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Orthodontic-Periodontics: An Interdisciplinary Approach

*Shreya Kishore, Vanita Barai, Suvetha Siva
and Keerthi Venkatesan*

Abstract

Periodontal pathogenesis is a multi-factorial process and the orthodontist must recognize the clinical forms of inflammatory periodontal disease. Orthodontics is the most conservative and predictable treatment to improve numerous local etiological factors that contribute to periodontal disease including periodontal breakdown. Proper occlusal function and masticatory function are stimulatory to the gingival tissue and the attachment apparatus, while, conversely, a lack of function predisposes to disease that increases plaque retention and calculus formation along with gingival inflammation leading to increased loss of bony support. No matter how talented the orthodontist, a magnificent orthodontic correction can be destroyed by failure to recognize periodontal susceptibility. Therefore, identifying periodontally susceptible patients is critical for the outcome of the treatment. This chapter will highlight the importance of the short-term and long-term outcomes of orthodontic treatment, which are influenced by the patient's periodontal status before, during and after active orthodontic therapy.

Keywords: Bio-relationship, Interdisciplinary approach, Adjunctive periodontal procedures, Periodontium, Orthodontia, Periodontal healing

1. Introduction

Periodontal care should be directed towards eliminating the bacterial infection and preventing reinfection. This involves creating an environment which encourages self-cleansing and is less conducive to harboring pathogenic bacteria. Appropriate therapy for each individual depends on the type, severity and morphology created by the specific disease, along with cooperation from the patient. Regardless, elimination of as many plaque-retentive areas should always be the primary objective of a treatment. Large number of teeth are extracted to eliminate periodontal defects (that act as bacterial reservoirs) that can be corrected by simple tooth eruption [1].

Although orthodontic treatment may not be considered preventive or corrective of periodontitis, it is one of the solutions to reduce the local factors. Patients with predisposing periodontal health tend to experience movement in teeth, as there will be comparatively lesser periodontal support. Commonly occurring movements of teeth include migration of teeth, intrusion, extrusion and flaring of teeth. In such cases, orthodontic treatment helps in eliminating the malposition of teeth but also aids in long term maintenance [2].

2. Role of periodontics in orthodontic treatment

When moving teeth orthodontically, the entire periodontal attachment apparatus, including the osseous structure, the PDL, and the soft tissue components, move with the tooth. Even though the connective tissue attachment level remains unchanged along the root surface there are considerable morphological alterations to crestal bone with tooth uprighting [3]. Hence we can say that orthodontic treatment is almost always an interdisciplinary approach, where the health of the periodontium plays a vital role throughout the treatment. Certain techniques can be adjunctive to the Orthodontic treatment which will be discussed further in this chapter.

2.1 Soft tissue considerations

2.1.1 Adjunctive procedures

They can majorly be classified, based on the extent and involvement, as, minimal, moderate and severe involvement. The procedures are discussed in the following.

2.1.1.1 Minimal involvement

2.1.1.1.1 Fiberotomy

Also known as circumferential supracrestal fiberotomy (CSF), it is one of the common procedures conducted to enhance retention after fixed orthodontic therapy. The procedure involves detachment of the supracrestal fibers to increase the retention of a re-established tooth position. Tooth repositioning (for e.g.: rotation) is tough in maintenance. To accommodate the new tooth position after orthodontic therapy, reorganization of the PDL fibers take place. This rearrangement of fibers, especially the Sharpe's fibers, take place even after 6 months, due to which the retention period is always advised for a minimum of 12 months [4].

Literature suggests that the maximum amount of relapse takes place during the first 5 hours post the removal of the appliance. Hence it is ideal for fiberotomy to be done at the end of the finishing phase of orthodontic therapy. This minimizes the relapse that usually occurs due to the elastic supracrestal gingival fibers [3].

