ABSTRACT

Objective: To discuss the reduction of lateral head translation pseudo-scoliosis in a patient with chronic cranio cervical symptoms including cervical dystonia.

Clinical Features: A 59-year-old female had cervical dystonia and cervical scoliosis. Examination showed symptoms consistent with dystonia including involuntary neck contractions, neck pain, headaches, and a right-handed tremor. Radiographic assessment showed a primary right-sided head translation posture (pseudo-scoliosis) with secondary left lateral head flexion, and tertiary left head rotation.

Intervention and Outcome: The patient was treated by Chiropractic BioPhysics® mirror image® left-sided head and neck traction, exercises, and spinal adjustments. After 24 treatment sessions over 8 weeks, she reported a 90% reduction in cervical dystonia symptoms, improvement in neck pain and improved disability. Repeat radiography demonstrated A 75% reduction in the cervical subluxation. A 1.5-year follow-up showed maintenance of symptoms and posture.

Conclusion: Although the mechanisms are not yet known, the correction of posture in those suffering from cervical dystonia and related neurological disorders may benefit from the correction of posture. The distinction between true scoliosis and ‘pseudo-scoliosis’ postures by routine radiographic assessment is essential prior to initiating spine rehabilitation as their treatment approaches will differ. (J Contemporary Chiropr 2019;2:131-137)

Key Indexing Terms: Pseudo-Scoliosis; Neck Pain; Cervical Dystonia; Chiropractic

INTRODUCTION

Research into spine coupling biomechanics has demonstrated lateral translated head postures create a cervicothoracic pseudo-scoliosis. (1) Pseudo-scoliosis involves a pure lateral bending of the upper thoracic and lower cervical spine towards the side of the head shift, and an upper cervical spine lateral bending away from the head shift returning the column towards a vertical alignment. (1) A pseudo-scoliosis also shows minimal or no vertebral rotation, whereas true scoliosis shows definitive vertebral body rotation. (2,3)

Cervical dystonia, also referred to as spasmodic torticollis, is a painful condition where the cervical muscles involuntarily contract, causing a turning and tilting of the head. This may cause great pain and disability in those affected. (4) The cause of cervical dystonia is often unknown and treatments typically include botulinum toxin injections and/or physiotherapy (5), each having its limitations. Botulinum injections (Type A or B) have risks of side effects, particularly dry mouth and dysphagia (6), and has limited duration of efficacy (12-16 weeks), where the patient requires repeated injections. (7) No data from randomized clinical trials, however, has evaluated the safety and effectiveness of repeated injections. (6) The efficacy of physiotherapy for cervical dystonia is yet to be firmly established. (8)

The purpose of this report is to present the reduction of a cervical pseudo-scoliosis and alleviation of chronic neck pain, headaches, and radicular pains in a patient previously diagnosed with cervical dystonia using Chiropractic BioPhysics® (CBP®) technique methods.
A 59-year old woman (175cm height; 79.4kg weight) previously diagnosed with cervical dystonia suffered from chronic neck pain, headaches, involuntary neck muscular contractions and a right-handed tremor. She had previously been diagnosed with cervical scoliosis. She reported symptoms began approximately 15 years previously. No other family members report having dystonia; however, there was cardiovascular disease in her family. She did report a history of mental illness as well as osteoarthritis in her spine. She had been previously treated unsuccessfully with steroid injections and cyclobenzaprine for muscle spasms; more recently, she received Botox injections a year ago but reported no relief.

A physical examination revealed several positive orthopedic tests. Cervical compression was positive, where pain was reported in the neck and down the left arm. She also displayed an overall reduced cervical range of motion, which was painful in all directions. Dermatomal testing revealed C6 and C7 dermatomal hypoalgesia. Palpation revealed global bilateral tightness throughout the neck and top of shoulders.

A visual postural assessment revealed a prominent, primary right head translation posture, coupled with a secondary left lateral head flexion (tilt) and a tertiary left head rotation. A forward head posture was also noted.

**Radiographic Assessment**

Spine radiographs were taken, digitized and analyzed using the PostureRay software system (PostureCo. Inc., Trinity, FL, USA). Lateral images (Figure 1) were analyzed with the Harrison posterior tangent method, and the antero-posterior (AP) images (Figure 2) were analyzed with the modified Risser-Ferguson method, both having good inter and intra-rater reliability (9-11).

