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Lets adopt a precise new periodontal vocabulary that we can use in our orthodontic treatment of adults

Laurence LAPORTE

ABSTRACT

The aim of this article is to present a precise periodontal terminology that orthodontists can use to clarify communication between orthodontists treatment and their patients. What's mean periodontal issues that arise in adult orthodontic treatment, what the purpose of the discussion? In general terms we refer, of course, to mechano-therapy for adults and to the periodontal diseases that arise with this class of patients and to the treatment that is available for these maladies. Orthodontists who treat adult patients and record procedures in careful way need to rely upon a precise periodontal vocabulary so that, as group leaders, they can communicate effectively with other members of the inter-disciplinary treatment team as well as with patients. In the management of this effort, orthodontists are responsible for referring patients to periodontists when it's necessary and for keeping the lines of communication open between patients, and periodontists.

KEYWORDS

Periodontal disease

Periodontal treatment

Orthodontic treatment

Periodontium.

Address for correspondence:
L. LAPORTE,
12, boulevard,
Auguste Raynaud, 06100 Nice.
dr.laurence.laporte@wanadoo.fr

1 - INTRODUCTION

The management of orthodontic treatment of adults requires a multidisciplinary effort of orthodontists, general practitioners, periodontists, implantologists, maxillo-facial surgeons, endodontists, and possibly other specialists like myo-functional therapists. These treatments require close cooperation and numerous communications between participating practitioners[4,5]. In this article we present a clarification of pertinent periodontal terms in order to broaden comprehension between team members and thereby solidify their cohesion in achieving treatment goals. Just one member of the treatment team should be in charge of recording the ensemble of different therapeutic possibilities, long term accumulation of information about patients, treatment costs, the difficulties that might be encountered, the chronological order of procedures, and, when indicated, a re-evaluation the case. And who is that individual? It is the orthodontist who is responsible for the treatment. As the only specialists who have, so far, been officially recognized in France, orthodontists have the obligation of coordinating treatment and ensuring cooperation from each team member, a post that sometimes puts them in the delicate position of regulating relations between general practitioners, periodontists, successful outcome of adult orthodontic treatment. This will frequently oblige orthodontists to exercise a high level of diplomacy in relaying information between general practitioner and periodontist.

When we speak of periodontal disease in relation to orthodontics, what exactly are we referring to?

2 - THE NEED FOR ORTHODONTIC TREATMENT IN THE SENIOR ADULT POPULATION (fig. 1 a to h)

The increasing desire of the general public to make a good appearance, the increase in the longevity of the population, the development of more esthetically acceptable appliances including transparent brackets white colored wires, almost invisible devices like Invisalign®, lingual techniques, and orthodontic miniscrews[11,14] have all contributed to the increased number of older patients seeking orthodontic care. (fig. 2 a, 2 b, fig.3 a to i).

But it is above all the many dental changes related to aging that are correctible by orthodontics that drive patients to make examination appointments with orthodontic offices. These include abraded teeth; inadequate restorations; aggravation of tooth crowding; worsening defects in alignment of teeth and gingiva; bone resorption, both vertical and horizontal, associated with periodontal disease; gingival recession; arch sectors where teeth are missing through agenesis or extraction; and impacted teeth. It is clear then, that esthetic and functional indications for orthodontic treatment are numerous. To sum up, they include:

a b c d

e f g

h

Figures 1 a to h

This 47 year-old woman who works as an assistant made a consultation appointment to see what could be done to ''change her mouth'' A big problem for her, the cost of treatment, had to be considered in the establishment of the multi-disciplinary treatment plan.

- incorrect vertical positions of anterior teeth;
- misalignment of teeth increasing with age;
- closing of gingival embrasures as a result of the ravages of periodontal disease as a preliminary preparation for additional treatment later:

Figure 2 a
Orthodontic miniscrews to help in intruding this molar. Before view.

Figure 2 b
Result 4 months later.

– modification of interdental spaces for future prosthetic restorations;

– opening of spaces for placement of implants;

– amelioration of osseous support;

– correction of bone defects;

– augmentation of the amount of bone to improve the future implant site through forced eruption;

– correction of location of teeth that have migrated in a weakened periodontal environment.

3 - THE PERIODONTIUM

The periodontium can be differentiated into two sectors:

– superficial periodontium represented by **the gingiva** and the **alveolar mucosa;**

– deep periodontium represented by **cementum, the periodontal membrane,** and **alveolar bone**.

