MEDICINE AND MATERIALS

Volume 5, Issue 3, 2025: 165-170 | ISSN: 2784-1499 & e-ISSN: 2784-1537

DOI: 10.36868/MEDMATER.2025.05.03.11| www.medicineandmaterials.com |

CONSIDERATIONS REGARDING THE RELATIONSHIP BETWEEN POSTURAL PROBLEMS AND OCCLUSAL DYSFUNCTIONS

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Abstract

Posturology is the science that studies the control of body balance, generated by the postural system. A posture can be normal or abnormal. A normal posture means a model adapted to the environment; an abnormal posture is a misfit or "disharmony." Also, it is proven and confirmed that dental occlusion can be influenced by the posture of the human body, through the simultaneous action of its functional structures represented by: teeth, mandibular and maxillary bones, temporomandibular joint, masticatory muscles and tongue. Alteration of only one of these components can represent the mechanism of transition from a normal physiological occlusion to a pathological occlusion, justified by the fact that the stomatognathic apparatus and posture are two segments closely linked to each other at an anatomical-functional level, so variations in occlusion will induce variations in the postural structure and vice versa. From this hypothesis it is understood that, once the alteration is established, it is very difficult for it to remain limited to a single district and tends to affect the entire postural chain, establishing an imbalance, which can be descending, if it comes from the stomatognathic apparatus, ascending, if, on the other hand, it comes from the podalic or mixed system.

Keywords: Postural system, posturology, stomatognatic system, dental occlusion

Introduction

Nowadays, posturology falls within a multidisciplinary scientific context that brings together numerous medical specialities; this discipline studying the dysfunctions of the postural system and the relation between posture and many pathologies, above all chronic pain [1].

Posturology is frequently recommended as a diagnostic-therapeutic system for treatment of chronic complaints, on the base of which different health caregivers (physicians and not) treat the same clinical problem, with very different methodological patterns and therapies [2].

Posture is the position each individual assumes in space relative to their surroundings and emotional experiences. The postural system is a cybernetically structured system that receives multiple and interdependent inputs with the task of counteracting the force of gravity and external forces, enabling balance during movement and improving individual performance. To do this, the body uses sensory receptors that transform sensory signals into electrochemical signals. The spine is the axial organ and the center of rotation for many vegetative functions [3].

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Posturology has long treated patients with various symptoms by intervening on ocular, foot, and stomatognathic receptors and the proponents of this discipline claim that postural tone is regulated by the CNS in relation to the receptors just mentioned [4].

Descending postural problems can be caused by the eyes (convergence defects, heterophoria, astigmatism, myopia, etc.), the mouth (malocclusion, dental problems, missing teeth, poorly made dentures, etc.), the tongue (atypical swallowing), the ear (vertigo, labyrinthitis, labyrinthitis, ear wax, etc.), and the psyche [5].

Ascending problems, on the other hand, depend on the complex of the feet, knee, hip, pelvis, spine, and viscera. Postural problems can often be mixed, that is, caused by both ascending and descending problems [5,6].

Assessing the primary cause of postural dysfunction is crucial in studying posture; that is, which of the identified problems is the primary cause of the dysfunctional pathology. Once the diagnostic assessment has been performed through a thorough examination, posture correction takes into account those elements of the tonic postural system that, in addition to the inner ear, allow us to locate ourselves in space and orient ourselves in relation to our surroundings; specifically, the feet, eyes, skin, teeth, and psyche [6].

Posture and its affinities

The term "posture" indicates the correct position of our body in relation to the surrounding space, capable of counteracting external forces, which continuously destabilize the system.The ultimate goal is to achieve balance, which is achieved when the perpendicular passes through the center of gravity of the body and falls inside the support surface, bounded by the feet [4].

Correct posture is maintained by constant reprocessing of information from the muscular system, which is essential for maintaining the center of gravity within the base of support. The position is also influenced by information coming from the different receptors of the postural system, including : the plantar (podiatric) system, the stomatognathic system and the visual system. It must be taken into account that individual muscles are part of a global system, understood as a single "chain", capable of connecting different structures of the body and transmitting information about position and movements to the nervous system, which participates in motor coordination [4,7].