2.1.1.1.2 Frenectomy

A frenectomy is a procedure that removes the frenum (a small muscular attachment that connects two pieces of oral tissue) (**Figures 1 and 2**). Labial frenum is present apical, between the two central incisors. Most commonly, the maxillary labial frenum tends to be more muscular causing midline diastema. In such cases apart from orthodontic therapy, adjuvant frenectomy procedure aids in space closure ensuring lesser chances of relapse. Usually the surgical removal of frenum is done after orthodontic treatment is complete or during the finishing phase of active orthodontic treatment [5].

2.1.1.1.3 Gingivectomy and gingivoplasty

Gingivectomy is a dental procedure, where a part of the gingiva is surgically removed (**Figures 3 and 4**). It is an essential and adjunctive procedure to orthodontic therapy. Gingivoplasty, on the other hand, is the reshaping of the gingiva



Figure 1.
High labial frenum (pre-operative).

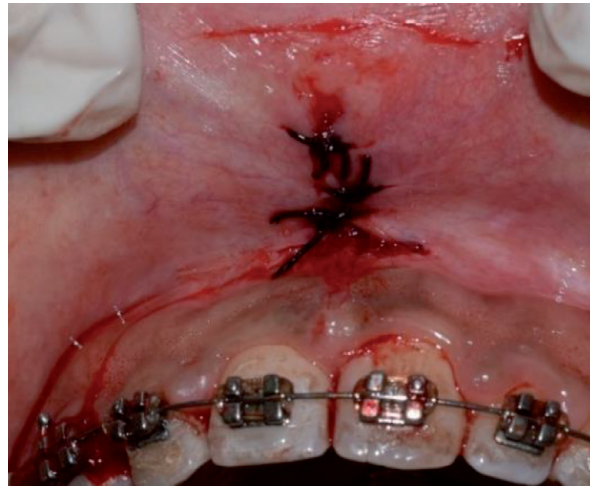


Figure 2.
Post-operative picture of Frenectomy.



Figure 3.
Uneven gingival margins (pre-operative).

to re-create physiologic contours with the purpose of recontouring the gingiva in the absence of pockets. Gingivectomy and gingivoplasty procedures are commonly performed together [6]. They are usually done for improving esthetics and for enhancing the prognosis of the teeth. Gingivectomy is needed in areas of space closure, where the tissue bunching also called clefts are surgically removed. It has also been documented that, performing CSF during a forced eruption of a tooth prevents displacement of gingiva more coronally [7, 8]. This will reduce the requirement for gingival recontouring after the completion of tooth movement.



Figure 4.
Post-operative picture gingivectomy done to correct the uneven margins.

2.1.1.2 Moderate involvement

2.1.1.2.1 Depigmentation

Gingival hyperpigmentation is presented as a diffuse, deep purplish, discoloration or irregularly shaped brown, light brown or black patches, striae or strands seen in the attached gingiva. This may be a genetic trait in some populations and is more appropriately termed as a physiologic or racial gingival pigmentation. This is common in occurrence and is immensely disturbing to the esthetics, especially while smiling [7, 8].

Gingival hyperpigmentation may be caused by exogenous and endogenous factors. Exogenous factors include contact with heavy metals and smoking. Endogenous factors include endocrine and genetic disorders. Clinical hyperpigmentation of the gingiva does not necessarily present as a medical problem. Gingival depigmentation is a periodontal procedure, to restore a more natural color of the mucosa [8].

2.1.1.2.2 Guided tissue regeneration

The aim of regenerative therapy is the restoration of lost tissue in its form and function. GTR is a surgical procedure that uses barrier membranes to direct the growth of new bone and gingival tissue to sites with insufficient volume or dimension of bone and gingiva for proper function, esthetics and prosthetic rehabilitation [9]. GTR is used as an adjunct to orthodontics to re-establish new periodontal attachment and to improve the pre-orthodontic conditions for moving the teeth into infrabony defects or for guiding vertical movements of teeth with reduced bone support [10].

