

Perio-Ortho Relation: A Review

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ABSTRACT

Background: Periodontic and orthodontic interactions usually deal with the establishment of an appropriate diagnosis and the treatment planning needed to enable coordinated periodontic-orthodontic therapy. A harmonious cooperation of the periodontist and the orthodontist offers great possibilities for the treatment of various orthodontic-periodontal problems. The present discussion is focused on the effects of a combined periodontal and orthodontic treatment on the periodontal health and dentofacial aesthetics, and the mode that each field can contribute to optimize treatment of combined orthodontic-periodontal clinical problems.

Periodontic-orthodontic interrelationships are still controversial issues. However, a standard language between the periodontist and the orthodontist must always be established to eliminate the existing communications barrier, and to improve the outcomes of the whole treatment.

Keywords: Periodontal health, Periodontics, Orthodontics, .

INTRODUCTION

The combined approach can greatly enhance the periodontal health and dentofacial aesthetics in many situations. The main aim of periodontal therapy is to restore and maintain the health and integrity of the attachment apparatus of teeth.^[1] Orthodontic treatment aims at providing acceptable functional occlusion and aesthetic occlusion with appropriate tooth movements.

In recent years, due to the increased number of adult patients seeking orthodontic treatment, orthodontists frequently face patients with periodontal problems. Esthetic considerations, like uneven gingival margins or functional problems resulting from inflammatory periodontal diseases, should be considered in orthodontic treatment planning.

PERIODONTAL TISSUE RESPONSE AND
ORTHODONTIC FORCES

Orthodontic force application results in compression of the alveolar bone and the periodontal ligament on one side while the periodontal ligament is stretched on the opposite side. The bone is selectively resorbed on the compressed side and deposited on the tension side.^[2] Moderate orthodontic forces, i.e., forces exceeding capillary blood pressure lead to periodontal ligament strangulation resulting in delayed bone resorption. Strong/heavy orthodontic forces, i.e., forces far exceeding capillary blood pressure, cause ischemia and degeneration of the periodontal ligament on the compressed side resulting in hyalinization with more delay in tooth movement.^[3]

HARMFUL EFFECTS OF ORTHODONTIC THERAPY
ON PERIODONTIUM

If a thorough oral hygiene regime is applied before and during orthodontic treatment, minimal or no

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increase in gingival bleeding index ^[4] or a plaque quantity will be evident ^[5]. After appliance removal, there is a significant improvement on plaque index and bleeding index ^[6]. With adequate plaque control, patients with reduced but healthy periodontium can undergo orthodontic treatment without aggravating their periodontal conditions

Gingivitis and gingival enlargement appear to be the main short-term effects of orthodontic treatments on the periodontium. It has been noted that gingival enlargement occurs after placement of a fixed appliance.^[7] The condition rapidly improves within 48 hours of the appliance being removed. The increase in probing depth during orthodontic treatment has been attributed, by others, to this enlargement.

A generalized increase in salivary bacterial counts, especially *Lactobacillus*, has been shown after orthodontic band placement.^[8] Early increase in anaerobes and *Prevotella intermedia* and a decrease in facultative anaerobes were also reported.^[9,10]

Clinical experiments and animal studies have shown that clinically recognizable inflammation occurs in regions with a lack of attached gingiva than in areas with a wider zone of attached gingiva. With labial bodily movement, incisors showed apical displacement of the gingival margin, but no loss of connective tissue attachment was apparent where there were no signs of inflammation. Where inflammation was present, loss of connective tissue attachment occurred ^[11].

It has been shown that intrusive forces usually change the position of dental plaque from supra-gingival sites to sub-gingival sites which may be resulted in the formation of infra-bony defects and loss of connective tissue attachment. An increase of sub-gingival pathogens was also noted after teeth intrusion. However, only a few studies did not mention the formation of periodontal pockets after tooth intrusion.^[12]

Precipitating factors lead to an acceleration of the defect, such as traumatic tooth brushing, traumatic overbite, age, smoking, parafunctional habits, pregnancy and piercing. In addition and perhaps equally important are inappropriate treatment mechanics, such as arch expansion, with excessive proclination and the use of RME in adult patients

Most gingival recessions which occur during an orthodontic treatment had been shown to occur in the regions of the anterior upper and lower teeth ^[13-16]

