Periodontal Maintenance After Therapy

By William L. Balanoff, DDS, MS, FICD

Educational Objectives
Upon completion of this course, the clinician will be able to do the following:
1. Understand the rationale for periodontal maintenance and the components involved in a periodontal maintenance program.
2. Be knowledgeable about patient compliance factors and the impact of non-compliance on periodontal outcomes.
3. Know the considerations involved in the selection and recommendation of oral care devices and preventive therapies for patients.

Abstract
Periodontal disease occurs in the presence of pathogenic bacteria in a susceptible host. The overall objectives of periodontal therapy are to halt disease progression, reduce pocket depths and, ideally, obtain clinical attachment gains. Following active periodontal therapy, periodontal maintenance comprising both in-office and meticulous home care is key for long-term positive clinical outcomes. Consideration should be given to techniques and protocols that aid patient compliance, as well as to address root caries risk and prevent unwanted sequelae.

Introduction
Periodontal disease occurs in the presence of periodontal bacteria in a susceptible host. As periodontal disease progresses, clinical attachment loss and bone loss increase (Figure 1). Advanced disease is found in up to 15% of adults, and the majority of people experience gingivitis or moderate levels of periodontal disease. It is known that it is mainly the host response that determines the onset and progression of periodontal disease, influenced by risk factors that include smoking, poor oral hygiene, gender, hormones and genetics. Nonetheless, in the absence of periodontal bacteria periodontal disease would not occur.

Periodontal Therapy
The standard treatment for periodontal disease is nonsurgical scaling and root planing. The overall objectives are to halt disease progression, reduce pocket depths and, ideally, obtain clinical attachment gains. Periodontal therapy, when properly performed, is effective.

Figure 1. Periodontal disease progression
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at removing subgingival calculus, biofilm, debris and endotoxins and at reducing subgingival bacterial levels. At the end of therapy, the root surface must be intact, free of calculus and compatible with oral hygiene goals. The continued or renewed presence of high levels of periodontal bacteria after active periodontal therapy negatively influences treatment outcomes, and periodontal bacteria can return to pretreatment levels in as little as several days.5–8

Periodontal maintenance is key for long-term positive clinical outcomes following periodontal therapy, involving both in-office maintenance and meticulous home care.

Patients who do not receive regular periodontal maintenance have greater probing depths and more tooth loss than those who receive such care.9,10

**Table 1. In-office periodontal maintenance**

- Full evaluation of hard and soft tissues
- Thorough removal of calculus and biofilm
- Scaling and root planing at sites as indicated
- Assessment of adequacy of patient’s oral hygiene
- Patient education and motivation
- Reinforcement of good oral hygiene habits

The standard of care for visits for periodontal maintenance visits at least four times per year. This can be adjusted based on the individual patient — less often or more often — depending on the presence of disease recurrence or progression, efficacy of home care, and predisposing risk factors. Regular in-office maintenance appointments enable the clinician to assess the current status of the patient’s oral care and the adequacy of his or her oral hygiene. The periodontal maintenance program must meet the individual patient’s needs.13,14
Regular professional care and adequate daily oral hygiene are required for periodontal maintenance

Patient compliance and motivation
One of the main issues in periodontal maintenance is patient compliance. One recent retrospective study found that 55% of patients were noncompliant with maintenance therapy.15 Another study found that 28% of patients did not comply with their first visit for periodontal maintenance.16 Non-compliance factors further underscore the need for regular periodontal maintenance recare appointments (Table 2). These visits provide an opportunity for patient motivation, repeated oral hygiene instruction and reinforcement of good daily oral hygiene habits.17

Table 2. Non-compliance factors

- Irregular contact with dental professional
- Lack of understanding and retention of information
- Lack of motivation to perform oral hygiene procedures
- Lack of motivation to spend enough time on oral hygiene
- Reverting to old habits
- Novelty effect of a new oral care device wears off

Giving in-office instructions with a new brush — rather than asking a patient to buy one in a store and use it — has also been found to be effective in reinforcing the home care oral hygiene message and technique.

Giving in-office instructions with a new brush has been found to be effective in reinforcing home care oral hygiene

Home Care for Periodontal Maintenance
The goal of daily oral hygiene procedures for periodontal maintenance is to remove dental biofilm before it matures so as to prevent the development of gingivitis and a mature subgingival plaque.

The accepted home oral hygiene care regimen is use of a toothbrush (manual or powered) plus floss or interdental brushes. Most patients have been estimated to brush for only one minute,18 and survey respondents have indicated that more than 50% of patients never floss.19,20 In the absence of flossing, a reduction in bleeding sites of only 35% was obtained with brushing alone in one study.21 One study found
that manual interdental brushes were more effective than floss; a second study concurred with these findings, while a third study found floss and interdental brushes to be equally effective. Electric interdental devices have also been found to be as effective as floss.

