

REVIEW ARTICLE

Splint Therapy When And Why?

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ABSTRACT

One of the first steps in TMJ disorder treatment for most patients is splint therapy. The goal of this article is to familiarize the dental clinician with the basic principles of occlusal splint therapy for treating temporomandibular disorders (TMD). Proper diagnosis and fabrication of the appropriate device can often result in relief of symptoms in such patients.

Keywords: TMJ, TMD, Symptoms, stabilisation splints.

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INTRODUCTION

Splint therapy has been widely used in the diagnosis as well as treatment of disorders of the temporomandibular joint.¹The purpose of this article is to clarify the reader's understanding of the basic splint designs and identify which factors are important in deciding how to use these effectively in daily practices. An overview of the examination and differential diagnosis is described to aid in the process of selecting the appropriate splint for each situation.

DEFINITIONS**Occlusal Splint Therapy**

Occlusal splint therapy is defined as the art and science of establishing neuro muscular harmony within the masticatory system by creating a mechanical disadvantage for parafunctional forces with removable appliances.²

Occlusal Splint

An occlusal splint may be described as any removable artificial occlusal surface used for diagnosis or therapy, occlusal stabilisation, treatment of temporomandibular disorders affecting the relationship of the mandible to the maxillae.³

Examination And Diagnosis

Currently the Temporomandibular joint syndrome is divided into three categories.⁴

- Myofascial pain dysfunction (MPD) syndrome
- Internal derangements (ID)
- Degenerative Joint Diseases (DJD)

MPD may be a psychophysiologic disease primarily involving the muscles of mastication. ID is defined as an abnormal relationship of articular disc to the mandibular condyle, fossa, and articular eminence. DJD(osteoarthritis) the organic degeneration of the articular surfaces within the TMJ.

MPD are the most common cause of pain in the head and neck region. The muscles of mastication are primarily involved and the condition is characterized by a unilateral, dull, aching pain which progressively worsens towards the end of day.⁵ Limited mouth opening, headache, tinnitus with decreased hearing are often associated with MPDs.

The symptoms related to the TMJ are

Headache: worsens on opening and closing the jaw. Facial pain increases with increase in muscle contraction on exposure to cold air.

Ear pain: Usually described as being in front of or below the ear.

Sounds: Patients with tmj disorders often present with grinding, crunching, clicking or popping sounds.

Fullness of the ear: Usually caused due to Eustachian tube dysfunction which is responsible for pressure regulation in the middle ear. Probable cause may be attributed to hyperactivity of muscles responsible for the opening and closing the Eustachian tube.

Clinical signs of TMJ disorders

1. Limited jaw opening (< 40mm)
2. Spasm of the facial muscles mainly masseter and internal pterygoid
3. Clicking and popping sounds
4. Deviation of the mandible on opening and closing the mouth
5. Clicking also associated with pain in cases of ID

Donlons and jacobson classification of internal derangements⁶

Type IA: Most common. Patient presents with derangement and popping of the joint without associated pain.

Type IB: Patient presents with popping sounds and pain due to stretching and inflammation of retrodiscal pad.

Type II : Similar to type IB but history of lockjaw can be elicited. There are two types of lockjaw, closed lockjaw due to inability of condyle to slide forward due to an anteriorly displaced disc and open lockjaw due to inability of the condyle to slide backover the disc into its normal position.

Type III : This is a persistent lock, usually closed. Hence there is no associated click or pop on examination.

PROSTHETIC MANAGEMENT OF TMJ DISORDERS

The Treatment of Myofascial pain disorders is divided into 4 phases

Phase I: Consists of educating the patient on muscle fatigue and spasm as the cause of pain and dysfunction. NSAIDS are prescribed with or without a muscle relaxant. Commonly used are Diazepam (2.5mg bd) and Ibuprofen (400mg tds).

