

Various Techniques of Permanent Splinting of Teeth in Diseases of Periodontal Tissues and Occlusive Disorders

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Abstract: The article analyzes the use of splinting devices and devices that stabilize occlusion. Constant splinting of teeth in occlusive disorders and diseases of periodontal tissues and the elimination of the inflammatory component in periodontal tissues leads to a decrease in tooth mobility. Progressive inflammation and an increase in tooth mobility or the absence of teeth require the use of orthopedic temporary or permanent splinting structures that stabilize occlusion, followed by prosthetics and splinting of teeth.

Keywords: orthopedic dentistry, dental splinting, dental mobility, periodontal tissue diseases, occlusive disorders, permanent splinting.

Introduction. The indications for splinting teeth are based on an assessment of their mobility, which characterizes the functional state of periodontal tissues. When bone tissue is reduced by half the length of the root, splinting methods should be used in the sagittal and transversal directions. In case of bone loss up to three quarters of the root length, vertical splinting must additionally be used. In all cases of splinting of movable teeth, it is necessary to eliminate the problem or minimize occlusal injury to periodontal tissues by choosing the optimal occlusal scheme and splinting device design. Permanent splints are used to: 1. limit the mobility of teeth in three directions — vertical, sagittal and transversal; 2. create complete or significantly reduced tooth mobility; 3. immobilize teeth for a long period of time. Splinting of movable teeth is largely determined by the clinical picture, namely the localized or generalized clinic of periodontitis, the shape of which dictates the type of stabilization: frontal for anterior teeth, sagittal for lateral teeth, frontosagittal and parasagittal or arched.

Orthopedic indications for the treatment of periodontal diseases are:

1. Active signs of inflammation in the form of focal or generalized periodontitis;
2. The patient notes tooth migration;
3. The mobility of individual teeth or all within the dentition is determined;
4. Food residues remain in the interdental spaces. When determining periodontal inflammation, occlusion correction should be used, since the possibility of tooth displacement after splinting is high enough. Prior to therapeutic treatment, it is only necessary to minimize premature contact on individual teeth or eliminate occlusal obstacles. Progressive inflammation and an increase in tooth mobility or the absence of teeth require the use of orthopedic temporary or permanent splinting structures that stabilize occlusion, followed by prosthetics and splinting of teeth [15]. When determining persistent dental mobility and recurrence of conservative treatment, constant splinting is required, followed by follow-up.

The splint structure must meet certain requirements:

1. Create a sufficiently strong block of splinted teeth, limiting their movement in three directions (sagittal, vertical and transversal) within the field of occlusion;
2. Firmly and rigidly fixed on movable teeth;
3. Food residues should not remain in the interdental spaces;
4. Do not irritate the surrounding periodontal tissues;
5. Do not interfere with the conservative therapy of periodontal tissues;
6. After grinding the occlusal surfaces of the teeth, do not create blocking moments during movements of the lower jaw;
7. Optimize the transmission of mechanical chewing load along the vertical axis of the tooth;
8. Do not disrupt the patient's speech and be acceptable cosmetically.

A permanent splint that fixes teeth with periodontal tissue lesions can be fixed, removable, or combined. The splinting properties of removable solid-cast devices are provided by the Ney type clamp system, the use of various claw-like appendages and occlusal pads that allow for the immobilization of movable teeth in three planes. Removable splints are more in need of cleaning, which makes it possible to carry out conservative periodontal therapy in fairly good conditions. Such tire designs are less likely to disrupt oral hygiene. One of the advantages of using removable splints is the ability to optimize the functional overload of the affected periodontal, especially with dental defects, but without signs of significant pathological mobility. At the clinical stage, the remaining teeth and periodontal tissues are evaluated. The next step is to obtain high-quality silicone casts and cast models from durable gypsum. In the dental laboratory, on a model installed in a parallelometer, the path of application of the denture frame is determined, the types and location of the support and retaining clamps are determined. The metal frame of the denture is cast on the refractory model, which is then processed and stored on the plaster model, polished and transferred to the clinic. The clinic evaluates the quality of the manufacture of the denture, marks the fixation of the support and retaining clamps on the model, and then evaluates it in the oral cavity. Subsequently, a functional impression is obtained from the opposite jaw and the central occlusion is determined. Teeth are placed in the upper and lower jaws in the laboratory. The design of the prostheses is checked at the clinic, and after replacing the wax composition of the prostheses, the prostheses are applied to the tissues of the prosthetic bed with careful alignment of the occlusal contacts. Such solid-cast structures require the need to manufacture them with great precision, which must be ensured by the good quality of impression materials, high-strength gypsum, the use of parallelometry methods to determine the path of application and fixation of the prosthesis and precise casting on refractory models, careful packing of the frame in the laboratory and subsequent in the clinic [14]. Non-removable splints or denture splints provide reliable fixation of splinted teeth, forming a block in one of the planes, or complete stabilization along the arc. With a significant loss of bone tissue, the creation of a block of teeth capable of resisting horizontal and vertical forces developing during chewing is shown. The stiffness of the tire is provided by the material from which it is made. The most optimal splint design for movable teeth is the use of an all-cast metal-ceramic or metal-plastic splint, or a prosthetic splint, which also makes up for defects in the dentition. Solid-cast splints can be used for mild to moderate periodontitis and for bone atrophy of up to 50% in recent years. All-ceramic splints have become quite widespread due to the biological inertia of the ceramic coating, the possibility of minimal injury and the availability of therapeutic measures in the field of marginal periodontitis, and better oral hygiene, since dental plaque forms in a minimal amount on the glazed surface of the denture. The negative properties of solid-cast splints permanently fixed to movable teeth include significant tooth preparation, especially with fan-shaped teeth, as well as the need for depulpation of splinted teeth, which can be included in the splinting unit in the absence of inflammatory changes in the apical periodontal area. It is also very important to take into account the characteristics of the alloys from which future structures will be made. [17], [19], [20], [21]. Intolerance to dental materials can be caused by various reasons: galvanism, allergic reactions to dental materials, toxic damage to the mucous membrane, etc., therefore, strict quality control of the materials used is necessary (to prevent the use of counterfeit products) and additionally a joint analysis of the materials by a dentist and an immunological laboratory. [16], [18], [22]. At the clinical stage, the patient's appearance is assessed, the condition of each tooth, the displacement of the dentition, the type of occlusion and the possibility

