

THORACIC KYPHOSIS TREATED WITH GLOBAL POSTURAL REEDUCATION

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ABSTRACT: This article describes the case of a patient subjected to physical therapy who had thoracic kyphosis of 55 degrees, chronic lumbar pain, and other postural deviations. The physical therapeutic treatment used was the technique of Global Posture Reeducation (RPG), aiming at morphological corrections and pain relief. The results obtained demonstrated improvement concerning the postural aspect, decrease of 16 degrees in the thoracic kyphosis and remission of the pain.

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Introduction

The human body is a structure that, in order to maintain itself in the erect position needs to arrange its bones segments in such a way that the gravity line passes through the center of the sustaining polygon.

Posture, according to FERREIRA (1986), is the way to sustain the body or compose its movements. "Normal" posture is generally accepted the following way: moderate lordosis on the cervical and lumbar regions of the column, moderate kyphosis of the thoracic and sacrococcygeous regions, a pelvic inclination forward of approximately 30 degrees, neutral femurs' rotation, the head centered in a way that the plummet from the mastoid process goes through the middle of the hip and shoulders and immediately anterior to the knee and the ankle's maleolus". (TUREK, 1991). It is vital to maintain good posture in order to preserve the skeletal, muscular, capsular and ligamental structures avoiding lesions and diseases. And, in accordance with MAC BRYDE (1975), all "abnormal" posture causes drawing of some articular vertebral

capsules, of the intervertebral ligaments, of the tendinous insertions, and of the dorsal muscles.

Thoracic kyphosis, object of this study, is a disturbance of the vertebral column in the sagittal plane. The deformity's evolution is related to the physiology of the conjunctive tissue growth and of the tonic musculature. This particular morphology, caused by a retraction of the erector muscles of the column, of the cervical-thoracic-abdominal-pelvic chain and of the fibrous prevertebral blade, disorganizes the anteroposterior, pelvic and inferior members' muscular compartments. Consequentially to these most unfavorable conditions, the torso develops a "stubby" aspect.

The problem is that this type of postural alteration represents not only an aesthetic postural unbalance but also brings on degenerative articular alterations and related symptoms; decrease of the thoracic perimeter; and impairment of the respiratory function.

Besides, all physiology of the body's mechanics obeys the law of minimal effort. Therefore, because the gravity line falls in front of the malleolus and to avoid constant muscular effort to keep this line inside the sustaining polygon, a harmonic organization between the different subjacent segments of the body is necessary in order to correct the anteroposterior unbalances.

"In effect, when the individual is "flattened" over one's curvatures, the central and segmental gravity centers will be lower increasing one's stability. This "flattened" position is indeed a comfortable one because it suppresses the postural efforts of some muscles, demanding more of the capsules and ligaments that, being more passively resistant, are more economic to the organism. Nevertheless, this position is only comfortable for a certain period of time, due to it's diminishing of the mobility and overload on the articular cartilage, evolving at a later time to pathological processes". (HUNGRIA, 1986).

The gravity lines have precise reference points over the skeleton in which they represent the forces that govern the static equilibrium as well as the movements. BIENFAIT (1995) describes the interpretation of those gravity lines in which the two first are descending, mildly inclined from the back to the front, named posteroanterior. These two lines are the materialization of a standing man's gravity line. Descending,

these lines illustrate what we can examine with cervical physiology, the descending balance reflexes due to the vestibular labyrinth and oculomotor systems. The following lines are also descending, mildly inclined from the front to the back: the anteroposterior. They represent the muscular forces that will intervene on the torso region, illustrating the sacrum occipital joining.

The two first lines called anteroposterior and posteroanterior are only double in the lower part of the body; they are the representation of the ground resistance that arrives to the acetabulum region.

The second ascending line is peculiar because it is located outside the column, anterior and parallel to the central line, it will materialize the posterior forces that balance the abdominal thoracic gravity.

Physiologically, the locomotor apparatus is constituted of two skeletons; one, rigid and passive, is constituted of bones joined through articulations; and the other, an active skeleton composed of very extensive fibroid conjunctive tissue in which everything is continuously connected, a functional entity in which the fascia and the muscles are included.

The skeletal muscles are mainly responsible for moving the articulations through nervous influxes coming from the brain. Some of the muscles, however, are in a permanent state of contraction, soft and reflex, through the pyramidal tract's motor fibers coming from the ventral roots of the spinal cord's neurons, origin of the motor fibers that aim to maintain the body's balance against the force of gravity. These are the static muscles, postural muscles that keep the body's erect position through tonic reflex contraction. Most of them are posterior even though located in several regions throughout the body. On the other hand, there are dynamic related muscles that perform movements in all joints according to the demands.

It is important to point out that the necessary muscular effort to postural maintenance against gravity force depends on the energy consumption of a large number of muscle groups working together; the dorsal muscles, gluteus, abdominal muscles, thoracic and scapular waist muscles.

