

Splint therapy

Definition

- A removable appliance usually made of hard acrylic that fits over the occlusal surfaces and incisal edges of teeth in one arch, creating precise occlusal contacts of teeth with the opposing arch

Uses

- Provide a more stable or functional joint position
- Introduce an optimum occlusal contact that reorganizes the neuromuscular reflex activity.
- Encourages a more normal muscle function.
- Protect teeth and supportive structures from abnormal forces that might create tooth wear.

- Occlusal splint might create the initial reversible and non invasive therapy to TMD, while improving the functional relationships of the masticatory system.
- It can affect the patient's symptoms in several manners.
- They can be helpful in ruling out certain etiological factors.

Types of occlusal splints

- Centric relation splint
- Anterior repositioning splint
- Anterior bite plane
- Posterior bite plane
- Pivoting splint
- Soft or resilient splint

Centric relation splint

- Puts the condyles in their optimum musculoskeletally stable position, the teeth are contacting evenly and simultaneously.
- Canine guidance is provided.
- The treatment goal is to eliminate malocclusion that contributes to the presence of the TM disorder.

- Indications

Generally used to treat muscle hyperactivity.

Patients with myospasm and myositis.

Patients who experience trauma or suffer an inflammatory joint disorder and have a coexisting factor of parafunctional activity are in part managed successfully with CR splint therapy.

Parafunctional activity associated with increased levels of emotional stress.

Fabrication technique

Criteria for centric relation splint

- Must accurately fit maxillary teeth, stay stable and retentive when in contact with mandibular teeth
- In CR all buccal cusps of mandibular posterior teeth should contact the splint evenly
- In protrusive movement mandibular canines must contact the splint with even force
- Canine guidance in latero-trusive movement
- The contact on posterior teeth must be heavier than anteriors
- The patient should return in 2-7 days for reevaluation

If the symptoms are relieved it is likely that the proper diagnosis has been made

Anterior repositioning splint

- It encourages the mandible to assume a more forward position in attempt to make the condyle assume a more favorable position in relation with the disc.
- The goal is to remove signs and symptoms associated with disc interference.
- Once the function is optimum the splint is gradually eliminated and patient returns to his previous preexisting occlusal relation with some conservative occlusal modification.
- Many chronic disc interference disorders return when the splint is eliminated, for these a more permanent treatment is needed like surgery or overlay partial

Indications

- Disc interference disorders like single or reciprocal click, immediate or chronic locking of the joint, some inflammatory disorders.

Fabrication technique

- A full arch acrylic resin is fabricated.
- Either arch can be used but the maxillary is preferred.
- Fabricating and fitting the splint
- Locating the correct anterior position. Should be the shortest position from the CO that eliminates the click.

Final criteria for the anterior repositioning splint

- Accurately fit maxillary teeth, support, stability, retention, all mandibular teeth should contact with even force
- The forward position established should eliminate joint symptoms
- The lingual retrusive guidance ramp should guide the mandible into the established forward position.
- It should be well polished.

Instructions to the patient

- It must be worn at all times even while eating
- At first it might create some adjustment problems especially with speech and chewing might take up to 5 days

Anterior bite plane

- Hard acrylic appliance worn over maxillary teeth to contact with only mandibular anterior teeth
- Intended to disengage posterior teeth and eliminate their influence in function or dysfunction of the masticatory system.
- Used for the treatment of muscle disorders that are caused by an occlusal condition.
- Only used for a short period as it might cause super eruption of posterior teeth leading to anterior open bite
- it does the same as the CR splint

Posterior bite plane

- Consists of hard acrylic fabricated on posterior teeth connected by a cast metal lingual bar
- Used to achieve major changes in vertical dimension and mandibular repositioning
- Used when there is severe loss of vertical dimension.

Pivoting splint

- Hard acrylic appliance worn on one arch and provides only one tooth contact in each quadrant, which is established as far posteriorly as possible.
- Used for the treatment of disorders related to degenerative joint disease.

Soft or resilient splint

Indications:

- Protective device for those likely to receive trauma like boxers
- Patients with high levels of clenching

It is difficult to achieve improved occlusal condition using a soft splint and once the patient has accommodated to the new occlusal condition the splint may in fact potentiate para-functional activity .

- Patients suffering from chronic sinusitis

Common treatment considerations in splint therapy

- A successful mode of treatment reducing 70-90% of symptoms associated with TM disorders.

Splints decrease muscle activity leading to reduced myogenic pain, decreasing the forces placed on the TMJs and other structures within the masticatory system.

Features common to all splints that are responsible in reducing muscle activity and symptoms

- Alteration in occlusal condition
- Alteration in condylar position
- Increase in the vertical dimension
- Cognitive awareness
- Placebo effect

Permanent treatment should be delayed until significant evidence exists that rules out other factors.

