



Effects of Occlusal Splint Therapy in Patients with Temporomandibular Disorders: A Review

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Abstract

Psychological discomfort, physical disability and functional limitations of the or official system have a major impact on everyday life of patients with Temporomandibular disorders (TMDs) Stabilization appliances are commonly used in the treatment of Temporomandibular disorders (TMD), although the

treatment effects are not fully understood. Acrylic resin interocclusal appliances have been used in dentistry for the management and treatment of Temporomandibular disorders (TMDs). Appliances have been used with the goals of altering occlusal relationship, redistributing occlusal forces, Preventing wear and mobility of teeth

reducing bruxism and other parafunctional habits, repositioning of the condyle and treating masticatory muscle pain.

Keywords

Temporomandibular joint, Temporomandibular disorders, Occlusal Splint, Muscle Pain.

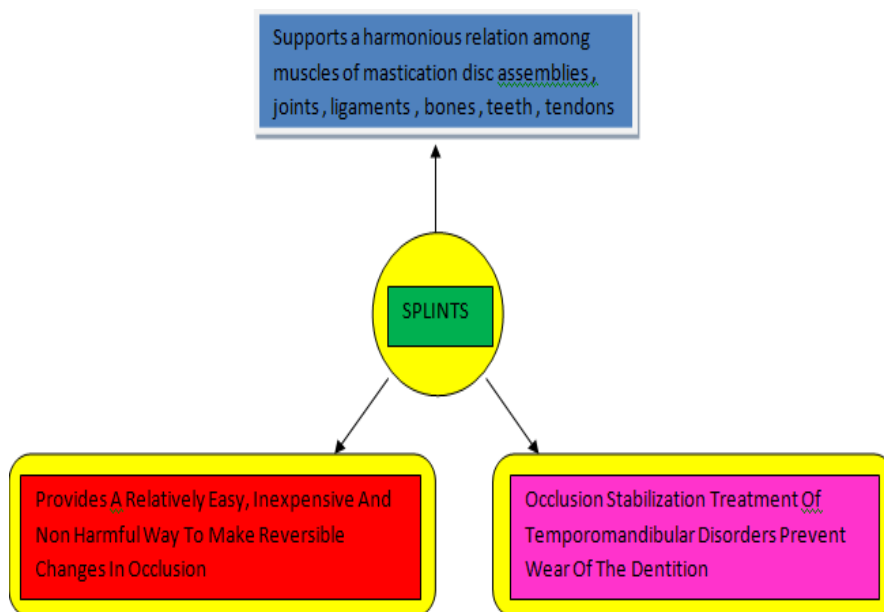
Introduction

Occlusal splints, also known as bite guards, oral orthotics, and oral appliances, are utilized frequently in dental practices. They are commonly used to relax jaw muscles, prevent temporomandibular jaw trauma, protect dentition, and control headaches¹. In nearly every case of TMD, the patient reveals muscle hyperactivity of the jaws, head, neck, and shoulders. The term TMD will include temporomandibular joint (TMJ) disorders, headache-including migraines as well as ear, neck, and shoulder pain-dizziness, and other neurologic

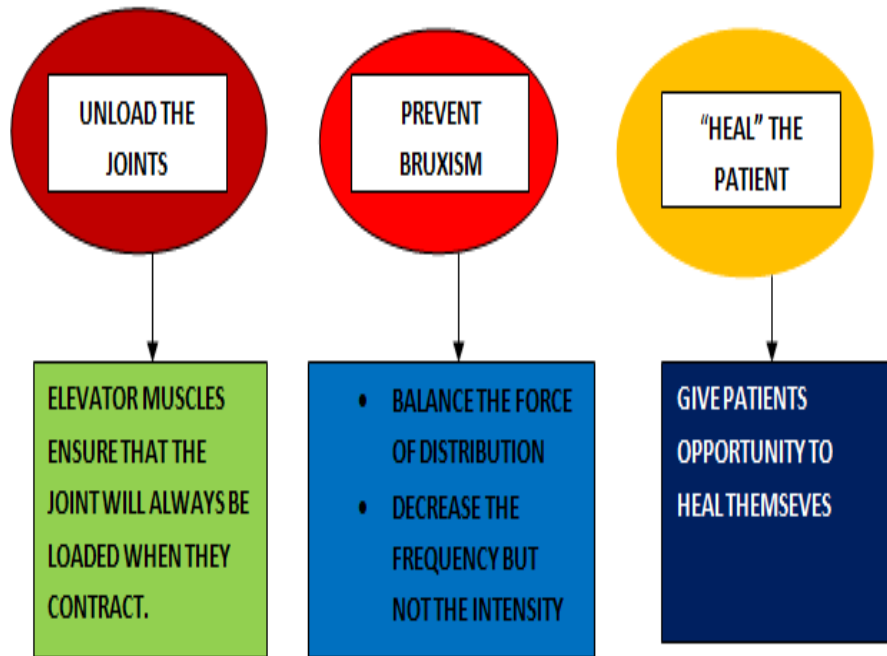
problems which often associated with TMJ and TMD issues.

