Position Paper

Periodontal Maintenance*

The purpose of this paper is to provide an overview of the role of periodontal maintenance procedures in the treatment of periodontal diseases. Reliance on this position paper in patient management will not guarantee a successful outcome, as periodontal diseases typically involve complex causes and symptoms. Ultimately, decisions regarding the diagnosis, treatment, and management of disease, as well as subsequent preventive therapy, must be made by the treating practitioner based on specific circumstances presented by the patient.
J Periodontol 2003;74:1395-1401.

Periodontal maintenance (PM) is the preferred term for those procedures formerly referred to as supportive periodontal therapy or periodontal recall, and includes maintenance of dental implants.[1] PM is initiated following periodontal therapy and is performed by a dentist, although components of PM may be performed by a dental hygienist under the supervision of a dentist. Typically, PM includes an update of the medical and dental histories, extraoral and intraoral soft tissue examination, dental examination, periodontal evaluation, implant evaluation, radiographic review, removal of bacterial plaque and calculus from supragingival and subgingival regions, selective root planing or implant debridement if indicated, polishing of teeth, and a review of the patient's plaque removal efficacy.[2] These procedures are performed at selected intervals to assist the patient in maintaining oral health. Although PM usually is instituted following periodontal and implant therapy and continues at varying intervals for the life of the dentition or its implant replacements, PM may temporarily be discontinued and surgical or non-surgical therapy reinstituted if recurrent disease or pathosis is detected.

BIOLOGICAL BASIS FOR PERIODONTAL MAINTENANCE

Tooth loss in some periodontal patients has been shown to be inversely proportional to the frequency of PM.[3] Ten years following completion of periodontal therapy, patients who had received at least periodic PM had significantly decreased probing depths and reduced tooth loss, compared to patients who had not received PM.[4] Indeed, numerous studies have demonstrated the efficacy of PM, and have shown that recurrent periodontitis can be prevented or limited by optimal personal oral hygiene[5-7] or through periodic PM.[8] Other studies have shown that patients who maintain regular PM intervals[9-25] experience less attachment loss and lose fewer teeth than patients who receive less PM[1,3,26] or none at all.[27-30] Since patients rarely are completely effective in removing plaque,[31,32] adherence to a PM program reduces the risk of future attachment loss. Similarly, PM allows for monitoring of dental implants, as well as evaluation of mechanical and biological aspects of implant support and restoration. Since it is not possible to predict when or if untreated gingivitis will progress to periodontitis, PM provides for periodic monitoring as well as professional plaque removal in patients who have been treated for periodontal disease.[3,9,33] Patients with a history of periodontitis require periodic PM, as personal supragingival oral hygiene alone has not been shown to control attachment loss.[34-36] Occasionally, despite the best efforts of clinicians and patients, some individuals may suffer progressive attachment or implant loss despite maintaining a regular PM schedule.[37-39] Additional diagnostic information such as microbial analysis, as well as therapy that includes local or systemic antimicrobial agents, may be required for those patients.[40-42]

THERAPEUTIC GOALS OF PERIODONTAL MAINTENANCE

1. To prevent or minimize recurrence of disease progression in patients who were previously treated for periodontitis, peri-implantitis, or some types of gingivitis (drug influenced, gingival diseases modified by systemic factors, hereditary gingival fibromatosis, etc.).
2. To prevent or reduce the incidence of tooth or implant loss by monitoring the dentition and prosthetic replacements of the natural teeth.

* This paper was developed under the direction of the Research, Science and Therapy Committee and approved by the Board of Trustees of the American Academy of Periodontology in May 2003.

3. To increase the probability of locating and treating other conditions or diseases found within the oral cavity in a timely manner.

TREATMENT CONSIDERATIONS

The following items may be included in a PM visit, subject to previous examination, history, and the judgment of the clinician:

