ORTHO-PERIODONTAL INTERRELATIONSHIP. A REVIEW.

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Abstract

The interrelation between orthodontics and periodontics is evident. In daily practice is common to meet patients with periodontal disease associated with dental malpositions. In addition, it is also common to observe dental migrations secondary to periodontal disease. In this context, the dentist may have to question the possibility and the necessity of orthodontic treatment. The question is if orthodontic treatment improves the existing periodontal situation and if is possible to perform orthodontic treatment on a reduced periodontium without causing other complications.

This review highlights three most important periodontal complications of the orthodontic treatment and it assesses the necessity of the periodical periodontal controls and treatments before, during and after the orthodontic treatment.

Keywords: orthodontic treatment, periodontal status, periodontal disease

Introduction

Orthodontic therapy carried out on a non-stabilized periodontium causes damaging complications. The cooperation and communication between the orthodontist and the periodontist as well as the patient's compliance are the keys to the success of such multidisciplinary therapy [1-3]. In fact, orthodontics and periodontics are two complementary disciplines: orthodontics allow intra-arch and inter-arch relationships to be reestablished in order to preserve the periodontium and periodontics is at the service of orthodontics and must be integrated throughout orthodontic treatment [4].

Normal intra- and inter-arches relations are an anatomical and functional prerequisite in the preservation of healthy dentition [5,6]. Certain orthodontic dysmorphoses are associated with problems in sustaining good hygiene. Also as possible consequences as gingivitis and potentially periodontitis. On the contrary, the correct alignment of the teeth in their respective arches and the establishment of normal inter-arches relations provided by orthodontic therapy facilitate the maintenance of oral hygiene and the control of periodontal inflammation.
Taking into consideration the fact that orthodontic devices by their presence constitute true plate traps and thus contribute to the local risk of periodontal disease it is imperative that orthodontist have a good communication and collaboration with the periodontist and refer their patients for regular periodontal controls [1].

Periodontal diseases are pathologies of bacterial origin with an inflammatory component leading to the progressive destruction of tooth support tissues [7]. The modification of the commensal flora does not explain in itself the pathogenesis of periodontitis; other factors are involved and explain the clinical differences observed between individuals. Therefore, understanding the biologic basis of periodontal surgical procedures, recent advancements in tissue engineering and research development can yield more productive clinical endpoints than ever before. Acknowledging the importance and necessity of these two specialties and making the best decision for the patient begins with the identification of periodontal elements of pathology that could complicate during orthodontic treatment [8-10].

Orthodontics is a complementary therapy to periodontal therapy. In the case of secondary dental migrations, orthodontics restore aesthetics and function. The literature remains controversial on the direct benefit of orthodontics on periodontal disease [1,10,11].

Orthodontics allows displacements in the three planes of space. Every tooth movement must be carried out with caution, as it may cause periodontal complications. It is well known that any orthodontic treatment must necessarily be preceded by a classic and specific periodontal treatment if necessary. Periodontics can also be used for orthodontics; just as periodontal maintenance perpetuates the orthodontic results [12].

Orthodontic tooth movement is due to the application of a force on a tooth and it assures a biological response of the tissues surrounding the teeth; also the intensity of the applied force is an important parameter to prevent the iatrogenic effects of orthodontics [13]. Therefore, these are aspects to be taken into consideration in the clinical practice and that should be well known by the orthodontists [1,10].

It is necessary to adapt the orthodontic treatment to the histophysiological conditions of the periodontium. For example, in adults, the turnover of repair and bone formation is slow: tooth movement is delayed and complications are more frequently and the orthodontic treatment takes more time.

The histophysiological particularities of the adult periodontium that should be taken into consideration and well known include the above. The displacement is slow: the cortical bone is dense, the cellular contribution is lesser, the rate of apposition and resorption reduced. Latency (response time of tissues to the exerted forces) is lengthened and can last several weeks. Indirect resorptions are very important, causing significant mobility [1].

