



Key Factors in the Development of Muscle Pain Syndrome in Diseases of the Temporomandibular Joint (Review)

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Abstract The current aspects of the formation of bolevoogo syndrome in the area of the nervous system at zabolevaniy high-low cell system. The author presented a comprehensive review of the literature of the adult and adult pupils, detalizirovala the basic factors of the formation of bolevoogo syndrome in the zabolevanii high-low cell system. The symptoms of bolevoogo syndrome are described in a timely manner and are planned for treatment.

Keywords: Syndrome of pain dysfunction, temporomandibular joint, myofascial syndrome.

The literature suggests that more than 80% of cases of pain dysfunction syndrome (PDSS) symptoms of the temporomandibular joint (TMJ) are not associated with inflammatory processes, but are caused by functional disorders [16], which leaves an immense scope for structuring the most diverse pathogenetic methodologies of this inflammation.

Currently, several pathogenetic theories explaining the algorithm of pain construction in dysfunctional disorders of masticatory muscles have been developed, among which it is necessary to emphasize the main ones. These are the vascular theory, the theory of generating pathologically increased tension and the psychophysiological theory. At the same time, one can trace a pattern when researchers adhering to the corresponding etiological theory tend to ignore or exaggerate the role of certain views on this issue [26]. According to the vascular theory of pain, the lever of its formation should be considered from the position of decreased blood supply in certain links of the trigeminal nerve system. It is known that the sheaths of the maxillary and mandibular nerves contain closely interconnected blood vessels and nerve-receptor structures [33]. At the same time, the uniqueness of the structure of the mandibular nerve contributes to the acquisition of a variety of sensory information from the oral cavity [22]. Due to the proximity of blood vessels and nerve trunks, the existing abnormalities are generalized, which represents a vasoneural conflict leading to pain syndrome.

The theory of the generation of pathologically intensified excitation is based on the fact that a focus of pathological excitation in the area of the masticatory muscles is formed in the form of painful trigger points (TT). Mention of areas of painful thickening can be found in the works of the British physiologist Balfour 1816.

In 1834, Frorier called the painful thrusts he found in the muscles a "muscle callus". Nowadays they are described as "nodular swellings and thickenings in the masticatory muscles that initiate pain in the teeth." [8]. J. Travell and G. Simons in 1980 published data on the transformation of TT sites in the masticatory muscle area during functional muscle disorders and psycho-emotional tension.

According to many publications, TT is a local muscle thickening, which can have various sizes, configurations, lengths and consistency. At the same time, the following variants are emphasized: a) active TT, when there is an area of muscle thickening, "muscle spasm", which correlates with spontaneous and reflected pain, local spastic response, changes in coordination relations in the form of synergistic activity activation; b) "silent" (latent) TT, when there is an area of muscle thickening, but spontaneous pain synchronously with a positive "jump" symptom is ignored. [18, 21, 29]. According to the hypothesis of L.L. Schwartz (1955), chewing muscle spasm "is the initial factor responsible for the signs and symptoms of the pain syndrome of TMJ dysfunction".

Muscle spasm is the basis for the development of the dysfunctional syndrome. It is formed from excessive stretching, reduction, fatigue of the muscles. At the first stage there is a static tension in the muscle, and then a stable local hypertonicity is formed. It was proved by Ivanichev G.A. (1997) that the biochemical basis of muscle thickening revival is calcium excess with the deficit of macroergic compounds, which provokes muscle fiber contractility increase and blood flow reduction in them. In masticatory muscles with such dysfunction, foci of contractures, areas of overstretching, physiological disorders of the contraction process are formed [20]. There are also revealed the changes similar to those that occur in violation of neurotrophic control. K. Ronkin (2014) believes that the increase in the bio-activity of the temporal muscles (BEA) affects the coordination of the act of chewing, for the integral functioning of which the disorders of physiological teeth clamping are also important, they can inspire proprioceptive disorders, which reflexively lead to tension, spasm and pain in the muscles.