For this reason, an imbalance in the podiatric system, or occlusal dysfunction, can cause a local muscle imbalance, which is not limited to a single specific region, but extends throughout the entire muscle chain. Other external afferents which can influence the postural system are : atypical swallowing, scars or trauma [8].

These afferents play a role in posture by virtue of the play of agonist and antagonist tensions that is established at the level of myofascial chains as a result of a continuous adaptation action carried out by the tonic-postural system: eyesight, hearing, skin, muscle-tendon receptors and joints, vestibular organs and receptors continuously provide information about the state of the system [9].

All this information is integrated and processed in the higher centers, represented by the vestibular nuclei, cerebellum and reticular substance, to help determine the position and movements of the body and to process motor responses, through effectors. The goal of body physiology is to obtain the most efficient and economical posture, with the least energy waste [10].

The stabilization of this mechanically unstable body therefore requires a feedback control system that can detect any deviation from the “equilibrium position” to control the appropriate reactions required to return to the original “equilibrium” [8,11].

Postural movement occurs because of the action of a system of strength and moments that are stretched out to a condition of balancing and therefore of equilibrium (unstable). These

continuously change because of the internal disturbances such as respiration, cardiac pump, and external interaction with the human–environment system [4].

Ascending or descending postural dysfunctions

A great importance in the evaluation of postural dysfunctions is to assess whether the syndrome is of ascending origin, therefore triggered from the bottom up; or of descending origin if it is triggered from above.

Ascending dysfunctions, coming from below, are most often activated by the podiatric system, through incorrect support of the feet, but sometimes they can also be the expression of problems related to certain joint areas such as the knee, hip, pelvis, spine and viscera. Descending dysfunctions, originating from the upper part of the body, come mainly from the segments:

• the visual system, through convergence defects, myopia, astigmatism, etc.
• the stomatognathic system, through the presence of a malocclusion, related to dental problems, missing elements, incorrect prostheses, atypical swallowing, etc.
• the vestibular system, through dizziness, labyrinthitis, labyrintholiasis, ear wax, etc...
• In many cases it happens that postural problems are of a mixed type, that is, caused by both ascending and descending problems [11,12].

Skull dysmorphisms

At the base of postural occluded dysfunctions lies the physiological relationship between the sphenoid and the occiput at the level of the sphenobasilar synchondrosis (SSB). The "disharmony" that can occur at the SSB level does not depend so much on its misalignment as on the tension that the latter creates at the level of the myofascial chains, involving the entire system [12].

In the embryonic phase, the cranial bones are protected by the amniotic fluid and present a certain malleability; at the moment of birth, the bones acquire greater rigidity, seeking the best adaptation to the external environment.

In case of prolonged labor, the skull is subjected to enormous pressures, likely to cause alterations between the cranial bones: these may depend on the extent and duration of the pressure, but also on the conformation of the birth canal. However, this adaptation requires quite long times, during which changes at the articular level may occur, called paramorphisms: these are adaptations, which may have a reversible outcome, at the therapeutic level. If they are not treated, they can develop into dysmorphisms, which are irreversible from a therapeutic point of view [13].

A long-term birth is preferable to one with short labor or cesarean section, precisely because the cranial bones do not have the appropriate adaptation times, being subjected to a sudden increase in pressure [2,13].

Occlusion dysfunctions

As already explained previously, postural alterations can originate or be the cause of stomatognathic alterations, with occlusal dysfunction [14].

• *Sagittal plane*:
  - Class I occlusion has a good relationship between the shoulder belt and the pelvic belt.
  - Class II occlusion involves the movement of the head and shoulders forward, inducing the anterior position of the shoulder band in relation to the pelvic band.
  - Class III occlusion, on the other hand, involves a backward movement of the head and shoulders inducing a posterior position of the shoulder band in relation to the pelvic band.

• *Vertical plane*: a deviation of the mandible can lead to a misalignment of the shoulders with the pelvis, which is evident. These cause a difference in height between the two shoulders in relation to the inclination of the pelvis.
• *Transversal plane*: Jaw deviation can create a rotation of the ipsilateral shoulder and pelvis, greater than the contralateral one. This side usually represents the side of a precontact, which gave rise to the dysfunction, which will therefore be of descending origin.

