

Research article

Periodontal Therapy With Intracoronal Fiber Splint in Case of Tooth Mobility With Crowded Anterior in Adolescents: A Case Report

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Background: Plaque is a significant factor that leads to periodontal disease. One of the most common areas for plaque accumulation is the lower anterior region. Crowding acts as a predisposing factor for plaque accumulation and if not treated eventually leads to periodontal disease. Periodontal disease progression may lead to pathological tooth mobility which can result from acute periodontal inflammation, traumatic occlusion and an apical shift of the rotational center of the tooth as it occurs in advanced alveolar bone loss, and the increased mobility can cause inconveniences for the patient. The new classification of periodontal disease states that teeth with progressive mobility may require splinting therapy to improve patient comfort and additional improvement for the Oral Health-related Quality of Life.

Objective: To describe the correction of tooth mobility with intracoronal fiber splint to improve function and comfort.

Case Report: A 26-year-old male patient with crowded anterior presented to the Periodontics Department of the Dental and Oral Hospital of Gadjah Mada University (RSGM UGM) with the main complaints of lower front teeth mobility and frequently bleeding of gums, especially when brushing the teeth. The treatment plans of periodontal therapy begins with the initial phase, followed by the correction and the maintenance phases. In the initial phase, DHE, SRP, desensitization, occlusion adjustment and intracoronal fiber splint were carried out to eliminate inflammation and stabilize the mobility of the teeth.

Conclusion: The splint is a periodontal therapy done through the redistribution of forces on the affected teeth, the splint minimizes the impact of the loss of support. The loss of support structures of the teeth leads to the mobility of the teeth. Increased mobility of the teeth affects the function, aesthetics and comfort of the patient. Splints are used to overcome all these

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1. Introduction

Healthy periodontal structures, including root cementum, periodontal ligament, and alveolar bone, constitute a functional unit or organ. The periodontal ligament has a rich and dense vascular and nervous network also distributes and absorbs forces [1].

Plaque is a significant factor that leads to periodontal disease. One of the most common areas for plaque accumulation is the lower anterior region. Crowding acts as a predisposing factor for plaque accumulation and if not treated eventually will lead to periodontal disease. Proper tooth position is a very important factor in the overall preservation of the dental health and for proper function and the aesthetics. Deviations from the normal tooth morphology and position will lead to food accumulation and occlusal prematurities. Dental crowding is the most common cause of malocclusion and can be associated with any of the underlying skeletal jaw relationships. There may be many reasons why crowding arises such as a tooth size or jaw size discrepancy, mesial movement of posterior teeth resulting in a shorter arch length and retroclination of the lower incisors which also shortens the arch length [2]. The most common malocclusion is anterior crowding, which can be detected in 40% of the upper and 60% of the lower jaws [3].

Occlusal trauma is a term used to describe injury resulting in tissue changes within the attachment apparatus, including periodontal ligament, supporting alveolar bone and cementum, as a result of occlusal force(s). Occlusal trauma may occur in an intact periodontium or in a reduced periodontium caused by periodontal disease. Occlusal trauma may occur in an intact periodontium (*Primary occlusal trauma*) or in a reduced periodontium caused by periodontal disease (*Secondary occlusal trauma*) [4]. The relationship between trauma from occlusion (TFO) and periodontal disease has been discussed for more than a century. Periodontal disease is characterized by gingival inflammation, periodontal pocket formation, bone loss and clinical attachment loss (CAL). Conversely, TFO has been defined as an “injury resulting in tissue changes within the attachment apparatus as a result of occlusal force(s) [5].

Occlusal adjustment, which was routinely conducted during an initial preparation phase as part of the preliminary procedures to control periodontal disease, has been considered part of periodontal therapy by many authors in several fields of study [5]. Occlusal adjustment may involve altering cuspal inclines, reducing heavy contacts, and removing premature contacts [6].

