

# OCCUSAL FORMULAS TYPES, CHARACTERISTICS AND INDICATIONS BIBIOGRAPHIC REVIEW

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## ABSTRACT

Occlusal plates, also called guards or planes, have been used for more than a century, since then, a multitude of occlusal devices has been proposed for the treatment of occlusal dysfunction as concepts have evolved and changed. They are a very frequent therapeutic indication in numerous pathologies or disorders of the craniocervico-mandibular unit and are included in the non-invasive and reversible modalities. In search of better results, they have been designed in different ways and made with different materials.

**KEYWORDS:** Occlusal plates, temporomandibular disorder, temporomandibular joint.

## 1. INTRODUCTION

Temporomandibular Disorders (TMD) are part of a set of musculoskeletal conditions that affect the temporomandibular joint (TMJ), chewing muscles, and adjacent anatomical structures. They are characterized by the presence of joint sounds and asymmetric or limited mandibular movements. Temporomandibular disorders have been identified as the main cause of pain in the oral and facial region not originated by the dental organs. Therefore, they are considered to be a problem in the general population, whose signs and symptoms meet a multifactorial character that must be addressed in a multidisciplinary manner in order to offer a better opportunity for treatment success<sup>1,2</sup>.

Occlusal plaques are part of the treatment in temporomandibular disorders, however, it is necessary to know its indications, contraindications, advantages and disadvantages of each one. We can define the occlusal plate as a removable orthopedic device that allows modifying and establishing new dental and joint relationships in patients with temporomandibular dysfunction. Some authors mention them as occlusal or flat splints and refer to them as a very therapeutic indication frequent in numerous pathologies or disorders of the cranio-cervic-mandibular unit, giving them various effects<sup>2,3</sup>.

For this reason, choosing a correct device, properly adjusted and properly used will achieve the effects sought in the treatment. Occlusal plaques can be classified according to their function, therapeutic

purpose, coverage and hardness. Depending on the function, can be used for muscle relaxation, such as mandibular repositioners, reducing planes, distractors and protectors. For therapeutic purposes they can be classified into programmed condylar changes and without condylar changes. Due to their coverage, they can be partial or total and, according to their hardness, can be classified as rigid, semi-rigid and resilient<sup>4</sup>.

Analyzing the literature, it can be seen that these devices have been used to deprogram, modify the sensory input, reduce the electromyographic activity of the mandibular and cervical levator muscles, decrease hyperactivity and muscle pain, achieve occlusal stability and manipulate the mandibular position. in order to improve the structural relationship of the temporomandibular joint<sup>5,6</sup>.

## 2. LITERATURE REVIEW

TMJ dysfunction is the most frequent cause of facial pain after dental pain, as well as chronic and temporal preauricular pre-auricular pain. The causes that cause this disorder are multiple and include local factors such as missing teeth, maladjusted denture restorations, dental malocclusion, trauma, bruxism, rheumatoid arthritis, exaggerated joint movement, Ehlers Danlos syndrome and stress as a major factor in today's population; Other causal agents also exist, such as growth factors and jaw development<sup>1</sup>.

In 1986, Dr. Bell classified them considering the clinical manifestations that patients had. This classification was adopted by the Dental Association (ADA) and was applied until 1996, when Okeson, along with the American Academy of Orofacial Pain (AAOP), classified them into 4 groups: chewing muscle disorders, TMJ disorders, chronic mandibular hypomobility, growth disorders.

Symptoms of TMJ disorders may present in the head or neck, so there are a variety of these and may suggest such disorders (Table1).

It is important to know the predisposing, precipitating and perpetuating factors of TMD. Predisposing factors increase the risk of TMD and may be pathophysiological (neurological, vascular, hormonal, nutritional and degenerative), structural (insufficient condyle development) and occlusal

(absence of posterior dental sectors, orthodontic treatment). Precipitating factors initiate the disorder and may be microtraumas, extrinsic repeated microtraumas (parafunctional habits) and intrinsic repeated microtraumas (bruxism). Regarding the perpetuating factors, it can be said that they prevent the cure and propitiate the progress of a TMD and an example are the alterations of the cervical spine<sup>1</sup>.

**Table 1.** TMJ Disorder Symptoms

|                                                                                                      |                                                |
|------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Sounds or feelings of bursting, crackling or hissing at the ATM while eating or drinking.            | Inflammation on one or both sides of the face. |
| Feeling of closing or brief engagement of the jaw while trying to open or close it or while chewing. | Headache, ear and neck.                        |
| Difficulty opening the mouth completely.                                                             | Spasm or muscle pain in the TMJ region.        |
| Jaw pain.                                                                                            | Facial and / or TMJ pain.                      |

Own source<sup>1</sup>.