Conversely, crossed rotations can occur, with a lower shoulder and a pelvis more on one side, compared to the contralateral one. This side presents an anterior rotation of the pelvic belt with posteriorization of the condyle and dysfunction of the temporomandibular joint, so its origin will be ascending [14,15].

The role of cranial nerves

From a comprehensive perspective on postural science, the trigeminal nerve plays a crucial role due to its innervation, both for the afferent and efferent components of the information the nerve conveys from its ganglia to the reticular formation and vice versa, and for the influence of dysfunctions that affect its function [14,16]. From a postural perspective, the breakthrough in knowledge and acceptance in the clinical and scientific fields came only with the discovery that the emergence of the nasopalatine nerve in the palate is very rich in exteroceptors, i.e., receptors involved in the mechanism of postural information [16]. Their position corresponds perfectly to the point of contact of the tongue on the palate in the lingual resting position and to the starting point of the swallowing movement. Pressing the tip of the tongue against the palate at this point has extremely obvious and immediate effects on the general musculature. Indeed, it has been noted for some time that positioning the tongue at a specific point on the palate changes the patient's postural position, reducing imbalances, reprogramming the foot support, and altering the posture of the spine [16,17].

Furthermore, the effect of lingual stimulation of the palatal receptor is always absent in bruxist patients, and gradually reappears until it persists when the tongue returns to its ideal position. To this extent, studies on bruxism have been conducted from an exclusively neurological perspective, based on the growing knowledge of the functions of the trigeminal nerve in sleep control and memory, all faculties mediated by the locus coeruleus, through trigeminal stimulation essential for the production of chemical memory mediators [18].

The Central Nervous System receives information from periodontal receptors, from muscle spindles, especially those located in the fibers of the masseter muscles, and from the capsular receptors of the TMJ. It's clear that any alteration in the shape of the palate, consequent to muscle dysfunctions related to altered swallowing, can impact mandibular posture and its function. Overactivity of the buccinator muscles will easily result in a narrow palate, which will cause different effects on the mandible [19].

In order to adapt its diameters to the maxillary ones, the mandible may retrude (with compression of the retrodiscal tissue and the auriculotemporal nerve) or deviate to one side, seeking stability obtained only by creating a crossbite on one side. In both cases, trigeminal information will be altered, evoking incorrect motor responses. The tongue may also insert itself between the arches, as happens with excessive activity. of the vertical muscle. This interposition will interfere with tooth eruption; the mandible will rise higher to achieve occlusion, with a condyle that sinks into the glenoid cavity. The lack of stimulation of the palatal receptors will also result in hypertonicity of the masseter muscles, which will affect tooth eruption, which will be hindered [17,19].

Discussions

The dentist is directly involved and responsible for postural deficits. His responsibility also includes prevention. Early treatments in young children, which we have termed preventive occlusodontics, will be the rule [14].

Recently, the attention of various specialists has focused on the need for a multifactorial analysis, because a modification of these afferents can produce alterations, which pathologically involve segments even far from the affected afferent [20].

Therefore, occlusal interferences can also extend to muscles that are not strictly related to mandibular movements, such as the cervical muscles [14,20].

The masticatory muscles together with the cervical muscles thus represent the first link of the postural chain, especially the sternocleidomastoid and trapezius muscles, which are fundamental in this balance because, through their insertions, they determine the position of the skull and the upper jaw [8]

In this perspective, the orthodontist can help in the treatment of occlusal-postural disorders with the application of orthodontic devices, which are capable of triggering greater occlusal stability, without forgetting that in everyday life it is necessary to associate correct and regular physical activity, since posture is given by muscle tone, and the laxity of its tissues is a factor that contributes to the triggering of related pathologies [14,21].

Conclusion

Very often, in the dental profession, attention is paid to the purely mechanical aspect of the stomatognathic system, without considering that it is part of a much larger and more complex system, which is represented by our body [14].

There are still many studies to be carried out to understand all the correlations between the functions and adaptations that the human body implements in each situation, but the starting point is the interdisciplinary collaboration between the different professional figures, such as the dentist, posturologist, osteopath, speech therapist, physiotherapist or ophthalmologist: each of them aims to solve a problem according to their abilities, but in a broader perspective, taking into account the fact that today a global approach to the whole organism must be established [21].

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