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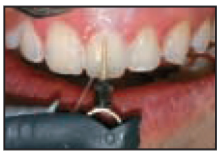
Maintaining periodontal health during adult orthodontic treatment



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ABSTRACT

In this article we describe a method for maintaining periodontal health that we have used in a quasi-systematic fashion in our orthodontie treatment of patients with chronic Periodontitis. Taking charge of their periodontal care and stabilizing their teeth are obligatory first steps in their orthodontic therapy. Then we ask them to initiate careful brushing by mechanical or sonic techniques.

During the course of orthodontic treatment these adult patients have routine monthly visits for essential periodontal therapy that consists of plaque removal and smoothing of the root surfaces of all teeth and implants with Vector Pro® and its carbon and composite inserts associated with hydroxylapatite and hydrogen peroxide. These monthly visits for periodontal care together with mechanical or sonic tooth brushing at home have effectively contributed to the long term stability of our results, from both orthodontic and periodontal perspectives.

KEYWORDS

Periodontal maintenance

Orthodontic maintenance

Maintenance of implants.

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1 - INTRODUCTION

Maintenance of periodontal health is a term that routinely appears in our treatment plans but its being put into effect is far from routine[11].

Patients with periodontal disease are usually treated before orthodontic treatment begins with plaque removal, and root planing, and, either during or at the end of mechano therapy, with mucosal and gingival surgery and benefit from individualized maintenance programs.

Problems arise, however, when active periodontal disease flares up during the course of orthodontic treatment, partly, or entirely, for iatrogenic reasons. The basic orthodontic treatment elements themselves, the appliances, often have bulky contours that tend to increase the accumulation of dental plaque of an intensity that varies with the type of device and the resultant added difficulty in daily cleaning.

Maintenance objective is to prevent recurrence of of the disease.

We limit this protocol to patients with chronic periodontitis

2 - PERIODONTAL DISEASE AND ORTHODONTIC TREATMENT

Periodontal disease is an inflammatory multifactoril pathology that combines the presence of bacterial pathogens with individual host susceptibility. Some systemic risks can favors periodontal disease development with an aggravating factors as tobacco use, stress[9] and malocclusion[7].

In the presence of periodontal disease, affected teeth whose bone support is reduced, have lowered resistance to muscular forces exerted by the tongue, lips, and cheeks as well as to occlusal impact.

As soon as the diagnosis of chronic periodontal disease in confirmed, which, in 80% of the cases, we institute an initial phase of treatment to reduce the bacterial population and prevent accumulation of biofilm.

This first step in treatment consists of a daily oral hygiene program adapted for each individual patient, a deep root scaling followed by careful polishing of root surfaces as well as crowns. Finally, surgical approach can eradicate persistence of lesion after initial therapy.

As soon as progression of the periodontal disease has been stoped, orthodon tists can begin therapy with the objective of correcting the malpositioning of teeth that the periodontal disease had, at least in part, caused (fig. 1a to f). Because

a b c

Figures 1 a to c
Patiente de 65 ans en cours de traitement. 65 year-old female patient during treatment.

d e f

Figures 1 d to f
End of orthodontic treatment. Note the deposits of plaque.

bone level has been reduced, the orthodontic forces employed should be light and well controlled.

Periodontal treatment results will be stable only if a regular maintenance schedule appropriate to the individual patient is followed throughout the time appliances are worn.

And when treatment is concluded, the retention employed should be the least traumatizing, from a periodontal standpoint, provided that it is consistent with the requirement for preserving both the orthodontic and the periodontal treatment results.

The periodontal maintenance visits that were begun at the conclusion of the initial phase and continued throughout active orthodontic therapy. This procedure should proceed after mechano-therapy has concluded, twice or three times a year for all patients to prevent any periodontal disease reccurence that would invariably lead to a return of the malocclusion[1].

3 - PERIODONTAL MAINTENANCE BEFORE COMMENCEMENT OF ORTHODONTIC TREATMENT

3 - 1 - Establishment of oral hygiene techniques

The first step is to prepare a daily, achievable oral hygiene regimen for each patient. This protocol is not aimed at those meticulous patients who use every instrument in the oral hygiene arsenal daily, so fiercely, in fact, that we often have to calm them down to prevent their eroding cementum and other oral tissues.