2.1.1.2.3 Gingival curettage

Gingival curettage is a surgical procedure designed to remove the infected/affected soft tissue lining of the periodontal pocket with a curet, leaving only a gingival connective tissue lining (**Figures 5 and 6**). The purpose of curettage is to eliminate or reduce the depth of the periodontal pocket by promoting the shrinkage of gingiva and enhancing new connective tissue attachment [11].

1. In cases of the presence of mild to moderate pockets, gingival curettage can be done to improve gingival attachments.
2. In cases where aggressive treatment is contraindicated, it can be performed to reduce the gingival inflammation.
3. In cases of recurrent inflammation, gingival curettage can be done to maintain gingival health.



Figure 5.
Pre-operative picture, presence of deep pockets.



Figure 6.
Post-operative—full mouth curettage done.

In many cases, it may be possible to correct bony pockets by correcting the tooth position and allowing reestablishment of the periodontal apparatus with the help of orthodontics [12]. A combination of orthodontics and periodontal therapy may help to improve the periodontal status and maintenance of oral health for a patient [13].

2.1.1.2.4 Crown lengthening

Crown lengthening is usually done to correct a gummy smile or fix a clinically short crown height for a tooth that requires bonding or banding.

When malalignment is responsible for a gummy smile, a gingival surgery is not the first treatment of choice, the teeth, then must be moved to a more esthetic and functional position, and the smile is corrected by an orthodontic leveling of the gingival margins.

It's important for the periodontist and orthodontist to identify the cases in which the teeth can be treated by gingival surgery and the ones in which orthodontics can benefit [12–14].

A gummy smile, may occur due to 3 reasons, the first being a maxillary excess, which is usually treated with a combination of orthodontics and surgery [14], secondly, a short anatomic lip and thirdly, the excessive eruption of maxillary teeth with delayed apical migration over the maxillary anterior can cause a gummy smile.

For gingivectomy or crown lengthening the sulcular depth is 3-4 mm when it should be only 1 mm, it may not migrate easily towards the CEJ, hence it has to be corrected [15].

Gingival margin discrepancy can be assessed by 4 parameters

1. Relation between the gingival margin of the maxillary central incisor and the patients lip line

2. Evaluate the labial sulcular depth
3. Evaluate the relation between the shortest central incisor and the adjacent lateral incisor.
4. Assess the incisal edges for abrasion

In some cases, the molars may have a short crown height and the placement of an orthodontic band can lead to attachment loss due to the encroachment of the biologic width. To prevent these problems, a crown lengthening procedure should be considered prior to the placement of orthodontic bands used for anchorage.

To achieve the appropriate crown to root ratio for orthodontic bonding, one may need to do a crown lengthening procedure [16] as this is a crucial step and can aid in a more specific outcome in treatment planning.

2.1.1.2.5 Gingival recession and root coverage

Gingival recession is not due to Orthodontics, it may be a multifactorial issue (**Figures 7 and 8**) [17]. There are many ways to cover a recession, and various grafting techniques are available [18]. conventionally, gingival and pedicle grafts were used for root coverage previously, but presently connective tissue grafts are the treatment of choice to cover root exposures [19] The advantages are, greater root coverage, superior esthetics and the ease and patient comfort.

Usually, the grafting is conducted after the completion of orthodontic treatment, however in many circumstances, due to inadequate gingiva and detrimental recession, the procedure may be done before or during Orthodontic treatment. This is usually case specific.

The factors to be considered before deciding for intervention.

1. Esthetics.
2. Sensitivity.
3. Depth of root erosion.
4. Patients concerns regarding the treatment.
5. Any gingival restorations.



Figure 7.
Pre-operative: gingival recession in relation to 31.



Figure 8.
Post-operative: root coverage done in relation to 31.

2.1.1.3 Severe involvement

2.1.1.3.1 Corticotomy

Corticotomy – it is a minor surgical procedure defined as osteotomy of cortical bone (**Figure 9**) [20]. Since the primary resistance to tooth movement is encountered in the cortical layer, corticotomy procedure makes it possible to move teeth faster without undesirable side effects [21].

