

Occlusal Splints Used in Prosthetic Management of Tmj Disorders

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Abstract: Stomatognathic system is the functional unit that performs masticatory tasks such as swallowing, speaking, and helps in esthetics. Occlusal splint therapy has been used routinely for diagnosis and treatment of various masticatory system disorders. Treatment with these appliances is non-invasive, reversible, and provides proper treatment. Literature provides an understanding of treatment protocol for the use of splints for temporomandibular disorders. The selection of particular splint design appropriate for patients' disorder will be facilitated by a better understanding of its physiologic and therapeutic effects. This review article enables reader with basic splint designs and explains how and when to use these effectively

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I. Introduction

The therapy which has been used since a long time for the diagnosis and treatment of various disorders of masticatory systems is Occlusal Splint Therapy. There are many designs which have been proposed in various articles and described in the literature. The main purpose of this article is to enhance the understanding of the reader about the basic splint designs and to identify the factors which govern the use of these splints effectively in daily clinical practices. It also gives an overview of the examination and differential diagnosis of various disorders and describes it to conclude the appropriate role of splint therapy for each problem occurring in the patient regarding temporomandibular disorders¹.

An occlusal appliance (also called a splint) is a removable device which is usually made of hard acrylic, which fits over the occlusal and incisal surfaces of teeth in one arch, creating precise occlusal contact with the teeth of opposing arch². It is commonly referred to as a bite guard, night guard; inter occlusal appliance, intra-oral arthrotic, or even orthopaedic device³. These are extensively used in management of TMJ disorders. They have shown considerable control in myofascial pain, however no clear hypothesis about the mechanism of action has been proved. It has a more of diagnostic value, for example, if a patient responds favourable to an occlusal device then the response to the same restorative permanent treatment should be positive. So it serves as an important diagnostic value before going for a fixed prosthodontic therapy.

II. What Occlusal Splints Can Do

1. Stabilization of weak teeth: An occlusal splint can effectively stabilize weak or hypermobile teeth by the adaptation of the splint material around the axial surfaces.
2. Distribution of occlusal forces
3. Reduction of wear
4. Stabilization of unopposed teeth

Occlusal splints cannot cause effects that are in violation of mechanical laws. Thus an occlusal splint does not unload the condyles. The popular claim that a posterior occlusal splint serves as a pivot for distraction of the condyles is in violation of facts of anatomy, laws of physics, and clinical data⁴.

2.1 Various Unexplained Therapeutic Claims:

1. Occlusal splints increase the wearer's strength
2. Occlusal splints cause remission of unrelated diseases
3. Occlusal splints can cause a 'purging of system poisons'
4. Occlusal splints cause a 'regulation of multiple bodily functions'

III. Types Of Splints

3.1 According to Okeson⁵

- 1) Muscle relaxation appliance/ stabilization appliance used to reduce muscle activity
- 2) Anterior repositioning appliances/ orthopedic repositioning appliance

3.2 Other types:

- a) Anterior bite plane
- b) Pivoting appliance
- c) Soft/ resilient appliance

3.3 According to Dawson:

1. Permissive splints/ muscle deprogrammer
2. Directive splints/ non-permissive splints
3. Pseudo permissive splints (e.g. Soft splints, Hydrostatic splint)
MORA – mandibular orthopedic repositioning appliance

3.5 Types of Occlusal Splints:

1. A permissive splint or
2. A directive splint

Permissive Splints: Permissive Splints are designed to unlock the occlusion to remove deviating tooth inclines from contact. The condyles are then allowed to return to their correct seated position in centric relation if the condition of the articular components permits. Permissive splints are often referred to as muscle deprogrammers. A properly made centric relation occlusal splint is a permissive splint. If a centric relation splint is made with deep fossae and inclines that are too steep, it can be turned into a directive splint that limit condylar access to centric relation only⁶.

Directive splints: Are designed to position the mandible in a specific relationship to the maxilla. The sole purpose of a directive splint is to position or align the condyle-disk assemblies. Thus directive splints should be used only when a specifically directed position of the condyles is required.

3.6 Contraindications for Directive Splints:

1. The condyle and the disk can be aligned correctly.
2. The correctly aligned condyle-disk assemblies can move to the most superior position against the eminentiae without derangement.
3. The disks can maintain their alignment with the condyles during function.

3.7 Verification that the condyle-disk assemblies are capable of normal function in the most superior position can be achieved on a tentative basis by testing in the following manner:

