Case Report

Improvements in Lung Function, Dysautonomia and Grip Strength in a Patient with Multiple Sclerosis Following Correction of Vertebral Subluxation Using Chiropractic BioPhysics®: A Case Study and Selective Review of Literature

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Abstract

Objective: The purpose of this study is to report on the structural and symptomatic improvements made in a patient with a 22-year history of multiple sclerosis using Chiropractic BioPhysics® technique.

Clinical Features: A 58-year-old female confined to a wheel chair presented for chiropractic care with a diagnosis of multiple sclerosis. An anterior-posterior lower cervical x-ray displayed 16.2mm left head translation (ideal is 0mm). Paraspinal thermography revealed a significant asymmetry in the cervical region with moderate asymmetry at C1 and C5 and severe asymmetry at C2-C4. Spirometry revealed a peak expiratory lung flow volume of 200 L/min and a forced expiratory lung volume of 1.48 L. Grip strength assessment revealed a maximum left-hand grip strength of 2.8 lbs and a maximum right-hand grip strength of 3.0 lbs.

Intervention and Outcomes: The patient received Chiropractic BioPhysics® technique protocols. Follow-up examination revealed that the patient achieved a correction of left head translation of 17.0mm from 16.2mm to -0.8mm; an improvement in peak expiratory flow volume of 27 L/min from 200 L/min to 227 L/min; an improvement in forced expiratory lung volume of 0.18 L from 1.48 L to 1.66 L; an improvement in left-hand grip strength of 9.2 lbs from 2.8 lbs to 12 lbs and in right-hand grip strength of 5 lbs from 3.0 lbs to 8.0 lbs.

Conclusions: Reduced vertebral subluxations, improved posture and a concomitant improvement in respiratory function, dysautonomia, and grip strength were achieved.

Key Words: Chiropractic, vertebral subluxation, multiple sclerosis, lung function, pulmonary function, forced expiratory volume, FEV, peak expiratory flow, PEF, spirometry, grip strength, posture, Chiropractic BioPhysics®, Mirror Image®, adjustment, traction

Introduction

Multiple Sclerosis

Multiple sclerosis (MS) is a chronic, degenerative disease of the nervous system that is demyelinating and inflammatory in nature and is characterized by patchy sclerosis of the central nervous system (CNS).¹-³ MS affects 400,000 people in the United States and over 2 million people worldwide.¹,²,⁴ The combined annual cost of diagnosis and management of multiple sclerosis in the United States is more than 2.5 billion U.S. dollars.¹,³ Half of multiple sclerosis patients will experience depression during the course of the disease, 43% will experience permanent disability leading to job loss, and
100% have a decreased life expectancy. Stole explains that sufferers of MS have an elevated rate of suicide compared to sufferers of other degenerative disorders. Furthermore, the National MS Society states that the disease is the most common non-traumatic disabling neurogenic disease among young adults.

While all forms of multiple sclerosis involve patchy sclerosis of the CNS, MS can further be differentiated into four types: relapsing-remitting MS, primary-progressive MS, progressive-remitting MS, and secondary-progressive MS. Relapsing-remitting MS is the most common form and is characterized by periods of total remission symptoms followed by periods of exacerbations of symptoms that are associated with the development of new CNS lesions or reactivation of previously formed lesions. Primary-progressive MS patients suffer a progressively intensifying and worsening disease process with zero relapses. Progressive-remitting MS is composed of periods of patient relapses that gradually get worse as time ensues. Secondary-progressive MS is defined by steadily increasing neurologic disability, and this type of MS generally indicates a poor prognosis.

