

# A-Z of Occlusal Splints in Orthodontics- Part II

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## Abstract

The treatment plan for the use of splints depends on the diagnosis after a thorough clinical examinations which includes complete dental and medical history in all the patients especially those having bruxism, TMD or facial pain. After proper examination it becomes necessary to select the best suitable occlusal splint according to the requirement of the patient as there are different types of occlusal splints available. When the occlusal splint has been delivered to the patient it becomes very important to properly follow the usage protocols in order to attain its effect.

This series of article focuses on the different types of occlusal splint, clinical implications, duration of usage of the occlusal splints and patient recall.

**Keywords:** Occlusal appliance, Temporomandibular disorders, Repositioning splint, Stabilising splint, Bite plane splints, Gelb's Mandibular orthopaedic Repositioning Splint

## Introduction

In the 21st century, it is safe to assume that dentists are familiar with 2 terms: occlusal appliances (OAs) and Temporomandibular disorders (TMDs). However, some clinicians may be surprised to learn that each of these terms has been redefined in light of research findings from the past 10-20 years. Oral appliances, which used to be simple processed acrylic devices that covered all or most of the teeth in one arch, are now available in a variety of types and designs based accordingly to their use. The conceptual basis for designing and using occlusal appliances as treatment devices also has changed considerably, ranging from simple jaw relaxation concepts to complex jaw repositioning rationales. Temporomandibular disorders, which used to be viewed as problems related to some type of occlusal or skeletal disharmony, have undergone a rather substantial paradigm shift. As the classic dental and skeletal etiologic theories have been challenged and refuted by studies conducted around the world, a biopsychosocial medical model of orthopedics, pain phenomenology, and behavioral factors has gradually replaced them.

The first 50 years of interest in TMDs were characterized by a narrow focus on mechanistic theories of etiology. In addition, these complex problems were often described in simplistic terms with diagnostic labels such as temporomandibular joint (TMJ) syndrome, myofascial pain-dysfunction syndrome, or even just TMJ problems. Because these early etiologic concepts revolved mostly around theories of occlusal disharmonies and/or skeletal malalignments, dentists became almost exclusively responsible for their management and occlusal appliances became a major treatment modality for TMD patients. Once a thorough clinical diagnosis has been established and occlusal appliance has been delivered to the patient it becomes very important to properly follow the usage protocols in order to attain its effect. This becomes the responsibility of both a doctor and the individual wearing the occlusal splint in order to maintain the proper time period for using the occlusal splint and a follow up should be scheduled for monitoring the patient.

This series of article focuses on the different types of occlusal splint, clinical implications, duration of usage of the occlusal splints and patient recall.

A broad outline of occlusal splints available in orthodontics are as follow:-

### Types of Splints

#### According to Okeson<sup>2</sup>

1. Orthopaedic Repositioning Appliance /Anterior Repositioning Appliances

2. Stabilization appliance which reduces muscle activity/Muscle Relaxation Appliance.



Figure 1. Anterior repositioning splint



Figure 2. Stabilisation Splint

#### According to Dawson<sup>3</sup>

1. Muscle Deprogrammer or Permissive Splints
2. Directive Splints or Non-Permissive Splints
3. Pseudo Permissive Splints, for example, soft splints



Figure 3. Permissive splint

#### According to Slavicek<sup>4</sup>

1. Myopathic Splint
2. Decompression Splint
3. Compression Splint
4. Verticalisation Splint
5. Anterior Repositioning Splint



Figure 4. Directive splints

#### Miscellaneous Classification of Splint

1. Bite Plane Splint
2. Hydrostatic Splint
3. MORA (Mandibular Orthopaedic Repositioning Appliance)
4. Pivot Splint

5. Soft Splint



Figure 5. Posterior Bite plane splint



Figure 6. Hydrostatic splint



Figure 7. Gelb's Mora



Figure 8. Soft and resilient splint  
Another way to classify splints based on the arch for which it is fabricated.