The static, especially of the vertebral column, depends entirely on the physiology of the human balance. Besides, all human balance is conditioned by the position of the eyes, by the head's positioning on space, as well as the balance of the dislocations of the head.

Therefore, the maintenance tonus works in order to balance and protect the head's position, the horizontality of the look, and the balance reflexes assure the adaptation of displacement; all of which are governed by the vestibular, ocular and articular reflexes.

In this context, gravity is a force that exerts itself vertically from top to bottom. In order to maintain an erect position it is necessary to oppose an equal and opposite force. The muscles work from fixed inferior points, the feet when we are standing; and the hip when we are seated. The body's standing position's maintenance occurs due to the muscles action exerted in the gravity's direction. That is possible only by means of inter-support lever systems and by the static muscles' actions exerting themselves on the opposite side of the gravity lines.

That means that the articulations that work as support points receive not only the weight of the body, but also the combined action of the muscles and masses destined to fight against tumbling.

Paradoxically, remembering SOUCHARD (1988), the same muscles responsible for our standing position are also the ones that "flatten" us.

Considering the exposed, this work was produced aiming to demonstrate the importance of Global Posture Reeducation in the treatment of thoracic kyphosis, given that several techniques are being proposed. This work is justified by the great benefit obtained from the technique which, beyond the correction of the kyphosis, also acts on the other alterations that accompany the pathology, in terms of posture and pain.

Case Relate

Patient of the masculine sex, yellow race, 15 years old, diagnosed with a 55 degrees thoracic kyphosis (Figure 1), chronic lumbar pain and other postural deviations,

referring to throbbing lumbar pain after standing for a long period of time, being this symptom the one that led him to the physician. The patient came to the physical therapeutic work of muscle lengthening Global Postural Reeducation through the orthopedist's referral.

The postural evaluation occurred standing in the anterior frontal plan, transverse plan, sagittal plan, flexion of the upper body and in the posterior frontal plan.

A lateral deviation of the head to the right side was observed in the patient's body structure, as well as a diminishing of the neck's angle on the right side, asymmetry on the shoulders being the right one more elevated, diminished Charpy's angle, scalenus retraction, sternocleidomastoid retraction and retraction of the greater and smaller pectoral muscles. On the transverse plan a upper body rotation to the right was found.

Protraction of the head, short cervical column, thoracic kyphosis, thorax depression, shoulder protraction, compensatory lordosis, sacrum horizontalization , retroversion of the pelvis (dissociation between sacrum and pelvis) and flexion knees (Figure 2) in the sagittal plan.

In the upper body flexion, the distance from the hands to the ground is of 22cm in retraction of the posteroinferior chain and pelvi-throcanterian muscles, tibio tarsal angle of a 73 degree opening (figure 3).

In the frontal posterior plan, deviation of the head to the right, asymmetric shoulders, the right one being more elevated, abductive scapula, retraction of the upper trapezium, rhomboids, scapulae elevator and retraction of the cervical spinal muscles.

Postures of active muscular lengthening, eccentric isometric contractions in opening and closing of the coxofemoral angle, initially with no weight, working the flattening components through articular decoaptation, with frog on the floor with open and folded arms; frog in the air with open and folded arms, were done also aiming to improve the function of the inspiratory chain.

At a later time postures with weight, such as seated, standing leaning forward with a board and standing in the middle of a board were done at the end of every treatment session being more effective on the orthopedic plan.

Discussion and Conclusion

Pointing out, according to (CHAITOW, 1982), that the daily postural habits, at work and off are, many times non violent, although persistent, moderators that lead to somatic dysfunction and consequences to health in general. The postures presents, in reality, the sum of health efficiency and can be read as a book in the evaluation of ones integrity and potential, and even to a certain point one's personal history.

“Each postural alteration is associated to a distinctive pattern of muscle shortening particular to each individual”. (MARQUES, 1975).

“In order to comprehend back pain resulting of deficient body mechanics it is only necessary a couple of hours standing in an inclined anti natural or forced position. The distension and drawing of the muscles cause pain that can last for a few days”. (MAC BRYDE, 1975).

“Even though pain is adaptively important and vital to phylo and ontogenetic development, allowing the individual to avoid or escape potentially harmful situations, it can also become prejudicial and even incapacitating when it becomes chronic. In reality, chronic pain has high incidence levels and affects people of all ages and both sexes, considered one of the most compromising aspects to life”. (MURTAS, 1999).

While acute pain is fundamental to preserve the individual's integrity, because it is an alert symptom; chronic pain has no such biological value and is an important cause of incapacity.