Naproxen (500mg bd) and Celecoxib (100 mg bd) are equally effective. Moist heat and massage of the masticatory muscles helps to relieve the pain.

Phase II: Medications are continued but custom made acrylic appliance is added. If patient remains asymptomatic, the appliance is discontinued. If symptoms return use of appliance is resumed at night and its use continued as long as necessary

Phase III: includes physiotherapy of the muscles, including ultrasonic therapy and electrogalvanic stimulation.

Phase IV: includes psychological counselling to identify the stress factor and referral to a TMJ centre.

CLASSIFICATION OF SPLINTS

According to Okeson

- 1) Muscle relaxation appliance/ stabilization appliance used to reduce muscle activity
- 2) Anterior repositioning appliances/ orthopedic repositioning appliance
- 3) Other types:
 - Anterior bite plane
 - Pivoting appliance
 - Soft/ resilient appliance

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

ACCORDING TO MATERIAL OF FABRICATION

- Acrylic splints(laboratory splints)
 - Heat cured
 - Self cured
- Composite splints (inhouse splints)
- Soft splints (silicone)
- Hydrostatic splints
- Others : gold silver lead (historical purpose only)

USE OF SPLINTS

- To stabilize unstable occlusion.



Figure-1: Stabilisation splint **Figure-2:** Anterior bite Plane **Figure-3,4:** Mandibular splint with lingual bar

- FDA approved Nociceptive Trigeminal Inhibition appliance is used for treatment of migraine headache pain. To evaluate the occlusion related changes in the TMJ. To eliminate the effect of occlusal interferences.
- To protect the teeth in bruxing patients.
- To protect the cheek and/or tongue in patients with oral parafunctions.

Michigan (MI)/ stabilisation type of splint
Fabricated on the maxillary arch with uniform stable contacts on the mandibular teeth in habitual closure. Indicated in patients with signs and symptoms of muscle hyperactivity. In case of partially edentulous patients the splint is fabricated over the edentulous area. It is also commonly known as a Flat Plane Stabilisation splint.

Relaxation plate (Sved plate)/Anterior bite plane
Contact is established only between the anterior teeth. Helps prevent clenching, since posterior teeth are not engaged in closing or in parafunctional activities. Recommended as an emergency splint for patients with acute or chronic muscle pain.

Mandibular splint with lingual bar. Indicated for patients who cannot control oral parafunctional activities when awake and do not feel comfortable with a splint of the Shore-type. The splint does not extend over the cuspids or incisors and should have balanced contacts in the premolar and molar regions.

Bite splint with a pivot. Introduced by Krogh-Poulsen for the treatment of patients with disk displacement. When the patient clenches on the pivot the condyles are pulled downwards, thereby relieving traumatic load and giving the disk freedom to resume a normal position.

Cap splints. It is useful for temporary reconstruction before final decision about design, vertical dimension in cases needing extensive restorative work. The Cap splint is fabricated in metal with the occlusal surface in hard acrylic.

Repositioning splints: These splints are advocated for short term use to facilitate repositioning of the disk by guiding the mandible into a more anterior position and subsequently reduce the load on retrodiscal pain sensitive areas.

Combination splint/partial denture and splint/orthodontic appliance: Missing teeth may be added to the Shore splint which function as a temporary partial denture.

Posterior Bite Plane: Usually fabricated over the mandibular teeth with areas of hard acrylic located over the posterior teeth connected by a metal lingual bar. Mainly indicated for evaluation of increased vertical dimension and mandibular repositioning. Drawback of this splint include supra-eruption of the unopposed teeth and/or intrusion of the occluded teeth, hence long term use should be discouraged.

STEPS IN FABRICATION OF SPLINT

The main procedures are

- Making and pouring impressions
- Face bow recording
- Bite registration
- Mounting of casts
- Blocking out of undercuts
- Waxing the splint or forming of composite
- Curing of acrylic or composite
- Delivery and maintenance of splint

Few important points should be stressed

The tray should be large enough to go about 5 mm beyond the most posterior teeth. When placing the tray it is essential to not have “break through”, and the thinnest alginate above the occlusal surfaces should be at least 2 mm. Alginate impressions should be poured immediately without delay. A high quality stone has to be used and mixed with the right proportions of powder and water.

