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Muscle deprogramming-A Review

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Abstract

Deprogrammers are customized, acrylic appliances tailored to individual patient needs, designed to fit precisely over the teeth, separating upper and lower arches to alleviate Temporomandibular Joint (TMJ) symptoms, including pain, discomfort, and limited jaw mobility. By effectively addressing bruxism, these innovative devices reduce teeth grinding and clenching, preventing tooth damage and associated dental problems. As a minimally invasive and reversible approach, deprogrammers offer a non-invasive and effective solution for diagnosing, treating, and preventing various dental issues, making them a valuable tool in modern dentistry. With their versatility in addressing occlusal issues, deprogrammers play a crucial role in dental rehabilitation, reconstruction, and preventative care, enhancing patient comfort and quality of life. As dental technology continues to advance, deprogrammers are poised to remain a vital component in the dental profession, offering a conservative, patient-centered approach to achieving optimal oral health and well-being.

Keywords: *Muscle programmer,centric relation,muscle memory.*

Introduction

According to the glossary of prosthodontic terms, centric relation (CRl is the maxillomandibular relation in which the condyles articulate with the thinnest avascular portion of their respective discs with the complex in the anterior·superior position against the shapes of the articular eminences(1). The establishment of Centric Relation (CR) is suggested by gnathologists and restorative dentists as a fundamental principle for achieving a stable and reproducible position, facilitating accurate dental reconstruction and optimal dentition restoration(2).

DISCUSSION

Accurate location and recording of the centric relation position is a crucial step in dentition rehabilitation, as it ensures a balanced and harmonious relationship between the teeth, muscles, and temporomandibular joint (TMJ), ultimately stabilizing the entire stomatognathic system.(17,18). The masticatory muscles exhibit remarkable adaptability to occlusal modifications, attributed to the concept of muscle memory or engram. Nevertheless, this adaptive mechanism can pose challenges for clinicians addressing occlusal issues.(3).Deprogramming devices eliminate muscle engrams, prevent neuromuscular avoidance, and facilitate Centric Relation (CR) positioning, enabling easier jaw alignment and accurate dental treatment.

The functions of a deprogrammer include:

1. Assessing the stability of a patient's existing bite.
2. Identifying the patient's ideal jaw position.
3. Differentiating between various types of abnormal tooth wear.
4. Simplifying the management of the patient's bite.

Aim

The goal is to Separate upper and lower posterior teeth to reset muscle patterns, guiding muscles into symmetrical contraction, smooth hinge action, and proper condylar positioning for optimal jaw alignment by erasing existing muscle closure pattern which is deprogramming of muscle Methodes (4)

Active deprogrammers

An active deprogramming device requires patient-generated muscle force to retain its position interocclusally.

- Dawson deprogrammer
- Leaf gauge deprogrammer

Passive deprogrammers deprogramming device is passive if it secures via contour snap-fit or independent retention mechanisms, requiring no patient muscle action to stay in place.

- Lucia jig/pankey deprogrammer

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- NTI-nociceptive trigeminal inhibition
- Kois deprogrammer
- B-splint

Leaf guage deprogrammer(5,6,7)

Introduced by V.O. Long in 1973, the Leaf Gauge Deprogrammer is a practical alternative to the Lucia Jig. This device consists of multiple thin plastic sheets, resembling a feeler gauge, which are inserted between the incisors at an upward angle. One or more sheets are used to achieve the desired separation.

Principle

The anterior jig or leaf gauge prevents posterior teeth occlusion, modifying proprioceptive memory by creating anterior resistance when contacted by the lower incisor during retruded closure. This rigid device reverses mandibular leverage, establishing a naturally braced tripod effect with the two condyles, thereby stabilizing the jaw and promoting optimal alignment.

Technique

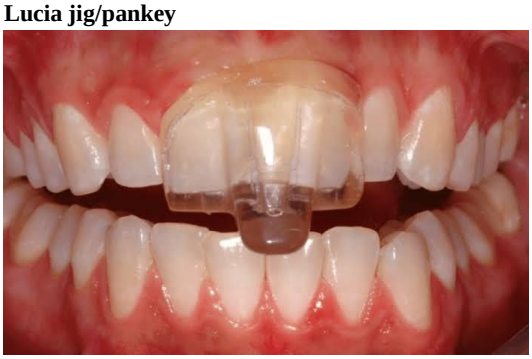
Fabrication Steps:

1. Obtain an unwanted panoramic radiographic film (15×30 cm; Carestream Dental LLC).
2. Draw a 15×60 mm outline on the film with a marker.
3. Cut out the marked area with scissors to create individual strips (10 strips total).
4. Punch a hole at one end of each strip using a paper punch (DP-52; Kangaro Group).
5. Attach all strips to a metal keychain ring through the punched hole.
6. Sterilize the deprogrammer in a dental sterilization pouch (Ayka Medical Inc) using an autoclave.

Clinical Procedure:

1. Seat the patient in an upright position.
2. Place a few leaves between the maxillary and mandibular anterior teeth.
3. Initially, the patient will have no posterior tooth contact.
4. As the condyles move superiorly, posterior teeth will eventually contact.
5. Gradually increase the number of leaves until posterior tooth disocclusion is achieved.

