

Effect of Splinting on Periodontal Health- A Review

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Abstract:

Periodontal disease impairs tooth support and permits secondary trauma to occur. As a consequence, teeth may loosen, and the alveolar bone may be subjected to additional damage. One of the common causes of tooth loss is a slow, deteriorating response to periodontitis. Hence the reduction of mobility is an important objective of periodontal therapy. In an effort to reduce the tooth loss due to the weakened periodontium, various treatments have emerged to provide a possible solution. The prognosis of periodontally involved teeth depends often on the initial mobility and whether it can be altered by treatment. One of the methods to retain the mobile, periodontically affected tooth is by splinting. Splinting simply refers to a method of stabilizing and fixing the mobile teeth. However, splinting by itself does not reverse the damages caused to the periodontium but rather it is a method which maintains the periodontal status and helps healing. The aim of this article is to do a literature review the effect of splinting on periodontal health.

Keywords: *splinting, periodontium, effect, weak, tooth.*

Introduction:

Periodontitis is an inflammatory disease of the periodontium which is the supporting structure of the tooth. It is considered as an infectious pathology caused by the interaction between a susceptible host and bacterial factors present in dental plaque. It is a long standing, progressive, advanced disease affecting both the calcified structures namely cementum and alveolar bone and the soft tissue structures which is the gingiva and the periodontal ligament which constitute the periodontium. Periodontitis is characterized by gingival inflammation and loss of connective tissue attachment and alveolar bone. Occlusal forces also play an important role because they may exacerbate a previously existing periodontal

lesion when they exceed the resistance threshold of a compromised attachment apparatus. (Soares et al., 2011) One of the classical symptoms of periodontitis is increased tooth mobility. Tooth mobility is considered as the extent of horizontal and vertical tooth displacement created by examiners force. Assessment of tooth mobility is considered as an integral part of periodontal assessment because it is one of the important signs in the diagnosis of periodontal diseases. (Pereira et al., 2017) Manual evaluation, fremitus, periodontometers and periotest are some of the methods of clinical evaluation of tooth mobility. Treatment of tooth mobility in periodontal disease is determined by the degree of damage to the bone support. For mobility caused by a widened periodontal space as a result of adaptation to

functional demands, the treatment is occlusal adjustments in combination with periodontal therapy. (Rauch et al., 2020)

Tooth mobility is usually graded into Grade 1, 2, and 3 in routine clinical practice using Miller tooth mobility index. It is a simple index and it is commonly used in dental practice because it is based on the treatment of choice for the best outcome and its ability to predict the possible outcome of the disease. The mechanism through which periodontitis cause tooth mobility includes inflammatory disruption of the periodontal tissues, widening of the periodontal ligament, attachment loss, alveolar bone loss, and occlusal trauma. In the case of periodontitis, the occlusal trauma is considered to be secondary occlusal trauma because the tissue destruction occurs in the presence of normal occlusal forces on the mobile tooth due and the problem is the weakened supporting periodontium. (Heo et al., 2020)

Tooth mobility results in occlusal instability, masticatory disturbances, and ultimately leads to impaired quality of life. The continued movement of the mobile tooth during regular oral function further damages the periodontium, accelerating the disease process thereby leading to tooth loss. The initial awareness of tooth mobility in patients may be from tooth tenderness experience on mastication followed by pain on sudden tooth displacement when biting on hard foods or from inadvertent trauma. People experiencing tooth mobility may resort to unilateral mastication and dietary restriction as a method of their coping to this occlusal instability. Maintenance of oral hygiene by daily tooth brushing is also difficult thereby leading to the worsening of oral hygiene status by plaque accumulation (Nyman & Lang, 1994).

Periodontal diseases have remained one of the major causes of tooth loss in Nigeria and globally despite numerous technological advances in prevention and

management of oral diseases. Tooth mobility is one of the terminal presentations of periodontal disease before tooth loss. The adoption of proper and adequate steps in the management of tooth mobility will definitive help in increasing the longevity of the tooth and preventing edentulism. The treatment of tooth mobility involves a combination of treatment of the etiology usually by nonsurgical and surgical periodontal treatment, occlusal adjustment, and splinting. (Azodo & Erhabor, 2016; Nyman & Lang, 1994)

Splinting as an option for treating periodontally compromised teeth:

Treatment of teeth with advanced periodontal disease and severe mobility following bone loss includes a combination of periodontal treatment, occlusal adjustment, stabilization of mobile teeth and eventual extraction of hopeless teeth. Hence, the reduction of tooth mobility is one of the prime objectives of periodontal therapy. The active term of splinting in dentistry is defined as the joining of two or more teeth into a rigid unit by means of fixed or removable restorations or devices. (Luchian et al., 2020)

One of the treatments for tooth mobility is splinting. Splinting in periodontology usually refers to joining together tooth/teeth having mobility. Splinting of teeth is performed for effective distribution of loads in mobile teeth and to lower the stress applied to compromised teeth. The reasons to stabilize periodontally compromised teeth have beneficial action in maintaining or healing the mobility degree of affected teeth, including the decreased patient discomfort, increased occlusal and masticatory function, and improved prognosis of mobile teeth. Splinting can be done either using intra coronal or extra coronal method. The direction of the applied forces to the splinted teeth is beneficially modified by

converting the lateral loads into vertical ones that are less harmful for the tooth supporting splints

However, it must be noted that Splinting teeth to keep the weak teeth for a longer time is only a good plan if no other permanent options are possible. Besides creating a plaque problem, splinting can at times be detrimental to the health of the strong teeth. (Mosedale, 2007)

