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Management Of Grade II Tooth Mobility Associated With Chronic Periodontitis Using A Fiber-Reinforced Composite Resin Extracoronal Splint: A Case Report

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Abstract

Chronic periodontitis is defined as an inflammatory condition of the periodontal tissues caused by specific subgingival microorganisms, resulting in the progressive destruction of the periodontal ligament and supporting tissues of the teeth. The primary clinical characteristic of chronic periodontitis is detectable clinical attachment loss, often accompanied by periodontal pocket formation and changes in the density and height of the alveolar bone. This condition may lead to pathological tooth migration, resulting in diastema formation and increased tooth mobility, which can ultimately cause tooth loss. Increased tooth mobility may negatively affect masticatory function, aesthetics, and patient comfort. One of the treatment modalities used to stabilize mobile teeth is splinting. Splinting *combined with occlusal adjustment is intended to reduce and control the progression of tooth mobility. Case Report: A 54-year-old female patient presented to Soelastri Dental Hospital with a chief complaint of mobility of the lower anterior teeth that had been present for approximately six months. The patient reported that the teeth felt loose during mastication, particularly when contacting the maxillary teeth. Intraoral examination revealed Grade 2 tooth mobility in teeth 32, 31, 41, and 42. Bleeding on probing was observed in the mandibular anterior region. Periodontal pocket depths around teeth 32, 31, 41, and 42 ranged from 5 to 6 mm. Radiographic examination demonstrated alveolar bone loss associated with these teeth. Management of this case involved the placement of a fiber-reinforced composite splint extending from teeth 33 to 43. Fiber* splinting *was selected because of its advantages, including high mechanical strength, excellent adhesive properties, biocompatibility, satisfactory esthetics, and ease of clinical application. Evaluation one week after splint placement showed favorable outcomes, with no signs of gingival inflammation or food impaction in the splinted area, as well as satisfactory occlusal relationships.*

Keywords: Chronic Periodontitis, Tooth Mobility, Fiber Reinforced Composite, Extracoronal Splinting.

INTRODUCTION

Chronic periodontitis is described as an inflammatory condition of the periodontal tissue caused primarily by certain microorganisms in the subgingiva, which can cause progressive damage to the periodontal ligaments and dental support tissues, such as the cementum, periodontal ligament, and alveolar bones. This damage is characterized by increased probing depth, gingival recession, and or both. The main clinical feature that distinguishes periodontitis from gingivitis is the presence of a detectable loss of attachment and is often accompanied by the formation of periodontal pockets as well as changes in the density and height of the alveolar bones (Newman et al., 2012). Chronic periodontitis is further classified into local periodontitis and generalized periodontitis based on the involvement of the disease site, which is ≤30% or >30% of the entire area examined (Cho et al., 2016). This condition causes loss of gingival attachment and deepening alveolar bone damage, accompanied by the formation of periodontal pockets, pathological migration of teeth that can cause diastema, as well as increased tooth mobility that ultimately has the potential to lead to tooth loss (Damayanti & Krismariono, 2019).

Physiological tooth mobility occurs as a consequence of the histological characteristics of the periodontal ligament. The level of physiological mobility, both in the horizontal and vertical directions, differs between monoradicular and multiradicular teeth, and is influenced by the width, height, and quality of the periodontal ligaments. Meanwhile, excessive occlusal force and premature contact of the teeth are the main etiological factors that can cause tooth hypermobility (Rahmawati & Lastianny, 2022).

Increased tooth mobility can have a negative impact on the chewing function, aesthetics, and comfort of the patient. Tooth mobility is classified into three degrees, namely degree 1 (wobble slightly exceeds physiological limits), degree 2 (mobility of about 1 mm), and degree 3 (mobility of more than 1 mm in all directions and/or can be moved in the apical direction). Identification and diagnosis of the underlying factors that cause tooth mobility is an important step to support the success of therapy (Ningsih et al., 2024).

In the case of tooth mobility, periodontal therapies such as occlusal adjustment, periodontal orthodontics, and restorative treatments can improve the occlusal relationship and redirect the distribution of force acting on the tooth. These actions play a role in reducing occlusal trauma and improving tooth stability. In addition, periodontal therapy in the form of splinting can increase the support of dental support tissue so as to improve the strength and stability of teeth that are swaying (Damayanti & Krismariono, 2019). The main principle of splinting is to reduce the movement of the teeth in three dimensions. The success of splinting depends on the placement of the center of rotation of the affected teeth within the healthy support tissue. Thus, the teeth will have a better ability to resist movement (Puri et al, 2012).