The lower jaw & base of skull is connected by a joint called the temporomandibular joint. Craniomandibular disorder (CMD) is a group of disorders with wide variety of signs and symptoms which involve joint pain or muscles of jaw or on mandibular movement, clicking, noise, and grating in the jaw joint, locking/luxation of joints or problems such as chewing or opening the jaw. There are different treatment modalities available for treating TMD which can be categorised as conservative treatment in which comes are physical therapy, localized steam application, external muscle massage, occlusal adjustment, analgesia, psychotropic medication, splint therapy, alternative therapies such as acupuncture, as well as treatment modalities such as ultrasound, soft laser, and infrared radiation and Surgical management.²

What Splints Can Do?³



What Splints Cannot Do?³



Functions of Occlusal Splints³



Reasons for Occlusal Splint Therapy

1. To protect oral tissues in patients with oral parafunction.
2. To stabilize unstable occlusion.
3. To promote jaw muscle relaxation in patients with stress related pain symptoms like tension headache and neck pain of muscular origin .
4. To eliminate the effects of occlusal interferences.

A common goal of occlusal splint treatment is to protect the TMJ discs from dysfunctional forces, which may lead to perforations or permanent displacements. Other goals of treatment are to improve jaw-muscle function and to relieve associated pain by creating a stable balanced occlusion.⁴

How Does Splints Work?

There is no general agreement about if or why splint treatment may have a beneficial effect. Following are few concepts, which explain how occlusal splints can help. Preventing the patient to close in maximal intercuspal position: By occlusal splint, the patient is

obliged to place his mandible in a new posture, thus resulting in a new muscular and articular balance.

The patient, disturbed in his habits will not clench his teeth any more, like before and protect his TMJ and teeth. The forces generated during bruxism can be as much as six times the maximal force generated by normal chewing. The splints distributes these forces across the masticatory system. These appliances can decrease the frequency of bruxing episodes but not the intensity.

Normalising periodontal ligament

According to **Cognitive awareness theory** the presence of the splint as a foreign object in the mouth would likely change the oral tactile stimuli, decrease the oral volume and space for the tongue and make the patient conscious about the position and potentially harmful use of their jaw. As cognitive awareness is increased, factors that contribute to the disorder are decreased. The result is a decrease in the symptoms.⁴

Types of Occlusal Splints³

According to Okeson

According to Okeson

- **Stabilization Appliance**
- **Anterior Repositioning Appliance**

Other Types

- **Anterior Bite Plane**
- **Posterior Bite Plane**
- **Pivoting Appliance**
- **Soft Or Resilient Appliance**

According to Dawson

- **Permissive Splints**
- **Muscle Deprogrammer**
- **Directive Splints**
- **Non-Permissive Splints**

Permissive Splints (Muscle Deprogrammers)

They are designed to unlock the occlusion to remove deviating tooth inclines from contact, thus eliminating the cause and effect of muscle in co-

ordination. The condyles are then allowed to return to their correct seated position in centric relation. The two classic designs.



Permissive Splints

Directive Splints

They 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 jaw to jaw relationship that results from maximum intercuspation with the splint determines the position of

the condyles at the intercuspal position. Anterior repositioning splint is a type of directive splint.

Stabilization Splint

It is a hard acrylic splint that provides a temporary and removable ideal occlusion, thereby reduces abnormal

muscle activity and produces neuromuscular balance. It is suggested that patients should wear the splint only at night. The splint should be adjusted over several visits as the masticatory muscles relax until a consistent jaw relationship is reached (between 2 to 3 months). A stabilization provides centric relation occlusion, eliminates posterior interference, provides anterior

guidance and gives stable occlusal relationships with uniform tooth contacts throughout the dental arch. They are used in the following situations; masticatory myalgia, habit management, parafunctional myospasms or myositis, trauma/ inflammatory joint disorder, TMJ arthralgia, oral parafunctional activity.³



Stabilization Splint

Anterior Repositioning Splint

This splint induces a therapeutic mandibular position, forward to the maximum intercuspation position of the patient and position provides a more favorable condyle-disc relationship in the fossa. It is typically placed on the maxillary arch with an anterior ramp that first engages mandibular teeth on initial

closure and shifts the jaw forward into final closure, when all mandibular teeth contact the splint. They are recommended only for short-term use because they can cause occlusal changes if worn continuously or chronically. repositioning splint is used in the treatment of disk interference disorders, intermittent or chronic locking of the joint and inflammatory disorders.³



Anterior Repositioning Splint

Anterior Bite Plane

The anterior bite plane is a hard acrylic appliance which provides contact with only the mandibular anterior teeth. It is worn over the maxillary teeth and used to disengage the posterior teeth, thus eliminating their influence in the function or dysfunction of the masticatory system. Examples of anterior bite plane include Anterior jig. Anterior bite plane therapy must be used only for a short period of time as continuous application for several. This splint

induces a therapeutic mandibular position, forward to the maximum intercuspation position of the patient and disc relationship in. It is typically placed on the maxillary arch with an anterior ramp that first engages mandibular teeth on initial closure and shifts the jaw forward into final closure, when all They are recommended term use because they can cause occlusal changes if worn continuously or chronically. The anterior repositioning splint is used in the treatment of disk.³