**Manual and powered toothbrushes**

Manual and powered brushes have both been found to be effective. An extensive number of trials and studies have been conducted comparing manual and power brushing, using a variety of protocols. Powered brushes include rotary, sonic and rotary/oscillating powered brushes (Figure 2), and all have been found to be effective.

Haffajee et al. found both powered and manual toothbrushes effective over a six-month period in reducing the levels of bacteria in periodontal pockets when used to remove supragingival plaque (simultaneously removing periodontopathogens present supragingivally). Warren et al., however, found that this depended on toothbrush design and found that a novel-design manual toothbrush (Oral B Pulsar) was as effective as two powered toothbrushes (Oral B CrossAction Power and Crest SpinBrush Pro) in removing plaque when used in the participants’ normal manner (i.e., without additional training). Another study in which participants received five weeks of professional oral hygiene training found no differences in plaque removal efficacy between use of a manual toothbrush and a powered toothbrush (Braun Oral B Plak Control 3D).

Sonic brushes (Sonicare) have been found to be more effective than manual brushes, especially in difficult-to-reach areas, for plaque removal. Robinson et al. found that use of either a sonic brush (Sonicare) or a rotary/oscillating brush improved oral health in periodontal patients, and that the improvements with the sonic brush were superior. In contrast, Bader and Boyd found use of a rotary brush (Rota-dent) over a period of 12 weeks significantly more effective than a sonic brush (Sonicare) in reducing plaque, the bleeding index and the gingival index. A small study involving dental hygiene students showed that a rotary powered brush (Rota-
dent) was significantly more effective at visual plaque removal than a manual brush and removed 75% of the plaque present in 30 seconds versus 15 seconds. While care should be taken in extrapolating data gathered from clinical students to the general population, in this case such an extrapolation would seem to be valid since expertise could be expected to improve manual brush efficacy and thereby reduce the time required for a given level of plaque removal. Given patient compliance issues discussed earlier, increased efficacy of plaque removal in a reduced time is an important consideration when recommending an oral hygiene protocol and brush to patients. In general, powered brushes offer an opportunity to accelerate cleaning for inadequate brushers.

Interdental cleaning
Oral hygiene regimens must adequately address interdental cleaning. In contrast to manual brushes, powered brushes have been found to be effective at cleaning interdentally as well as in furcation areas. When compared to the combined use of a manual toothbrush, floss and toothpicks, Murray et al. found a rotary brush (Rota-dent) equally effective at controlling gingivitis in study patients over a period of 12 months and equally effective at producing significant reductions in the levels of periodontopathic bacteria. In comparing Rota-dent and Interplak (Bausch and Lomb) powered brushes, Bader and Williams found the Rota-dent to be significantly superior interproximally and at furcations.

Powered brush heads are typically smaller and more compact than manual brush heads, aiding access to difficult-to-reach areas. Patients in one study of sonic brushes (Sonicare) reported finding smaller brush heads preferable to larger brush heads. Recent designs have improved interdental cleaning using a powered brush — an important consideration given patients’ unwillingness to use interdental cleaners (in particular, floss). Brush heads with rotating or spiraling filaments are effective for interdental cleaning, and other design features that aid this include specific brush head shapes and active brush tips that reach into interdental sites.

Force and abrasion
Powered brushes have been compared in several studies to manual brushes for applied force and abrasivity. Van der Weijden et al. also studied brushing forces and
found that more force was applied using a manual toothbrush than a powered toothbrush and that the applied force depended on the brush used (Table 3). In one in vitro study, sonic, rotary/oscillating and ultrasonic brushes were all found to abrade both sound and demineralized dentin more than a manual brush. Boyd et al. studied the forces applied in vivo using either a Rota-dent, Braun Oral B or Interplak powered toothbrush or a manual toothbrush (Oral B P40) and regular dentifrice. The manual toothbrush was found to result in the most applied pressure and the Rota-dent the least applied pressure. In a similar comparison using in vitro testing, differences were also found in abrasivity with the same ranking of powered toothbrushes.

McLey et al., in comparing three powered brushes and a manual brush, found that the Rota-dent was more effective at removing stains and simultaneously less abrasive than a Braun or Interplak brush, with the manual brush being the least abrasive (20 µg/minute of material removed versus 35 µg/minute for the Rota-dent, 57 µg/minute for the Braun and 117 µg/minute for the Interplak). In addition, stain removal was achieved at the 97.2% level (assessed spectrophotometrically) versus 78.5% for a manual brush and 70.6% for a Braun powered brush. The Rota-dent also left the smoothest surface.
and Zwart found a powered brush (Oral B Ultra Plak Remover) to be less abrasive on dentin than a standard ADA reference manual toothbrush, with a relative dentin abrasivity (RDA) of 16 compared to 100 for the manual brush43 (Table 4).

