



Review Article

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The Relationship between Orthodontics and Periodontics— A review

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Abstract

The periodontal aspects of orthodontic treatment are reviewed in this article highlighting the cases of maxillary expansion, molar extrusion, and class III malocclusions. Gingival recession is dependent on two main factors namely, gingival biotype and the bone morphology. Teeth when placed in the center of the alveolar ridge and having adequate bone support circumferentially and alveolar bone on the labial and lingual aspects of the roots are considered to be best for supporting the teeth. The arch width can be increased with expansion appliances such as RPE which may lead to undesired effects on the periodontium. In this article, we review how mini-screws can be used for expansion in posterior crossbite and protraction of maxillary arch in class III malocclusions to prevent periodontal issues.

Keywords: Periodontium, Gingival recession, Gingival biotype, bone morphology, mini-screw assisted rapid palatal expansion, molar extrusion, Class III.

INTRODUCTION

Gingival recession is the apical displacement of the gingival margin in relation to the cemento-enamel junction (CEJ). Gingival recession can occur either on the labial side, lingual side, or interproximal areas [1]. This can result in exposure of the root-surface which can increase the sensitivity to cold, air, and also increase the chances of root caries in addition to compromising the esthetics [2, 3]. The prevalence of gingival recession increases with age and is present in more than 85% of adults older than sixty-five years [4]. Gingival recession can occur with good oral hygiene and poor oral hygiene [5, 6]. The most common teeth to experience recession are mandibular incisors on the labial aspects and maxillary molars on the buccal aspects [7]. The cause for gingival recession seems to be multifactorial. Tooth movement with orthodontic appliance has been implicated as a potential contributing factor [1, 8, 9]. There are conflicting findings on whether orthodontic treatment can lead to periodontal diseases or not [10-13]. In clinical situations as gingival recession can occur following orthodontic treatment, it is necessary to take steps to prevent it. This review article describes the effects of orthodontics on periodontal tissues.

Periodontal health and Gingival Recession

The ideal conditions for healthy periodontium are that the teeth are in proper alignment in the middle of the alveolar ridge, adequate bone on the labial and lingual surfaces of the root by at least 1 mm, axial loading, and circumferential bone present all around the teeth 1-2 mm from CEJ. Gingival recession presents itself as the apical movement of the marginal gingival tissue and can occur even in patients with appropriate oral hygiene [8]. In these situations, gingival recession is mainly observed on isolated teeth on the labial surfaces. On the other hand, in patients with poor oral hygiene, a generalized gingival recession may be observed [14]. The main factors responsible for gingival recession are the gingival biotype that is the width of the gingival soft tissue, and bone morphology such as the thickness of the alveolar bone [15, 16]. Alveolar bone dehiscence is considered as a high risk factor for gingival recession. Although, it is not necessary that with alveolar bone dehiscence, gingival recession will occur with certainty. But, whenever gingival recession is present, there is always an associated bone loss of the alveolar crest. Therefore, there is some relation between gingival recession and alveolar bone dehiscence [17].

Orthodontic treatment and gingival recession

There are certain risk factors associated with gingival recession and orthodontic treatment such as the buccolingual position of the teeth and the movement of teeth in the frontal plane [18]. The tooth position in

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the buccolingual dimension has an influence on the gingival-thickness and gingival-width of the keratinized gingiva [12, 19]. An increase amount of keratinized gingiva is present when the teeth are placed lingually rather than buccally. Rapid palatal expansion (RPE) is an appliance used to expand the maxillary arch and applies forces to the maxillary molars and premolars in the frontal plane. These appliances move the teeth buccally in the frontal plane and therefore, can lead to decreased gingival width on the labial aspects of teeth [20]. Recently, a new treatment modality has been introduced which uses mini-screws in the palate to anchor the expansion appliance and is known as mini-screw assisted rapid palatal expansion (MARPE). MARPE appliance move the two halves of palatal bone transversely by applying forces to the palate rather than the teeth. Thus, these appliances have an advantage in that it MARPE does not move the teeth buccally as much as the RPE. This is evident in the findings that MARPE appliances cause more skeletal expansion than RPE appliances when observed at intervals of more than 2 years [21]. There is an increasing trend toward the nonextraction treatment in orthodontics [22]. With nonextraction treatment, newer designs of orthodontic expansion have been introduced [23]. Orthodontic expanders can also help in correcting the dental crowding and arch asymmetry. One such design is U-MARPE which leads to movement of teeth in the frontal plane on one side of the palatal arch [24].

Another aspect of orthodontics is the extrusion of teeth caused by orthodontic tooth movement. The two most common tooth movement encountered in orthodontics is tipping and extrusion. Some authors have questioned whether extrusion of teeth with orthodontic tooth movement can lead to negative effects on the periodontium [25]. With expansion, there is accompanying orthodontic extrusion. It has been shown that the amount of extrusion that occurs with expansion appliances such as MARPE is similar to that of RPE and controls [26]. And thus, there appears to be no significant changes in periodontal structures with the normal orthodontic extrusion [12, 27]. This has been confirmed by the evidence that even after significant extrusion of impacted canines to bring them into the dental arch, there is no adverse effects on the periodontal tissues [28].

In patients with Class III malocclusion, the mandibular incisors are retroclined as a compensation to the skeletal pattern. In these situations, the labial wall thickness is reduced and there is a higher presentation of alveolar bone dehiscence for the lower incisors [29]. These situations predispose to gingival recession. That is why it is important to manage Class III malocclusion appropriately or the gingival tissues in the lower anterior region may migrate apically. For correction of class III skeletal relation, the ideal way seems to be with mini-screws in the jaw bones and intermaxillary elastics from the mini-screws [30]. In this technique, the force is applied directly to the maxilla and mandibular bone and not the teeth and therefore, there is decreased chances of periodontal side effects. With the mini-screws, the class III malocclusion is corrected, maxilla is moved forward and ideal Class I relation is achieved [30]. Mini-screws can also be used to distalize or retract the complete maxillary and mandibular arches to achieve Class I relationship [31, 32].

Periodontic and Orthodontic relationship

In order to minimize the chances of gingival recession and increase the gains of orthodontic treatment, both the periodontist and orthodontist should be aware of the potential contributing factors and risk-factors for periodontal issues. A consultation with periodontist before the orthodontic treatment is conducted may be helpful in identifying the preexisting periodontal conditions. Additionally, a collaborative effort between the orthodontist and periodontists during the orthodontic treatment period would ensure in prompt assessment and management of any undesired periodontal sequel. After the orthodontic treatment is completed, a complete periodontal checkup and cleaning would ensure a healthy periodontium. Orthodontic tooth movement should be done to align not just the crowns of the teeth but also the roots. It is important

to inform the patients of the potential risk factors for periodontal problems such as anatomical conditions as well as oral hygiene while conducting orthodontic treatment.

CONCLUSION

A comprehensive evaluation of the potential risk-factors for periodontal problems is necessary before conducting orthodontic treatment. Expansion of dental arches can be performed with conventional appliances where indicated. Mini-screws can be used for the purpose of expansion and protraction in class III malocclusion in cases where it is desired to not apply forces on teeth. A collaboration between orthodontist and periodontist is beneficial in identifying any contributing factors for gingival recession and periodontal issues.

Conflict of interest

The author reports no conflicts of interest.

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