

Orthodontic Treatment of Periodontal Problems : A Comprehensive Interdisciplinary Approach

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Abstract

Orthodontic treatment aims at providing an acceptable functional and aesthetic occlusion with appropriate tooth movements. These movements are strongly related to interactions of teeth with their supportive periodontal tissues. In recent years, because of the increased number of adult patients seeking orthodontic treatment, orthodontists frequently face patients with periodontal problems. Aesthetic considerations, like uneven gingival margins or functional problems resulting from inflammatory periodontal diseases should be considered in orthodontic treatment planning. Furthermore, in cases with severe periodontitis, orthodontics may improve the possibilities of saving and restoring a deteriorated dentition. In modern clinical practice, the contribution of the orthodontist, the periodontist and the general dentist is essential for optimized treatment outcomes. The purpose of this discussion review is to highlight the relationship between orthodontics and periodontics in clinical practice and to improve the level of cooperation with dental practitioner.

Introduction

With an increasing number of adult patients now seeking orthodontic treatment, the problems of a dentition affected by chronic periodontitis are more likely to be encountered. Adult patients present a challenge to orthodontists because they have high esthetic demands and they often have dental conditions that may complicate treatment, such as tooth wear, poorly contoured restorations, and periodontal disease, osseous defects. Orthodontic appliances have become smaller, less noticeable and easier to maintain during orthodontic therapy. And also if these individuals have underlying gingival or periodontal defects, these defects often can be improved during orthodontic therapy if orthodontist is aware of situation and plan the appropriate tooth movement accordingly.

Keywords : Orthodontic Appliances, Gingival discrepancies, Osseous defects.

A. Orthodontic Treatment of Gingival Discrepancies

I] Uneven Gingival Margins

These discrepancies could be caused by abrasion of the incisal edges or delayed migration of the gingival margins, when gingival margin discrepancies are present, the proper solution for the problem must be determined: orthodontic tooth movement to

reposition the gingival margins or surgical correction of gingival margin discrepancies.

To make the correct decision, it is necessary to evaluate four criteria. **First**, the relationship between the gingival margin of the maxillary central incisors and the patient's lip line should be assessed when the patient smiles. If a gingival margin discrepancy is present but the discrepancy is not exposed, it does not require correction.¹

If a gingival margin discrepancy is apparent, the **second** step is to evaluate the labial sulcular depth over the two central incisors. If the shorter tooth has a deeper sulcus, excisional gingivectomy may be appropriate to move the gingival margin of the shorter tooth apically. However, if the sulcular depths of the short and long incisors are equivalent, gingival surgery does not correct the problem.

The **third** step is to evaluate the relationship between the shortest central incisor and the adjacent lateral incisors. If the shortest central is still longer than the lateral incisors, the other possibility is to extrude the longer central incisor and equilibrate the incisal edge. This moves the gingival margin coronally and eliminates the gingival margin discrepancy. However, if the shortest central is shorter than the laterals, this technique would produce an unaesthetic relationship between the gingival margins of the central and lateral incisors.



The **fourth** step is to determine whether the incisal edges have been abraded. This is best accomplished by evaluating the teeth from an incisal perspective. If one incisal edge is thicker labiolingually than the adjacent tooth, this may indicate that it has been abraded and the tooth has overerupted. In such cases, the best method of correcting

the gingival margin discrepancy is to intrude the short central incisor. This method moves the gingival margin apically and permits restoration of the incisal edges. The intrusion should be accomplished at least 6 months before appliance removal. This allows reorientation of the principal fibers of the periodontium and avoids reextrusion of the central incisor(s) after appliance removal.^{2,4}



II] Open Gingival Embrasures

The presence of a papilla between the maxillary central incisors is a key esthetic factor in any individual. This open space is usually due to one of three causes: tooth shape, root angulation, or periodontal bone loss.⁵

The interproximal contact between the maxillary central incisors consists of two parts. One portion is the tooth contact, and the other is the papilla. The ratio of papilla to contact is 1:1. Half of the space is occupied by papilla, and half is formed by the tooth contact. If patient has an open embrasure, the first aspect that must be evaluated is whether the problem is due to the papilla or the tooth contact. If the papilla is the problem, then the cause is usually a lack of bone support due to an underlying periodontal problem.⁵

In some situations, a deficient papilla can be improved with orthodontic treatment. By closing open contacts, the interproximal gingiva can be squeezed and moved incisally. This type of movement may help create a more esthetic papilla between two teeth despite alveolar bone loss. Another possibility is to erupt adjacent teeth when the interproximal bone level is positioned apically.^{3,4}

