*SVOA Dentistry*

ISSN:2753-9172

ScienceVolks Open Access

Review Article

# Symbiotic Relationship between Orthodontics and Periodontics - A Review

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DOI: https://doi.org/10.58624/SVOADE.2023.04.0136

***Received:** May 31, 2023* ***Published:** June 19, 2023*

## Abstract

The primary goal of orthodontic treatment is to support a functionally stable occlusion surrounded by sound periodontium. Orthodontic-periodontic interactions are mutually beneficial. Certain periodontal techniques can be supportive to the Orthodontic treatment and vice versa. A harmonious coordination of the periodontist and the orthodontist offers great possibilities for the treatment of various orthodontic-periodontal problems.

***Keywords:** Orthodontics; Periodontics; crowding in anterior teeth.*

## Introduction

In a healthy periodontium, with every tooth movement, the bone around the tooth remodels without injuring the supporting tissues. Orthodontic movements involve interactions of teeth with their supportive periodontal tissues.[1] Successful orthodontic treatment is greatly dependent on the patient's periodontal health during the entire period of active orthodontic treatment. It is believed that orthodontic treatment can improve the bone levels and contours in periodontally involved cases by making plaque removal easy, reducing occlusal trauma and tender a possible action to enhance the formation of bone within the bony defects.[2,3,4] On the other hand, periodontal therapy may also be beneficial for the orthodontic treatment.[5,6,7] Although abundant literature exists that discuss the interrelationship between orthodontics and periodontics, but mutual benefits of both the fields are discussed very rarely.[8,9,10] The present discussion aims to focus upon the symbiotic relationship between the two specialities and how each discipline can contribute towards the success of other speciality treatment.

### Advantages of orthodontic treatment in a periodontal patient

Some of the bone changes induced during tooth movement may be osteogenic and can modify bony deformities and contours. Moreover, some periodontal problems are frequently found to be aggravated by localized or generalised mal-occlusion because it creates a pathologic environment in some way[11]. In those cases, some orthodontic procedures can offer some degree of protection against periodontal breakdown.

1. Correction of crowding in anterior teeth, enable the adult patients to clean all the tooth surfaces in a better way. So, patients who are at risk for alveolar bone loss and those lacking manual dexterity will be able to maintain their oral hygiene effectively. It is suggested that the presence of periodontal microbes in the anterior sites of crowded teeth is much more than that in the sites of well aligned teeth and gingivitis is generally associated with crowding. Alignment of crowded teeth can eliminate any harmful occlusal interference which may hasten the development of periodontal breakdown.[12]

2. The hemi septal defects can be eliminated by various orthodontic movements like extrusion, up righting, and levelling of the bone defect.[13] It is believed that the bodily movement of the tooth into an intrabody defect "carry the bone," along with the tooth, that results in rectification of the defect. Thus, helping in improving adjacent tooth position before placement of implant or tooth replacement.[14]

3. An important and a common application of orthodontics in the periodontally involved dentition is the up righting of molars for implant placement or tooth replacement. The distal movement allows the alveolar bone deposition on the mesial side of the defect thereby eliminating the gingival folding and plaque retentive area on that side.[15]

4. Orthodontic tooth movement by extrusion applies traction forces in all areas of the periodontal ligament so as to stimulate marginal apposition of crestal bone. Extrusion results in positioning the intact connective tissue attachment which includes gingival margin and mucogingival junction to a more coronal position, which in turn shallows the bony defect.[16,17,18] In patient with fractured maxillary anterior tooth, extrusion is needed for crown lengthening.

5. Repositioning the tooth into a lingual position within the alveolar bone, may decrease the recession, as well as the dehiscence and if surgery is to be done after retraction, the surgical procedure will have a higher success rate than if it was performed before the tooth movement.[19]

6. Because orthodontic treatment aims at achieving root parallelism, so this helps in uniform distribution of occlusal forces. The correct occlusal and masticatory function are in turn stimulatory to the gingival tissue and the attachment apparatus, and thus corrects vertical bone defects whereas lack of suitable function predisposes to increased plaque retention and calculus formation, resulting in loss of bone support. [5]

7. Before planning any alternative treatment for aesthetic relationship of gingival margin levels, orthodontic treatment can be considered to improve gingival topography. Favourable changes of osseous and soft tissue topography during tooth movement have been demonstrated to diminish the need for gingival recontouring, which may require bone removal and root exposure.[5]

8. Open gingival embrasure above the contact area (black triangles) in maxillary anterior region gives a patient very unesthetic appearance. So, in these cases orthodontic treatment helps to regain lost papilla by correcting divergent roots or by placing contact points in the apical region. Sometimes combination of tooth reshaping, orthodontic tooth movement, and/or restoration is required to correct these dark triangles.[5,20,21]

**Benefits of periodontal Therapy during orthodontic treatment**

During orthodontic movement of a tooth, the complete periodontal attachment apparatus, that includes the periodontal ligament, osseous structure, and the soft tissue components, move with the tooth. The connective tissue attachment level remains unchanged along the root surface but some topographical alterations to alveolar crest bone do occur with tooth uprighting.[22] In addition, certain existing periodontal problems impede the success of orthodontic treatment. So for stable and aesthetically acceptable result with orthodontic treatment, occasionally supporting periodontal procedures need to be done.

