

THE IMPLICATION OF TMJ MUSCLE IN POSTURE RELATION AND THEM ,BIOLOGICAL AND FUNCTIONAL CORRELATION - literature review

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ABSTRACT

The main disorders of the crano-cervico-mandibular system, which often affect human posture, are the temporomandibular disorders (TMD). These are a group of diseases affecting the muscle of stomatognathic system ,temporomandibular joint, and surrounding structures.Posture refers to the position of the human body and its orientation in space. Posture involves muscle activation that, controlled by the central nervous system), leads to postural adjustments Postural adjustments are the result of a complex system of mechanisms and nervous correlation that are controlled by multisensory inputs (visual, vestibular, and somatosensory) integrated in the central nervous system .

Keywords : TMJ, muscle , posture relation , rehabilitation , algorithm treatment , prosthetic .

INTRODUCTION

The Stomatognathic system(ssgt) is a functional, biological ,integral and integrative structure from oral territory characterized by several structures: skeletal components (maxilla and mandible), dental arches, soft tissues (salivary glands, nervous and vascular supplies), and the temporomandibular joint and masticatory muscles .[1,2,]

These structures act in harmony to perform different functional tasks (to speak, to break food down into small pieces, and to swallow)[3].In particular, the temporomandibular joint makes muscular and

ligamentary connections to the cervical region, forming a functional complex called the“crano-cervico-mandibularsystem.”

The extensive afferent and efferent innervations of the ssgt. are reflected in the extensive representation of the orofacial district in the motor and sensory areas of the cerebral cortex.[4]

From literature we revealed that the stomatognathic system also plays an important role in postural control in this context the main disorders of the crano-cervico-mandibular system, which often affect human posture, are the temporomandibular disorders

(TMD) that include TMJ and also the afferent muscle and also surrounding structures.

According to the dento-muscular, physiological and psychophysiological theories, it would seem that the muscles of the stomatognathic system are, in the majority of cases, incriminated in producing the dysfunctions of the stomatognathic system.

In several studies authors indicate that different mandibular positions can induce variations in body posture. [5]. For example, a change in the mandibular position, which can lead to changes in the proprioceptive and periodontal afferents, may affect the center of foot pressure (COP) position and gait stability.[6,7,8] An influence of periodontal receptors on body posture is hypothesized by Gangloff and Perrin (2002),[9] who found a significant alteration of postural control after unilateral truncular anesthesia of the mandibular nerve.[10].

Patients with dysfunctional syndrome of stomatognathic system can report bilateral or unilateral pain as their primary symptom, typically triggered by jaw movements or by palpation, where the pain sometimes radiates to the temples or to the neck.[11,12].

In this context, we can reveal that posture is an automatic and unconscious position and it represents the body's reaction to the gravity force.

Also, it is maintained through the contraction of skeletal muscles, coordinated by a series of stimuli of various nature and through continuous adjustment of neuromuscular type [13-14]. In both static and dynamic balance, the center of gravity is maintained in accordance to anatomic structures but with the minimal energy consumption, distributing the body weight throughout the skeletal system. The authors, also, revealed in 2009 the antagonistic isometric contractions that

determine postural tone, and the responsible for maintaining the posture.

The posture is possible thanks to the interaction between the muscular system and skeletal system.[15]

In literature, from a purely motor function, the posture can be:

- Static: an active resistance to the dislocation caused by the action of the forces of gravity on the body segments.
- Dynamic: it maintains the balance through the synergistic action of active components (such as muscles), passive components (such as joints and bones), and control components (SNC, proprioceptive and exteroceptive systems, vestibular system) (16).

This system is known from studies as Tonic Postural System, and is a «cybernetic system», composed by an afferent system (sensory pathways) that transmits information to a central computer (Central Nervous System-SNC) that (muscular system) is ultimately responsible for postural control thanks to an efferent, effector pathway.

To simplify the basic mechanism that regulates the posture, we could refer it to a simple reflex arc, even if, unlike what happens with the reflexes, the postural movements are continuously influenced and improved by learning and by the exercise. (17)

From the gnathologist's point of view, the main incriminated muscle muscular dysfunction within the dysfunctional syndrome of the stomatognathic system is the external pterygoid with both fascicles, but also the masseter, temporal and internal pterygoid.

Other muscles associated with dysfunction are considered sternocleidomastoid and trapezius. Dawson is the one who assumes that muscle function changes in the presence of occlusal interference, joint obstruction, periodontal

changes, organs that play the role of proprioceptors of the stomatognathic system.

Studies and interest in clarifying this posturology implication and problem have shown that the clinical resonance of stomatognathic disorders is increasingly moving away from the orofacial sphere to spread throughout the body to the foot extremities.

