



Research article

Intracoronar Splinting as an Initial Treatment for Patients with Tooth Mobility: A Case Report

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Background: Tooth mobility is a problem that often results in tooth loss due to disease or injury to the gingiva or bone that supports the teeth. Tooth mobility is one of the clinical features of periodontal disease caused by alveolar bone destruction, occlusion trauma and the expansion of inflammation from the gingiva to the deeper supporting tissues. One of the treatments for stabilizing tooth mobility is splinting. Various types of splints can be used as an initial therapy for the treatment of periodontal disease so that the teeth become more stable for further treatments.

Objective: To describe the correction of tooth mobility with splint.

Case Report: A 64-year-old patient presented to the periodontics clinic of Dental and Oral Hospitals Gadjah Mada University (RSGM UGM) with complaints of inferior front teeth mobility. The patient had a history of controlled diabetes mellitus. The management of this case was done by an initial treatment of scaling root planning (SRP) and intracoronar splint.

Results: The four-week control showed more stable teeth and further treatment was possible.

Conclusion: The periodontal splint can be used as an initial treatment for patients with periodontal disease because the mobile tooth is supported by another tooth, thereby increasing comfort during mastication.

Keywords: tooth mobility, diabetes mellitus, splint, intracoronar splint

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1. Introduction

Diabetes Mellitus (DM) is a metabolic disorder characterized by an increase in blood glucose levels (hyperglycemia) due to disturbances in insulin secretion and insulin action. Diabetes mellitus is characterized by blood glucose levels (blood sugar) exceeding normal values, namely blood sugar levels at the same time or more than 200 mg/dl, and fasting blood sugar levels above or equal to 126 mg/dl [1]. Diabetes Mellitus is one of the predisposing factors for periodontal tissue damage. The destruction of the



periodontal tissue makes the gums no longer attached to the teeth, the bones become damaged, and over time the teeth become loose [2].

Mobility of the teeth can be physiological or pathological [3]. The occurrence of increased tooth mobility can be caused by many factors. Tooth mobility is caused by damage to the bone that supports the teeth, trauma from occlusion, and the extension of inflammation from the gingiva to the deeper supporting tissues and the pathological process of the jaws often occurs in patients with trauma due to occlusion with chronic periodontitis [4]. Tooth mobility is classified into three degrees. Grade 1 is swaying slightly greater than normal. Grade 2 is about 1 mm mobility, and grade 3 is mobility > 1 mm in all directions and/or the tooth can be pressed apically [3].

Treatment for cases of tooth mobility (tooth mobility) must be carried out properly, proper diagnosis of the factors causing the occurrence of tooth mobility is needed for successful treatment [5]. There are various forms of treatment that can be used to treat dental mobility problems. For cases of tooth mobility caused by inflammation, it can be done to exclude inflammatory factors such as scaling and root planing, use of local and systemic drugs and surgical therapy [5,6].

One of the treatments for stabilizing tooth mobility is splinting. Splinting is indicated in the presence of immobile teeth with severe bone damage [6]. The main indication for the use of splints in controlling mobility is immobilization of unsteadiness which causes patient discomfort and stabilizes teeth at increasing levels of mobility [2]. The splint can be fixed or removable, which can be placed extracoronal or intracoronal. An intracoronal splint is an example of a temporary splint. Intracoronal splinting can also be used as a semi-permanent splint. Intracoronal splinting can be used for both posterior and anterior teeth [6].

This case report aims to describe the correction of tooth mobility with intracoronal splint before getting corrective treatments.

2. Case

A 64-year-old patient came to the periodontics clinic of Dental and Oral Hospitals Gadjah Mada University (RSGM UGM), with complaints of mobility inferior front teeth. The patient has a history of controlled diabetes mellitus. Extraoral

examination revealed no abnormalities. Intraoral examination revealed asymmetrical and reddish gingival margins, looks shiny, swelling in almost the entire region and no gingival pocket. There was bleeding on probing positive (+) on teeth 23, 33, 34, 42, 43, 44, 45, 47 and gingival recession on teeth 35, 34, 33, 32, 31, 41, 42, 43, 44, 45,

47. There were 3-7mm deep periodontal pockets in almost all teeth. Dental hygiene index (OHI) was good with minimal plaque and calculus index.

Gingival index examination showed 0.58 (mild gingivitis). From the OPG radiographic examination, it was seen that there was a general decrease in the alveolar bone in almost all regions. HbA1c as a support to the results <7. The patient did not have any abnormalities of the temporomandibular joint. There was traumatic occlusion on teeth 32, 31, 41, 42. The patient did not use dentures. On clinical examination, there was grade 2 mobility on teeth 33, 32, 31, 41, 42, 43. This condition is diagnosed as chronic periodontitis et cause plaque and calculus with diabetes mellitus.