1. Load testing the joints with bilateral pressure
2. Clench testing with the teeth separated
3. Doppler auscultation

III. Superior Repositioning Splints

The purpose of anterior repositioning therapy is fulfilled when the retrodiscal tissues have healed sufficiently to regain a backward pull on the disc. However, either the condyle or the disc may have difficulty moving back to centric relation after being held forward. There is reason to suspect that the inferior lateral pterygoid muscle is shortened by long-term use of anterior repositioning devices⁷. This makes it more difficult for the muscles to release the condyles to their most superior position. Deformity of the displaced disc may also require time to adaptively remodel to a stable contour. The purpose of a superior repositioning splint is to eliminate the effect of the neuromuscular reflex that directs the mandible to close repetitively into the maximum intercuspation position. By covering the occlusal surfaces with plastic to provide a smooth surface, you can eliminate the reflex and the mandible can have free access to the seated position. The goal is a true skeletal relationship of the mandible to the maxilla and not one that is influenced by the maximum intercuspation of the teeth. The purpose of the superior repositioning splint is to establish the correct skeletal relationship before the correct occlusal relationship is determined⁹. The fabrication of a superior repositioning splint is identical to the centric relation splint. It is especially important that the anterior guidance on the splint must disocclude all posterior teeth in all jaw positions except centric relation. The time required to achieve superior positioning of the condyle-disk assembly varies from patient to patient. It may occur in a few days, or it may take several months. The determining factors appear to be related to the amount of deformity of the recaptured disc, and the condition of the inferior and superior bellies of the lateral pterygoid muscles¹⁰.

Occlusal splints are frequently recommended by dentists and other health professionals to treat a variety of conditions, including bruxism/parafunctional habits, fatigued masticatory muscles, headaches, sore teeth, worn teeth, malocclusion, and noisy and uncomfortable temporomandibular joints (TMJ).

Occlusal splints have three primary purposes in modifying masticatory system dynamics:

1. alteration of the dental occlusion
2. reduction of muscle contraction and associated forces
3. repositioning of the TMJ

The decision to prescribe a particular splint is based on several important factors, including the findings from the examination, the differential diagnosis, and an understanding of the effects of each splint design.

V. Examination And Differential Diagnosis

Dentists are exposed daily to conditions that lead to a full appreciation of the dynamic relationships of the TMJ, mastication muscles, dental occlusion, the trigeminal system, and central nervous system. Many signs and symptoms are commonly manifested in the masticatory system and relate to disharmony, dysfunction, and deformation. A thorough history and examination of the teeth, muscles, and joints is the starting point for comprehensive care for all dental patients and is critically important for those experiencing masticatory system problems. The complete examination is essential for a differential diagnosis⁸.

A systematic approach will differentiate problems into three basic categories:

Extracapsular: a masticatory system problem without joint derangement

Intracapsular: a derangement inside the TMJ capsule¹¹

Other: a medical condition affecting the masticatory system, which often requires expertise outside of dentistry to diagnose and treat, e.g., systemic, neurologic.

Occlusal splint therapy may or may not be therapeutic, depending on the diagnosis.

VI. Chronic, Painful Disc Displacement Disorders

If an anterior disc displacement is causing retrodiscal compression by the condyle, there may be a benefit to moving the condyle to a more forward position both in the fossa and underneath the disc. If it is possible to achieve complete reduction of the disc in a forward joint position but not in a superiorly seated joint position with a permissive splint, a directive splint may help maintain condyle disc alignment. The challenge is the long-term instability of this arrangement. It is generally not possible to realign the damaged condyle disc assembly in a forward position and then carry it back intact to the most superior musculoskeletally braced position. This can become a long-term management dilemma. Serious concerns include fibrotic contracture of the lateral pterygoid muscles, unstable soft tissue formation in the joint, and an unstable bite.

Upon successful resolution of symptoms, occlusal analysis and appropriate occlusal correction are implemented. In many cases, symptoms remain absent, without the use of a splint, after definitive occlusal therapy. The perfected occlusion in centric relation, with proper anterior guidance, and immediate posterior disclusion become a built-in full arch permissive splint. Parafunction can present a problem even in the absence of occlusal discrepancy. In some cases, symptoms may remain after definitive occlusal correction, if parafunctional clenching remains. Clenching can create sore temporalis and masseter muscles, even in a perfected occlusion. In such cases, if this leads to discomfort upon waking, the patient should continue wearing the splint at bedtime, as needed, indefinitely. Counselling regarding daytime parafunction and biofeedback are also important, as has been found through jaw tracking.

A nightguard to control the harmful effects of nocturnal parafunction may be used indefinitely to prevent muscle symptoms and protect the teeth from excessive wear. However, extended use of a segmental appliance/splint can sometimes lead to intrusion of the teeth touching the splint and supraeruption of the teeth not touching the splint. To prevent undesired tooth movement with extended usage, consider having the patient wear a dual splint covering both arches at night. Full arch permissive splints provide the traditional approach to treating occlusomuscular-parafunction problems.

Full arch permissive splints are excellent for idealizing occlusions in a reversible manner and therefore are often effective in treating occluso-muscle problems.

6.1 Treatment using occlusal splints has three primary goals¹²:

1. Harmonizing occluso-muscle-joint relationships
2. Decreasing the load to the damaged joint tissues eliminating symptoms related to intracapsular edema and inflammation
3. Muscle pain caused by splinting and parafunction

VII. Conclusion

It is imperative that clinicians have a strong working understanding of masticatory system dynamics. Differential diagnosis through the screening of muscles, joints, and dental occlusion will clarify the presence of signs and symptoms of dysfunction. Controlling the effects of malocclusion and parafunction is typically successful through the selective application of the occlusal splint designs described in this article. Joint derangements are often manageable using occlusal splints, but due to multifactorial etiology, may have some limitations relative to creating long term joint stability. Occlusal splint therapy is an effective means of diagnosing and managing specific masticatory system disorders.

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