PERIODONTAL SPLINTING – AN ADJUNCT TO NON-SURGICAL PERIODONTAL THERAPY FOR TEETH WITH INCREASED MOBILITY

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ABSTRACT

Introduction: Periodontitis is a chronic inflammatory disease leading to the loss of the supporting apparatus of the tooth, and tooth mobility is a common complication of advanced stages of the disease. Splinting is a therapeutic measure stabilizing mobile teeth and improves function in the patient.

Aim: To present the clinical procedure and therapeutic outcome of splinting of mobile lower incisors in a patient with stage 3, class B periodontitis.

Methods: A case of a 40-year-old patient with pronounced gingival recessions, moderate plaque index, subgingival calculus and mobility of the lower frontal teeth is presented. After initial non-surgical therapy and subgingival curettage, splinting of the lower incisors was performed using Ribbond fibers. The procedure included etching, adhesive preparation, adaptation of the fibers to the contour of the tooth and finishing with composite material, with occlusion check and polishing. Clinical effects were monitored through multiple visits.

Discussion: Splinting with fiber-reinforced composite materials is an effective and aesthetically acceptable method of tooth stabilization in patients with periodontitis. In this case, stabilization of mobile teeth and reduction of subjective symptoms of hypersensitivity after treatment were achieved. The literature confirms that adequately planned and timely splinting can contribute to the improvement of periodontal parameters, bone remodeling and increased oral health quality of life. An individualized approach and estimation of optimal intervention timing are key to achieving stable long-term outcomes.

Keywords: periodontitis, tooth mobility, periodontal splint, Ribbond fibers, non-surgical therapy, tooth stabilization.

Introduction

Periodontitis is a chronic, multifactorial inflammatory disease associated with the accumulation of dental plaque (dental biofilm) and is characterized by progressive damage to the periodontal ligament and alveolar bone [1].

Periodontitis is a significant health problem, with a prevalence of 62% in adults with preserved teeth, while severe forms of the disease affect about 23.6% of the population [2]. Studies show that 30–50% of patients with periodontitis have loose teeth, which significantly affects the quality of life associated with oral health [3].

According to the new classification, periodontitis is classified into 4 stages (stage I-IV) according to the severity and complexity of treatment of the disease and is determined by several factors: loss of clinical attachment, amount and percentage of bone loss, depth of probing, presence and size of bone defects, and involvement of root furcations, tooth mobility and tooth loss due to periodontitis. There are three classes (Class A – low risk, Class B – moderate risk, Class C – high risk of disease progression) and it also includes aspects related to the progression of periodontitis, general health and other risk factors such as smoking and the level of metabolic control of diabetes [2].

According to the World Classification of Periodontal Diseases 2017, teeth with progressive mobility may require the placement of a splint in their therapy [4].

Early splint placement in advanced periodontitis can improve periodontal healing and prolong tooth retention. There are different types of splint materials, categorized according to their purpose, such as wire, fiber-reinforced tape (Ribbond splint), retainers, and welded tapes (metal strips) [5].

Case report

The patient, aged 40, reports to the Clinic for Oral Medicine and Periodontology of the School of Dental Medicine in Sarajevo due to pain in the area of teeth 37 and due to pronounced hypersensitivity of the teeth in the frontal part of the mandible. Anamnestic data indicate a negative medical history but a positive genetic predisposition to periodontitis. The patient denies bad habits.

The general condition of the patient was good, extraoral examination did not reveal any abnormalities.

After determining and measuring periodontal indices and pockets, the patient was determined to maintain a moderate level of hygiene, with a plaque index of 20%. Present subgingival stones in all regions, gingival edema, and generalized bleeding on probing.

