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IMPLANT MAINTENANCE: AN UPDATE

Dental Science

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ABSTRACT

Introduction Long term success of implants depends on health of periimplant tissues. A relationship between bacterial plaque and the development of inflammatory changes in the tissues surrounding oral implants has been developed. If this condition is left untreated, it may lead to the progressive destruction of the supporting tissues around implant (peri-implantitis), and ultimately lead to its failure. Early diagnosis and management of periimplant disease is important to prevent failure of implants. This article describes the importance of maintenance phase in the prevention of failure of the supporting tissue around implants and the role of a periodontist in undertaking safe implant maintenance therapy.

Methods A study to provide evidences supporting the feasibility of various implant care methods was carried out using online and published resources.

Conclusion Implants are highly susceptible to inflammation and bone loss. Early diagnosis and management of periimplant disease is important to prevent failure of implants. The key factors for the long term success of implants is the maintenance of healthy tissues around them. Therefore, a tight recall schedule and comprehensive maintenance protocol needs to be followed for long term success.

KEYWORDS

Peri-implant Mucositis, Peri-implantitis Implant Maintenance

Introduction:

The replacement of lost natural teeth by implants has represented one of the most significant advances in restorative dentistry. Since their introduction in the 1970s, endosseous oral implants have become an integral part of reconstructive dentistry Placement of dental implant and its maintenance is a multi-disciplinary approach which require a team of specialists including prosthodontist, oral surgeon, periodontist and oral radiologist. They all 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] Depending on the severity peri-implant infections are classified as peri-implant mucositis and peri-implantitis. 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. The aim of this paper is to describe the prevention of problems around implants that arise from microbial colonization, the diagnosis of problem and the therapy to peri-implant infections. Implant complications can be due to a number of factors including surgical failure and loading failure, prosthetic failure, esthetic failure, phonetic failure and biologic failure[3].

In biologic failures, inflammation of the surrounding peri implant tissues in response to bacterial accumulation is seen. Clinical features and signs of inflammation in peri implant soft tissue is similar to the inflammatory response in periodontal tissues. In this paper, authors are primarily interested in the prevention of biologic failure that is failure of the supporting tissue of implants and will not discuss in detail about prosthetic, material or surgical complications.

Etiology:

The microorganisms associated with mucositis are very similar to that of gingivitis and, unsurprisingly, that of peri-implantitis is very similar to that seen in periodontitis.[4] Failing implant sites harbors large no. of Gram negative anaerobes namely Prevotella intermedia, Actinobacillus actinomycetemcomitans, Porphyromonas gingivalis, Fusobacterium species, Campylobacter rectus and Treponema denticola.

A relationship between bacterial plaque and the development of inflammatory changes in the soft tissues surrounding oral implants has been developed. If this condition is left untreated, it may lead to the progressive destruction of the supporting tissues around implant (peri-implantitis), and ultimately lead to its failure.

Diagnosis:

Diagnosis of periimplantitis includes radiological evidence for destruction of crestal bone and clinical evidence of pain, bleeding on probing, peri-implant pocket formation, suppuration and swelling of the peri-implant tissues. 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:

1. **Clinical indices**- For the evaluation of the peri-implant mucosa and plaque Mombelli et al[5] proposed modified index. (Table 1)
2. **Bleeding on probing (BOP)**- Absence of Bleeding on probing 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).[6]
3. **Suppuration**- Suppuration is 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. So suppuration indicates the need for anti-infective therapy.
4. **Peri-implant probing**- Probing pocket depth of 3mm around implant is considered to be normal.[7] Probing force of 0.2 to 0.3 N is recommended around implants as junctional epithelial attatchment zone has less strength to the implant and probe can go beyond the peri-implant sulcus to reach the bone.[8]
5. **Mobility**- Implant mobility is a sign of lack of osseointegration. Clinically it can be tested with the help of two rigid instruments applying in labiolingual direction. Amplitude of tooth mobility can be checked through implant mobility scale (Table 2) given by Misch.[9] Assessment of implant mobility can easily be done at the clinical level by non-invasive devices such as perio-test and ostell. Recently a device based on the principles of resonance frequency analysis (RFA) has been developed to evaluate implant stability over time. These noninvasive tests reflect the rigidity of the bone to implant interface.
6. **Radiographic evaluation**- The annual bone loss after the first year in function is expected to be 0.1mm or less.[10] 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 unfavorable 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.[9]

Maintenance Phase:

A maintenance program must be started 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 program which 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 should initiate the implant care immediately after surgical placement of implant. During healing period when mechanical plaque control is contraindicated, chemical agents (chlorhexidine) should be used[8]. 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.[11] In difficult-to-access areas smaller-diameter toothbrush heads such as end-tufted brushes or tapered rotary brushes may be of benefit.[8] 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 Interdental brushes should be chosen according to interproximal areas. In case of implant, an interproximal brush with a plastic coated wire is usually recommended.[11] Implant patients prone to inflammation, daily cleansing with chemotherapeutic agents (chlorhexidine) in the form of gels or rinses is also recommended.

Professional Implant Maintenance:

Professional care 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) Ultrasonic scaler, air abrasion, stainless steel instruments should be avoided and 4) Nonabrasive prophy pastes should be used. Oral irrigating devices can also be used to remove s plaque around the implants.

The "cumulative interceptive supportive therapy" (CIST)[12] suggests a protocol for the monitoring of healthy implants and the interception of peri-implant diseases. This protocol relies on probing depth, bleeding on probing and radiographic evidence of bone loss. As each parameter becomes more severe, more complex treatment is introduced, with each subsequent treatment incorporating that of the previous protocol.

1. *CIST protocol A (mechanical debridement):* If the probing depth is <4mm, oral hygiene can be improved by using soft scalers, rubber cup and paste.
2. *CIST protocol A+B (Antiseptic therapy):* If the probing depth is 4-5mm antiseptic therapy *(chlorhexidine rinse or topical chlorhexidine gel daily*) is used along with step A.
3. *CIST protocol A+B+C (Antibiotic therapy):* If the probing depth is ≥ 6mm, tetracycline fibers for 10 days and systemic antibiotics for 10 days *(amoxicilline + metronidazole)* are used along with step A+B.
4. *CIST protocol A+B+C+D (Regenerative and Resective therapy):* If the CIST protocol A+B+C is used and stillconsiderable amount of bone loss and probing pocket depth are present, surgical therapy is usedalong with step A+B+C. regenerative approach (barrier membrane) or respective approach (osteoplasty + apically positioned flap) is opted depending on esthetic considerations and morphological characteristics of lesions.

The goal of this cumulative treatment approach is ti intercept peri-implant tissue destruction as early as possible.

Conclusion

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.

Table 1: Peri- implant marginal mucosal indices

Score

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 to profuse bleeding

Table 2: Clinical implant mobility test

Score

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 1: Peri- implant marginal mucosal indices

Score

0	No bleeding when a periodontal probe Is passed along the mucosal margin adjacent to the implant
4	Isolated bleeding spots visible
5	Blood which forms a confluent red line on mucosal margin
6	Heavy to profuse bleeding

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

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