Case Report

Improved Health Outcomes in a Patient with Muscular Dystrophy and Hypertension Following Subluxation Based Chiropractic Care

Curtis Fedorchuk, D.C.1
Chad Frisch, D.C.2

1. Private Practice, Cumming, GA
2. Private Practice, Fort Mill, SC

Abstract

Objective: To discuss the use of Chiropractic Biophysics Technique (CBP) in the case of a 76-year-old female patient with muscular dystrophy, hypertension, headaches and vertigo.

Clinical Features: Prior to the presenting fall which brought the patient into the office, the patient had been diagnosed with muscular dystrophy and was on several medications. She was having trouble breathing as a result of her diagnosed condition. She had extreme muscle weakness in her lower extremities and was not able to get around without significant assistance. She was suffering from vertigo on a weekly basis.

Intervention and Outcome: At initial examination, evidence of subluxation was found through exam, thermography, and SEMG. Radiographs were analyzed prior to patient care. Chiropractic care using CBP analysis, diversified, drop table, and instrument adjusting was implemented. The patient’s overall health status was measured utilizing the SF-36 form. Objective assessments were made using SEMG, thermography, electronic muscle testing, and postural assessment. After 1 month of care, the patient reported an improvement in overall pain levels, as well as a decrease in vertigo. After 6 weeks she was off all blood pressure medication. After 2 months of care the patient had increased muscle strength. After 4 months of care the patient reported a near complete absence of symptoms.

Conclusion: The onset of the pain following a fall at home brought the patient in to the office seeking pain relief. Her care was designed for the reduction of subluxation, which also manifested in the reduction in pain symptoms. The patient experienced a complete absence of all neurological symptoms following 4 months of chiropractic care. This suggests a link between sub luxation, poor posture, and abnormal neurological conditions. Further investigation into subluxation and deviations from the normal spinal model as a contributing factor to neurological disease should be pursued.

Key Indexing Terms: Chiropractic, Chiropractic Biophysics, surface EMG, thermography, Muscular Dystrophy, DNA repair, hypertension, migraine, vertigo

Introduction

The following case report discusses a 76-year-old female patient who presented at a chiropractic office following a household fall. Prior to this event, she was diagnosed with Muscular Dystrophy (MD) and had been suffering from vertigo, hypertension, and headaches. Muscular dystrophy refers to a group of genetic diseases characterized by progressive weakness and degeneration of the skeletal or voluntary muscles which control movement.1 The muscles of the heart and some other involuntary muscles are also affected in some forms of muscular dystrophy and a few forms involve deterioration of organs as well.2 The muscles break down and are replaced with fatty deposits over time. It is common for a young child with MD to develop enlarged calf muscles, a
condition called calf pseudohypertrophy, in which muscle tissue is destroyed and replaced by fat.

The major forms of Muscular Dystrophy include myotonic, Duchenne, Becker, limb-girdle, facioscapulohumeral, congenital, oculopharyngeal, distal and Emery-Dreifuss. These disorders can vary considerably in terms of progression of the disease, sites involved, and severity of the disease. Mutations in at least 20-30 genes have been associated with MD. The reduction or absence of the sarcolemmal protein Dystrophin is the contributing cause to the breakdown of muscle tissue in muscular dystrophy patients.

Dystrophin is a protein that helps the muscle cells keep their shape and length, and its absence in muscle tissue leads to muscle breakdown. Dystrophin provides strong reinforcement for the membranes of myocytes, and dystrophin abnormalities lead to cardiomyopathy and skeletal muscle disorders. Dystrophin is usually absent in patients with Duchenne’s Muscular Dystrophy (DMD), but is reduced in amount or abnormal in size in people with Becker Muscular Dystrophy. Hence, this absence of dystrophin is why Duchenne’s is a much more severe form of these two X-linked disorders. Patients with Duchenne and Becker’s muscular dystrophy typically will develop cardiomyopathy because of this dystrophin deficiency.

Muscular dystrophy can affect people of all ages. Although some forms first become apparent in infancy or childhood, others may not appear until middle age or later. Duchenne (DMD) is the most common form of muscular dystrophy affecting children, and myotonic muscular dystrophy is the most common form of adult onset muscular dystrophy.