Diagnosis of MS involves multiple tests and an array of signs and symptoms. The gold standard of MS diagnostic testing is magnetic resonance imaging (MRI) because it reveals CNS plaque formation which is a cardinal sign of multiple sclerosis. Brown agrees that MRI is one of the best tools for diagnosing multiple sclerosis and additionally states it is a helpful tool for doctors to be able to track the progress of the disease because it provides data to distinguish between new and old lesions. Another diagnostic tool is a visual evoked potential test (VEP) which measures the time between a visual impulse and perceived impulse in the subject’s brain. VEP can reveal demyelination of the optic nerve, which is one of the most common areas that undergoes demyelination in MS patients. Other common areas of demyelination include the brainstem, spinal cord and cerebellum.

Typical signs and symptoms associated with MS include numbness in the extremities, fatigue, muscle spasms, muscle weakness, vision loss, blurred vision, loss of coordination, gait alteration, ataxia, seizures, mood swings, depression, intention tremors, impaired bladder control, and loss of sphincter control. Motor symptoms typically occur first followed by the sensory symptoms. Wade claims that paresthesia is typically when MS starts to develop, although symptoms may take years to develop.

No known treatment of MS exists. Current MS patient care focuses on alleviating the symptoms associated with MS. MS is an inflammatory, autoimmune disease, so the current medications that are prescribed to patients aim to reduce the symptomatology experienced. Classes of medications include immunomodulatory and immunosuppressant drugs such as interferon beta-1a, interferon beta-1b, and glatiramer acetate. Stoll found that 79.3% of 111 surveyed MS patients take disease-modifying agents to manage their condition. Corticosteroids are another common medication used to manage MS symptoms. Stoll discovered that 57.7% of the patients she surveyed utilized forms of complementary and alternative medicine such as acupuncture, massage therapy, osteopathic manipulative therapy, physical therapy, psychotherapy and reflexology. Lerner and Lerner mentioned a study conducted by Nayak, et al. in which 25.5% of MS patients surveyed were found to utilize chiropractic care to manage the pain and symptoms they experienced.

**Review of Literature - Chiropractic and MS**

Stude and Mick reported a case of a 32-year-old male patient presenting with a diagnosis of MS and lower extremity numbness. After only a few adjustments, the patient reported he had a decrease in the lower extremity numbness. Stude and Mick reported utilizing conservative, manual adjustments. They were able to conclude that the manual adjustments administered appeared to be responsible for the increase in the patient’s quality of life and decrease in symptoms.

Kirby stated that the vertebral subluxation is correlated to MS symptomatology and may even be responsible for the symptoms patients experience at times. Given the nature of secondary MS (relapsing-remitting cycle of symptomatology), this study suggests that chiropractic care may play a role in treating the symptoms and cause of multiple sclerosis.

Elster found that 90.9% of MS patients in her study showed symptomatic improvement and no further progression in the MS disease process while under chiropractic care. Elster claims there is a close correspondence between MS pathology and the compression of the cervical spinal cord or herniated discs within the cervical spine.

Dougherty and Lawrence performed a literature review of cases published before 2005 on MS patients who received chiropractic care. The authors concluded that “chiropractic care may represent a viable non-pharmacologic treatment alternative for patients suffering from chronic musculoskeletal pain syndromes associated with MS.”

In 2009 Carson, et al. conducted a retrospective, cross-sectional survey of MS therapy centers in the United Kingdom (UK) to analyze their level of awareness and utilization of chiropractic. Carson, et al. determined that 91% of the patients had participated in some rehabilitation modality. 52% of the patients reported using physical therapy; 44% reported using massage therapy; and 42% reported using chiropractic care. Of the 42% who underwent chiropractic treatment, 92% said they would recommend chiropractic care to patients who also had multiple sclerosis because it was an effective treatment option.

Lerner reported on the care of a 51-year-old female patient diagnosed with MS and gastro-esophageal reflux disease (GERD) that presented with back pain, neck pain, and jaw pain. Lerner employed a heavy metal detoxification protocol as well as chiropractic care using the Pettibon technique. After 105 visits, the Lerner reported a reduction in vertebral subluxations and the patient reported a “dramatic improvement in symptoms related to multiple sclerosis.”