All teeth are present except teeth 36, 38, 46, 48 (missing). Gingival recessions are present on all teeth of the lower jaw and their value is from 2 to 5 mm, in the upper jaw recessions are present only on the lateral teeth and from 2 to 3 mm. When probing, the depth of the periodontal pocket (measured by the Williams graduated probe) in the upper jaw is highest in the area of the frontal teeth (from 13 to 23) and is 4-5 mm, on the remaining lateral teeth of the upper jaw the depth is from 2 to 4 mm. By probing the teeth of the lower jaw, the

Figure 1. (a)

Figure 1. (b)

Figure 1. (c)

Figure 1. (d)

Figure 1. (a-d)
Clinical intraoral photographs of the patient

Figure 2.
Orthopantomogram of the patient

depth is from 2 to 3 mm. Clinical examination observed the mobility of individual teeth (42, 31, 32), the mobility of 2 degrees is in question. Intraoral photos of the patient are shown in Figure 1, and the OPG image is shown in Figure 2.

On the OPG scan, we can see the loss of alveolar bone, with dominant horizontal resorption in the upper and lower jaw. On the lateral teeth of the mandible in the area of the premolars and molars, the greatest bone resorption is observed with the presence of infrabone pockets (vertical bone resorption). By clinical examination and analysis of the OPG image, the diagnosis in the patient according to the classification from 1999 is chronic periodontitis, however, according to the new classification of the World Health Organization from 2017, the diagnosis of periodontitis stage 3, B class is made. The therapy plan for this patient includes non-surgical periodontal therapy, subgingival curettage of the tooth 13,12,11,21,22,23. In order to preserve function and prevent further deterioration, periodontal splint is planned to be placed in the therapy as an additional therapeutic measure to non-surgical therapy.

During the first visit, non-surgical periodontal therapy was performed, with the aim of removing supragingival and subgingival stones. After seven days, a check-up was carried out. During the examination, the patient reported tooth hypersensitivity 32, 31 and 41, which was correlated with clinically recorded exposed root surfaces. At the next check-up, a week later, a complete withdrawal of subjective symptoms of hypersensitivity was confirmed.

In the continuation of the therapy, subgingival curettage was performed in the lower jaw, on teeth 33, 32, 31, 41, 42 and 43. During the fourth visit, a splint was placed on the lower frontal teeth with the application of Ribbond fibers.

Sterilized aluminum foil was used as a measure, as it was tightly fitted to the teeth. The measured foil was then used as a template for the Ribbond ribbon. The teeth were coated with 37% phosphoric acid for 15 seconds, after which the acid was washed away. After drying, the surfaces acquired a white matte appearance. Then, a bond was applied to the rinsed and dried surfaces using a microbrush, air-dried and fixed with LED light for 15 seconds, twice (Figure 3).

Figure 3.
Preparation for Ribond splint placement and necessary instruments

Figure 4.
Clinical picture after Ribbond splint placement

The Ribbond tape is carefully held with a special instrument, a thin layer of composite for fixing the Ribbond is applied to the prepared surfaces of the teeth. Holding the Ribbond with metal pliers, it is carefully adapted to the lingual and aproximal surfaces of the teeth by following their contour and anatomy.

The liquid composite was then carefully applied to cover all of the Ribbond fibers and was thoroughly polymerized for 30 seconds per tooth. Finally, occlusion checking, finishing and polishing followed (Figure 4).

Discussion

Tooth mobility is an important characteristic of periodontal disease, which begins as periodontitis progresses and affects the periodontal ligament,

leading to bone loss, tooth mobility, and eventual tooth loss if left untreated. That is why tooth mobility is one of the criteria for assessing the condition of periodontium. It has become an important diagnostic parameter for clinicians to determine the integrity, functional state, and disease of periodontium [3].

The placement of the splint helps to redistribute forces to the stronger teeth, thereby reducing the occlusal load on the periodontium.

It is also noted that splinting stimulates the bone remodeling process to prevent bone tissue loss. It is necessary to take into account the indications and contraindications for the splint placement procedure itself, which will eventually lead to positive clinical and functional outcomes for a longer period of time [5]. In our case report, we made the diagnosis based on clinical parameters and analysis of the family farm image.