How can corticotomy be used along with Orthodontics?

1. Exposure of impacted teeth by corticotomy assisted orthodontics
2. Intrusion of overerupted molars by corticotomy.
3. Rapid retraction of severely proclined incisors with spacing
4. Closure of fistula by bony transport and corticotomy assisted expansion.
5. In cases with significant arch-length discrepancies.
6. In cases with transversely constricted maxilla.
7. To enhance molar distalization.
8. Corticotomy and compression osteogenesis in the posterior maxilla for treating severe anterior openbite

Suya suggested that most surgical and orthodontic procedures be performed in the first 3-4 months after corticotomy, before fusion of tooth bone units [22].

It is critical to begin the orthodontic movement immediately after the surgery, before bony healing occurs. Since it takes around 4 hours for the release of cAMP and as well as for bone remodeling to start; it will be better for us to activate the orthodontic phase of treatment immediately after the corticotomy procedure [23].

Frost coined the term, 'Regional Accelerated Phenomenon' (RAP), where he noticed that surgical healing occurred mainly at the surgical site due to the reorganization of cells and accelerated bone turnover rate.

The technique developed by the Wilckos, called the Wilckodontics system or Accelerated Osteogenic Orthodontics (AOO), is similar to single tooth corticotomy,



Figure 9.
Corticotomy done in the lower anterior region to induce the AOO phenomenon.

except that it is extended to all the teeth to be moved during orthodontic treatment. (**Figure 1**) This usually aids with correction of severe malocclusions and crowding.

2.1.1.3.2 Bone grafts

Pre-orthodontic Osseous surgeries.

Osseous craters - these do not repair or improve with orthodontic treatment hence they should be treated before any orthodontics is initiated [23]. They are interproximal two walled defects which may be maintainable non-surgically, however if correction or intervention is required then it can be managed with shaping the defect and reducing the pocket depth. The need for surgery is based on many factors like patient compliance, location of the defect, resistance to treatment by the periodontium [24].

3 walled defects- these usually require auto generous bone grafts or allografts with resorbable membranes [25]. If the results of periodontal therapy are stable post 3-6 months after, then orthodontic treatment maybe considered.

Types of bone grafts used.

1. Autografts

2. Allografts

3. Xenografts

4. Alloplastic

5. Non bone grafts

Bone grafting is very commonly done at many stages for cleft patients as an adjunct to the orthodontic treatment planning [26]. It has even been found that the canines organically are guided into the graft site also [27]. Hence grafting has been very essential part of orthodontics especially for cleft palate patients [28, 29].

Also it aids during cortication procedures. Many times to aid in tooth movements and to prevent the onset of any Osseous defects cortication is carried with a bone graft and the results are usually sound periodontium and excellent tooth movements. In many cases it also allows regeneration and restoration of the periodontium. With the help of a graft many difficult tooth movements can be continued in an otherwise compromised periodontium [30].

3. Role of orthodontics in periodontal treatment

The patients who seek orthodontic treatment beyond the age of 18 are categorized as: (a) young adults (typically younger than 35 years, often in their 20s) who have not received any comprehensive orthodontic treatment in their teens and (b) an older group, typically in their 40s or 50s, who need orthodontics as a corrective measure for an interdisciplinary approach [13].

The first group often seek treatment to improve their quality of life. Their expectations are more and they seek the best possible outcome. While the latter need treatment, to improve and maintain their current oral health, not necessarily seeking treatment to achieve an esthetic outcome, hence correction and control of disease progression becomes the primary goal in this group of patients.

In adults, Adjunctive orthodontic treatment is, tooth movements that are planned and achieved to facilitate other dental procedures necessary to control disease, restore function, and/or enhance appearance. The primary goal is to make it easier or more effective to replace missing or damaged teeth and to control periodontal problems. The treatment duration tends to be a few months, rarely more than a year, and long-term retention often is supplied by the restorations. The treatment duration tends to be a few months, rarely more than a year, and long-term retention is provided with restorations.