After a thorough review of the way home care is taught by dentists we decided to adopt mechanical brushing as a technique for our patients to use because it is generally more appropriate for them than the manual, especially when older patients reduce the time they devote to home care.

In fact, depending upon the type of action, mechanical (Oral 3D®) or sonic (Sonicare®), these hygiene instruments have proved their superior effectiveness[4].

We believe the time devoted to teaching oral hygiene to patients, a task often assigned to our assistants, is well spent and we view it as an important element of our daily practice. And as for the tools themselves, the rapidity with which they accomplish their assigned tasks correctly is one of their most important features.

As the life expectancy of the population increases, it would appear to be desirable for patients to acquire a regimen of oral hygiene that they can utilize efficiently even as their vision and motor skills diminish with advancing age.

It is extremely frustrating for older people when they begin to lose the ability to manipulate small inter-dental periodontal brushes or dental floss because of their decreasing manual dexterity but thanks mechanical brushes they can regain their lost autonomy.

In our opinion, the use of a non-abrasive dentifrice alternating every other day with a mixture of bicarbonate of soda and hydrogen peroxide gives the best results[15].

The addition of a water jet device adds stimulation of gingival blood vessels to the program and also contributes to removal of debris lodged between teeth.

It is worth noting that adding hydrogen peroxide to the mix poses no problems, unlike mouth washes composed of fatty digluconate of chlorexidine, which are inadvisable because they tend to cause blockage in the water propulsion device thus rendering it useless.

3 - 2 - Professional maintenance

We believe it is important to see our patients on a regular schedule for periodontal treatment and evaluation that will include mobility assessment occlusion evalation, and a determination of the rate in which calculus is deposited on teeth. We also use these visits to stimulate our patient's motivation reminding them how important good, efficient, daily oral hygiene is in obtaining and maintaining periodontal health.

Patients must understand that the periodontal disease they are suffering from, which is frequently chronic, is one that can be controlled; that they must be compliant in its treatment; and that we, as professionals, are ready and willing to give them the help they will need in this effort[16].

Not only must they maintain good daily oral hygiene but they must also perform faithfully by keeping regularly scheduled appointments for scrupulous professional prophylaxes and control of bacterial activity[13].

The increasing use of implants has introduced a new element to periodontal care: maintenance of the tissues surrounding implants. Our periodontal patients are frequently candidates for the placement of implants and taking care of them has become a new phase of our modern professional dental obligations.

Our treatment schedule for periodontal patients includes a variety procedures that are performed in a precise chronological order:

– cleaning with ultrasonic instruments in conjunction with betadine and/or hydrogen peroxide to remove calculus from all tooth surfaces;

– use of LM-Dental® CK6 and mini-CK6 to eliminate deposits of calculus in embrasures;

– use of Gracey curettes for subgingival calculus;

– use of aeropolisher to remove tobacco and other stains;

– additional polishing with prophylactic brushes and polishing paste;

– finishing with Vector Pro® set with carbon and composite periodontal inserts with hydroxylapatite and hydrogen peroxide (fig. 2 and fig. 3 a to e);

