



ORIGINAL RESEARCH PAPER

Prosthodontics

OCCLUSAL SPLINT THERAPY- A REVIEW

KEY WORDS: Bite splint, occlusal splint, occlusal device, occlusal appliance.

Dr. Hajira Moin	Dept. Of Prosthodontics Mamata Dental College, Giriprasad Nagar, Khammam, 507002
Dr. D. Chalapathi Rao*	Professor Dept. Of Prosthodontics Mamata Dental College, Giriprasad Nagar, Khammam, 507002 *Corresponding Author
Dr. M. Sujesh	Professor Dept. Of Prosthodontics Mamata Dental College, Giriprasad Nagar, Khammam, 507002
Dr. C. Ravi Kumar	Professor and Head of the department Dept. Of Prosthodontics Mamata Dental College, Giriprasad Nagar, Khammam, 507002
Dr. G. Harilal	senior lecturer Dept. Of Prosthodontics Mamata Dental College, Giriprasad Nagar, Khammam, 507002

ABSTRACT occlusal splint therapy has been used for several years for the identification and treatment of assorted disorders of the masticatory system. It is used in oral para function, unstable occlusion, stress connected pain symptoms, occlusal interferences, and in intensive restorative treatment. This article will familiarize the reader with basic splint styles and justify a way to use these effectively.

INTRODUCTION:

Interocclusal appliance is usually thought-about to be a removable device fabricated from hard synthetic resin which inserts between the maxillary and mandibular teeth. Its purpose is to perform one or additional of the subsequent.

1. Stabilize and improve the action of temporomandibular joints.
2. Improve the behaviour of masticatory motor system and moderate abnormal muscle activity.
3. Conserve teeth from attrition and adverse traumatic loading. With the growing recognition of relationship among occlusal stability, mandibular exercise and musculoskeletal health, the utilization of the inter occlusal appliance in diagnosis and therapy has been greatly enhanced.

As a diagnostic tool, the interocclusal appliance or "splint" as it is usually known as, will facilitate to establish a snug relaxed maxillo-mandibular relationship. The splint is additionally used diagnostically as a reversible technique to check the muscular articular responses to changes within the vertical or horizontal positioning of the mandible before permanent stabilization of the occlusion with occlusal adjustment either prosthodontics or orthodontics.

Therapeutically, in cases of traumatic occlusion the splint will offer a stable bilateral occlusal contact pattern. Interocclusal appliances are shown to lessen the activity of masticatory muscles each at night and through the day. In cases of bruxism, these appliances will shield the teeth from attrition and function a reminder against this parafunctional activity.

THEORIES OF INTEROCCLUSAL APPLIANCE THERAPY:

At present there are many appliance scheme and a number of other distinct therapeutic approaches. Although, the most important priority of this article will be the interocclusal stabilization appliance, appliance designs and 5 distinct theories with respect to how the different interocclusal appliance work.

OCCLUSAL DISENGAGEMENT THEORY:

The occlusal disengagement theory is determined on the idea of providing the patient with an interocclusal appliance that has an "interference free ideal occlusal scheme" that will depress or eliminate all the abnormal muscle activity caused by occlusal interferences. (Posselt, 1960 ; Ramfjord and Ash, 1983) The occlusal theme of the splint is sometimes designed to

achieve synchronal bilateral multiple posterior tooth contacts, with excursive guidance on the canine and/or the anterior teeth.

VERTICAL DIMENSION THEORY:

The vertical dimension theory is based on the idea that by providing the patient with an interocclusal splint design, restores previously lost occlusal vertical dimension, eliminates and reduces abnormal muscle activity due to the abnormal vertical dimension. (Block, 1947 ; Christensen, 1970) According to this theory, care is given to select an interocclusal opening, so that it will re-establish the original occlusal vertical dimension.

MAXILLO-MANDIBULAR REALIGNMENT THEORY:

The maxillo-mandibular realignment theory states that for varied reasons, the mandible within the position of maximum intercuspation has an abnormal, non-adoptive position related to the maxilla. It is theorized that only by changing the relationship to a more anatomically and physiologically correct jaw position with an interocclusal appliance can the varied dysfunctional musculoskeletal symptom approve or disappear.

TEMPOROMANDIBULAR JOINT REPOSITIONING THEORY:

TMJ repositioning theory is determined on the idea that by remodelling the position of the condyle within the fossa, the function of the TMJ, and presumptively the neuromuscular system, can improve. (Weinberg, 1979, 1980a, 1980b).

COGNITIVE AWARENESS THEORY:

Although the previous four theories are the foremost prevailing ones, a fifth theory, cognitive awareness is introduced which can be applied to any and every one of the appliances utilized. The cognitive awareness theory is predicated on the idea that having an interocclusal appliance within the mouth constantly reminds the patient to change his/her normal behavior so that the chance for harmful or abnormal muscle activity is decreased.

