Review Article

Ortho-perio Interdisciplinary Approach: A Review

Manjiri P Amte[1], Dipali R Mane[2], Aditi S Sarda[3]

[1]Department of Periodontology, Aditya Dental College, Beed, Maharashtra, India, [2]Department of Orthodontics and Dentofacial Orthopaedics, Aditya Dental College, Beed, Maharashtra, India, [3]Department of Endontontics Aditya Dental College, Beed, Maharashtra, India

Abstract

Periodontic and orthodontic interactions usually deal with the establishment of an appropriate diagnosis and the treatment planning needed to enable coordinated perio-ortho therapy. These interactions are mutually beneficial, allowing diseased periodontium to be significantly improved and permitting orthodontic tooth movement. The purpose of this review is to discuss in detail the various orthodontic movements that can afford some degree of protection against the periodontal breakdown provided periodontal inflammation is controlled and oral hygiene is maintained throughout the treatment.

Keywords: Orthodontic movements, Periodontium, Ortho-perio interactions.

Introduction

Orthodontic-periodontic interactions are mutually beneficial. The combined approach can greatly enhance the periodontal health and dentofacial esthetics 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 esthetic occlusion with appropriate tooth movements. These movements are strongly related to the interactions of teeth with their supportive periodontal tissues.[2] Orthodontic treatment can be justified as a part of periodontal therapy if it is used to reduce plaque accumulation, correct abnormal gingival and osseous forms, improve esthetics, and facilitate prosthetic replacement.[3] The periodontal prognosis and the elimination of pockets are influenced by the topography of the underlying bone and any intraosseous deformities.[3] It has been proposed that orthodontic treatment may be used to attain more favorable 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 to enhance the bone formation within the bony defects.[4-6]

Periodontal Tissue Response and Orthodontic Forces

Tooth movement induced by orthodontic force is the result of placing controlled forces on teeth. The applied force causes remodeling changes in the dental and periodontal tissues. 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.[7] Light orthodontic force, that is, force less than capillary blood pressure, causes periodontal ligament ischemia with simultaneous bone resorption and deposition resulting in continuous tooth movement. Moderate orthodontic forces, that is, forces exceeding capillary blood pressure, lead to periodontal ligament strangulation resulting in delayed bone resorption. Strong/heavy orthodontic forces, that is, 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.[8]

The most common periodontal problems that can be solved by minor orthodontic procedures are mainly the correction of crowding, pathologic tooth migration, mesially tilted molar, closure of midline diastema, etc.

Orthodontic Treatment as an Adjunct to Periodontal Therapy

In many situations, orthodontic treatment can serve as an adjunct to periodontal therapy. Various orthodontic treatments

Address for correspondence:
Dr. Manjiri P Amte, Postgraduate Student, Department of Periodontology, Aditya Dental College, Beed, Maharashtra, India.
E-mial: manjuamte03@gmail.com

Received: 23 Jul, 2021; **Accepted:** 18 Aug, 2021; **Published:** 04 Sep, 2021

How to cite this article: Amte MP, Mane DR, Sarda AS. Ortho-perio interdisciplinary approach: A review. J Res Adv Dent 2021;12(6):299-301.

Access this article online

Website: www.jrad.co.in

DOI: https://doi.org/10.53064/jrad.2021.12.6.72

such as uprighting, intrusion, and rotation are performed to correct the pathologically migrated teeth that control further periodontal breakdown, improve oral function, and provide acceptable esthetics. These procedures should be performed only after controlling the periodontal disease. Although there is no consistent relation between malocclusion and periodontal disease, certain characteristics of malocclusion can promote a pathologic environment and hinder periodontal therapy.[9] Correction of crowded or malposed teeth permits 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.[10]