General considerations in occlusal therapy

- Any treatment that changes the patient's occlusal condition.
- It can be divided

Reversible: which temporarily changes the occlusal condition or joint position, like occlusal splint.

Irreversible: permanently changes the occlusal condition like selective grinding, fixed restorative procedures, orthodontic treatment. This must be provided when it is determined that it is beneficial to the patient, and when sufficient evidence exists that the primary etiologic factor is the prevalent occlusal condition.

Indications for irreversible occlusal therapy

- Treatment of some TMD
- Treatment in conjunction with other necessary measures that will significantly change the existing occlusal condition

Treatment goals for occlusal therapy

- The specific treatment goals are determined by reversible occlusal therapy
- If a centric relation occlusal splint has resolved the disorder, a similar occlusal condition should be introduced.

Treatment goals for the centric relation position

1. The condyles are resting in their most superior anterior position against the posterior slopes of articular eminence.
2. The articular disc are properly interposed between the condyle and the fossa.
3. In hinge axis closure even contact exists between posterior teeth, occlusal forces directed along the long axis of teeth
4. When the mandible moves eccentrically the anterior teeth contact and disclude posterior teeth.
5. The posterior tooth contact is more prominent than anterior teeth.

Treatment goals for predetermined forward position

- Such therapy often consists of major occlusal changes and can be expensive and time consuming
- 1. The condyle position is that closest to the centric relation position and eliminates the disc interference symptoms
- 2. In this position the discs are properly interposed between the condyle and the fossa
- 3. During closure posterior teeth contact evenly. Contact occurs between cusp tips and opposing flat surface, occlusal surface should be directed towards the long axis
- 4. During any retrusive movement sufficient retrusive guiding contacts exist and maintain the forward position
- 5. In eccentric movement anterior teeth contact and disclude posterior teeth
- 6. Posterior tooth contacts are more prominent than anteriors

Treatment planning of occlusal therapy

- The best choice is the least amount of dental alterations that will fulfill the treatment goals.
- When only minor changes are needed, selective grinding is done (when the amount needed to be removed is confined to enamel).
- As the interarch alignment becomes farther from ideal there is need for more extensive alteration of the existing occlusion, restoration of teeth may be indicated... if the skeletal mal alignment is great, surgery may be needed

Golden rules

- The simplest treatment that will accomplish the treatment goals
- Treatment should never begin till the end result can be visualized as well as each step the will make it possible

Rule of the thirds

- The critical factor that determines the appropriate treatment is the buccolingual arch discrepancy of the maxillary and mandibular posterior teeth
- The inner inclines of posterior centric cusps are divided into thirds
- When the condyles are in their desired centric relation position and the opposing cusp contacts on the third closest to the central fossa selective grinding is accomplished
- If it contacts the middle third the crowns or fixed prosthesis is needed.
- When contact occurs at the opposing centric cusp tip then ortho is needed

Factors that influence treatment planning

- Symptoms
- Condition of the dentition
- Systemic health
- Esthetics
- Finance

The patient's concern must always remain the foremost in the development of a successful treatment plan

Operative considerations in occlusal therapy

- Treatment goals to stabilize tooth contacts and provide optimum functional conditions.
- The new restoration must provide stability for both adjacent and opposing teeth.
- The contact must be in harmony with the existing contact in all posterior teeth.
- Should direct the forces along the long axis of teeth.
- It is best to carve the restoration to a cusp tip opposing a flat surface type of contact relation.
- Anterior teeth should contact with less force than posterior teeth

Treatment goals for mandibular position

- When a patient has a functional disturbance of the masticatory system it should be resolved before the operative procedure is begun.

Occlusal problems encountered

- Occlusal wear
- Deep overbite
- Anterior overjet problems
- Anterior open bite problems
- End to end occlusion
- Splayed teeth
- Cross bite
- Crowded, irregular, interlocking anterior teeth
- Severe arch malrelation.

Deep anterior overbite

- It is considered a problem if there are no stable holding contacts, the degree of difficulty encountered in the treatment is directly related to the difficulty of providing holding stops in centric relation.

- Treatment consideration:

Care must be taken to maintain neutral zone

Phonetics

Supraeruption of lower incisors need to be corrected

- Methods of correction

Reshaping by shortening the lower incisal edges in combination with restoring holding contacts on the maxillary teeth.

Orthodontics

Restorative procedures: lower incisors can sometimes be restored forward to achieve centric relation contact

surgery

Lingually inclined anterior teeth

- The centric contact is usually made against the lower labial surface by the upper incisal edges.
- The resolution of such a problem almost always involves reshaping the upper lingual surfaces and shortening the lower incisors
- Upper lingual stops must be extended by restoration.
- Complete orthodontic resolution of the problem is the first choice

- Minimizing operative intervention through the use of bite plane to solve deep overbite problems, it is considered the least complicated way to provide contacts on a removable bite plane, wearing it at night is enough to keep the teeth from erupting into tissue impingement after they have been shortened.