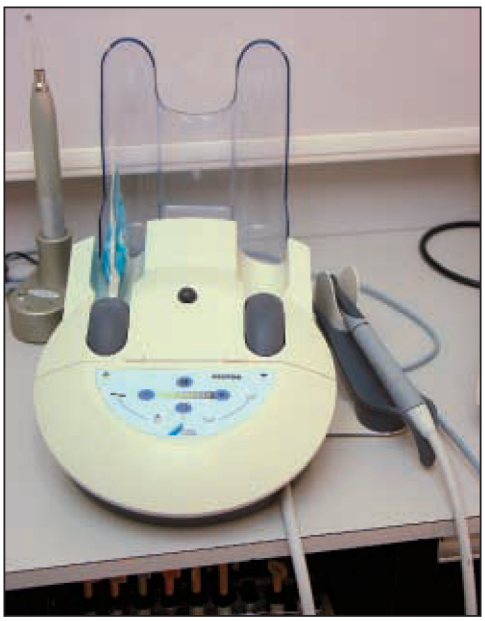


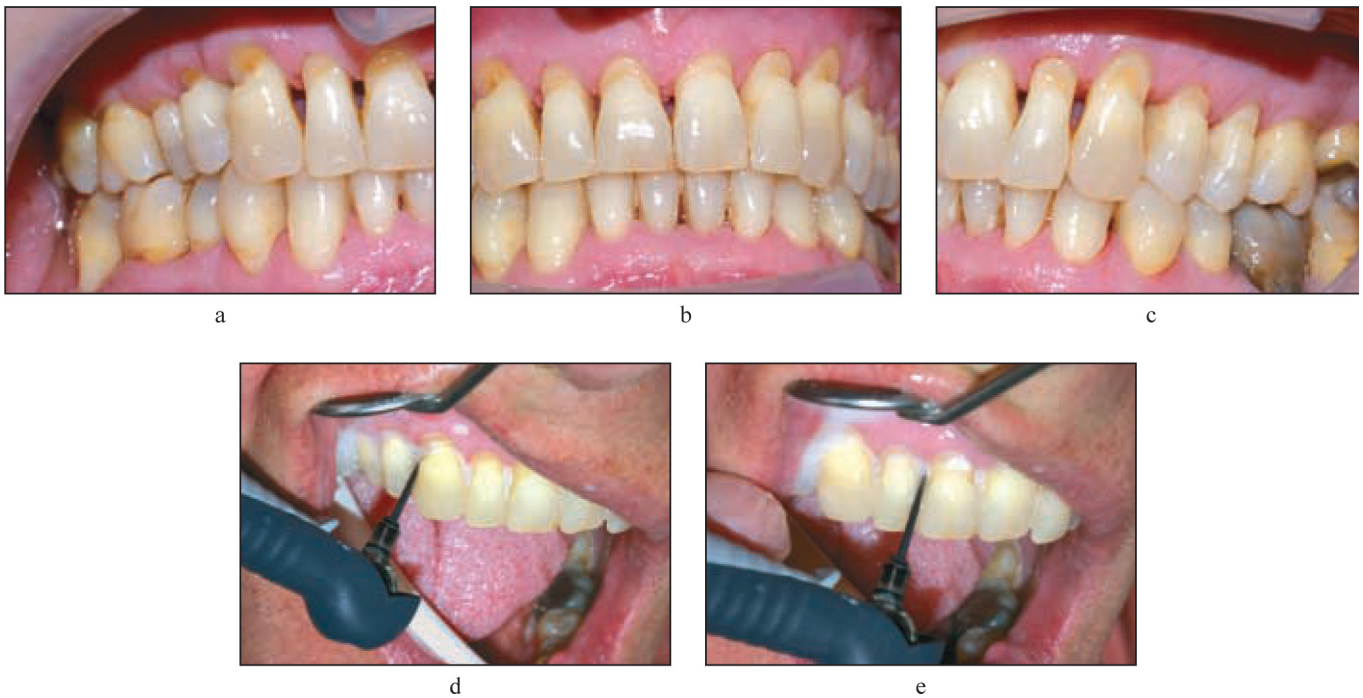
Figure 2
Vector Pro® appliance from DURR®.

– instructing patients how to use electric and sonic toothbrushes and dental floss so that they can maintain appropriate oral hygiene status.

This combination strategy constitutes our primary line of attack. It is important to note that only the Vector Pro® carbon and composite inserts are capable of providing atraumatic cleansing of dental implants, the ceramic components of bridges and crowns, and orthodontic appliances.

We always carry out this first treatment under local anesthetic. When it is completed patients go home with electric or sonic toothbrushes that they are asked to use faithfully in the intervals between appointments.

We schedule a check-up appointment for 15 days after this visit to re-evaluate any sectors that may have been imperfectly treated, to estimate



Figures 3 a to e

Utilization of Vector Pro® carbon inserts in conjunction with hydrogen peroxide and particles of hydroxylapatite for maintenance of patients with inadequate home care.

how well the patient will be able accept continuing treatment demands, and to assess how capable the patient has been in manipulating the electric or sonic toothbrush.

In this second appointment the practitioner will listen attentively to the patients' account of how treatment is proceeding and take this opportunity to congratulate them and to encourage them to persevere in their efforts. The practitioner will check the progress to date, and, if necessary, remove any plaque perhaps overlooked in some sectors in previous visits, frequently finding that patients have become comfortable enough with offices procedures to endure this prophylaxis without anesthesia.

Future check-up visits will be scheduled at 3 month, and in some cases, 6 month intervals. When the treatment team is convinced that the periodontal condition has been stabilized, orthodontic treatment can begin.