A manual toothbrush is controlled solely by the patient, and the patient must brush gently and use a soft bristle toothbrush to help prevent abrasion — particularly important for the exposed root surfaces in periodontal patients. This is also an important concept when interpreting in vitro test results as these are carried out under controlled laboratory conditions, whereas in normal daily life this is not the case. Powered brushes are controlled mechanically, and while it is possible to apply more force momentarily, current powered brushes are designed to cut out if too much pressure is applied. Using a technique and brush that results in the least possible abrasion helps preserve tooth structure as well as the integrity and esthetics of direct and indirect esthetic restorations (Figure 5).

With respect to gingival abrasions, a recent study found no differences between two powered toothbrushes (Braun Oral B Plak Control Ultra, Braun Oral B Plak Control 3D) and soft manual brushes.44 It should be noted that this study involved dental students well trained in the manual Bass tooth-brushing technique. Niemi et al., however, found more gingival abrasions using a V-shaped manual brush than a powered brush.45

**Patient preference and selection considerations**

Given the issues of patient compliance addressed above, use of a powered brush offers a reduced time requirement for the same level of plaque efficacy and a “quicker” brushing experience. Powered brushes with interdental cleaning heads offer a suitable compromise for patients who are noncompliant with manual interdental cleaning — they may be willing to “brush interdentally” even if they are noncompliant with flossing or using individual manual interdental brushes. Bader found that patient compliance with recall was 92% for the patient group using rotary toothbrushes (Rota-dent), while it was 51% for patients using manual brushes.46 He also found that 67% of rotary-powered brush users exhibited good oral hygiene scores, compared to 25% of manual toothbrush users.

**Preventive care — caries and hypersensitivity**

In patients with periodontal disease, root exposure due to clinical attachment and bone loss occurs. Exposed roots are susceptible to caries due to the softness of dentin and any remaining overlying cementum (Figure 6). A recent study of patients under periodontal maintenance for between 11 and 22 years found that 82% had experienced root caries during the maintenance phase.47 Erratic patient compliance (noncompliance) has also been found to be associated with higher levels of root caries.48
The root caries risk for periodontal patients is compounded by dentinal hypersensitivity that can be a factor in noncompliance, since the root surface becomes painful upon contact with stimuli such as toothpaste or water (temperature) or the action of a toothbrush (touch) against the exposed dentin. Therefore, the prevention and treatment of both caries and dentinal hypersensitivity is an important consideration.

Relief from hypersensitivity can be obtained by using a number of techniques at home or in-office. At-home remedies include the use of dentifrices containing either potassium nitrate, potassium chloride or stannous fluoride. In-office techniques include the use of glutaraldehyde, iontophoresis, lasers, amorphous calcium phosphate and resins, as well as fluoride varnishes (Vanish™, OMNII™; ProDenRx, Pro-Dentec®; Duraphat®, Colgate Oral Pharmaceuticals; Duraflor, Pharmascience). Fluoride varnishes have the additional advantage of exposing the root surface to a very high concentration of fluoride (22,600 ppm) for an extended period of time while relieving hypersensitivity by forming globules that block the dentinal tubules; a protective fluoride-rich layer forms on the tooth surface and is available during acidogenic challenges.

Consideration should be given to prescribing a prescription-only high-fluoride dentifrice containing 1.1% sodium fluoride for caries prevention (ProDenRx, Pro-Dentec®; PreviDent 5000 Plus®, Colgate Oral Pharmaceuticals; Fluoridex Daily Defense, Discus Dental; ControlRx™, OMNII™). Remineralization and the prevention of demineralization are also important to help prevent abrasion of the dentin root surface, as demineralized dentin has been shown to abrade more easily than sound dentin.

Utilizing chemotherapeutics such as chlorhexidine gluconate to reduce microbial loads has also been shown to be effective as part of a preventive program. Applying 0.12% chlorhexidine gluconate rinse by dipping the microfilaments of a powered toothbrush (Rota-dent) in the rinse was found in one study to increase the efficacy of chlorhexidine gluconate rinse more than rinsing alone. However, the side effect of tooth staining precludes its long-term use for most patients. Consideration should also be given to advising patients to chew sugar-free gum at least three times daily for an extended period of time, as this has been shown to reduce the incidence of caries.

Summary
Periodontal therapy when appropriately utilized results in good clinical outcomes. Consideration should be given to techniques and protocols that aid patient compliance. The use of a powered brush offers the patient efficacy with reduced
time involvement and, depending on the brush head, may enable interdental cleaning in patients who are non-compliant with manual interdental cleaning techniques. It has been found that the risk of tooth abrasion may be reduced with the use of a powered brush. Periodontal maintenance is imperative for patients following active therapy. Care should be taken to address each patient’s ability and willingness to perform daily oral hygiene as well as his or her root caries risk.

