J. Phys. Ther. Sci. 32: 864–868, 2020

The Journal of Physical Therapy Science

Case Study

The treatment of dizziness by improving cervical lordosis: a Chiropractic BioPhysics® case report

Gregg Gerstin, DC[1], Paul A. Oakley, DC, MSc[2]*, Deed E. Harrison, DC[3]

[1] *Private Practice, USA*
[2] *Private Practice: Newmarket, ON L3Y 8Y8, Canada*
[3] *CBP NonProfit, Inc., USA*

Abstract. [Purpose] To present the case of the relief of idiopathic dizziness and the reduction of neck pains and headache by the improvement in cervical alignment using Chiropractic BioPhysics® technique. [Participant and Methods] A 57 year old female presented with 30 years of chronic dizziness, neck pains and headache. Multiple testing ruled out known causes of vertigo. The patient was diagnosed with idiopathic dizziness. The patient scored 56 points on the dizziness handicap inventory. The patient showed a cervical hypolordosis of −13.7° and anterior head translation of 27 mm. The patient underwent a multimodal treatment of spinal manipulation, cervical extension traction, neck exercises as well as initial electrical stimulation. Traction procedures were slowly progressive due to the severity of the dizziness symptoms. [Results] Over a period of 12-months and 115 treatments there was a 20° increase in cervical lordosis. The patient reported significant reduction in neck pains, headache and dizziness frequency and severity. The patient had a 44-point drop on the dizziness handicap inventory; dizziness symptoms were reported to be very rare. A 1.5 year follow-up showed stability of the symptom relief and a negligible score on the dizziness handicap inventory. [Conclusion] Cervical hypolordosis may be an under-diagnosed cause of idiopathic dizziness in some patients.

Key words: Dizziness, Cervical lordosis, Cervical spine

(This article was submitted Jun. 22, 2020, and was accepted Sep. 2, 2020)

INTRODUCTION

Dizziness as a symptom is a common presentation in clinical practice[1, 2]. Examination tests can help elucidate possible etiologies, such as benign paroxysmal positional vertigo or orthostatic hypotension for example, but often the cause cannot be established[1]. These cases are named idiopathic or defined as an 'unspecific category' of dizziness[1].

It has been proposed that dizziness may be caused by cervical spine hypolordosis. Moustafa et al. demonstrated that in patients having cervical spine hypolordosis and forward head posture (anterior head translation: AHT) and having a primary complaint of neck pains and dizziness had a dramatic improvement in symptoms after the improvement of the subluxation pattern[3]. In fact, 36 patients receiving 30 treatments with the cervical Denneroll as part of a multimodal rehabilitation program achieved a 14° improvement in lordosis and a 25 mm reduction in AHT that resulted in improved dizziness severity, frequency, and a 24-point drop on the dizziness handicap inventory (DHI)[3]. Surprisingly, a 1 year follow-up, without treatment, demonstrated the patients showed a preservation of the initial lordosis improvement and a further 17-point drop on the DHI. Fortner et al.[4] has also presented a case report mirroring the results of Moustafa et al[3].

We present the case of relief of idiopathic dizziness and the reduction of neck pains and headache by the improvement in cervical alignment in a mid-aged female treated by Chiropractic BioPhysics® (CBP®) technique.

*Corresponding author. Paul A. Oakley (E-mail: docoakley.icc@gmail.com)

PARTICIPANT AND METHODS

A 57 year old female (157 cm height, 68 kg weight) presented with the chief complaint of dizziness that had been diagnosed 4 years prior by her family medical doctor. It was reported that the first dizziness episode started 30 years ago, a year after being involved in a motor vehicle collision. The patient had previously tried several treatments that were unsuccessful including chiropractic spinal manipulative therapy (SMT), over the counter medication, prescription medication and physical therapy. She would experience symptoms with lying on her right side or her back, on roller coasters, watching movies, with lifting, looking up, getting into and out of bed, playing sports, and had difficulty walking in the dark. She additionally reported a history of recurring lower back and neck pains as well as headaches. The only medication she was taking was a statin for her cholesterol, as well as she would resort to taking a muscle relaxant for 1–2 days, about 3–4 times per year when her back would act up.

The patient reported neck pain at its worst to be 9/10 on a numerical pain rating scale (NPRS: 0=no pain; 10=worst pain ever). The patient scored a 56 on the dizziness handicap inventory (DHI) which indicates a severe disability due to dizziness (16–34=mild, 36–52=moderate, 54+=severe disability)[5]. The patient scored an 18% on the neck disability index (NDI)[6], a 26% on the Oswestry low back pain disability questionnaire (ODI)[7], and a 24% on the Rand quality of life questionnaire (RQOL)[8].