3 - 1 - Superficial perodontium (fig.4)

The gingiva is the portion of buccal mucosa that surrounds the teeth. Gingiva begins at the mucogingival line, cover the coronal aspect of alveolar process, and terminates as the free marginal gingival surrounding the cervix of each tooth. It consists of stratified para-keratinized tissue. The sulcus is made up of non-keratinized tissue that seals the tooth hermetically at its base, forming the junctional epithelium. The free marginal gingiva, generally speaking, is found at the depth of the sulcus or the periodontal pocket. The attached gingiva is located more apically, between the free gingiva and the alveolar mucosa. The gingival connective tissue is dense and rich in collagenous fibers, but has few elastic fibers. It is primarily made up of fibroblasts, but other types of cells are also found in it.

The muco-gingival line, which separates the attached gingiva from the

Figures 3 a to i
The patient, who had refused any surgical treatment, did not want to wear visible appliances. She asked for treatment with a lingual technique.

alveolar mucosa, occurs at a level predetermined genetically.

The alveolar mucosa is an extension of the buccal mucosa that lines the borders of the mouth. It is mobile because it is rich in elastic fibers and its epithelium is not keratinized. In addition it is abundantly supplied with blood vessels.

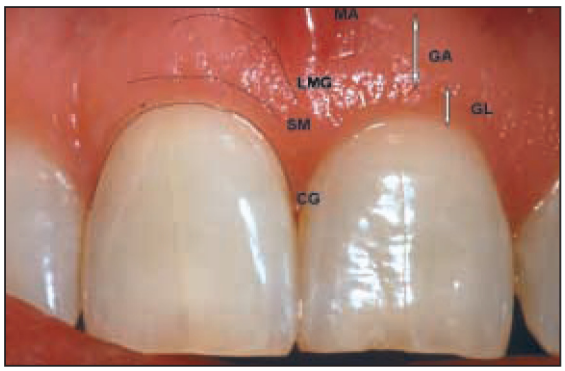


Figure 4
Superficial periodontal view. The muco-gingival line (MGL). The marginal groove (MG), the Gingival crest (GC). The alveo-lar mucosa (AM). The attached gingiva (AG). The free gingiva (FG).

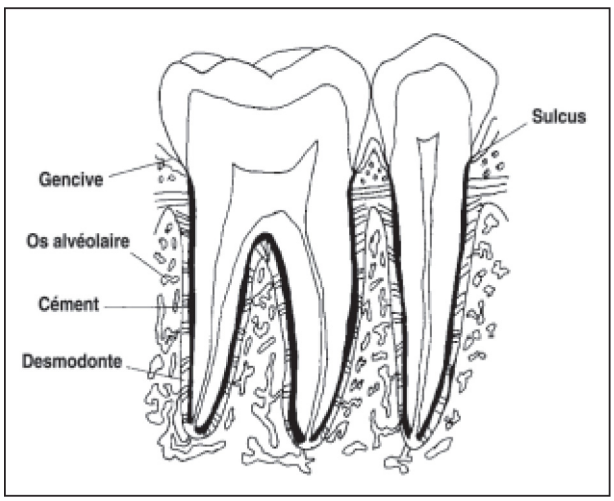


Figure 5
The deep periodontium.

3 - 2 - Deep periodontium (fig. 5)

The cementum is a calcified tissue that covers the roots of teeth. It acts in a supporting role for teeth because the fibers that attach roots to bone and gingiva could not exist without its serving as one of their termini. The principal cells of this hard tissue are cementoblasts, cementoclasts, and cementocytes. Resorption of cementum is the primary cause of dentinal sensitivity. Unfortunately, the cementum is not an impenetrable barrier to bacterial invasion.

The alveolar bone in its primary role moors teeth in position by serving as the other terminus for the attaching ligamentary fibers. It is a calcified connective tissue that has undergone permanent morphological changes as it participates in the general osseous physiology of the organism. It is made up of two dense cortical plates, the buccal and the lingual, and spongy bone between them. Another thin cortical plate is found within the spongy bone where it forms an osseous alveolar wall, described, radiologically, as the lamina dura. It has

numerous perforations through which pass the blood vessels supplying the ligaments. Alveolar bone's principal cells are osteoblasts, osteoclasts, and osteocytes.

The periodontal membrane is a very thin layer of fibrous connective tissue located in the alveolus between the tooth and alveolar bone. Those of its fibers that attach the tooth to alveolar bone are designated as Sharpey's fibers. Intermingled between all the fibers are cellular bodies, fibroblasts, primarily, blood vessels, and nerves. The periodontal membrane acts as a shock absorber for occlusal forces. Practitioners can take advantage of the periodontal membrane's rich potential to use it as a base for guided tissue regeneration.