Lucia jig/pankey



The Lucia Jig is a therapeutic device employed in dentistry to deprogram and relax the masticatory muscles, enabling accurate registration and manipulation of the jaw in its centric relation position, particularly useful in treating Temporomandibular Disorders (TMD) and achieving optimal occlusal alignment(8)

The Lucia Jig works by preventing posterior tooth contact during mandibular elevation, thereby blocking proprioceptive impulses and facilitating muscle relaxation, which in turn enables easier jaw manipulation into the centric relation position.The lucia jig is made from self curing resin, which is adaptedto upper anterior teeth, as a separating medium soft paraffin is used

Fabrication and Adjustment of the Lucia Jig*

1. Adapt palatal acrylic to cover soft tissues, with a 40-60° lingual slope posteriorly and superiorly, using a wooden spatula.
2. Avoid engaging undercuts and thermal trauma by gently removing and reinserting the jig while setting.
3. Adjust the jig using articulating paper on the palatal aspect during lateral and antero-posterior excursive movements.
4. Identify the retruded position by scribing an arrowhead pattern with a selected lower incisor; grind away 'wings' and 'tail', leaving the apex.
5. Repeat step 4 until a raised acrylic area remains at the apex.
6. Adjust vertical height until posterior teeth are just out of contact.
7. Record the position with the jig in place.

Important Considerations

- During adjustments, patients must bite on cotton wool or a saliva ejector to maintain disclusion.
- This method applies even if upper anterior teeth are missing; simply span the edentulous area with the jig(9)

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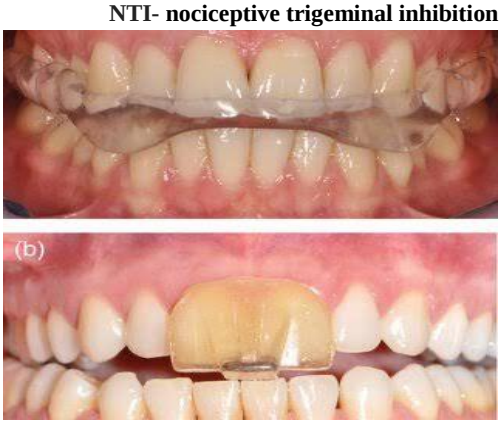
NTI- nociceptive trigeminal inhibition



The NTI-tss device is a small, pre-fabricated anterior bite stop that fits over the maxillary (or mandibular) central incisors, and is customized chairside by filling with autopolymerizing acrylate or thermoplastic material to securely adapt to the teeth and incrementally increase the vertical dimension of occlusion.(10) The NTI device is usually worn at night, but two variations of the bite stop are also available for optional daytime wear.(10)

Principle

In principle, NTI-tss can be positioned in both jaws. Clenching with an anterior-contact-only appliance results in decreased elevator muscle activity compared to maximum voluntary clenching with the natural dentition and clenching with posterior-coverage oral appliances.(16) When the lower front teeth experience significant pressure, they trigger a reflex that relaxes the temporalis muscles, preventing potential harm. This automatic response, known as the jaw-opening-reflex, serves as a protective mechanism to prevent damage to the back teeth by inhibiting the ability to bite down on hard objects.(17)

16. Bender SD. Occlusion, Function, and Parafunction: Understanding the Dynamics of a Healthy Stomatagnathic System. Available from: http://www.chairsidesplint.com /docs / OcclusionFunction-Parafunction-BENDER.pdf. [Last cited Aug 20, 2013].

Mechanism of Action:*

The NTI-tss device promotes optimal musculoskeletal stability by guiding the condyles to their ideal position, allowing for posterior-superior repositioning and symptom resolution in cases of suboptimal condylar alignment.(11) The NTI-tss device was made covering the maxillary incisors and contacting only the tips of the lower middle incisors, according to the manufacturers' guidelines (12)

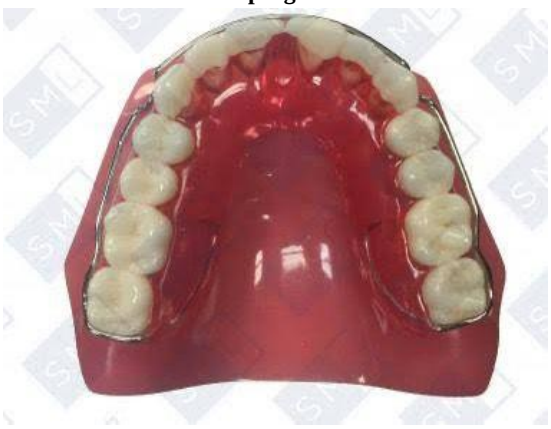
In June 2001, the FDA approved the NTI-tss device for two indications:

1. Preventing migraine pain and tension-type headaches by reducing muscle activity.13
2. Preventing bruxism and TMJ syndrome by reducing muscle activity.

NTI-tss splints offer several advantages over traditional stabilization splints, including:

- No need for cast fabrication, streamlining the treatment process
- Potential for shorter adjustment periods, enhancing patient comfort and compliance
- Compact design, making them a more convenient and appealing option for both clinicians and patients.(15)

Kois deprogrammer



The Kois Deprogrammer (KD) is a maxillary acrylic device with palatal coverage and a flat plane positioned lingually to the anterior teeth. It separates the dental arches and allows for a single point of contact between the lower central incisor and the anterior bite plane. Essentially, the KD is a modified Hawley appliance featuring an anterior bite plane. Notably, the KD is not a proprietary appliance and can be fabricated by any independent dental laboratory.

The Kois Deprogrammer (KD) serves as a diagnostic tool to evaluate whether the mandible needs to move anteriorly or posteriorly to achieve centric relation (CR) from maximal intercuspal position (MIP). Additionally, it helps differentiate between three types of abnormal occlusal attrition:

1. **Constricted Path of Closure (CPC):** Attrition occurs during closure into MIP when anterior interferences create a distal thrust, displacing the condyles posteriorly relative to CR (Fig 4).
2. **Occlusal Dysfunction:** Attrition caused by excessive grinding due to interferences on the posterior teeth (Fig 5).
3. **Parafunction (True Bruxism):** Occlusal wear resulting from excessive grinding initiated by the brain, unrelated to functional purpose(16)

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