

Ortho-Perio Continuum: An Interdisciplinary Approach

Swati Punyatoya¹, Saurav Panda², Rinkee Mohanty³, Rashmita Nayak⁴,
Anurag Satpathy⁴, Abhaya Chandra Das², Manoj Kumar²

¹Intern, ²Reader, ³Professor & Head, ⁴Professor, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha O Anusandhan (Deemed to be University), Bhubaneswar-751003, Odisha, India

Abstract

Orthodontic therapy is a combination of process which is related to move the malaligned teeth by correcting its position. There have been many dental cases where orthodontic tooth movement is assisted by periodontal therapy and also the periodontal condition is improved by orthodontic therapy. This interdisciplinary approach is a symbiotic relation between the two. This review highlights the various orthodontic therapies requiring periodontal therapy for better outcome and vice-versa. Harmonious cooperation between the periodontist and orthodontist would provide satisfactory outcome for the combined orthodontic periodontal problems. The knowledge of this approach in the field of dentistry would help clinicians' decide a better outcome in patient's favour.

Keywords: Orthodontic Therapy; Malaligned Teeth; Periodontal Therapy; Interdisciplinary Approach.

Introduction

In the different branches of dentistry, co-ordination and co-operation among them is very important. It will not only help to get a spectacular idea about the diagnostic procedures but also make the treatments easier. This type of interrelated relationship exists between Orthodontics and Periodontics. Basically, this is a symbiosis type of relationship where the treatment procedures of both the branches are interrelated. There have been many dental cases where orthodontic tooth movement is assisted by periodontal therapy and also the periodontal condition is improved by orthodontic therapy. Orthodontic therapy is a combination of process which are related to move the malaligned teeth by correcting its position. It is shown that patients who are under orthodontic treatment are more susceptible to develop plaque on their teeth surfaces. It is due to several orthodontic appliances,

brackets, wires and elements which are present on the teeth surfaces. Because of the such elements, the oral hygiene procedures might be more difficult. It may also cause several complications liketooth decalcification, tooth discoloration, tooth devitalization, rootresorption, gingival recession, pain, TMJ dysfunction, periodontal problems, loss of enamel, dental caries, many types of psychological complications and allergic reactions also. Out of all above complication, periodontal problems are the most common in nature and also need proper consideration. Despite all these, orthodontic treatment sometimes is very helpful in increasing the periodontal status. So, the periodontal conditions in which orthodontic treatment is necessary should be given some special importance at the time of interdisciplinary approach in both the ways.

Adverse effects of orthodontic therapy on periodontium

Orthodontic therapy may hinder the complete procedure of oral hygiene. So, improper oral hygiene creates feasibility of change of the subgingival plaque to a much more aggressive periopathogenic flora. But it can be reduced by appropriate plaque control method. So, patients having healthy periodontium can undergo for orthodontic treatments without infuriating the periodontal condition.

Corresponding Author:

Dr. Saurav Panda

Associate Professor, Department of Periodontics and Oral Implantology, Institute of Dental Sciences, Siksha O Anusandhan (Deemed to be University), Bhubaneswar: 751003, Odisha, India
e-mail : drsaurav87@gmail.com

Orthodontic therapy produces several periodontal complications which includes; gingivitis, periodontitis, alveolar bone loss, gingival recession, tooth mobility, black triangles, periodontal pocket fenestration and dehiscence^(1,2).

There are many ortho-dental cases which show the presence of various types of bacteria in the dental plaques of the patients who are undergoing orthodontic therapy. Some of such bacteria are spirochetes, intermedius, motile rods, *B. forsythus*, *T.denticola*, *P.nigrescens*, *C.rectus* and fusiform bacteria.⁽³⁾ Most of the cases show the development of gingival recession during or after the orthodontic treatment. This type of development of gingival recession courses many clinical problems. Most of the gingival recessions which develop during the orthodontic treatment had been shown to occur in the upper and lower anterior teeth regions. According to a study made by Steiner and his colleagues, the gingival recessions occurring after the orthodontic treatment are more tends to occur in the areas with thin underlying bony structure and thin keratinized gingiva.⁽⁴⁾

Periodontal conditions which require orthodontic treatment includes: Gummy smile, Midline diastema & correction of black triangles, Pathological migration with infrabony defects, Tilted molars, and Gingival margin discrepancies etc.

