Correction of Spondylolisthesis by the Correction of Global Posture

by Donald W. Meyer, D.C.

Dr. Donald W. Meyer graduated with honors from the Los Angeles College of Chiropractic in 1981. He maintains a full-time practice in Fountain Valley, CA. In 1986, he founded Circular Traction Supply, Inc. to provide extension traction-oriented products to the chiropractic profession. In 1999, he developed a wearable head retraction brace called Cervical Remodeling Collar™. Last year, he introduced a wearable thoraco-lumbar, posture corrective, traction brace called the Lumbar Remodeling Brace™. This year, Dr. Meyer has created a new design for posture corrective body weighting called the Posture Corrective Exercise Belt™. He has combined these devices into a new therapy entitled Ambulatory Postural Remodeling™.

INTRODUCTION

There is ample evidence in the literature that abnormalities of global posture can account for spinal histopathology, myopathology, neuropathophysiology and kinesiopathology.[1] There is also increasing evidence that the correction of global posture could have strong implications for the prevention of disc, ligament, myofascial and bony degenerative changes.[1] The case report presented here demonstrates the possibility of reducing and stabilizing a common spinal pathology by the correction or improvement of global posture and raises the question whether the pathology caused the aberrant posture or the aberrant posture caused the pathology?

CASE REPORT

A 60-year-old female presented for treatment of chronic, intermittent right buttock and lower lumbar pain that she rated as a four on a 0-10 visual pain scale. She also denoted having chronic low back tension and tightness. The patient is moderately overweight, but physically active.

A computerized range of motion test was performed on her lumbar spine as well as a visual postural inspection. The lateral global posture revealed anterior translation of the thorax in relation to the pelvis and a hypokyphotic thoracic region. The AP global posture demonstrated a right lateral translation of the thorax to the pelvis with a left axial rotation of the entire pelvic girdle. Because of the axial rotation of the pelvis, inspection of the foot stance was performed and found a collapse of the medial longitudinal arch of the right foot with associated pronation. Flexibility testing of the piriformis muscles revealed bilateral increased tonus with restricted mobility, especially on the right. Straight leg testing was negative for radicular involvement as was reflex and dermatome testing of the legs. There was some increase of buttock pain on standing lumbar flexion, no increase of pain on left lateral flexion and there was mild lower lumbar pain with extension and right lateral flexion. Increased tenderness was elicited upon digital pressure to the lower right lumbar paraspinal region and the piriformis musculature, especially on the right.

Standing radiographic studies demonstrated an anterior thoracic translation of 42 millimeters with an associated increased sacral base angle of 51 degrees. The segmental analysis of the lumbar spine revealed an increased mid to upper lumbar lordosis with a decreased L5/S1 angle. An eight millimeter spondylolisthesis was also observed.(*See X-ray A*) A bilateral pars defect was noted on the oblique views. The AP view showed a nine and a half degree right lumbosacral angle and a two degree right superior sacral base line.

The diagnosis was as follows:

1. Right-sided lower lumbar facet syndrome secondary to the patient's altered thoraco-pelvic posture and associated L5/S1 isthmic spondylolisthesis (grade 1).

2. Right-sided piriformis syndrome secondary to the collapsed longitudinal arch of the right foot.

A treatment plan of CBP® Mirror-Image® diversified spinal adjustments, Ambulatory Postural Remodeling™ utilizing the Lumbar Remodeling Barace™ with lateral translation traction belts, transverse abdominis strengthening on a Torso-Track™, home lumbar and piriformis stretching exercises and Spenco™ shoe orthotics was initiated. The Lumbar Remodeling Brace™ is an adjustable, padded steel device that is wore by the patient and can pre-stress the patient's thoraco-lumbo-pelvic posture back to a normal lateral alignment (eliminating either anterior or posterior thoracic translation) while also applying an anterior traction force into the mid to lower lumbar spine to restore its normal elliptical configuration (*See Picture 1*).