One of the most commonly used tools for treating patients with TMD and bruxism is occlusal plaques. These devices have been used to deprogram, modify sensory stimulation, reduce the electromagnetic activity of muscles, decrease hyperactivity and muscle pain, achieve occlusal stability and manipulate the mandibular position in order to improve the structural relationship of the TMJ.

According to the glossary of prosthetic terms, an occlusal plaque is defined as any removable artificial occlusal surface that affects the jaw-jaw relationship used for diagnosis or therapy; Uses of this device may include, but are not limited to, occlusal stabilization for the treatment of TMD, diagnostic overlap prior to extensive intervention, occlusal positioning, and prevention of teething wear or damage to restorative materials. Considering all of the above, we can define occlusal plates as removable appliances. normally made of hard acrylic resin, that fit the most often over the dental parts to establish a particular occlusal scheme. This treatment is considered noninvasive and reversible and may be useful to treat people with TMD. Success or failure in these cases depends on the type of device chosen, the manufacture and fit, and the collaboration of the affected patients<sup>1,3,4,7</sup>.

Occlusal plaques reduce TMD symptoms and signs by changing the patient's usual occlusal state, improving the condylar position, increasing the occlusal vertical dimension, leaving the muscle closer to the neuromuscular resting vertical dimension and providing an occlusal situation that allows the joints to adopt a more stable position from an orthopedic point of view. On the other hand, they help to establish an optimal occlusal state in the patient, which reorganizes neuromuscular reflex activity; reduce abnormal muscle activity while protecting dental and supporting structures from abnormal forces that may wear or alter them<sup>1,2,3</sup>.

We can classify the occlusal plates as follows (Table 2):

**Table 2.** Occlusal Plaque Classification

|                            |                                                                                          |
|----------------------------|------------------------------------------------------------------------------------------|
| Function                   | Muscle relaxation, mandibular repositioning, reducing planes, distractors and protectors |
| Therapeutic purpose        | With programmed therapeutic modification of the condylar position and without            |
| According to your coverage | Partial or Full                                                                          |
| Second hardness            | Rigid, semi-rigid and resilient                                                          |

Own source<sup>1,5,8</sup>.

Similarly, we can divide them as follows (Table 3):

**Table 3.** Occlusal Plaque Characteristics

| Permissive Plates | Characteristics                                                                         |                                                                                                                                                                           |                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
|                   | Allow free movement of the jaw                                                          | Its mission is to direct the condyles to a more stable musculoskeletal position (centric relationship)                                                                    | Soft, vertical, neuromorelaxant as well as myorelaxant or Michigan type plates. |
| Guidelines        | Patients with disc change disorders when the meniscus is encountered early or luxuriant | Your mission is to position the jaw in a protruding position so that the condyle be likely to relate to the disc, rather than being placed in a position posterior to it. | Anterior bite plates and posterior bite plane plates (GELB or MORA)             |

Own source

The goals of occlusal plaque treatment are:

- Establish neuromuscular harmony in the masticatory system, temporomandibular joints, bones, ligaments, bones, protection of dental parts, associated structures, muscles and tendons.
- Provide diagnostic information.
- Mechanically counteracting parafunctional forces are removable devices.
- Cause muscle relaxation and reprogramming.
- Prevent tooth wear and damage to restorations caused by bruxism, and occlusal overloads from other sources.
- Teething protection or restorations placed.
- Reduces symptoms and signs of TMD.
- Improve condylar position by increasing its vertical dimension.
- Favors cognitive awareness, increases peripheral stimuli and may even have a placebo effect<sup>1,5,9,10</sup>.

### Muscular relaxation or stabilization board

This plate is usually placed in the upper arch and provides optimal occlusal relaxation for the patient, where the condyles are in their most stable musculoskeletal position. On the other hand, while the teeth present a uniform and simultaneous contact, it provides a canine occlusion of the posterior teeth during eccentric movement; Thus, the therapeutic goal is to eliminate all orthopedic destabilization between the occlusal and articular position, so that it no longer acts as a causal factor. Usually used in muscle hyperactivity. Using it has been shown to reduce the parafunctional

activity that often accompanies stressful periods. Muscle relaxation plaques are also useful in patients with trauma-associated retrodiscitis as they can help reduce the forces exerted on damaged tissues and allow for more efficient healing.

