

PERIODONTAL RISKS AND COMPLICATIONS CORRELATED WITH ORTHODONTIC TREATMENT. A REVIEW.

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Abstract.

Periodontal health may be used to evaluate the success of orthodontic treatment. Orthodontic treatment ensures proper alignment of the teeth and improves the occlusal and jaw relationship. This improves the quality of life, contributing to oral and general health. Orthodontic treatment has benefits, but also risks and complications. Oral hygiene instruction and periodontal therapy are also indicated for child and adolescent orthodontic patients. 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: *periodontal risks, orthodontic treatment, periodontal status.*

Introduction

Properly aligned teeth are easier to clean, and correct occlusion could promote healthier periodontium. The periodontal complications correlated to orthodontic treatment include gingivitis, periodontitis, gingival recession or hypertrophy, alveolar bone loss, dehiscences, fenestrations, interdental fold, and dark triangles [1-4].

This review aims to highlight the main periodontal complications. Also, the complications of orthodontic treatment include tooth discolorations, decalcification, root resorption, periodontal complications, psychological disturbances, gastrointestinal complications, allergic reactions, infective endocarditis, and chronic fatigue syndrome [1, 5]. It is well known that orthodontic tooth movement induces an inflammatory

reaction in the periodontium [6,7]. An important objective and also challenge of orthodontic therapy is to initiate a minimum of complications.

In general the adult patient with preexisting periodontal disease is considered at risk when orthodontic treatment is performed and prior to orthodontic treatment it is mandatory that periodontal disease be properly controlled with root debridement and reinforcement of oral hygiene instruction. Oral hygiene instruction and periodontal therapy are also indicated for child and adolescent orthodontic patients.

Although periodontal complications are generally minimal and infrequent [6-10] in adolescent patients the literature presents such cases also. For example, a case of an adolescent patient with two distinct soft-

tissue lesions. The initial lesion occurred in response to local irritations, soft-tissue pressure from the rapid palatal expander appliance and a possible microbial infection under the appliance. After the removal of the local irritants, the return to healthy tissue was observed. The second lesion was also associated with the orthodontic treatment, but forces were not applied directly to the soft tissue. The first molar was originally banded with a prominent solder joint and either the band or the solder joint may have acted as a plaque trap to provide a nidus for infection.

Therefore these bands should be removed and replaced with new bands. The presence of these lesions may be indicative of an unusual host response to local irritants. Certain groups of patients present exaggerated reactions to dental plaque possibly as a result of transient systemic hormonal shifts (for example, puberty). In that case, on the basis of this patient's profile, the intense inflammatory nature of the periodontal defect, and the hypervascular response to plaque, it can be stated that this patient manifests an exaggerated response to average plaque accumulation [11].

In such cases it is recommended that the clinician takes measures to recognize the early development of periodontal problems during orthodontic treatment in order to prevent them, also the reinforcement of plaque control and instructions for proper hygiene are recommended, in addition to periodic periodontal treatment. These should be considered routine. Other important aspect consists in utilizing properly adapted and biologically designed orthodontic appliances and the use of radiographs at reasonable intervals [11].

The fixed orthodontic appliances act as retention factors for the plaque, so it's difficult to accomplish a proper hygiene and gingivitis is the most common short-term effect of orthodontic treatments on the periodontium. In the cases of patients with poor oral hygiene oral [12] gingivitis is very common, but is also observed in the cases of patients with good oral hygiene [13].

Also gingival inflammation could be of iatrogenic origin, in the cases in which the brackets interfere with the biologic periodontal space. Gingivitis could be caused by the presence of excess bonding material [14,15]. Studies have shown that that comparatively to metal ligatures, elastomeric ligatures and elastomeric ligations significantly increase bleeding on probing [16,17].

Chronic inflammatory conditions may lead to fibrosis and this is manifested by gingival hyperplasia or hypertrophy. As chronic gingivitis is usually reversible after removal of orthodontic appliance, the removal of orthodontic devices does not always result in resolution of gingival hypertrophy [18]. There are cases in which hypertrophic gingivitis can evolve towards periodontitis [19].