4 - PERIODONTAL MAINTENANCE DURING THE COURSE OF ORTHODONTIC TREATMENT

In accordance with the specific characteristics of the various orthodontic appliances available, we explain to patients what side effects to anticipate,

how they will affect the periodontium, and how to deal with them.

4 - 1 - Treatment with splints and removable appliances

We believe it is important to explain to patients that wearing a splint almost all day long, 22 hours out of 24 as is required for orthodontic treatment to succeed[2] will compress the vascular tissues of the periodontium and confine the teeth within this framework. This makes it all the more necessary for patients to use dental floss to eliminate food debris and the resultant stagnation and bacterial accumulation that lead to development of caries and periodontal destruction. The removable appliances will also need careful cleaning and disinfection with prosthetic bushes and immersion in a warm, soapy solution.

A monthly visit for checking the patients' periodontal health is highly desirable and serves also to stimulate patients' motivation.

4 - 2 - Full banded buccal appliances

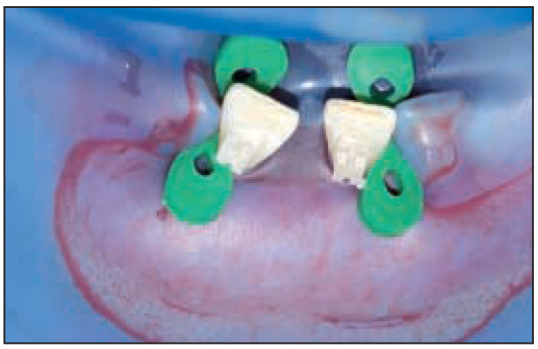
The impediment of a full-banded appliance with its brackets and arch wire, makes it impossible for patients to floss their teeth in the usual way, thus adding a factor that encourages the accumulation of bacterial plaque. In addition, the location of the opening of the Stenon canal, the exit route of the Parotid gland, facing the appliance laden buccal surfaces of the upper molars, together with the exits of the sublingual glands behind the lingual surfaces of the mandibular incisors, constitute additional important zones where plaque is laid down.

So monthly check-ups are essential for removing debris in these areas with thorough and scrupulous prophylaxes followed by polishing with Vector Pro® in association with sub-gingival irrigation with hydrogen peroxide. Particular attention must be paid to the high risk areas of salivary gland excretion and to other zones difficult for patients to reach with hygiene devices like the posterior teeth partially blocked by the ascending rami of the mandible (fig. 4 a to d).

As soon orthodontists note any sign of gingival recession, they should stop treatment immediately, so that corrective muco-gingival surgery can ameliorate and, if possible, completely eliminate the condition, and, above all, the treatment team can discover what factors have caused the recession. Fortunately, the buccal positioning of these defects usually offers good access for the surgery.

4 - 3 - Lingual appliances

Because of their location between the tongue and the lingual surfaces of the mandibular teeth, patients have more difficulty than usual in keeping lower lingual appliances clean. So it is imperative that they receive regular monthly assistance in this hygiene endeavor from trained dental personnel, especially in the lower molar areas and in all interdental spaces. In contrast with the traditional buccal fixed appliances, patients do not find impediments in maintaining good oral



a

b

Figures 4 a and b
Extraction with bonding of an extension on lower left lateral incisor.

Figure 4 c
Occlusal equilibration.

Figure 4 d
Note the accumulation of plaque on the teeth of this 78 year-old female patient.

hygiene buccally in the maxilla if their appliances are lingual. It is only when food gets impacted into the appliances during chewing that difficulties arise.

If lingual mandibular gingival recession develops, the topography prevents a surgical procedure. So pre-planning is more vital than usual, and the appliance must be designed in a way that will forestall any traumatism to the periodontium lingually (fig. 5 a to g).

4 - 4 - Temporary anchorage device

The introduction of mini-screws has not only made it possible for orthodontists to solidify anchorage and prevent any undesirable movement of anchorage teeth but also to intrude molar teeth thus often making unnecessary the need for ameloplasty, certain prostheses, and specific endodontic treatment [8,10]. They can also frequently reduce the intrusiveness of

Figures 5 a to c
Female patient before beginning of periodontal and orthodontic treatment.

