

The Relationship Between Orthodontics and Periodontics: An Interdisciplinary Approach

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Key Message: Orthodontics and periodontics are interrelated in variety of situations and a multidisciplinary approach is often necessary. Higher susceptibility of plaque accumulation in patients undergoing orthodontic treatment made involvement of periodontist almost unavoidable, also orthodontic treatment frequently results in undesirable periodontal changes which require immediate attention

ABSTRACT

In the recent years rapid advances in dental techniques and dental materials had taken place. Public interest had developed in maintaining a good oral health with attractive smile, which has resulted in understanding the interrelationships between periodontics and orthodontics. Orthodontics and periodontics are interrelated in variety of situations and a multidisciplinary approach is often necessary. Higher susceptibility of plaque accumulation in patients undergoing orthodontic treatment made involvement of periodontist almost unavoidable, also orthodontic treatment frequently results in undesirable periodontal changes which require immediate attention. Making the most of what these two specialities offer each other begins with the identification of periodontal problems that could become more complicated during orthodontic therapy and conversely those that could benefit from orthodontic therapy. However a standard language between periodontist and orthodontist must always be established to eliminate the existing communication barrier and to improve the outcomes of the whole treatment.

INTRODUCTION

The requirement of periodontal therapy is to preserve the attachment apparatus of the teeth. Loss of teeth in patients would result in their pathological migration. This may lead to spacing, collapse of occlusion and decreased vertical dimension. Orthodontic treatment can correct or at the minimum prevent these problems from progressing. In 1960's it was found that there was a generalized increase in salivary bacterial counts especially *lactobacillus* after orthodontic band placement ^[1]. This resulted in generating an interest between the two fields of dental sciences i.e. Periodontics and Orthodontics. Unfortunately, the same treatment also carries a potential to harm the periodontal tissues by causing plaque accumulation on the teeth because of the presence of orthodontic elements on the teeth surfaces with which the oral hygiene procedures might be difficult.

Effect of Orthodontic Forces on Periodontal Tissues

During orthodontic therapy, the various forces are applied. Tooth moves as the bone surrounding the tooth responds. The tooth responds in following manner:

- Bone resorption is seen where the pressure is applied.

- Bone formation is seen where the tension occurs.

Protective Role of Orthodontic Treatment against Periodontal Breakdown

There is an increased number of periodontal pathogens in the anterior crowded teeth compared to the aligned teeth [2]. Correcting the crowded teeth with orthodontic therapy may help in reducing the development of periodontal breakdown.

During orthodontic therapy all the components of tooth including the osseous structure, periodontal ligament and the soft tissue move together with the tooth [3]. After initiating orthodontic therapy at a mesially tipped molar; there is reduction in pocket depth at upright molar. Moreover, less plaque accumulation and improved gingival architecture on the upright molar may be noticed.

Periodontics as an Adjunct to Orthodontic Treatment

Many a times after orthodontic therapy an acceptable outcome cannot be achieved without an added periodontal procedure. For example, a midline diastema caused by a high labial frenum needs to be solved with a periodontal intervention as the fibres in it are thought to prevent the mesial migration of central incisors, however, the timing of this periodontal intervention has been a topic of discussion.

Surgically the maxillary labial frenum should be removed until after orthodontic treatment unless the tissue has become painful or it prevents space closure [4]. It is a common orthodontic procedure to forcibly erupt a labially or palatally impacted tooth. The expertise of a periodontist would be required to expose the impacted tooth while preserving the keratinized tissue by an apically or laterally positioned pedicle graft [5]. After tooth rotation is achieved by an orthodontic therapy retaining the same is possible with a circumferential supracrestal fibrotomy [6].

To maintain a sufficient width of the attached gingiva during orthodontic therapy there may be a need for mucogingival surgeries [5]. The common cause of esthetic concern among adults is the pathological migration of anteriors and the etiological factors responsible may include -attachment loss, habits like Bruxism and pressure from tongue, inflamed periodontal tissue, unreplaced missing teeth. All of these factors may lead to functional and esthetic problem. This may be one of the prime motivating factors to seek orthodontic treatment. Orthodontic treatment can be initiated once the periodontal disease is controlled. Through this a good treatment outcome which can be achieved in a patient with compromised dentofacial esthetics [7,8].