The appearance of these periodontal complications involve patient factors (such as past periodontal condition, increased susceptibility, poor oral hygiene, smoking) and the technique used in the treatment [20-22]. Orthodontic treatment induce both positive and negative local soft-tissue reactions in the gingiva.

Orthodontic brackets and elastics interfere with effective removal of dental plaque, increasing the risk of gingivitis. Few clinical studies also reported poor periodontal health and greater loss of

clinical attachment level distally in the dental arches. This could be a result of poor oral hygiene in molar regions and the presence of molar bands, which favors food lodgment [19].

Orthodontic treatment affects the equilibrium of oral microflora by increasing bacteria retention. In most cases after the placement of a fixed appliance, gingival inflammation is visible, but could be transient and does not lead to attachment loss [23]. Some reports support the fact that the fixed orthodontic treatment may result in localized gingivitis, which rarely progresses to periodontitis [24].

Gingival inflammation around orthodontic bands could lead to pseudopockets, which usually disappear with debanding of the brackets. If the orthodontic forces kept within the adequate limits in healthy reduced periodontal tissue support regions, the chances of gingival inflammation will be minimal [25]. Alexander [19] in his results has also reported lack of periodontal destruction over a longer period of time among patients wearing fixed appliances. Published reports on human periodontal tissues state that the orthodontic banding performed with great care and proper maintenance of oral hygiene can prevent permanent periodontal destruction [19].

Root resorption is one of the undesirable but unavoidable complications of orthodontic treatment that could cause tooth mobility and even permanent tooth loss [26]. It is caused by a combination between individual biological variability and the effect of mechanical factors [27]. Root resorption is defined as the destruction of the cementum or dentin by cementoclastic or

osteoclastic activity; it may result in the shortening or blunting of the root [28].

Brezniak and Wasserstein in 2002 suggested a new and more descriptive term for orthodontically induced inflammatory root resorption (OIIRR) and they defined it is a sterile inflammatory process that is extremely complex and composed of various disparate components including forces, tooth roots, bone, cells, surrounding matrix, and certain known biological messengers [29].

Studies have concluded that the risk and severity of external apical root resorption increase as the duration of orthodontic treatment increases, also is influenced by the use of panoramic or periapical radiographs during orthodontic treatment, by the use of a rapid maxillary expander, by increasing force magnitude, by intrusion and by torquing as orthodontic movements [30-40].

Black triangles: open gingival embrasures occur when the embrasure space is not completely covered by gingival tissue and so leads to retention of food debris. This condition is more common in adult patients with bone loss [41] and should be discussed with patients before initiating orthodontic treatment [42].

Orthodontic treatment should be always preceded by evaluation of the periodontal status. Periodical periodontal controls during and after orthodontic therapy minimize the risk of developing such periodontal complications. Also, if needed periodontal therapy must be implemented.

Primarily patients must be made aware of the correlation that exists between orthodontic treatment and periodontal status, thus tooth stability. It is recommended to highlight the esthetic effects of a poor tooth stability and periodontal complication,

aspect that most likely will remain the same after the removal of orthodontic appliances.

In the undesirable cases in which patients aren't enough motivated to maintain a good oral hygiene and they aren't proceeding to regular periodontal maintenance it is most likely to develop certain periodontal complications either with short term effect either with long term effect

The frequency of these complications depends on patient's general and oral health, oral hygiene habits, orthodontic technique and medical knowledge, but also the patient's ability to

understand these interrelationships and also his commitment and cooperation.

Conclusions

Studies show that periodontal complications are the most common complications and in order to minimize them it's very important to assess the patient's risk before initiating the orthodontic treatment. So the real challenge seems to be minimizing these iatrogenic lesions and to consider periodontal care. A special situation is represented by close monitoring of adults with reduced periodontal support, that, in this case is mandatory in this case.

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