ORTHODONTIC TREATMENT AS AN ADJUNCT TO PERIODONTAL THERAPY

Although there is no consistent relation between malocclusion and periodontal disease, certain characteristics of malocclusion can promote a pathologic environment and hinder periodontal therapy. Correction of crowded or malposed teeth permit the patient better access to clean all the surfaces of his/her teeth. Food impactions are also reduced or eliminated by the creation of proper arch form and proximal contact.^[17]

A recent clinical study on orthodontically treated patients with intact periodontium concluded that extrusion of mandibular incisors resulted in displacement of the gingival margin and the mucogingival junction by 80% and 52.5%, respectively, of the total amount of extrusion. Thus, in cases where movement of bone margin and attachment along with the tooth is not desirable (as in crown-root fractures), there is a need for periodical circumferential supracrestal fiberotomy at the start and every 2 weeks during orthodontic extrusion ^[18].

Orthodontic intrusion has been recommended for teeth with horizontal bone defect or infrabony pockets, and for increasing the crown length of a single tooth. The intrusion of plaque-infected teeth may lead to apical displacement of supragingival plaque, which results in periodontal destruction.

It has been suggested that orthodontic tooth movement into infrabony defects can result in healing and regeneration of the tooth attachment apparatus. In addition, periodontitis have believed that if a wide osseous defect is adjacent to a tooth and the teeth were moved to narrow the better healing potential may be present.

PERIODONTAL THERAPY AS AN ADJUNCT TO ORTHODONTIC THERAPY

Insufficient width of the attached gingiva predisposes the development of recession. To maintain proper gingival health, a 2-mm width of keratinized gingiva is adequate ^[19].

The abnormal frenum prevents mesial migration of the central incisor and the aberrant fiber increases the relapse tendency after orthodontic space closure. Surgical removal of the frenum is usually advised in these situations and it should be performed after the completion of orthodontic treatment unless the frenum prevents space closure or become painful or traumatized.

In order to prevent orthodontic relapse and to achieve proper rearrangement of the supporting tissues, the teeth must be retained. However, Sharpey's fibers of the newly formed bundle bone as well as supraalveolar and transseptal fibers undergo rearrangement even after 4-6 months of retention, especially after the correction of rotation. Hence, the teeth must be retained for at least 12 months to allow time for complete remodeling of these fibers. Circumferential supracrestal fiberotomy is usually advised to reduce this relapse tendency

Crown lengthening is usually performed in teeth with shorter clinical crown to facilitate proper placement of orthodontic appliance.

Alveolar ridge augmentation and placement of implants for orthodontic retention are other adjunctive procedures performed to achieve orthodontic treatment goals.

Discrepancies in the gingival margin level may be due to ectopic eruption of the tooth or due to altered position of the gingiva. A combined orthodontic-periodontic interdisciplinary approach is usually preferred to correct these abnormalities.

Missing interdental papilla are frequently referred to as gingival "black holes" and may be due to a number of factors such as over-divergence of adjacent roots and advanced periodontal disease with loss interdental alveolar crest. An orthodontic periodontic interdisciplinary approach is usually advised to manage these problems [20]

CORTICOTOMY -ASSISTED ORTHODONTICS

Corticotomy-assisted orthodontics has been employed in various forms to accelerate orthodontic treatment. In corticotomy-assisted orthodontics, rapid tooth movement is achieved by disrupting the continuity of the cortical bone by a

selective cut and preserving the vitality of the teeth and marginal periodontium [21]

PERIODONTALLY ACCELERATED OSTEOGENIC ORTHODONTICS

It is a revised corticotomy-facilitated technique, which involves a full-thickness labial and lingual flap elevation accompanied by selective surgical scarring of the labial and lingual cortical bones (corticotomy) followed by placement of the graft material, surgical closure, and orthodontic force application [22]

CONCLUSION

Orthodontic treatment along with patient's compliance and absence of periodontal inflammation can provide satisfactory results without causing irreversible damage to periodontal tissues. Cooperation between an orthodontist and a periodontist offers great possibilities for the treatment of combined orthodontic-periodontal problems.