Thornhill published a case of a 28-year-old female patient diagnosed with MS with complaints of neck and back pain following a recent trauma. Thornhill treated the patient with Thompson and Toggle chiropractic techniques. The patient reported a decrease in her presenting symptoms after only five days of treatment.

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adjustments. In 2012, Brown, Chung, and McCullen reported the case of a female patient with MS that presented with numbness, neck pain, tinnitus, fatigue, and vertigo. The patient was treated with the National Upper Cervical Chiropractic Association (NUCCA) protocol. After 30 visits, the patient reported a decrease in symptoms.

Southerst, Labrecque, and Mior published a case series of two patients undergoing chiropractic care to manage MS. One case was a 64-year-old female who presented with chronic low back pain. This patient was treated over a 4-week period with spinal manipulative therapy and soft tissue therapy in the lumbar spine and pelvis. The patient reported a decrease in her back pain. The other case was a 26-year-old female who presented with right-sided mid-thoracic pain and lumbar pain. This patient was treated with spinal manipulative therapy and soft tissue therapy in her thoracic and lumbar spine for 12 treatment sessions over 6 weeks. The patient reported a significant decrease in her chief complaints. The doctors concluded that chiropractic therapy may be an appropriate addition to a multidisciplinary treatment approach to multiple sclerosis.

In 2013, Mandolesi, et al. performed a study on the correlation between C1 misalignment, MS, and chronic cerebrospinal venous insufficiency (CCVI). A correlation has been found between chronic cerebrospinal venous insufficiency and multiple sclerosis and is thought to be a possible cause of the neurodegenerative disease. The study revealed positive outcomes for patients with both MS and CCVI. The authors hypothesized that a severe C1 misalignment is linked to extra-cranial venous compression which is thought to participate in the pathophysiology of MS.

In 2014, Gibson and Gallagher reported on the improvement in quality of life of a 36-year-old female diagnosed with MS, who was received chiropractic care. The doctors analyzed the patient through Thompson and Mastering Chiropractic with Certainty (MC²) protocols and adjusted the patient manually and with the Integrator™ adjusting instrument for 12 visits over one month. The patient reported 60% improvement in neck pain, clearer thinking, increased alertness, a greater amount of energy, decreased stress, increased ability to stand, lift, and drive, balance improvements, increased confidence and strength during gait, increased quality of sleep, more mobility and increased cervical ROM.

In 2015, Tedder and Canfield published a case of a 49-year-old woman with MS, who presented with pain, difficulty writing, fatigue, and head instability. The authors reported using the Knee-Chest Upper Cervical chiropractic technique. The patient received 32 treatments over 7 months. She reported that all of her symptoms decreased except the difficulty in writing and head instability. The authors concluded that upper cervical chiropractic care increased the patient’s quality of life and decreased MS symptomatology.

**Chiropractic Biophysics® (CBP®) Technique**

CBP® is a full spine/pelvic structural correction technique created by Dr. Donald D. Harrison that aims to correct abnormal spinal alignment and posture to the Harrison Spinal Model, which is a valid, evidence-based ideal spine model in accordance to linear algebra. The protocol requires that practitioners make subluxation diagnoses based upon data from radiographic and postural analysis, health history and physical examination, and orthopedic and neurological examinations. The visual postural analysis involves the Cartesian coordinate system to “describe global postural translations and rotations of the head, thorax, and pelvis around x, y, and z axes, in the coronal, sagittal, and transverse planes.” CBP® care consists of Mirror Image® adjustments, exercises, and traction. Harrison and Oakley concluded that there is a strong correlation between quality of life and spinal alignment. Sagittal spinal alignment also has direct and indirect effects on the patient’s CNS and its associated structures and may even lead to degenerative conditions or pathologic processes in the nervous system.

The Harrison Spinal Model defines the ideal sagittal curvatures in the human spine. The cervical spine has a circular lordotic curve measuring -42°; the thoracic spine has an elliptical kyphotic curve measuring 44°; and the lumbar spine has an elliptical lordotic curve measuring -40°. Relative rotational angles (RRA) are intersegmental angles and absolute rotational angles (ARA) are the sum of the RRAs in the cervical, thoracic, or lumbar spinal region.