Splinting is part of the initial therapy in the etiological phase of the periodontal disease treatment plan. In this phase, the steps taken include plaque control which includes motivation, education, and instructions to patients, followed by scalling and root planning, splinting, and occlusal adjustment, as well as providing supportive therapy in the form of antimicrobial agents (Newman et al., 2012).

The classification of splinting based on the type of material used includes bonded composite resin button splint, braided wire splint , fiber reinforced composite splint (e.g. ribbond) (Puri et al, 2012). One type of flexible splinting that is widely used is fiber-reinforced composite (FRC) because it has good aesthetics, is easy to adjust, and has mechanical properties that are quite flexible. FRC splinting is composed of glass or polyethylene fibers reinforced in a resin matrix, providing strength, transparency, and ease of application. However, the use of this material requires good moisture control and careful adhesion techniques, and there is a risk of plaque accumulation if it is not properly formed (Goswami et al, 2026). FRC belongs to the recommended category of extracoronal splinting, so it can be a suitable clinical alternative in the management of cases of degree II shaky due to chronic periodontitis.

RESEARCH METHODS

Study Design

This study was conducted using a descriptive case report design. The report describes the management of Grade II tooth mobility associated with chronic periodontitis using a fiber-reinforced composite resin extracoronal splint in a patient treated at Soelastri Dental Hospital. Clinical findings, treatment procedures, and post-treatment outcomes were documented and evaluated.

Case Subject

The subject of this case report was a 54-year-old female patient who presented to Soelastri Dental Hospital with a chief complaint of mobility of the mandibular anterior teeth for approximately six months. The patient reported discomfort during mastication due to tooth mobility when contacting the maxillary teeth. The patient had no history of systemic diseases such as diabetes mellitus, hypertension, or asthma, but reported an allergy to amoxicillin.

Clinical Examination and Diagnosis

A comprehensive examination was performed, including anamnesis, extraoral examination, intraoral examination, periodontal assessment, and radiographic evaluation. Tooth mobility was assessed clinically using Miller's mobility classification. Periodontal probing depths and bleeding on probing were recorded to determine periodontal status. Panoramic radiographic examination was performed to evaluate alveolar bone loss and supporting periodontal structures. Based on the clinical

and radiographic findings, the patient was diagnosed with chronic periodontitis associated with Grade II mobility of teeth 32, 31, 41, and 42.

Treatment Procedure

Initial periodontal therapy consisted of oral hygiene instruction, dental health education, scaling, and root planing. One week after initial therapy, the mobility of the mandibular anterior teeth persisted; therefore, occlusal adjustment was performed on teeth 31 and 41, followed by extracoronal splinting using a fiber-reinforced composite resin.

The splinting procedure involved measurement of the required fiber length, preparation of grooves on the lingual surfaces of teeth 33–43, prophylaxis using pumice paste, acid etching with 30% phosphoric acid, application of bonding agent, placement of fiber-reinforced material, and coverage with flowable composite resin. Polymerization was performed using a light-curing unit according to the manufacturer's recommendations. Occlusal adjustment and polishing procedures were completed after splint placement.

Outcome Evaluation

Clinical evaluation was performed one week after splint placement. The assessment included patient-reported symptoms, tooth mobility, gingival condition, bleeding on probing, food impaction, occlusal relationship, and masticatory comfort. The treatment outcome was considered successful when tooth mobility decreased, gingival inflammation was absent, no food impaction occurred, and the patient reported improved comfort during mastication.

Ethical Considerations

The patient provided informed consent for treatment and for the use of clinical data, radiographs, and intraoral photographs for scientific publication while maintaining patient confidentiality and anonymity.

RESULTS AND DISCUSSION

Case Report

A 54-year-old female patient came to Soelastri Dental and Oral Hospital with complaints of shaking, lower jaw front teeth about 6 months ago. The rocking teeth have never been treated before. The last patient cleaned tartar 1 year ago. The patient admitted that the teeth felt shaken when used to chew food when in contact with the teeth of the upper jaw. The patient admitted that there was no history of high blood pressure, asthma, and diabetes. The patient had an allergy to the drug amoxicillin and had no history of food or weather allergies. The general condition of the patient is good. On extraoral examination, there were no abnormalities. An intraoral examination was found: teeth 46, 36, and 37 were missing. There is wobble $^{0}2$ in teeth 32, 31, 41, and 42. On the examination of bleeding on probing the gingival bleeding easily in the anterior region of the lower jaw. The periodontal pockets in teeth 32, 31, 41, and 42 average 5-6 mm. Radiographic examination showed damage to alveolar bones in teeth 32, 31, 41, and 42 as shown in Figure 1. The treatment plan in phase I is dental health education (DHE), scaling of the upper jaw and lower jaw. Phase II treatment is 42-32 tooth splinting and occlusal adjustment. Phase IV maintenance is maintenance.

