

Expanding Ellipsoidal Decompression (EED®) of the Spine

A novel approach to the treatment of neck pain and postural dysfunction by a self-administered therapy provides an immediate treatment effect in the form of disc positional and conformational changes.



By Tiziano Marovino, DPT, DAAPM

Since humans evolved into bipedal creatures, there has been a growing recognition of the important role that posture plays in the total health of a person. We have recognized that there are a multitude of both internal (anatomical/physiological) and external factors (environmental) in our daily lives that can act to shape our adult frame and habitus in general. The interrelationship or relative positioning of each spinal vertebra is the primary determinant of the skeletal alignment of an individual. There are many known factors that directly and indirectly affect the vertebral positioning and total posture in a given person including:

- inherent spinal health (disease),
- biomechanical forces acting on the spine (work positions),
- musculo-tendinous forces (muscle balance/synergy),
- ligamentous integrity (laxity/strength),
- disease and injury,
- preferred or “grooved” movement patterns, and
- motor strategies (favorite postures).

Many of these factors converge into the clinical presentation practitioners observe during a posture analysis. Sometimes we fail to clinically recognize these factors and simply classify the problem as stemming from age-related changes since the results or consequences of these factors often manifest as non-specific neck/back pain in later stages of life.

Epidemiology of Spine Pain

An interesting spine-related factoid is that lower spine pain represents the fifth

most common reason for physician visits in the United States and is the most frequent cause of activity limitations in persons younger than 45 years of age. The vast majority of spine pain is self-limiting and non-organic (not related to infection, inflammatory arthritis, fracture or cancer) and approximately 2% of our U.S. workforce is compensated (paid claims) for spine pain each year. As a result, we spend many billions of dollars in direct treatment costs and many billions more for associated indirect costs of treating spine pain.¹

The global prevalence for neck pain of all causes is estimated to be approximately between 27% and 48%, with non traumatic (insidious) cervical discomfort being the most common classification assigned to this disorder. According to CDC-based investigators, three month prevalence (population-based study) of neck and/or low back pain was 31%, with pain sufferers having more co-morbid conditions—together with greater psychological distress—and a greater tendency to engage in risky behavior.² The precise mechanisms underlying spine pain have been not well described. What is known is that very few people go through life devoid of a single episode of significant cervical/lumbar spine pain. It is estimated that the mean lifetime prevalence of neck pain is approximately 48.5%.³ The incidence rate of neck pain is recognized to be growing as a result of the rapid growth in the computer and video terminal industries. Monitor use tends to make the person draw or pull the

upper body forward including head, neck and thoracic spine—all moving into forward flexion in an attempt to get closer to one’s work.⁴ The end result is a tightening of the anterior body soft tissues and a stretching out, or lengthening, of the posterior body tissue. Forward head posture and rounding of the shoulders go together and eventually lead to glenohumeral dysfunction, including impingement syndromes with possible subsequent rotator cuff shredding.

Faulty Biomechanics

Forward cervical spine translation (neck forward posture) disrupts the ideal cervical spinal alignment that is defined by the external auditory meatus lining up with the acromion bone of the shoulder when a plumb line is dropped from the head downward. It is postulated that for every centimeter that the head protrudes forward beyond or past neutral, the effective weight of the head increases by 10 pounds. That is, the force required to control the head in this forward position is the same as it would be if one added a 10 lb weight to the head. In extreme head forward positions, the cervical spine and surrounding soft tissue are under constant mechanical stress in an effort to control or stabilize the head and prevent injury. Chronic postural strain is but one way in which the cervical curve or lordosis becomes neutralized and oftentimes reversed, or kyphotic.

A loss of lordosis has become an important clinical sign that many musculoskeletal practitioners look for when per-



FIGURE 1. Combined cervical/lumbar unit: Deluxe Full Spine Posture Pump® Model 4100. (Photo courtesy of Posture Pro, Inc.)



FIGURE 2. Posture Pump® Cervical Spine Hydrator® Model 1000. (Photo courtesy of Posture Pro, Inc.)



FIGURE 3. Posture Pump® Elliptical Back Rocker® Model 2000. (Photo courtesy of Posture Pro, Inc.)

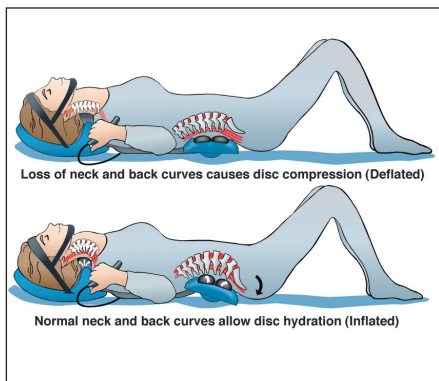


FIGURE 4. Decompression, shaping, lubricating action of Posture Pump. (Illustration courtesy of Posture Pro, Inc.)

forming an examination on a patient who complains of neck pain. In the absence of a congenital manifestation that leads to a spinal abnormality in shape—or likewise, a metabolic disease affecting spinal bone where we expect disease related spinal bone changes—one expects the healthy spine to be relatively straight. In a perfect world, we would all have perfect textbook spinal patterns. Human spines, however, are subjected to many forces that can change their natural alignment. The subsequent loss of these spinal curves has physiologic and biomechanical implications including early disc degeneration, muscle strain and imbalances, early arthritis, and even neuro-compression. With a change in alignment comes a change in segmental weight distribution in an anterior-posterior and side-to-side direction. In extreme cases of forward neck posture or poker neck, there is usually concomitant thoraco-lumbar spinal involvement with possible rotational deformity or roto-scoliosis as well. This causes the spine to take a markedly different appearance and, when severe, can interfere with both swallowing and respiration.