The increased cognitive awareness of the patient will all influence the patient to find out what position or activities are harmful. Learning to change, lessen or change a harmful behavior is usually useful to most successful therapeutic interventions. (Rugh and Solberg, 1976)¹

TYPES OF OCCLUSAL SPLINTS ACCORDING TO OKESON²

- Stabilization appliance
- Anterior repositioning appliances

OTHER TYPES:

- Anterior bite plane
- Posterior bite plane
- Pivoting appliance
- Soft/resilient appliance

ACCORDING TO DAWSON³

- Permissive splints/ muscle deprogrammer
- Directive splints/ non-permissive splints

PERMISSIVE SPLINTS: These are designed to unlock the occlusion to withdraw deviating tooth inclines from contact. The cause and effect of muscle in-co-ordination is eliminated by this. The condyles are then allowed to recover to their correct seating position in centric relation if the condition of the articular elements permits.

Permissive splints are usually said as muscle deprogrammers. The two classic styles of permissive splints are:

- Anterior Midpoint Contact Splints and
- Full Contact Splints.

Nociceptive trigeminal inhibition (NTI) splint, Lucia jig and the B splint are examples of anterior midpoint contact splints. Full contact splint example is centric relation splint.

DIRECTIVE SPLINTS: These are programmed to position the mandible in a certain relationship to the maxilla. The purpose of a directive splint is to position or to align the condyle-disc assemblies. The jaw to jaw relationship that results from most intercuspatation with the splint, determines where the condyles should be at the intercuspal position. Therefore, directive splints ought to be used only if a specifically directed position of the condyles is needed. Anterior repositioning splint is a directive splint.

SPECIFIC USES OF VARIOUS FORMS OF SPLINTS

STABILIZATION SPLINT: Stabilization splint is additionally referred to as the superior repositioning splint, the Tanner appliance, the Michigan splint, the Fox appliance or the centric relation appliance. The stabilization splint is a hard acrylic splint that gives a brief and removable ideal occlusion. Providing a perfect occlusion by the employment of splint therapy reduces abnormal muscle activity and produces neuromuscular balance.⁴

A stabilization splint provides centric relation occlusion, eliminates posterior interference, provides anterior guidance and offers stable occlusal relationships with uniform tooth contacts throughout the dental arch.



Fig. 1: Upper stabilizing splint

INDICATIONS:

- The stabilization splint is mostly preferred for masticatory myalgia and TMJ pain, particularly if the pain is worse upon wakening. this sort of splint may be used throughout the day for oral habit management. Such splints are designed to supply postural stabilization and to safeguard the TMJ, muscles, and teeth.
- The centric relation splint is usually accustomed to treat muscle hyperactivity. Studies have shown that wearing it, decreases parafunctional muscle activity. Patients with myospasms or

inflammation are best treated with centric relation splint.⁵

ANTERIOR REPOSITIONING SPLINT

The anterior repositioning splint induces a mandibular position, forward to the utmost intercuspatation position of the patient and affects the physiological topographic relationship of the disc condyle complex. The anterior positioning splint places patient's mandible and TMJ into an anterior position thus as to reduce TMJ clicking that happens on opening and shutting of the jaw.

The anterior positioning splint is often placed on the maxillary arch with an anterior ramp that 1st engages mandibular teeth on initial closure and shifts the jaw forward into final closure, once all mandibular teeth contact the splint. This position provides a lot of favorable condyle-disc relationship within the fossa in order that normal function may be established. The goal is to eliminate the signs and symptoms related to disc-interference disorders.^{6,7}



Fig. 2: anterior repositioning splint

INDICATIONS:

- Anterior repositioning splints are used essentially to treat disorders of disc interferences.
- Patients with joint sounds such as single or reciprocal clicks will typically be effectively treated with this kind of splint.
- Intermittent or chronic locking of the joint
- Inflammatory disorders (e.g. retrodicitis)

ANTERIOR BITE PLANE

The anterior bite plane is a hard acrylic appliance worn over the maxillary teeth that gives contact with solely the mandibular anterior teeth. It's primarily supposed to disengage the posterior teeth and therefore eliminate their influence within the function or dysfunction of the masticatory system. Anterior jig, Lucia jig, Hawley with bite plane, anterior deprogrammer and Sved plate are sorts of anterior bite plane.⁸

INDICATIONS:

- Treatment of muscle disorders associated with orthopedic instability or an acute disturbance in the occlusal condition.
- Parafunctional activity related to unfavorable contacts of posterior teeth may also be treated however just for short periods.

If the appliance is worn continuously for many weeks or months, it's doubtless that the unopposed mandibular teeth can supraerupt. Once this happens and the appliance is removed, it leads to an anterior open bite. Anterior bite plane therapy should be closely monitored and used just for short periods.

POSTERIOR BITE PLANE

The posterior bite plane is typically fabricated for the mandibular teeth and consists of areas of hard acrylic situated over the posterior teeth and connected by a cast metal lingual bar.

The treatment goals of the posterior bite plane are to attain major alterations in vertical dimension and mandibular repositioning. The Gelb (Gelb MORA [mandibular orthopedic repositioning appliance]) splint could be a form of posterior bite plane.⁹



Fig.3: Gelb-MORA Splint.

