

PARAFUNCTIONS IN DYSFUNCTIONAL SYNDROME OF THE STOMATOGNATHIC SYSTEM- LITERATURE REVIEW

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Abstract.

The dysfunctional syndrome of the stomatognathic system (SDSS) is based on the problem of the vicious circle in which anxiety, tension, pain and probably psychological changes interact and we can conclude that stomatognathic parafunctions affect the stomatognathic system, and SDSS manifests itself as a dishomeostasis, an imbalance of the mechanism of regulation of functions of this morphological and functional complex.

Keywords: bruxism, parafunctional activity, temporomandibular disorders, stomatognathic system, tensions.

Introduction

Diseases located at the level of the stomatognathic system are not the product of our times [1] but they help us to understand and be even more aware to make correlations so that we can approach the problematic complexity from a global point of view outlining an integrative model and in this context the syndrome of painful dysfunction can be approached as a functional psychophysiological condition with organic changes such as occlusal disharmonies, degenerative arthritis and muscle contracture that tend to achieve self-perpetuating conditions and may later be in the teeth and joint as secondary than primary phenomena [2, 3].

Definitions

According to Folkman (1984), the definition of stress is „a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her

resources and endangering his or her well-being” [4].

The proper functioning of the stomatognathic system is achieved by dental and musculo-nervous system harmonious interaction. If either of these two systems fails, it leads to the stomatognathic system's motor apparatus impairment.

Dysfunction is often accompanied by various types of parafunctions (e.g. bruxism). The term „bruxism” was first used in the literature in 1931 by Frohman to refer to „dysfunctional gnashing and brushing of the teeth” [5].

For instance, a general medical definition of parafunction states that it is „disordered or perverted function” or „abnormal or disordered function”. However, the term of parafunction is mainly used in dentistry and its definition is more specific, but still is not universal. Thus, Medical Dictionary for the Dental Professions [6] states that parafunction is „movements of mandible

that are outside normal function, while Mosby's Dental Dictionary refers to „*habitual movements* (e.g., bruxism, clenching, and rocking of teeth using teeth for tools) *that are normal motions associated with mastication, speech, or respiratory movements and that result in worn facets and other problems associated with occlusal trauma*” [7]. Moreover, the parafunctions can be referred to as parafunctional habits or oral habits which shifts the term of oral habits fully towards abnormal range. In any case, even such specific definitions of parafunction are still not very precise [5, 6]. Kato proposed in 2003 the following definition of bruxism: „*nocturnal bruxism is a parasomnia and a parafunctional oral activity characterized on the one hand by the tightening of the jaws (tonic activity) and/or by a phasic activity of the masticatory muscles, repetitive, which results in the grinding of the teeth*” [8]. In 1990, Thorpy MJ states that nocturnal bruxism is a stereotypical movement disorder characterized by grinding or clenching of teeth during sleep [9] and with the American Sleep Disorders Association (ASDA), the International Classification of Sleep Disorders: Diagnostic and coding manual, [10]. The American Academy of Sleep Medicine (AASM) conducts the International Classification of Sleep Disorders, Westchester, pointing out that „*nocturnal bruxism is defined as a disorder of stereotypical movements during sleep and is characterized by grinding and/or clenching of teeth*”. According to this, nocturnal bruxism is a sleep disorder, being included in the category of parasomnias.

Parafunctions and dysfunctional syndrome of the stomatognathic system

Temporomandibular disorders (TMDs) represent a set of muscle-skeletal disorders associated with the masticatory system and a number of symptoms. Among the

determinants that cause dysfunction in the stomatognathic system most often the following are mentioned: traumatic occlusion, stress, wrong habits, acute and chronic injuries, muscles' dysfunctional features and iatrogenic issues. Dysfunction of the masticatory motor system persisting for years causes over time occurrence of pain symptoms or painless signs, referred to as dysfunction. The main symptoms of masticatory dysfunction are: pain during mandibular movements, limiting its mobility, and leaping and crackling in the TMJ. It is assumed that at least one of these symptoms occurs in about 90% of the human population [11]. Dysfunctional syndrome of the stomatognathic system (SDSS) manifests itself as a dishomeostasis, an imbalance of the mechanism of regulation of the functions of this morphological and functional complex (the stomatognathic system). It is pointed out that systemic homeostasis is governed by supersystemic factors that act at the level of the body creating the conditions of a system-specific homeostasis (Ca level, Mg [12, 13], hormonal titration etc.) neuromuscular disorders, sensitivity, intoxication etc. The etiology of joint disorders and muscle dysfunctions is variate and we can mention that there are a number of hypotheses in the literature that refer to primary etiological factors: peripheral neuropathies, arterial disorders, cervical syndrome, endocrine disorders [14, 15].

