CASE STUDY

Resolution of Fibromyalgia & Polypharmacy Concomitant with Increased Cervical Curve & Improved Quality of Life Following Reduction of Upper Cervical Subluxation: A Case Study

William Soriano D.C.[1] & Annie Apatiga D.C.[2]

ABSTRACT

Objective: The correction of an upper cervical vertebral subluxation through Knee Chest upper cervical specific care in a patent suffering from fibromyalgia is described.

Clinical Feature: A 31-year-old female presents with low back pain, headaches and fibromyalgia. Patient sought chiropractic care as an alternative means to pharmacological management of her pain.

Intervention and Outcome: X-rays were taken as well as a skin temperature differential analysis establishing the patient's pattern. Patient received five knee chest upper cervical specific adjustments in the span of 18 months. The patient reported a decrease in symptomatology related to fibromyalgia after two months of care. Vertebral subluxation was reduced and cervical curvature was improved. The patient recently reports she is no longer taking any medications.

Conclusion: The correction of an upper cervical vertebral subluxation through knee chest upper cervical specific care is presented. Acknowledged decrease in patient's perceived pain with decreased signs of vertebral subluxation findings in the upper cervical area is noted. This report discusses the possible pathophysiological connection behind an upper cervical subluxation and fibromyalgia.

Key Words: *Subluxation; upper cervical spine; fibromyalgia; chiropractic; adjustment; Knee Chest Technique*

Introduction

Fibromyalgia is acknowledged to affect more than 5 million members of the adult population in the United States. Fibromyalgia is a chronic disease that affects the body by causing bilateral widespread pain.[1] This pain has been recently associated with a possible neurogenic origin.

Fibromyalgia patients are described to have a perceived amplification of pain perception not normally felt i.e. allodynia. The patient also feels heightened sensitivity to stimuli that a normal person would not find painful i.e. hyperesthesia. Neuroimaging studies have shown that allodynia and hyperesthesia in fibromyalgia patients occurs in the central nervous system.[2] In recent clinical trials pharmaceutical companies have been able to explore usage of compounds that affects either the hyperesthesia or the deficiencies of efferent cortical processes that desensitizes nociception.

1. Private Practice of Chiropractic, Winder, GA
2. Private Practice of Chiropractic, Riverview, FL

These compounds have shown some measurable success but they are not curative. Scientists have also tried to identify specific biomarkers but as of this time the patients' history and self report are the best evidence used to understanding their diagnosis.[3] When a patient presents with chronic widespread pain that has lasted for years, (greater than 3 months is a requirement) has suffered from sleep disturbance and is frequently fatigued then fibromyalgia is at the top of the differential.

About three-quarters of fibromyalgia patients report a lack of restorative sleep which in turn causes an exacerbation of their symptoms. Other common symptoms include pain upon digital palpation of specific tender sites on the body (at least 11 of 18 required), stiffness, depression and or anxiety, trouble concentrating, disorganized thinking and other various cognitive difficulties.[2,4]

When considering treatment, doctors tend to focus on reducing pain and improving the patient's quality of sleep. There are several drugs that have shown efficacy in clinical studies that reveal a reduction in the symptomatology of fibromyalgia. Amitriptyline and duloxetine are a few of the drugs in early controlled studies that show some promise. NSAIDS, steroids and imipramine have shown to be no more effective on fibromyalgia than a placebo treatment.

The treatment of patients with fibromyalgia through a pharmacological approach has seen symptom relief in less than 50% of the population.[5] When approaching fibromyalgia from a non drug avenue it has been shown that acupuncture, cardiovascular therapies and biofeedback have demonstrated some benefits in some patients.[4] Managing stress has also shown some success, and while there is still an unclear pathophysiological process as to why patients develop fibromyalgia in the first place, co-morbid psychiatric disorders are addressed as well.[6]

The purpose of this paper is to describe a case study in which a patient with fibromyalgia received upper cervical specific chiropractic care and the outcomes of that care.

Case Report

History

The patient was a 31-year-old female who sought chiropractic care two and a half years after receiving a fibromyalgia diagnosis. She presented with constant back pain and shooting pain down her legs as her chief complaint. It was later revealed that she had been diagnosed with fibromyalgia two and a half years prior and she had constant pain in her low back, hips, legs, knees, feet, sacrum, and coccyx. She also suffered from headaches 3-4 times a week, depression, fatigue, loss of balance, tinnitus, visual stars, chronic sinus infections, hyposmia, dry mouth, acid reflux (dry heaves), dysmenorrhea, excessive sleeping, constipation and hemorrhoids.

