Chiropractic Management of Performance Related Musculoskeletal Disorder in a Career Violist

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Conflict of interest: None declared

Patient: Female, 64-year-old
Final Diagnosis: Atlas subluxation complex
Symptoms: Hip pain • neck pain • wrist pain
Medication: —
Clinical Procedure: Chiropractic adjustment • manual therapy
Specialty: Family Medicine

Objective: Challenging differential diagnosis

Background: Music performance is a highly stressful activity, requiring skilled neuromuscular dexterity. A lack of reported strategies for musicians suffering performance-related musculoskeletal disorders (PRMDs) exists. Papers investigating the role that postural distortions or spinal structural anomalies that could play a role in setting the stage for PRMD do not exist. The purpose of this paper was to provide a description and discussion of the use of a specialized upper cervical manual correction at the cranio-cervical junction (CCJ) to treat a violist who had disabling pain in her wrists, arms, neck, and hip. Differential diagnoses are required regarding possible confounding elements within the cervical spine.

Case Report: After 40 years of music performance, a violist experienced severe pain while attempting to play the simplest student musical pieces. Early retirement seemed imminent. To determine appropriate chiropractic approach, the patient's clinical assessment included active range of motion, chiropractic tests, palpation, and radiographic study. Postural distortions, hypertonic muscles, joint pain, arthritis, and ponticulus posticus (PP) were noted. Upper cervical spine orthogonal radiographic series were used to develop a correction strategy. These images identified excursion of the cervical spine away from the vertical axis and C0–C1–C2 misalignments. After performing low-velocity, low-force manual correction to the CCJ, the patient experienced immediate relief of wrist pain. Over a 9-month follow-up period, the patient reported gradual decrease of pain and increased stamina while performing. Upon completing chiropractic care, the violist's career was restored.

Conclusions: This case supports the hypothesis that evaluating and correcting spinal structures proximal to painful extremities may represent an efficient and long-lasting solution for PRMD.

MeSH Keywords: Cervical Atlas • Chiropractic • Neck Pain • Wrist Injuries

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Background

Performance-related musculoskeletal disorder (PRMD) is universally recognized as common phenomena amongst professional orchestral musicians, with career-ending potential [1–6]. Between 39% and 69% of musicians have pain affecting playing capacity, and nearly 12% are forced to permanently retire [7]. One author found that 93% of musicians who responded to a survey reported musculoskeletal symptoms [8]. These disorders create a significant financial burden to individuals and orchestras and lead to serious consequences to musicians’ performance and ultimately, career. The most common symptoms of PRMD include pain, weakness, numbness, and/or tingling that interfere with the ability to play an instrument at the level to which the musician is accustomed [9–11]. Anyone may be susceptible, but gender, age, static muscle loading, repeated movements, poor posture, and poor fitness stand out as contributing risk factors [9]. Unhealed injuries, micro-trauma from repetitive loaded movement, instrument change, posture, technique, and performance stress contribute to playing-related disorders [9,11]. Risk factors also include sudden increase in practice time, physical environment, instrument weight, and average playing hours per week. Postural muscles, ligaments, joint capsules and synovium can be involved [12]. Paresthesia, such as burning or tingling, tiredness, or heavy limb sensations are frequent initial symptoms [10–14]. Even mild neurologic deficits have serious consequences for string players due to the high demand for extraordinary neuromuscular dexterity. A lack of reported strategies to reduce injuries in this population is readily apparent [3,15]. Most studies of musicians have focused on questionnaire methodology and have not documented physical findings [14]. This author has found no studies that investigated hidden factors including trauma, structural anomalies of the spine, or osteoarthritis as contributors to PRMD.

It has been hypothesized that upper cervical correction of misaligned structures of the cranio-cervical junction removes interference to the central and peripheral nervous systems, thus restoring the ability of the body to successfully adapt to stressful conditions [16–20]. The purpose of this paper was to provide a description and discussion of the use of an upper cervical chiropractic procedure to treat a career violist with heavy limb sensation and disabling pain in wrists, arms, neck, and hip of 1-year duration. An additional purpose was a discussion of unrecognized elements in this case that have the potential to contribute to PRMD.

