



Case Study

## Alleviation of posttraumatic dizziness by restoration of the cervical lordosis: a CBP<sup>®</sup> case study with a one year follow-up

MILES O. FORTNER<sup>1)</sup>, PAUL A. OAKLEY<sup>2)\*</sup>, DEED E. HARRISON<sup>3)</sup>

<sup>1)</sup> Private Practice, USA

<sup>2)</sup> Private Practice: Newmarket, ON, L3Y 8Y8, Canada

<sup>3)</sup> CBP NonProfit, Inc., USA

**Abstract.** [Purpose] To present the successful treatment of posttraumatic dizziness and neck pains that were initiated in a patient following a whiplash event. [Subject and Methods] A 46 year old male suffered a whiplash event that initiated neck pain and dizziness symptoms. The patient had many positive orthopedic findings and demonstrated a forward head posture and cervical hypolordosis. The patient was treated by Chiropractic BioPhysics<sup>®</sup> technique including cervical extension traction, extension exercises and spinal manipulative therapy initially three times a week for 16-weeks, and once a month thereafter. [Results] The patient had a resolution of daily dizziness and neck pain with a concomitant reduction of forward head translation and increase in cervical lordosis. The postural measures were further improved after one year of mostly home-care. [Conclusion] The cervical spine alignment may be an important biomarker for those with dizziness. The correction of cervical lordosis may be an essential requirement for superior clinical outcomes for those with posttraumatic dizziness.

**Key words:** Posttraumatic dizziness, Cervical lordosis, Extension traction

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### INTRODUCTION

The report of dizziness is common in clinical practice<sup>1, 2)</sup>. Although a thorough examination can often lead to obvious causes such as benign paroxysmal positional vertigo or orthostatic hypotension<sup>1)</sup>, the diagnosis and management can remain difficult due to the lack of objective measures for this condition<sup>2)</sup>.

Posttraumatic dizziness is that evolving after a traumatic event, including concussion or whiplash<sup>3, 4)</sup>. Those patients who remain symptomatic after differential diagnosis are likely those who have occult cervical spine injury, contributing to cervicogenic dizziness. Whiplash is associated with cervical spine loss of lordosis<sup>5-7)</sup>, and whiplash associated disorders (WAD) including dizziness<sup>4)</sup> persisting beyond 6-months is termed late whiplash syndrome (LWS)<sup>8)</sup>. LWS and cervical spine misalignment have been reported, where the correction of lordosis has resulted in reduction of symptoms<sup>9)</sup>.

We present the successful resolution of dizziness and neck pains following the correction of the cervical lordosis in a male patient whose symptoms initiated following a motor vehicle collision.

### SUBJECT AND METHODS

A 46 year old male presented reporting suffering from dizziness for 2 years. The dizziness onset was following a rear end vehicle collision. He reported to have a history of car crashes as he raced cars on a racing track.

The patient also reported neck pain rated as a 5/10 (0=no pain; 10=worst pain ever), as well as neck stiffness, ringing

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

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in ears, spots in eyes, heart palpitations, low back pain, bilateral knee and shoulder pains.

Upon examination it was determined the patient had several positive findings: cervical range of motion (ROM) was restricted in bilateral lateral bending, positive right sided Jackson's cervical compression test, decreased L4 reflex, hypoesthesia on the right C3 and C4 dermatomes. Visual postures<sup>10)</sup> included a left head translation, a right head flexion, a left thoracic translation, and a right posterior pelvic rotation.

Radiographic assessment was performed and the cervical spine was analyzed using the PostureRay system (Trinity, FL, USA) that uses the Harrison posterior tangent (HPT) method to measure lateral cervical alignment<sup>11)</sup>. The HPT method draws lines along the posterior of the vertebral bodies, a global angle between C2 and C7 gives the overall lordosis measurement. Forward head posture (translation) is measured as the horizontal distance from the vertical line drawn from the posterior-inferior C7 to the posterior-superior C2 body. This method is accurate and reliable as is standing posture<sup>11-13)</sup>. The patient demonstrated forward head posture (31.2 mm vs. 0-15 mm normal<sup>14, 15)</sup>), cervical hypolordosis ( $-17.4^\circ$  vs.  $-31$ - $42^\circ$  normal<sup>14-16)</sup>), and a reduced atlas plane line (APL:  $-2.8^\circ$  vs.  $24$ - $29^\circ$  normal<sup>14, 15)</sup>) (Fig. 1).