The AP cervico-thoracic view demonstrated a 19mm right head translation, a mid-neck cervico-dorsal (CD) angle
of 12°, and a lower thoracic to vertical (Rz) angle of 6.4° (Figure 2). The lateral cervical view showed a forward head posture (33mm vs. <15mm(12,13)), decreased cervical lordosis [-3.5° vs. normal 29-42 (12-14)], near normal atlas plane line [APL: 27.9°, normal = 24-29° (12,13)]. According to the study by Harrison et al. (1), the range of motion for the average height subject in right head translation is 35mm; therefore, the patient’s ‘neutral posture’ presentation of a 19mm translation is 19/35 or a 54% ‘shifted’ head position relative to its maximum range of motion; thus, a large posture abnormality.

Upon close inspection of the AP view, analysis of the spinal coupling verified that it was not a true scoliosis but a postural induced spinal deformity subluxation, a ‘pseudo-scoliosis’. The patient also had severe degenerative joint disease noted by the decreased disc spacing and anterior bony osteoarthritic lipping primarily between C5-C7 (Figure 1). She scored a 36% on the neck disability index (NDI) (15), and rated her pain as 7/10 (0=no pain; 10=worst pain ever) on the numerical pain rating scale (NPRS). A quality of life (QOL) questionnaire (SF-36 (16)) showed a physical function component summary score of 65% and a mental health score of 36% (ideal=100%).

**Intervention**

The patient was treated with CBP technique (17-19) including mirror image® exercises, drop table adjustments, and lateral translation traction to reduce the asymmetrical head and neck subluxation. All exercises, traction and adjustments were applied to stress the head position to the left, the exact opposite (mirror image) to the presenting posture.

Traction consisted of a left head translation, right lateral flexion, and a right rotation (when applicable) position that was stretched to the patient’s maximum tolerable magnitude each session (Figure 3). The Meyers wall translation traction device (Circular Traction, Huntington Beach, CA, USA) was used where the patient was seated with the left side of her body against the wall. A firm, cylindrical pad housing a pulley system was place on the right lateral base of the neck, with a small firm foam block placed between the head and wall to ensure the head remained relatively vertical while the pulley was tightened; this caused the head to translate toward the wall. The patient performed the traction for 12 minutes at every treatment session.

A second traction of traditional distraction traction was also performed. The patient could not tolerate cervical extension traction, thus longitudinal y-axis distraction traction was performed. The patient built up to 12 pounds for a maximum of 6 minutes; this was performed every session.

Mirror image left head translation exercises (Figure 4) were performed at every treatment and consisted of 30 repetitions where the patient held the shift for 20 seconds.
per repetition. Mirror image drop-table adjustments were also performed (Figure 5). The patient would lay on her left side, where an adjustable head drop-piece was lowered so that her head could be stressed into a left translated position. A drop mechanism would be engaged that caused the head-piece to drop a small amplitude, stressing the head and neck ‘into’ the opposite side of the presenting maligned posture. She provided verbal and written consent for the publication of these results, including X-ray images.

**Results**

The patient was treated 24 times over 2 months. An assessment revealed a dramatic reduction in all complaints including neck pain, headache and a 90% improvement in involuntary neck contractions and right-handed tremors. All previous positive orthopedic tests were now within normal limits. Cervical range of motion was improved in all directions, however, still had limited motion overall, but without reported pain. The patient scored a 6% on the NDI and a 2/10 on the NPRS. There were also improvements in QOL as documented in improvement in both the physical function component summary score (75% vs. 65%) and in mental health (60% vs. 36%) on the SF-36.

Repeat radiographic examination showed the lateral postural subluxation had been reduced (Figure 2). The head translation decreased by 75% or 14mm (4.8mm vs. 18.7mm), the CD angle reduced 7.7° (4.3° vs. 12°), and the Rz angle reduced by 3.6° (2.8° vs. 6.4°). The lateral cervical view showed small improvements (Figure 1), the forward head posture reduced by almost 10mm (23.5mm vs. 33.1mm), the lordosis increased by 5° (-8.5° vs. -3.5°), and the APL remained stable (28.3 vs. 27.9°).

A long-term follow-up assessment was performed 18 months after the original 'corrective' treatment sessions were performed. The patient was coming in on a maintenance basis, and was treated 20 times over the previous 18 months. She stated her neck felt stronger and had greater flexibility and that she was doing well symptomatically since the initial set of treatments. Examination was unremarkable since last assessment and the patient reported their pains to be 2-3/10 on the NPRS. Repeat radiography (Figures 1 and 2) showed stability of the lateral head translation posture, measuring 4.7mm (vs. 18.7mm), the CD angle was 4.0° (vs. 12°), and the Rz angle was 2.2° (vs. 6.4°). The lateral view indicated there was continuous improvement in the sagittal cervical alignment: the head was forward by 21mm vs. 23.5mm, the lordosis was -18° (vs. -8.5°), and the APL had remained stable (27.3°). The patient performed the previously described treatments when attending the office, and performed the corrective exercises at a frequency of 3-4 times per week for 5 minutes at home throughout this time period.