The dysfunctional syndrome of the stomatognathic system is based on the symptomatology like anxiety, tension, pain and probably psychological changes interact in a complex and specific way. The role of psychic stress as an etiological factor and its interpretation, some authors draw attention that there are individual differences in the ability to cope with stress, the psychological profile may be important in the adaptation of the individual [16-18]. The increase of anxiety and depression are the result of stress

regarding the stomatognathic dysfunction in the same way that they have etiological significance. The idea of stress we can mention that it is among the external factors involved in triggering the chronic orofacial pain, mentioned in the specialized studies: parafunctional habits, stress, depression, postural habits, anxiety, caffeine, sleep disorders etc [19].

In some studies, it has been shown that the clinical aspects of stomatognathic disorders are moving further and further away from the orofacial sphere to spread throughout the body to the extremities. There is a direct link between the oral neuromuscular system and the global musculature and there is also a parallel between occlusal dysfunction, bruxism, damage to the masticatory muscles and the general posture of the body, implicitly the cephalic extremity. As shown in Brodie's scheme, the muscle groups are in a continuous antagonistic balance in order to keep the head upright and the mandible at rest. Any muscle imbalance has implications for the function of neighboring muscles and can cause stomatognathic dysfunction. This explains the syndrome in people with postural defects in the muscles of the scapular girdle, neck, head [20].

Another idea shows that the Painful Dysfunction Syndrome „*is essentially a functional psychophysiological disorder with organic changes that may later be in the teeth and joint as secondary than primary phenomena*” as Laskin 1969 said in the psychophysiological theory, attention was drawn to implication. The etiology of the dysfunctional syndrome of the stomatognathic system of the spasm of the masticatory muscles is generated by increased psycho-emotional stress, the stomatognathic dysfunction being primarily a psycho-somatic disease. In 1985 Yemm argues that complex movements in bruxism are centrally governed. He shows that research into the physiology of sleep has provided

significant data in this regard. It has been shown that bruxism may be associated with sleep phases, namely when the patient is relatively easily asleep in a rapid eye movement (REM) phase and when dreaming may occur. During this phase of sleep, there are other apparently organized movements, not only of the oral-facial region, such as swallowing and grinding of teeth, but also movements of the upper and lower limbs, of the trunk [21, 22]. It has also been shown experimentally that the bruxoman's habit is not a constant feature but varies from week to week, from month to month. Psychological stress has been shown to be responsible for this variability and it also contends that bruxism depends on the state of imbalance of the various areas of the reticulated formation, as a result of self-rejection the bruxoman's movements appear as manifestations of a minor autoeroticism with the most complex clinical forms of the stomatognathic system dysfunctions. It should be perceived like a nocturnal muscular hyperactivity induced by a stressful environment or so-called „*strangled aggression*” [21]. Even if the etiological significance of psychological factors is accepted, there is much controversy regarding the onset or moment of action of the factor, the mode of action, the weight of the role in maintaining the dysfunctional syndrome. They aim to demonstrate that, aggression and anxiety would be a cause of painful joint dysfunction, but it could be considered a significant factor and it was shown that increased muscle tension could be the result of a large area of interaction between different psychological factors and other medical one. Other authors consider the aspect of anxiety as an etiological factor of pain and spasm, motivated by the increased levels of anxiety found in patients with stomatognathic dysfunctions compared to the control group [23].