Upon previous examination by the MD, MRI screening ruled out occult vestibular etiology and Meniere's disease was also ruled out. A neuro-otologic examination revealed clinically intact vestibular ocular reflexes, an absence of spontaneous or gaze nystagmus and a normal Romberg's test. An audiogram showed normal hearing sensitivity. The patient was diagnosed by her MD as having a 'very complex chronic vestibular problem'. The chiropractor performed several orthopedic tests, only a generic dizziness feeling could be elicited by performing the Dix-Hallpike maneuver. The patient showed a normal Romberg's test and all other tests were negative. Since otologic and vestibular causes of vertigo were previously and currently ruled out, a working diagnosis of non-specific or idiopathic dizziness was made by the first author.

The patient's posture presented with a right head translation, an AHT and an anterior translated pelvis. The patient had reduced cervical spine range of motion in all directions and difficulty with lumbar flexion causing dizziness. Palpatory exam was done seated due to the patient's inability to lie without dizziness onset. Palpation revealed muscle tenderness and hypertrophy present in the upper cervical and lower lumbar regions.

Radiographic assessment was performed and analyzed using the PostureRay system (PostureCo Inc., Trinity, FL, USA) which uses Harrison's posterior tangent methods to measure sagittal spine alignment by lines on the posterior margins of the vertebrae[9]. The total lordosis is measured by the intersection of posterior tangents of C2 and C7. Forward head translation is measured by the horizontal distance of a line drawn vertically from the posterior-superior corner of C2 body and the posterior-inferior corner of C7 body. This method is reliable and repeatable, as is standing posture[9–11]. Initial X-ray analysis (Fig. 1) revealed a forward head translation of 26.6 mm (0–15 mm normal[12]), a C2–7 hypolordosis of −13.7° (vs. 31–42° normal[12, 13]), and a normal atlas plane line of −29.8 (25–29° normal[12, 14]).

Spinal rehabilitation including CBP cervical extension traction[15–18] was selected for treatment as this method has a substantial evidence-base and the patient was a good candidate as she had definitive cervical hypolordosis.

The initial treatment plain involved instrument adjusting to the cervical and lumbar paraspinal tissues while the patient was seated using the arthostim (Impac Inc., Salem, OR, USA). This was to stimulate the spinal muscles and related tissues

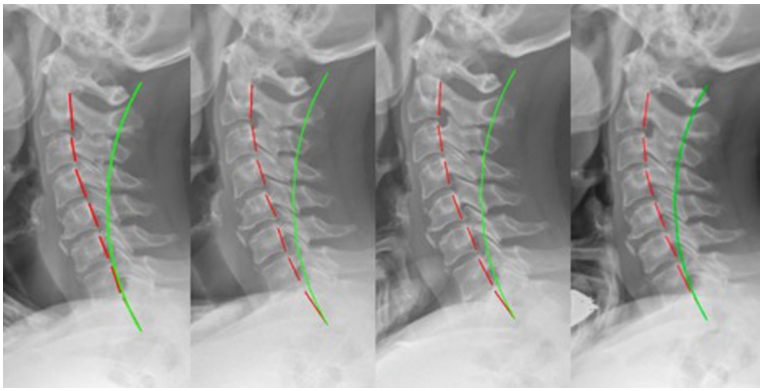

Fig. 1. Lateral cervical X-rays.
Left: Initial image (5/21/18) showing a −13.7° lordosis (C2-C7 posterior tangents) and 26.6 mm anterior head translation (AHT); Second: 3-month follow-up image (8/29/18) showing a −27.3° lordosis and 26.3 mm AHT; Third: 9-month follow-up (2/7/19) showing a −29.4° lordosis and 29.5 mm AHT; Last: 12-month follow-up (5/14/19) showing a −33.2° lordosis and 24 mm AHT.

thought to reduce muscle spasms and tension and was continued throughout the entire course of treatment. Electric stimulation and cryotherapy were performed to the patients shoulders. A unique cervical extension exercise was performed for 3-minutes and held for 10-seconds for each repetition; the patient performed a forward head translation, then a head extension and then attempted to compress the neck all while in the standing position. Cervical traction was initially not tolerated, so an elevation block supporting the head of 30 mm was used which did not instigate any vertigo symptoms and was performed for 10-minutes (Fig. 2). This describes the first 6 treatments.