The patient was treated by Chiropractic BioPhysics® (CBP®) protocol to increase the cervical lordosis<sup>17, 18)</sup>. CBP technique is a full spine and posture correcting method that applies linear algebra concepts of mirror image® exercises, spinal manipulation, and traction methods to correct spinal deviation<sup>17, 18)</sup>. Several recent randomized trials have substantiated this approach to be successful in restoring cervical lordosis<sup>19-21)</sup>.

The patient was treated three times a week for 16 weeks, and then received another 10 treatments (once per month) until a year follow-up assessment was performed. Treatment included neck extension exercises (6 minutes in-office; 100 repetitions holding for 5 seconds daily at home) with the Pro-lordotic™ (Circular Traction Supply Inc., Huntington Beach, CA, USA) as performed on the Powerplate® (Northbrook, IL, USA) to intensify the exercise (Fig. 2). Spinal manipulative therapy was performed each session to mobilize the spinal joints and provide pain relief. Cervical extension traction (Pope 2-way<sup>22)</sup>) was performed each session building up to 45 pounds of front pull for up to 20 minutes duration per session (Fig. 3). The patient was instructed to lay supine on a cervical Denneroll™ (Denneroll Spinal Orthotics, Wheeler Heights, NSW, Australia) for 20 minutes per day at home<sup>19, 20)</sup>. All treatments and assessments were performed by the first author. There were no adverse reactions reported by the patient associated with the treatments, and the patient gave consent for the publication of these results including pictures and radiographs.

## RESULTS

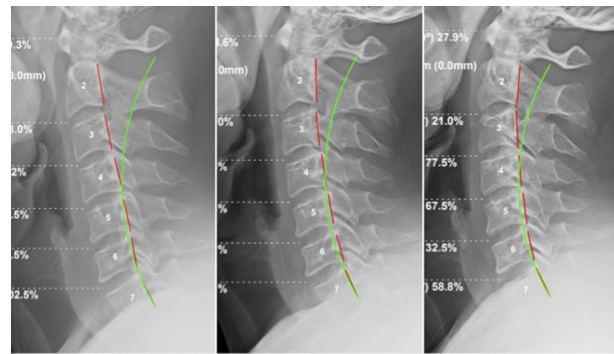
After 46 in-office treatment sessions, a follow-up assessment on Aug. 5, 2016 demonstrated a reduction of forward head posture (+22.1 mm vs. +31.2 mm), an increase in cervical lordosis ( $-23.2^\circ$  vs.  $-17.4^\circ$ ), and an increase in APL ( $-12.0^\circ$  vs.  $-2.8^\circ$ ) (Fig. 1). Cervical ROM was slightly reduced in all directions but improved, neck pain was now 2/10, and all other tests were WNL.

A one-year follow-up assessment was performed on May 4, 2017. The patient had had 10 maintenance treatments since the last assessment (Aug. 5, 2016), and 56 treatments overall. The patient demonstrated a further reduced forward head posture (+15.9 mm vs. 31.2 mm), a further increased cervical lordosis ( $-30.4^\circ$  vs.  $-17.4^\circ$ ), and APL ( $-20.9^\circ$  vs.  $-2.8^\circ$ ) (Fig. 1). The patient demonstrated all cervical ROM, DTR, dermatome and myotome testing was WNL, and the patient reported no neck pain (0/10).

Dizziness was reported to be completely resolved on a daily basis, although only mildly bothered him while on a boat; his low back pain was 90% improved and only bothering him when he bent over; all other initial complaints of neck stiffness, ringing in ears, spots in eyes, heart palpitations, bilateral knee and shoulder pains were reported to be 100% improved.