One possible justification for orthodontic treatment is that irregular teeth are more difficult to clean and therefore predisposed to gingivitis and so aligning the crowded or malposed teeth permit the patient better access to clean all the surfaces of their teeth properly. This could be tremendous advantage for patients who are susceptible to periodontal bone loss or do not have the dexterity to maintain their oral hygiene. Food impactions, both vertical and lateral, may be reduced or eliminated by the creation of proper arch form and proximal contact. Besides, these malposed or rotated teeth may be predisposed to more rapid breakdown of the periodontium when the roots are too close to one another, resulting in a thin interproximal septum. Since a rotated tooth may have a portion of the root out of the alveolar housing, there is a great possibility of such a tooth having a dehiscence or fenestration and more readily succumbing to periodontal insults. Correction of the rotation of such a tooth may be therapeutic or prophylactic.[5]

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. Professional supragingival and subgingival scaling are important during the active phase of intrusion.[1]

Periodontal Treatment as an Adjunct to Orthodontic Therapy

Properly delivered orthodontic forces do not induce any damage to the periodontium. However, it is widely believed that insufficient width of the attached gingiva predisposes the development of recession.[11,12] To maintain proper gingival health, a 2 mm width of keratinized gingiva is adequate. Tension on the gingival margin during orthodontic force application also results in gingival recession.[1] Orthodontic proclination of the incisors has a greater risk of recession and loss of attachment, especially in areas with minimal gingiva and bone support. To maintain adequate width of the attached gingiva in these conditions, mucogingival surgery may be advised during the course of orthodontic treatment.[13]

High frenal attachment is considered to be one of the causes for midline diastema. 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.[1] The gummy smile is generally due to a delayed apical migration of the gingival margins; esthetic gingival surgery is usually indicated in this situation. Vertical maxillary excess also results in a gummy smile. Orthognathic surgery involving a LeFort I osteotomy with maxillary impaction is usually advised in adult patients; however, in growing patients, "first bicuspid extractions followed by application of a high pull J-hook headgear to the pre-maxillary segment" help to prevent the development of this problem.[13]

Orthodontic Treatment in Adults

In the recent era, there is a raising influx of adult patients seeking orthodontic treatment. Adult orthodontics need special consideration in several aspects such as psychosocial, biological, mechanical, and age-related considerations such as the aging of tissues, lack of growth potential, vulnerability to temporomandibular joint disorder, and root resorption. Adult bone is less reactive to orthodontic force.

Compared to the elderly, there is a greater risk of marginal bone loss and loss of attachment with mild gingival infection. Loss of attachment results in apical shift of the center of resistance, thereby increasing the distance from the point of force application to the center of resistance, which, in turn, increases the tipping moment produced by the given force than that of the healthy tooth. Hence, the absolute magnitude of force should be reduced.[14] Lindhe *et al*. (1989) recommended the use of an interrupted force of 20–30 g in adults during the initial stage of orthodontic treatment. Later, the force might be increased up to 50–80 g in bodily movement and 30–50 g in tipping, corresponding to a distance of movement of 0.5–1.0 mm/month, depending on the amount of the remaining alveolar bone and the degree of marginal bone loss.[15]

Tooth Movement and Implant Esthetics

There are mainly three areas where orthodontics plays a role in implant rehabilitation. The lack of adequate space for implant can be managed by orthodontic movement of the neighboring teeth to an optimal position, which will allow redistribution of the available space in the dental arch and provide space for implant placement.[15-17]

The reduced buccolingual ridge thickness associated with extraction space shows difficulty in implant placement. It can be managed by orthodontic movement of the adjacent tooth to the edentulous space, which results in bone deposition along the tension side and the implant can be placed at the site of the orthodontically moved tooth. This is an alternative to surgical horizontal ridge augmentation.[15,18]

Periodontally Accelerated Osteogenic Orthodontics (PAOO)

PAOO, also termed Wilckodontics, was introduced by Wilcko *et al*. in 2001.[19] 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.[20] Rapid tooth movement associated with PAOO is substantially different from periodontal ligament cell-mediated tooth movement. Recent evidence suggests that RAP is a localized osteoporosis state, which occurs as a part of healing and may be responsible for rapid tooth movement associated with PAOO.