In a 1968 a literature study characterizes patients with stomatognathic dysfunction as „*hostile, rigid, sarcastic*”, drawing the conclusion that personal or emotional problems result from overloading of the masticatory muscles and thus have a role in the development of some parafunctions that lead to pain [24, 25]. In an article on the role of psychological factors in the etiology of masticatory pain and dysfunction, from 1982, literature synthesized that: „*there is convincing evidence that psychological factors play a significant role in the etiology and maintenance of masticatory pain and dysfunction. These effects are mediated by: a) muscle hyperactivity; b) alteration of pain perception and tolerance; c) secondary symptoms; d) depression; e) personality traits; f) anxiety; g) parafunctional habits*”. Thus in the classification of the etiopathogenic theories realized by V. Burlui it is stated that, subsequently The patients with stomatognathic dysfunctions are divided in two categories: dominant and dominated persons. The mechanism of the transfer of the conflicting tension from the central level to the muscular level follows the physiological circuit of the gamma loop, with dysfunctional effects later manifested in the muscle, the temporo-mandibular joints, the dento-alveolar arches, the periodontium, the occlusion [1]. The persistence of the etiological factor of psychic irritation can determine the organization of the aforementioned phenomena so that the simple removal of the irritating factor can no longer achieve the balance of the stomatognathic system and restorative interventions at the level of the systemic elements are necessary Laskin has the merit of drawing attention to the possibility that stomatognathic muscular hyperactivity is mediated centrally, being the result of stress [26]. The general used criteria for classification of bruxism is depending on the timing of the episode of bruxism, there are two types

of bruxism: nocturnal bruxism and diurnal bruxism. Night bruxism is manifested by the involuntary clenching and/or rubbing of the teeth of the two arches during sleep. Nighttime bruxism is found in both children with deciduous or mixed teeth and in adults. In children it is more frequent until the age of 12 years and is not accompanied by pathological changes at the level of the dental-maxillary device, being considered a way of functionalizing the dental occlusion. In case bruxism in children acquires dysfunctional forms, with the tendency to stabilize it [27].

In this case the bruxism in children acquires dysfunctional forms, with the tendency to stabilize some pathological intermaxillary relations, the intervention is necessary to eliminate or improve the bruxism. This is achieved in practice by selective grinding or by applying orthopedic appliances. The most important clinical signs of nocturnal bruxism are: dental abrasion of varying degrees depending on the age of the disease and the more or less aggressive character of the disease, tooth grinding (sound manifestation), moderate myalgia, morning redness, and mild remodeling phenomena, bone of the alveolar processes and of the temporo-mandibular joint [28, 29].

Daytime bruxism presents clinical manifestations similar to nocturnal bruxism, but myalgia has a rising intensity throughout the day and is deaf, constrictive. Myalgias are exacerbated by the cold and can last for several days.

Depending on the position of the jaw versus the jaw during the episode of bruxism, there are two types of bruxism: central bruxism encountered when the teeth of the two arches occur in a central position; eccentric bruxism encountered when the friction of the teeth of the two arches occurs in another eccentric position [30].

There are authors who argue that central and eccentric bruxism are manifestations

of nocturnal and diurnal bruxism and other authors associate diurnal bruxism with central bruxism and nocturnal bruxism with eccentric bruxism [31].

Kato classifies bruxism into two forms: idiopathic primary bruxism; secondary bruxism of iatrogenic origin. The same author also mentions the differences between the two forms of bruxism [8]. Idiopathic primary bruxism encompasses nocturnal bruxism, except for medical causes, and diurnal bruxism due to the nervous and psychic tension during the day, and secondary bruxism includes forms of bruxism related to neurological and psychiatric pathology, sleep disorders or drug abuse [32]; ASDA and AASM who have achieved International Classification of Sleep Disorders (ICSD), divided sleep disorders into: dyssomnias, parasomnias, sleep disorders associated with psychiatric medical disorders, other possible sleep disorders. According to ICSD, parasomnias are classified into: disorders due to micro-excitations; common parasomnias associated with rapid eye movements during sleep; other parasomnias. Night bruxism is included in the category of other parasomnias [33].

Clinically bruxism manifests itself in the form of a sustained contact between the teeth for a longer period of time, strong contraction of the lifting muscles, accompanied or not by specific noises (gnashing of teeth). It comes in two clinical forms: a) bruxism in centric relation in which under the action of intense, isometric muscular contractions, the dento-dental contacts appear in static conditions, there is no noticeable movement of the mandible; b) eccentric bruxism in which under the action of intense isometric and isotonic muscle contractions the dento-dental contacts appear in dynamics. The mandible performs eccentric movements of a very small, noticeable amplitude.

The central nervous system plays a role in bruxism because stimulation of the limbic system can abolish the reflex activity that opposes this pathology.

From the point of view of the clinical manifestations it is also noted:

Coronal lesion:

- fractures, cracks in the spit;
- abrasion in the form of slightly concave wear facets, localized or generalized, symmetrical or asymmetrical, with or without preserving the vertical dimension of the lower floor;
- dental mobility, signs of periodontal disease if microbial factor is added;

Pulpal pathology;

Pain (dental, periodontal, muscular, joint, sinus, cardiac);

Hypertrophy of masseter;

- hyperactivity of the lifting muscles;
- modification of the jaw movement tire;
- migraine.