Orthodontics as an Adjunct to Periodontal Therapy

Studies have demonstrated a positive association between malocclusion and periodontal health [9]. Orthodontic procedures can provide a number of benefits to a periodontally compromised patient. Vertical repositioning of teeth by an orthodontic therapy can improvise certain osseous defects in periodontal patients. Regaining the lost papilla may be done by orthodontic therapy which allows open gingival embrasures to be corrected. If before implant placement, the patient has missing teeth for several years and shows tipping and drifting of adjacent teeth orthodontic treatment can help improve the adjacent teeth position. Orthodontic therapy may benefit patients who have severe fracture of the anteriors that require forced eruptions for restoration of root. This will allow the crown preparation to have sufficient resistance and retention form. Alignment of crowded teeth by orthodontic therapy may provide tremendous advantage for patients who do not have the dexterity to maintain oral hygiene or patients susceptible to periodontal bone loss.

Gingival Discrepancies Which can be treated by Orthodontic Therapy

Uneven gingival margins

Whenever these discrepancies are present the proper solution for the problem must be determined i.e. to choose between an orthodontic therapy for repositioning the gingival margin or surgical correction to be done for these discrepancies. Four factors which contribute to ideal gingival form. (a) The two central incisors should have thin gingival margins at the same level. (b) The gingival margins of central incisors and canines should coincide with the gingival margins of central incisors positioned more apically than lower incisors. (c) The labial gingival marginal contours should mimic the cement-enamel junction of the teeth. (d) Between each tooth, a papilla should be present and therefore half of the inter-proximal contact is occupied by the papilla and other half of the contact is formed by adjacent teeth.

- To make a correct decision as to which treatment should be chosen, four criteria are to be evaluated.
- To assess the relationship between the patient's lipline and the gingival margin of maxillary central incisors when the patient smiles. If gingival margin discrepancy is present but it is not exposed it does not require correction.
- The labial sulcular depth over the two central incisors is evaluated. Excisional gingivectomy may be appropriate for moving the gingival margin of a clinically shorter tooth with a deep sulcus. However gingival surgery may not help if the sulcular depth of the short and long incisors is equivalent.
- The relationship between the shortest central incisor and the adjacent lateral incisor is evaluated. If it is found that the

shortest central incisor is still longer than lateral incisor the longer central incisor is extruded and the incisal edge is equilibrated. This will help the gingival margin to move coronally and the gingival margin discrepancy is eliminated. However if the shortest central incisor is found to be shorter than the lateral incisor this technique is likely to produce unesthetic relationship between gingival margins of central incisor and lateral incisor.

- To observe if incisal edges are abraded this is done by evaluating the teeth from an incisal perspective. If one incisal edge is found to be thicker labiolingually than adjacent tooth it may show the incisal edge has been abraded a tooth has been overerupted. In this condition the appropriate method to correct the discrepancy is to intrude the short central incisor this will move the gingival margin apically and will permit the restoration of incisal edges ^[10,11].

Abraded and Overerupted teeth

Habits such as probusive bruxism can end in significant wear off maxillary and mandibular incisors with overeruption which is compensatory. To treat these kind of cases there are two options available.

First, crown lengthening procedure performed by elevating a flap, removing sufficient bone and positioning the flap apically to create a good amount of tooth length for crown preparation. This procedure however, would not be applicable for teeth with short tapered roots as this can adversely affect the crown to root ratio and may potentially open the gingival embrasures between anterior teeth.

Second, short abraded teeth can be intruded orthodontically and this will move the gingival margins apically. This procedure creates the space which is necessary to restore the teeth. Orthodontic intrusion of severely abraded and overerupted teeth is a distinct advantage over periodontal crown lengthening unless the patient has long and broad roots or has extensive periodontal horizontal bone loss.