Lateral translation traction belts were also used to Mirror-Image® her thoracic translation during the treatment. The patient should be ambulatory during this therapy, so it was applied with the patient walking at two to three miles per hour on a treadmill. These closed-chain, weight-bearing traction/exercise sessions were started at five minutes and progressed to 15 minutes in length. The patient would then perform a 10 repetition set of abdominal strengthening on a Torso-Track™. She started with cable assistance and progress to no cable assistance on this device. The patient then received a CBP® Mirror-Image® spinal adjustment. Treatment was rendered at a frequency of three times per week.

After 18 treatment sessions, the first re-evaluation revealed an improvement in lumbar extension, left lateral flexion and rotation. Flexion remained mildly restricted at 52 degrees. The patient's buttock pain had been eliminated. She now rated her lower lumbar pain as a one on the 0-10 visual pain scale. Her Revised Oswestry pain questionnaire demonstrated only an eight percent interference with her activities of daily living. Her post lumbar radiographic findings denoted a reduction of anterior thoracic translation to 28 degrees, a decrease of the excessive sacral tilt to 46 degrees and a reduction of the spondylolisthesis to five millimeters (*See X-Ray B*). The AP lumbosacral angle (and therefore the lateral translation) reduced to seven degrees and the sacral base line remained two degrees right superior. Because the patient's sacral base line did not level and there were indications on the x-ray of a left anatomical leg length deficiency, a left-sided seven millimeter heel lift was prescribed.

After 12 more treatments, a second re-evaluation showed improvement in lumbar flexion to 57 degrees, no lumbar pain and only occasional, mild right buttock pain. The patient rated her improvement at 90 percent. Her new post lumbar radiographic findings exhibited no further change in anterior thoracic translation, sacral tilt or spondylolisthesis slippage. The patient's AP lumbosacral angle reduced to four degrees and the sacral base line reduced to level. Since no further structural improvement of the spondylolisthesis or the anterior thoracic translation had occurred, the patient was released to monthly maintenance care.

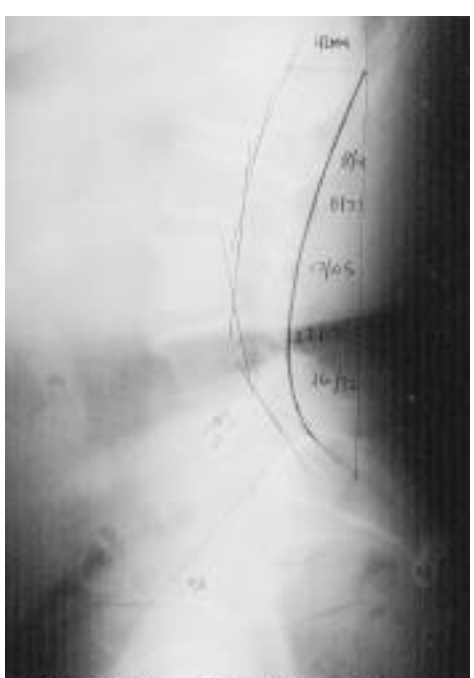
DISCUSSION

Spondylolisthesis among the Caucasian population is estimated to be five to seven percent with an equal sex distribution.[2] Approximately 90% of all spondylolistheses involve the fifth lumbar vetebra.[3] Common non-degenerative spondylolisthesis is classified as either dysplastic or isthmic.[3] Dysplastic includes those spondylolistheses with a congenital abnormality in the upper sacrum or the neural arch of L5 that allows displacement to occur. Isthmic involves an alteration to the pars interarticularis either by an acute fracture, lytic or stress fracture or an elongated but intact pars. The source of the symptomatology associated with an L5/S1 isthmic spondylolisthesis is considered unclear, although it appears that the facet joint pain referral patterns of the lumbar spine parallels those of "classic" spondylolisthesis and that it is highly likely that this joint is a major source of the pain.[2] The etiology of the spondylolysis that allows the spondylolisthesis to occur is also controversial. Presently, the most commonly proposed etology leading to a pars interarticularis defect is that of a stress fracture that commonly occurs in childhood.[3]

Except for a single case reported at C4 in a gorilla, the defect of spondylolysis has not been reported in mammals other than man.[3] Because of this, the upright posture of man combined with additional repetitive mechanical stress is considered the significant etiological factor.[3] Upon examination, Yochum and Rowe state that distinct postural changes will be seen. A hyperlordosis of the lumbar spine and an anterior shift of the gravitational weightbearing line is often noted. Decreased anterior trunk flexion and reduced straight leg raising are often present due to hamstring muscular tightness that is often associated with spondylolisthesis.

