

Occlusal Splints Therapy: A Review

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Abstract

Despite the voluminous content on this topic, controversies and lack of understanding are still prevailing regarding the proper use of the occlusal splints either for diagnostic purpose or for treatment purpose. The aim of this topic is to provide an insight and detail information regarding the various types, their rationale, functions and proper case selection for the occlusal splint therapy. An extra emphasis has been placed on the importance of recalling the patient after placing the occlusal splint so that the patients may be relieved of their symptoms within short period of time.

Introduction

Occlusion splint therapy is often a challenge for both the dentist and the patient. Occlusion related disorders are often difficult to diagnose, as the symptoms presented by the patients may be variable. Once the cause of occlusal-related disorders is identified, this reversible, noninvasive therapy provides both diagnostic information and relief with the other problems.

Occlusal Splint

"An occlusal splint is a removable appliance covering some or all of the occlusal surfaces of the teeth in either the maxillary or mandibular arches (Fig. 1). The ideal occlusal splint is made from laboratory-processed acrylic resin which should cover the occlusal surfaces of all the teeth in one arch." It is also called as occlusal appliance, inter-occlusal appliance, bite guard and night guard.

"Occlusal splint therapy can be defined as the art and science of establishing neuromuscular harmony in the masticatory system by creating a mechanical disadvantage for parafunctional forces with removable appliance¹".

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Types of Occlusal Splints Available

Many types of occlusal splint have been advocated. They may be full or partial occlusal coverage, maxillary or mandibular, repositioning or stabilizing, and made from a variety of different materials. The types of splints currently employed in occlusal splint therapy include permissive, non permissive, hydrostatic, and soft rubber splints.

Permissive Splints

The permissive splints allow the teeth to glide unhindered over the biting or contact surface² (Fig. 2). When this condition is achieved the neuromuscular reflex that controls the closing of the jaw in maximum inter-cuspal position is lost. Hence these splints are also called as "muscles deprogrammer". Examples of permissive splints are bite planes (anterior deprogrammer, Lucia jig, anterior jig) and stabilization splints (Tanner, centric relation, flat plane, and superior repositioning occlusal splints).

Non Permissive Splints

Non permissive splints do not allow free movements of the mandible on contacting surface. These have ramps or indentations on the occluding surface that help in limiting the movements of the mandible. These are also called as the "directive splints" because these appliances direct the mandible in a specific relationship to the maxilla (Fig. 3). The sole purpose of directive splint is to position or align the condylar-disk assemblies to a more stable position. Examples include an anterior repositioning appliance and a mandibular orthotic repositioning appliance.

Soft Rubber Splint

The soft appliance is a device fabricated of resilient material that is usually adapted to the maxillary teeth (Fig. 4). Soft appliances function by separating the teeth. These appliances have been recommended for the patients who exhibit high levels of clenching and bruxism. But these appliances can exacerbate the bruxism probably due to inability to achieve balanced contact with them³ (usually posterior teeth contact first).

Hydrostatic Splint

Hydrostatic splints are dental splint cushioned with fluid to redistribute occlusal force (Fig. 5). These splints are based on a new application of a basic physical law of nature called Pascal's Law, which states that an enclosed fluid will apply equalized fluid pressure regardless of where pressure is applied to the fluid. In other words, biting down on the hydrostatic appliance causes the fluid to distribute bite forces evenly across the bite, reducing TMJ pressure and pain and ensuring relief. Aqualizer™ is the example of hydrostatic dental splints.

The Rationale for Occlusal Splint

The ideal occlusal splint is made from laboratory-processed acrylic resin which should cover the occlusal surfaces of all the teeth in one arch. It should provide even simultaneous contacts on closure on the retruded axis with all opposing teeth and anterior guidance causing immediate disclusion of the posterior teeth and splint surface out side inter-cuspal position.