Based on the patient's complaints and the clinical examination that has been carried out. In this case the initial treatment is scaling root planing for removing plaque and calculus, occlusal adjustment on teeth 32, 31, 41, 42 for traumatic

occlusion, and intracoronal splinting with fiber composite on teeth 34, 33, 32, 31, 41, 42, 43, 44 for tooth mobility. The procedure has been informed and explained to the patient, and the patient agrees with all the treatment plans that will be carried out and the patient has signed an informed consent as a sign of approval for the treatments.



Figure 1: OPG radiographic examination.



Figure 2: the front of clinical view.

3. Treatment

The initial treatment was carried out. Scaling root planing for removing plaque and calculus even though OHI in good condition, Plaque Control Record (PCR) = 9.6% and Gingival Index (GI) = 0.52 (mild). Then, occlusal adjustment on teeth 32, 31, 41, 42 for traumatic occlusion. After that, intracoronal splinting with fiber composite on teeth 34, 33, 32, 31, 41, 42, 43, 44 for tooth mobility was carried out.

Splinting treatment starts from making a 1 mm deep cavity with a round bur on the occlusal side of teeth 35, 34, 45, 44 and the lingual side of teeth 33, 32, 31, 41,

42. Measure the fiber according to the length of the tooth to be splinted, by placing dental floss on the surface along work area. Apply etching gel along the work area, let stand 15 seconds, rinse with water. Then dry the work area and isolate it with a cotton roll. Apply a bonding agent on the work area and on the fiber pieces on the glass plate. Shine the bonding agent on the work area with lightcure for 20 seconds. Apply a thin layer of flowable composite to the occlusal and lingual cavity. Place the fiber on top of the flowable composite layer and press with plastic filling instrument until it sticks to the cavity well. Shine the fiber with lightcure gradually on each tooth. limit the light with a cement spatel pressed into the interdental. Covering the fiber with packable composite, and then shine with lighcure. Polishing the work area until it is neat. We have to make sure the patient is comfortable with his splinting when masticating. After initial treatment, the patient was given education: maintain oral hygiene by brushing the teeth regularly, use an interdental brush to clean interdental area, avoid biting hard food, and also have to check up with internal specialist for diabetes mellitus.



Figure 3: making a 1 mm deep cavity with a round bur on the occlusal side of teeth 35, 34, 45, 44 and the lingual side of teeth 33, 32, 31, 41, 42.

The patient returned for a 1 week control, the patient did not any complain. After the examination, the results of OHI: 2,1 (good), GI; 0,5 (mild), and PCR: 9,4%. The

splinted teeth were in good condition, there were no sharp or rough edges, the tongue was not injured, and there was no traumatic occlusion. After everything was in good condition, especially the mobile teeth were stable, the patient was planned for Open Flap Debridement (OFD) and bone grafting.

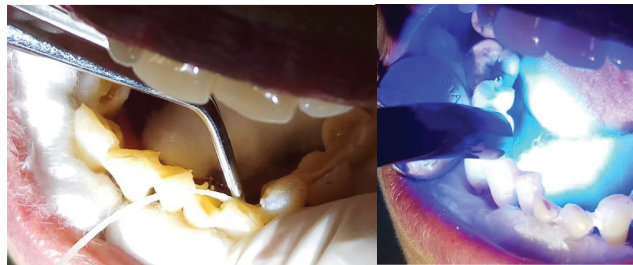


Figure 4: The fiber on top of the flowable composite layer and press with plastic filling instrument; and shine the fiber with lightcure gradually on each tooth.



Figure 5: intracoronal splint with fiber-composite and after 1 week control.

4. Discussion

Mobility is defined as the degree of looseness of the tooth. Tooth mobility is usually a continuation of the problem of periodontitis. There are two types of tooth mobility. First, physiologic tooth mobility. This type refers to a moderate force exerted on the crown of tooth surrounded by a healthy & intact periodontium & tooth will show tipping movement until a closer contact has been established between root & marginal bony tissue. Second, pathologic tooth mobility. This type Mobility beyond the physiologic range is termed abnormal or pathologic tooth mobility. It is pathologic in that it exceeds the limits of normal mobility values [2,4].

Tooth Mobility Indices [4]:

1. Miller's Index 1950

- a. Score 0-no detectable mobility

- b. Score 1-distinguishable tooth mobility
- c. Score 3-movement of more than 1mm in any direction

2. Glickman's/Carranza Index

- a. Grade 0-normal tooth mobility
- b. Grade 1-slightly more than normal
- c. Grade 2-moderately more than normal
- d. Grade 3-severe mobility faciolingually & mesiodistally combined with the vertical displacement

1. Grace and Smales Index

- a. Grade 1-mobility <1mm buccolingually
- b. Grade 2-mobility 1-2mm buccolingually
- c. Grade 3-mobility >2mm buccolingually and or vertical tooth mobility

Tooth mobility if not treated will cause severe conditions such as the tooth will be separated from the socket. If it is detached from the socket, it will cause tooth loss where tooth loss will make the masticatory function lose [7]. In addition, it will affect the condition of the surrounding teeth. Local and systemic factors can contribute to tooth mobility, some of the factors that cause tooth mobility are as follows [8]:

Diabetes mellitus (DM) is a metabolic disorder characterized by an increase in blood glucose levels (hyperglycemia) due to disturbances in insulin secretion and insulin action. Diabetes mellitus is characterized by blood glucose levels (blood sugar) exceeding normal values, namely blood sugar levels at the same time or more than 200 mg/dl, and fasting blood sugar levels above or equal to 126 mg/dl [1]. Diabetes Mellitus is one of the predisposing factors for periodontal tissue damage. The destruction of the periodontal tissue makes the gums no longer attached to the teeth, the bones become damaged, and over time the teeth become loose. The prevalence of periodontal disease in patients with poorly controlled diabetes is worse than that of well-controlled diabetes [2]. Some teeth may remain immobile due to a decrease in the height of the alveolar bone. The treatments for mobile teeth are occlusal adjustment, splinting, and regenerative adjustment [4]. The most frequent example is mobility due to decreased periodontal attachment that persists after the teeth are treated in periodontitis cases so that needs splinting treatments [10].

TABLE 1: Etiology of mobility grading – local factors.

Grade	Etiology of mobility	Reason
EL1	Gingival marginal inflammation	The gingival fibers will be disrupted, which in turn results in increased tooth mobility
EL2	Periodontitis	When the components of the periodontium becomes inflamed, there is disruption of the tooth-alveolar bone anchorage system and the tooth will become mobile and in some cases, involvement of the pulp will result in endo-perio lesions contributing to depressibility of the tooth also
EL3	Primary TFO	Injury to the tissues of the periodontium results from excessive occlusal forces that exceed the adaptive capacity of the normal periodontium and this causes excessive tooth mobility
EL4	Secondary trauma from occlusion	Injury to the tissues of the periodontium results from normal or excessive occlusal forces that act on a compromised periodontium and this, in turn, will result in excessive tooth mobility
EL5	Periapical pathology	A periapical abscess or a periodontal abscess or any pathology which causes inflammatory changes in the periodontal ligament will disrupt the anchoring fibers of the periodontal ligament resulting in tooth mobility
EL6	Pathology of jaw	Cysts, tumors, and other pathologies of the jaw, when situated very close to the tooth, can cause tooth mobility
EL7	Parafunctional habits like bruxism	Parafunctional habits like bruxism causes injury to the periodontium resulting in tooth mobility
EL8	Occlusal prematurities	Occlusal prematurities between occluding teeth can injure the periodontium resulting in tooth mobility
EL9	Traumatic injury to the tooth	
EL10	Hypofunction due to missing adjacent and opposing teeth, pulpitis resulting in unilateral chewing, open-bite relationship, etc.	Hypofunction might result in disuse atrophy of the periodontal ligament. There is a thinning of the periodontal ligament
EL11	Postperiodontal surgery	It has been observed that tooth mobility often increases following periodontal surgery
EL12	Tooth morphology	Single-rooted teeth with short, tapering roots are more prone toward mobility
EL13	Impacted tooth	Impacted tooth impinging on roots of erupted tooth resulting in root resorption

TFO: Trauma from occlusion

Indications for splint treatment is to protect mobile teeth and to promote healing, distribute occlusal forces to the teeth which lost periodontal support and not traumatized, prevent extrusion of unopposed teeth, facilitate effective prophylaxis and surgical procedures, preserve normal masticatory function, prevent occlusal forces, stabilize

TABLE 2: Etiology of mobility grading – systemic factors.

Grade	Etiology of mobility	Reason
ES1	Sex and race	Females and individuals belonging to the dark skinned race have been found to have increased tooth mobility ⁽²⁾
ES2	Menstrual cycle	Gingival responses are enhanced during the menstrual cycle resulting in increased mobility ⁽⁴⁾
ES3	Use of oral contraceptive pills	The alteration in hormonal levels makes the periodontium more susceptible to inflammatory changes resulting in increased tooth mobility
ES4	Pregnancy	During pregnancy, there is an increase in tooth mobility due to alteration in the periodontal ligament and not due to changes on alveolar bone ⁽³⁾
ES5	Systemic diseases	Diabetes, Papillon-Lefevre syndrome, Chediak-Higashi syndrome, Down's syndrome, hypophosphatasia, acute leukemia, Paget's disease, etc., are all associated with increased tooth mobility

teeth after trauma, subluxation and avulsion, and stabilize teeth after orthodontic movements. Contraindications of splinting is severe tooth mobility, insufficient number of firm teeth, patient with very poor oral hygiene, a tooth on which occlusal trauma has been reduced, and teeth with severe inflammation and pathology. The advantages of splinting are alveolus remodeling of alveolar bone and periodontal ligament for orthodontically moved tooth or teeth, provides healing of supporting structures, fine stability and comfort for patient will be provided, facilitates surgical procedures by keeping the tooth immobile and distributes occlusal forces on a wide area [6].