“From the biomechanical point of view, the action of the abdominal wall muscles exceeds the lumbar curvature control through the balance of the paravertebral muscles. By means of its insertions, closing the posterior opening of the pelvis, the abdominal wall superiorly tractions the pubic tuberculum in cinergic function with the hip extensors retroverting the pelvis”. (TANAKA & FARAH, 1997)

In respiratory biomechanics, the main muscle is the diaphragm which is in harmony with the thoracic and abdominal contents, and also with the bone structure

connecting the respiration with the vertebral static, thanks to its tendinous center's fixation.

Besides, the inspiratory muscles are static. They must be flexibilized through insistence over expiration. They are, in fact, very numerous and diversely implanted. That is how the dorsal spines (that elevate the thorax when they excavate the upper body) belong to the great posterior master chain. The scapular inspiratories form the superior and antero internal shoulder chain. Any attempt of drawing on one or the other of these chains will be recovered by a inspiration blockage. In all postures it is, therefore, essential to insist on deep expiration.

We point out that the treatment technique is associated to a specific respiratory work that, through the postures of global active lengthening, interact promoting simultaneous corrections, restituting the morphology and recovering the function.

In SOUCHARD's (1988) view, the form and the function depend on the structure. Change in the incorrect form can only be obtained through action over the structure, which causes, *ipso facto*, recovering of the function.

“The medical treatment for thoracic kyphosis was narrowed down to the use of the Milwaukee and Hepp's vest when the kyphosis is evolving or very rigid, active effect vest as it is known”. (PITZEN & ROSSLER, 1981). In conventional Physical Therapy the treatment consists in active muscular exercises aiming to strengthen the vertebral column's supporting mechanisms. In one way or the other we are talking about segmented approaches that miss the overall view. In these cases recur is almost systematic for being an analytical treatment.

On the other hand, in the Global Postural Reeducation the physical therapist treats the locomotor apparatus' pathologies within a global context of muscular chains. A global approach of the body is indeed a revolutionary idea of treatment in the field of corporal reeducation, which until this time was used to rely only on analytical maneuvers. In the Global Postural Reeducation's philosophy the physical therapist understands the muscular system as a functional entity that conveys, coordinates, and distributes tensions, a totality organized in muscle chains.

According to SOUCHARD (1996), the tension exertion on a muscular chain is always delicate, soft and progressive. The technique relies on active muscle stretching postures, elongating together the static antigravitary muscles, the internal rotator muscles and the inspiratory muscles. This active work is indispensable given the fact that the rigidity of the muscles is not solely connected to the retraction of the conjunctive tissue but equally to the hypertonicity of the neuromuscular fuses.

Only the global tractions are really effective and being global means, according to the referred author, correcting at the same time all the compensations related to the drawing of a muscular chain.

The physical therapeutic treatment aimed at rebalancing tensions from the static muscles of the superior and antero internal shoulder chain, the inspiratory chain (diaphragm and accessory inspiratory), cervical-thoracic-abdominal-pelvic chain, erector muscles of the column, pre vertebral fibrous blade, the antero posterior chain, the postero inferior chain and pelvi-throcanterian muscles, in order to regress the pain condition and realign the body's segments, aiming at body symmetry and diminishing of thoracic kyphosis.

The patient's pain condition was reversed after five treatment sessions. After thirty five sessions the radiological tests show diminishing of the thoracic kyphosis in 16 degrees (Figure 4). The treatment sessions took place once a week and had one hour of duration each.

In the postural correction, an alignment of every plan, anterior, transversal, posterior and sagittal was seen. It is important to point out that in this last plan, the corrections were more perceptible (Figure 5). On the upper body flexion the patient was able to touch the floor with his hands after the treatment, and a closing of 12 degrees of the tibiotarsic angle occurred (Figure 6).

Finally, as observed, the patient's improvement treated with the Global Postural Reeducation was significant, however it is important to point out that the different techniques are not exclusive, but complement each other. Therefore, the physical therapist should assess carefully the case in order to develop the best treatment. When treating mechanical pathologies we shouldn't miss the global view, because the

balanced muscular tension of each muscle, for as minimal as its function can be, is key to a good development of the whole.

The movement itself comprehends balance between the static and dynamic muscles. It is the integrity and freedom of the structures that guarantee adequate motor reactions.

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Figure 1: Radiological image, thoracic kyphosis 55 degrees, observe the head positioning in protraction and extremely short cervical column.

Figure 2: Sagittal plane, head in protraction, short cervical column, thoracic kyphosis, depression of the thorax, shoulders in protraction, compensatory lordosis, horizontalization of the sacrum, pelvis in retroversion and flexed knees.

Figure 3: Upper body flexion, distance from hands to ground: 22cm, retraction of the posterior inferior chain and pelvithrocanterian, tibiotarsic angle in 73 degrees opening.

Figure 4: Radiological image showing decrease of 16 degrees on thoracic kyphosis. Observe: alignment of the head and neck.

Figure 5: Postural improvement in every segment of the vertebral column.

Figure 6: Upper body flexion, observe that the patient touches the ground with his hands and a 12 degrees closing on the tibiotarsic angle.