3.1 Orthodontic considerations

Orthodontic therapy can provide various benefits to the periodontal patient as discussed here [11]:

- The malaligned maxillary or mandibular anterior teeth pose a challenge in maintaining a good oral hygiene.
- Patients with fractured maxillary anteriors can benefit with orthodontic treatment, where extrusion of the tooth can improve the crown and root ratio, as well as improve the quality of restoration provided to the tooth.
- Vertical repositioning of teeth by orthodontic forces can improve certain types of osseous defects in periodontal patients, minimizing or eliminating the need for resective osseous surgery.
- Orthodontic treatment can improve the esthetic relationship of gingival margin levels.
- Orthodontic treatment can help in improving the adjacent teeth position before the restorative phase.

3.1.1 Adjunctive procedures

3.1.1.1 Orthodontic treatment for osseous defects

According to the literature, there are three risk groups in a population for progression of periodontal bone loss: (a) those with rapid progression (about 10%), (b) those with moderate progression (the majority, about 80%), and (c) those with no progression (about 10%) [13, 30].

Patients who have had a history with periodontal disease and bone loss, present with no contraindication to receiving orthodontic treatment if the disease has been treated and maintained adequately since. The Periodontist usually guides the Orthodontist in this regard as progression of an untreated periodontal breakdown must be anticipated, however, the patient's periodontal condition must receive attention during planning and execution of orthodontic treatment [30].

3.1.1.2 Hemiseptal defects

Hemiseptal defects are one-or two-wall osseous defects that are often seen around mesially tipped teeth or supra-erupted teeth. Usually, these defects can be eliminated with orthodontic treatment [30, 31].

Some patients have a discrepancy between both the marginal ridges and the bone levels but these discrepancies may not be of equal magnitude; orthodontic leveling of the bone in this case may not be able to level the marginal ridges. In these patients the crowns of the teeth should not be used as a guide for completing orthodontic therapy. The bone should be leveled, and any remaining discrepancies between the marginal ridges should be equilibrated. In case of a tooth that is tipped, uprighting it will level the defect [31].

If there is supraeruption, then, intrusion and leveling the tooth, can help in leveling the osseous defect. It is important that any periodontal inflammation be controlled before the start of orthodontic therapy. After the completion of orthodontic treatment, these teeth should be stabilized for at least 6 months and reassessed periodontally.

3.1.1.3 Advanced horizontal bone loss

The location of the bands and brackets on the teeth is a primary determinant of outcome after orthodontic treatment has been planned. In a periodontally healthy individual, the anatomy of the crowns of the teeth determines the position of the brackets. Incisal edges and marginal ridges form a guide to position the anterior brackets and posterior bands or brackets. If the incisal edges and marginal ridges are at the correct level, the cemento-enamel junction (CEJ) will also be at the same level. This relationship creates a flat, bony contour between the teeth [13, 32].

In situations where the patient has an underlying periodontal problems and significant alveolar bone loss around certain teeth, using the anatomy of the crown to determine bracket placement is not appropriate. In vital teeth, the equilibration should be performed gradually to allow the pulp to form secondary dentin and insulate the tooth during the equilibration process [32].

The main goal of equilibration and favorable bracket placement is to provide a constructive bony level as well as a more favorable crown-to-root ratio. In some of these patients, the initially apparent periodontal defects may not need periodontal surgery after orthodontic therapy.

3.1.1.4 Furcation defects

Furcation is the place where the roots of teeth separate. Furcation defect is bone loss, commonly due to a result of periodontal disease affecting the base of the root trunk of a tooth. These furcation defects can be classified as: Class I, Class II and Class III (mild, moderate and severe respectively) [11]. Furcation lesions require special consideration because they are difficult to maintain and can worsen during orthodontic therapy. These patients ideally should be on a 2 to 3 month recall

schedule. Detailed instrumentation of the furcation can help minimize further periodontal breakdown.