Figures 5 d to g
The same patient during lingual treatment. She has been receiving regular monthly periodontal maintenance care.

a full-banded appliance. With the secure anchorage provided by mini-screws treatment can now be limited to a sector when formerly a full arch or arches needed to be included in the strap-up. The nature of the situation buccally when mini-screws are used with adjuncts like elastic chains, long ligature wire attachments, and protections of the Fermit® type can provoke the accumulation of a considerable amount of plaque that that will require frequent checking and cleaning (fig. 6 a and b and fig. 7 a and b).

Mini-screws located in the hard palate also attract amounts of plaque that are substantial enough to require professional prophylaxis.

Figure 6 a
Treatment with mini-screw and plastic block. Note that plaque accumulation has caused gingivitis.

Figure 6 b
At the end of 4 months of treatment.

Figure 7 a
Intrusion of a molar with arch wire and miniscrew anchorage.

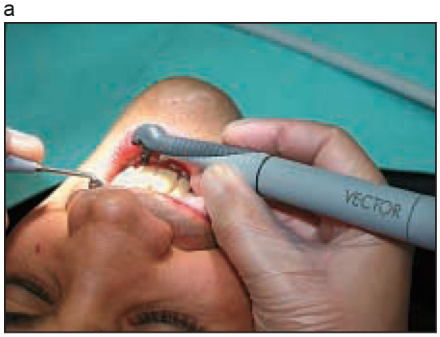
Figure 7 b
Toujours accumulation de plaque et tartre. Plaque and tartar are still accumulating.

Over-all monthly maintenance visits are advisable to prevent development of gingivitis in response to the irritation of mini-screws and the devices attached to them.

4 - 5 - Implant

With the widespread use of implants to replace missing teeth, we are increasingly called upon to treat patients who have implants in their mouths, and sometimes, as we have said, we find it useful to employ fixed implant screws or other implanted devices to create supplementary anchorage for our orthodontic tooth movement. Proper care of these implants requires the application of specially designed instruments[5]. Many suppliers are offering instruments made of plastic, various metals, even titanium, none of which work particularly well. But we have found that the polishing methodology we have already described undertaken with the aid of Vector Pro® and its

a



b

Figure 8 a
Male patient with slight recession near the post-crown junction.

c

d

Figures 8 b to d
Maintenance of implants with use of composite Vector Pro® inserts in association with hydrogen peroxide.

e

Figure 8 e
Result after one week.

carbon and composite inserts working with a polishing paste containing particles of hydroxylapatite and hydrogen peroxide is highly effective (fig. 8 a to e).

4 - 6 - Retention

The final stage of orthodontic treatment is the retention period, which frequently, especially with adult patients consists of a fixed appliance. The purpose of this device is to resist muscular and functional forces that might tend to impel teeth back toward their former positions. Orthodontists select the type of appropriate retention based on the available bone support, or lack of it; the length of the active treatment; the esthetics of the appliance; the occlusion; the cost;

and, above all, respect for good oral hygiene. They must choose from a multitude of splinting materials available, fiber, cast, arches, sealed with blocks of composite, all of which need to be made accessible for daily cleaning by the patients[3].

Whatever the retainer will be, it will constitute additional bulk to the dental arch and increase the likelihood of plaque accumulation. So it should be made as unobtrusive and as smooth as possible, constructed and bonded with rigorous respect for protocol and finally well polished to remove any surface crevices or defects[6].

5 - CONCLUSION

Maintenance, the least spectacular of periodontal procedures, is, nevertheless, essential for the long term survival of good treatment results and for the prevention of a recurrence of periodontal disease during orthodontic treatment. We are thoroughly convinced of the importance of this aspect of treatment, but practitioners have a wide spectrum of opinions about it. In this article we have attempted to present a methodology of chronological steps that we have developed and applied for many years in our office and which we have found to be particularly effective clinically.

The increasing number of adults seeking orthodontic treatment, has solidified our conviction that we must follow our patients carefully after conclusion of active treatment, emphasizing good periodontal maintenance is particularly important for this group of patients at high risk for relapse of periodontal disease. We think it is important that these patients, whose life expectancy is constantly increasing, use electric and sonic toothbrushes to optimize oral hygiene over the long term.

It is evident that the non-inclusion of this phase of treatment in the list of covered benefits discourages a certain category of patients. Such a possibility should be taken into consideration before treatment starts. Should we, after all, undertake orthodontic treatment for patients who are not willing to assume the financial responsibility for the post-treatment periodontal maintenance that is an absolute necessity?

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