DMD is the second most commonly occurring genetically inherited disease in humans. Together, Duchenne’s and Becker’s make up the majority of Muscular Dystrophy cases. These two forms have many similarities, but Becker muscular dystrophy is less severe than Duchenne’s. These two Muscular Dystrophies are both X-linked recessive diseases. Males and females typically each have 23 pairs of chromosomes. The first 22 pairs are usually the same in both genders, with the 23rd pair determining sex differences. The 23rd pair for males is expressed as XY and the 23rd pair for females is expressed as XX. Thus, for males there only needs to be one copy of an X-linked recessive gene in order for the trait or disorder to be expressed. Males almost exclusively inherit BMD and DMD because of this fact. A mother may carry a recessive gene on one of her X chromosomes and unknowingly pass the gene to her son who only needs one X gene to express the disease.

There is no specific treatment for any of the forms of MD. Physical therapy to prevent contractures (a condition in which shortened muscles around joints cause abnormal and sometimes painful positioning of the joints), orthoses (orthopedic appliances used for support) and corrective orthopedic surgery, may be needed to improve the quality of life in some cases. The cardiac problems that occur with Emery-Dreifuss muscular dystrophy and myotonic muscular dystrophy may require a pacemaker. The myotonia (delayed relaxation of a muscle after a strong contraction) occurring in myotonic MD may be treated with medications such as phenytoin or quinine; and prednisone may be used to prolong ambulation and preserve motor function. Prednisone must be used with caution due to the fact its side-effects include decreased bone density and weight gain. Weight gain can be a potential problem due to the already weakened state of the musculature in MD patients.

Recent research also suggests supplementation with the amino acid L-arginine may decrease the inflammatory cascade associated with MD, and increase the muscle regeneration process. L-arginine decreases the activity of metalloproteinase (MMP)-2 and MMP-9, which are transcriptionally activated by nuclear factor (NF) kappab. L-arginine has an inhibitory effect on the NF-kappaB/MMP cascade, reduces beta-dystroglycan cleavage, and translocates utrophin and nNOS throughout the sarcolemma.

NF-kappaB has been suggested to play a role in the muscle degeneration process and oxidative stress has been one of the mechanisms implicated in activating NF-kappa B and its consequent pathogenetic cascade in skeletal muscle. Data suggests that loss of dystrophin, as occurs in DMD, results in the up-regulation of NF-kappaB signaling pathways in skeletal muscle. Chronic activation of NF-kappaB has been associated with muscle wasting but the mechanisms by which this regulation occurs remain for the most part unknown.

Genetic modification of bone marrow cells provides another possible alternative therapy for muscular dystrophy. Transplantation of genetically marked bone marrow into immunodeficient mice revealed that marrow-derived cells migrate into areas of induced muscle degeneration, undergo myogenic differentiation, and participate in the regeneration of the damaged fibers. Genetically modified, marrow-derived myogenic progenitors could potentially be used to target therapeutic genes to muscle tissue, providing an alternative strategy for treatment of muscular dystrophy.

Creatine Kinase, an enzyme that is found in osteoblastic cells, is released into the bloodstream when muscle fibers are deteriorating. Elevated levels of this enzyme indicate that something is causing muscle damage. Creatine monohydrate supplementation is well known for its ability to increase fat free mass in healthy young men and women, and has thus become a staple supplement in the regimens of many competitive athletes. A study conducted by Amameria et al. illustrates that creatine monohydrate supplementation can potentially decrease the breakdown of bone in those with muscular dystrophy.

Many of the neuromuscular (e.g., muscular dystrophy) disorders share similar final common pathways of cellular dysfunction that may be favorably influenced by creatine monohydrate supplementation. Studies using the mdx model (the mdx mouse is an animal model of Duchenne’s Muscular Dystrophy) of Duchenne’s Muscular Dystrophy have found evidence of enhanced mitochondrial function, reduced intracellular calcium and improved performance with creatine monohydrate supplementation.

Quality of life is dramatically compromised in patients with neuromuscular disorders such as DMD. A study conducted of 22 boys with DMD found the average age for walking
incapacity to be 8.8 years of age. In this study, the patients who were still ambulatory had a higher degree of pain reported than those that depended on wheelchairs for mobility.

Twenty-one of the twenty-two patients reported experiencing moderate to severe pain on a daily basis, with the most intense pain suffered during mobilization. The fracture prevalence of these patients was high with the most common cause of fracture being a fall. In a similar study of nineteen non-ambulatory patients with DMD (13-24 years old; all males), a 5 year study was performed to describe functional ability, muscle strength, forced vital capacity, and clinical events as related to their disease progression. All variables deteriorated over the course of the study and there was a correlation between them. Sixteen of the participants had cardiorespiratory clinical events leading to death in five of the cases.