Progressively, over the first 12 weeks the block height was reduced by 10 mm increments, so that eventually the patient was able to lay the head flat on the table. This describes the subsequent 24 treatments. At this point manual cervical spinal manipulation was also initiated. Over the next 7 treatments, the patient progressed to being able to tolerate a compressible cervical roll under the neck for 20-minutes. This was the progression for the initial 3-months.

For the subsequent 6-months, 41 treatments were given with the patient able to tolerate a medium cervical Denneroll traction orthotic (Fig. 2). The patient lay supine with the peak of the orthotic positioned at C6–7, the time was increased from 3-minutes progressing to a maximum of 20-minutes. Cervical spinal manipulation was also continued as was the neck exercise for up to 5-minutes, however the electrical muscle stimulation was not. For the next 3-months leading up to the 1 year examination, 37 treatments involved the patient performing 'Pope's 2-way' type of 3-point cervical extension traction (Fig. 2). The patient was seated in a chair and the head was distracted but also retracted and extended, while a posterior-to-anterior transverse pull was achieved. The time progressed from 10-minutes up to a maximum of 16-minutes, and the anterior weight was started at 10 pounds progressing to a 17.5 pound maximum. The patient continued to perform the Denneroll traction orthotic at home for 20-minutes per day. Cervical spinal manipulation was continued as was the neck exercises with the addition of an elastic band pro-lordotic neck exerciser (Circular Traction Supply Inc., Huntington Beach, CA, USA) for resistance, these again were performed for up to 5-minutes being held for 10-seconds.

In total, the patient received 115 treatments over a one-year time period. Due to the severity of the patient's dizziness, treatment progressed slowly as described. Cervical radiographs were taken initially, and at the 3-month, 9-month, and 12-month follow-ups. Detailed examinations including disability questionnaires were performed initially and at the 1 year follow-up. The patient gave verbal and written consent for the publication of this report.

RESULTS

An assessment performed after 3-months (37 treatments) indicated the patient's neck and lower back pains had reduced to 1/10 NPRS. The patient also reported improvement in dizziness and less headaches, both having less frequent and less severe episodes. The lateral cervical radiograph showed improved lordosis to −27.3° (Fig. 1). A 9-month post-radiograph (78 treatments) showed increased lordosis to −29.4° (Fig. 1). At the 12-month examination (115 treatments), the patient reported the neck and low back pains to average a 1/10, and the headaches to be mostly resolved. The patient reported to be well with very little reports of dizziness, and was able to perform many tasks that had previously initiated dizziness episodes, such as drive for extended periods and performing household cleaning duties. The patient had a DHI score of 12 (vs. 56), an NDI

Fig. 2. Top left: Traction progressed from laying head on a 3 cm high block; Top right: Traction over a foam circular roll; Bottom left: Traction over a medium size Denneroll; Bottom right: Traction performed in 'Pope 2-way' extension traction.

score of 14% (vs. 18%), an ODI score of 14% (vs. 26%), and a RQOL score of 14% (vs. 24%). The lordosis measured −33° (Fig. 1). Due to the positive results experienced by the patient, they chose to remain on a once per week maintenance schedule continuing the treatments described during the 9 to 12-month timeframe. A follow-up assessment at 10-months post-treatment (i.e. 1 year, 10-months) showed a score of 10 on the DHI. The patient continued to remain well and had not resorted to taking any muscle relaxants since beginning care. There was no report of any adverse side-effects from the treatment.

DISCUSSION

This case demonstrates the relief of dizziness by the improvement in cervical lordosis by CBP methods in a mid-aged female. There was also relief of neck pain, headaches and low back pains. There was an approximate 20° lordosis increase achieved over the duration of one year after 115 in-office treatments.

There has been one randomized controlled trial demonstrating that correcting the cervical lordosis was beneficial in reducing symptoms of dizziness in a cohort of patients having cervical hypolordosis and neck pain[3]. As mentioned, Moustafa et al. reported that after 10-weeks of a multimodal program of cervical spine mobilization, myofascial release, TENS therapy, hot packs, and therapeutic neck exercises as well as 20-minutes of the cervical Denneroll extension traction orthotic, there was a statistically significant increase in cervical lordosis and reduction of dizziness symptoms[3]. In contrast, a comparison group receiving the same treatment protocol, minus the Denneroll traction device had no increase in lordosis, no reduction of AHT and only temporary initial dizziness symptom reduction that did not last; the initial pain relief and dizziness regressed towards baseline at the 1 year follow-up. This trial shows definitive evidence that the loss of cervical lordosis may be a key parameter in the causation of dizziness in some patients.