A. Review and update of medical and dental history
B. Clinical examination (to be compared with previous baseline measurements)
   1. Extraoral examination and recording of results
   2. Intraoral examination and recording of results:
      a. Oral soft tissue evaluation
      b. Oral cancer evaluation
   3. Dental examination and recording of results:
      a. Tooth mobility, fremitus, and occlusal factors
      b. Coronal and root caries assessment
      c. Restorative and prosthetic factors, such as defective restorations
      d. Other tooth-related problems, such as open contacts or malpositioned teeth
   4. Periodontal examination and recording of results:
      a. Probing depths
      b. Bleeding on probing
      c. General levels of plaque and calculus
      d. Evaluation of furcations
      e. Exudate
      f. Other signs of disease progression
      g. Microbial testing if indicated
      h. Gingival recession
      i. Attachment levels if indicated
   5. Examination of dental implants and peri-implant tissues and recording of results:
      a. Probing depths
      b. Bleeding on probing
      c. Examination of prosthesis/abutment components
      d. Evaluation of implant stability
      e. Occlusal examination
      f. Other signs and symptoms of disease activity (e.g., pain, suppuration)
C. Radiographic examination
   1. Radiographs should be current, based on the diagnostic needs of the patient, and should permit appropriate evaluation and interpretation of the status of the oral structures, including teeth, periodontium, and dental implants. Radiographs of diagnostic quality are necessary for these purposes.
   2. The judgment of the clinician, as well as the prevalence or degree of disease progression, may help determine the need, frequency, and number of radiographs.
   3. Radiographic abnormalities should be noted.
D. Assessment of disease status or changes by reviewing the clinical and radiographic examination findings, compared to baseline
E. Assessment of personal oral hygiene
F. Treatment
   1. Removal of subgingival and supragingival plaque and calculus
   2. Behavioral modification:
      a. Oral hygiene reinstruction
      b. Adherence to suggested PM intervals
      c. Counseling on control of risk factors (e.g., smoking, nutrition, stress)
   3. Selective scaling or root planing, if indicated
   4. Occlusal adjustment, if indicated
   5. Use of systemic antibiotics, local antimicrobial agents, or irrigation procedures, as necessary
   6. Root desensitization, if indicated
   7. Surgical therapy (or discontinuation of periodontal maintenance and treatment of recurrent disease), if indicated
G. Communication
   1. Informing the patient of current status and need for additional treatment if indicated
   2. Consultation with other health care practitioners who may be providing additional therapy or participating in the PM program, or whose services may be indicated
H. Planning
   1. For most patients with a history of periodontitis, visits at 3-month intervals may be required initially.
   2. Based on evaluation of clinical findings and assessment of disease status, PM frequency may remain the same, be modified, or the patient may return to mechanical, chemical, surgical, and/or non-surgical treatment.

FREQUENCY AND TIME ALLOTTED FOR PERIODONTAL MAINTENANCE

Many patients presenting with recurrent gingivitis without additional attachment loss after definitive periodontal therapy may be adequately maintained with PM performed semiannually.[43] However, for most patients with a history of periodontitis, numerous clinical studies suggest that PM should be performed at intervals of less than 6 months. Intervals of 2 weeks,[16,44] 2 to 3 months,[9] 3 months,[3,4,10,45-50] 3 to 4 months,[7,14] 3 to 6 months,[11,51,52] 4 to

6 months,[37] and up to 18 months[53] have been evaluated. In general, data suggest that most patients with a previous history of periodontitis should obtain PM at least four times per year, since that interval will result in a decreased likelihood of progressive disease, compared to patients receiving PM on a less frequent basis.[9,12,18,19,51] Nevertheless, the PM schedule should be individualized, with the PM interval tailored to the needs of each patient.

Although pocket debridement suppresses components of the subgingival microflora associated with periodontitis,[54,55] periodontal pathogens may return to baseline levels within days or months.[56-68] The return of pathogens to pretreatment levels generally occurs in approximately 9 to 11 weeks, but can vary dramatically among patients.[69]

The time required for PM appointments should be dictated by such factors as the number of teeth or implants, patient cooperation, oral hygiene efficacy and compliance, systemic health, previous frequency of PM, instrumentation access, history of disease or complications, and the distribution and depth of the sulci.[9] Although PM traditionally has been delivered over a 45- to 60-minute period, the time required for effective PM should be individualized.

Adherence to suggested PM intervals can affect the success of treatment. However, studies have suggested that the degree of compliance with PM has been poor. One report indicated that 28% of patients did not comply with their first PM visit.[70] Another showed that, over a 10-year period, compliance was 45.8%, and that 59% of patients 30 years of age or younger were non-compliant.[71] Consequently, periodic reinforcement of the benefits of PM appears to be indicated, since it has been shown that patients treated for periodontitis who comply with suggested PM intervals will experience less attachment and tooth loss than patients who do not demonstrate compliance.[3,17,30,69-74] Moreover, mechanical, chemical, surgical, and/or non-surgical therapy may need to be reinitiated in some PM patients at specific sites that manifest disease progression. This may be indicated particularly at sites associated with previous attachment loss.[75-77]

IMPLANT MAINTENANCE

Patients with implants should be evaluated at regular intervals to monitor their peri-implant status, the condition of implant-supported prostheses, and plaque control. It has been hypothesized that routine instrumentation of dental implants may scratch and pit the exposed implant surfaces, resulting in alterations that may enhance both plaque accumulation and recolonization with pathogenic bacteria.[78-81] Although a number of investigators have examined the effects of various scalers, curets, and abrasives on implant surfaces, there are no clinical data to support the hypothesized relationship between implant maintenance technique and implant failure.