In this case, Thermography and SEMG provided objective evidence of subluxation. Thermography and electromyography are techniques which record temperature variations and electrical activity of muscles. Electromyography activity has been used to document the presence of nerve root irritation, muscle, spasm, and the neurological manifestations of disc lesions. Advantages of electromyography as an assessment tool include the following: non-invasive, very good test-retest reliability, quantitative assessment of paraspinal muscle activity, and easy to duplicate protocols for longitudinal studies.

The rationale for the use of chiropractic care in this case was to correct subluxations. Structural correction of the spine by the correction of subluxations was sought out in this case in accordance with the "normal spinal model" proposed by Harrison et al. The "normal spinal model has been described as being "evidence based", and the CBP sagittal lumbar and cervical models have been found to have discriminative validity in as much as they can distinguish between normal subjects, acute pain subjects, and chronic pain subjects. This normal spinal model is based, in part, on average values from normal subjects and has been published in orthopedic and chiropractic journals.

This case suggests a relationship between the corrective process from abnormal spinal configurations toward the normal spinal model and an improved state of health. It is proposed that subluxation correction utilizing CBP protocol, with an objective of obtaining the normal spinal model, will allow the body to reverse the deleterious effects neurological conditions have on the body. It is suggested that this and other cases serve to establish a foundation for future research into the effects of subluxation on health and neurological integrity.

**Case Report**

A 5'2", 118 pound, 76 year old female presented for chiropractic care after a recent fall in her home. She reported no other history of trauma besides this recent fall. Blood pressure was taken and was 150/95 bilaterally. Physical examination revealed paraspinal muscle spasms at the L1-L5 vertebral levels and muscular spasms of the piriformis muscles bilaterally. Range of motion of the lumbar spine revealed the following: flexion/extension were both 0 degrees, Right and left rotation was zero degrees, and Right and left lateral flexion were 3 degrees in both directions. The patient also presented with a grade 1 patellar reflex bilaterally.

At the initial examination objective assessments were made using SEMG, Therm, electronic muscle testing and postural assessment. The x-ray values were analyzed and compared to the published ideal norms.

**Thermography Interpretation Narrative**

A paraspinal thermal scan was performed on the patient to measure skin differences along the spine. Infrared sensors were used to compare temperatures at 25-paired anatomical points. The purpose of the test was to assess sympathetic nerve function. Alterations in skin temperature patterns are associated with aberrations in the function of the autonomic nervous system, which includes the sympathetic system. The autonomic nervous system controls the function of the organs, glands, and blood vessels, and is critical in the regulation of the metabolic processes of the body.

In the analysis of thermal differentials, we are concerned with two factors, symmetry and pattern. Symmetry refers to the difference in temperature between the left and right sides at the same spinal levels. Differences in temperature from side to side are maintained within strict limits in healthy persons. Skin temperature patterns are constantly changing, but symmetrical paraspinal readings remain in the absence of subluxation within the body. This is because the "body is constantly adapting to its environment, and vertebral subluxations result in thermal asymmetries or fixed patterns. When a thermography scan reveals asymmetries and/or fixed patterns (lack of adaptability to the internal and external environment of the body), objective evidence of subluxation can be ascertained.

Uematsu et al, of the Johns Hopkins Medical Institution, determined normal values for skin temperature differences based upon asymptomatic "normal" individuals. The results were published in the Journal of Neurosurgery. According to the study, “these values can be used as a standard in assessment of sympathetic nerve function, and the degree of asymmetry is a quantifiable indicator of dysfunction. Deviations from the normal values allow suspicion of neurological pathology to be quantified, and therefore can improve assessment and lead to proper clinical management.”

Temperature differences found in the thermal scan were compared to the reference values. Mild, moderate, and severe asymmetries are identified by color. Temperature differences between one and two standard deviations indicate a mild asymmetry, two to three standard deviations a moderate asymmetry, while three or more indicate a severe asymmetry.

The results of this examination, taken in concert with the patient history and other clinical findings, were used in determining recommendations for the type, frequency, and duration of chiropractic care.
Thermal Scan Results

The initial thermal scan revealed temperature differences one to two standard deviations above normal means at: C1(R), C7(R), and T6(R). This is indicative of a mild asymmetry. Temperature differences two to three standard deviations above normal means were observed at: C5(R), C6(R), T4(R), and T5(R). This is indicative of a moderate asymmetry. Temperature differences three to four standard deviations above normal means were observed at: C2(L), C3(L). This is indicative of a severe asymmetry (Figure 1).

A reassessment thermal scan two months later revealed temperature differences one to two standard deviations above normal means at: C2(R), C3(L), C5(R), C6(R), and C7(R). This is indicative of a mild asymmetry. Temperature differences three to four standard deviations above normal means were observed at: C4(L). This is indicative of a severe asymmetry (Figure 2).

