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## Perio-ortho symbiosis: A review article

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### Abstract

Health reforms have affected many health professionals, who question how the traditional, altruistic values of equity, equality of access, and free delivery of care can be integrated into an organizational service culture that emphasizes management in a free competitive market. The practice of dentistry requires an interdisciplinary approach integrating all the disciplines of dentistry to obtain good results and integrate the knowledge, expertise and skills of various specialists. Rapid and fast changing advances in technology and invention has made it difficult for practitioners to update their knowledge, hence the requirement of various specialist is quintessential. Periodontitis is an infection with polymicrobial etiology leading to destruction of host and supporting apparatus. The risk factors included such as smoking, genetic or general factors which impacts the immune health of the host and leads to accelerated worsening of periodontal status.

**Keywords:** Orthodontic therapy, periodontal disease, multidisciplinary approach, adult orthodontics, malpositioned teeth

### Introduction

Periodontology and Orthodontics require an integrated, symbiotic and multidisciplinary approach to treat complex dental problems in patients. The main objective of periodontal therapy is to restore and maintain the health and integrity of the attachment apparatus of teeth<sup>[9]</sup>. Orthodontics plays an important role as an adjunctive discipline in generating the optimal base for the re-establishment of a healthy, well functioning dentition - hopefully with a lifelong prognosis<sup>[1]</sup>.

Orthodontic treatment is based on the principle that if prolonged pressure is applied to a tooth, it will move as the surrounding bone remodels. Bone is selectively removed in some areas and added in others. This response is mediated by the periodontal ligament, tooth movement is primarily a periodontal ligament phenomenon. The process of bone remodelling i.e apposition or resorption of bone is affected by the amount and impact of force being applied and the distance with the approximate teeth and also the sutures of maxilla and mandible, along with the surface of temporo-mandible joint<sup>[2]</sup>.

Hence, the biologic impact does not only occur onto the bone on which the forces are exerted but also the nearby structures impacted by the impact of forces. Gingival health can also be improved along with jaw deformities of dentition by orthodontic therapy. Orthodontic-periodontic interactions are mutually beneficial. The integrate approach of both periodontal therapy and orthodontics can enhance the facial aesthetics of the patient<sup>[3]</sup>.

### Review

An "ideal" occlusion is exemplified by a normal mesio-distal relation and inter-digitation of the cusps of the posterior teeth, with an acceptable overbite, overjet, and incisal guidance of anterior teeth in well-developed and well-aligned dental arches. This type of occlusion has been regarded as "normal" and most compatible with periodontal health. Unfortunately, normal occlusion is found in only a small percentage of the population. Because great pains are taken in orthodontics to achieve a normal occlusion, it would be desirable to show that this small percentage of the population has a greater predisposition to better periodontal health. It has always been thought that an ideal, "good" uncrowded arch form would be more conducive to the maintenance of good oral hygiene by the patient<sup>[4]</sup>.

When the roots of two teeth are close to each other i.e when the teeth are rotated or malpositioned they are predisposed to rapid breakdown of the periodontal fibers and consequently a thin interdental septum.

The correction of malposed teeth helps in maintaining the oral hygiene. The maintenance of oral hygiene helps in reducing food debris which is an important factor that causes periodontitis. If the rotated or malposed teeth are left uncorrected then it leads to mobility eventually and pathological migration of teeth<sup>[5]</sup>.

In the past 2-3 decades there is greater focus on dentofacial esthetics in the adult population with an increasing demand for orthodontic treatment to improve the dental and facial appearance. Periodontal and Orthodontic interactions are in vogue since years and are mutually beneficial. Combined periodontal and orthodontic treatment can greatly enhance periodontal health and dentofacial esthetics<sup>[6]</sup>. Interrelationship of Orthodontic and Periodontic treatment can be discussed in two ways:

1. Adjunctive orthodontic treatment for periodontally compromised patients.
2. Adjunctive periodontal treatment for orthodontic patients.

Adult patients have multiple problems with their dentition like pathological migration, rotation of teeth, fractured teeth, missing teeth, tipped abutment teeth, inadequate pontic space along with periodontal problems, which require periodontal restorative treatment<sup>[7]</sup>.