She did not attribute the low back pain and shooting pain down her legs to any mechanism of injury. The pain started two and half years prior to the examination. She stated the pain started initially as pelvic pain. She mentioned that carrying or lifting heavy objects, twisting, sitting, standing for long periods of time and physical activity exacerbated her pain.

She stated that lying down and getting physical therapy helped temporarily with range of motion and received physical therapy for one year. She described the pain to be an average of 1-2/10 on a pain scale, 10 being the worst pain experienced. When the pain was at its worst it was a 5/10 on the same pain scale. She stated that she had experienced this pain before, 8 years ago. She also described numbness that would occur into her right leg.

When she was 5 years old she was involved in a motor vehicle accident in which she went through a windshield. From that accident she suffered a laceration to the skull, the bottom row of her teeth went through her bottom lip and she fractured her right leg as well. She also described being in a car accident in 2007 where she was t-boned and her knees smashed into the dashboard. She reported no other major traumas. She stated that her chief complaint limited her ability to kickbox and work out at the gym.

She mentioned she had a laparoscopy in 2010 and a C-section in 2003. She had not sought care from a chiropractor before. At the time, she was taking Hyrdocodone for her pain, Cymbalta for pain and depression, Ranitidine for acid reflux and was getting Depo shots for birth control. She was also taking Topomax for sciatica, Ultram for pain relief and Fentanyl patch - an opiod analgesic. She was worried about all the drugs and therefore decided to seek out non-pharmacological routes in hopes to improve her pain.

Examination

Radiographs were taken of the cervical and lumbar spine after the initial examination. The lateral cervical radiograph showed a lordotic curve of 12 degrees. There was evidence of anterior head carriage. Interruption of George's line was noted at the level of C4 with a posterior relation to C3 vertebral segment. There was also an interruption of the spinolaminar line at the spinal levels of C3 and C6 vertebrae. (Figure 2) The AP lateral film showed an abnormal curve with slight right-sided concavity from L1-L5 vertebral segments. It was also determined that there was a retrolisthesis of C4.[7] Evidence of an upper cervical subluxation was noted as well. The patient was given an ASL listing in which it was determined that C1 (atlas) lateral masses' had moved anterior, superior and lateral to the occipital condyles.[8]

Intervention

The patient was managed by using a chiropractic technique called Knee Chest Upper Cervical Specific (KCUCS). This technique is used to address misalignments of the atlas (C1) or axis (C2), which if not corrected, can cause neurological interference due to torsion of the spinal cord per various osseous and soft tissue changes. KCUCS addresses what's called the medullary lock, a system of hard and soft tissues that stabilizes the medulla and spinal cord in the upper cervical area.[9]

The development of the medullary lock was built upon the foundation of Dr. John D. Grostic's work on the dentate

ligaments of the spinal cord. The dentate ligaments attach to the arachnoid and dura mater and are believed to provide stability to the cord during movement.[10] The medullary lock also consists of four pairs of muscles called the suboccipital muscles which are innervated by the C1 nerve. These muscles help the neck perform several ranges of motion including extension, rotation and lateral flexion.

This movement is however merely assistance to the larger muscles in the neck that do most of the work. The suboccipital muscles have a more important role in that the muscles contain proprioceptive nerve fibers relaying messages regarding where the head is positioned.[11,12] The medullary lock also is made up of an extensive ligamentous system that helps secure the upper cervical spine from osseous structure to osseous structure. In addition there are also six connections of ligaments, muscles and membranes directly affecting the spinal cord.[9] These structures are the following:

1. Attachment of the dura mater to the foramen magnum[9,13]
2. Attachment of the dura mater to the posterior arch of C1 & C2[9,13]
3. An attachment between the rectus capitus posterior minor muscle and the dura mater.[9,14]
4. A connection between the ligamentum nuchae and flavum to the dura.[9,15,16]
5. A connection of tissue between the rectus capitus posterior major and dura mater between C1/C2. [17]
6. The dentate ligament attachment from arachnoid to dura mater.[9,10]

The rectus capitus posterior minor muscle and its attachment to the dura mater plays an important role in preventing excessive movement of the spinal cord during extension of the neck.[14] Studies have also shown that the connection between the ligamentum nuchae and flavum to the dura plays an integral role in preventing dural infolding of the spinal cord during neck flexion.[16]

The fifth component of the medullary lock is a relatively new discovery. Through recent studies of cadavers it was found that when traction of the rectus capitus posterior major muscle is elicited there is gross movement of the dura from the level of the axis to the first thoracic vertebrae. Thus, it is suggested that this connection prevents dural folding during neck hyperextension. The medullary lock as a whole plays an important role in stabilizing the structures around the spinal cord and anchoring the medulla and upper spinal cord to their position in relation to the spinal canal and foramen magnum.