As per CBP® protocol, spinal alignment is radiographically analyzed. The anterior-posterior view is analyzed according to Harrison’s Modified Risser-Ferguson analysis, which is an evidence-based, inter- and intra-examiner reliable method. The sagittal spinal view is analyzed according to Harrison’s Posterior Tangent line drawing method which is an evidence-based, valid, and reliable method. Relative rotational angles (RRA) are intersegmental angles and absolute rotational angles (ARA) are the sum of the RRAs in the cervical, thoracic, or lumbar spinal region.

CBP® uses Mirror Image® corrective and rehabilitative procedures. Mirror Image® refers to the patient positioning during CBP® rehabilitative and corrective procedures to correct abnormal spinal alignment and posture. This is accomplished by setting the patient up in the opposite postural rotations/translations during adjustments, exercises, or traction. Mirror Image® adjustments, exercise, and traction addresses all of the tissues involved with the spine and postural alignment. The spine is supported by many muscles, tendons and ligaments, so the entire musculoskeletal system adapts to the curvatures that the spine forms. Thus, repetitions of forces in Mirror Image® posture are crucial in restoring spinal alignment and posture to normal.

Before CBP®, chiropractors manipulated the spine with a myriad of protocols to attempt to optimize CNS and other bodily functions, reduce pain, correct spinal disorders such as scoliosis, and increase quality of life. While these methods and various techniques have had symptomatic success, it can be argued that correcting spinal alignment in accordance with the Harrison Spinal Model is the greatest duty among chiropractors. As chiropractors aim to positively affect the nervous system and optimize body function, it is clear that optimal spinal alignment and posture must be attained.
Case Report

Patient History

A 58-year-old female presented with constant, severe, throbbing pain in her left hip for 6 years. The patient also reported neck pain, neck stiffness, wrist pain, irritability, constipation, sinus problems, cold feet, cold hands, tension, dry skin, heat and cold intolerances, tingling sensation in her arms, shoulder pain, shortness of breath, depression, and difficulty urinating. The patient stated she had surgery in which screws were placed into her hips bilaterally. The patient did not report taking any medications. The patient stated she was retired because she is disabled and is confined to a wheelchair.

Examination

An anterior-posterior lower cervical (APLC) x-ray (Figure 1A) was taken and analyzed using PostureRay® Electronic Medical Record (EMR) software (PostureRay® X-Ray Electronic Medical Records Software, PostureCo, Inc., Trinity, FL, USA). Rotation angle of the cervical spine relative to the true vertical of the lower cervical and upper thoracic spine (RZA T7) measured -6.2° (ideal is 0°); cervicodorsal angle which is a measurement of the mid-cervical angle from vertebral segments C3-T7 (CDA C3-T7) measured 8.6° (ideal is 0°); and lateral translation from vertebral segments C3-T7 measured 16.2mm (ideal is 0mm) (see Figure 1C). PostureRay® can also determine if ligament damage exists. This information is vital to providing safe chiropractic care.

Thermography from the Insight Millennium Subluxation Station (CLA Insight™ NeuralTherm™ Paraspinal Thermal Scanning System, S/N: T 12818, Chiropractic Leadership Alliance, Bethany Beach, DE, USA) was used to analyze paraspinal temperature differences of the patient. The thermography instrument is designed to take real-time temperature measurements as it collects data from the patient’s radiant and thermal energy. Thermography measures skin temperature which is controlled by the autonomic nervous system (ANS). A temperature variance can reveal a disturbance of the ANS and a corresponding vertebral subluxation. Thermography is used to determine the overall degrees of autonomic dysfunction (dysautonomia) that exists in a patient. McCoy et al. concluded that the Insight Subluxation Station exhibits excellent inter- and intra-examiner reproducibility. Initial thermography revealed significant asymmetry in the cervical region with mild asymmetry at T2, T3, and T5-T9, moderate asymmetry at C1 and C5 and severe asymmetry at C2-C4.