Orthodontic treatment can influence the adult periodontal problems in a number of ways. When crowded teeth are aligned, it provides better access to adequately clean all surfaces of the teeth. It is especially advantageous in patients who are susceptible to periodontal disease. Certain types of osseous defects which are very common in adults can be improved by orthodontic treatment and eliminate the need for resective osseous surgeries. Esthetic relationship of gingival margin especially maxillary arch can be greatly improved by orthodontic treatment<sup>[8]</sup>.

Patients undergoing orthodontic treatment have high susceptibility of plaque accumulation due to the presence of brackets and wires. The considerable variance of the design and the material characteristics of orthodontic elements may also play an important role in this field. The orthodontic treatment is a double-action procedure, regarding the periodontal tissues, which may be sometimes very meaningful in increasing the periodontal health status, and sometimes a harmful procedure which can be followed by several types of periodontal complications, namely: gingival recessions, bone dehiscence, gingival invaginations and/or the formation of gingival pockets<sup>[9]</sup>. When the tooth moves. It moves the entire attachment apparatus with it and the socket as the moves and is mediated by periodontal ligament phenomenon.

The main focus of orthodontic treatment is to attain a desirable functional occlusion. Tooth loss can lead to many complications such as pathologic tooth migration, midline diastema and incisal proclination. An increasing number of adult patients seeking orthodontic treatment, many of whom are likely to have some degree of periodontal disease<sup>[10]</sup>.

Recent research has acclaimed that patients undergoing orthodontic therapy are more prone to plaque accumulation because of the presence of brackets which makes the oral hygiene maintenance cumbersome. The main etiologic factor for the initiation of periodontal disease is presence of plaque which affects the periodontium. Plaque also causes gingivitis<sup>[11]</sup>.

The presence of plaque on brackets and elastics make it difficult for adequate plaque removal. As a result of the orthodontic treatment, a shift in the composition and type of bacteria can be expected<sup>[12]</sup>. Orthodontic treatment is known to affect the equilibrium of oral microflora by increasing bacteria retention. Furthermore, in patients with active periodontal disease, the presence of traumatic occlusion may

inhibit bone apposition that can occur following periodontal treatment<sup>[13]</sup>.

The difficulty in maintaining adequate oral hygiene leads to increased risk of gingivitis. Orthodontic therapy is a double edged sword which adversely affects the periodontium. Periodontal complications such as gingival recessions and invaginations are commonly seen as a result of orthodontic treatment.

The forces generated by orthodontic treatment initiates an inflammatory reaction. This reaction is necessary for orthodontic tooth movement. Labial movement of teeth during orthodontic treatment may result in gingival recession in the upper or lower anteriors in the absence of keratinized gingiva, orthodontic treatment only further deteriorates gingival health<sup>[14]</sup>.

Alveolar bone may have fenestration and dehiscence during movement of teeth in facial direction. Fenestration is present when root surfaces denuded of bone but covered only by periosteum and gingiva. The marginal bone in these cases are intact. If integrity of the marginal bone too is lost, the defect is termed a dehiscence. If the teeth are moved back to their original position the bone will reform. So, orthodontic treatment may be considered an etiological factor as well as a treatment option for management of these defects<sup>[15]</sup>.

Pathological migration is important from two perspectives - it affects the dentofacial aesthetics and it results in severe periodontal breakdown. Treatment of teeth with pathological migration has to address both these issues. It has been shown that treatment options such as uprighting molars decreased the pocket depth, improves alveolar bone defects, gingival aesthetics and the crown root ratio. However, pocket elimination therapy should be performed prior to intrusion to prevent apical displacement of plaque and further worsening of periodontal status<sup>[16]</sup>.

The changes in the dentition are a consequence of the diminished support provided by the compromised periodontium, and they can sometimes hinder periodontal treatment by reducing the conditions for good oral hygiene and impairing function and aesthetics of the stomatognathic system.