Local muscle hypertonus, from the position of the authors of this theory, can be motivated by short-term painful muscle spasms: for example, in the jaw region during yawning or forced opening of the mouth. Muscle spasm in this case not only becomes an auxiliary source of pain, but also generates a vicious circle that guarantees chronicity of the somatogenic pain symptom. A patient develops a pathological stereotype of the lower jaw movements, namely: muscle spasm - muscle pain - fortification (saving) reduction of the amplitude of its contractile activity during chewing - muscle spasm - reduction of the lower jaw movements, etc. [27].

Of particular interest are the views of the authors who believe that in the pathogenesis of myofascial syndrome (MFS) lies dysfunction of the neuromuscular apparatus located in the immediate vicinity of the motor terminal plate, i.e. in the area of neuromuscular junction. This causes their local excessive contraction [18].

When studying quantitative parameters, E.A. Bulycheva et al. revealed that a decrease in the length of the mandibular movement trajectories was most frequently observed in patients with TMJ pain dysfunction syndrome (67.7%). The authors attributed such a decrease in the amplitude of lower jaw movements to "functional overload of the masticatory muscles with their hypertension" [10].

The concept that unites the views of different authors is that any proprioceptive impulse, including pathological one, causes in the descending nucleus of the trigeminal nerve a physiological enhanced excitation, which can develop into a pathological one if exposed for a long time. Along with this, the somatosensory cortex also plays a certain role in the sensation of pain. The following neuronal mechanisms are considered to be involved: sensitization of cortical parts of the brain, pathological excitation of peripheral nociceptive afferent fibers of the trigeminal system, reduction of modulating antinociceptive cerebral influences, development of spontaneous central pain as a result of on-cell activation in the medulla oblongata, cortical hyperexcitability. It is no coincidence that pain sensations in TMJD have an autonomic coloring in the form of burning and tumescence.

The observation of L.L. Schwartz (1955) laid the foundation for the first studies, the result of which in 1969 was the introduction, together with D.M. Laskin, of the psychophysiological theory to explain the dysfunctional TMJ syndrome. According to it a stressful situation causes psycho-

vegetative stimulation of an organism that leads to increase in a tone of masticatory muscles, their spasm and TMJ dysfunction. In this case, the TT are also activated, which is accompanied by local pain [24].

L.L. Schwartz (1955), introducing than the disorder associated with the pathology of the masticatory apparatus. It is known that sympathoadrenal system takes an active part in formation of pain reactions of an organism. Increased sympathetic activity is a universal reaction of an organism to stress (trauma, infection, anxiety). In this case, patients have an increase in the threshold of pain perception, which is aimed to reduce pain sensations, but it is performed by increasing the muscle tone, which causes the pain syndrome, which, in turn, increases the muscle tone [19, 30].

The study of the masticatory muscles using needle EMG reveals a high level of activity in the TMs themselves and a positive response to psychoemotional influence [1,2,4]. At the same time, there is an increase in bioelectrical activity (BEA) in m. masseter and m. temporalis at rest [5], indicating dysfunctional spasm. According to the authors, painful areas - "trigger" or "trigger" muscle zones - arise in the spasmed muscles, from which the pain irradiates to the neighboring areas of the face and neck. The works of several researchers testify to the presence of sympathetic innervation of the muscle spindles, which are the proprioceptive component of the muscle tissue. However, there are few works on the autonomous control of extrafusional or normal muscle fibers, through the TT of which the connection of psychological stress with muscle pain is carried out. The same opinion is held by M.N. Puzin et al. (2002), claiming that the appearance as a result of sympathetic activation of TT associated with muscle spindles can be considered as a result of stress, in which psycho-emotional tension supports TT activation.

Many researchers attribute the leading role in the pathogenesis of TMJ disorders primarily to the masticatory muscles [3,7,9,25].

Numerous proponents of the occlusal-articular theory of dysfunctional disorders believe that the main cause of their development is a masticatory apparatus disorder. At the same time, the authors directly or indirectly link the occurrence of functional disorders of the masticatory system with tooth loss and increased tooth wear [5,8,11,28].