A repeat study to evaluate response to care was once again suggested to be performed at the next re-examination.

A third reassessment was performed three months later temperature differences one to two standard deviations above normal means were observed at: C5(R), C6(R), C7(R), and T1(R). This is indicative of a mild asymmetry (Figure 3).

Each re-evaluation displayed progression towards normal values. The improvement in thermographic scans suggests an improvement in autonomic dysfunction thus a decrease in subluxation.

The initial paraspinous surface electromyographic scan (SEMG) was performed to measure differences in muscle tension along the spine. Paired electrode sets were used to compare muscle tension at 15 left-right pairs of anatomical points. Standardized protocols and normative data were utilized. The purpose of the test was to assess paraspinous muscle activity. Surface electromyography allows the chiropractor to determine abnormal areas of muscle function and follow-up examinations allow the chiropractor to determine if a patient is responding positively to the implemented chiropractic management plan.

This technique is completely non-invasive. Electrodes are placed on the skin overlying the spine at 15 or 25 specific sites. The EMG signals of the patient being examined are compared to a normative database. The doctor is then able to determine the location and extent of abnormal paraspinous muscle function. Surface electrode paraspinous electromyography is well supported in medical, chiropractic, and scientific literature. The technique is taught and researched under the aegis of several accredited chiropractic colleges. No needles are employed because the technique is non-invasive, thus, this procedure can be considered within the scope of chiropractic.

In his article on surface electromyography and its relationship to subluxation, Kent outlines that paraspinous SEMG scans, taken in concert with other examination findings, may be helpful in determining the following:

1. Asymmetrical contraction
2. Areas of muscle splinting
3. Severity of the condition
4. Aberrant recruitment pattern
5. Responses to dysaferentation
6. Responses to chiropractic adjustment
7. Dyspemis - Dyspemis refers to a reversible physiopathologic state consisting of errors in energy expenditure, which can produce functional disorders.

Dyspemis consists mainly of covert errors in action potential output from the motor and premotor areas of the cortex and the consequences of that output.

In the SEMG scan signals were measured in microvolts (millions of a volt), by an instrument with a frequency band of 25-500 Hz. The computer program analyzes the measurements and compares them to a normative database. Surface electromyography scans are interpreted in two ways:

1. Amplitude. This refers to the signal level in microvolts. The higher the signal level, the greater the paraspinous muscle activity. By comparing these readings to a normative database, elevated or decreased signals can be identified.
2. Symmetry. This refers to a comparison of the left-to-right amplitudes at each spinal level.

The SEMG signals of the patient were compared to published reference values with mild, moderate and severe elevations of muscle tension identified by color. Differences between one and two standard deviations indicate mild tension, two to three standard deviations indicate moderate tension, while three or more indicate severe tension. A normal or ideal SEMG scan would present with short symmetrical white bars at each vertebral level.

In addition to the comparison with reference values, the amount of asymmetrical muscle activity was calculated, with mild, moderate, and severe asymmetries identified by color. Differences between one and two standard deviations indicate mild asymmetry, two to three standard deviations represent moderate asymmetry, while three or more indicate severe asymmetry. The use of surface electromyography is of particular interest, because aberrant muscle activity is generally accepted as one manifestation of Subluxation.

The initial static scans revealed readings up to one standard deviation above normal means at: T6(L), T6(R), T8(R), T10(L), T10(R), T12(L). This is indicative of normal muscle tension. Readings one to two standard deviations above normal means were observed at: T2(R), T8(L), T12(R), L1(L), and L1(R). This is indicative of a mild elevation of muscle tension. Readings two to three standard deviations above normal means were observed at: T2(R), T8(L), T12(R), L1(L), and L1(R). This is indicative of a mild elevation of muscle tension. Readings more than three standard deviations above normal means were observed at: C1(L), C1(R), C3(L), C3(R), C5(L), C5(R), C7(L), C7(R), T1(L), T1(R), T2(L), T4(R), L3(L), L3(R), L5(L), L5(R). This is indicative of a severe elevation of muscle tension. Areas of significant asymmetry were noted at the following sites: T2(L), T8(L), and L5(L) (Figure 4).
Upon reassessment, the static scan revealed readings one or more standard deviations below normal means at: C1(R), T6(L), T10(R), T12(R), L1(R). This is indicative of reduced muscle tension. Readings up to one standard deviation above normal means were observed at: C1(L), C3(L), C3(R), C5(L), C7(R), T1(L), T1(R), T2(L), T2(R), T4(L), T4(R), T6(R), T8(L), T8(R), T10(L), T12(L), L1(L), L3(L), L3(R), L5(L), L5(R), S1(L), S1(R). This is indicative of normal muscle tension. Readings one to two standard deviations above normal means were observed at: C5(R), C7(L). This is indicative of a mild elevation of muscle tension. No areas of significant asymmetry were determined at re-examination (Figure 5).