Most open embrasures between the central incisors due to problems with tooth contact. The first step in the diagnosis of this problem is to evaluate a periapical radiograph of the central incisors. If the root angulation is divergent, then the brackets should be repositioned so the root position can be corrected. If the periapical radiograph

shows that the roots are in their correct relationship, then the open gingival embrasure is due to a triangular tooth shape.^{4,5}



If the shape of the tooth is the problem, two solutions are possible. One possibility is to restore the open gingival embrasure. The other option is to reshape the tooth by flattening the incisal contact and closing the space. This results in lengthening of the contact until it meets the papilla. In addition, if the embrasure space is large, closing the space squeezes the papilla between the central incisors. This helps create a 1:1 ratio between the contact and papilla and restores uniformity to the heights between the midline and adjacent papillae.^{6,7}



B. Orthodontic Treatment of Osseous Defects

I] Hemiseptal Defects

Hemiseptal defects are one- or two-wall osseous defects that often are found around mesially tipped teeth or teeth that have supraerupted. Usually, these defects can be eliminated with the appropriate orthodontic treatment. In the case of the tipped tooth, uprighting and eruption of the tooth levels the bony defect. If the tooth is supraerupted, intrusion and leveling of the adjacent cements/enamel junctions can help level the osseous defect.^{7,8}



In the periodontally healthy patient, orthodontic brackets are positioned on the posterior teeth relative to the marginal ridges and cusps. However, some adult patients may have marginal ridge discrepancies caused by uneven tooth eruption. When marginal ridge discrepancies are encountered, the decision as to where to place the bracket or band is not determined by the anatomy of the tooth. In these situations, it is important to assess these teeth radiographically to determine the interproximal bone level.

If the bone level is oriented in the same direction as the marginal ridge discrepancy, then leveling the marginal ridges will level the bone. However, if the bone level is flat between adjacent teeth and the marginal ridges are at significantly different levels, correction of the marginal ridge discrepancy orthodontically produces a hemiseptal defect in the bone. This could cause a periodontal

pocket between the two teeth.^{7,8}

If the bone is flat and a marginal ridge discrepancy is present, the orthodontist should not level the marginal ridges orthodontically. In these situations, it may be necessary to equilibrate the crown of the tooth.

II] Advanced Horizontal Bone Loss

In a periodontally healthy individual, the position of the brackets is usually determined by the anatomy of the crowns of the teeth. However, if patient has underlying periodontal problems and significant alveolar bone loss around certain teeth, using the anatomy of the crown to determine bracket placement is not appropriate.⁸

In a patient with advanced horizontal bone loss the bone level may have receded several millimeters from the CEJ. As this occurs, the crown-to-root ratio becomes less favorable. By aligning the crowns of the teeth, the clinician may perpetuate tooth mobility by maintaining an unfavorable crown-to-root ratio. In addition, by aligning the crowns of the teeth and disregarding the bone level, significant bone discrepancies occur between healthy and periodontally diseased roots. This could require periodontal surgery to ameliorate the discrepancies.^{8,9}

Many of these problems can be corrected by using the bone level as a guide to position the brackets on the teeth. In these situations, the crowns of the teeth may require considerable equilibration. The goal of equilibration and creative bracket placement is to provide a more favorable bony architecture as well as a more favorable crown-to-root ratio. In some of these patients, the periodontal defects that were apparent initially may not require periodontal surgery after orthodontic treatment.

III] Furcation Defects

Furcation defects can be classified as incipient (Class I), moderate (Class II), or advanced (Class III). These lesions require special attention in the patient undergoing orthodontic treatment, because they are the most difficult lesions to maintain and can worsen during orthodontic therapy. These patients need to be maintained on a 2 to 3 month recall schedule. Detailed



instrumentation of these furcations helps minimize further periodontal breakdown.⁸

If a patient with a Class III furcation defect will be undergoing orthodontic treatment, a possible method for treating the furcation is to eliminate it by hemisecting the crown and root of the tooth. However, this procedure requires endodontic, periodontal, and restorative treatment. If the patient will be undergoing orthodontic treatment, it is advisable to perform the orthodontic treatment first. This is especially true if the roots of the teeth will not be moved apart. In these patients, the molar to be hemisected remains intact during orthodontics. This patient would require 2- or 3-month recall visits to ensure that the furcation defect does not lose bone during orthodontic treatment.⁹

In some patients requiring hemisection of a mandibular molar with a Class III furcation, pushing the roots apart during orthodontic treatment may advantageous. If the hemisected molar will be used an abutment for a bridge after orthodontics, moving the roots apart orthodontically permits a favorable restoration and splinting across the adjacent edentulous spaces.