References

About the Author:

William L. Balanoff, DDS, MS, FICD received his dental degree from Northwestern University and his masters in craniofacial research from Nova Southeastern University. He is an adjunct assistant clinical professor at University of Tennessee and a former assistant clinical professor at Nova Southeastern University teaching postgraduate prosthodontics; specifically implant surgery and reconstruction to the prosthodontic residents.

Dr. Balanoff is the owner of a multilocation fee for service group practice in the south Florida area. He is on staff at Broward General Hospital and North Broward Hospital with privileges for implant surgery and reconstruction. Dr. Balanoff is on the editorial board of Compendium and is a consultant for Zila Pharmaceuticals.

Best of all he has three wonderful children and an incredible wife who allows him to live his dreams.
1. Periodontal bacteria must be present for the onset and progression of periodontal disease.
   a. True
   b. False

2. The overall objectives of periodontal therapy include _________.
   a. to halt disease progression
   b. to reduce pocket depths
   c. to obtain clinical attachment gains
   d. all of the above

3. Periodontal bacteria can return to pretreatment levels in as little as several days.
   a. True
   b. False

4. In-office periodontal maintenance should include _________.
   a. a full evaluation and examination of the hard and soft tissues
   b. thorough removal of calculus and biofilm
   c. an assessment of the patient's oral care and the adequacy of his or her oral hygiene
   d. all of the above

5. One of the main issues in periodontal maintenance is _________.
   a. finding appointment time for maintenance visits
   b. patient compliance
   c. the availability of scaler units
   d. all of the above

6. One recent retrospective study found that ________% of patients were noncompliant with maintenance therapy, while another study found ________% did not comply with their first visit for periodontal maintenance.
   a. 25%; 38%
   b. 35%; 42%
   c. 45%; 45%
   d. 55%; 28%

7. It has been estimated that most patients brush for _________.
   a. thirty seconds
   b. forty-five seconds
   c. one minute
   d. two minutes

8. Less than ________% of patients floss daily.
   a. 50%
   b. 35%
   c. 15%
   d. 10%

9. Erratic patient compliance has been found to be associated with higher levels of root caries in periodontal maintenance patients.
   a. True
   b. False

10. The goal of daily oral hygiene procedures for periodontal maintenance is to remove dental biofilm before it matures so as to prevent the development of gingivitis and a mature subgingival plaque.
    a. True
    b. False

11. The accepted home oral hygiene care regimen is _________.
    a. use of a toothbrush (manual or powered)
    b. use of a tongue irrigator
    c. use of either floss or interdental brushes
    d. a and c

12. Rotary, sonic and rotary/oscillating powered brushes have all been found to be effective in trials.
    a. True
    b. False

13. ________ found that use of either a sonic brush (Sonicare) or a rotary/oscillating brush improved oral health in periodontal patients, and that the improvements with the sonic brush were superior.
    a. Robinson et al.
    b. Haraldsen et al.
    c. Boyd et al.
    d. none of the above

14. Bader and Boyd found use of a rotary brush (Rota-dent) over a period of 12 weeks significantly more effective than use of a sonic brush (Sonicare).
    a. True
    b. False

15. Increased efficacy of plaque removal in a reduced time is an important consideration given _________.
    a. brush head wear and fatigue
    b. patient compliance issues
    c. memory lapse
    d. all of the above

16. Design features that aid interdental cleaning include specific brush head shapes and active brush tips that reach into interdental sites.
    a. True
    b. False

17. van der Weijden et al. found that more force was applied with use of a manual brush than with use of a powered brush.
    a. True
    b. False

18. Powered brushes with interdental cleaning heads offer a suitable compromise for patients who are noncompliant with manual interdental cleaning.
    a. True
    b. False

19. Lack of abrasivity while brushing is particularly important for periodontal patients _________.
    a. with exposed roots, since dentin and cementum are more difficult to abrade than enamel
    b. with exposed roots, since dentin and cementum are more easily abraded than enamel
    c. with sialitis
    d. none of the above

20. The prevention of demineralization and remineralization of root surface _________.
    a. can be aided by the use of a 1.1% sodium fluoride dentifrice
    b. is important to help prevent abrasion of the dentin root surface
    c. is an important component of care for patients at risk for root caries
    d. all of the above
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### Educational Objectives

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3. Know the considerations involved in the selection and recommendation of oral care devices and preventive therapies for patients.

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The author of this course is a speaker for Zila Pharmaceuticals, Inc.

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