Gingival recession is defined as the location of the marginal tissues apical to the cemento-enamel junction [7]. Three major factors are associated with increased susceptibility to gingival recession: (i) thin gingival tissue; (ii) mucogingival conditions; and or (iii) a positive history of progressive gingival recession and/or inflammatory periodontal disease(s) in teeth presenting with either or both of the first two factors [8].

Physiological tooth mobility is the result of the histological characteristics of the periodontal ligament. Physiological tooth mobility, horizontally as well as vertically, is different between single-rooted and multirouted teeth and is determined by the width, height, and quality of the periodontal ligament. Excessive occlusal forces or premature contacts on teeth are primary etiological factors for hypermobility [1].

Loss of tooth-supporting structures results in tooth mobility. Increased tooth mobility adversely affects function, aesthetics, and the patient's comfort. Splints are used to overcome all these problems. A splint is an appliance used for immobilization of injured or diseased parts. A periodontal splint is an appliance used for maintaining or stabilizing mobile teeth in their functional position. When faced with the dilemma of how to manage periodontally compromised teeth, splinting of mobile teeth to stronger adjacent teeth is a viable option. This prolongs the life expectancy of loose teeth, gives stability for the periodontium to reattach, and improves comfort, function and aesthetics. Although splinting has been used since ancient times, it has been a topic of controversy because of its ill effects on oral health, including poor oral hygiene and adverse effects on supporting teeth. There have been considerable advancements in the materials used for splinting, resulting in fewer ill effects [9].

This case report aims to describe the correction of cases of teeth mobility in mandibular anterior crowding with gingival recession and alveolar bone loss with a degree of mobility 1-2' and trauma from occlusion with fiber splint intracoronal to improves comfort, function and aesthetics.

2. Case

A 26-year-old male patient came to the periodontics department of the Dental and Oral Hospital Gadjah Mada University (RSGM UGM), with main complaints that his mandibular anterior teeth are mobility and his gums bleeding

frequently, especially when brushing his teeth. The patient did not want to undergo the orthodontic treatment to medicate the mobility teeth. The patient is not a smoker and non alcoholic person. He also has no history of systemic disease. The patient admitted



Figure 1: Anterior Crowding in the 32,31,4,42 with mobility.

that he had never been hospitalized and did not have any drugs or food allergies. On extra oral examination there were no abnormalities. On intraoral examination, the gingiva was reddish, shiny, unstippling, bleeds easily in almost all regions. There was also gingival recession in the maxillary and mandibular anterior teeth. Tooth mobility occurred in the 32,31,41,42 region. There is a periodontal pocket (probing depth) of approximately 3-5 mm. Dental Hygiene (OHI) status is sufficient [3,1]. and Plaque Control Index (PCR) 35.8%. On radiographic examination, OPG X-ray was performed and bone damage was seen in almost all regions and at the apical of teeth 32 and 42 a radiolucent was seen.

Based on the patient's complaints, clinical and radiographic examination, a diagnosis and treatment plan are established. The action procedure is notified and explained to the patient. After the patient agrees to the action to be taken, the informed consent is signed by the patient as a sign of approval for the action to be taken.

3. Treatment

The treatment plan begins with the initial phase then the corrective phase and the Maintenance phase. DHE, SRP, Desensitization, Occlusal Adjustment and Intracoronal Fiber Splinting was performed in the initial phase to eliminate inflammation and stabilize the mobility teeth. Initial treatment is removing plaque and calculus and smoothing the roots as well as desensitizing the region experiencing gingival recession (pain) and then giving oral hygiene instructions (DHE) to the patient. Control 1 was performed 1 week after SRP, DHE, desensitization with OHI 3.1 (adequate), PCR 35.8% and GI 0.78 (mild). To stabilize the loose teeth, intracoronal fiber splinting was conducted. Previously, occlusal adjustments were made to see if there were premature contacts on the mobility teeth.