Orthodontic treatment as an adjunct to periodontal therapy: There is a strong correlation between the periodontal disorder and malposed teeth in the dental arch. The correction of the malposed teeth can eliminate any harmful occlusal interference which may prevent plaque accumulation and provide a better oral hygiene procedure. It may offer a great opportunity for the development of a good periodontal health.

Generally, during orthodontic tooth movement, the entire periodontal attachment apparatus, including the bony structure, periodontal ligament, and soft tissue components move along with the tooth. Brown made a study on the influence of uprighting of molars on the periodontium in four patients. After 7 months of treatment, the associated pocketing at uprighted molars had 2.5mm more pocket depth reduction than the control tooth.⁽⁵⁾

A clinical study was done on orthodontically treated patients having intact periodontium. It concluded that extrusion of mandibular incisors resulted in displacement of the mucogingival junction and the gingival margin

by 52.5% and 80%, respectively, of the total amount of extrusion.⁽⁶⁾ There are some cases where movement of attachment and margin of bone along with the tooth is not advisable as in crown-root fractures. In such cases, periodical circumferential supracrestal fiberotomy is needed. It should be done at the start and every 2 weeks during orthodontic extrusion. It has been suggested that orthodontic tooth movement into infrabony defects can result in healing and regeneration of the tooth attachment apparatus.

Periodontal therapy as an adjunct to orthodontic therapy: The aim of orthodontic treatment is to achieve a good occlusal relation, maintain a healthy periodontal status and to improve dental and facial aesthetics and also function. For the success of any orthodontic treatment, health of the periodontium is an important factor. So good periodontal health should be maintained not only before but also during and after the orthodontic treatment. Appropriate orthodontic forces do not produce any damage to the periodontium. There is different periodontal treatment which are used as adjuncts to orthodontic therapy.

Pre-orthodontic gingival surgery: It is seen that insufficient width of attached gingiva prevents plaque control and develops gingival recession. The denuded area extending through the marginal bone is known as 'dehiscence' which is a risk factor for the development of gingival recession. So, it is necessary to maintain the adequate width of attached gingiva. An attached gingiva with 2mm of width, is appropriate in maintaining a proper gingival health.⁽⁷⁾ There are different mucogingival surgeries such as free gingival autograft, connective tissue gingival graft, apically repositioned graft and modified apically repositioned flap can be utilized for augmenting the width of attached gingiva. Among these techniques 'Modified apically repositioned flap (MARF)' is a simple and less time-consuming procedure.

Fiberotomy: Elastic fibers, collagen fibers and the periodontal ligament are re-organized by several orthodontic tooth movements in order to accommodate the re-established tooth positions. The teeth must be retained in the new positions to prevent orthodontic relapse and to achieve proper rearrangement of the supporting tissues. Supracrestal fiberotomy is usually performed to correct the relapse of tooth rotation corrected by orthodontic treatment. It is done before the removal of orthodontic appliances i.e. towards the end of the active orthodontic therapy.

Frenectomy and frenotomy: Abnormal frenum attachment is a potent aetiological factor for the development of midline diastema. By frenectomy incision and relocation of frenal attachment is done. Frenectomy is the complete excision of the frenum along with its attachments to the underlying bone. It can be done by either conventional scalpel technique, electrosurgery or by using lasers.⁽⁸⁾

Crown lengthening: It is a surgical procedure which is used to extend the supragingival tooth structure for aesthetic or restorative purposes either by the method of positioning the gingival margin apically, removing the supportive bones or by both of these.⁽⁹⁾ It is necessary if there is not enough of clinical crown height. It reduces gum tissue and shaves bone down when required. The procedure usually performed by gingivectomy or an apically repositioned flap in combination with gingivectomy prior to orthodontic bonding procedures.⁽³⁾ It can be done to prevent gummy smile in which gums are visible above the teeth while smiling.

Preorthodontic osseous surgery: It is mainly indicated for different types of defects such as; hemiseptal defect, three-walled defect, osseous crater and furcation involvement etc.

Missing interdental papilla are usually known as gingival “black holes”. It may be due to a number of factors such as over-divergence of adjacent roots and advanced periodontal disease with loss interdental alveolar crest. An orthodontic periodontic interdisciplinary approach is usually advised to manage these problems.

