Dynamic Chiropractic

CHIROPRACTIC TECHNIQUES

Utilizing Automated, Selected, Long Axis Compression/Traction in Conjunction with Continuous Passive Motion of the Spine

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In the book, Clinical Biomechanics of the Spine,[1] Panjabi, White, Morris and Markoff make an interesting discovery utilizing long axis compression loading of injured discs of the spine. It regards a remarkable "self-sealing" process that comes into play when an injured lumbar specimen is loaded for a second and third time. During the third loading cycle, the motion segment showed near "intact" behavior again. This was found to be independent of the type of injury. The authors state that this experiment suggests there is a repair or an adjustment mechanism in the disc which is mechanical in nature (using a load/unload cycle and is initiated by loading/compression). It has been shown that a defect in the annular ring alters the mechanical characteristics of the disc, and the adjustment is such as to restore near pre-injury disc function.[2]

Case History

On April 18, 1995, a 38-year old Caucasian male came to this office stating that he had injured his back two days previously. While in a forward flexed and awkward position, he attempted to pull a pallet while unloading a truck. The symptoms began with a moderately painful onset and continued to get more "achy" as the day progressed. He then reported he had a difficult time standing erect, and that he was getting increasingly sharp pain in the area of the lower lumbar and left sacroiliac spine.

Examination revealed a positive straight-leg raise at 45 degrees, positive cough-sneeze test, a moderately decreased left ankle reflex. The patient was unable to walk without severe foot drop on the left. Dermatomes showed a decreased sensitivity over the anterior lower leg in the L4-L5 dermatomes. Further, there was paravertebral muscle spasm with stiffening and straightening of the spine. The patient was unable to perform the Kemp's test or any thoracolumbar flexion/extension, lateral bending or rotation. AP/LAT lumbosacral films revealed a normal disc height throughout the lumbar spine, however there was a 27 degree sacral angle with George's line falling approximately one inch posterior of the femur heads. The AP lumbosacral film revealed a 5mm anterior external subluxation of the right innominate, and right rotation of the bodies of L4 and L5, with a lateral list of the lower lumbar spine to the left.

The patient was treated four times throughout the first week in this office with slight improvement. At the end of the first week, it was suggested the patient see a neurosurgeon for an MRI to determine the existence and/or the extent of any possible disc herniation. The patient complied and was sent to a local large medical clinic for evaluation. The surgeon's impression after MRI was "herniated nucleus pulposis L4-5, left with significant foot drop." The surgeon's plan was "surgery in this case is indicated because of the foot drop -- I believe this gives the patient the best chance to recover." The patient was

then scheduled for surgery three weeks later. The patient returned to my office on 5-3-95, stating he continued to have difficulty with his condition and asked if there was anything I could do while he was waiting for surgery to give him relief. A course of treatment with continuous passive motion was suggested for possibly giving him some relief and improve spinal mobility during this waiting period.[3,4,5]

The patient was seen for six more visits (May 3-15) on an every-other-day basis. At the end of the those treatments, the patient's subjective symptoms had gone from 10 in the lower back to a one; from a nine in the left SI leg area to a one; and the patient's reflexes were making obvious gains. After seeing the surgeon for the pre-surgical check-up on May 16, 1995, the surgeon commented: "Mr. C. returns today. He is significantly stronger in his left foot. No positive straight-leg raising. I don't believe that surgery is indicated at this point in time. We will see the patient back in two weeks for follow-up of foot strength. He knows that he may call if his situation worsens. -- Dr. H.G.S."

This patient has regained full use of his reflexes and has no foot drop or other significant symptoms and the patient returned to work full-time on 5-31-95 and has worked a minimum of 40 hours per week for the past year. He is currently being seen on approximately a bi-monthly basis for maintenance care.

It is essential to bring out the fact that this patient was successfully treated primarily by loading of the spine in the long axis, while undergoing circumduction, during which the patient is able to contact adjustable handlebars on the adjusting table and resist the forward/backward motion as the knee/thigh piece of the table circumducts. The patient's abdomen is unsupported and the patient can exert as much or as little compression as is comfortable with his arms. As the patient voluntarily increases compression on the spinal column, the lumbars tend to bow forward or effectively into a natural lordosis, thus reducing a posterior or post/lat nucleus pressure on nerve roots or the spinal cord.

The role of spinal flexion and extension in changing nerve root compression in disc herniations was studied by Schnebel, Watkins, Dillin at Biomechanics Laboratory, Centinela Hospital Medical Center, Inglewood, California.6 They noted changes in nerve root compression forces with spinal motion as measured on six freshly frozen adult cadaver spine specimens. A model was devised to represent a herniated disc at the L4-5 level. This was done using an anterior approach placing a compression-measuring device through the disc at the L4-5 level and against the L5 root. An accelerometer was used to monitor the range of motion of the spine. Because the compression device was held in a static position, the only variable was the tautness of the nerve root against the tip of the device. By simultaneously monitoring motion and force delivered at the tip of the compression meter placed at the nerve root, they were able to quantitate nerve root tension forces across the tip of the measuring device in relation to spinal motion. The force was measured in flexion and extension. In addition, the force was measured as traction was applied to the L5 nerve root. The amount of compressive force and tension in the nerve root increased with flexion of the spine, and decreased with extension of the spine. In conclusion, flexion of the lumbar spine increased the compressive force on the L5 root, and extension decreased the compressive force on the L5 root.

