

TITLE:

Neuro-occlusal rehabilitation in the treatment of temporomandibular joint dysfunction, cervicalgia, bruxism, and tinnitus: A case report

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Abstract:

Here we report different disorders associated in a single case. TMJ and neck pain, bruxism and tinnitus symptom were reported. After verifying the causes and define effects with high technology tool, therapeutic was conducted with occlusal splint DOOPE® and selective wear based on Neuro-Occlusal Rehabilitation getting better in all symptoms.

KEYWORDS:

Bruxism. Neck pain. Occlusal splints. Occlusal adjustment. Temporomandibular Joint dysfunction. Tinnitus.

KEY CLINICAL MESSAGE:

Importance in verify and associate causes and define effects of different disorders.

High technology combined with basic subjects in simple tools construction and economic for diagnosis.

Establishment functional effective therapy for well-being.

INTRODUCTION

Recently, the technologies used to treat temporomandibular joint (TMJ) have been examined by professionals and scientists from various fields. This multidisciplinary effort contributed to great advances in the field of TMJ research. Clinical guidelines also improved diagnosis specificity and treatment assertiveness in the treatment of temporomandibular joint (TMJ) dysfunction¹ and orofacial pain.

TMJ dysfunction includes a series of disorders (with or without pain) of multifactorial and biopsychosocial etiology that affect the chewing muscles and TMJ, resulting in musculoskeletal and neuromuscular pathological conditions². The symptoms may include orofacial pain, headache, inner ear pain, dizziness, masticatory muscle hypertrophy, mouth opening limitation or obstruction, excessive occlusal facet wear, and joint noises, with the biopsychosocial condition of the patient being an important triggering factor.

Bruxism is a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible. Bruxism has two distinct circadian manifestations: it can occur during sleep (indicated as sleep bruxism) or during wakefulness (indicated as awake bruxism)³.

A study correlating sleep bruxism and TMJ dysfunction reported somatization as a factor stronger than sleep bruxism in the diagnosis of myofascial pain and TMJ dysfunction⁴. However, depending on bruxism severity, this parafunctional (repetitive jaw-muscle) activity cannot be ignored, requiring a therapeutic approach to treat the disorder or reduce its risk.

Cervical pain is one of the five main chronic pain conditions⁵. Studies show that bruxism increases pain and may lead to TMJ dysfunction⁶. In addition, some studies showed the association between cervical spine connections and cochlear nuclei and their anatomical relationship with the cervical trigeminal ganglion and somatic tinnitus due to the activation of muscle trigger points⁷.

Tinnitus is a clinical symptom in which the patient reports the perception of sound or noise in the ears without external sound stimuli, interfering with quality of life and sleep⁷. The association of tinnitus with TMJ dysfunction and dysfunctions of the musculoskeletal system of the head and neck was already reported^{8,9}. The authors show that a high number of cases of somatosensory tinnitus, a subgroup classification, are often underdiagnosed. Tinnitus was more frequent in patients with sleep bruxism and chronic facial pain. Furthermore, myofascial pain and painful areas in the masticatory and cervical muscles on palpation were more frequent in the group with tinnitus, confirming that patients with somatosensory tinnitus need a TMJ dysfunction and neck evaluation to select the best treatment.

Occlusal splints can be used to treat TMJ dysfunction with masticatory and cervical muscle pain. Although the exact physiological effects of these splints on TMJ dysfunction treatment are still unclear, some studies show that they decrease pain and improve cervical mobility in cases of TMJ dysfunction and bruxism¹⁰.

Selective occlusal adjustment is the recommended treatment in neuro-occlusal rehabilitation (NOR). Although occlusal adjustment is well been sedimented issue for researchers and specialized clinicians, the relationship between the mandible, cranial base, and cervical spine and between TMJ dysfunction treatment and cervicgia cannot be ignored^{11,12}. The complex stomatognathic system is an integrative component of the functional priority octagon and muscle chains related to head and neck posture and the whole body¹³. The biomechanics of dental occlusion is an important aspect in clinical dentistry and

provides subsidies to identify and manage dental occlusion, TMJ dysfunction, and head and neck muscle problems with a better understanding of the impact of occlusion on stomatognathic functions¹⁴.

In view of the above, this report presents occlusal splint therapy associated with selective occlusal adjustments based on the NOR proposed by Pedro Planas (Figure 1) to achieve functional balance of the stomatognathic system. It shows a dental clinical point of view based on the basic neuroanatomy and pathophysiology and demonstrates how these concepts were mandatory in the treatment of TMJ dysfunction, cervicalgia, and bruxism with associated tinnitus. This study aimed to report how an occlusal splint and occlusal adjustment based on NOR improved the signs and symptoms of TMJ dysfunction, cervicalgia, and bruxism with associated tinnitus. The patient provided informed consent. This study was approved by the School of Odontology of Piracicaba UNICAMP Ethics Committee, SP, Brazil (CAAE:13128019.0.0000.5418 / PN: 4.060.393).