4 - PERIODONTAL DISEASE

While **gingival recession** can be caused a multitude of factors such as mechanical as in insult from faulty brushing or ill-fitting orthodontic attachments, anatomical anomalies with teeth placed too far labially, or thin periodontium, or functional defects such as infraocclusion, it cannot be considered to be a periodontal disease. This distinction is reserved for cases of gingivitis and periodontitis, which are infectious maladies associated with formation of dental plaque[7] (fig. 6 a to c)

The **gingivitis** group is limited to that tissue which, when affected, displays redness and bleeding in reaction to probing, and is reversible. The cause and effect relationship of plaque with gingivitis has been clearly established[13]. In France, 80% of the 35-44 year-old population is affected by gingivitis, which may develop into a frank periodontitis.

On the other hand, the group of **periodontitis** maladies affects deeper structures of the periodontium and cause destruction of connective tissue and bone resorption, often with a loss of periodontal attachment with its epithelium migrating apically and laterally. The gingiva ''comes unglued'' and a pocket forms, establishing a reservoir, a nest for the bacteria[1] that favor inflammation. Without appropriate treatment, periodontitis can lead to

a b c

Figures 6 a to c
Patient's teeth were severely abraded and the gingiva receded as a result of traumatic tooth brushing.

loss of teeth. It has been well established that development of periodontal disease can be correlates to cardiovasculardisease[9], to preterm birth[17], infection of hip and knee joints with their possible total deterioration, respiratory infections[16] and, even diabetes mellitus[6].

Periodontal disease result from a defficience of host reponse, for example a functional defect of the PMN (Polymorphonuclear leukocyte). Other risk factors can induced an escape of the host reaction. These include use of tobacco, stress[15] and inadequate oral hygiene[13].

We can major our treatment efforts by explaining to patients that tobacco and emotional stress contribute to periodontal disease severitybut their elimination is not suffisant to make it disappear. Our action on patient hygiene is our principal goal during multidisciplinary treatment of periodontal disease.

5 - PERIODONTAL TREATMENT

Good **daily oral hygiene** is indispensable for controlling and combating dental plaque, a safe haven for the nesting of the bacterial inciters of periodontal disease. The first stage of periodontal therapy is the instruction of patients in the correct way to brush and to prescribe for each patient appropriate cleansing instruments. Mechanical brushes, either sonic or electric, are the equivalent of traditional brushes and, in many instances, superior to them[3,8] especially during the course of orthodontic treatment and also for seniors because they accomplish their task in less time. It is recommended that all patients brush at least once in the morning and once in the evening, but patients being treated for periodontal disease should brush at noon as well. Hydropik and other water propulsive devices add an element of gingival massage that stimulates immune reactions to the procedure. And the use of dental floss makes it possible to cleanse interproximal spaces. In this effort small interdental brushes are also effective. And finally Super-floss® is the only way for patients to maintain good hygiene under pontics and around implants.

Professional prophylaxis by dentists or hygienists completes the picture of the methods available for removing tartar from the crowns and roots of teeth (fig. 7 a to f). This service greatly reduces the quantity of pathogens, especially the anaerobic type and their endotoxins that infiltrate into the cementum and dentinal tubules[10]. Prophylaxis can be undertaken manually with De Gracy type curettes, with mechanical sonics (Soniflex©, Kavo) or with ultra-sonics, a modality that includes magnetostriction (Cavitron SPS©, Dentsply), and ferro-magnestriction (Odontogain©, XO), piezo-electricity (Piezo master©, EMS/P-max©, Satelec), with or without antiseptics (digluconate of chlrorhexidine, oxygenated water. Then a more specific device that smoothes surfaces by vertical movements associated with particles of hydoxylapatite in Vector Pro© (Dürr-Dental) can be

a b c

Figures 7 a to c
The gums of this 55 year this old female patient were bleeding.