In 1971, important authors shows that there is a direct connection between the oral neuromuscular system and the global musculature and also there is a parallelism between occlusal dysfunction, bruxism, impairment of the masticatory muscles and the general posture of the body, implicitly of the cephalic extremity that is reveals like the primary responsible factor in the etiology of the dysfunctional syndrome of the stomatognathic system . [1,2,]

According to the balance factors required for homeostasis of the stomathognated system and the positions in genetal from Brodie's scheme, the muscle groups are in a continuous antagonistic balance in order to keep the head upright and the mandible resting. Some findings are also supported by some authors who relies on the articles of Rocabado (physiotherapist), stating, among other things, that 70% of Class II Angle cases have a head posture said that head position seems to be important and postural modification of the head will cause different bone ratios on the vertebral assembly.

The clinical and paraclinical examination of these category of dysfunction patients will necessarily include the assessment of physical as well as behavioral, psychosocial factors. In this context, the aspect of anxiety as an etiological factor of pain and spasm, is sustained by motivated by the increased levels of anxiety found in patients with stomatognathic dysfunction.

In the clinical aspects is necessary for the practitioners for having performs by inspection, palpation and rarely auscultation, in a postural resting position as during active dynamic contraction. Examining the muscles of the stomatognathic system will consider the following elements: appreciation of muscle tonicity, the appearance of muscle mass and of the bilateral and symmetrical insertions.

In the postural resting position, the muscles are characterized by a state of slight contraction, for some authors not electromographically undetectable, which achieves a state of mild tension called postural muscle tone. Posture tone is variable, depending on the clinical, functional, morphological factors, its assessment must be done carefully, depending on the relationships between the insertional bone segments and the state of posture tension that the muscle develops. [1,2]

For orofacial muscles,in general , the tonicity is appreciated by the simetric right and left ,palpation ,of the mobilizing muscles of the neighboring regions, of the lips and cheeks, of the tongue.

The tonicity of the muscles of the lips and cheeks can be appreciated by the Netter maneuver. The patient may recommend movements (for the mandibule,for the tongue), to which the practitioner opposes, to test the contraction capacity of the subject.[forna]. Deviation of the mandibular dynamics from the normal movement trajectories, due to the imperative adaptation needed by the interposition of the obstacle, as well as due to the occurrence of nociceptive reflexes, requires the modification of the muscular contraction, both in terms of coordination and resting tone, capacity resistance to effort. Some of the important symtoms caracterising the disfunctional syndrom of stomatognathic system in the muscular pricipal affectation are the pain- miofascial pain -,the term "myofacial pain" was introduced by

Travell and Rinzler in the muscular pathology of the stomatognathic system. [1,2]

Muscular hypertonia is appreciated by clinical examination manoeuvre and also characterised to the increase of the consistency of the muscle mass upon palpation. which subsequently leads to the decrease of the vertical posture dimension of the lower level (SN GN) - DVP, and this modifies the mandible position influencing the position of the maxillars .

Muscle spasm always appears accompanied by strong pain in the interested muscle mass and functional impotence. At palpation clinical examination ,the muscle is tightened, with a variable consistency up to the appearance of woody consistency under the name of trismus masseterin, causing paramedian displacements of the mandible. It is obvious, especially at the masseter and the temporal, masseterine hypertrophy can be accompanied by the outflow of the gonion and the accentuation of the corner aspect of the face. When it is unilateral it is accompanied by facial asymmetry.

In general , and in the stomatognathic system, muscular contraction occurs in two forms: isotonic contraction and isometric contraction.

The fatigue of the muscles of the stomatognathic system, within the dysfunctional syndrome, can be due either to the shortening of the breaks necessary for the restoration, or to change the patterns, the coordination of the muscular contraction, the lack of training in mechanical overload. Literature confirm, in 2010, that ,the muscle asymmetry during chewing activity is seen predominantly in patients with TMD found no significant difference between TMD or healthy patients when assessing muscle asymmetry. It is observed that all individuals including the healthy ones have some degree of asymmetry, and that the temporal muscle is more active

compared to the masseter in all study subjects.[18] Tension perceived in TMD patients is characterized as causal factor for its symptomatology , therefore the electrical activity is not necessarily increased in the afferent muscle on these patients.

However, it should be stressed that a possible increase in muscle activity may precede and produce pain,[19, 20] do not support the use of EMG on an integrated surface as a means to differentiate patients with TMD from controls, even when they are exposed to standard stresses with a significant level of physiological and emotional activation are tired or painful they are centrally inhibited from being recruited.[21, 22,23].

Literature electromyography studies in stomatognathic system muscle have shown that the mean values for electrical activity of the masseter and temporal muscles at rest range 2.2 - 4.0 v in individuals with TMD and 2.9 3.8 v in healthy subjects.