**Radiographic Analysis**

Radiographic line drawing analysis has been shown to be one of the most reliable tools in clinical practice. The validity of radiographic analysis is supported in the literature by an understanding of coupled motion and posture. Coupled motion refers to the concept that rotation and lateral flexion in the spine are always accompanied to some degree by one another. For normal spinal biomechanics these motions (rotation and lateral flexion) must be present within each motor unit (two individual vertebra and the intervertebral disc which accompanies these vertebrae) of the spine. The radiographic spinal alignment (spinal coupling) can be compared to the initial posture of the patient (main motion) to determine if the coupling patterns are the same as published movements in the literature.

Because upper cervical misalignments were suspected in this patient a precision upper cervical radiographic series was performed. The radiographic equipment included a laser-aligned frame (American X-ray Corporation, Knoxville, TN) to eliminate image distortion. To maintain postural integrity, the patient was placed in a positioning chair using head clamps. In addition, the patient was aligned to the central ray using a laser mounted on the radiographic tube. The four views (lateral, anterior-posterior, anterior posterior open mouth, and base posterior) enabled examination of the upper cervical spine in 3-dimensions: sagittal, coronal, and transverse.

**Chiropractic Adjustments**

Treatment in the initial phase of care was based on pain management to make the patient more comfortable. The patient was at first adjusted with the ArthroStim instrument in the prone position. The ArthroStim Instrument delivers 12-14 incremental thrusts per second. By dividing the energy of a single thrust into rapid successive inputs, the ArthroStim Instrument modulates the (peak) force. The power of the thrusts can be changed from several ounces of force, up to 40 pounds of thrusting force. Through the usage of controlled, incremental thrusts, the ArthroStim Instrument is suggested to be able to stimulate specific neural receptors (mechanoreceptors and proprioceptors) without activating undesirable pain receptors. The validity of the arthrostim instrument is only hypothetical at this point in time. No scientific studies have been published on the efficacy of the arthrostim instrument to this point in time.

The patient was very antalgic upon her initial presentation into the office, so she was mirror imaged according to her antalgic position. Once again this was performed in the prone position. Considering she was carried into the office, an upright assessment of her posture was not possible. Also while weight bearing is the more favorable measure for x-ray, it simply was not possible considering her antalgic posture. Light drop was utilized in her initial phase of treatment which she was able to tolerate well. Postural adjustments as performed with drop table, hand-held instrument, or even mirror image manipulation procedures are performed for resetting the nervous system regulation of postural muscle balance.

For the first few visits muscle stimulation and ice were used in order help with pain management. These treatments were applied to the patient’s lower lumbar region while she was in the seated position. After 8 visits, the patient was adjusted using Chiropractic BioPhysics (CBP) mirror image technique exclusively.

Once she was out of pain she was analyzed first for her mirror image while seated. Then placed prone on the adjusting table and adjusted accordingly to the protocols outlined by CBP. The patient displayed forward head posture, +z translation, and +x translation of the cervical spine. She was adjusted in the mirror image of that and also for the lumbar spine. Home care instructions were given to her in regards to her posture as far as reading, watching television and talking on the phone. She was asked to avoid, as much as reasonably possible, anything that would be counter-productive to stabilizing her posture and the work we were doing in the office.

Table 1 displays the results the patient has had over the course of her chiropractic care plan. Symptomatic and objective results are listed over specific timeframes in this table. The patient experienced very positive results over the course of her chiropractic care plan and Figure 1 briefly illustrates some of these results.

CBP technique implements the use of a multi-modality care regimen that complements spinal adjusting with mirror image exercises, mirror image adjusting and mirror image®/extension spinal traction procedures, various stretching procedures and ergonomic counseling. The reason for postural mirror image exercises, adjustments, and traction procedures is to address all the tissues involved in spine and posture alignment. According to Oakley et al., this CBP protocol enables for structural spinal correction by “stretching shortened muscles and strengthening those muscles that have weakened in areas where postural muscles have adapted to asymmetric or ill-positioned postures.” CBP emphasizes optimal posture and spinal alignment as the primary goal of chiropractic care, while concurrently documenting improvements in pain and functional based outcomes.