The treatment modalities in a furcation defect usually involve hemisection (mostly in class III defects). After hemisection, and completion of endodontic and periodontal surgery, can the tooth serve as an abutment. Some molars with class III furcation defects, may have short roots, advanced bone loss, fused roots, or other conditions that contraindicate hemisection. In these patients, extraction and replacement with an implant is advisable [33] at any point irrespective, to the orthodontic treatment.

3.1.1.5 Root proximity

When roots of the posterior teeth are in proximity, periodontal health and restorative options are limited. With the help of orthodontics, these roots can be separated allowing bone to form, which widen the embrasures, provide additional bone support, and make oral hygiene more accessible. The movements should be planned prior to bonding, so they can progress with the initial arch wires. The movements can be monitored with radiographs. A movement of 2-3 mm is usually sufficient for favorable bone response. The oral hygiene maintenance should be good. Occasional occlusal adjustments may be required in the process [31, 33].

3.1.2 Fractured teeth and forced eruption

Trauma to the upper anterior is the most common occurrence in children and adolescents. This trauma can be (a) fracture of the crown or (b) fracture of crown and root. If the fracture is restricted to the crown, then endodontics and restorative procedures will be sufficient to manage. If the fracture extends into the biological width, then any restoration will cause irritation and inflammation to the marginal gingiva. Alternatively, extrusion of the tooth followed by restoration may be possible depending on the amount of tooth structure [34]. If the fracture extends to the root, then, depending on the level of involvement the tooth may have to be extracted. There are six criterias used to determine the direction of treatment to choose:

- a. Root length: The ideal crown to root ratio should be 1:1 after extrusion of the tooth. In order to maintain the biological width of 2.5 mm, 4 mm should be extruded, this will provide 1.5 mm margin in crown preparation. The root length is evaluated using periapical radiographs. If this ratio is less than 1:1, the tooth will be unstable within the bone, hence extraction will be mandated.
- b. Root form: Both the external and internal root form should be considered. The external root form should be broad and non-tapering rather than thin and tapering. This root form avoids easy fracture and unaesthetic appearance at the cervical margins after restoration. Internally, the root canal should be one-third of the root form in order to avoid root fracture.
- c. Level of fracture: If the fracture level is 2-3 mm apical to the alveolar bone, the ideal treatment of choice will be extraction.
- d. Age of the patient: If it is a young patient, forced eruption followed by the crown placement will be the ideal choice of treatment. If it is an aged patient with a crown on an adjacent tooth, it will be better to extract and replace the teeth.

- e. Esthetics: If the patient has a high lip line, gingival exposure on smile will be increased. Hence, preservation of natural teeth will be better than artificial restoration of teeth.
- f. Prognosis: Endodontically, if there are vertical fractures of the root, it should be extracted. Periodontally, if there is an osseous defect, then the tooth can be extracted [13, 32, 34].

If all the above criteria are favorable, forced eruption of teeth can be considered. It can be carried out with orthodontic brackets or with composite extension with elastics. If the tooth movement is faster, the bone will not follow the root, hence circumferential fibrotomy would be necessary. If the tooth movement is slow, the bone follows the root and crown lengthening procedure may be required for the restorative phase.

After the forced extrusion, teeth must be stabilized to prevent re-intrusion, which may occur due to the orientation of the oblique fibers, which will allow intrusion with any compressive force, until 6 months post treatment [33].

Usually during forced eruption, the clinical crown length may be shortened. This is because the gingiva follows the direction of eruption of the teeth. If there is a mismatch in the bone levels with the adjacent teeth, flap elevation and bone recontouring followed by gingivectomy can be considered. If the mismatch is limited only to the gingival heights then gingivectomy is sufficient [32, 34].