In some molars with Class III furcation defects the tooth may have short roots, advanced bone loss fused roots, or other problems that prevent hemisection and crowning of the remaining roots. In these patients, extracting the root with a furcation defect and placing an implant may be more advisable. In some situations, the implant could be used as an anchor to facilitate pre-restorative orthodontic treatment.¹⁰

IV] Root Proximity

When roots of posterior teeth are in close proximity, the ability to maintain periodontal health and accessibility for restoration of adjacent teeth may be compromised. However, if the patient were undergoing orthodontic therapy, the roots can be moved apart and bone will be formed between the adjacent roots.¹¹ This opens the embrasure beneath the tooth contact, provides additional bone support, and enhances the patient's access to the interproximal region for hygiene. This generally improves the periodontal health of this area.

V] Hopeless Teeth

Patients with moderate to advanced periodontal disease may have specific teeth that are deemed hopeless and normally would be extracted before orthodontics. However, these teeth can be useful for orthodontic anchorage, if the periodontal inflammation can be controlled. In moderate to advanced cases, some periodontal surgery will be necessary around the hopeless tooth. When the flaps are reflected, debridement of the roots of the hopeless tooth may be all that is necessary to control inflammation during the orthodontic process. The important factor is to maintain the health of the bone on the adjacent teeth. Rigidly enforced 3 month

periodontal recall is imperative during this process. Following orthodontic treatment, there is a six month period of stabilization before reevaluating the periodontal status.¹¹ Occasionally, the hopeless tooth may be so improved after orthodontic treatment that it is retained. However, most of the time, it will require extraction, especially if other restorations are planned in the segment.



C. Mucogingival Considerations Mandibular Midline Frenum

When a frenum is associated with a mucogingival problem, it most frequently relates to an inadequate zone of attached gingiva. Therefore the use of frenectomy to correct mucogingival problems is considered obsolete. The high frenum insertion contributes to movement of the marginal gingiva where the keratinized tissue has been lost or detached or where mechanical trauma exists. This problem is most prevalent in the lower anterior area.¹⁰

Maxillary Midline Frenum

It has been recommended that a frenectomy procedure be done in the maxillary midline for young children because of the belief that the midline diastema is caused by the maxillary labial frenum. Many believe that this frenum prevents mesial migration of the maxillary central incisors and that removal should precede orthodontic therapy. Others have suggested that if the frenum is removed, the space can be orthodontically closed more easily. However, the practitioner must remember that a physiologic space will normally be present between the maxillary central incisors until eruption of the canines in the adolescent dentition. In addition, a frenectomy procedure may cause scar tissue that could prevent orthodontic space closure. With extremely large diastema (6 to 8 mm) in the early transitional dentition a frenectomy is usually recommended to facilitate space closure, regain space at the midline, and prevent ectopic eruption of the lateral incisors or canines.¹⁰

A U- or V-shaped roentgenographic appearance of the interproximal bone between the maxillary central incisors is a

diagnostic key to the persistent midline diastema. The patient should be informed before orthodontic treatment of the need of indefinite retention with bonding of the central incisors after treatment to prevent return of the maxillary midline diastema.

Generally, surgical removal of a maxillary labial frenum should be delayed until after orthodontic treatment, unless the tissue prevents space closure or becomes painful and traumatized. Removal may be indicated after treatment to change irreversible hyperplastic tissue to normal gingival form and to enhance posttreatment stability. This is particularly helpful on incisors during Phase I of early treatment problems.

Gingival Hyperplasia

Mild gingival changes associated with orthodontic appliances seem to be transitory, and the periodontal tissues sustain little permanent damage. Usually this condition will resolve itself or will respond to plaque removal, curettage, or both. Should the gingival tissue or enlargement interfere with tooth movement, however, it must be surgically removed. Otherwise, it is preferable to wait until appliances are removed to correct surgically abnormal gingival form and use the procedure to enhance post-treatment stability.¹²

Mouth Breathing

The drying effect on the exposed tissue in the susceptible patients is associated with enlarged, erythematous labial gingivae, particularly, in maxillary and mandibular anterior regions. With a short upper lip, a demarcation line can usually be seen where the lip contacts the labial tissue. The mouth breather will usually exhibit dry, cracked lips as well. Although orthodontic retraction of anterior segments may help to provide a better lip seal, extra-oral appliances and lip bumpers will exacerbate the problem or may even cause mouth breathing in the normal patient.

Patient who exhibits symptoms of an inability to breathe properly (tongue posture, enlarged adenoid tissue narrow high palatal vault, allergies) should be referred for evaluation of nasal obstruction and adenoid tissue. Although the plaque index is not significantly higher in mouth breathers it has been reported that there is an increase in the gingival index. This increased inflammation should be reduced to a minimum before fixed appliances are placed and is usually accomplished by scaling and curettage.