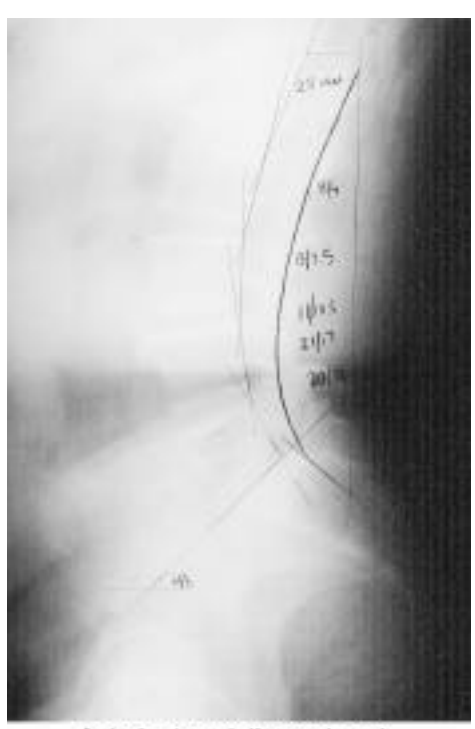
These findings are also found in patients with chronic anterior thoracic translation with or without spondylolisthesis. Anterior thoracic translation will cause a hyperlordotic tendency with an increased pelvic tilt and sacral inclination.[4] This posture is also generally associated with a decrease of the thoracic kyphosis. Some biomechanical researchers, such as Berlemann, et al., now are concluding that further studies should focus on the analysis of spinal alignment and lower lumbar end-plate orientation to identify patients at risk for development of Degenerative Spondylolisthesis or lower lumbar retrolisthesis. They have found that the overall lordosis of the

See **CORRECTION** *on next page*



Anterior Thoracic translation of 42mm with a 8mm Spondy.

X-RAY A



Anterior translation reduced to 28mm. Spondy reduced to 5mm.

X-RAY B

PICTURE I

CORRECTION

continued from previous page

lumbar spine and end-plate inclination were considerably reduced in patients with retrolisthesis and that the end-plate inclination in patients with DS was greater.[5,6] In another study, the sacral base angle was found to be greater in spondylolisthesis patients and a significantly greater incidence of hyperextension at L4/L5 was found in symptomatic spondylolisthesis patients.[2] These recent findings raise the question whether chronic thoracic anterior translation with its associated increased sacral inclination and hyperlordosis is not the underlying cause of the additional repetitive mechanical shear stress that results in pars interarticularous stress fractures in children as well as being a main cause of Degenerative Spondylolisthesis in the elderly.

CONCLUSION

Muscles attaching onto the rib cage have been found to be important for control of the overall spinal posture and maintenance of equilibrium.[7] The deep Transverse Abdominis muscle is now being considered vital to lumbar spine stability.[8] The Torso-track™ is an excellent, progressive, in-office method to tone and strengthen this deep superior abdominal muscle. Stretching of the hamstrings and strengthening of the back extensor musculature has also been found to encourage a more normal lumbar lordosis and thoracic kyphosis.[9,10,11,12] These two benefits occur naturally during ambulatory exercise.

Weight bearing activities require the co-contraction of accessory and stabilizing muscles. They also stimulate proprioceptive input from receptors in the muscles, connective tissues, and joint capsules. This is why it is so important to perform spinal rehabilitative exercises in a closed-chain, weight bearing posture that is closer to real life positions. The specific adaptation of imposed demands (SAID) concept tells us to expect that closed chain, weight bearing exercises generally will be more effective.[13]

I hope that it is clear from these references, and this article, that adopting a weight-bearing, posture corrective rehabilitation program in the treatment of your patient will not only result in improved patient outcomes, but also allow you to better deal with numerous spinal pathologies that are directly influenced by global posture.

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