Orthodontic-Periodontic Interdisciplinary Approach

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ABSTRACT

In the last years, a significant development has taken place in the orthodontic treatment of adult patients. Adult orthodontics is different than that for children because in adults there is virtual no more growth and because there are changes in the tooth supporting structures: the periodontium. The orthodontic treatment is carried out through the medium of periodontium so a healthy tooth supporting system is the essential prerequisite for carrying out the orthodontic treatment. At the same time, as the tooth is moving under the effect of orthodontic force, various changes occur in the periodontium under the effect of force. So, it is important that the orthodontic treatment is periodontally compromised patient be considered separately as they are more prone to further bone loss; the reduced periodontium cannot sustain further loss without the potential loss of teeth. The reduced periodontal support dictates altered treatment design, mechanics and retention. At the same time it is important to consider the limits of periodontium while carrying out orthodontic treatment so that there is no damage due to inadvertent intervention.

Key words: Center of resistance, Loss of alveolar bone height, Optimal Force, PDL attachment area, Tipping moment.

INTRODUCTION

In recent times more and more numbers of adults are seeking orthodontic treatment. This has been made possible with advancements in dental materials and techniques. New innovations in materials and orthodontic techniques and more esthetic fixed appliance options like ceramic brackets and lingual appliances have motivated the adult patients to seek orthodontic treatment. These adult patients who come for orthodontic treatment basically fall into two groups. First group comprise of patients who have malocclusion and were not able to get the treatment done as children and now due to improved awareness and paying capacity seek orthodontic treatment. These patients are generally motivated by esthetic concerns. Second group comprise of patients who have additional dental problems and require orthodontic treatment as an adjunct to other dental corrections.

ORTHODONTIC PERIODONTAL INTERACTIONS

It has been shown that statistically significant periodontal differences exist between patients with normal and malaligned teeth. Irregular teeth are a predisposing factor to periodontal disease as it is very difficult to maintain oral hygiene in such cases. Gingivitis is generally associated with crowding as bacterial levels are higher in areas of crowding. Sadowsky C, BeGole E (1981) evaluated periodontal heath of patients who had received comprehensive fixed appliance orthodontic treatment and that of persons who had malocclusion and had not been orthodontically treated. They concluded that orthodontic treatment in adolescence is not a major factor in determining the long term periodontal health status. Conversely, the lack of orthodontic therapy in adolescence does not influence subsequent development of non- development of periodontal disease in adults. Changed lifestyles and patient awareness have increased the demand for adult orthodontic treatment, and interdisciplinary dental therapy has allowed better management of the more complicated and unique requirements of the adult patient population, thereby greatly improving quality of care and treatment prognosis.

Orthodontic treatment and chances of developing breakdown

In orthodontics, force is the basic modality being used for treatment. A well-executed orthodontic treatment by optimal forces, resulting in controlled tooth movements generally does not result in periodontal breakdown. Various factors that can be considered in gauging the periodontal response of a tooth to orthodontic tooth movement are discussed below.

Periodontal tissue response to orthodontic force

I. Effect of force magnitude

Light pressure: when the force is less than or equal to the capillary blood pressure PDL is compressed on the pressure side and stretched on tension side. Metabolic changes occur, cellular differentiation begins within PDL and frontal resorption takes place. Tooth movement begins as bony socket remodels.

Heavy pressure: when the force is heavy, blood vessels within PDL are occluded on pressure side leading to cell death in compressed area. This leads to hyalinization and undermining resorption.

Thus, the optimum force levels for orthodontic tooth movement should be just high enough to stimulate cellular

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activity without completely occluding blood vessels in PDL.

II. Effect of type of tooth movement
PDL response is determined by force per unit area. Thus, the optimum force levels for orthodontic purposes differ with different types of tooth movement required. The actual area of PDL that is being loaded is less than the total PDL area so the force should vary according to that.

Effect of orthodontic forces on PDL
Orthodontic tooth movement requires reorganization of PDL. A moderate increase in mobility is expected due to orthodontic treatment. Heavy forces lead to crushing of PDL, undermining resorption, pain and mobility and thus should not be used. If a tooth becomes excessively mobile during orthodontic treatment, all forces should be discontinued.

Polson AM, Reed BE (1988) evaluated the clinical periodontal status of persons with orthodontic therapy and adults with untreated malocclusions. They showed no significant differences between the two groups indicating that orthodontic treatment had no long term effect on subsequent connective tissue attachment levels. They also concluded that orthodontic treatment during adolescence had no discernible effect upon later periodontal health.