Ectopically Positioned & Unerupted Teeth

Many orthodontic patients exhibit teeth that have not penetrated the oral mucosa or will not erupt. Orthodontists that have treated cases involving unerupted teeth have all faced the problems of devitalization, reexposure or reuniting of the tooth, ankylosis, external root resorption, and injury to adjacent teeth when an unerupted

tooth has been surgically uncovered from the wrong side of the ridge. Localization and the tooth's exact position must be known before the tooth is uncovered surgically. Palpation, evaluation of the teeth in the arch, panoramic radiographs, periapical views, and occlusal or cephalometric evidence can be helpful.¹⁴

Labial impaction

The preferred surgical procedure is primarily an apically or laterally positioned pedicle graft. When a tooth is uncovered, space in the arch should be created before uncovering the tooth if it is on the labial. The edentulous space created in the arch provides a tissue area to act as a donor site so that an adequate zone of attached gingiva can be taken for the partial thickness of the apically or laterally positioned graft. Grafts should be partial thickness, this preference should be expressed to the oral surgeon because full thickness grafts would be thick and unaesthetic.¹⁴

Palatal impaction

With the maxillary palatally positioned canines, which occur 3 times more frequently, the problem is different. The palate is all masticatory mucosa; therefore a graft is not placed on the teeth. These teeth are uncovered by reflecting the palatal tissue, by placing a window, and then by replacing the tissue over the palate. A periodontal dressing is placed for 7 to 10 days before being removed, at which time a bonded attachment is placed, and tooth movement is begun.¹⁵

Second premolar and second molar impaction

After canines the second premolar is the

tooth that most frequently requires surgical uncovering. As it is with mandibular premolars, apically repositioned grafts are necessary. If the tooth is located on the lingual, the graft is placed on lingual only. If the tooth is in center of arch, an apically positioned graft on the lingual, as well as on the facial, is required. With the mandibular molars as well, it is necessary to do a buccal and a lingual graft when these teeth are located in the middle of the ridge.

Incisor impaction

Less frequently, a mandibular incisor may need to be uncovered. With mandibular incisors, both a labial and a lingual graft must be done; these grafts have to be extended beyond the line angle of each individual crown. If the grafts are not placed beyond the line angle of the unerupted tooth, a mucogingival defect may be created on the line angle, whether it is on the lingual or the facial even when teeth are in the center of the ridge.¹⁵

Conclusion

Above discussion illustrated the benefits of integrating orthodontics and periodontics in the management of adult patients with underlying periodontal defects. The key to treating these types of patients is communication and proper diagnosis before orthodontic therapy as well as continued dialogue during orthodontic treatment. Not all periodontal problems are treated in the same way. Gingival recession, horizontal bone loss, intrabony defects, hemiseptal defects, furcation problems, root proximity, and periodontally hopeless teeth provides the clinician with a framework that will be

helpful in treating these situations.

References

1. J L. Wennström, B L Stokland, S Nyman, and B Thilander. Periodontal tissue response to orthodontic movement of teeth with infrabony pockets. Am J Orthod 1993;103:313-9.
2. Kokich V.G. Esthetic : The orthodontic periodontic restorative connection. Semin Orthod. 1996;2:21-30
3. Y Nakamura, T Tanaka, and Y Kuwahara. New findings in the degenerating tissues of the periodontal ligament during experimental tooth movement. Am J Orthod . 1996;109:348-54
4. G Costopoulos, and R Nanda. An evaluation of root resorption incident to orthodontic intrusion. Am J Orthod 1996;109:543-548
5. A D Vardimon. Orthodontic tooth movement enhances bone healing of surgical bony defects in rats. J Periodontol. 2001;72:858-864.
6. Carranza's Clinical periodontology. 7th edition 1990 ch.53; 704-718
7. Carranza's Clinical periodontology. 8th edition 2003 ch.1; 15-58
8. Socransky S S .New concept of destructive periodontal disease. J Clin Periodontol 1984;11:21
9. Tulin A, Korkmaz S, Didem N. Case report The periodontal supporting tissue can benefit from orthodontic treatment. World J Orthod 2005;6:275-280
10. Edwards J.G. The diastema, the frenum, the frenectomy-A clinical study. Am J Orthod 1977; 71:489-508
11. Kokich V. Esthetic : The orthodontic-periodontic-restorative connection. Semin Orthod 1996;2:21-31
12. Monefeldt I and Zachrisson B U. Adjustment of clinical crown height by gingivectomy following orthodontic space closer. Angle Orthod 1977;47:256-264
13. David P. Mathews and Vincent G kokich ; Managing treatment for the orthodontic patient with periodontal problems. Seminar in orthodontics 1997;3;21-38
14. Page R C. Rapidly progressive periodontitis : a distinct clinical condition. J Periodontol 1983;54:197
15. Bishara S E. Text of orthodontics. 1st edition 2001, ch 24:442-453

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