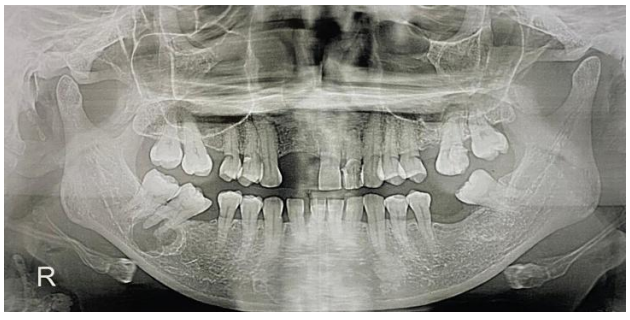

Figure 1. Panoramic X-ray photo showing alveolar bone involvement

Case Management

In the initial stage of treatment, patients are given instructions related to plaque control and oral hygiene, followed by scalling and root planning procedures in all regions as shown in Figure 2. A one-week post-treatment evaluation showed that there was still tooth shaking. As a follow-up, occlusal adjustments were made to teeth 31 and 41. After that, fiber splints are installed on teeth 33-43 to reduce mobility and improve tooth stability.

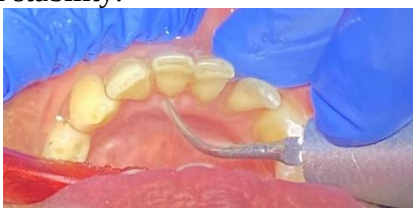

Figure 2. Scalling and root planning actions

The splinting procedure begins with the determination of the teeth to be splinted according to the treatment plan. The length of the work area is measured to determine the length of fiber required using dental floss as shown in Figure 3, then the fiber is cut according to the measurement results and placed the fiber on a glass plate. The lingual surface of the teeth to be splinted is prepared by making grooves following the curve of the lingual surface using bur polishing as shown in Figure 4. Next, dental deposits are cleaned in the tooth area to be treated using paste and pumice which are applied using brushes and handpieces as shown in Figure 5. The work area is rinsed with water and dried.

Figure 3. Measurement of fiber length with dental floss

Figure 4. Creation of splinting work area grooves on lingual surfaces

Figure 5. Oral prophylaxis with pasta and pumice

The surface of the teeth to be splinted is applied with etching material (30% phosphoric acid) as in 30 seconds, rinsed with water, and dried the work area and insulated with a cotton roll as in Figure 6. After that, the bonding material is applied to the work area using a disposable micro applicator brush and irradiated using light cure for 10–20 seconds as shown in Figure 7. Apply bonding material to the fiber placed on the glass plate as shown in Figure 8.

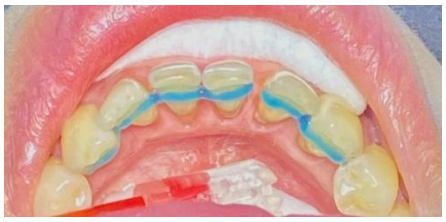

Figure 6. Application of etching material (phosphoric acid 30%)

Figure 7. Application of bonding materials

Figure 8. Applying bonding materials to fibers

The flowable composite resin is then applied to the prepared area, followed by fiber laying and irradiation using light cure for 10–20 seconds. Next, flowable composite resin is again applied to coat the fibers and irradiated until it hardens as shown in Figure 9. Once the procedure is complete, occlusion adjustments and polishing are performed using a fine bur to produce a smooth composite surface and minimize food retention.

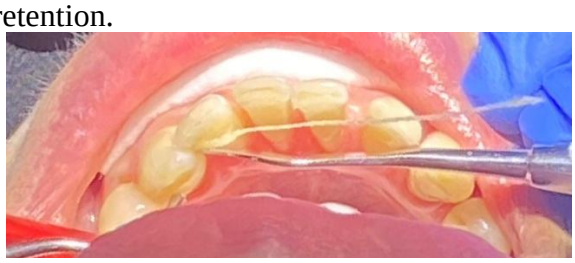

Figure 9. Applications of flowable composite resins as well as fiber laying

The patient is then given post-treatment instructions not to eat and drink 1 hour after treatment, avoid consuming hard and sticky foods, and brush teeth 2 times a day after breakfast and before going to bed paying attention to the interdental area to avoid food impaction. The patient is also scheduled for an evaluation visit one week after the procedure.