**SF-36 Health Form Questionnaire**

A health survey known as the SF-36 was used in this case to measure improvements in health status in response to chiropractic care. The SF-36 is a short-form health survey consisting of 36 questions. It yields an 8-scale profile of functional health and well-being scores as well as a
psychometrically-based physical and mental health measures and a preference-based health utility index. Tables 2 and 3 display SF-36 scores for this patient case at the start of her care plan and then again 3 months into her care plan. The patient showed improvement in 6 of the 8 SF-36 categories. These results suggest that the patient experienced a better quality of life and better state of overall health following the initial three months of her chiropractic care plan.

The SF-36 Health Survey was developed for the Medical Outcomes Study and has been tested and validated extensively. The SF-36 form has been utilized in over 4000 scientific papers.

Discussion

This article discusses a patient with seemingly unrelated conditions, raising questions as to how chiropractic care, or any single treatment for that matter, could have produced a favorable result. Established normals of the structural alignment of the spine have been published, thus it could be said that anything deviating from this model could produce dysponesis and show up in various forms of pathology, or symptoms. In this case, dysponesis refers to abnormal transfer of efferent and/or afferent neurological signals from the central nervous system to the peripheral tissues of the body.

Dysponesis may result in an accumulation of endogenous oxidative stress on the body. It is proposed that chiropractic care may have reduced the levels of oxidative stress in this case which resulted in a reversal of dysponesis. The very idea that such a relatively simple solution could provide the answer to an array of complex health problems invokes skepticism. It would be natural, therefore, to dismiss the results as an anomaly. However, considering there are no adverse reactions to this type of care discussed in the literature it is reasonable to suggest that the idea of spinal correction, or an attempt to move towards normal values should be attempted by everyone. This is especially suggestive of those with neurological disease, since there are numerous sources in the peer reviewed literature supporting the hypothesis that alterations and deformations of the spinal column are directly transmitted to the CNS.

This patient presented for care in a state of health that was progressively deteriorating but showed dramatic improvement following the intervention of chiropractic care utilizing CBP technique and analysis. The patient’s care was directed entirely for subluxation correction towards the restoration of health and thus, it appears that the subluxations contributed to the patient’s conditions. In its policy statement, the International Chiropractic Association (ICA) states:

Of primary concern to chiropractic are abnormalities of structure or function of the vertebral column known clinically as the vertebral subluxation complex. The subluxation complex includes any alteration of the biomechanical and physiological dynamics of contiguous spinal structures which can cause neuronal disturbances.

With this said, it does not appear so far-fetched that chiropractic care could have resulted in alleviation of this patient’s complaints and improvement in her overall health status.

Muscular dystrophy (MD) refers to a group of genetic diseases characterized by progressive weakness and degeneration of the skeletal or voluntary muscles which control movement. However, the key word here is progressive, where the body breaks down in a small mutation in the x chromosomes. The largest protein in the body, dystrophin, is not made properly in MD patients because the exons on the DNA strand are missing, which results in instability of the muscle cell membrane.

Observational data shows that dystrophin mRNA and protein levels composing between 29%-57% of control muscle are sufficient to avoid muscular dystrophy in the human when the protein is uniformly present in all muscle fibers. Therapeutic approaches aimed at directly restoring dystrophin production in muscle and/or indirectly tackling some of the consequences that lack of dystrophin has in muscle are currently being researched in an attempt to avoid the progressive muscular degeneration which characterizes MD patients.

When examining the neuropathy involved in the patient’s various conditions several similarities exist. Migraine headaches have been attributed to malfunctions of the brainstem trigeminal nucleus and brainstem serotonergic pathways that affect nerves and blood vessels in the head. Postural abnormalities and paraspinal imbalances can occur due to improper innervation of antigravity muscles, influenced by serotonergic pathways within the brainstem and several brainstem nuclei, including the vestibular nucleus. Thus, all of the patient’s conditions could arise from malfunctions within the brainstem and most could be attributed to a single neurotransmitter, serotonin.

The relationship between subluxation in the cervical spine and brainstem function is an area requiring further research. Since chiropractic care appeared to stimulate the patient’s improvements, then it follows that the care may have generated improvement in brainstem chemistry and circuitry. Due to the upper cervical subluxation in this patient, a variety of complex, detrimental neurological changes developed (probably originating in the brainstem), which ultimately allowed for the manifestation of the patient’s conditions. Despite a variety of treatments administered, the patient’s symptoms remained until the subluxation was discovered and addressed. Once the patient’s upper cervical alignment was corrected and stabilized, irritation to the central nervous system was eliminated and the patient’s normal neurophysiology was restored.