#### Maxillary Splints

- A. Centric With Cuspid And Anterior Guide Ramp

1. Biostar Or Omnivac Base With Self Cure Occlusal
2. Heat Processed With Clasps
3. Cast Metal - Vitallium or Gold

- B. Distraction or Forward Repositioner

1. Biostar or Omnivac Base Self Cure Occlusal

2. Heat Processed with Clasps
- C. Bite Plate
- D. Posterior Bite Plate

**Mandibular Splints**

- a. Lower Centric Splint with or without Anterior Ramp
  - b. Lower Pivot Splint
  - c. Lower Posterior Forward Position Splint
1. Partial Coverage
  2. Full Coverage

**Classification According to Alex Willis<sup>5</sup>**

- (AJO 1995 MARCH)
1. Flat Plane Splint
2. Anterior Repositioning splint
3. Canine protected splint

**Clinical Implications**

1. Patients having bruxism associated with headache without any organic cause for TMD can be treated with use of a simple full coverage head acrylic resin splint which is to be used for night only. This splint also relaxes muscles which also helps in relieving the symptoms. The type of bruxism habits dictates whether the splints should be given in upper or lower arch. Usually the maxillary guard with all the teeth in contact should be given in the patients clenching isometrically. The mandibular splint is more effective if the parafunctional movement is in or protrusive direction.

2. Canine guidance is to be given in the patients having lateral parafunctional movement, where the anterior teeth are relieved.

3. The thickness of splint is used as an important criteria in the effectiveness of the therapy. As per Mann's et al.<sup>6</sup> The best results in relieving the pain and relaxing the muscles of patients with bruxism were obtained using splints which increase vertical dimension of 4.4 mm to 8.2 mm as compared the splints which are 1mm thick.

4. According to Piper<sup>7</sup> 12-15mm thickness of splint in incisal region can reduce the clenching efficiency.

5. The conclusion of all the studies regarding the thickness of splint revealed that at least 4mm increase in vertical dimension should be given to protect the patient from bruxism. If the patient wearing 4mm thick splint still complaints of pain, muscle soreness, headache and facial muscle tightening immediately after waking then the thickness of the splint should be increased incrementally till the symptoms are relieved.

6. Now in the patient with TMD the selection of the splint depends on the diagnosis of the disorder. In case of muscle disorder the bite planes are the choice of splint. Hyperocclusion can result in the muscle disorder. Bite plane disoccludes the posterior teeth and allow the muscles to relax. Since these appliances separate the posterior teeth they should not be worn for more than 24-48 hours continuously. It can result in the supraeruption of posterior teeth.

7. Stabilization splints can also be used. Since these splints have uniform contact there are no chances of super eruption and can be worn for a long period.

8. Patients with the complaint of joint click or pop associated with muscle symptoms are diagnosed as a combination of muscle and disc disorder. These types of disorder are more damaging and are more chronic in nature.

9. The treatment of choice for such patients is full coverage stabilization splints which can be worn continuously for 24 hours except when eating. These splints can be worn for a period of 3 to 6 months so as to eliminate tooth, muscle ligament and discsymptoms. Such disorders bare good results if diagnosed early and treated properly.

10. Patients who experience in jaw locking and /or noises, painful joints and increased pain with splint therapy are diagnosed as advanced disc and muscle disorders. 7 to 10 day therapy with anterior repositioning splint may be useful in the patients with acute trauma. This splint keeps the condyle away from retro disclosure tissues so as to subside the inflammation. Such patients often complaint of joint pain, locking and instability. The treatment of choice is stabilizing splint for a period of 6 months to 2 years. These disorders are usually irreversible but splint therapy can relieve symptoms.

**Duration of Usage**

Most patients use their splints only during sleep to protect them from the effects of involuntary parafunctional motor activities like bruxing, clenching, tongue pressure, etc. Those who cannot control such habits when awake may need to use the splint during the daytime hours. There are no fixed rules for the length of time that a conservative splint (a splint that doesn't change the jaw relations except for a minimal increase of vertical) should be used. Some patients can discard them after a few months; others may need to continue them for decades. Generally wearing must not exceed a few months because with his parafunctional habits, the patient gets used to occlusal splint and a negative dependence can be created. If the patient is aware that their TMD are correlated with stressful situation such as examination or sporting events, episodic daytime wearing is advisable during these periods. In patient with frequent parafunctional habits which abrade their teeth or put in danger their prosthetic reconstructions or implants, permanent nocturnal wearing of the occlusal splint is recommended.<sup>8</sup>

Splints that do not cover all teeth with balanced contacts with opposing teeth should not be used for longer period than 4-6 weeks. During that period they should be continuously worn for 24 hrs a day and removed only when brushing the teeth. Irreversible changes may occur in the occlusion if they are used for periods longer than 6 weeks.