### Michigan miorrexing plate

It is the most widely used as it has few contraindications and is effective for almost all types of muscle dysfunction, as well as for patients who suffer mainly from bruxism. It is a plate made of transparent jaw acrylic, because in this arcade it is usually more aesthetic and stable. Acrylic occlusal plaque can produce almost complete elimination of joint noise in just one week, which brings with it the improvement in painful symptoms, not only of the muscles that influence chewing, but also of other muscles such as the upper back and right arm<sup>1,8,11,12</sup>.

Key features that separate the Michigan plate from other stabilization plates:

- Fit to centric ratio.
- Freedom in the centric zone: 0-5-1-0 mm on a flat surface.
- Cusp enlargement begins approximately 1 mm from centric freedom.
- There is no incisive guide to centric occlusion.
- Allows condyles to seek optimal position.

#### Indications:

- Severe bruxism.
- Diagnosis and treatment of trauma by occlusion in any part of the masticatory system.
- Establishment of optimal condylar positions in centric relationship before definitive occlusal therapy.
- Stabilization of mobile jaw teeth and to prevent eruption of mandibular teeth.
- Support the jaw teeth in the desired position after orthodontic therapy or loss of opposing teeth.
- Differential diagnosis for patients with signs and symptoms that mimic TMJ or muscle disorders, but without masticatory system origin.
- Treatment of patients with tension headaches.

Therefore, it is mentioned that the pain subsides and sometimes is completely eliminated after a few days or weeks with the splint, but in some cases relief is only obtained after several weeks or months of periodic adjustment of the splint to the relationship. centric and interference elimination. Plaque therapy has been found to be effective in reducing or eliminating pain in 70-90% of patients. Plates will not always eliminate click or noise in the TMJ, but will eliminate jaw blockage<sup>13,14</sup>.

### Previous positioning board

Interocclusal device that promotes a more anterior position in the adaptable jaw than that of intercuspals. Its purpose is to provide a better condyle-disc ratio in the pits by replacing the anterior sense jaw and also because it extends further forward during function. It is used

primarily in patients with disc changes, although it can also be useful in those with joint noises and inflammatory disc disorders, which is relieved with the anterior position as it is more comfortable for those affected.

### Previous bite plan or board

Hard acrylic device that is used on the jaw teeth and provides contact only on the anterior mandibular teeth. It is fundamentally intended to disengage the posterior teeth and, therefore, eliminate their influence on the function of the masticatory system. It is indicated in patients with early mixed or permanent dentition, with deep bite, diminished lower third of the face and favorable rotation of the mandibular growth direction. It works by producing a rotation of the jaw on the condylar axis, unclogging the posterior teeth and facilitating passive eruption of premolars and molars<sup>1,8,15</sup>.

### Plant or backbit plate

It is usually constructed for the mandibular teeth and consists of areas of hard acrylic material, located on the posterior teeth and connected by a metal lingual bar. The therapeutic goals are to modify the vertical dimension and mandibular repositioning.

### Pivoting Plate

It is a hard material device that covers a dental arch and usually provides a single posterior contact in each quadrant, which is usually as posterior as possible. When applying a higher force under the chin, the tendency is to push the front teeth together and destroy the condyles around the posterior pivot point<sup>1,8,16</sup>.

### Soft or resilient plate

The soft plate is a device built with elastic material that usually adapts to the jaw teeth. The therapeutic goals are to achieve uniform and simultaneous contact with opposite teeth. In many cases this is difficult to achieve accurately as most soft materials do not easily adjust to the exact demands of the neuromuscular system<sup>1,8,16</sup>.

### Surgical plate

One of the first medical uses was for dental surgeons to splint the bones of the broken jaw. In November 1862, Thomas Gunning manufactured a custom accessory, "Plate" to treat himself by a broken jaw. They are employed for two purposes: to ensure the condyles in the desired centric position prior to surgical separation of the jaws, and the second objective is to place the three-dimensional shape about the opposite jaw according to the segment of the operated jaw that contains the dental arch. Indications: Plaques for postoperative use<sup>1,8,16</sup>.

## 3. CONCLUSION

Currently, there are different types of occlusal plaques, each with its own indications and

contraindications, correctly used to reduce clinical manifestations in patients with TMD, as they improve the condylar position and temporarily provide an occlusal situation, allowing the joints adopt a more stable orthopedic position while protecting dental structures and supporting abnormal forces that may wear out and / or change. In assessing the types of occlusal plaques, it may be noted that there are some use more than others because of their wide effectiveness and minimal after-treatment repercussions. One must be properly trained and informed about the use of each type of occlusal plate, as its misuse can have serious repercussions. Likewise, the reviewed literature only presents the possible aspects that interact with the professional, but not the ones that actually occur in the patient, so we have to follow a protocol to ensure the correct participation of the patient during his treatment.

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