Solving anterior overjet problems

- Difficulty is present in providing centric stops
- Problems with posterior teeth stability are common because of the difficulty in providing anterior guidance with posterior disocclusion
- It should be determined if the excessive overjet is caused maxillary protrusion or mandibular insufficiency before treatment is started.

- Treatment objectives:

- Ensure stability of lower incisors

- Provide the best possible anterior guidance (we might need to use premolars)

- Use group function on working side to disocclude the other side

- Correct facial profile

Extreme anterior overjet treatment choices

- Reshape: some overjet problems can be corrected by closing the VDO to permit the arc of closure to move the lower anterior teeth forward into contact with the upper anterior
- Orthodontics: it is often that the solution to the problem is a combination of orthodontics and restorative
- Restorative dentistry: to restore holding contacts
- Removable appliance to provide palatal bar stops for the lower incisors
- Surgery:

The problems of anterior overjet

- In excessive anterior overjet, the lower anterior teeth have no stabilizing contacts with the maxillary teeth, they have tendency to supererupt, drift out of alignment, frequently impinge on palatal tissue.
- Lack of anterior guidance to diocclude posterior teeth
- esthetics

Treatment goals:

- Stabilize lower anterior teeth
- Provide anterior guidance (can sometimes be provided by canines or premolars)
- Provide best possible guidance in lateral excursions (group function with evenly distributed contacts)
- Improve esthetics

Anterior open bite problems

- Something should be filling the space (super eruption of teeth, tongue, pipe, lips splint...)
- The most important determination what has caused the open bite: if a habit, treatment will not be successful until the habit is stopped.
- Skeletal malrelations can be treated successfully.
- Many anterior open bites are stable
- A major problem is trauma of posterior teeth, due to lack of anterior guidance for posterior disocclusion

Treatment objectives

- Maximize the number of equal intensity occlusal contacts on both sides of the arch
- Correct the reverse smile line
- Close the anterior opening by correcting the arch that is wrong
- If a habit can't be broken the occlusion must conform to the habit
- Achieve posterior disocclusion by providing anterior guidance as far anteriorly as possible
- Use group function on working side

Finding the cause

- Thumb or finger sucking, or use of a pacifier
- Crowding
- Airway obstruction (mouth breathers)
- Lip and tongue habits
- Intracapsular TMJ deformation
- Neurologic problem like cerebral palsy leading to tongue posture problems
- Skeletal growth problems

Treating end-to-end occlusion

- They can be very stable if they are in harmony with centric relation.
- Condylar guidance can combine with flat anterior guidance to disclude posterior teeth.
- Changing this relation to an anterior overlap relation can cause a bruxing wear problem, hypermobility, or migration of anterior teeth. A night time splint may be needed.
- The ideal solution is to maintain anterior guidance as flat as possible if esthetic goal can be met

Posterior end-to-end relation

- Are all teeth stable or unstable, look for wear or hypermobility
- Can anterior guidance disclude posterior teeth
- Correction of posterior relation is accomplished by

Reshaping

Repositioning

Restoring

surgery

Splayed or separated teeth

- Teeth that are inclined outward from strong tongue pressure leading to spacing between teeth
- Disharmony between the size of teeth and jaws can cause spacing
- Teeth are positioned in a neutral zone between the lips and tongue

Questions to be answered before starting the treatment

- Why are teeth splayed (oversized tongue, or posterior interference pushing the mandible forward)
- Can the spaces be closed constricting the arch without affecting anterior guidance
- Will constricting the arch interfere with the tongue neutral zone and position the teeth away from the neutral zone

Cross bite patients

Important considerations

- Is the anterior cross bite caused by maxillary deficiency or mandibular prognathism
- What is the anterior relation in maximum intercuspation
- Do anterior teeth need restoration because of wear or appearance
- Anterior cross bite patients do not protrude, they have vertical envelope of function
- Disclusion of the balancing side can be achieved by group function on the working side
- Orthognathic surgery is often the treatment of choice

Problems

- Esthetics
- No centric contact on anteriors
- No anterior guidance

Severe arch malrelation

- Treatment goals
 - Optimum oral health
 - Occlusal stability
 - Comfortable function
 - Acceptable esthetics

Crowded irregular or interlocking anterior teeth

- Check if the teeth are stable
- Esthetics
- Function
- Tooth/ arch size
- Can the alignment of anterior teeth occur without interference of posterior teeth
- Cleanability
- Functional interferences
- Possible relation with periodontal status
- Treatment mainly orthodontic