Occlusal adjustment (OA) was performed using articulating paper (AP). The patient was instructed to bite the prepared AP on the maxillary and mandibular anterior teeth with movements such as chewing food. After that, the patient was asked to open his mouth, so that the colored part of the tooth surface could be seen and occlusal



Figure 2: OA using articulating paper.

adjustment would be applied in that site by grinding the surface using a fissure bur to prevent TFO does not occur again.

After conducting OA, a 2 mm deep slit was made with a round bur on the occlusal side 34,44 and the lingual side on teeth 33, 32, 31, 41, 42, 43. Etching gel along the work area was applied and rinsed with running water after sitting for 30 seconds. The next step is to measure the fiber according to the length of the tooth to be splinted. Then, the cut fiber was placed on the glass plate and applied a bonding agent to the fiber and the work area then sprayed it with wind and then illuminated it with LC for 20 seconds.

A thin layer of flowable composite was applied on the work area and the fiber that has been given a bonding agent then place the fiber on the work area, the resin-treated surface is exposed to the area of the occlusal and lingual gaps, pressed with a plastic filling instrument until it adheres to the gap well and neatly then in the LC light gradually. After being hard and then polished with an Arkansas bur until it is neat and there is no retention that can cause food impaction. Control was conducted 1 week after the procedure. The patient was prescribed chlorhexidine mouthwash 2 times a day for 1 week and instructed to brush his teeth 2 times a day to keep oral hygiene. The second control was carried out at week 3 after the procedure. The patient's OH condition improved with OHI 2,3, PCR 10%, GI 0.66, the patient did not complain of pain and teeth 32, 31, 41, 42 were not mobility, there is no food impaction and plaque is more controlled. The color of the gingiva is no longer red like the first time the patient came.

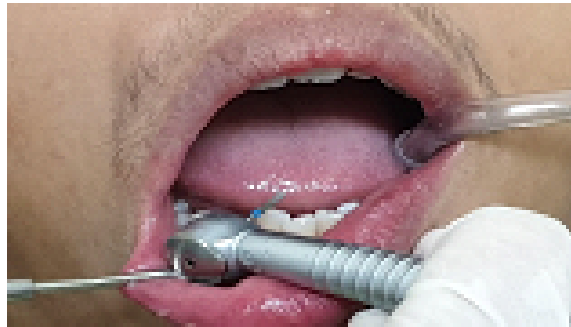


Figure 3: Grinding the surface with fissure bur.

4. Discussion

4.1. Occlusal Adjustment

Trauma from occlusion has been defined as structural and functional changes in the periodontal tissues caused by excessive occlusal forces. Some of these changes are adaptive, whereas others should be considered pathological. Occlusal trauma can be acute if caused by external impact forces or chronic if caused by internal occlusal factors (premature contacts, grinding). *Occlusal trauma* is the overall process by which *traumatic occlusion* (i.e., an occlusion that produces forces that cause injury) produces injury to the attachment apparatus. Chronic occlusal trauma can be understood as primary (caused by excessive and non physiological forces exerted on teeth with a normal, healthy, and noninflamed periodontium) and secondary trauma (caused by excessive and premature occlusal forces on teeth with an inflamed periodontium) [1].

The relationship between trauma from occlusion (TFO) and periodontal disease has been discussed for more than a century. Periodontal disease is characterized by gingival inflammation, periodontal pocket formation, bone loss and clinical attachment loss (CAL) [5].

In a healthy noninflamed dentition, traumatic occlusion leads to hypermobility of some teeth; if hypermobility, radiological widening of periodontal ligament space or pronounced cervical abfraction is found, the occlusion should be analyzed and corrected. Simple, uncomplicated, procedures are in most cases adequate to restore a physiological situation and to reduce hypermobility. In cases of a healthy but reduced periodontium, increased mobility may also be reduced by *occlusal adjustment*, it should be recognized that tooth mobility in such cases, based on the mechanical situation, is nevertheless increased. It may be necessary to splint the teeth to increase functional comfort and to avoid direct fracture [1].