## DISCUSSION

This case demonstrated the significant improvement in dizziness and resolution of neck pain in a 46 year old by the improvement in cervical lordosis by multimodal CBP methods. The current patient had suffered a whiplash event 2.5 years



**Fig. 1.** Lateral cervical radiographs. Left: Initial (Apr. 27, 2016); Middle: 16-week follow-up (Aug. 5, 2016); Right: One year follow-up (May 4, 2017). From left to right demonstrates reduction of forward head translation (31.2 mm; 22.1 mm; 15.9 mm), increase in cervical lordosis (C2-C7 ARA:  $-17.4^\circ$ ;  $-23.2^\circ$ ;  $-30.4^\circ$ ), and increase in atlas plane line (C1 to horizontal:  $-2.8^\circ$ ;  $-12.0^\circ$ ;  $-20.9^\circ$ ). Note: red line indicates patient (posterior vertebral bodies); green line indicates ideal  $42^\circ$  C2-C7 lordosis from Harrison et al.<sup>14)</sup> (CBP Seminars).



**Fig. 2.** Cervical extension exercises. Patient stands on PowerPlate and extends head and neck backwards against resistance of Prolordotic elastic band tension.



**Fig. 3.** Cervical extension traction. Patient is seated with back against backrest, a padded fulcrum is placed at mid-neck and hooked through a pulley at approximately horizontal angle and weights are added to force the neck into an involuntary extended position. The head is held in place by the posterior and superior placed head harness that is locked to the metal frame.

previous to initially presenting for treatment. This is thought to be the initiating event contributing to the symptoms of neck pain and dizziness as the patient had unremarkable health history prior to the event.

Whiplash events cause trauma to the cervical spine and are associated with altering its normal alignment<sup>5-7</sup>. An altered cervical spinal alignment is associated with many symptoms including dizziness<sup>20</sup>. Moustafa et al. reported on a randomized clinical trial on patients having concomitant dizziness symptoms as well as loss of the normal cervical lordosis. Seventy-two patients were randomized into a control group or a treatment group, where both groups received a multimodal program including cervical spine mobilization, myofascial release, TENS therapy, hot packs, and therapeutic neck exercises. The treatment group also received the Denneroll cervical spine extension traction orthotic device for 20-minutes. Results after 10-weeks (30 treatment sessions) demonstrated an improvement in dizziness and neck pain for both groups, however, only the treatment group showed significant improvements in increased lordosis and decreased forward head translation. Results at one-year, 10-weeks demonstrated that only the treatment group (with improved posture) demonstrated statistically significant difference (and maintenance) of the improved symptoms (including dizziness) and posture (lordosis and forward head translation); the control group receiving all physiotherapy treatments excluding the Denneroll device regressed symptomatically back to baseline values.

The results in this case mirror the results from the Moustafa trial<sup>20</sup>, a one-year follow-up assessment verified the patient remained virtually symptom free. This case suggests that the dizziness was caused by cervicogenic origins, as its correction led to the alleviation of symptoms.

How does altered cervical spine alignment contribute to dizziness? It is known that altered cervical spine alignment causes both altered vertebral kinematics<sup>23, 24</sup> as well as premature and accelerated degenerative changes to the tissues of the neck<sup>25-28</sup>. These two conditions may lead to altered sensorimotor integration and altered afferent neural input from the cervical spine soft tissues<sup>20</sup>.

Further it is known that cervical spine hypolordosis causes an increase in the length of the spinal canal<sup>30</sup>. This causes a direct increase in strain to the spinal cord<sup>30, 31</sup>. Thus, instead of normal physiologic tension put onto the cord, any dynamic flexion of the neck in one with a neutral cervical hypolordotic or kyphotic alignment will exert pathologic strains onto the spinal cord<sup>29-31</sup>. In certain patients this may contribute to dizziness symptoms through structural or microstructural nervous system injury<sup>32</sup>.

Moustafa et al. suggest that the restoration of the cervical spine alignment itself may be a missing component in the management of cervicogenic dizziness. The results from their trial as well as from the current case seem to support this contention. Further research needs to clarify the relationship of cervical spine alignment and the symptom of dizziness in those who through differential diagnosis remain in the 'nonspecific category<sup>1)</sup>' or idiopathic.

This case is limited being an isolated case. Further, multiple treatments were given to the patient. It is supported by previous work that restoration of the cervical lordosis is achieved by cervical extension traction procedures versus muscular exercises or spinal manipulation<sup>19-21</sup>.

## Conflict of interest

PAO is paid by CBP NonProfit for writing the manuscript; DEH teaches chiropractic rehabilitation methods and sells products to physicians for patient care used in this manuscript.

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