Case Report

Patient consent was obtained for this case report. A female violist, string and piano teacher, age 64, sought help with several issues that were affecting her ability to play and teach [21,22]. After 40 years of this work, she felt that the severity of her condition would force early retirement because playing even the simplest beginner’s music caused pain. Neck pain, bilateral wrist pain, left brachial pain following the radial nerve distribution and right hip pain of 1-year duration presented extreme challenges to her daily playing and teaching activities. She found it impossible to raise her arms to playing position due to heavy limb sensation and pain, and she resorted to using a pillow under the left axilla to manage the pain (Figure 1). These symptoms had progressed over the past year until simple rest did not help. Wearing braces on both wrists at night helped alleviate only some wrist pain. History included a fall on the left arm that occurred 2 years previously. This injury did not result in immediate symptoms. There were no other diagnoses or treatments. These symptoms, present in daily teaching and playing practice, were forcing her to consider early retirement.

Examination

To establish the presence of the spinal subluxation, the National Upper Cervical Chiropractic Association (NUCCA) protocol was used for her evaluation. The supine leg check (SLC) showed the right leg was ¼ inch short. With the patient turning her head left, the legs became even. This finding alone indicated the presence of the atlas subluxation complex (ASC) [20]. Upon further investigation of the patient’s condition, active range of motion tests revealed right lateral flexion of the neck producing right neck pain, with range of motion moderately restricted in right and left lateral cervical flexion and right cervical rotation, and unrestricted left cervical rotation. Palpation tests were positive for hypertonic muscles of the left scalenus, left levator scapula, left trapezius, left lumbar erector spinae, and a posterior ilium on the left. Investigation of cranial bone motion revealed occipital bone shift and left parietal bone shifted left.
Radiographic study

Radiographic study of the neck following standardized NUCCA protocol showed the following characteristics: lateral cervical film revealed left-side complete ponticulus posticus (PP), severe disc degeneration at C5–C7, exuberant osteophyte formation from C5–C7, and loss of cervical lordosis (Figure 2). Nasium (frontal) film revealed relative positions of the skull, atlas (C1), axis (C2), and cervical spine in relation to the vertical axis. The atlas shifted right 2 degrees, the cervical spine shifted into right frontal plane 3.75 degrees, and skull correctly positioned on vertical axis (Figure 3).

Intervention

Using NUCCA protocol, corrective manual adjustments were delivered, employing a low-force, low-velocity method without taking the joint to its physiologic limit. The patient was positioned left side down on the adjusting table with her head supported in a neutral position on a stationary headpiece. The corrective force delivered at the right atlas transverse process with the clinician’s body stance and line of drive was established from the radiographs.

Outcome

After performing the correction, immediate tests demonstrated the reduction of hypertonic muscles, pelvic twist, SLC, and cranial distortions. Initial immediate post radiographs showed reduction of the misalignment to 1 degree, a 50% reduction. To be consistent with NUCCA protocol for a more favorable long-term outcome, reduction of at least 80% is desirable. After more corrective adjusting with the same strategy, the second post radiographs at the same visit showed a complete reduction with all elements balanced optimally on vertical axis (Figure 4).

The patient reported immediate sense of relief from wrist pain. Over the next 2 days, neck pain was slightly aggravated 10% according to the patient report completed at day 3. This was the only time an aggravation of neck symptoms occurred.
throughout the period of care. The patient’s low back and hip pain reduced immediately and only recurred mildly and briefly 6 months later. Over the first 9 weeks there were 15 visits. On 7 of those, adjustments were performed when indicators were present. Initial frequency of follow-up visits were twice a week for 4 weeks, then once a week for 5 weeks. Progress examination at 8 weeks showed improved active range of motion in all directions and no pain elicited with right lateral cervical flexion. Symptom change occurred over the first 9 weeks as indicated by data points at 1 week intervals (Figure 5). Symptoms gradually reduced over time and were all either at a minimum (90% improved neck and low back) or completely better by month 9 (arm, wrists, and hip). Especially significant is that month 9 was December when the full holiday musical engagements were performed without discomfort or relapse. The patient has been able to continue her teaching and playing career over the last 7 years.

Discussion

The upper cervical chiropractic framework

As the healing profession undergoes stratification into specialties, the chiropractic profession also reflects that movement. Over the past 8 decades, empirical observation has served to unify upper cervical chiropractic procedures around the theory that primary misalignment or subluxation occurs in the CCJ. These procedures follow 1 of 2 conceptual frameworks: the articular model, focusing on atlas (C1) in relation to skull and axis (C2), and the orthogonal model, focusing on the relation between skull, atlas, axis, and cervical spine below both in relation to each other and in relation to the vertical axis [16]. The NUCCA procedure used for this patient is considered orthogonal. The scope of practice of the chiropractor is to diagnose spinal subluxation, not to ignore the patient’s condition, but to focus attention on a strategy to improve the patient’s condition through correction of the spinal misalignment.

