Challenges in Ortho- Perio interaction – a systemic update…

|  |  |  |
| --- | --- | --- |
| Abstract |  |  |

This article aims to provide the basic understanding of the interrelationship between orthodontic mechanotherapy in periodontally compromised situations for a complete update on the most recent view regarding the same in the best interest of the patients. While past studies have shown that orthodontic treatment can positively affect the periodontal health, recent reviews indicate an absence of reliable evidence for the positive effects of orthodontic therapy on patients' periodontal status [1].

**Keywords:** Ortho-Perio interaction, Review

**Introduction**

This article aims to provide the basic understanding of the interrelationship between orthodontic mechanotherapy in periodontally compromised situations for a complete update on the most recent view regarding the same in the best interest of the patients.

|  |  |  |
| --- | --- | --- |
| Tooth movement during orthodontic therapy is the result of placing controlled forces on teeth. Removable appliances place intermittent tipping forces on teeth while fixed appliances can create continuous multidirectional forces to create torquing, intrusive, extrusive, rotational and bodily movement[2]. Bone surrounding a tooth subjected to a force responds by remodeling; resorption occurs where there is pressure and new bone forms where there is tension. When pressure is applied to a tooth, the periodontal ligament (PDL) is compressed, blood supply is minimized in the compressed area producing an avascular cell-free zone by "hyalinization". During this lag phase, tooth movement is practically nil. The hyalinized zone of tissue is removed for tooth movement to occur again. |  |  |

Evidence suggests reduction of probing depth in intrabony defects following tooth extrusion [3,4]. The combination of orthodontic intrusion and periodontal therapy has also been shown to improve reduced periodontal conditions in animals, provided oral hygiene is maintained and tissues are healthy [5]. Intrusion of incisors in adult patients with marginal bone loss and deep overbite has been described with root resorption varying from 1 to 3 mm. It is suggested that intrusion is best performed with low forces (5-15 g/tooth) and in the presence of healthy gingival tissue [6]. Studies have also shown that moving teeth into adjacent osseous defects, orthodontic extrusion with and without fiberotomy and labial tipping of anterior teeth can be successfully accomplished without jeopardizing the periodontal support in the presence of adequate plaque control [7].

|  |  |  |
| --- | --- | --- |
| An important factor in the initiation, progression and recurrence of periodontal disease in is the presence of microbial plaque [8]. Clinical studies have demonstrated that with plaque control, teeth with reduced periodontal support can undergo successful tooth movement without compromising their periodontal situation [9]. However, orthodontic patient's inability to clean adequately contributes to the development of gingival inflammation apart from the mechanical irritation caused by the band or cement [10].An increase of sub-gingival pathogens was also noted after intrusion [11]. Other studieshave shown that after the achievement of surgical periodontal therapy, intrusive forces did not show any negative effect on the periodontium with a reduction in probing depth [12,13].  An adequate amount of attached gingiva is necessary for gingival health [14]. Thin, delicate tissue is far more prone to exhibit recession during orthodontic treatment than in normal or thick tissue. If a minimal zone of attached gingiva or thin tissue exists, a free gingival graft that enhances the type of tissue around the tooth helps control inflammation. This should be done before any orthodontic movement is begun [15]. Histological and histo-chemical specimens taken from sites of gingival invagination showed hypertrophy in the epithelial and the connective tissues, and sometimes, loss of gingival collagen [16] offering good sites for dental plaque and being a prime risk factor for the periodontal tissue disorders during orthodontic treatment [17]. It has been shown that most cases of gingival recession which occur during an orthodontic treatment occurred in the regions of the anterior upper and lower teeth [18]. |  |  |
| A review of the literature conducted by Van Gastelshowed contradictory findings on the impact of malocclusion and orthodontic appliances on periodontal health, since only a few studies reported attachment loss during orthodontic treatment [19]. It has been suggested that this contradiction may be partly due to the selection of materials and differences in the research methods employed. However, others have shown that orthodontic treatment does not have harmful effects on the periodontal tissues when a high level of oral hygiene is maintained [20].  A systematic review of controlled evidence suggested that orthodontic therapy was associated with 0.03 millimeters of gingival recession, 0.13 mm of alveolar bone loss and 0.23 mm of increased pocket depth when compared with no treatment, and it was concluded that the effects of orthodontic therapy on gingivitis and attachment loss were inconsistent across studies [21].  On the other hand, Gray and McIntyreconducted a systematic literature review to determine the effectiveness of orthodontic oral health promotion (OHP) upon gingival health, and it has been found that an OHP program for patients undergoing fixed appliance orthodontic treatment produces a short-term reduction (up to 5 months) in plaque and improvement in gingival health [22]. Thornberg and co-workersaimed to investigate changes in periodontal pathogen levels before, during, and after orthodontic treatment in adolescents showing a significant increase in pathogen count after six months of fixed appliance treatment, but these returned to pretreatment levels by 12 months of orthodontic treatment [23]. The existing evidence does not seem to support the claim that orthodontic therapy results in overall improvement in periodontal health. Recent advances like surgically accelerated modalities such as Selective Alveolar Decortication (SAD) and Periodontally Accelerated Osteogenic Orthodontics (PAOO) can be used as an adjunct to conventional approaches to accelerate orthodontic tooth movement with fewer adverse effects [24]. |  |  |