Parafunctions are represented by an abnormal activity (plus/minus- mandibular dynamics) of some muscle groups, which may recur and occur unconsciously. These parafunctions mainly target the lifting muscles, and the result is clinically manifest in the form of bruxism.

We also note that exist simtomatology like:

-*parafunctions* in the form of tics: onychophagy, biting of the lips, tongue, cheeks, suction tics, pencil suggestion, use of chewing gum. The interposition of an object between the arches can draw attention to an undersizing of the lower floor;

-*un unilateral mastication*, in the case of an obstruction or of a joint device in overocclusion, can become an unconscious habit;

-post playful postural attitudes (by the viewer, with his head resting in his hands, elbows resting on his knees);

-*professional attitudes* (shorthand, violinists, trumpeters);

-*vicious positions during sleep*.

All of these represent repetitive insidious factors (chronic microtrauma that result in unbalanced muscle contractions involving the muscles of the stomatognathic system (Brodie-Ackermann-Lejoyeux scheme) [1].

Effective management of primary awake bruxism is challenging. Since increased anxiety levels and somatization symptoms have been reported in these patients, interventions such as counselling about triggers, habits modification, relaxation therapy or biofeedback have been suggested to be appropriate.

For different treatments in the reduction of bruxism activity during sleep evaluated are as follows algorithm: (1) sleep hygiene measures combined with relaxation techniques, (2) splint therapy, (3) pharmacological therapy and (4) contingent electrical stimulation.

Occlusal splints have been considered as the first-line strategy for preventing dental grinding noise and tooth wear in primary sleep bruxism. In general, the design of the device is simple, covers the whole maxillary or mandibular dental arch, and is well tolerated by the patient.

Mohamed *et al.* reported the first RCT evaluating amitriptyline (used during 7 days) in a group of patients with sleep bruxism and temporomandibular disorder symptoms, and found no changes in pain reports and in the nocturnal masseteric muscle activities with the therapy. In opposite, Lobbezzo *et al.* evaluated the acute effect of levodopa in 10 severe sleep bruxers and found a decrease in the number of sleep-related masticatory events in 7 of them when compared to placebo. However, given the unknown clinical relevance and the lack of further research supporting its use, levodopa is not considered as a treatment for sleep bruxism [34, 35].

Other pharmacological therapies such as bromocriptine and propranolol have also been investigated, but again failed to show

positive results. An experimental one-night treatment with clonidine, an α_2 adrenergic agonist used for treating hypertension, attention-deficit hyperactivity disorder in children and for acute alcohol or substance withdrawal syndrome has demonstrated to reduce bruxism activity by 60%, but with significant adverse effects such as morning hypotension, REM sleep suppression, and dry mouth [36-38]. In patients with psychiatric and sleep comorbidities, the acute use of clonazepam has been reported to improve sleep bruxism activity together with the general quality of sleep, as suggested by Saletu *et al* [39].

Recently, some studies have evaluated the efficacy of botulinum toxin type A injections into the masticatory muscles for treating sleep bruxism. Based on PSG (placebo-controlled polysomnographic and psychometric), Shim *et al.* found that the amplitude of the muscle contraction during bruxism events was reduced after four weeks of injection, but with no changes in the rhythm or number of bruxism episodes per hour of sleep [32].

Another kind of treatment contingent electrical stimulation (CES) has reappeared in an attempt to reduce the masticatory muscle activity [40] associated to sleep bruxism. This consists in the inhibition of the masticatory muscles responsible of bruxism, applying a low-level electrical stimulation on the muscles when they become active, i.e. during the bruxism episode [26].

Conclusion

The importance of psychophysiological theory also lies in the use of therapeutic techniques of bio-feed-back and masotherapy, these belonging to a multidisciplinary approach to the treatment of dysfunctional syndrome. Behavioral medical orientation using bio-feed-back training and conducting stress management sought to highlight stress by promoting self-awareness and self-regulation of

tension in the patient's mandator muscles as well as the use of drug treatment and occluded interceptors depending on the severity of the recorded clinical situation. Based on the present literature review on

the influence of stomatognathic parafunctions on stomatognathic system, we can conclude that stomatognathic parafunctions affect stomatognathic system.

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