Two theories in the literature have been proposed to explain the relationship between subluxation and neurological dysfunction. The mechanisms of these two theories will be discussed briefly. The first mechanism, central nervous system facilitation, can occur from an increase in afferent signals to the brainstem coming from articular mechanoreceptors after a spinal injury or in this case abnormal posture. The upper cervical spine is uniquely at risk for this problem because it possesses inherently poor biomechanical stability (lacks intervertebral disks and vertical zygapophyseal joints), along
with the greatest concentration of spinal mechanoreceptors.\textsuperscript{52, 55} 

Hyperafferent activation (through central nervous system facilitation) of the sympathetic vasomotor center in the brainstem may lead to the second mechanism, cerebral penumbra, or brain hibernation. According to this theory, a neuron can exist in a state of hibernation when a certain threshold of ischemia is reached. This ischemia level (not severe enough to cause cell death) allows the cell to remain alive, but the cell ceases to perform its designated purpose. The brain cell may remain in a hibernation state indefinitely, with the potential to resume function if normal blood flow is restored. If the degree of ischemia increases, the number of functioning brain cells decreases and the disability worsens.\textsuperscript{56, 62}

Indirect evidence suggests that oxidative stress may play a role in the pathogenesis of inherited muscular dystrophy, but the significance and precise extent of this contribution is poorly understood. According to Pero et al., oxidative stress not only induces DNA damage but it also inhibits DNA repair.\textsuperscript{63} Serum Thiol can be used as a surrogate estimate of DNA repair and once quantified can predict the redox state of poly ADP-ribose polymerase.\textsuperscript{64, 65} Poly ADP-ribose polymerase is a key enzyme that dictates an individual’s DNA repair capacity. Compared with normal muscle, significantly higher contents of glutathione, glutathione disulphide, protein-glutathione mixed disulphides and protein carbonyl groups, and significantly lower contents of free protein thiol groups, were found in pectoralis major muscle of genetically dystrophic chickens (the muscle affected by this disease) at 4 weeks of age.\textsuperscript{66}

Other tissues did not show such marked disease-related differences. Levels of serum thiol have been used as measures of mortality, longevity, and the presence of active disease.\textsuperscript{41} Interestingly, the protein pool in normal, but not dystrophic, pectoralis major muscle was relatively less oxidized in relation to the glutathione pool as compared with other tissues studied.\textsuperscript{66} The mechanisms by which this unique relationship between the thiol pools is maintained remain unknown. Although the physiological consequences of the increased content of protein carbonyl groups and the altered thiol pools in dystrophic muscle are not clear, the changes evident at such a young age are consistent with the occurrence of oxidative stress and may reflect significant damage to cellular proteins in this disease.

The question remains as to why Chiropractic Biophysics Technique produced such dramatic results, when other procedures and treatments (medical, chiropractic, or otherwise) had such limited results for this patient. The answer likely rests in the utilization of advanced diagnostic technology (paraspinal digital infrared imaging and the laser-aligned cervical radiographs) and the specific mirror image adjusting procedures. We hypothesize that the combination of the diagnostic and adjusting procedures allowed for precise diagnosis, correction, and stabilization of this patient’s subluxations.

Because mechanical loading of the neuromusculoskeletal tissues plays a vital role in influencing proper growth and repair, chiropractic rehabilitative care should focus on the normalization/minimization of aberrant stresses and strains acting on spinal tissues. Manipulation alone cannot restore body postures or improve an altered sagittal spinal curve. Therefore, postural chiropractic adjustments, active exercises and stretches, resting spinal blocking procedures, extension traction and ergonomic education are deemed necessary for maximal spinal rehabilitation.\textsuperscript{66}

It is of interest that recent publications have found strong correlations between altered sagittal spinal alignment (specifically loss of the lumbar lordosis), health related quality of life, and physical function as measured with the Short Form-36 questionnaire.\textsuperscript{57} Therefore, it is suggested that objective outcome measures such the Short-Form 36 questionnaire be performed at every initial visit and every reevaluation thereafter to monitor patient progress. There is strong evidence available to express the need and outcome effects of Chiropractic Biophysics Technique care past the typical 8-12 visit average of spinal manipulative therapy. Although improvements in structural alignment of the spine are the primary intervention goal, Chiropractic Biophysics methods can be utilized to achieve health and reduce disability. Improvement of postural alignment has been one of the most sought after goals in the treatment of human ailments for ages; this continues today in the medical arenas of dentistry, physiotherapy, surgery, and chiropractic.\textsuperscript{68}