Fiber-reinforced composite splint quickly gained popularity as the material of choice for periodontal splint. They allow precise adjustment to the contours of the teeth, making them resistant to damage. They can be glued, repaired, are more aesthetically pleasing and easier and faster to adjust than conventional wire splinters. Periodontal splint is widely accepted and is used as an adjunct treatment for tooth mobility [6]. According to a retrospective study by Sarah K. Sonnenschein et al., the splint durability rate in the lower front teeth was 67% after 10 years. Kumbuloglu et al. also found an extremely high rate of splint persistence in their retrospective follow-up of 19 periodontitis patients who had lower canine-to-canine splinting therapy. After 4.5 years, the splint durability rate was 94.8% [7, 8]. These indicate significant differences in the stability of splints in the mandibular anterior region compared to the posterior region, which was confirmed by both Graetz et al. [6]. Posterior teeth are exposed to greater chewing forces compared to the front teeth, and it can be assumed that this leads to different loads on the splints in individual regions, which is why fractures in the posterior region occur more often [7].

A new classification of periodontal diseases states that teeth with progressive mobility may require splint placement in therapy to improve patient comfort [9]. The latest evidence also points to a trend of additional improvement in oral health quality of life in patients with periodontitis through splinting of mobile incisors as an integral part of periodontal therapy. Retrospective studies, furthermore, show high endurance rates and periodontal stability of spliced teeth during long-term, supportive periodontal therapy [6, 10].

According to the results of research by Sonnenschein et al. (2022), the splinting time of mobile mandibular incisors can significantly affect periodontal outcomes. Early splinting, before the implementation of complete non-surgical periodontal therapy, showed a tendency to better results in terms of periodontal parameters, which can be explained by the reduction of microtrauma and easier maintenance of oral hygiene [9].

On the other hand, splinting after non-surgical periodontal therapy makes it possible to monitor the remission of tooth mobility, which can avoid unnecessary stabilization of the tooth, which emphasizes the importance of an individualized approach in therapy planning. These findings suggest that the decision on the optimal moment of splinting should be based on clinical parameters and the specific condition of the patient, thereby maximizing the therapeutic effect and minimizing unnecessary intervention [9].

The work of Zhang et al. (2021) presents an innovative digital technique for splinting mobile teeth in the lower frontal region in patients with periodontitis. The use of an intraoral scanner and CAD/CAM technology enables the production of a precise and durable splint, which minimizes the risk of improper adhesion and potential mechanical complications. The use of titanium alloy ensures long-term mechanical stability, while the design of the splint does not interfere with oral hygiene or worsen periodontal condition. This digital approach further emphasizes the importance of individualization of therapy and can extend the life of mobile teeth, improve chewing

function, aesthetics and patient comfort, and delay or avoid invasive interventions [[10]. However, the clinical applicability of a digital approach depends on the availability of technology and professional competencies in practices, and long-term research is needed to assess the durability and impact on periodontal health [11].

Of course, there are also some drawbacks to splinting. Access to oral hygiene and plaque control are difficult after splint placement. It has been observed that due to the accumulation of plaque on the margins of the splint, gum irritation and periodontal problems can occur in patients with damaged periodontium. Long-term splinting can cause caries on interproximal surfaces, gingival caries due to the accumulation of food debris, as well as crown loss or fractures of the front teeth. Splinting can also cause phonetic problems [5].

Conclusion

Periodontal splint is an important addition to non-surgical periodontal therapy in teeth with increased mobility, as it stabilizes teeth, reduces microtrauma and improves functional and aesthetic outcomes. The combination of strategic planning of splinting time and the application of digitally precise methods represents a promising direction in modern periodontal therapy, with the aim of preserving mobile teeth and increasing the quality of life of patients.

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Declaration of Interest:

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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