Upper cervical chiropractic practice consistently uses the established term chiropractic subluxation, defined by the World Health Organization as follows:

A lesion or dysfunction in a joint or motion segment in which alignment, movement integrity, and/or physiological function are altered, although contact between joint surfaces remains intact. It is essentially a functional entity, which may influence biomechanical and neural integrity (emphasis added) [23].

The upper cervical chiropractor specializes in the CCJ misalignment detection and correction. In this patient case, the CCJ subluxation was detected, analyzed, and corrected. However, to be able to ascertain causality between CCJ misalignment and PRMD, stricter controls on the case would have been necessary.

Elements of the case revealed on radiograph

Radiographic elements of this patient’s condition have been described, with severe osteophyte formation in the cervical spine and the presence of the PP on the atlas, which have been associated with neck pain [24,25]. According to the published literature, no diagnostic significance of cervical curve alteration in relation to neck pain exists [25]. With the chiropractic care provided, neck pain gradually subsided after an initial aggravation of 3 days, which is the most common adverse event of upper cervical correction [18]. Even more interesting, the pain in the left wrist ulnar nerve distribution vanished immediately after the initial correction. Those patient-reported events support the hypothesis that the upper cervical subluxation was the causative factor in this individual’s neck and radicular pain apart from the PP and arthritic changes. These findings call
for greater study in this area; it is not the intent of this paper to establish causality in this case due to the lack of controls.

It has been noted that the set of symptoms described as PRMD can occur outside of the scope of standard orthopedic and neurologic tests [11]. Given the fact that there is no gold standard for diagnosing musculoskeletal disorders, developing a specific medical diagnosis would not have been more helpful than simply observing the totality of symptoms expressed in the general diagnosis of PRMD [10]. Radiographic studies of PRMD patients do not exist. Outcome measures specific to the musician are available and clarify the level of functional disturbance of PRMD symptoms. Nordic Musculoskeletal questionnaire (NMQ), International Conference of Symphony and Opera Musicians (ICSOM) questionnaire, and the Musculoskeletal Pain Intensity and Interference Questionnaire for Musicians (MPIIQM) represent 3 outcome measures that appear in the literature [9,26,27]. Ancillary procedures such as biofeedback, Feldenkrais technique, and remedial lessons in the FM Alexander Technique have been suggested for amelioration and prevention of nerve compression symptoms [28]. Developing kinesthetic awareness and rehabilitation of movement patterns characteristic of this training seem to require more than 10 weeks to achieve success in complex activities such as viola performance [29]. Changes in this musician’s equipment such as chin rest and shoulder rest, or remedial interventions such as sessions in Feldenkrais or the FM Alexander technique were not discussed in order to focus on correction of the spinal subluxation. In the upper cervical chiropractic office, the 2 main points for the clinician involve the severity of the complaint and the presence or absence of the spinal subluxation. As a result, outcome measures are focused in relation to the subluxation. In this case, for example, the supine leg check displayed the functional short leg, and the palpation tests displayed taut and tender muscle fibers and joint motion restriction. Outcome measures also used in the upper cervical chiropractic office may include thermography, posture analysis, force platform, and prone leg check. In this case, quality of life outcome measures or the musician questionnaires would have provided greater depth of understanding. If health issues resist timely resolution, the patient is referred to the appropriate practitioner. With rapid resolution of symptoms for this patient, other procedures were not considered.

Conclusions

This report details the evaluation of an injured string player and measurement of outcomes using a low-force, low-velocity correction of the ASC. Restored ability in this one patient followed the measured change at the CCJ. This possibly suggests that degenerative disc disease and the PP may not be significant contributors to reported symptoms for the musician in this case.

One weakness of this case report was that the use of a standardized quality of life questionnaire (such as NMQ, MPIIQM...
or ICSOM questionnaires, or the RAND-36 quality of life index) may have supported the outcome more robustly. Another weakness was the limitation of upper cervical outcome measures in the standard clinical setting. In a research setting, performing in-depth neurologic tests and spinal posture tests on sagittal and transverse planes using chosen osseous points and recording with calibrated imaging software would enhance our understanding of the link between spinal imbalance and neurological signs [30].

Future research is clearly warranted to include a longitudinal study investigating the relation between uncorrected postural distortions, spinal subluxations, and PRMD. Testing the hypothesis that body awareness techniques can be associated with improvements in spinal distortions and PRMD symptoms is warranted [29]. Finally, evaluating structural and functional characteristics of the upper cervical spine may hold promise in the evaluation and treatment of musicians with PRMD.

Conflict of interest

None.

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