Moustafa et al. hypothesized that it was the loss of cervical lordosis that was causative for the dizziness symptoms since the comparison group had only temporary symptomatic relief that was lost at the 1 year follow-up[3]. The treatment group, having increased lordosis and reduced forward head translation, remained well after the year. Fortner et al.[4] extended upon Moustafa et al.'s theory reporting that the loss of cervical lordosis is associated with an anatomically longer cervical spine[19], thereby having a traction effect on the spinal cord[19, 20]. Normal movements of the head and neck, particularly flexion, can exert a dynamic overstraining of the cord and nerves, or changing normal physiologic movements of the cord to become pathologic strains onto the cord[19–21]. Pons-cord structural or microstructural injury may cause dizziness symptoms in certain patients[22].

This theory makes sense as head position and head motion are intrinsically linked to neurologic structures[23, 24]. In fact, head motion recorded by the vestibular labyrinths is conveyed to specific brainstem and cerebellar structures that relay velocity information to eye muscles to stabilize vision, and to the axial and limb muscles necessary to stabilize balance. Neural networks enhance and extend the primary vestibular signal, and create adaptation to movement when appropriate. Pathological lesions to one or more of these structures may cause central vertigo and imbalance, and may be localized by specific forms of nystagmus and other abnormal neurological signs[24].

We concur with Moustafa et al. and Fortner et al. that the 'pathological lesion' can be the dynamic strain with flexion movements in a patient having altered cervical spine alignment (i.e. cervical hypolordosis/kyphosis). Further, the potential combination of head and neck subluxation patterns as translations and rotations from neutral head posture may create an accumulation of neurological strain such that other head motions, not simple head flexion movements, may exert overstrain onto the cord to create dizziness symptoms in those who are vulnerable[25]. This is also supported since the diagnosis and management of patients with dizziness remain difficult due to the lack of objective measures for this condition[2].

It may be a prudent suggestion for the routine assessment of cervical spine alignment screening in those diagnosed with 'unspecific' dizziness. Although not a typical screening protocol for this disorder, this is consistent with the recent suggestion of cervical spine screening for those suffering from lingering whiplash symptoms, or so-called chronic or 'late whiplash syndrome'[26].

The limitations of this report are that it is one only a single patient, the patient treatment involved a multimodal treatment regime, and that a longer follow-up period would have improved the quality of the reporting. It may be argued that manual spinal manipulation resulted in the improved dizziness reported, however, in a recent systematic review[27], there seems to be very limited quality evidence for manual therapy to be effective for cervicogenic dizziness. Further, as reported in the trial by Moustafa et al.[3], their comparative group receiving physiotherapy treatment minus extension traction, did initially report temporary dizziness improvement, however this improvement regressed towards baseline at the follow-up at 1 year.

Thus, we believe the improved dizziness in this case was due to the improvement in cervical lordosis. The strength of this report is that the results are consistent with other reports of similar idiopathic dizziness and CBP treatment[3, 4], and there was report of follow-up.

Conflict of interest

Dr. Paul Oakley (PAO) is a paid consultant for CBP NonProfit, Inc.; Dr. Deed Harrison (DEH) teaches chiropractic rehabilitation methods and sells products to physicians for patient care as used in this manuscript.