Hyalinization is long: the cellular and fibrillar turnover is slow, resulting in a delay in movement and significant risk of bone destruction. We must adopt a mechanical system that avoids repeated hyalinizations. For Melsen [14,15], with age the general trend is the reduction in cortical thickness and volume of trabecular bone. This implies that a smaller amount of bone should be
resorbed for some dental displacement to occur. However, the marginal bone loss influences the position of the resistance center and therefore has an impact on the system of forces implemented. According to Fontenelle [16] the use of light forces reduces the formation of hyaline zones, favors the direct resorption of the cribriform plates and directs the progenitor cells to osteoblastic cells.

Orthodontic dental movement must follow these conditions: the periodontium must be complete and healthy; the non-surgical and surgical procedures must be accomplished (scaling, root planning, pocket surgery) and the use of light and continuous forces should be implemented.

Possible complications or undesired secondary effects of orthodontic treatment should be well known. Above there are some of these possible complications.

Gingival recession is a common complication found in young adults and in some cases is related to past orthodontic treatment [17]. A recent study [18] concluded that the prevalence of gingival recessions increases after orthodontic treatment. In that study it was observed that there was a continuous increase in gingival recessions after orthodontic treatment with full fix appliances from 7% at end of treatment to 20% at 2 years after treatment and to 38% at 5 years after treatment. This study concluded that fixed orthodontic treatment and the retention phase may be risk factors for the development of labial gingival recessions [19]. Therefore, orthodontic tooth movement should be carefully made within the alveolar housing.

Gingival hyperplasia is another possible complication of orthodontic treatment. Mild gingival modifications correlated with orthodontic appliances appear to be transitory, and the tissues exhibit just little permanent periodontal damage [20]. Gingival hyperplasia usually resolves or responds to plaque removal, curettage, or both. If the gingival tissue or enlargement interferes with tooth movement and hygiene and it is not resolved by the previous means it must be removed surgically. But after the appliances are removed the hyperplasia can be well corrected surgically [21], and it is recommended to use this procedure to enhance posttreatment stability [11, 22,23].

Apparently apical root resorption is an unavoidable complication of the orthodontic treatment, microscopic studies showing a prevalence of 100% after the finalization of the treatment. The signs and symptoms of root resorption are usually absent, even mobility has been rarely present. Kalkwarf demonstrated that the shortening of the root with 4 mm due to this pathological aspect is equivalent to 20% loss of the periodontal attachment, and 3 mm loss is equivalent to 1 mm loss of the periodontal attachment [24]. The high severity forms of root resorption, that correspond to shortening of the root, also with influence on tooth prognosis, are one of the most discussed complications correlated with the orthodontic therapy. Actually is an unpredictable effect without an sufficiently known treatment. For the purpose of minimizing the severity of root resorption a good knowledge of etiopathogenic mechanism is mandatory; mainly two categories of factors are incriminated. Individual susceptibility has the main role in root resorption appearance, aspect difficult to correctly estimate. Indicators of high risk patients may be, for example, the signs of root resorption prior to
orthodontic therapy [4,13,25]. Among risk factors of root resorption related directly to orthodontic technique there are: treatment time, the amount of root apex displacement, the type and amount of orthodontic force, and also the type of orthodontic appliance used. Also, many studies demonstrate that one of the most important factor is treatment duration, an optimal period being less than 1½ years [26]. Apparently bracket prescription and type (for example standard edgewise or straight wire technique, conventional or self-ligating) doesn’t influence root resorption severity [27].

This review highlights three most important periodontal complications of the orthodontic treatment and it assesses the necessity of the periodical periodontal controls and treatments before, during and after the orthodontic treatment. Patients must be motivated to maintain a really good hygiene and be conscientious about the interrelationship between the orthodontic treatment and the periodontal status.

Conclusions.
This review highlights three most important periodontal complications of the orthodontic treatment and it assesses the necessity of the periodical periodontal controls and treatments before, during and after the orthodontic treatment. The orthodontists and periodontologists should work together in order to achieve the best clinical results for their patients.

Bibliography: