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Combination Treatment of Splinting with Wire Composite and Artificial Tooth Pontic for Improved Aesthetics: A Case Report

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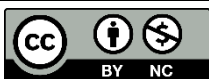
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Abstract

Advanced bone loss in patients with periodontitis often leads to increased tooth mobility, sometimes resulting in tooth loss. The mobility of teeth necessitates splinting to optimize periodontal treatment outcomes in terms of aesthetics and periodontal health. This case report presents a novel approach using an artificial tooth pontic as a periodontal splint, utilizing wire stabilization to prevent severe tooth mobility and enhance esthetics. A 37-year-old male with aggressive periodontitis (Stage III, Grade C) exhibited extensive periodontal destruction, particularly in the upper and lower anterior regions. Pathological migration was evident following the loss of teeth 31 and 41, with additional anterior teeth in the lower jaw showing mobility and trauma from occlusion, notably tooth 33. The patient underwent nonsurgical periodontal therapy, including scaling, subgingival debridement, occlusal adjustment, and splinting. Stabilization was achieved by applying a wire splint from teeth 34 to 43, incorporating an artificial tooth pontic. Subsequent evaluations revealed improvements in clinical parameters such as probing pocket depth, tooth mobility, and bleeding on probing during supportive periodontal therapy visits. The splint remained stable, and the patient expressed satisfaction with their appearance remaining unaffected. This case demonstrates that severe tooth mobility can be effectively stabilized using a composite wire splint and an artificial tooth pontic, enhancing the patient's esthetic outcomes.



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1. Introduction

Periodontitis treatment aims to prevent further disease progression, minimize disease symptoms and perception of disease, help tissue healing, and support patients in maintaining a healthy periodontium [1]. According to the American Academy of Periodontology (AAP), which prioritizes minimally invasive and cost-effective periodontal treatment, this is usually done through non-surgical periodontal treatment. The treatments in non-surgical periodontal treatment include plaque control instructions, mechanical debridement, occlusal adjustment, and local and systemic pharmacotherapy [2-4].

Advanced periodontal disease is characterized by severe bone loss. This condition is one of the undesirable effects of periodontal disease [5-7]. Loose teeth may impact masticatory function and phonetics, reducing patient comfort [6]. In such cases, loose teeth can be stabilized with splinting, and additional prosthetic treatment is needed to replace missing teeth [7, 8]. Generally, loose anterior teeth due to periodontal disease show spacing and extrusion, giving rise to functional and aesthetic problems. Hirschfeld, in 1950, was the first writer in modern periodontics to recommend splinting teeth with periodontal disease using wire or silk [9].

Splinting treatment is a tool used to immobilize an injured or diseased part. Meanwhile, periodontal splinting is a tool used to stabilize or immobilize teeth that are loose due to an injury or periodontal disease. Splinting also provides a good relationship between occlusal force and periodontal tissue by distributing occlusal force evenly throughout the teeth to prevent further damage due to mobility [3, 10, 11]. The main indication for splinting is the immobilization of loose teeth, which causes patient discomfort and prevents an increase in tooth mobility [8].

Splinting treatment options can also prevent pathological migration, maintain teeth in position, facilitate mechanical debridement treatment, periodontal surgery in cases of loose teeth degree 2 to 3, and reduce the risk of traumatic occlusion [6, 12]. Splinting is performed in non-surgical periodontal therapy in a sequence of periodontal disease treatment [3, 12]. The clinical features of occlusive trauma include progressive tooth mobility, fremitus, occlusal discrepancy, tooth wear, tooth migration, tooth fracture, thermal sensitivity, root resorption, and widening of periodontal ligament space on radiographs [13].

Anterior teeth with a hopeless prognosis will cause aesthetic and mechanical function problems as well as psychological disorders in the patient [14]. Immediate replacements of missing anterior teeth prevent psychological and social trauma for the patient [8]. Artificial teeth in splinting procedures can be used for pontics as temporary restorations for prostheses [15]. As reported, Augustie et al. and Vasques et al. utilized the patient's natural teeth to replace those lost to periodontal disease through avulsion. These teeth were transformed into pontics and reinforced with fiber resin. Conversely, in the case detailed by Muhamad and Azzaldeen, a mandibular left central incisor absence was addressed by replacing it with an acrylic tooth pontic reinforced with fiber composite [15]. This is very suitable for patients who request immediate replacement of hopeless teeth in the aesthetic area [16, 17].

For patients undergoing splinting treatment, meticulous plaque control and regular dental visits are imperative to maintain healthy periodontal tissues [12]. This case report aims to outline the management of a patient with generalized aggressive periodontitis (Stage III, Grade C) requiring prosthetic intervention. An interdisciplinary approach combines non-surgical periodontal therapy, prosthetic treatment, and ongoing supportive periodontal care to achieve optimal outcomes.



Figure 1. a) Condition of the teeth before treatment, visible extrusion of teeth 12 and 33; b) There is an edentulous space in lower anterior teeth.

2. Cases

A 37-year-old male patient visited the Periodontics clinic at the Oral Dental Hospital, Faculty of Dentistry, Universitas Sumatera Utara (USU). The patient complained that his lower front teeth were loose, and his gums often bled. The patient wanted his teeth tied with wire because it had been recommended at the health facility he had previously visited. Based on the history, the patient admitted that his lower front teeth had been lost approximately one year ago. Extra oral examination showed no abnormalities. Intra-oral examination showed teeth 33, 32, 42, 43, and 44 probing pocket depth 4-8 mm, clinical attachment loss 4-11 mm, teeth 41 and 31 were missing. Pathological migration occurs in teeth 32 and 42 with grade 2 mobility, while tooth 33 has degree 3 mobility (Figure 1).

Radiographic examination showed that teeth 32 and 42 had quite a lot of bone resorption up to the apical third on the mesial side, and tooth 33 showed occlusion trauma (Figure 2). Tooth 12 has been extruded with tooth mobility grade 3. The patient's oral hygiene is poor; there is supragingival and subgingival calculus in almost all the teeth.

Patients received initial treatment, and pocket depth improved from 33, 32, 41, and 43 to 2-6 mm, with clinical attachment loss of 2-9 mm. Avulsed teeth 31 and 41 will be replaced with color-matched artificial teeth, A3. Due to pathological migration that occurred between teeth 32 and 42, only one artificial tooth was replaced to cover the space.

After that, a groove is made on the lingual side of the artificial tooth, and a twisted wire is added. Then, it is attached to the composite resin and exposed to a light cure. Pontic uses a modified ridge lap design to maintain good oral hygiene and aesthetics. Tooth 12, which had experienced extrusion and no longer had bone support,



Figure 2. Panoramic radiograph showing alveolar bone loss in the upper and lower jaw.



Figure 3. Clinical picture splinting and use of immediate denture on the upper jaw.

was extracted, and then an immediate denture was placed.

Preparation of tools and materials: 1 set of diagnostic tools, scissors, cutting pliers, needle holder, 0.3 mm wire, artificial teeth, applicator, cotton roll, etching, bonding, flowable composite, light curing. The teeth to be splinted are cleaned. The 0.3 mm wire is adjusted to the lingual part of teeth 34, 33, 32, 42, and 43. The artificial tooth, which is used as a pontic, is made into a groove in the lingual part, and then the twisted wire is attached to the artificial tooth with a resin composite. Isolate the work area by installing a rubber dam, applying 30% phosphoric etching acid, rinsing it with water, bonding it, and irradiating it with a light cure. Then, the flowable composite is applied first to the tooth surface before wire application, followed by wire application and activation of the composite resin using light cure one tooth at a time for 20 seconds. Then, look at the sharp splinting parts and polish them.

Follow up one week after splinting; the patient complained that the splinting had shaken and the patient felt uncomfortable. Then splinting is carried out again using wire using the Essigs method. The major wire, which has been twisted and attached to the artificial tooth, is then looped around teeth 34 to 43. Then, the minor wire is passed into the interdental area. To stabilize the wire, the splinted part of the tooth is etched with 30% phosphoric acid, sit for 30 seconds, and rinse with water.

Dry the work area, then isolate it with a cotton roll. Apply bonding to the labial and lingual parts of the splinted teeth and cure for 10 seconds. Then, observe if there are sharp and uneven parts. Next, the finishing and polishing procedures use fine finishing diamond burs and enhancing and polishing brushes. Check occlusion with articulating paper and avoid traumatic occlusion in the pontic area and other teeth (Figure 3).

Oral hygiene instructions use an interdental brush on the interdental parts of the teeth and under artificial teeth. Then, a control was carried out one month after the splinting procedure. The splinting still functions well, but there is plaque, the teeth are still well fixed, and there is no mobility. The patient was very satisfied with the splinting results and felt more comfortable.

3. Discussions

The results of this case report emphasize that patients with advanced periodontitis, which causes tooth mobility and tooth loss, require periodontal and prosthetic treatment. At regular visits after splinting, it was found that the teeth were comfortable to use for chewing. Loose teeth in cases of advanced periodontal disease require periodontal therapy, occlusal adjustment, and tooth splinting [12]. Splinting procedures can induce a bone remodeling that prevents bone loss [18]. Splinting benefits anterior teeth that show moderate to severe degrees of mobility and do not respond to occlusal adjustment and periodontal treatment [11]. Splinting is recommended for tooth stabilization in conditions of secondary occlusal trauma [11]. Splinting can also be applied before periodontal surgery on loose teeth, especially in cases where the patient's discomfort is very prominent [5, 11]. The contraindications for splinting are mobility due to primary occlusal trauma and the patient being unable to maintain oral hygiene [11]. Splinting has several disadvantages, including faster plaque accumulation in the splinting area, which causes further periodontal damage in periodontitis patients [9].

In addition, the development of caries is a risk that cannot be avoided, so this case requires very good oral hygiene maintenance by the patient [9]. In this case, maintenance procedures are carried out periodically [6]. Various materials have been used for periodontal splints, such as composite resin, wire, and fiber [12, 15]. Based on Muhamad and Azzaldeen's case report, he used Fiber Reinforced Composite (FRC) with artificial dental pontics in periodontitis patients. When regular control of splinted teeth has shown healthy periodontal tissue, the patient is very satisfied with the aesthetic results and functional treatment [15]. However, fiber has the weakness of often exposing the ends of the fiber, so it requires periodic

repair and replacement with new fiber [19]. The splinting carried out using wire is more cost-effective and economical for the patient than fiber [20]. An important thing to consider when choosing the type of splint is the mechanical interaction between the splint material and the teeth [12].

Sonnenschein et al. compared a group that received splinting treatment and FMPS (Full Mouth Plaque Score) with another group that received only FMPS. After 12 months, the teeth that had been splinted showed significant improvements in periodontal parameters [21]. Sonnenschein et al. also investigated the OHRQoL (oral health-related quality of life) of periodontitis patients who experienced mobility in the mandibular anterior teeth. He found a positive impact of non-surgical periodontal treatment on OHRQoL in the group with splinting compared with the group who did not receive splinting treatment [22]. While Graetz, in a retrospective study, stated that splinting did not significantly increase the risk of tooth loss, Splinting teeth shows long-term success. However, periodic repairs are required to maintain splinting [6].

4. Conclusions

The use of artificial teeth as pontics is an excellent and acceptable treatment option for the condition of missing anterior teeth. This treatment choice also reflects the dentist's attention to the patient's compromised aesthetics. Using artificial teeth as pontics attached with wire and composite resin as splinting is a conservative, aesthetic, and cost-effective method for replacing missing anterior teeth.

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