The splint provides the patient with an ideal occlusion with posterior stability and anterior guidance. It will disrupt the habitual path of closure into inter-cuspal position by separating the teeth and removing the guiding effect of the cuspal inclines. It causes an immediate and pronounced relaxation in the masticatory muscles, which will eventually result in the mandible repositioning and closing in the retruded position uninterfered with the teeth.

Functions of Occlusal Splints

Guide Condyle-disc Assembly to More Stable Position

The basic function of the occlusal splint is to prevent the existing occlusion from controlling the maxillo-mandibular relationship at maximum inter-cuspal position. A properly balanced splint results in an occlusion associated with relaxed positioning elevator muscles, allowing the articular disc to obtain its antero-superior position over the condylar head¹ (Fig. 6). Splint therapy can utilize centric-relation as a physiologic treatment position. Whenever reorganisation of the occlusion is required, it is essential to precede restorative procedures with a period of splint therapy to ensure that a stable relationship has been achieved.

Muscle Relaxation

The tooth interferences to the centric relation arc of closure activate the lateral pterygoid muscles⁴, posterior tooth interferences during excursive mandibular movements cause hyperactivity of the closing muscles⁵. Occlusal splints promote muscle relaxation by providing a platform for the teeth that allows for equal distribution of tooth contacts, immediate posterior tooth disclusion in all movements (with anterior guidance), and reduced stress on the joint (Fig. 7). Neuromuscular harmony that follows provides for optimal function and comfort.

Provide Diagnostic Information

Occlusal splints provide diagnostic information in different ways. The dentist can determine parafunctional habits, anterior guidance requirements, as well as obtain information about vertical dimension from patients who wear a splint. Whether or not bruxing is continuing can be monitored by observing wear facets created on the splint surface.

Protect Teeth and Jaw

Patients who are prone to nocturnal bruxism ("the grinding or clenching of teeth at other times than for the mastication of food.") should routinely wear occlusal splints at night because the splints protect the teeth against wear as the wear occurs against the splint. Also, the splints reduce stresses on the individual tooth due to more teeth contacts of equal intensity.

It is important to remember that splints do not prevent bruxism; rather, they distribute the force across the masticatory system. These appliances can decrease the frequency but not the intensity of the bruxing episodes⁶.

When capillary perfusion pressure is above 25 mm Hg cellular hypoxia can take place. When the patient clenches without the splint, pressure may exceed 200 mm Hg, but pressure remains less than 25 mm Hg when clenching is with the splint. With compression of the vessels, the affected area has reduced blood flow, which adversely affects normal function and wound healing⁷.

Selection of the Occlusal Splint

A careful medical and dental history along with a thorough examination is necessary for

those patients with facial pain, TMD, or bruxism. The type of splint utilized is dependent on the diagnosis.

1. If the patient reports bruxism and headaches but no TMD, the use of a full-coverage splint at night, in which acrylic covers an entire arch of teeth, is often adequate to protect the teeth. If the patient clenches isometrically, a full-coverage maxillary guard with all of the teeth in contact is appropriate. If the patient demonstrates parafunctional movement in lateral and protrusive directions, a splint for the mandibular teeth will be effective. With parafunctional movement laterally, a mandibular splint that does not touch all of the anterior teeth is acceptable (Fig. 8) (it must touch the cuspids for guidance).

A minimum of a 4-mm increase in vertical dimension is necessary to protect bruxing patients. If the patient is wearing a splint 4 mm in thickness and still experiences muscular soreness, headache, and/or facial muscle tightness immediately after waking, splint thickness should be increased incrementally until symptoms disappear⁸ (Fig. 9).

2. When a muscle disorder is suspected in TMD patients, bite plane therapy may be used. Muscle disorders are initiated by hyperocclusion; bite planes separate the teeth, allowing the muscles to relax. Full-coverage stabilization splints, which are flat plane splints covering the entire dental arch, can also be used, and may be the treatment of choice for unreliable patients. In general, muscle disorders are effectively treated with appropriate splint therapy (bite planes and stabilization appliances).