Figure 4: Fiber was placed on the glass plate.



Figure 5: Application of etching on work area.



Figure 6: Application of bonding agent and flowable composite in work areas and fiber.

Occlusal adjustment as part of periodontal therapy has been controversial for years, mostly because the literature does not provide enough evidence regarding the influence of TFO on periodontitis. Although it is still not possible to determine the role of *occlusal adjustment* in periodontal treatment, adverse effects have not been related to *occlusal adjustment*. This means that the decision made by clinicians whether or not to use occlusal adjustment in conjunction with periodontal therapy hinges upon clinical evaluation, patient comfort, and tooth function [5].

4.2. Fiber Splint Intracoronal

Periodontitis is an inflammatory disease induced by bacterial biofilms that accumulate in the gingival margin and characterized by gingival inflammation, loss of connective tissue attachment and alveolar bone, presence of increased periodontal pocket depth, and



Figure 7: Illuminated work area with LC for 20 seconds.



Figure 8: Polishing with arkansas bur.

gingival bleeding [10,11]. Removal of plaque, calculus, elimination of deep periodontal pockets and occlusal adjustment are treatment options and result in healthy periodontium. If left untreated, the continuous loss of the supporting tissues during periodontal disease progression may result in increased tooth mobility. Tooth mobility can also be a consequence of occlusal trauma in addition to the periodontal inflammation and attachment loss. Mobility could cause occlusal instability, discomfort or pain during function [12]. A common intention of splinting therapy is to improve the oral comfort of patients affected by severe tooth mobility [11]. The main objective of splinting anterior mandibular teeth is to reduce increased pathological tooth mobility. Mobility resulting from periodontal inflammation and or traumatic occlusion may often be treated by an adequate anti-infective periodontal therapy and by the adjustment of occlusion [13].

The most common indication for periodontal splinting is to improve the prognosis of mobile teeth and patient comfort and provide better control of the occlusion if the anterior teeth are mobile. Periodontal splints that redistribute functional and parafunctional forces achieve stability after periodontal treatment. Numerous types of splints have been described in the literature, such as composite resin based ones used in conjunction with adhesive systems, orthodontic wire, wire-composite or fiber reinforced composite resin [12].

The most common use for fiber reinforcement that has been described in the dental literature has been the splinting of teeth. A splint is “a device that maintains hard and/or soft tissue in a predetermined position”. Teeth are splinted for a variety of reasons, including to replace missing teeth, to retain teeth that have been orthodontically repositioned, to stabilize teeth that have been traumatized, and to stabilize teeth that are periodontally involved and have mobility [14]. Fiber reinforced composite (FRC) is a combination of fiber and resin matrix. The fiber is the reinforcing part, providing stability and stiffness, while the resin matrix is the protecting part, assuring the reinforcement and the possibility to work with the material [15]. The splints that used composite resin and the adhesive system had a similar biomechanical response in the supporting bone at the different load levels. periodontal splints with adhesive systems were more effective in reducing the strain levels, which was significant at higher occlusal load levels [16].

5. Conclusion

Periodontal disease and occlusal trauma are more common in the anterior mandibular region, although the occlusal forces in this region may be lower compared to other regions, the loads may be higher due to the thinner bone. In the case of bone loss, treatment consists of a combination of periodontal therapy, occlusal adjustments and tooth stabilization. Stability is achieved through periodontal splinting, which redistributes functional and parafunctional forces. This supports the tissue reorganization process of the gingiva, periodontal fibers and alveolar bones, and maintains patient comfort. When used prior to surgical periodontal therapy, the periodontal splint promotes tooth stabilization and tissue healing by reducing inflammation. Various techniques have been used to manufacture periodontal splints, such as : fiber reinforced composite in combination with composite resin. Finally patient compliance also plays a very important role in the success of treatment.

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