of reorganizing the occlusal relationships of the dentition are analyzed. After choosing an orthopedic treatment plan, the remaining teeth are dissected, taking into account future designs of non-removable solid-cast dentures. At the stage of gum retraction, de-epithelialization of the inner surface of the gingival margin is carried out, which allows, after healing of the gingival part, a tight gum coverage in the neck area of each tooth. Using silicone materials, impressions are obtained, the position of the central occlusion is fixed, in which solid-cast frames for the teeth of the upper and lower jaw are prepared. After checking the skeletons in the oral cavity and re-determining the central occlusion in the dental laboratory, a ceramic coating is applied. Then they are transferred to the clinic, where they optimize the position of the solid-cast ceramic frames relative to the gingival margin, the relationship of the dentition rows with each other, taking into account the reorganization of occlusal contacts. With the help of a carbon marker, a subtle reorganization of the dental contacts is carried out in the position of the central occlusion, achieving tight contacts in transversal movements. In case of periodontal tissue diseases complicated by tooth loss, it is necessary to take into account the appearance of an additional functional load on the remaining teeth, which should be splinted with removable, non-removable or combinations of these splints, immobilizing, without overloading, the remaining periodontal teeth. When the lateral teeth are lost, the load on the remaining frontal teeth increases, under the influence of which the incisors and canines fan out, which leads to a decrease in the interclusal height. As a result, there is a risk of functional overload of the temporomandibular joint. Orthopedic treatment for periodontal diseases consists in immobilizing movable teeth, forming a functionally durable block, and prosthetics of defects. Depending on the defects of the dentition, treatment can be carried out using fixed, removable, or a combination of splints and dentures. Introoral scanning has proven itself very well and has recently become widespread in orthopedic dentistry. [3], [4], [5], [6]. Using this method, it is possible to obtain an accurate digital model of the relief of objects in the oral cavity. [8], [10], [12], [13]. After receiving the optical impression, various protective caps, permanent tires and splints are manufactured on CAD/CAM systems. One of the important features of CAD/CAM systems available on the modern market is their versatility in terms of the choice of structural materials [6]. The technological capabilities of the equipment provide not only computer modeling of the model of the future prosthesis, but also the direct execution of the finished product, which provides, in particular, orthopedic dentistry with the necessary resource when creating various structures for permanent splinting, taking into account the personal anatomical and physiological features of the structure of the facial skull. [7], [8], [9]. Patients with partial tooth loss and periodontal tissue diseases should be divided into three groups. The first group includes patients with included dental defects that can be repaired by splinting a solid denture. With significant dental defects and a developed inflammatory periodontal component, a combination of removable and non-removable splint prostheses is possible. The second group includes patients who have lost the teeth of the chewing group on both sides, who are shown splinting the frontal group of teeth and restoring distal defects using non-removable splints on the frontal group and removable structures in the area of the lateral teeth. In such situations, it is necessary to provide a design in which the load from the removable prosthesis would not overload the remaining immobilized frontal teeth [11]. The third group of patients who have lost their teeth includes patients with multiple dental defects. Orthopedic treatment is performed using non-removable, removable and combined splints and prostheses. The treatment plan is determined by the condition of the periodontal tissues of the remaining teeth, the size and topography of the defects, the training of the doctor, the capabilities of the dental laboratory and the patient. At the clinical stage, the position of the teeth is determined in the central occlusion, then in the sagittal and transversal occlusions. After selecting the prosthesis design, teeth are prepared, impressions are obtained, and central occlusion is determined. The dental laboratory manufactures solid-cast frames of non-removable splinting parts of the prosthesis, which are stored in the oral cavity.

Conclusions. Subsequently, taking into account the new relationship of the dentition, a ceramic mass is applied. In the clinic, the prostheses are adjusted during occlusal contacts in the oral cavity. Impressions are obtained for the manufacture of removable dentures in the laboratory. Ready-made prostheses with fixed and removable parts are stored in the oral cavity at a new height of occlusion, taking into account sagittal and transversal movements. The non-removable part of the prosthesis is

glazed and fixed on permanent cement. In subsequent observations, fine grinding of dental contacts in dentures is possible.

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