Effects on root structure
Root remodelling is a constant feature of orthodontic tooth movement. Despite the potential for repair, the teeth of patients who have undergone comprehensive orthodontic treatment of longer duration show average shortening. This shortening in majority of cases is imperceptible and clinically insignificant. Severe resorption is generally rare in orthodontic treatment.

Effect on height of alveolar bone
Excessive loss of crestal bone height is almost never seen except in cases of uncontrolled periodontal disease.

Artun J, Krogstad O (1987) showed development of bone dehiscence and some gingival retraction during excessive proclamation of anterior teeth especially in patients with thin alveolar housing, during orthodontic appliance therapy.

BENEFITS OF ORTHODONTIC TREATMENT FOR A PERIODONTAL PATIENT
- Aligning crowded or malposed teeth, permits the adult patients, better access to clean all surfaces of their teeth adequately.
- Vertical orthodontic tooth repositioning can improve certain types of osseous defects in periodontic patients. Often the tooth movement eliminates the need for respective osseous surgery.
- Orthodontic treatment can improve the esthetic relation of the gingival marginal levels before restorative dentistry.
- Orthodontic treatment can improve adjacent tooth position before implant placement or tooth replacement in cases of missing teeth leading to drifting and tipping of adjacent dentition.

ORTHODONTIC MANAGEMENT OF PATIENTS WITH PDL DISEASE
Effect of reduced periodontal support
When the alveolar bone is lost to periodontal disease the PDL area decreases and the same force against the crown produces greater pressure in the PDL of a periodontally compromised tooth than a normally supported one. Thus, the absolute magnitude of force used to move teeth must be reduced when periodontal support has been lost.

Due to loss of PDL attachment area, the centre of resistance shifts apically. This increase the amount of moments produced and the moments required to control root movement have to be increased (Figure1).

Artun J, Urbey KS(1988) showed that loss of periodontal bone support may occur during orthodontic realignment of pathologically migrated teeth.

TREATMENT SEQUENCE
The basic treatment sequence for the orthodontic treatment of a patient with compromised periodontal status is as follows
- Disease control
- Establishing occlusion
- Definitive periodontal and restorative treatment
- Maintenance

Pre-existing periodontal problems should be brought under control before starting orthodontic treatment. Preliminary periodontal therapy should include scaling and root planning. Surgical flaps may be required to ensure the best possible scaling. Treatment procedures like osseous recontouring or repositioned flaps are best deferred till the final occlusal relationships have been established. A period of observation should follow preliminary periodontal treatment to allow healing and to make sure that the patient is adequately maintaining the oral hygiene and the periodontal disease is controlled.

Preventive program for orthodontic treatment
- Provide the patient with initial brushing instructions.
- Check plaque removal effectiveness on every visit.
- Record plaque removal effectiveness in patients chart.
Introduce additional methods to improve oral hygiene once success is established with brushing.

If poor compliance persists schedule more frequent orthodontic visits, carefully check the progress of periodontal disease and refer the patient for frequent prophylaxis.

**Minimal periodontal involvement**

Plaque induced gingivitis develops in patients with orthodontic appliance in place. In children it rarely progresses to periodontitis. But in adult patients who already have some periodontal involvement the periodontal health status is compromised because of orthodontic appliance. Such patients should be advised to maintain fastidious oral hygiene by both mechanical and chemical means.

**Moderate periodontal involvement**

In addition to above measures some additional precautions should be taken in such cases. Margins of bands can make periodontal maintenance difficult, thus fully bonded orthodontic appliance is preferred in periodontally involved patients. Self-ligating brackets and steel ligatures are preferred rather than elastomeric rings as patients with elastomeric rings have higher levels of microorganisms in gingival plaque. Periodontal maintenance therapy at 2-4 month interval should be undertaken. Adjunctive chemical agents like chlorhexidine should be used.

**Severe periodontal involvement**

For patients with severe periodontal involvement periodontal maintenance should be scheduled at more frequent intervals i.e. every 4-6 weeks. The orthodontic treatment goals and mechanics should be modified to keep orthodontic forces to an absolute minimum. Even after severe periodontal problems have developed orthodontic treatment can be carried out without further loss of alveolar bone if good control of the periodontal conditions is maintained. Space closure in areas of major bone loss sometimes leads to an improvement in bone height.

**CONCLUSION**

Greater and greater numbers of adult are seeking orthodontic treatment because of changing life styles and aspirations. It is very important to take into account the periodontal considerations before starting orthodontic treatment as even a magnificent orthodontic result can be destroyed by poor periodontal support. At the same time we can very well achieve the desired orthodontic results even in patients with severe periodontal disease if due consideration is given to periodontal status of the patient.

**REFERENCES**