The periodontal prognosis and the elimination of pockets are influenced by the topography of the underlying bone and any intraosseous deformities. It has been proposed that orthodontic treatment may be used to gain more favourable bone levels and contours in periodontally involved cases through mechanisms such as increased ease of plaque removal, reduced occlusal trauma and offer a possible action for increased formation of bone<sup>[17]</sup>.

Orthodontic treatment has adverse effects such as allergic reactions, endocarditis, periodontal complication and root resorption. One of the quintessential challenge was to finish treatment with least complications such as root resorption. The success of orthodontic treatment affects the periodontal treatment, during the active orthodontic treatment, especially post-maintenance of the patient<sup>[18]</sup>.

With evolution in orthodontic therapy, appliances have become smaller, so as to maintain them during the long span of treatment. Many adult patients are going for orthodontic therapy to get their teeth aligned. Implants have become a major part of treatment plan so as to maintain space during the treatment or to be used as anchorage or abutment during orthodontic treatment. Orthodontic therapy also helps in making space by uprighting mesial tilted teeth due to prolonged edentulous space<sup>[19]</sup>.

Periodontal treatment can improve the outcomes of orthodontic treatment or it can remove the obstacles in achieving good orthodontic profile. Periodontally accelerated osteogenic orthodontics (PAOO) technique is a combination

of a selective decortications facilitated orthodontic technique and alveolar augmentation. With this technique, teeth can be moved 2-3 times further in one third or one fourth of the time required for traditional orthodontic therapy. It can be used to treat moderate to severe malocclusions in both adolescents and adults and can also reduce the need for extractions<sup>[20]</sup>.

Other periodontal treatment techniques that facilitate orthodontic treatment are circumferential fibrotomy, frenectomy, surgical exposure of impacted tooth for forced eruption, mucogingival surgeries to maintain the width of attached gingiva, crown lengthening procedures to facilitate easy placement of orthodontic attachment teeth with short clinical crown, alveolar ridge augmentation and placement of dental implants<sup>[21]</sup>.

### Discussion

Graber and Vanarsdall<sup>[22]</sup> stated that if the maxillary expansion is performed after the mid palatine suture begin to fuse (after approximately 14-16 years of age), there is a greater risk of recession of the buccal gingival tissue of the maxillary premolars and molars later in life.

Periodontal evaluation of a potential adult orthodontic patient must include not only the response to periodontal probing but also level and condition of attached gingiva. Artun J and Urbye KS<sup>[23]</sup> conducted a study to analyze whether pronounced orthodontic advancement of mandibular incisors during class II correction in mixed dentition resulted in gingival recession. They used 67 patients treated with reverse head gear, concluded that pronounced advancement of mandibular incisors may be performed in adolescents with dentoalveolar retrusion without increasing the risk of recession.

Burgett FB *et al.*<sup>[24]</sup> demonstrated that there is significantly greater gain of clinical attachment in periodontitis patients who received occlusal adjustment as part of the treatment compared to those who did not. The extent to which it is necessary to avoid, or reduce, occlusal trauma during orthodontic treatment is controversial and unsupported by scientific evidence. However, correct cusp fossa relationships cannot always be achieved with orthodontic therapy alone. Besides potentially causing damage to the periodontium, relapse of orthodontic therapy may result. Hence, occlusal adjustment by selective grinding is indicated following orthodontic therapy.

Various theories have been put forth to account for open gingival embrasures following orthodontic treatment. One proposal implicates shortening of the interdental papillae due to stretching of the interdental gingival fibers as crowded incisors are aligned<sup>[23]</sup>. However, the hypothesis fails to take into account possible contributions made by crown, alveolar bone loss, gingival fibers other than the interdental fibers and aging of the gingival tissues. In the presence of excellent oral hygiene no significantly hyperplasia should develop as a result of orthodontic tooth movement in adolescents or adults.

### Conclusion

Periodontal health is essential for any form of dental treatment. Close monitoring of adults with reduced periodontal support is mandatory. Therefore, a thorough assessment of the periodontal health is recommended prior to the orthodontic treatment. Also, it is equally important to lay emphasis on the necessity of good oral hygiene in order to achieve the best treatment outcome.

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