A spirometer (Microlife Peak Flow and FEV1 Meter, Model PF100, USA, Microlife Inc., Dunedin, FL, USA) was used to analyze the patient for peak expiratory flow (PEF) lung volume measuring 200 L/min and forced expiratory volume at 1 second (FEV1) measuring 1.48 L (Figure 2). "Spirometry is used to assess how well your lungs work by measuring how much air you inhale, how much you exhale and how quickly you exhale." Spirometry is also used to diagnosis and monitor lung pathologies and is being increasingly utilized in primary practices.

The patient performed a grip strength assessment using a dynamometer (CAMRY Electronic Hand Dynamometer, Model: EH101, Zhongshan Camry Electronic Co., Ltd., Guangdong, China). Smith and Cox concluded that reducing vertebral subluxation can improve musculoskeletal function and that chiropractic care can improve muscular strength by positively affecting neural factors, muscle factors, and biomechanical factors that all regulate muscular strength. Objective measurement of grip strength before and following chiropractic care can help to determine changes in neuromusculoskeletal function as a result of chiropractic care. The patient’s initial left grip strength was 2.8 lbs and right grip strength 3.0 lbs.

Chiropractic Diagnosis

The Chiropractic Biophysics® definition of vertebral subluxation is defined by one or more structural displacements (rotational or translational abnormalities) that cause the patient’s spine to differ from the Harrison Spinal Model. As visualized on the APLC x-ray, the patient exhibited evidence of vertebral subluxation in the cervical spine as well as upper thoracic spine. Specifically, the patient presented with a right head rotation (-RH), left lateral head translation (+TH), and left lateral thorax translation (+TXT). On CBP® spinal listings, the positive or negative sign indicates the direction of movement as per the Cartesian Coordinate System whereas the ideal center of gravity is 0. The first letter denotes rotation (R) or translation (T). The second letter denotes the axis as per the Cartesian Coordinate System in or around which the R or T takes place. And the third letter denotes the body region (head is H, thoracic cage is T, and pelvis is P) with respect to the body region below.

Intervention and Outcomes

The patient received CBP® treatment during 30 visits over 10 weeks. Mirror Image® adjustments and traction were applied to the cervical and thoracic regions. CBP® defines an adjustment as an “application of force to bones of the spine (or extremity) which causes a change in alignment towards normal.” The patient was placed in the overcorrected, opposite postural alignment as she presented with before care.

The patient was positioned in left head rotation (+RH), right head translation (-TH), and right lateral thorax translation (-TXT) during adjustments. Adjustments were delivered to the patient in Mirror Image® position using a Diversified, high-velocity, low-amplitude (HVLA) manual maneuver, a drop-table adjustment using an OMNI elevation drop-table, or an instrument-assisted adjustment using an Impulse® adjusting instrument (Impulse® Adjusting Instrument, Neumechanical Innovations, Chandler, AZ, USA). The Impulse® adjusting instrument is an FDA approved device. The benefits of the Impulse® adjusting instrument are that the force of the thrust can be programmed, it delivers a consistent force, and it delivers a quicker adjustment than can be done by HVLA. Drop table adjustments and instrument-assisted adjustments are used in addition to HVLA adjustments in the CBP® protocol in order to stimulate the most mechanoreceptors and proprioceptors as possible. Mechanoreceptors and proprioceptors are responsible for relaying the position of the body to the brain so that the brain knows where all parts of the
The purpose of stimulating these types of sensory receptors in the patient’s body during adjustments is to retrain the patient’s CNS to adapt to normal posture according to the Harrison Spinal Model.31

The patient also received Mirror Image® traction while lying supine on the Berry Translation Table (Berry Translation Table, Berry Translations, Montour Falls, NY, USA). The Berry Translation Table is a postural traction device used to apply translational traction to the cervical and thoracic regions along the x-axis and rotational traction to the cervical region around the z-axis. The patient was placed in right head translation. The Berry translation protocol starts the patient out at 3 minutes of traction and works them up to 20 minutes.48

The purpose of the cervical traction was to reverse the patient’s abnormal posture to normal by stressing relaxation of the cervical ligaments, tendons, and muscles and initiating muscle creep therefore creating permanent restorative change.31 The patient was unable to perform Mirror Image® exercises.