Patient's education and motivation as complemented by interdisciplinary approach transform the patient's unattractive dentition (due to migrated teeth secondary to periodontal breakdown and inflamed periodontium) into an attractive dentition with a radiant smile. In the recent years, because of the increased number of adults seeking orthodontic treatment, orthodontists frequently face patients with periodontal disease. The combined orthodontic-periodontic interdisciplinary approach could be effective in these situations.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Ong MA, Wang HL, Smith FN. Interrelationship between periodontics and adult orthodontics. J Clin Periodontol 1998;25:271-7.
2. Vinod K, Reddy YG, Reddy VP, Nandan H, Sharma M. Orthodontic- periodontics interdisciplinary approach. J Indian Soc Periodontol 2012;16:11-5.

3. Meeran NA. Cellular response within the periodontal ligament on application of orthodontic forces. *J Indian Soc Periodontol* 2013;17:16-20.
4. Ari-Demirkaya A, Ilhan I; Effects of relapse forces on periodontal status of mandibular incisors following orthognathic surgery. *J Periodontol*, 2008; 79:2069-77.
5. Lundström F, Hamp SE, Nyman S; Systematic plaque control in children undergoing long-term orthodontic treatment. *Eur J Orthod*, 1980; 2:27-39.
6. Speer C, Pelz K, Hopfenmüller W, Holtgrave EA; Investigations on the influencing of the subgingival microflora in chronic periodontitis. A study in adult patients during fixed appliance therapy. *J Orofac Orthop*, 2004; 65:34-47.
7. Baer PN, Coccaro PJ. Gingival enlargement coincident with orthodontic therapy. *J Periodontol* 1964;35:436-9.
8. Bloom RH, Brown LR Jr. A study of the effects of orthodontic appliances on the oral microbial flora. *Oral Surg Oral Med Oral Pathol* 1964;17:658-67.
9. Diamanti-Kipioti A, Gusberti FA, Lang NP. Clinical and microbiological effects of fixed orthodontic appliances. *J Clin Periodontol* 1987;14:326-33.
10. Huser MC, Baehni PC, Lang R. Effects of orthodontic bands on microbiologic and clinical parameters. *Am J Orthod Dentofacial Orthop* 1990;97:213-8.
11. Wennstrom J, Lindhe J, Nyman S; Role of keratinized gingiva for gingival health. Clinical and histologic study of normal and regenerated gingival tissue in dogs. *J Clin Periodontol*, 1981; 8(4):311- 28.
12. Melsen B, Agerbaek N, Markenstam G. Intrusion of incisors in adult patients with marginal bone loss. *Am J Orthod Dentofacial Orthop* 1989;96:232-41
13. Hall WB; The current status of mucogingival problems and their therapy. *J Periodontol*, 1981; 52(9):569-75.
14. Pearson LE; Gingival height of lower central incisors, orthodontically treated and untreated. *Angle Orthod*, 1968; 38(4):337-9.
15. Polson AM, Reed BE; Long-term effect of orthodontic treatment on crestal alveolar bone levels. *J Periodontol*, 1984; 55(1):28-34.
16. Sadowsky C, BeGole EA; Long-term effects of orthodontic treatment on periodontal health. *Am J Orthod*, 1981; 80(2):156-72.
17. Singla S. Influence of orthodontic therapy on Periodontal health: A review. *Indian J Dent* 2013;2: 127-31.
18. Kozlovsky A, Tal H, Lieberman M; Forced eruption combined with gingival fiberotomy. A technique for clinical crown lengthening. *J Clin Periodontol*, 1988; 15:534-8.
19. Lang NP, Löe H; The relationship between the width of keratinized gingiva and gingival health. *J Periodontol*, 1972; 43:623-7
20. Keim RG. Aesthetics in clinical orthodontic-periodontic Interactions. *Periodontol* 2000 2001;27:59-7119
21. Wilcko WM, Wilcko T, Bouquot JE, Ferguson DJ. Rapid orthodontics with alveolar reshaping: Two case reports of decrowding. *Int J Periodontics Restorative Dent* 2001;21:9-19.
22. Goyal A, Kalra JP , Bhatiya P, Singla S, Bansal P. Periodontally accelerated osteogenic orthodontics (PAOO) — A review. *J Clin Exp Dent* 2012;4:e292-6.