What drives the use and popularity of chiropractic is patient satisfaction.\textsuperscript{69} A study conducted by Coulter et al\textsuperscript{70} analyzed elderly individuals over age 75 from an insurance database. A comparison was made between individuals that were under chiropractic care with those who were not under chiropractic care. The chiropractic group reported better overall health, less prescription drug use, fewer hospital visits, and increased activity levels. In a survey of 2,818 respondents in 156 chiropractic practices,\textsuperscript{71} a strong correlation was noted between individuals receiving chiropractic care and self-reported improvement in health, wellness, and quality of life. 95% of these 2,818 respondents reported their expectations of care had been satisfied, and 99% desired to continue chiropractic care.

Conclusion

This case report details the history of a 76-year-old woman suffering from muscular dystrophy, hypertension, headaches and vertigo. The patient was analyzed for subluxation using objective means at the initial visit and it was determined that subluxations were present. A management plan was then implemented to address the aforementioned subluxations.

After 4 months of chiropractic care, cessation of all neurological symptomology occurred. Chiropractic care using CBP analysis, drop table, and instrument adjustments were utilized. The patient’s health status was measured utilizing the SF-36. Objective assessments were made using SEMG, thermography, electronic muscle testing, x-ray analysis, and postural assessment. Her care was designed for the reduction of subluxation.

The complete absence of all neurological symptoms within 4 months of care suggest a link between the patient’s subluxations, poor posture, and her neurological conditions.
Long term chiropractic care has been shown to increase serum thiol levels posing the possibility that as a result of subluxation reduction thiol levels may have increased in the presenting case resulting in increased health indicators. Further investigation into subluxation, deviations from the normal spinal model and DNA repair as a contributing factor to neurological disease should be pursued.

References

Muscular Dystrophy


M E Murphy and J P Kehrer, Oxidation state of tissue thiols and protein carbonyl groups in chickens with inherited muscular dystrophy: Biochim J. 1989 June 1; 260(2): 359–364.

Table 1. Adjustments performed on weekly basis and results that occurred

<table>
<thead>
<tr>
<th>Time frame</th>
<th>No of Adjustments Performed</th>
<th>Symptomatic and Objective Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>3</td>
<td>Mild change in pain, walking straighter</td>
</tr>
<tr>
<td>Week 2</td>
<td>2</td>
<td>Less pain, less antalgia</td>
</tr>
<tr>
<td>Week 3,4</td>
<td>1</td>
<td>Same</td>
</tr>
<tr>
<td>Week 5 Visit 1</td>
<td>1</td>
<td>Vertigo better. Less headaches</td>
</tr>
<tr>
<td>Week 5 Visit 2</td>
<td>1</td>
<td>* MD increased BP meds Pulse Weak, BP sev low</td>
</tr>
<tr>
<td>Week 6</td>
<td>4</td>
<td>Got off BP meds, BP normal, no vertigo, No pain, DID SF-36 assessment.</td>
</tr>
<tr>
<td>Week 7</td>
<td>2</td>
<td>Able to lift groceries, BP still normal</td>
</tr>
<tr>
<td>Week 8</td>
<td>2</td>
<td>Able to vacuum, neck and shoulder better</td>
</tr>
<tr>
<td>Week 9</td>
<td>2</td>
<td>Able to now walk up stairs, and opens bottles.</td>
</tr>
<tr>
<td>Month 3</td>
<td>5</td>
<td>Continues to improve. BP and pulse. Strength changes</td>
</tr>
<tr>
<td>Month 4-15</td>
<td>18</td>
<td>Continues to improve, No Meds, Self Sufficient</td>
</tr>
</tbody>
</table>

Table 2. SF-36 Scores Pre & Post

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre Score</th>
<th>Post Score Three Months Later</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Health</td>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td>Health Change</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>Physical Functioning</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Limitations Phys</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>Limitations Emotional</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Social Functioning</td>
<td>37</td>
<td>75</td>
</tr>
<tr>
<td>Pain</td>
<td>12</td>
<td>67</td>
</tr>
<tr>
<td>Energy, Fatigue</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Emotional Well Being</td>
<td>100</td>
<td>92</td>
</tr>
</tbody>
</table>
Figures

Figure 1. Initial thermography scan

Figure 2. Thermography scan two months later

Figure 3. Thermography scan 4 months later

Figure 4. Initial SEMG scan

Figure 5. Re-evaluation SEMG

Muscular Dystrophy