Anterior Bite Plane

Posterior Bite Plane

Made of hard acrylic, it covers the posterior teeth and is connected by a cast metal lingual bar, used mainly on the mandibular teeth. The GELB-MORA (mandibular orthopaedic repositioning appliance) is an example of posterior bite plane. It is indicated

when there is severe loss of vertical Dimension of occlusion and when a major change in the anterior positioning of the mandible is desired. Constant and long term use is contraindicated as it can cause supraeruption of the unopposed teeth and the intrusion of the occluded teeth.³



Posterior Bite Plane

Soft or Resilient Splint

This appliance is generally made of a resilient material (2 of polyvinyl sheet) and is adapted to the maxillary arch. This splint should be worn only at night and As they lose their resiliency over time, this appliance should be replaced every 4 -6 months. The soft splint is generally produces symptomatic relief

within 6 weeks. less likely to cause significant occlusal changes that are occasionally noted with hard occlusal splints. They are used to reduce symptoms of joint dysfunction or myalgia, to prevent bruxism and clenching and as a protective device in athletes.³



Soft Resilient Splint

Location of Splint: Maxillary or Mandibular?

If teeth are missing, the splint is usually made in the jaw where most teeth are lost to increase the stabilizing effect by creation of additional occlusal points. In case of missing molars and premolars in both jaws, it is advisable to fabricate both upper and lower splint. In case of significantly increased incisor overjet, as in case of severe Angle Class II, an occlusal splint on the maxillary arch is preferred because it is difficult to achieve proper anterior contacts and guidance with a mandibular splint. In case of a deep curve of Spee, mandibular splint is preferred. Mandibular occlusal splint also offers the advantage of encouraging a better rest place for tongue (which is anterior palate).³

Use of Occlusal Splints to Lessen Parafunctional Activity

The use of bite guards or oral appliances to treat TMD and a long list of associated jaw problems has spanned more than a century. Dentists have accepted their role in helping to quell TMJ disorders and jaw pain, although success is usually variable and unpredictable. Too often, neither design works well, because these appliances are functionally based. There is merit in covering malocclusions while giving the occlusal splint canine rise and incisal guidance, as with flat plane stabilization appliances. There is also merit in recapturing discs or at least pulling the condyles from the impinged nerves and vessels of the retrodiscal tissues. Parafunctional activity is common, experienced by most patients to some degree during their lives.

Parafunctional activities must be eliminated or controlled before extensive restorative treatment is undertaken. Ignoring or minimizing the effects of parafunctional activity when doing full-mouth rehabilitations may force the restoring dentist to create occlusal splints every few months. Patients may continue their bruxism on their occlusal splints, even if the teeth and TMJs fit and function perfectly. Dentists unfortunately sometimes treat parafunctional problems with occlusal splints that are designed for functional problems. Bruxism is a parafunctional activity; thus it must be diagnosed as such.

A protective occlusal splint should be a neurophysiologic device that minimizes muscle activities of the jaw. In other words, an occlusal splint should work in harmony with the brain. It should not be a mechanical “bully” that positions condyles as its primary objective. Likewise, an occlusal splint should not be created from an electrical device that fails to capture the neurologic balance of the jaw muscles and their agonist-antagonist relationships when the jaw is at rest. Since teeth should not be loaded more than 20 minutes in 24 hours, an appliance worn on the teeth should not be loaded longer than 20 minutes.

Loading posterior teeth on an occlusal splint stimulates muscle contractions. Landing incisors on anterior disoccluding elements, even if they include the canines, can carry its own set of problems. Landing or loading on incisors is not physiologic.¹

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 (it must touch the cuspids for guidance).



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

- 2 A minimum of a 4-mm increase in vertical dimension is necessary to protect bruxism 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 disappear.



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

- 3 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).
- 4 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.
- 5 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.
- 6 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.⁵

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 disocclusion 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.⁵

Conclusion

Occlusal splint therapy has been used for many years for the diagnosis and treatment of various disorders of the masticatory system. Many designs are described in the literature. The different types of splint are used to treat different conditions. A proper examination and differential diagnosis are the prerequisites for making a decision regarding the appropriate splint therapy best suited for different situations. Occlusal splint design should incorporate neurophysiologic and musculoskeletal principles to ensure that the appliance functions as intended, particularly for the treatment of TMD. The MAPA is a highly effective passive occlusal splint, but, like any occlusal splint, it is not singularly successful without proper adjunctive therapies. Different types of splint that can be given to TMD patient for different problems

and for selecting proper splint clinician should have through understanding of dynamics of mastication and carry out a complete assessment of Temporomandibular joint and its associated make-up. Perfect appliance with fewer complications should be delivered.

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