REFERENCES

1) Hogue JD: Office evaluation of dizziness. Prim Care, 2015, 42: 249–258. [Medline] [CrossRef]
2) Byrne M: Assessment of the dizzy patient. Aust Fam Physician, 2002, 31: 722–727. [Medline]
3) Moustafa IM, Diab AA, Harrison DE: The effect of normalizing the sagittal cervical configuration on dizziness, neck pain, and cervicocephalic kinesthetic sensibility: a 1-year randomized controlled study. Eur J Phys Rehabil Med, 2017, 53: 57–71. [Medline]
4) Fortner MO, Oakley PA, Harrison DE: Alleviation of posttraumatic dizziness by restoration of the cervical lordosis: a CBP® case study with a one year follow-up. J Phys Ther Sci, 2018, 30: 730–733. [Medline] [CrossRef]
5) Jacobson GP, Newman CW: The development of the Dizziness Handicap Inventory. Arch Otolaryngol Head Neck Surg, 1990, 116: 424–427. [Medline] [CrossRef]
6) Vernon H, Mior S: The Neck Disability Index: a study of reliability and validity. J Manipulative Physiol Ther, 1991, 14: 409–415. [Medline]
7) Hudson-Cook N, Tomes-Nicholson K, Breen A: A revised Oswestry disability questionnaire. In: Roland M, Jenner JR, eds. Back pain: new approaches to rehabilitation and education. Manchester: Manchester University Press, 1989, pp 187–204.
8) Ware JE Jr, Sherbourne CD: The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med Care, 1992, 30: 473–483. [Medline] [CrossRef]
9) Harrison DE, Harrison DD, Cailliet R, et al.: Cobb method or Harrison posterior tangent method: which to choose for lateral cervical radiographic analysis. Spine, 2000, 25: 2072–2078. [Medline] [CrossRef]
10) Harrison DE, Holland B, Harrison DD, et al.: Further reliability analysis of the Harrison radiographic line-drawing methods: crossed ICCs for lateral posterior tangents and modified Risser-Ferguson method on AP views. J Manipulative Physiol Ther, 2002, 25: 93–98. [Medline] [CrossRef]
11) Harrison DE, Harrison DD, Colloca CJ, et al.: Repeatability over time of posture, radiograph positioning, and radiograph line drawing: an analysis of six control groups. J Manipulative Physiol Ther, 2003, 26: 87–98. [Medline] [CrossRef]
12) Harrison DD, Harrison DE, Janik TJ, et al.: Modeling of the sagittal cervical spine as a method to discriminate hypolordosis: results of elliptical and circular modeling in 72 asymptomatic subjects, 52 acute neck pain subjects, and 70 chronic neck pain subjects. Spine, 2004, 29: 2485–2492. [Medline] [CrossRef]
13) McAviney J, Schulz D, Bock R, et al.: Determining the relationship between cervical lordosis and neck complaints. J Manipulative Physiol Ther, 2005, 28: 187–193. [Medline] [CrossRef]
14) Harrison DD, Janik TJ, Troyanovich SJ, et al.: Comparisons of lordotic cervical spine curvatures to a theoretical ideal model of the static sagittal cervical spine. Spine, 1996, 21: 667–675. [Medline] [CrossRef]
15) Harrison DD, Janik TJ, Harrison GR, et al.: Chiropractic biophysics technique: a linear algebra approach to posture in chiropractic. J Manipulative Physiol Ther, 1996, 19: 525–535. [Medline]
16) Harrison DE, Harrison DD, Haas JW: Structural rehabilitation of the cervical spine. Evanston: Harrison CBP® Seminars, Inc., 2002.
17) Oakley PA, Harrison DD, Harrison DE, et al.: Evidence-based protocol for structural rehabilitation of the spine and posture: review of clinical biomechanics of posture (CBP) publications. J Can Chiropr Assoc, 2005, 49: 270–296. [Medline]
18) Harrison D, Moustafa I, Oakley P: Systematic review of Chiropractic Biophysics® (CBP®) methods employed in the rehabilitation of cervical lordosis. Proceedings from the 14th International Society on Scoliosis Orthopedic and Rehabilitation Treatment (SOSORT) meeting, San Francisco, April 25–27, 2019, p 156.
19) Breig A: Adverse mechanical tension in the central nervous system. Relief by functional neurosurgery. Almqvist & Wiksell International, 1978.
20) Panjabi M, White A 3rd: Biomechanics of nonacute cervical spinal cord trauma. Spine, 1988, 13: 838–842. [Medline] [CrossRef]
21) Breig A: Biomechanics of the central nervous system. Uppsala: Almqvist & Wiksell International, 1960.
22) Fife TD, Giza C: Posttraumatic vertigo and dizziness. Semin Neurol, 2013, 33: 238–243. [Medline] [CrossRef]
23) Moustafa IM, Youssef A, Ahbouch A, et al.: Is forward head posture relevant to autonomic nervous system function and cervical sensorimotor control? Cross sectional study. Gait Posture, 2020, 77: 29–35. [Medline] [CrossRef]
24) Welgampola MS, Bradshaw AP, Halmagyi GM: Assessment of the vestibular system: history and physical examination. Adv Otorhinolaryngol, 2019, 82: 1–11. [Medline]
25) Harrison DE, Harrison DD, Troyanovich SJ: Three-dimensional spinal coupling mechanics: part II. Implications for chiropractic theories and practice. J Manipulative Physiol Ther, 1998, 21: 177–186. [Medline]
26) Fortner MO, Oakley PA, Harrison DE: Cervical extension traction as part of a multimodal rehabilitation program relieves whiplash-associated disorders in a patient having failed previous chiropractic treatment: a CBP® case report. J Phys Ther Sci, 2018, 30: 266–270. [Medline] [CrossRef]
27) Yaseen K, Hendrick P, Ismail A, et al.: The effectiveness of manual therapy in treating cervicogenic dizziness: a systematic review. J Phys Ther Sci, 2018, 30: 96–102. [Medline] [CrossRef]