Lack of gingival papillae or open gingival embrasures

The important esthetic factor in any individual is the presence of papilla between maxillary central incisors. If adults show lack of gingival papillae or open gingival embrasures it often becomes difficult to treat these cases with periodontal therapy. However, orthodontic therapy can help us correct them. Open gingival embrasures are usually caused by shape of the tooth, angulation of the root and periodontal bone loss. First and foremost it is necessary to evaluate whether the problem is caused by papilla or the tooth contact. If papilla is the problem then the cause is absence of bone support because of the underlying periodontal problem. Many open embrasures are caused by tooth contact problem. At this time evaluate with an intra-oral periapical radiograph of central incisor. If the root angulation is found to be divergent from each other then correction of the root position can be achieved by placing brackets. If the roots are at a correct angulation, then the open contact may be caused by abnormal tooth shape. Most contact areas between central incisors are 2-3 mm long but in these situations where shape is a problem the contact areas are located in the incisal 1 mm between the two central incisors. The best method to correct these problems is to create a diastema by recontouring the mesial surfaces of the central incisors. The amount of enamel that should be removed is approximately 0.5-0.75 mm which is equal to half the distance between the mesial surfaces of incisors at the level of tip of the papilla and it also does not penetrate into the dentine. After this is done the contact lengthens and moves towards the papilla ^[12].

Osseous Defects which can be treated by Orthodontic Therapy

Hemiseptal defects

These kinds of defects are often found around mesially tipped teeth or supra erupted teeth. In case the teeth are tipped mesially, uprighting of the tooth and eruption of the tooth helps in leveling the bony defect. In case the tooth is supraerupted, intrusion of the tooth and leveling of the adjacent cement enamel junction can help level the osseous defects.

Advanced horizontal bone loss

When a patient shows an advanced horizontal bone loss, the bone level might be receded by several millimeters from cemento enamel junction. This may cause the teeth to have disproportionate crown root ratio. In order to decrease mobility and achieve improved crown root ratios it may be appropriate in such cases to decrease the clinical crown length of these teeth ^[13].

Furcation defects

They are difficult lesions to maintain and can worsen orthodontic treatment. A possible method of treating class III furcation is to eliminate it by hemisectioning of crown and root of tooth. If the hemisectioned teeth are planned to be used as abutments for a bridge, moving the roots apart orthodontically permit favorable restoration and splinting across the adjacent edentulous spaces. In these kinds of patients after performing hemisectioning, endodontic and periodontic surgery, and orthodontic elements can be placed on respective teeth to separate roots. This process creates a space to clean it with greater ease and efficiency and eliminates the furcation process as well.

Relationship between Orthodontic Treatment and Oral Hygiene

Orthodontic therapy has been suggested to lead to an improved periodontal status by helping in easy removal of plaque

and reducing the occlusal trauma. Gusmao et al. studied 90 patients with malocclusion^[14]. A significant association was found between gingival recession and the variables like buccally tipped teeth, excessively proclined maxillary incisors and also between chronic periodontitis and mesially tipped molars, crowding, excessively proclined incisors, and diastema. Bonding of molars result in better periodontal health than banding. Removing excess composite around brackets especially at gingival margins is important to keep the periodontal tissue healthy during orthodontic therapy.

CONCLUSION

The wide range of interrelationships between periodontics and orthodontics shows that focal point is the comprehensive rehabilitation of periodontally affected patients. Patient education, enhanced oral hygiene maintenance, regular periodontal care and motivation are essential during orthodontic treatment. The perio-ortho treatment goal can be defined by weighing up a number of different factors in each individual findings: esthetics, function, risks of orthodontic tooth movement, biomechanical considerations and periodontal prognosis. An orthodontist may achieve more stable and esthetically acceptable results by adjunctive periodontal procedures. A close dialogue between periodontist and orthodontist can ensure excellent results with long term stability.

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