However, Glaros et al. (1997) [24] state that the electrical activity is slightly higher in the TMD patients, averaging 2.9 to 3.3 v for the masseter and 4.5 to 5.7 v for temporal. In healthy volunteers, the average was 2.2 to 2.3 for the masseter and 3.6 to 3.7 for the temporal. also in literature, the consensus is that the temporal muscle has a higher electrical activity at rest compared with the masseter.[25, 26, 27]

Many researchers have investigated the various factors that can influence body posture: mood states, anxiety, head and neck positions, oral functions (respiration, swallowing), oculomotor and visual systems, and the inner ear. Recent studies indicate a role for trigeminal afferents on body posture, but this has not yet been demonstrated conclusively.[28]

Orthostatic and dynamic postural control, influencing by the ability to perform daily living activities are considered important

mechanisms of feed-back and feed-forward for postural adjustments . As with reflexes, postural adjustments improve through exercise and learning. These adjustments are evoked by several types of afferent inputs: exteroceptive (skin sensitiveness of feet), proprioceptive (especially from the cervical, hip, ankle, and knee joints), vestibular (utricle, saccule, semicircular canals), and visual (movement of the surrounding environment). And also ,this afferent inputs can be modulated by many factors, such as mood state and anxiety, that lead us in some important correlation in some clinical associative aspects of patients that have different nociceptive psychological disorders that can be experienced and the literature exposure to recognize it [29,30]

Muscular changes (of mass, tone, respectively of muscle contraction) will generate abnormal muscle behaviors with pathological mandibular-cranial positions.

It has been shown in Laskin theories that the muscles of the stomatognathic system by their morphological (small and thin) and functional characteristics react first to all disorders of P-Ca metabolism from different endocrine disorders. [31]

Stomatognathic muscular dysfunction is accompanied in these cases by uncoordinated muscle contractions, asymmetry of contractions, changes of reflexes with different characters than at other levels of the body. As it follows from the characteristic of the functional convergence manifested at the level of the stomatognathic system, between the different elements of the system are established relations and mechanisms of regulation of a level of the intrasystemic balance at the biological and biomechanical level. The affection of a single systemic component leads, through the existing interrelationships, to the imbalance of the whole system and simultaneously to the intervention of the self-regulating mechanism . [32,33]

Yang and all. 2006 revealed that hypersalivation is the result of hypersecretion of salivary glands, but it is commonly associated with the loss of neuromuscular control with impaired oral motor activity and increased saliva flow .

However, most patients suffering from sialorrhea show poor oral neuromuscular mechanisms that come to restore a new precarious balance.[34-35] Recent studies emphasize the potential role of dental occlusion and of trigeminal afferents in maintaining postural control.

Other studies further suggest that dental occlusion may influence body posture and spine curvature (e.g., scoliosis and lordosis).(36) According to Ciancaglini et al. (37), the correlation between the correction of occlusive and temporomandibular joint disorders (TMJ) and the improvement of postural problems symptoms is well supported by scientific and experimental evidence . In particular this studies and the Consensus Conference of 2009 show that the set of anatomical, clinical and experimental observations are in favor of a correlation between postural disorders of the spine and TMJ disorders occlusal [38].

Occlusal problems (such as malocclusion) are considered the main risk factor for dysfunction of the stomatognathic system. The malocclusion is a disarmonie of the teeth position , which also includes an abnormal closing of the jaws, and a muscular balance problem in the closure of the mouth. As a consequence the jaw can assume a position slightly or seriously impaired when the teeth come into contact. Malocclusion can also cause imbalance of the mastication muscles, which in turn disturb the closed kinematic chain of the stomatognathic and alter the posture, causing pain in the lower back. [39].

If we consider the neurophysiology of the occlusion and the maintenance of the mandibular posture, we have at the level of the periodontium and the temporo-mandibular joint, the presence of a complex receptor system, consisting of: - Non-nociceptive receptors that communicate strength, direction and speed of application of the forces on the crown of the tooth; When the occlusal relationship is lost either unilaterally or bilaterally, the body posture may take on an unusual position, causing neck or shoulder pain. In these cases, a dental splint restores a balanced occlusion and determines a more symmetric maxillomandibular position and muscular activity, thereby reducing the range of body oscillation [40, 41].

In edentulous subjects, the reconstruction of the teeth the endodontical, parodontal treatment, the rehabilitation of occlusal support improves reaction time, based on an Interogative questionnaires investigative tool suport.[42, 43]

Our clinical experience suggests that an interdisciplinary approach is reliable and sufficient for making diagnoses and developing treatment plans.

CONCLUSION

Our specific clinical experience in TMD patients indicated that posture relation an interdisciplinary approach is reliable and sufficient for making diagnoses and developing treatment plans but this approach should involve a variety of experts in postural rehabilitation, including physiatrists, orthopedists, psychologists, physical therapists, dentists, and ear, nose, and throat specialists.

These internal mechanisms aim to maintain the level of specific biological homeostasis represented by the level of biological manifestations that ensure system functions and biomechanical homeostasis that ensure static and dynamic balance.

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