Splint is any device which joins two or more teeth in order to provide support and to reduce mobility. Splint is an appliance used for maintaining or stabilizing or immobilizing mobile teeth in their functional and physiological positions. Splinting is indicated in the presence of immobile teeth with severe bone damage [6]. The main indication for the use of splints in controlling mobility is immobilization of unsteadiness which causes patient discomfort and stabilizes teeth at increasing levels of mobility [2]. Splint can be classified into 2; Temporary splint is a splint which exist only for a limited period of time-not a permanent splint and Provisional splint is provisional splint can be fabricated for the present situation which can be changed later may or may not to a permanent splint [6].

Goldman, Cohen & Checker Classification Temporary splints :

1. Extra-coronal type
 - (a) Wire ligation
 - (b) Orthodontic bands



- (c) Removable acrylic appliances
 - (d) Removable cast appliances
 - (e) Ultraviolet-light-polymerizing bonding materials
2. Intra coronal type
- (a) Wire & acrylic
 - (b) Wire & amalgam
 - (c) Wire, amalgam & acrylic
 - (d) Cast chrome- cobalt alloy bars with acrylic, or both
3. Provisional splint
- (a) All acrylic
 - (b) Adapted metal band and acrylic

Ross, Weisgold and Wright Classification :

1. Temporary stabilization
- (a) Removable extra coronal splints
 - (b) Fixed extra coronal splints
 - (c) Intra-coronal splints
 - (d) Etched metal resin-bonded splints
2. Provisional stabilization
- (a) Acrylic splints
 - (b) Metal-band-and-acrylic splints
3. Long term stabilization
- (a) Removable splints
 - (b) Fixed splints
 - (c) Combination removable and fixed splints

An intracoronal splint is an example of a temporary splint. Intracoronal splinting can also be used as a semi-permanent splint [2,12]. Intracoronal splints can be used for both posterior and anterior teeth. Intracoronal splints can also be performed in



Figure 6: Resin Bonded Splint and Intracoronal splint.

cases of advanced periodontitis exacerbated by secondary occlusion trauma, where complex and expensive restorative approaches are not possible for the patient (eg due to finances or the patient's health) [12]. Splinting Intracoronal provides comfort during chewing, helps stabilize teeth, prolongs the durability of these teeth in the oral cavity, is more aesthetically pleasing, and fixes teeth before permanent splinting or regenerative procedures are applied. Intracoronal splints are also able to distribute the load evenly throughout the tooth thereby reducing occlusion trauma and helping to stabilize the tooth during the surgical process and postoperative healing [12].

Failure of splint treatment can cause various conditions of loose teeth that can lead to various clinical problems such as caries, traumatic occlusion, and the development of periodontal problems which can be more severe [2,10]. In this case the patient used fiber splinting treatment where the fiber material has evaluation from several studies that it has properties that can stabilize teeth and has clinical success because it increases flexural strength and also increases the flexural modulus of the composite resin [11]. In the study, all splinting treatments using fiber material were successful within 1 year [10]. The success of the application of splinting treatment itself can be seen from the existing periodontal tissue and the mobility of the tooth itself [11]. Although splinting treatment has been carried out, this treatment does not allow eliminating the cause of the wobbly teeth because even though the teeth have been removed, the shakiness of the teeth can still be felt. Tooth mobility is considered important to determine the prognosis of a recommended treatment, namely splinting to stabilize teeth. Therefore, further action or regenerative action is still needed [2,4,6].

5. Conclusion

Tooth mobility is a common problem. This case of mobile teeth can be caused by periodontitis which causes loss of bone attachment. This condition can be exacerbated

by the presence of systemic diseases, one of which is diabetes mellitus. Treatment that can be done to stabilize mobile teeth is splinting. There are many types of splints, one of which is the intracoronal splint. This type is more comfortable for the patient and easy application for the operator.

Splinting treatment should be used as initial treatment so that the dental condition does not get worse and the patient can feel more comfortable. Patients are

still given education to maintain dental and oral health. Splinting is a treatment that stabilizes the teeth but does not eliminate the tooth loss factor. Although splinting treatment has been carried out, this treatment does not allow eliminating the cause of the mobile teeth because even though the teeth have been removed, the mobility of the teeth can still be felt. Therefore, further action or regenerative treatment such as bone graft is needed.

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