At the end of the 30 visits, a post-treatment APLC x-ray was taken and compared with pre-treatment assessments (Figure 1B). RZA T7 improved 5.4° from -6.2° to -0.8°. CDA C3-T7 improved 4.4° from 8.6° to 4.2°. And C3-T7 lateral translation improved 17.0mm from 16.2mm to -0.8mm (Figure 1C). Post-treatment spirometry showed an improvement in PEF of 27 L/min from 200 L/min to 227 L/min and an improvement in FEV1 of 0.18 L from 1.48 L to 1.66 L (Figure 2). Post-treatment grip strength via dynamometry showed an improvement in left-hand grip strength of 9.2 lbs from 2.8 lbs to 12 lbs and in right-hand grip strength of 5 lbs from 3.0 lbs to 8.0 lbs (Figure 3). Post-treatment thermography showed a reduction in cervical and thoracic thermal asymmetry indicating that autonomic activity had been positively affected (Figure 4B).

Discussion

Vertebral Subluxation

The founding theory of vertebral subluxation upon which chiropractic was created was that it was a vertebra out of normal alignment which occludes a foramen producing pressure on nerves causing neurological interference.49 Cohn states that the vertebral subluxation is any cause an increase or decrease in the sympathetic nervous system’s activity.50 These alterations can cause the nervous system to become hyperactive and hypactive and, if untreated, these effects can manifest as various diseases or dysfunctions including autoimmune diseases.50 Cohn states that vertebral subluxations can be caused by abnormally high amounts of physical, emotional or chemical stressors.50

CBP® defines the parameters of vertebral subluxation as any significant spinal alignment or posture alteration from the Harrison Spinal Model.25 According to Wolff’s Law and Davis’ Law, abnormal posture causes the abnormal load distribution on the spine leading to spinal degeneration and dysfunction.19,31 Abnormal posture also causes the spinal canal to change in length which results in increased tension of the spinal cord.19,26 Spinal cord tension impairs the flow of blood and cerebrospinal fluid in the CNS which transport oxygen and other nutrients.31 Cardwell and Barone stated that increased tension in the spinal cord results in “altered somatosensory evoked potentials, neurogenic motor evoked potentials, oxidative mitochondrial metabolism, the spinal cord’s blood supply, and therefore, perfusion of the spinal cord, brainstem and cranial nerves.”19 Harrison, et al. determined that any central nervous system deformation is primarily due to changes in posture.25 Fedorchuk stated that spinal function is directly related to the structure of the spine.31

Subluxation can lead to neural facilitation, which causes the nervous system to maintain a hyper-excitable state due to lowered neurological reflex thresholds.8 Facilitation decreases the amount of activation energy required to produce an action potential in a neuron and directly results in the ability of that nerve to be fired with less input. Over time, this can lead to over-firing of neurons which result in over-stimulation and abnormal function of tissues.8,31 Neural facilitation can lead to a hyperactive immune system.50 This effect can lead to chronic, degenerative conditions in the central nervous system such as MS.50

Lung Function and Physiology

The lungs’ primary function in the human body is to take in and provide oxygen (O2) to and remove carbon dioxide (CO2) from the body.37,52 Oxygen is a crucial nutrient for the brain to function properly.37,51,52 The lungs rely on inspiratory and expiratory muscles to bring air into and remove it from the lungs.52,55 Moore, Dalley, and Agur explain that the inhalation process increases the sagittal and transverse plane dimension of the thorax.55 Healthy, unrestricted range of motion of the spine is a necessary component of this action.

