Orthodontic Treatment of Patient with Significant Periodontal Problem: A Case Report

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Aim: To demonstrate the efficacy of orthodontic treatment as an adjunctive therapy in managing adult patients with significant periodontal problems, specifically those with tooth mobility and loss of periodontal attachment that cannot be addressed by standard periodontal care alone.

Case Description: A 47-year-old female patient was referred to our orthodontic clinic seeking an adjunctive limited orthodontic treatment to address the wide space between her lower anterior teeth that affecting her smile and oral function. A radiographic examination showed substantial horizontal bone loss. The patient underwent initial periodontal therapy, followed by carefully planned orthodontic treatment using light forces and long activation periods to align teeth and close spaces. A fixed retainer was placed post-treatment to maintain tooth stability.

Conclusion: Treatment success depends mainly on the controlling of dental plaque, and the application of the optimal orthodontic mechanics. Permanent retention is necessary to compensate for the loss of periodontal support and follow-up maintenance appointments for cleaning and scaling should be set after the end of orthodontic treatment.

Keywords: Orthodontic treatment, adult patient, periodontal loss of attachment.

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Introduction

The dentofacial appearance and oral function are the primary reasons why adult patients seek orthodontic treatment.\(^1\) Correction of dental esthetic and health by orthodontic treatment is directly associated with improving patient’s quality of life including social interaction and self-confidence.\(^2,3\)

In the meantime, periodontal condition should always receive special attention when treating adult patients.\(^4\)

Orthodontic treatment of periodontally involved teeth requires multidisciplinary planning and coordination.\(^5\)

Adult teeth with periodontal disease can be safely moved by orthodontic treatment if the disease has been brought under control.\(^6\)

Orthodontic treatment may be necessary to facilitate periodontal treatment or stabilize the periodontal condition in some cases. Moreover, orthodontist can help in treating different types of periodontal defect that otherwise difficult to be treated by standard periodontal care alone.\(^7\)

Healthy periodontium maintains the balance that resist unwanted tooth movement in the normal oral environment. Loss of periodontal attachment causes balance alteration which lead to pathological tooth displacement and spacing problems.\(^8\)

This change in tooth position not only deteriorate esthetic and function, but also complicate plaque control which in turn lead to tooth loss.\(^9\)

Therefore, orthodontic tooth movement is sometime necessary when planning to treat individuals with significant loss of periodontal support. The selection of properly designed orthodontic appliance with the application of correct magnitude of force can gradually move teeth into proper alignment to improve oral function, health, and esthetic.\(^10,11\)

This case report illustrates an orthodontic treatment of a pathologically displaced teeth with spacing problems and significant mobility. The clinical and radiographical stability were also evaluated two years after treatment.

Case Presentation

History:

A 47-year-old female patient was referred to our orthodontic clinic seeking an adjunctive limited orthodontic treatment to address the wide space between her lower anterior teeth that had a strong impact on her smile esthetic and oral function. There was no significant medical history or habit that may have contributed to the presented teeth displacement.

Oral examination revealed generalized supra and subgingival plaque and calculus deposition as a result of poor oral hygiene (Figure 1). The periodontal probing depth was ranging between 4 to 6 mm. Recessions were obvious in most teeth and Lack of keratinization in teeth number 42 and 41. Significant mobility were observed in teeth number 41 and 31. Radiographic examination (Figure 1) showed a significant horizontal bone loss especially between lower central incisors.

![Intra-oral photo](A) and radiographic view (B) on the first-day patient was presented to our clinic.

Figure 1: Intra-oral photo (A) and radiographic view (B) on the first-day patient was presented to our clinic.

Our objective was to save both lower central incisors by applying orthodontic treatment for a limited purpose in order to help improving periodontal health of those teeth and providing better access for maintaining oral hygiene.
Alternative treatment options were also discussed with patient including implant replacement of the periodontally involved teeth. The patient was informed about the complications that could occur during the orthodontic treatment including the possibility of losing the periodontally affected teeth. Informed consent was obtained and treatment protocol was approved by Taibah University College of Dentistry Research Ethics Committee (TUCDREC).

Treatment

The initial periodontal therapy (Figure 2-A) was started in October 2020 by the elimination of dental calculus and biofilm. Scaling and root planning were conducted, and complete oral hygiene instruction were given. This phase lasted for six months with multiple monitoring and maintenance sessions every 2 months.

Orthodontic treatment was started after periodontal disease was brought under control (Figure 2-B). Lower dental arch was bonded in March 2021 with American Ortho Mini Master series brackets 022 slot MBT. A light force was applied in teeth aligning and leveling using Nickle-Titanium archwires.

Space closure was started after reaching the Stainless-Steel archwire size 0.019 x 0.025 inch. Light force was applied using long (wide) power chain where the rings of the chain were separated by longer distance with total force magnitude around 100 gram (Figure 3).

Treatment was approached with caution by applying lighter force with longer periods around 6 weeks between activation. Orthodontic treatment was completed (Figure 4-A) in February 2022. Fixed retainer (0.018 inch) round stainless-steel wire was bonded to all lower anterior teeth just before removing the appliance. The retainer was bonded in a position that not complicating the oral hygiene maintenance (Figure 4-B).