Selection criteria for splinting of periodontally compromised teeth:

Treatment of tooth mobility in periodontal disease is determined by the degree of damage to the bone support. For mobility caused by a widened periodontal space as a result of adaptation to functional demands, the treatment is occlusal adjustments in combination with periodontal therapy. In teeth affected by gingival inflammation and with higher mobility due to loss of bone tissue, the treatment is a combination of periodontal therapy, occlusal adjustments, and tooth restraints for stability (Graber, 1982)

Increase in mobility because of widened periodontal ligament may be reduced by occlusal adjustment alone by eliminating the occlusal interferences. In cases where occlusal adjustment will not reduce the tooth mobility, reduction of mobility can only be achieved by a splint. Splinting in such situations is only indicated if the mobility disturbs the patient's masticatory function or chewing comfort or aesthetics. If the increased mobility is due to a combination of widened periodontal ligament and reduced periodontal support height (without active periodontal disease), the occlusal adjustment may be sufficient to reduce the mobility to an acceptable degree. (Ramfjord & Ash, 1981)

In a study done by Reza Amid et. Al, it was found that when the mandibular lower anterior teeth were

splinted, the tooth with the best bone support (right and left canine) experienced greater stress after splinting. Prior to splinting of teeth in the anterior mandible, adequate bone support of canine teeth must be ensured to increase the longevity of the system. Splinting of highly mobile teeth to teeth with adequate bone support can increase the stress and compromise biomechanical health (Amid et al., 2018)

Ideal requirements for splinting:

The splint should incorporate as many firm teeth as is necessary to reduce the extra load on individual teeth to a minimum. It should hold the teeth rigid and not impose torsional stresses on any teeth included in the splint. It should extend around the arch so that anteroposterior forces and faciolingual forces are counteracted. It should not interfere with the occlusion. If possible, gross tooth disharmonies should be eliminated before the application of the splint. It should not irritate the pulp. It should not irritate the soft tissues, gingiva, cheeks, lips, or tongue. It should be designed to be comfortable and easy to keep clean for the patient. Interdental embrasure spaces should not be blocked by the splint. It should be readily available, relatively inexpensive, and medically acceptable. Ease of fabrication and maintenance. Capable of removal, insertion and esthetically acceptable. (Grover et al., 2012)

Techniques in splinting:

Different techniques are available for splinting of mobile teeth to their adjacent teeth. They can be classified based on their purpose and duration of use, the location of the splinted teeth in the jaw and the way of fabrication. Splints are classified as metallic, non-metallic, and combination of metallic and non-metallic type on the basis of material. Metallic types are usually made of stainless steel, chrome cobalt, and cast metals, whereas non-metallic types are made of

acrylic and composites. Splints are classified as fixed and removable on the basis of way of fabrication. Splints are classified as extra coronal and intra-coronal on the basis of the location of the splinted teeth in the jaw. Intra-coronal splints are not often recommended since they require tooth preparation and removal of tooth structure. Various materials have been used to create periodontal splints, such as, composite resin in combination with adhesive systems, orthodontic wire, orthodontic wire in combination with composite resin, or pre-impregnated fibre-reinforced composite in combination with composite resin. An important aspect for the selection of a splint type is the mechanical interaction between splinting materials and tooth substrates. The most commonly used method of splinting of teeth with periodontal mobility is the use of extra-coronal splints by use of composite resin along with adhesives, fibre-reinforced composite (FRC) or orthodontic wires along with composite resin. Permanent splints are worn indefinitely and could be fixed or removable. They are intended to increase functional stability and improve aesthetics on a long-term basis. They are usually placed only after completion of periodontal therapy and achievement of occlusal stability. (Liu et al., 2016)

Effect of splinting on periodontium:

Splinting of the teeth will not prevent or retard apical downgrowth of plaque and associated attachment loss. In a study done by Gallers C et. Al, it was found that attachment levels and bone levels were similar in splinted and non-splinted teeth following osseous surgery. (Galler et al., 1979) splinting of tooth helps in redistributing the occlusal forces over a larger area. In a study done by Mandel U and Viidik K, it was found that rigid splinting of luxated teeth did not improve the mechanical properties of the periodontal ligament during healing. (Mandel & Viidik, 1989) Splinting mobile teeth acts as an adjunct to periodontal

treatment and maintenance and hence is recommended. However, selecting the right splint for the right procedure is done based on the discretion of the advantages and disadvantages of each. A splint should be designed in such a way that it attracts the least plaque and calculus, is able to be retained for the specified time, is able to carry out its designated function, and does not interfere with healing and esthetics. (Kegel et al., 1979; Smart, 1979)

Conclusion:

Tooth mobility is a common sequel to periodontitis and trauma from occlusion. Mobility, bone loss and attachment loss associated with trauma from occlusion can be reduced by eliminating trauma. Periodontally compromised teeth with poor prognosis can also be retained for a longer time by using splints, until a more definitive treatment is planned for the patient. Provided all the factors are considered and proper maintenance therapy is recommended, splints are becoming an integral part of periodontal therapy and maintenance. However, it should be noted that splinting itself will not eliminate the cause of tooth mobility. They are only an aid in stabilizing the mobile tooth, and mobility may revert once the splints have been removed. Though it is effective in maintaining the healthy status of the periodontium, splinting has its limitations. It cannot be done in cases which do not permit good plaque control. It must be stable, efficient and easily repaired. Hence, splinting is an essential adjunct in addition to cause-related therapy in the treatment of mobile teeth.

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