Factors supporting myofascial pain syndrome (MFPS) are secondary changes in the TMJ, masticatory and mimic muscles, as well as the presence of a psycho-vegetative syndrome [34,25,30]. According to Baradina I.N. et al., occlusal disorders are the root cause of functional disorders of mastication, therefore, elimination of the imbalance should lead to recovery [4]. However, in MFBS, restoration of physiological contact between the teeth does not lead to functional muscle recovery. At the same time, it should be noted that there are a large number of patients with functional disorders, but without disorders of the maxillary system. This indicates that not only occlusal disorders can cause MFBS.

Of all the parafunctional disorders of the masticatory muscles, bruxism is considered to be the most unfavorable risk factor for the development of TMJD and myofacial pain [11]. According to the observations of D.Sh. Shukrullaeva (2016), bruxism is observed in 10-21.4% of the adult population and in 15.6-18% of children and adolescents. Such a high frequency of this form of parafunction is explained by the influence of emotional factors on human life. Most domestic and foreign authors clinically and experimentally confirm that the leading link in the formation of bruxism is psychoemotional stress [31].

The cause and simultaneously aggravating circumstances of the muscle disorder are considered to be nocturnal clenching of teeth, clenching of teeth during emotional stress and non-drinking chewing, manifested permanently or with intermittent frequency [10]. The theory of occurrence of bruxism and parafunctions of the masticatory muscles, connected with emotional tension, confirm

A.V. Tsimbalistov, T.A. Lopushanskaya (2012), V.M. Bezrukov et al. S. Sato et al. (2008) believe that bruxism is an example of the somatic realization of psychological stress.

Numerous recent publications indicate the importance of psychosomatic factors in the occurrence of TMJD. A number of scientists have noted that the main factor predisposing to the occurrence of neuromuscular dysregulation and joint disease is chronic emotional tension (repeated mental trauma). TMJ pathology was often observed in patients who were subjected to prolonged emotional stress, as well as in cases of masked depression and some neuropsychiatric diseases. Affective disorders, predominantly in the form of depression and anxiety, were found in 40.3% of those examined for temporomandibular dysfunction.

The results of the clinical examination conducted by R.R. Semenov (2013) showed that patients with TMJD have, in addition to algic clinical manifestations, psychopathological disorders characterized by complexity and diversity. The author cites data that 40% of patients with the disease in question were in a state of psychoemotional tension. Affective disorders were mostly represented by depression and anxiety. Neuropsychological examination of this category of patients revealed a high level of anxiety and depressive disorders. These psychopathological disorders were directly related to the severity of pain in TMJD.

V.V. Gorbachev (2006) found that chronic emotional stress was the cause of masticatory muscle hypertonicity in 71.8%. Most researchers who study the psychophysiological aspects of TMJ pathology believe that this disorder develops in response to stress exposure. Muscle hyperactivity in individuals with TMJD has also been identified during examinations and while watching horror movies. However, other researchers do not support this view of the nature of TMJD. They believe that the link between muscle hyperactivity and TMJD has not been convincingly demonstrated, and emotional stress may be a consequence of pain, but not the cause.

Chronic emotional stress (repetitive mental trauma) leading to masticatory muscle hypertension is caused by both social and psychological reasons: family and occupational turmoil, the presence of concomitant diseases, illness or loss of loved ones, the onset of fading [23]. As a consequence, the TMJ function disorders detected in the examinees fall into the locus minoris resistentiae (place of least resistance), leading to a chronic form of muscular tension [9]. A similar model of the development of TMJ pain dysfunction is proposed by G. Montgomery, J. Rugh (1990). According to their ideas, skeletal-muscular pain disorders (stress-muscle hyperactivity-pain, SMP-model) and the development of the pain syndrome follows the following scheme: stress - muscle hyperactivity - pain.

Summarizing the review of 70 articles, I believe that psychological, emotional factors, unexpressed mental manifestations, as well as the social and economic condition, which not only lead to long-term strengthening of the masticatory muscles tone, but also reduce the "adaptive capacity" of the individual, that in the aggregate contribute to the formation and development of TMJD.

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