Outcome and Follow-up

Radiograph examination (Figure 5-A) showed an improvement in alveolar bone architecture after the end of orthodontic treatment. The patient was informed that lifelong retention is necessary and good oral hygiene should always be maintained. Follow-up appointments was set for every six months.

Figure 2: Oral condition at the end of Phase I periodontal therapy (A), orthodontic aligning and leveling (B).

Figure 3: orthodontic space closure.

Figure 4: Intra-oral photo of orthodontic treatment at the end of orthodontic treatment (A), bonded retainer (B).

Figure 5: radiograph examination at the end of orthodontic treatment (A), two years follow-up (B).
Two years after orthodontic treatment (Figure 6-A), the patient was recalled for check-up in February 2024. Slight space relapse was noticed due to the separation of tooth-adhesive interface of the fixed retainer (Figure 6-B). However, the periodontal condition and bone level were stable, and teeth showed no sign of mobility. The patient was satisfied with esthetic and function. The alveolar bone level was stable as shown by radiographic examination (Figure 5-B).

Figure 6: Oral condition two years after finishing orthodontic treatment (A), fixed retainer two years after finishing orthodontic treatment (B).

Discussion
This report demonstrates treatment option that allows the patient to save teeth with significant loss of periodontal attachment. The major effects of periodontal attachment loss are related to an impaired alveolar bone level and attachment support that can go from mild tooth mobility to tooth loss. Our goal was to provide the best possible treatment outcome by restoring the structure and function of previously damaged periodontium with the least biological, psychosocial, and financial cost to the patient.

The objective of orthodontic tooth movement as adjunctive therapy for treatment of patients with significant loss of periodontal support is to restore the structure and function of previously damaged periodontium. The principle of orthodontic tooth movement is based on the ability to remodel the alveolar bone when applying a force that can alter the perfusion of periodontal ligaments. When applying force on tooth, some part of periodontal ligaments will compress under the pressure from the force, other part will stretch. Bone resorption happens at the pressure side while bone formation happens in the tension side. The result remodeling of the surrounding alveolar bone will allow the tooth to move and change position. That means bone formation and remodeling can be used to change and improve the alveolar ridge morphology as a result of orthodontic force. Actually, tooth movement will not only able to generate new bone, but also new soft tissues are following the tooth and cover the new part of alveolar ridge.

Many studies of the effect of orthodontic treatment on different parameters of periodontal condition have found that moving teeth with reduced periodontal attachment will not deteriorate the condition of periodontal support, but on contrary, can enhance the periodontal health and stimulate bone formation. The success of this treatment approach depends mainly on the controlling of dental plaque, and the application of the optimal orthodontic force.

Thorough periodontal treatment and good oral hygiene are necessary to stabilize the periodontal condition before orthodontic treatment. This includes procedures such as scaling and root planning, or periodontal surgeries that improve the support and health of the affected teeth. It is also important to monitor the periodontal condition more often during orthodontic treatment. A maintenance schedule must be tailored to the patient’s need, with frequent cleaning and scaling appointments at intervals depending on the severity of the periodontal disease.

The direction, amount and method of force application are essential toward achieving the desirable outcomes when moving periodontally involved teeth. Orthodontic treatment mechanics must be modified to address the loss of periodontal attachment and the vertical reduction of alveolar bone height. The position of tooth center of resistance moves toward the root apex as a direct result of vertical bone loss.
This means that even slight force can generate a very high and harmful pressure on the periodontal tissues. Therefore, the orthodontic force must be kept to an absolute minimum with longer and less frequent activation period. In this case, the magnitude of force delivered was approximately 100 gram with frequency of activation every 6 weeks. Moreover, a round or small dimensional rectangular wire must be avoided when moving teeth bodily using continuous archwire mechanics.

Lifelong retention is always necessary at the end of orthodontic treatment of periodontally involved teeth. A permanent fixed retainer bonded to all affected teeth is needed to prevent teeth mobility and to compensate for the instability caused by the loss of periodontal attachment. The fixed retainer should be placed in a position that facilitates the maintenance of good oral hygiene. The patient should be informed about the importance of brushing and flossing and be encouraged not to miss the periodic check-up appointments afterward.

Teeth mobility and displacement caused by the loss of periodontal attachment in adults can be challenging to address. Obtaining the best treatment outcomes required the use of our best judgment to design treatment strategy that address the patient’s problems while maximize the benefit to the patient and minimize the cost and risk. Omitting the orthodontic perspective from the treatment planning in periodontic and prosthodontic cases is not beneficial to the patient. Therefore, the communication and coordination between clinicians in different fields is necessary because it is important to do what is the best for the patient rather than what you are able to do.

Conclusion

The periodontal attachment loss in adults is directly related to teeth mobility and displacement. This case can be corrected with orthodontic treatment and require coordination with the periodontist. Treatment success depends mainly on the controlling of dental plaque, and the application of the optimal orthodontic mechanics. Permanent retention is necessary to compensate for the loss of periodontal support and follow-up maintenance appointments for scaling and root planning should be set after the end of orthodontic treatment.

Declaration of interest

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References