Conclusion

Periodontal health is essential for any form of dental treatment, especially for orthodontic treatment. The orthodontic treatment has two ways of action on the periodontal tissues; it provides some degree of protection to the periodontium and keeps the gingiva, the bone, and the periodontal ligament in a healthy status but, on the other hand, it produces negative effects on the periodontium, mainly gingivitis, gingival recessions, and bone dehiscences, etc. The development of new methods to accelerate orthodontic tooth movement through periodontal surgical procedures, especially PAOO and piezocision, has shortened the treatment time and increased the quality of treatment. The harmonious cooperation of the periodontist and the orthodontist offers great possibilities for the treatment of combined orthodontic-periodontal problems.

References

1. Ong MA, Wang HL, Smith FN. Interrelationship between periodontics and adult orthodontics. J Clin Periodontol 1998;25:271-7.
2. Gkantidis N, Christou P, Topouzelis N. The orthodontic-periodontic interrelationship in integrated treatment challenges: A systematic review. J Oral Rehabil 2010;37:377-90.
3. Pritchard JF. Advanced Periodontal Disease. Philadelphia, PA: W.B. Saunders Company; 1965.
4. Brown IS. The effect of orthodontic therapy on certain types of periodontal defects. I. Clinical findings. J Periodon 1973;44:742-56.
5. Kessler M. Interrelationships between orthodontic periodontic. Am J Orthod 1976;70:154-72.
6. Diedrich P. Periodontal relevance of anterior crowding. J Orofac Orthop 2000;61:69-79.
7. Vinod K, Reddy YG, Reddy VP, Nandan H, Sharma M. Orthodontic periodontics interdisciplinary approach. J Indian Soc Periodontol 2012;16:11-5.
8. Meeran NA. Cellular response within the periodontal ligament on application of orthodontic forces. J Indian Soc Periodontol 2013;17:16-20.
9. Newman MG, Takei HH, Klokkevold PR, Caranza FA. Carranza's Clinical Periodontology. 10th ed. Noida: Saunders, Reed Elsevier India Private Limited; 2006. p. 856-70.
10. Singla S. Influence of orthodontic therapy on periodontal health: A review. Indian J Dent 2013;2:127-31.
11. Ericsson I, Thilander B, Lindhe J. Periodontal condition after orthodontic tooth movements in the dog. Angle Orthod 1978;48:210-8.
12. Steiner GG, Pearson JK, Ainamo J. Changes of the marginal periodontium as a result of labial tooth movement in monkeys. J Periodontol 1981;52:314-20.
13. Keim RG. Aesthetics in clinical orthodontic-periodontic interactions. Periodontol 2000 2001;27:59-71.
14. Bagga DK. Adult orthodontics versus adolescent orthodontics: An overview. J Oral Health Comm Dent 2010;4:42-7.
15. Lindhe J, Lang NP, Karring T. Text Book of Clinical Periodontology and Implant Dentistry. 5th ed. United States: Wiley-Blackwell; 2018. p. 1241-97.
16. Dibart S, Sebaoun JD, Surmenian J. Piezocision: A minimally invasive, periodontally accelerated orthodontic tooth movement procedure. Compend Contin Educ Dent 2009;30:342-4, 346, 348-50.
17. Mittal SK, Sharma R, Singla A. Piezocision assisted orthodontics. A new approach to accelerated orthodontic tooth movement. J Innov Dent 2011;1:1-4.
18. Cano J, Campo J, Bonilla E, Colmenero C. Corticotomy-assisted orthodontics. J Clin Exp Dent 2012;4:e54-9.
19. Wilcko WM, Wilcko MT, Bouquot JE. Rapid orthodontics with alveolar reshaping: two case reports of decrowding. Int J Periodontics Restorative Dent. 2001;21:9-19.
20. Keser EI, Dibart S. Piezocision-assisted invisalign treatment. Compend Contin Educ Dent 2011;32:46-8, 50-1.