Post gingival surgery, embrasures due to the difference in the widths of root and crown may be seen. These can be corrected either by recontouring the teeth or by reshaping the crowns during space closure. The latter is preferred because it improves the overall shape of the final crown [35].

3.1.2.1 Hopeless teeth maintained for orthodontic anchorage

In certain cases, moderate to severe periodontally compromised teeth may be used for anchorage. Even though the tooth is compromised, with sufficient bone it may be used for anchorage. Flap surgery and root debridement can improve the quality of this anchorage unit and post orthodontics, these can be maintained as are or extracted and replaced [36].

3.1.3 Orthodontic treatment of gingival discrepancies

3.1.3.1 Uneven gingival margins

The gingival margins of the anterior teeth play an important role in esthetics. The four factors that need to be considered for good esthetics are: (a) The height of the gingival margins of upper central incisors should be equal, (b) Gingival margin of lateral incisor should be coronal to the central incisor, (c) The gingival contour should follow the shape of CEJs in the anterior region, (d) Gingival papilla should occupy half the distance from the highest point of gingival contour to the incisal edge; the remaining half should be tooth contact [37].

The cause of the marginal discrepancies should be appropriately diagnosed and treated by either orthodontics or gingival surgery.

Four steps that can be considered for planning the treatment are: [36, 37]

Lip line: When the patient smiles, if the gingival discrepancy is not visible, it can be left untreated. If it is visible, then step two should be evaluated.

Labial sulcular depth: in the presence of an uneven gingival margin, if the labial sulcular depth is greater than 1 mm, then gingivectomy is possible. If the labial sulcular depth is less than 1 mm, then step three should be evaluated.

Relationship to the adjacent incisors: If the Central incisor is longer than the adjacent lateral incisor, orthodontic extrusion of this incisor will allow the gingival margins to move apically. The extruded tooth will have to be leveled with the adjacent teeth. If the Central incisor is shorter than the adjacent lateral incisor, then step four should be evaluated.

Abrasion: The incisal edges should be checked in the occlusal view. If this is thicker than the adjacent central incisor, then extrusion has taken place. Then the treatment of choice would be intrusion of the affected central incisors which will move the gingival margin apically. Followed by restoration of incisal edges. This step should be completed 6 months prior to the appliance removal as the periodontal fibers need time for re-orientation.

3.1.3.2 Significant abrasion & over eruption

When the patient reports with an abraded anterior, it can be managed either by orthodontic extrusion and restoration of the anterior tooth or by orthodontic intrusion of the adjacent anterior teeth followed by restoration of incisal edges. The extrusion option is not preferred as it may alter the crown: root ratio (1:1). It is advisable to intrude the anteriors. Extrusion of posterior teeth is not possible due to the occlusal forces. Once the intrusion has been achieved it is followed by a retention phase for 6 months after which restorations on the incisal edges can reestablish the ideal crown height [38].

3.1.3.3 Open gingival embrasures

The gingival embrasures can be deficit or open due to several reasons such as: (1) root position, (2) underlying bone loss, and (3) shape of the crown. If the problem is due to divergent roots, then orthodontic correction with modification of bracket position is an option. Once the root position is corrected, changes in the incisal contact can be modified. If the open gingival embrasure is due to other reasons, intrusion of the teeth would be ideal. Orthodontic intrusion will lead to compression of spaces which will in turn lead to an occlusal push of interdental gingiva, thus achieving the ideal ratio of 1:1, embrasure to tooth contact [34].

4. Conclusion

Adjunctive orthodontic treatment for patients with periodontal disease has some unique effects. Orthodontic treatment should only be done on a clinically sound periodontium. It is essential for dentists to have adequate knowledge on perio-ortho interrelationship. Maintaining a good oral hygiene and receiving regular basic periodontal care is of outmost importance to achieve a more effective orthodontic treatment. A better outcome can be achieved along with good maintenance, through a close collaboration between the orthodontist and the periodontist.

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Conflict of interest

The authors declare no conflict of interest.

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