Conclusion

|  |  |  |
| --- | --- | --- |
| Evidence suggests that proper emphasis on plaque control procedures prior to initiating orthodontic mechanotherapy, may well minimize the inflammation found later.  Recent advances like surgically accelerated modalities such as Selective Alveolar Decortication (SAD) and Periodontally Accelerated Osteogenic Orthodontics (PAOO) can be used as an adjunct to conventional approaches to accelerate orthodontic tooth movement with fewer adverse effects. |  |  |

References

1. Dannan A. An update on periodontic-orthodontic interrelationships. J Indian Soc Periodontol 2010;14:66-71.
2. Proffit WR, Fields HW,   Sarver DM. Contemporary Orthodontics. 5th ed. St Louis: CV Mosby; 2013.
3. Ingber JS. Forced eruption: I: A method of treating isolated one and two wall infrabony osseous defects-rationale and case report. J Periodontol 1974;45:199-206.
4. Ingber JS. Forced eruption: Part II: A method of treating nonrestorable teeth-Periodontal and restorative considerations. J Periodontol 1976;47:203-16.
5. Melsen B, Agerbaek N, Eriksen J, Terp S. New attachment through periodontal treatment and orthodontic intrusion. Am J Orthod Dentofacial Orthop 1988;94:104-16
6. 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.
7. Pontoriero R, Celenza F Jr, Ricci G, Carnevale G. Rapid extrusion with fiber resection: A combined orthodontic-periodontic treatment modality. Int J Periodontics Restorative Dent 1987;7:30-43.
8. Ericsson I, Thilander B, Lindhe J. Periodontal conditions after orthodontic tooth movements in the dog. Angle Orthod 1978;48:210-8.
9. Eliasson LA, Hugoson A, Kurol J, Siwe H. The effects of orthodontic treatment on periodontal tissues in patients with reduced periodontal support.Eur J Orthod 1982;4:1-9.
10. Boyd RL, Baumrind S. Periodontal considerations in the use of bonds or bands on molars in adolescents and adults. Angle Orthod 1992;62:117-26.
11. Folio J, Rams TE, Keyes PH. Orthodontic therapy in patients with juvenile periodontitis: clinical and microbiologic effects. Am J Orthod 1985;87:421-31.
12. Corrente G, Abundo R, Re S, Cardaropoli D, Cardaropoli G. Orthodontic movement into infrabony defects in patients with advanced periodontal disease: A clinical and radiological study. J Periodontol 2003;74:1104-9.
13. Re S, Corrente G, Abundo R, Cardaropoli D. The use of orthodontic intrusive movement to reduce infrabony pockets in adult periodontal patients: A case report. Int J Periodontics Restorative Dent 2002;22:365-71.
14. Lang NP, Loe H. The relationship between the width of keratinized gingiva and gingival health. J Periodontol 1972;43:623-7.
15. Maynard JG. The rationale for mucogingival therapy in the child and adolescent. Int J Periodontics Restorative Dent 1987;7:36-51.
16. Ronnerman A, Thilander B, Heyden G. Gingival tissue reactions to orthodontic closure of extraction sites: Histologic and histochemical studies. Am J Orthod 1980;77:620-5.
17. Helm S, Petersen PE. Causal relation between malocclusion and periodontal health. Acta Odontol Scand 1989;47:223-8.
18. Pearson LE. Gingival height of lower central incisors, orthodontically treated and untreated. Angle Orthod 1968;38:337-9.
19. van Gastel J, Quirynen M, Teughels W, Carels C. The relationships between malocclusion, fixed orthodontic appliances and periodontal disease: A review of the literature. Aust Orthod J 2007;23:121-9.
20. Dannan A, Darwish MA, Sawan MN. How do the periodontal tissues react during the orthodontic alignment and leveling phase? Virtual J Orthod 2008;8:1-7.
21. Bollen AM, Cunha-Cruz J, Bakko DW, Huang GJ, Hujoel PP. The effects of orthodontic therapy on periodontal health: A systematic review of controlled evidence. J Am Dent Assoc 2008;139:413-22.
22. Gray D, McIntyre G. Does oral health promotion influence the oral hygiene and gingival health of patients undergoing fixed appliance orthodontic treatment? A systematic literature review. J Orthod 2008;35:262-9.
23. Thornberg MJ, Riolo CS, Bayirli B, Riolo ML, Van Tubergen EA, Kulbersh R. Periodontal pathogen levels in adolescents before, during, and after fixed orthodontic appliance therapy. Am J Orthod Dentofacial Orthop 2009;135:95-8.
24. Singh G, Batra P. The Orthodontic Periodontal Interface: A narrative review2014;6(2):77-85.