John E. Upledger, DO, says in Craniosacral Therapy: "We coax the cranial sacral system; we do not brutalize it, shock it, or even scare it. Approach it as you would a timid child, or an animal, whose trust you wish to gain. Do not force the craniosacral system to make non-physiological motions. Rather, the goal is simply to prevent it from returning from extreme positions along its usual pathway, and to encourage it to find a new route. Such coaxed discovery of new routes will introduce added mobility

into the system and its library of motions."

Upledger goes on to say: "Frequently, dural adhesions seem to dissipate with the continued application of techniques directed at the modification of the intradural hydraulic forces, and other techniques aimed at the enhancement of the gliding motion of the dural membranes within the vertebral canal." These latter techniques utilize the leverage forces which can be developed and imposed upon the osseous attachments of the spinal dural membrane. Hence, the legs, lower back and head are often used when attempting to mobilize the spinal dura mater. He adds: "Gently, but firmly, encourage the synchrony of the motion of the occiput and sacrum, and gently, but persistently encourage an increase in the amplitude of motion through 30-50 cycles of flexion, extension. Frequently you can overcome the dural membrane restriction in this way; as you do, the paraspinal somatic dysfunction will self-correct."[7]

It is the contention of this author after 15 years of clinical use that selective, traction/compression in combination with circumduction of the spine, is the key to unlocking a great deal of mechanical and soft tissue dysfunction of the spine and associated conditions. It is perhaps obvious that in hyperlordotic and compressive disorders of the spine, that traction is the treatment of choice. However, as Swedish neurosurgeon Alf Breig states: "Observations are now emerging that traction can aggravate the intrinsic damage to the injured cervical cord by over-stretching axially oriented nerve fibers and blood vessels in spinal pathways. The urgent need to investigate the effects of therapeutical cervical traction has been made especially evident by the discovery that critical traumatic compression of the spinal cord invariably results in transverse rupturing. ... it can now be easily and clearly demonstrated in experiments in situ in the rat and in the fresh human cadavers that the surfaces of a cervical intramedullary wound (reproducible by a transverse incision into the cervical cord) are drawn apart whenever traction (exceeding two kg, in the human case) is applied to the cervical spine. The consequences of this startling observation, of course, flatly contradict the previously unquestioned conventional wisdom regarding usefulness of cervical traction." He further states: "Numerous works on this issue in recent years show rehabilitation experts still to be defending themselves against the notion that cervical traction is potentially harmful. ...it is stretching of the cervical cord that give rise to neurological deficit, and that relaxation of the cervical cord is the therapeutic factor. Since it prevents the damaged cord from being stretched."[8]

Dr. Breig states in his book, Adverse Mechanical Tension in the Central Nervous System, "As has been shown earlier, shortening of the spinal canal results in axial compression (telescoping and folding of all the soft tissues that are in it). During flexion of the normal spine from full extension, the slight stretching of the soft tissues takes up the slack until, just when the neutral position is reached the folds are eliminated. In the cadaver, some folding of the dura is observed in normal lordosis of the cervical spine. It is very destructive to traction an already reversed or hypolordotic cervical or lumbar spine."[9] It is further the contention of this author that compression is far more therapeutic in restoring normal biomechanics to a hypolordotic lumbar or cervical spine than traction can possibly ever be. Not only is traction not effective, but it is often severely counterproductive in treatment of reversed curve conditions.

There is much evidence to suggest a relationship between mechanical factors, i.e., intermittent pressure and tension and chondrogenesis of bone and cartilage.[10] Clinically, long axis spinal compression gives immediate relief and correction in a large percentage of those afflicted with hypolordosis of the cervical or lumbar spine. Many of my colleagues express shock at utilizing

compression as a form of therapy when they consider it a frequent cause of spinal pathology. In Clinical Biomechanics of the Spine, Virgin observed that although discs were subjected to very high loads and showed permanent deformation on removal of the load, there was no herniation of the nucleus pulposus due to compressive load. Even when a longitudinal incision was made in the posterior lateral part of the annulus fibrosus all the way to the center, and the specimen was loaded in compression, there was very little change in the elastic properties, and definitely no disc herniation.[11] This has been substantiated by further experiments by Hirsch[12] and Markoff and Morris. Further, they found that the first component to fail in such a construct was the vertebra due to the fracture of end plates. No failure of the disc ever took place. The mode of failure was solely dependent on the condition of the vertebral body. Osteopetrotic vertebra showed extensive collapse of the endplate and the underlying bone at relatively low loads (which calls for utilizing extreme caution in treatment of mineral deficient spines with compression) As any competent doctor would not prescribe heavy weightlifting for a patient with a degenerative spine, so one must use caution in treatment. Brown and colleagues observed that there were no differences between the vertebra with "normal" and degenerated discs. Farfan, to the contrary, proved by his large number of tests, that the degenerated disc was actually stronger than the normal disc when subjected to compression. These observations suggest that disc herniation is not caused by excessive compressive loading.[13]

Conservative chiropractic adjusting procedures in combination with the efficacious and judicious use of compression, I believe, will provide yet untold benefits to the millions of patients who suffer from conditions of lordosis reduction and/or reversal. It is my experience and opinion that employing these concepts and techniques will provide greater overall and more satisfactory recoveries, and assist in the prevention of recurring musculoskeletal/neurological problems, while reducing the costs to the patient and insurance carriers.

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