CASE DESCRIPTION

A 37-year-old Caucasian female physical educator with self-reported impaired sleep and work activities due to TMJ and neck pain and tension in the morning, with difficulty in chewing hard foods, which was not relieved by medication use. She had a vicious habit of tooth tightening with the sensation of upper teeth moving forward and tinnitus. This was the first time the patient sought treatment for this problem. Clinical examination showed Angle class I with bilateral protrusion. There was mouth opening limitation and deep masseter pain on palpation, with no clinical signs of articular TMJ dysfunction and presence of palpable nodules in the cervical ganglion chain. Signs of severe occlusal wear were observed only in the second molars. After anamnesis and clinical examination using the diagnostic criteria for TMJ dysfunction, the patient was diagnosed with muscular TMJ dysfunction resulted by trauma due to repetitive jaw-muscle activity tooth tightening movements – probable sleep or awake bruxism – with cervicalgia and lymph node sensitization associated with tinnitus due to probable retrodisc zone compression.

Treatment

The initial therapy was daytime use (except when chewing) of the DOOPE® lower occlusal splint, made according to NOR principles using high technology (HT) gnathostatic device, which considers the Camper's plane when assembling the gnathostatic models. Bausch® carbon (BK 200 µ) and maxcut tungsten cutters for the handpiece were used for adjustment.

In the first week of treatment, the cervical ganglia returned to normal, without painful symptoms in the TMJ region, but the patient reported pain after chewing. Then, premature contacts with Bausch® BK 200 µ carbon were checked in the region of the second molars on distal slopes in the upper posterior direction, which were adjusted with a high-rotation extra fine granulation diamond wheel drill for neuro-occlusal balance (Figure 4).

After complaints were resolved, the patient continued to use the occlusal splint during the day to practice sports due to an improved performance and at night due to improved quality of life and sleep.

DISCUSSION

This report presents a clinical case of TMJ dysfunction and bruxism associated with cervicalgia and tinnitus, a rare association, especially considering the overall treatment with splint and occlusal adjustment based on NOR, showing a significant improvement in all symptoms. Although the literature

reports difficulties in determining the clinical effectiveness of occlusal splints and does not provide evidence of the role of occlusion in the etiology of TMJ dysfunction and bruxism¹⁵, we agree with some authors¹⁴ that occlusion would have an impact and that an individual and careful analysis is required to determine its cause and effect². Thus, the complementary diagnostic test used in this case was the gnathostatic model, and the HT gnathostatic device was used for occlusal splint construction based on Camper's plane. This treatment based in basic subjects and clinical expertise clearly shows that the patient benefited from the administered therapy.

In fact, the patient's report regarding pain intensity and frequency shows that the severity of muscle TMJ dysfunction decreased after the use of the occlusal splint, even with the return of pain after chewing. As the patient described pain suppression after the occlusal adjustment, it seems that occlusal interferences were a determining factor in causing the signs and symptoms in this case.

The DOOPE® occlusal splint, based on NOR, which was used in the proposed TMJ dysfunction and bruxism treatment with cervicogenic somatosensory tinnitus, probably improved the synergy of oral–cervical muscle and fascia chains, and body awareness helped balance occlusion and posture¹³.

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Consequently, tinnitus was relieved due to its somatosensory cervicogenic characteristic, a factor also controlled with the oral–cervical posture. Moreover, as night bruxism was controlled in the first week, with a clear reduction in the sensation of teeth moving forward associated with the normalization of cervical ganglia and remission of painful symptoms, the patient reported a significant improvement in sleep quality and comfort. Concomitantly, after selective occlusal adjustments, one week before splint use, there was remission of the painful symptomatology related to chewing with the patient reporting a feeling of occlusal comfort and postural balance.

Based on the above discussion, the proposed NOR-based treatment had a positive impact on not only TMJ dysfunction and cervicgia complaints but also bruxism and tinnitus.

The importance of early diagnosis and treatment of these signs and symptoms is multidisciplinary and involves physicians, dentists, physiotherapists, and other health professionals. Moreover, when the association of these disorders is present in only one patient, the solution is to search for evidence to select the best treatment¹¹²¹³.

In conclusion, as the stomatognathic system demonstrates a remarkable ability to adapt to both structural and functional changes, this report shows the following: 1) the need to verify the causes and define the effects of different disorders and their associations; 2) the use of HT gnathostatic device combined with basic subjects in the construction of simple and economically viable tools necessary for diagnosis; and 3) the establishment an effective therapy to change patterns and seek the functional balance and general well-being of the patient.

AUTHOR CONTRIBUTIONS

DFB: conceived and designed the study, conducted the treatment, coordinated the co-authors responsibilities and proceeded with submission process. LEPC, SB, LFB, FB had full access to all of the data in the study and takes responsibility for the integrity of the data. LEPC was responsible for literature review of TMJ dysfunction and tinnitus. SB was responsible for the literature review of neck pain and

posture. LFB was responsible for the literature review of bruxism, treatment conduction and English grammar. FB: supervised study. All the authors analyzed and critically revised the manuscript for important intellectual content; and involved in the final approval of the manuscript.

CONFLICT OF INTEREST:

All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Professor LEPC declares he has no conflict of interest related to this research. Mrs. SB declares she has no conflict of interest related to this research. Mss. LFB declares she has no conflict of interest related to this research. Mrs. DFB reports having conflict of interest of DOOPE occlusal splint idealized by herself with INPI register. Dr FB declares he has no conflict of interest related to this research.

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FIGURE LEGEND:

Figure 1. HT (High Technology) Gnathostatic device model that use Camper's plane for diagnose and DOOPE® occlusal splint construction.