Periodontally accelerated osteogenic orthodontics: This technique was developed by Dr Thomas Wilcko and Dr William Wilcko.⁽¹⁰⁾ It is also known as alveolar osteogenic orthodontics or Wilkodontics. This procedure can be used as an adjunct to conventional approaches to accelerate orthodontic tooth movement. Basically this is a clinical procedure that combines alveolar augmentation and selective decortication facilitated orthodontic technique.⁽¹⁰⁾ Theoretically it is a procedure which is based on the bone healing pattern in corticotomy regions known as the “Regional Acceleratory Phenomenon (RAP)”. RAP was first described by Frost in 1993.⁽¹⁰⁾ Regional acceleratory phenomenon is a localized tissue reaction to

noxious stimulus. It accelerates the healing efficiencies of the affected tissues 2-10 times faster than normal physiologic healing process.^(11,12) This is usually seen in osteotomy sites, fracture sites or bone grafting areas but mainly seen in fracture sites.⁽¹³⁾ The two main features of RAP in bone healing which are believed to improve orthodontic treatment are; decreased regional bone density, accelerated bone turnover.⁽¹⁰⁾ It mainly focuses on enhancing the manner in which the periodontium responds to applied forces and on providing for more intact periodontium and increased alveolar volume to support the teeth and overlying soft tissues during retention. The procedure for the PAOO technique is portrayed in Figure 1-6.

Advantages:

- Increases alveolar bone width
- Reduced treatment time to 1/3rd to 1/4th of conventional procedure
- Less root resorption
- Improved periodontal support
- Less chance of relapse
- Alveolar grafting also benefits patients by repairing bony dehiscence and fenestrations.

Disadvantages:

- Not applicable to all cases
- Costly procedure
- Post-surgical crestal bone loss and recession may occur
- Sometimes there is occurrence of pain and swelling
- Not suitable for patient who take NSAIDS or regular basis or patient having other chronic health problems

Applications:

- Resolve crowding
- Accelerate canine retraction after premolar extraction
- Facilitate slow orthodontic expansion
- Manipulation of anchorage
- Molar intrusion and open bite correction



Figure 1: Pre-operative photograph



Figure 2: Orthodontic brackets placed



Figure 3: Interdental vertical cuts given



Figure 4: Bone grafts placed



Figure 5: Interrupted sutures placed



Figure 6: Palatal View

Different studies on orthodontic periodontal interrelationship: Generally, the main reasons routinely cited to justify the provision of orthodontic treatment are important of dental and facial aesthetic and of dental function and health. Following are some of the studies regarding orthodontic periodontal interrelationship.

A research on correlation between periodontal health and malocclusion was conducted by Ngom and co-workers.⁽¹⁴⁾ According to them malocclusions are the risk factors for periodontal diseases. But in this study the real conclusion about the cause or effect relationship between periodontal condition and malocclusion was not possible.

Van Gastel⁽¹⁵⁾ conducted a review of literature which showed contradictory findings on the effect of malocclusion and orthodontic appliances on the

periodontal health. Dental plaque is the primary cause of gingival inflammation and periodontitis. There are some studies reported loss of attachment during orthodontic therapy.

Two systemic reviews were conducted by Bollen⁽¹⁶⁾ to know whether the malocclusion and orthodontic treatment affect the periodontal health or not. The first one suggested that person having greater malocclusion will have more periodontal problem. It may depend on oral health status. The second one showed that there is no reliable evidence on the effect of the orthodontic treatment on the periodontal health.

A systemic literature review was conducted by Gray and McIntyre⁽¹⁷⁾ to determine the effect of Oral Health Promotion (OHP) upon gingival health. They concluded that an OHP for patients undergoing fixed appliances

orthodontic treatment produces a short-term reduction (up to 5 months) in plaque and improvement in gingival health. There are no specific oral health promotion method that can produce a greater short-term benefit to periodontal health during fixed orthodontic treatment.

Conclusion

Healthy periodontium is required for all types of dental treatment, mostly for orthodontic treatment. Orthodontic therapy has both beneficial and harmful effects on periodontium. For adult patients, combined orthodontic and periodontal treatment is required, who are seeking orthodontic treatment for aesthetic correction. Orthodontic treatment cannot be performed on periodontally compromised conditions. In such conditions regular follow up is required to check the periodontal status. Harmonious cooperation between the periodontist and orthodontist provides a satisfactory outcome for the combined orthodontic periodontal problems.

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