**Mucogingival and minor osseous surgeries**

1. Inadequate width of the attached gingiva is one of the major factors predisposing to the development of recession, during orthodontic force application. Tension on the gingival margin during orthodontic force application further results in gingival recession.[23] In order to maintain sufficient width of the attached gingiva in these conditions, mucogingival surgery may be considered during the course of orthodontic treatment.[24]

2. High maxillary labial frenum is considered to be one of the causes for midline diastema. This frenum prevents mesial migration of the central incisor and the aberrant fiber further adds to the relapse tendency after orthodontic space closure. Frenectomy is usually advised in these situations, and it should be done after the completion of orthodontic treatment otherwise the frenum may prevent space closure or it can become painful or traumatized.[24]

3. After correction of any rotated tooth, Fiberotomy should be done. This is usually done before debonding to reduce any rotational relapse. Internal bevel gingivectomy or labiolingual flap reflections with interproximal sutures enhance alignment and prevents relapse.[25]

4. During surgical exposure of impacted tooth, it is important for the tooth to erupt through the attached gingiva so flaps to expose the tooth has to be planned properly. Apically or laterally positioned pedicle graft is usually advised in this situation.[26]

5. Crown lengthening is usually performed in teeth with shorter clinical crown to help in proper placement of orthodontic appliance. This is also used in smile designing. This is generally done by gingivectomy or an apically repositioned flap in combination with gingivectomy before bonding of orthodontic appliances.[27]

6. Gingival invaginations are commonly seen following orthodontic closure of extraction space. These invaginations act as pseudo pocket leading to compromised oral hygiene and are one of the important risk factors for impending periodontal disease during orthodontic treatment. A surgical correction is usually performed to eliminate these invaginations.[28]

7. For some osseous defects like three walled defect, furcation lesion or hemi septal defects that might not improve with orthodontic treatment alone, minor osseous surgery is indicated before starting of orthodontic therapy. Whereas few lesser severe bone defects can be maintained nonsurgical during orthodontic therapy[11].

8. Alveolar ridge augmentation and placement of orthodontic implants as a Temporary anchorage device (TAD) are other adjunctive procedures performed to achieve orthodontic treatment goals.[29]

**Perio-surgeries to accelerate orthodontic tooth movement.**

*1. Dentoalveolar distraction osteogenesis*- The concept of "distracting the periodontal ligament" was presented by Liou and Huang to shorten the canine distalization time to 3 weeks and called this concept "dental distraction". This technique involves modification of the extraction socket by undermining the interseptal bone, distal to the canines, and uses an intraoral distraction device, that can be activated 0.5–1 mm/day immediately after the extraction to move the canines distally.[30]

*2. Corticotomy-assisted orthodontics* - Rapid tooth movement associated with corticotomy was first introduced by Henry Kole in 1959. In corticotomy-assisted orthodontics, the continuity of the cortical bone is distrupted by a selective cut without affecting the vitality of the teeth and marginal periodontium.[31] This results in increased level of inflammatory mediators and increased osteoblastic-osteoclastic activity in the areas around the cuts. As a result the bone turnover multiplies which further acceletates orthodontic tooth movement.[32]

*3. Periodontally accelerated osteogenic orthodontics (PAOO)*-To maintain periodontal integrity and to reduce the treatment time, Wilcko brothers introduced a technique known as Periodontally Accelerated Osteogenic Orthodontics (PAOO). With this technique,they changed the mechanical concept of a "bony block movement" relating the corticotomy effect, to a physiological concept, the regional acceleratory phenomenon (RAP) described by Frost. This is a local response of the tissue to noxious stimuli, as a result of which regeneration rate of tissue increases. In this technique, a full-thickness labial and lingual flap is reflected and corticotomies are performed, followed by placement of the graft material and surgical closure. Orthodontic force application is usually done immediately after the surgery.[33]

*4. Piezocision*- In order to overcome the invasive nature of corticotomy, a minimally invasive surgical procedure without flap elevation Piezocision was introduced by Dibart *et al*. in 2009. It combined the flapless approach of corticision with the advantage of grafting offered by PAOO. In this technique micro incision is performed on the buccal gingiva that allows the piezoelectric knife to give osseous cuts to the buccal cortical plates and initiate regional acceleratory phenomenon (RAP) This procedure provides rapid tooth movement without an extensive traumatic surgical approach.[34,35]

## Conclusion

Every orthodontic intervention has periodontal dimensions. Periodontic and orthodontic interactions aid in the formation of a proper diagnosis and the treatment planning. This coordinated periodontic-orthodontic therapy can greatly improve the periodontal health as well as dentofacial aesthetics and malocclusion in many situations.

## Conflict of Interests

The authors' declare that they have no competing interests.

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**Citation:** Sapna S, Manjeet T, Gurvanit L. Symbiotic Relationship between Orthodontics and Periodontics - A Review. *SVOA Dentistry* 2023, 4:3, 110-114.