INDICATIONS:

- Severe loss of vertical dimension.
- When major changes in anterior positioning of the mandible are required.

The major concern with this appliance is potential supraeruption of the unopposed teeth and also the intrusion of the occluded teeth. Constant and long term use is discouraged.

PIVOTING SPLINT

The pivot splint is also called distraction splint. The pivot splint was introduced by *Krough-Poulsen*. It's a hard acrylic appliance that covers one arch and typically provides one posterior contact in every quadrant. This contact is sometimes established as far posteriorly as attainable.

The planned effect is that the condyles are forced downward upon clenching on the pivot, thereby relieving traumatic load and giving the disc freedom to reassume a standard position. The pivoting splint was originally developed with an idea that it would decrease interarticular pressure, so unloading the articular surface of the joint. This was thought to occur once the anterior teeth moved nearer together, making a fulcrum round the second molar and pivoting the condyle downward away from the fossa. However, this could occur only if the forces that close the mandible are settled anterior to the pivot.

Unfortunately, the forces of the elevator muscles are settled primarily posterior to the pivot, which thus doesn't enable any pivoting action.

INDICATIONS:

- Unloading the articular surfaces of the joints which are caused by decrease in inter-articular pressure.
- Treating joint sounds.
- For the treatment of symptoms associated with chronic joint diseases.

SOFT OR RESILIENT SPLINT

The soft splint is an appliance fabricated from resilient material and typically adapted to the maxillary teeth. Treatment goals are to attain even and synchronous contact with the opposing teeth. It's fast to fabricate and can be provided as "emergency treatment" for a patient who presents with associate acute TMD. The only record required is an upper alginate impression. These appliances are usually worn solely at night time and can produce symptomatic relief within six weeks. They must get replaced after four – six months as they lose their resilience with the passage of time.

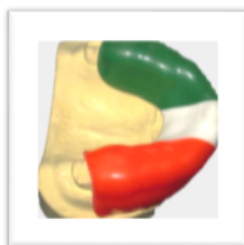


Fig. 4: Athletic mouth guard

INDICATIONS:

- In reducing symptoms of temporomandibular disorders (joint dysfunction and myalgia).
- Protective device for persons seemingly to receive trauma to their dental arches (athletic splint)
- To stop bruxism and clenching
- For relief of very sensitive posterior teeth because of chronic or recurrent sinusitis. The soft splints are less seemingly to cause significant occlusal changes that are sometimes noted with hard occlusal splint.

They need low density and amorphous structure; thus, they are compressed or worn before the masticatory muscles are stretched or stressed beyond their physiologic limits.

BITE SPLINT

According to Shore, this splint features a style almost like the stabilization splint however doesn't extend onto the facial or buccal surfaces of the teeth, and covers the complete palatal space. It may be most popular by some patients who need to use the splint throughout daytime, for esthetic reasons, because they are often created less visible. These feel lighter in patients with parafunctional tongue activities, such a palatal extension. A centric relation splint will simply be changed into this sort by removing facial and buccal extensions, adding palatal cover and, if needed, securing adequate retention with clasps.

CAP SPLINT

A cap splint can be represented as an intermediary between a splint and a bridge. It's helpful for temporary reconstruction before final decision concerning design, vertical dimension, etc., can be created. It's usually created using metal with the occlusal surface in hard acrylic.

HYDROSTATIC APPLIANCE (Commercial name: Aqualizer)

It employs water to balance the biting pressure, to treat malocclusion and to relieve TMJ pain and symptoms related to TMDs. once the hydrostatic cell is inserted between the arches, a sequence of reorganization spreads throughout the stomatognathic system, all occlusal disharmonies are compensated mechanically by distribution of fluid inside the cell.
10,11

NTI (Nociceptive trigeminal Inhibition) Tension Suppression System (By Dr. James Boyd)

The direct stimulation of the periodontal ligament of the lower incisors activates a feedback loop, that considerably limits the contraction intensity of the closing muscles. this is often due to the sensitive trigeminal inhibition (NTI) reflex. The NTI appliance takes advantage of this reflex via an acrylic guard worn on either the mandibular or maxillary incisors. Stock NTIs are relined with self-cure acrylic.



Fig. 5: NTI splint

LOCATION OF SPLINT: (MAXILLARY OR MANDIBULAR)

Presumably it's attainable to get constant results no matter the design of the occlusal splint however the selection of the individual situation depends on many basic principles. If teeth are missing, the splint is typically created within the jaw wherever most teeth are lost to extend the stabilising impact by creation of additional occlusal points. If molars and premolars are missing in both jaws, it

should be advisable to make both upper and lower splint or to first restore occlusion in at least one jaw with prosthodontic reconstruction.

CONCLUSION

Occlusal splint therapy has been used for several years for the diagnosis and treatment of varied disorders of the masticatory system. Several designs are described in the literature. Various sorts of splint are used to treat different conditions. A correct examination and medical diagnosis is important to guide to a decision relating to the suitable role of splint therapy for every drawback. After reading this article, clinicians should be higher equipped to with success implement splint medical care into their collection of treatment choices in managing masticatory system disorders

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