**DISCUSSION**

This case demonstrates mirror image unilateral head exercises, spinal adjustments, and traction methods reduced the lateral head translation cervical spine pseudoscoliosis in an older patient with cervical dystonia. The patient was treated 3 times weekly for 8 weeks with no...
home care initially, and the 1.5-year follow-up assessment demonstrated stability of the postural correction and symptom regression with minimal maintenance treatments (1x per month).

CBP technique employs multiples of the unique inverse of postural segments (i.e. head, thorax, pelvis) expressed as rotations and/or translations about an orthogonal axis (Figure 6) in the application of therapeutic (mirrorimage®) exercises, spinal traction and postural adjustments to correct postural subluxated spinal deformities (17-19). Specifically, the unique inverse is a function that brings the displaced object exactly back to the neutral origin, whereas multiples of the unique inverse (2-3 times the original displacement in absolute value) brings the object into the opposite position across a plane or a line (17). The inverse of a lateral head translation is the opposite-sided head translation; this approach has been proven to reverse the corresponding spine coupling (1) and reduce such deformities (20) as seen in this case.

In a non-randomized trial, Harrison et al. (20) showed that after 37 treatments over a 13-week period, lateral head translation postures were, on average reduced by approximately 50% (7mm) of the initial presenting posture in a group of 51 chronic neck pain patients. The average size of the patients’ abnormal lateral head posture relative to their range of motion for this posture was 14mm/35mm or 40% of the maximum range of motion; certainly, this would be a moderate sized abnormal posture alignment, and Harrison et al. argued that their patients’ neck pain improvements of 4/10 to 0.7/10 following care were likely the result of the spine and posture correction achieved (20). In the current case, our patient presented with a large posture of 54% of the maximum range of motion for her lateral head translation; we believe the reduction of the altered alignment (down to 4.8mm/35mm = 13.7% of range of motion on the post x-ray) following care was largely responsible for the dramatic improvements in pain, disability, and QOL outcomes on the SF-36.

In a retrospective screening for the prevalence of lateral head translation posture, Oakley and Harrison determined that it was present in 53% of a sample of 335 randomly selected radiographs of patients suffering from craniocervical symptoms (21). They also determined that two-thirds of the time the head was shifted to the right likely towards the dominant arm side, as was found in the current case.

Although there is only one clinical trial demonstrating CBP methods effective in treating lateral head translations (20), there are several clinical trials demonstrating...
successful improvements in other spine subluxation patterns, including increase of the cervical lordosis (22-24) and lumbar lordosis. (25-27) One may question how these methods are thought to correct neutral standing spine alignment. Since the ligamentous and musculo-tendinous structures of the spine are viscoelastic in nature, the deformation of these structures are both force-dependent and time-dependent. (28) This is the reason that spinal traction was performed to patient tolerance, and for a duration of 12 minutes in order to maximize the creep deformation of the spinal muscles and ligaments. (28,29)

Success for treating cervical dystonia may lay in the ability to modulate pre-existing sensorimotor plasticity (5); thus, the mirror image exercises and/or spinal adjustments may also contribute to the reduction of symptoms and postural correction. More research is needed to elucidate the exact physiological mechanisms that result in spine and posture rehabilitation.

As demonstrated in the lumbar spine (2), Harrison et al. showed that a lateral translation posture may be erroneously diagnosed as a scoliosis curvature. The distinction is made, however, with close scrutiny of whether there is individual vertebral body rotation which is apparent in true scoliosis, or whether there is an absence of vertebral rotation as in lateral primary translated postures. (2,3) This distinction is critical, as the treatment for true scoliosis and lateral translation side-shift postures (coupled with lateral bending and y-axis rotation) necessitate different treatment approaches for their optimal outcome. (20,30) This substantiates the use of radiography as a standard screening tool for patients presenting with suspected scoliosis and/or lateral translated head postures (3).

Limitations to the current case are that it is only a single case report with limited long-term follow-up. Strength to the current case is the use of standardized pain and disability questionnaires and the use of repeat radiography which verified an absolute biomechanical change in the neutral resting AP posture of the craniocervical region post-treatment. Due to the complexity of treating cervical dystonia, further research in spine and posture correcting methods is warranted.

CONCLUSION

This case demonstrates that neurologic symptoms can be directly related to poor postural alignment; although the mechanisms are not yet known, the correction of posture in those suffering from cervical dystonia and related neurological disorders may benefit from the correction of posture. The distinction between true scoliosis and ‘pseudo-scoliosis’ postures by routine radiographic assessment is essential prior to initiating spine rehabilitation as their treatment approaches will differ.

REFERENCES