Studies evaluating the effects of different maintenance procedures on implant surfaces have revealed that titanium and hydroxyapatite-coated surfaces are frequently scarred and pitted when metal curets or ultrasonic instruments are used.[81] However, topical antimicrobials, manual or motorized toothbrushes, or rubber cup polishing with a fine abrasive paste all produce minimal surface alterations.[79] Other reports have suggested that the use of interdental brushes and plastic scalers maintain the integrity of titanium implant surfaces, whereas ultrasonic scalers may lead to severe roughness.[80] In a comparative study of titanium implants instrumented with titanium, stainless-steel, or plastic curets, the plastic instruments produced no significant changes in titanium implant surfaces following scaling, while metal instruments caused significant surface alterations.[81] Furthermore, titanium-tipped curets produced rougher surfaces than those treated with stainless-steel instruments.[81] Another study compared surfaces of titanium implants subjected to standardized scaling forces using gold-tipped scalers, a resin scaler, a graphite-reinforced scaler, an air-powder abrasive system, and a rubber cup with tin oxide slurry. No significant surface alterations were produced by the air abrasive system, but all other hygiene methods either created significant surface alterations, left residual particles on the abutment surfaces, or both.[82]

Plastic scaling instruments are commercially available. Their relatively large size can limit access to defects around implants. Therefore, other plastic instruments incorporating harder plastic have been designed specifically to provide better subgingival access and sufficient strength to remove subgingival calculus. However, no studies have reported the efficacy of these instruments. Gold-tipped and graphite-reinforced instruments are also available. Since gold is softer than titanium, these instruments may be less likely to scratch the implant surface.

The effect of altered implant surfaces on cellular growth and tissue attachment remains unclear. Evidence suggests that air-powder abrasives do not alter titanium surfaces, but that they do effectively remove microorganisms and allow normal fibroblast growth in vitro.[83] Implant surfaces instrumented with stain-

less-steel and titanium-alloy curets have been associated with significantly fewer attached fibroblasts than untreated control surfaces, with the greatest reduction in cell attachment associated with surfaces treated with stainless-steel instruments.[84,85]

The evidence suggests that plaque control is as critically important for the maintenance of dental implants as for natural teeth.[86,87] Consequently, it appears that effective implant oral hygiene techniques may include interdental brushes, dental floss, dental tape, and floss ribbons, as well as topical chemotherapeutic agents. Professional maintenance using plastic instruments or judicious use of metal instruments, air-powder abrasives, as well as polishing with a rubber cup and fine abrasive, also may be indicated.[79,82,88] A more comprehensive review of treatment considerations is found in the American Academy of Periodontology position paper, *Dental Implants in Periodontal Therapy*.[89]

TREATMENT SITES FOR PERIODONTAL MAINTENANCE

Effective PM involves cooperation and understanding among all involved participants: the patient, the referring (or restorative) dentist, and periodontist. Patients with recurrent gingivitis or slight chronic periodontitis traditionally have been maintained by their general dentist. Patients with a history of chronic periodontitis with moderate attachment loss may receive PM on an alternating basis with the general dentist and the periodontist. Patients with a history of severe periodontal attachment loss, or aggressive forms of periodontitis, often obtain PM at the periodontist's office, with the general dentist maintaining the non-periodontal aspects of the dentition. This approach has been validated by post-treatment patient surveys.[90] In addition, patients with dental implants, extensive periodontal prostheses, and those who are concurrently undergoing active orthodontic therapy often require PM to maintain periodontal and peri-implant health. With interdisciplinary therapy, cooperation and coordination among the treating practitioners are important as well.

FUTURE DIRECTIONS

As the results of further research become available for predicting disease activity, PM schedules may be better adapted to the needs of each patient. Specific areas of advancement may include more accurate and less expensive methods for disease diagnosis, including documentation of clinical attachment levels, improved imaging technology and microbiological assessment, and evaluation of host factors including gingival crevicular fluid components.[91,92]

SUMMARY

Successful periodontal and implant therapy with regular PM can promote periodontal and peri-implant health. Following surgical or non-surgical periodontal therapy, an interval is established for periodic ongoing care. PM is not synonymous with a prophylaxis. Maintenance procedures are under the supervision of the dentist and include an update of the medical and dental histories, extraoral and intraoral soft tissue examination, dental examination, periodontal and implant evaluation, radiographic review, removal of bacterial plaque from supragingival and subgingival regions, scaling and root planing where indicated, polishing of the teeth, and review of the patient's ability to perform plaque control.[2] An interval of 3 months between appointments for patients with a history of periodontitis appears to be effective, but this can vary depending upon patient compliance, as well as the clinical judgment of the dentist. When new or recurring periodontal disease appears, additional diagnostic and treatment procedures must be considered. The successful long-term control of periodontal disease and implant complications depends upon active periodontal maintenance care and appropriate additional therapy, if indicated.

ACKNOWLEDGMENTS

The primary author for this paper is Dr. Robert E. Cohen. Members of the Research, Science and Therapy Committee include: Drs. Terry D. Rees, Chair; Christopher Cutler; Petros Damoulis; Joseph P. Fiorellini; William V. Giannobile; Henry Greenwell; Angelo Mariotti; Steven Offenbacher; Leslie M. Salkin; Brian K. Nicoll, Board Liaison; Robert J. Genco, Consultant.

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