Anterior bite splints are worn continuously but for a very limited time, wearing it for more than 2 weeks may be hazardous in case intracapsular pathology because of compression risk. It is proposed for emergency treatment, or very short duration and musculo-articular symptoms of an acute form.

Hard splints cannot be used in the children for more than short periods because they may not fit after a relatively short time and therefore interfere with the normal growth pattern.<sup>9</sup>

The effective monitoring of the patients by the practitioner at 2,4,8 and possibly sometimes 12 weeks is essential to accompany rehabilitation and to evaluate the affect of treatment. Dylina TJ<sup>10</sup> has suggested a protocol, which include adjustments at 24hrs, 3 days, 7 days, 14 days, 21 days and 1 month.

When no movement on the splint is seen at adjustment appointments and symptoms are improving, then interval between adjustments can be extended.

Regular supervision is important and a splint should never be delivered without securing that the patient can and will come back for regular check-ups. The dentist also has to ensure that he or she is able to see the patient any working day during the first weeks after delivery.

Acute pain can be caused by inflammation in intracapsular TMJ tissues.

They may swell or shrink during different stages of the disease period. Repeated adjustments may have to be made for quite long periods.

The worsening symptoms require immediate reevaluation in order to provide explanations, corrections or necessary adjustment but also reevaluation of the diagnosis.

**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.<sup>10</sup>

**Conclusion**

Thinking about occlusal appliances this way will enable clinicians to use as they treat TMD patients conservatively and reversibly, as long as they avoid full-time wear or specific designs that lead to permanent occlusal changes; the worst-case outcome should be nothing more than a failure to relieve symptoms. As for treating sleep bruxism, there is no question that OAs can provide protection against excessive attrition of patients' teeth. They do not stop people from performing parafunctional activities at night, but they may diminish the duration, frequency, or intensity of those activities for some patients and for variable amounts of time. The only negative possibility is development or continuation of morning muscular pain in a small number of patients, which requires a change of strategy; for the majority of SB patients, however, these devices can be very helpful.

Thus this article gives an idea of the major clinical implications of occlusal splints and also explains about the correct way of using the occlusal splint and what time period should be maintained while using this appliance in order to receive its best effectiveness.

**References**

1. Klasser GD, Greene CS. Oral appliances in the management of temporomandibular disorders. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2009 Feb; 107(2):212-23
2. Okeson JP. Management of temporomandibular disorders and occlusion. 6th Edition. St. Louis; Mosby, 2008. Pg 468-510.
3. Dawson PE. Evaluation, Diagnosis and Treatment of Occlusal Problems. 2<sup>nd</sup> ed. St Louis, Mo: Mosby; 1989.
4. Slavicek R. Clinical and instrumental functional analysis for diagnosis and treatment planning : Removable Splint Therapy. 1989; 23(1): 42.
5. Willis AW. The effectiveness of an extreme canine protected splint with limited lateral movement in treatment of temporomandibular dysfunction. *Am J Orthod Dentofacial Orthop.* 1995; 107(3): 229-234
6. Piper M. Manual for intermediate to advanced TMD treatment. St. Petersburg (FL): Center for Advanced Dental Study. 1999. 1-17.
7. Okeson J. The effects of hard and soft occlusal splints on nocturnal bruxism. *J Am Dent Assoc.* 1987; 114:788.
8. Deogade CS, Nazikar G. Occlusal splint therapy. *IJDPMS.* 2013; 1(2).
9. Dylina TJ. A common sense approach to splint therapy. *J Prosth Dent.* 2001; 86:539-45
10. Yunus N. Occlusal Splint Therapy : A review In *J Dent Ed.* 2009; 2(1).