Reviewing the Evidence

There is no doubt that the evidence supporting a causal relationship between loss of cervical spine lordosis and subsequent disability is primarily empirical and based on observational methods. It stands to reason that this type of question is best answered with a population-based, or epidemiological, approach and not necessarily a randomized clinical trial. The existing evidence does, for the most part, support a correlation between the degree of forward head posture with a greater degree of disability.^{5,6} This relationship is supported from an anatomical and general motor control standpoint as well. We now understand that the positional interrelationships amongst the various anatomical structures of the head, neck and shoulders should be maintained in optimal alignment, and this also means preserving our natural spinal curvatures. The body will ultimately “find” its center of balance by re-positioning the spine in such a manner as to always be in neutral balance—i.e., keeping the head close to the midline. The cranio-vertebral angle (CV) is formed by the intersection of two tangential lines—a line of canthus to the external auditory meatus (EAM) along with a line from EAM to C7—measured

anterior to intersect. This angle represents a key outcome measure used by many investigators when assessing the severity of a forward head posture or, conversely, when assessing positive interventional change as an outcome measure of interest.

We now know that loss of cervical or lumbar spine lordosis may signal deeper-rooted problems and often the altered spine is associated with other underlying disc problems including disc degeneration and herniations. The misaligned spine also changes the manner in which muscles pull, as well as their relative contributions to any given motion due to altered length/tension relationships, proprioceptive capabilities, and stabilization strategies. The spine, like any mechanical structure, requires a certain optimal alignment to maintain integrity of structure and function. When injury, weakness, disease or poor body mechanics affect spinal alignment, those vertebral segments above and below must also shift and change to accommodate the altered biomechanical organism. This cycle of events continues until a weak link is exposed and manifests in structural trauma (injury) or the body undergoes a series of mal-adaptations to accommodate the new position (altered posture).

Posture Pump®

The relationship between joint alignment and underlying discal pathology was confirmed in a study conducted by Shealy et al in an investigation using 34 patients that reported neck pain combined with a positive MRI profile for disc herniations.⁷ The use of a conservative decompression therapy known as expanding ellipsoidal decompression (EED), or Posture Pump (see Figures 1, 2 and 3) was used as the primary intervention for 20 minutes following the first MRI. Figure 1 is a combined cervical/lumbar unit. Immediately thereafter, a second MRI was performed for post intervention comparison.

The Posture Pump Cervical Spine Hydrator uses a patented technology and is a device that the patient rests their head upon and then simply inflates the pump. This applies an incremental upward pressure on the cervical spine gently guiding the cervical spine back into a natural lordotic position. Figure 4 shows the Posture Pump mechanism of action for the lumbar spine. While the device seeks to restore the once normal curvature of the

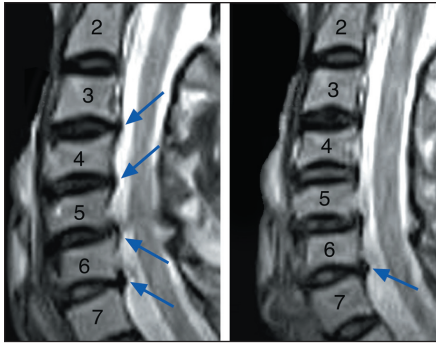


FIGURE 5. Pre- and post-intervention MRIs of patient with faulty vertebral mechanics shows positional and conformational changes immediately following use of the Posture Pump.

spine, the Shealy report found that the Posture Pump can have a beneficial effect on disc health, even if the cervical lordosis is not maintained by the patient after pump application/intervention. The pre- and post-intervention MRIs of patient with unnatural posture having resulting faulty vertebral mechanics appear to provide visual evidence that, within the treatment time period defined, there can be actual disc re-hydration and subsequent disc decompression (see Figure 5). According to the Shealy report, the MRI provides evidence that there is a reduction in annular bulging with subsequent greater patency in the subarachnoid space leading to a rapid reduction in symptoms—with or without restoration of lordosis. Positional segmental relationships that determine spine posture or alignment are important but not critical to pain reduction. In other words, there can be a reduction in symptoms with or without concomitant restoration of spinal curves.

The manufacturer of this product describes the central air cell mechanism of the Posture Pump as providing a milking action to the cervical vertebrae and discs (spinal segments). This milking action can help restore proper cervical alignment while acting to lubricate motion segments that have been mal-positioned for extended periods of time. The decompression effect is what provides relief from pain and associated soft tissue guarding/weakness.

Conclusion

The Posture Pump, for both neck and low back areas, is a new addition in the arsenal of tools for relieving pain in the cervico-lumbar spine. This device is unlike any of our more conventional therapies in that it takes a novel approach to the treatment of neck pain and postural dysfunction. Preliminary study seems to favor this device and mode of treatment over conventional traction therapy. There is powerful evidence in the form of MRI images before and after treatment that support an immediate treatment effect in the form of disc positional and conformational changes. These changes have important implications to spinal health in general.

One of the goals in our clinical reports series is to provide exposure and recognition to products that are innovative as well as cost effective. Many of these will be patient-administered or home-based interventions. The Posture Pump approaches the problem of neck and back pain from a novel perspective and the early research is promising. The use of self-administered therapies or home-based treatments is but one way we can help reduce health care costs and, at the same time, empower pa-

tients to take control of—and better manage—their health problems. Posture Pump information is available at www.posturepump.com. ■

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