Respiration Neurology

Breathing is a unique mechanism because it can be controlled voluntarily and involuntarily and is subject to the effects of the sympathetic nervous system.37,51 During sympathetic activation of the nervous system, the respiratory center in the brain receives more stimulation than normal which results in an increased frequency of respiration whereas parasympathetic activation of the nervous system causes the exact opposite response.37,51,52 Subluxation can result in over-activation of the sympathetic or parasympathetic nervous system.50

Lung Function in the MS Patient

MS patients experience impaired respiratory function as a result of respiratory muscle fatigue.56,57 Expiratory muscle strength is known to deteriorate earlier than inspiratory muscle strength in the progression of MS.57 Besides decreased respiratory muscle strength, abnormal respiratory control and sleep disorder breathing can also result.56 In MS, impaired respiratory function primarily results from demyelinating lesions in the respiratory motor pathways located in the medulla or cervical spinal cord which cause the transmission of nerve signals between the brain and lungs to be slowed and thus less effective.56 Tzelenis and McCool reported that 47% of MS patients eventually die from respiratory-related causes.56
Postural Effects on Lung Function

Compliance is “the measure of the elasticity of pulmonary or thoracic tissues”. Compliance changes in postural position can directly affect lung compliance. The thoracic cage encases the lungs and their parietal layers. The postural shape, orientation, position, and range of motion of these bones critically affect the thorax volume in an individual which is directly correlated to how well the lungs can expand and contract.

MS Pathophysiology

MS is caused by inflammation in the white matter of the nervous system resulting in chronic immune system activation. Poser concluded that the blood-brain barrier’s permeability must be altered for an autoimmune disease to affect the human central nervous system. This alteration of the BBB may induce multiple sclerosis. This abnormal breach of the BBB allows autoreactive T-lymphocyte cells to pass through the capillary junctions in the endothelial layer of the brain and create a positive feedback loop of CNS antigen recognition that results in inflammatory conditions of the brain. Elster also observed an association between past head trauma and the development of MS. Head trauma may even cause established lesions to enlarge.

It is also proposed that MS is an autoimmune cascade that initiates the microglia and macrophages in the CNS to degrade the myelin or axonal components of neurons. Demyelination causes nerve conduction to slow down or fail entirely whereas axonal damage results in complete disruption of neuron conduction. Both of these effects lead to diminished body function.

Proposed Mechanism of Improvement

A properly functioning immune system will prevent MS development or can even initiate healing within the nervous system. Chiropractic adjustments have been shown to restore immune system integrity to a normal state.

Vertebral subluxations of the cervical spine can create aberrant reflexes in the upper and lower motor neurons of the respiratory centers in the brain leading to respiratory muscle dysfunction. Diaphragmatic muscle control is controlled by the C3-C5 nerve roots. The upper thoracic spine also plays a role in respiration because the nerves that exit the intervertebral foramen in this region innervate the abdominal muscles that assist in respiration. Chiropractic adjustments have been shown to increase range of motion in the thoracic vertebrae and the structures with which they articulate to function better.

Limitations

The limitation of this study is the low level of evidence that a case report is considered. Since there is no control group to compare the outcomes of this case, there is no way to establish a cause-effect relationship. Additionally, the retrospective nature of the case allows for selection bias. Also, it would have been beneficial to take pre- and post-treatment MRIs to determine the effect of chiropractic care and MS brain lesion activity.

Conclusion

CBP® technique has the unique ability to conservatively correct abnormal spinal alignment and posture. Spinal alignment and postural distortions result in adverse mechanical tension and distortion of tissue. Abnormal biomechanics leading to increased loading of the spine deleteriously affects processes such as tissue growth and repair. Long term postural distortions place undue strain on the neural tissues surrounding these distortions.