3. If combination of muscle and disc disorders are identified (i.e. clicking of TMJ with muscle pain), stabilization splints are the treatment of choice. They provide long-term wear that is usually needed. They also cover the entire dental arch, ensuring that the covered teeth do not move. They must be worn continually for 24 hours for as long as required to eliminate muscle, disc, ligament, and tooth symptoms. Three to 6 months of wear is often required.

4. If advanced disc and muscle disorders are

identified (jaw locking and/or noises, painful joints), stabilization splints are the treatment of choice which must be balanced to accommodate the specific needs of the patient. Splints may need to be worn for 6 months to 2 years depending on the patient.

5. In acute trauma anterior repositioning appliance for 7 to 10 days is required to keep the condyle away from the retrodiscal tissues so that the inflammation can subside.

Patient Recall

If an occlusal splint is being used only as a night guard to protect teeth or restorations it is advisable to review the patient after 7 days to check whether their occlusion has remained stable and to readjust if necessary.

The patient must be reviewed and the splint re-adjusted at weekly intervals for as long as is necessary to achieve a stable retruded position if the splint is being used to treat mandibular dysfunction. The time necessary for this to occur may vary from a couple of weeks to several months. The splint must be continually monitored and adjusted to ensure equal contacts on all teeth, with immediate disclusion of the posterior teeth in all movements.

If splint therapy was initiated to treat mandibular dysfunction no irreversible alteration to the patient's occlusion (equilibration) is generally needed. The patient may be gradually weaned off the splint but told to wear it if their discomfort returns which is often at times of stress.

Conclusion

For a successful occlusal appliance therapy through examination of the patient and exact diagnosis is quiet mandatory. Also, the complete knowledge of the appliances is essential.

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Fig. 1: Maxillary occlusal splint (in mouth).



Fig. 2: Permissive occlusal splint.



Fig. 3: Non-permissive or Directive occlusal splint.



Fig. 4: Soft occlusal splint (made of PVC sheet).



Fig. 6: Non-Permissive occlusal splint, these app. Direct the mandible in a more position (CR).¹ stable

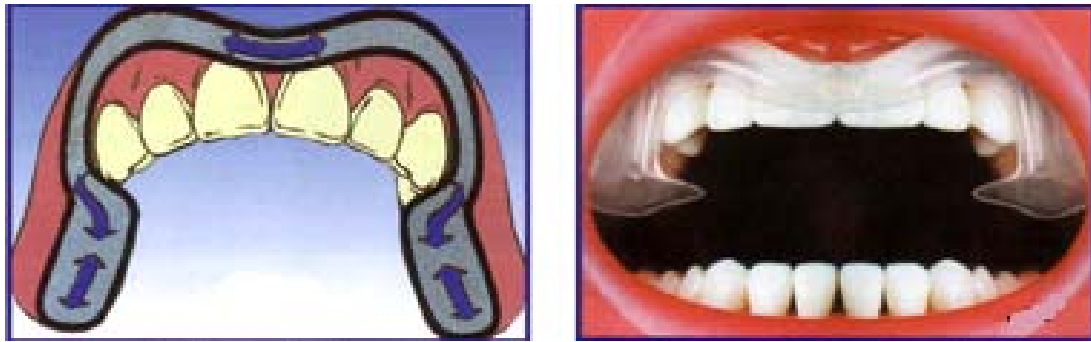


Fig. 5: Hydrostatic occlusal splint (aqualizer).



Fig. 7: Occlusal splint for muscle relaxation, this app. should have anterior guidance so that in all EC movements posterior teeth may disocclude.



Fig. 8: If the patient demonstrates parafunctional movement in lateral and protrusive directions, a splint for the mandibular teeth will be effective (no anterior teeth coverage).



Fig. 9: If 4 mm increase in vertical height is not effective in reducing muscle hyperactivity, the height may be increased 12-15 mm. ⁸