Always try to take a checkbite if:

- There is a large discrepancy between CR and CO.
- There is a significant lateral deviation of the mandible on opening and closing.
- There is a significant lateral slide in centric.

Checkpoints for Centric wax bite registration

- Relax the muscles before recording the bite by telling the patient to bite on cotton rolls so that there is complete disocclusion of posterior teeth
- No perforations of wax.
- Stable seating of splint on maxillary teeth and on casts.

Splint delivery

Make sure that extension not more than 1 mm in the horizontal plane beyond the occlusal surfaces of the maxillary teeth, minimal thickness adjacent to the second molars and minimal thickness labial to the incisors. The finished splint should be

smooth. Interproximal buccal areas are used for retention. If excessive they should be blocked out to avoid too much retention.

The splint should have adequate retention without extensions onto the facial surfaces of the incisors. Improved retention can, if needed, be achieved by adding simple ball clasps in the molar or premolar areas or by adding acrylic or composite in the molar interproximal areas on the lingual of the appliance.

Reduce the appliance as much as possible in the labial areas and check for lipseal.

Checkpoints

- Splint fully seated.
- No rocking.
- adequate retention.
- Even bilateral and posterior contacts.
- No balancing contacts.
- No contact of posteriors on protrusion
- Splint comfortable relative to bulk.
- Lipseal.
- Feather edge on palatal side.
- Check for splint centric and CR contacts.
- Do not polish the splint centric contacts.

How often should the splints be adjusted?

The splints delivered should be monitored at regular intervals. Recommended adjustment protocol a 24 hrs, 3 days, 7 days, 14 days ,21 days and 1 month should be followed.

<p>Pain Dysfunction Syndrome <i>Signs & Symptoms</i></p> <ul style="list-style-type: none"> • Pain in preauricular region sometimes referred to the part of the head • Limitation/deviation on opening • Joint clicking • Muscle tenderness on palpation or restricted movement • Headache • CO not in CR 	<p><i>Treatment</i></p> <ul style="list-style-type: none"> • Explanation & Reassurance • Analgesics & anti inflammatory agents • Physiotherapy • Muscle relaxants reduce hypertonicity and reduce parafunction • Splint therapy
<p>Internal disc displacement with reduction (click) <i>Signs & symptoms</i></p> <ul style="list-style-type: none"> • Clicking on opening & closing circles (reciprocal click) • Not usually painfull • Mandible may deviate to one side before returning to midline 	<p><i>Treatment</i></p> <ul style="list-style-type: none"> • Splint for therapeutic period • Muscle relaxants and physiotherapy • In failed conservative treatment cases surgery is an option

<p>Internal disc displacement without reduction (lock) <i>Signs & symptoms</i></p> <ul style="list-style-type: none"> • Reduction of opening due to mechanical cause • If unilateral mandible will deviate to one side & NOT return to midline 	<p><i>Treatment</i></p> <ul style="list-style-type: none"> • Counselling • Muscle relaxants and physiotherapy • If conservative treatment succeeds and clicking starts the treatment plan changes accordingly other refer to a specialist for surgery
<p>Osteoarthritis <i>Signs & symptoms</i></p> <ul style="list-style-type: none"> • Pain related and restricted to the joint • Limitation of mouth opening and localised discomfort which becomes worse with function 	<p><i>Treatment</i></p> <ul style="list-style-type: none"> ➤ Anti-inflammatory drugs and intraauricular steroids ➤ Consideration to restoration of posterior teeth ➤ Surgery

Table-1: Summary⁷

CONCLUSION

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 with respect to creating long term joint stability.

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