d e f

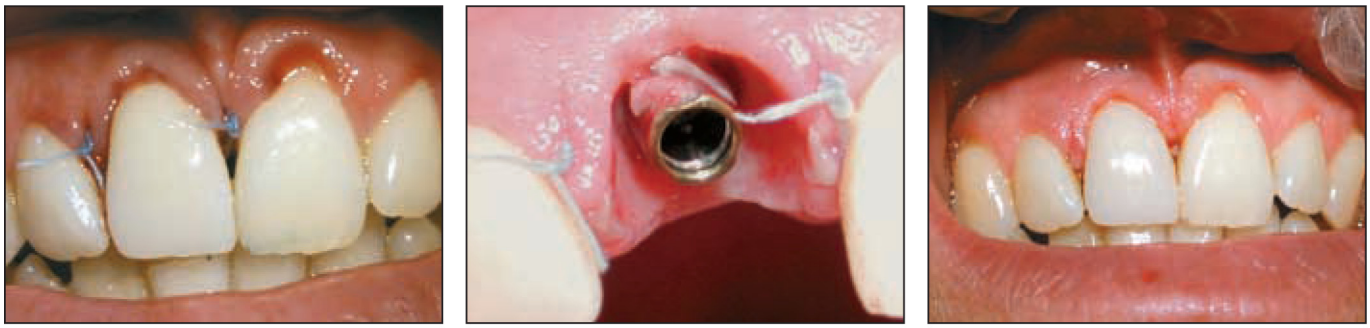
Figures 7 d to f
Situation after prophylaxis and somoothing of dental surfaces.

used. For cleaning pockets lasers are highly effective. It should be noted that only Vector Pro is capable of mechanically cleaning implant bases non-traumatically.

Good home care with careful brushing and flossing supplemented by regular visits to dentists or hygienists for professional plaque removal should be sufficient to maintain a healthy periodontium after treatment for early or moderate forms of periodontal disease under local anesthesia. Maintenance periodontal check-up visits should be scheduled every three months or every six months depending on the severity of the condition.

Periodontal surgery is performed only if professional cleaning and subsequent home care prove to be inadequate for controlling the disease. When periodontal pockets persist and their bacterial inhabitants remain active, mastering the malady requires a surgical procedure, whose goals are to restore favorable contours to supporting bone and to regenerate or repair bone lost during the course of the disease process. In cases where a filling with substitute bone material is indicated cellular derivatives (Endogain®)[18] or regeneration membranes are used. Periodontal surgery, which is performed under local anesthesia, includes gingivectomies and other procedures such as:

– crown elongation aimed at restoring proper biological space for the



a b c

Figures 8 a to c
This 30 year old female patient had a tooth with a fractured root that was extracted atraumatically followed by placement of an implant that was loaded immediately with the tooth's prosthetic crown.

Figure 8 d
Osteotomes were used to augment bone density and to create a second alveolus.

a b

Figures 9 a and b
Permanent bonded retention that allows good access for maintenance of oral hygiene.

future prosthesis by reducing periodontal, gingival and osseous, tissue[2];

– muco-gingival surgery whose goal is to reconstitute the lost periodontal tissue[12] if the patient complains of pain or functional difficulties or if esthetic problems are present;

– preservation of alveolar crests: it is vital to plan for preservation of and reconstruction of this bone, if necessary, when a tooth is extracted so that it can later be replaced under the best possible conditions[19] either with an implant, a bridge, or a removable partial denture. Bone preservation techniques include atraumatic extraction, periotomal and luxation, with placement of implants associated with the use of osteotomes followed by immediate loading (fig. 8 a to d), the filling of the extraction site with resorbable substitute bone material, and the eventual establishment of a barrier of regenerated natural bone in concert with a gingival graft.

Retention at the end of treatment, whether it was basically periodontal or basically orthodontic, is indispensable for the maintenance of good periodontal health. Of course, this retention should be as unobtrusive as possible without compromising stability (fig. 9 a and b). Bonded retainers are preferable to removable ones or those that require ablation of dental tissue for installation.

6 - CONCLUSION

Periodontal language has to be extensive in order to describe a range of domains, each word expressing a pathology, such as periodontitis; an action, such as piezo electricity; and a specific procedure, such as atraumatic extraction.

Detection of periodontal disease, has a high priority in the planning for and treatment of adult patients. In this relatively short review of periodontal terminology, we have seen how crucial it is for orthodontists and periodontists to cooperate each other and how difficult it is to explain to patients in clear and simple terms all aspects of periodontal disease. As it has so often been proclaimed but far less actually implemented, cooperation between orthodontists and periodontists is indispensable for the establishment of an effective treatment plan for an adult patient. In formulating it and in implementing it, the treatment team should steer an inter-disciplinary course of therapy, fixing in advance the chronological order of its stages. From the beginning, it is imperative that the patient's periodontium be restored to a healthy state and that it be maintained in that condition throughout the orthodontic treatment.

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