Increasing tension in the spinal cord stresses the CNS by increasing intramedullary and cerebrospinal fluid pressure, coupled with a decrease in afferent and efferent nerve conduction. In this case study, the patient’s posture and spinal alignment were corrected and as a result, the left head translation was improved. By reducing the adverse gravitational loading from the patient’s left head translation, aberrant stresses and strains on the neuromuscular tissues were minimized and so too were their associated symptoms.

This case report suggests that CBP® care may be an effective conservative, non-surgical treatment for abnormal spinal alignment and posture and neuromusculoskeletal symptoms in MS patients such as decreased lung function (PEF and FEV1) and grip strength. Once more, CBP® care may serve as a preventative to cervical degenerative diseases and the consequences that arise from such pathologies. Abnormal spinal alignment and posture is a precursor to the types of neuromusculoskeletal dysfunctions seen in this case. By using CBP® care to improve postural distortions, the need for medical or invasive surgical procedures may be negated.

More research needs to be done concerning the connection between chiropractic care and functional improvements in MS patients. To extend the research on chiropractic care and its effects on MS patients, clinical trials should be conducted.

References


30. Harrison DE. CBP® technique elective course [unpublished lecture notes], TECH 5831, Life University College of Chiropractic; lecture given summer quarter 2015.


Appendix

Figure 1A: Pre-Treatment APLC X-ray

Figure 1B: Post-Treatment APLC X-ray

The green line represents the ideal spinal alignment; the red line represents the patient’s actual spinal alignment.

<table>
<thead>
<tr>
<th>Global Analysis</th>
<th>Normal Values</th>
<th>Xray 1 Values</th>
<th>Difference From Normal</th>
<th>Xray 2 Values</th>
<th>Difference From Normal</th>
<th>% Change: Xray 1 to 2</th>
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<tbody>
<tr>
<td>RZA T7</td>
<td>0°</td>
<td>-6.2°</td>
<td>6.2°</td>
<td>-0.8°</td>
<td>0.8°</td>
<td>87.1%</td>
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<tr>
<td>CDA C3-T7</td>
<td>0°</td>
<td>8.6°</td>
<td>8.6°</td>
<td>4.2°</td>
<td>4.2°</td>
<td>51.2%</td>
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<tr>
<td>Translation C3-T7</td>
<td>0 mm</td>
<td>16.2 mm</td>
<td>16.2 mm</td>
<td>-0.8 mm</td>
<td>0.8 mm</td>
<td>104.9%</td>
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CDA = Cervico-dorsal Angle and is a measure of the mid cervical angle
RZA = Rotation Angle relative to true vertical of the lower cervical and upper thoracic spine

Figure 1C: PostureRay® Comparison Evaluation of APLC X-rays
Pre- vs. Post-Treatment Spirometry Values

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<th>Date/Time</th>
<th>PEF (L/min)</th>
<th>FEV1(L)</th>
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<td>7/15/2015 11:37 AM</td>
<td>227</td>
<td>1.66</td>
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<td>% Change</td>
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<td>12.16%</td>
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**Figure 2:** Pre- vs. Post-Treatment Spirometry Values

Pre- vs. Post-Treatment Dynamometry Grip Strength Values

<table>
<thead>
<tr>
<th></th>
<th>LEFT HAND</th>
<th>RIGHT HAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Care Plan</td>
<td>2.8 lbs</td>
<td>3.0 lbs</td>
</tr>
<tr>
<td>Post-Care Plan</td>
<td>12 lbs</td>
<td>8 lbs</td>
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<td>% Change</td>
<td>428.57%</td>
<td>266.67%</td>
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</table>

**Figure 3:** Pre- vs. Post-Treatment Dynamometry Grip Strength Values
Figure 4A: Pre-Treatment Paraspinal Thermography

Figure 4B: Post-Treatment Paraspinal Thermography

Red indicates a severe asymmetry (>1.5° F); blue represents a moderate asymmetry (1.0°-1.5°F); and green represents a mild asymmetry (0.7°-0.9° F).