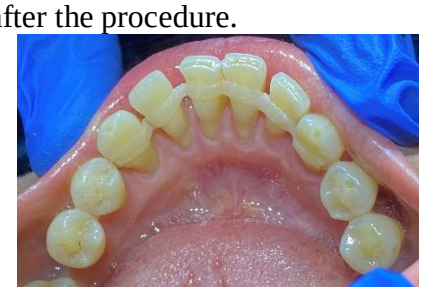

Figure 10. Control 1 week after splinting installation

Evaluation at the one-week post-splinting visit showed no subjective complaints from the patient as shown in Figure 10. Clinically, tooth mobility is significantly reduced, there is no gingival bleeding when brushing, and there is no clogging of teeth during mastication movements. Patients also reported increased comfort during mastication function. Intraoral examination showed gingival condition on the labial surface of teeth 32–42 without signs of edema.

Discussion

Periodontal disease is a condition that arises due to the complex interaction between microorganisms in dental plaque and the response of vulnerable hosts. The inflammatory response that occurs results in damage to periodontal tissue in the form of disorganization of periodontal fibers, resorption of alveolar bones, and loss of epithelial attachment (Sonnenschein et al., 2022). Loss of periodontal support can lead to increased tooth mobility, shifting tooth position, and occlusal trauma, which ultimately hinders the process of bone remodeling and periodontal fiber reorganization necessary to maintain the stability of the tooth's supporting tissue (Damayanti & Krismariono, 2019).

Tooth mobility is one of the clinical manifestations of periodontal disease that occurs due to the loss of attachment to the dental supporting tissue and the presence of vertical damage to the alveolar bone (Gani et al., 2017). Increased degree of dental mobility can negatively impact the patient's mastication function, aesthetics, and comfort. Therefore, clinical management of teeth with periodontal disease accompanied by heavy mobility is still a challenge for dental practitioners.

One of the management to stabilize tooth wobbling is splinting. Splinting along with occlusal adjustment is an action aimed at reducing and controlling the progressive development of tooth mobility (Astuti, 2015). Splinting is indicated to improve mastication function and patient comfort, stabilize teeth with progressive mobility that do not show adequate improvement after periodontal treatment and occlusal adjustment, and prevent tipping, drifting, and supra-eruption in teeth that lose contact with the antagonistic teeth. In certain cases, splinting is performed to maintain tooth stability after orthodontic treatment, create adequate occlusal stability in the rehabilitation of missing teeth, as well as stabilize teeth that have suffered acute trauma (Kathariya et al., 2016).

Contraindications to the use of splints include conditions when occlusal stability and optimal periodontal health cannot be achieved. In addition, splinting is not recommended in patients with poor oral hygiene, insufficient number of supporting teeth, presence of occlusal interference, high caries activity, and poor periodontal prognosis. Crowding conditions and dental malposition can also be contraindications as they have the potential to reduce the success and effectiveness of splinting treatment (Kathariya et al., 2016).

A comprehensive anamnesis, supported by intraoral and radiographic examinations, plays an important role in establishing the diagnosis as well as determining the main cause of tooth mobility. In this case report, the patient was diagnosed with chronic periodontitis. The enforcement of an accurate and comprehensive diagnosis is essential to determine the proper treatment plan and management in patients with dental mobility. In this case report, the management of dental mobility with extracoronal splinting techniques.

Extracoronal splinting is the simplest way to connect several teeth to each other with the classic bonding method. Extracoronal splinting can be made using a variety of materials, including stainless steel wire, fiber-reinforced composite, conventional composite resin, and cast splint(Puri et al, 2012). In this case report, the selection of splinting materials uses fiber-reinforced composite.

Fiber splint is one of the effective treatment options in stabilizing teeth that are moving. The use of this material is supported by the characteristics of fiber-reinforced composite resins, namely having high mechanical strength, good adhesion ability, biocompatible properties, adequate aesthetic value, and ease in clinical applications. An additional advantage of this material is its ability to form chemical bonds with the resin structure, thereby improving its integrity and restoration strength (Kathariya et al., 2016).

In this case, the evaluation is carried out one week after the installation of the splint. The results of the anamnesis showed that the patient did not experience any post-treatment complaints. Clinical examination showed no signs of inflammation of the gingiva or food impaction in the splinting area, as well as good occlusal connection. Patients are then instructed to maintain oral hygiene with the use of dental floss and microbrushes, avoid consuming foods and drinks containing dyestuffs, and undergo periodic check-ups every 6 months.

CONCLUSIONS

Treatment of periodontal disease with alveolar bone loss requires a multidisciplinary approach that includes a combination of periodontal therapy, occlusal adjustment, and tooth stabilization. Tooth stability can be achieved through the act of periodontal splinting which functions to redistribute functional and parafunctional forces. This supports the process of reorganization of gingival tissue, periodontal fibers, and alveolar bones, and helps maintain patient comfort. Various techniques have been developed for the manufacture of periodontal splints, one of which is the use of fiber-reinforced composite combined with composite resin. In addition, patient compliance also plays a very important role in determining the success of treatment.

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