can be divided into mild, moderate and severe. Mild bone loss is treated by oral hygiene reinforcement, topical antiseptic treatment, local or systemic antibiotics and surgical resection. Moderate bone loss indicates the same treatment for mild, but open debridement should be considered. Severe bone loss indicate cleaning the implant, oral hygiene instruction, local and/or systemic antibiotic delivery, open debridement or explantation [11] (Figure 1).

Conclusion

Implants are more susceptible to inflammation and bone loss compared to natural tooth. One of the key factors for the long term success of oral implants is the maintenance of healthy tissues around them. Therefore, a tight recall schedule and comprehensive maintenance protocol needs to be followed to ensure long term success.

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