When the medullary lock has been compromised due to trauma it can prove to be fatal. It is reported that most deaths in fatal car accidents are because of an upper cervical spine injury of C1 and/ or C2.[18] Due to the unique anatomy of the atlas' lateral masses and their curvilinear articulation on the occipital condyles, when the upper cervical structures misalign they can deform the cord through the various connections to the spinal cord, thus causing neurological issues.[8] If trauma has occurred to the spine without proving fatal, the force can cause a three-directional torque misalignment of the upper cervical vertebrae causing an occlusion of the foramen magnum, pressure upon nerves and, confliction within the nervous system.[9,19] This interference can be measured by reading the temperature of the skin which is indirectly associated with vasomotor constriction or dilation. Vasomotor constriction is directly affected by the sympathetic nervous system. KCUCS utilizes skin temperature differential analysis as its primary objective measure for determining the presence of torsion of the spinal cord due to vertebral subluxation.

Temperature readings of the neck in this case were measured using the Tytron, an FDA--registered instrument that has two probes that measure the heat emitted from skin bilaterally around the spine.[20] These thermography readings are taken from the same starting point on the neck to the same end point each time. Once the patient has had several readings, preferably on different days and different parts of the day, the doctor determines if there is a repeated pattern on the graphs. If there is a pattern to the graphs this leads to the conclusion that the vascular system is not constricting and dilating in response to the outside environment like it should indicating dysautonomia.[9,21]

The doctor may also check the lengths of the legs in a supine leg check. If there is a measurable difference between the heels of the patient's feet then a possible rotation in the pelvis may be occurring due to abnormal muscle tone and joint proprioception. These signals are being interfered with due to the spinocerebellar tracts' close proximity to dentate ligaments and spinal cord torsion in the upper cervical region.[10] Leg checks are just one tool to determine an upper cervical subluxation but are not the deciding factor on whether the patient receives a knee chest adjustment. The determining basis for a knee chest adjustment is the thermal pattern.

The knee chest adjustment itself is focused on the position of the patient. The patient kneels and places their head on the knee chest table and turns their head towards the side of atlas or axis laterality. When the patient turns their head the atlas drops down relative to the occipital condyles and the atlanto-occipital joint is able to open up while the cervical vertebrae below the axis are locked. The adjustment is a high –velocity, low amplitude thrust with the pisiform of the doctor at a line of drive relative to the patients x-ray listing. The patient is then required to rest for one hour so that the atlas may adapt to its new position.[9,19,21,22]

Following examination, thermal scanning and x-rays the patient received her first adjustment. Her legs showed a left short leg of ¾ of an inch and her thermography reading showed pattern. She was adjusted based on x-ray showing that her atlas was subluxated in an anterior, superior and left lateral position. The next day she came in with a balanced supine leg check as well as a change in her thermography readings showing a straighter line and no signs of pattern. (Figure 1) The patient continued to come in twice a week and showed adaptive thermography changes.

Approximately one month later she was reassessed. Her progress report showed symptomatic improvement in her back pain, headaches, leg pain, sciatica and constipation. Her foot pain was still bothering her. She reported a 40% relief of pain since her first adjustment. She also reported feeling more rested in the morning. The patient continued to be holding her

adjustment until about a month later in which her legs were ¼ of an inch off and her thermography readings showed pattern for the second visit in a row.

A few weeks later she was reevaluated again. She stated that her sciatic pain, back pain and knee and foot pain had all improved. She maintained that she still had some low back pain and sinus issues. She reported an 80% relief in pain since she started under care. At this point she decided to get off her medication. After the second reevaluation it was determined that the patient needed to come in 1x a week. She did not show signs of pattern until approximately 7 months later at which point she was adjusted again.

Outcome

Post x-rays show an increase in lordosis of the cervical region from 12 degrees to 30 degrees. (Figure 2) The patient was adjusted a total of five times in eighteen months and is continuing care. She is currently off all her pain medication. Her pain is at a 0/10 currently for all joints. She is now able to work out at the gym and has taken up running.

She completed a SF-36 pre and post chiropractic care which showed improvement in functional health and well-being overall from 22 to 60. Her physical health improved from 21 to 65 and mental health improved 22 to 50. Other components showed improvement and are displayed in Table 1.

Discussion

Vertebral subluxation theoretically can cause harm to the body's ability to heal itself.[19] The nucleus tractus solitarus is an example of how a distortion in the cord may affect a patient with fibromyalgia. The nucleus tractus solitarus (NTS) is located in the dorsal brainstem and is an important viscerosensory center. The NTS collects important information about the body's internal environment through vagal afferent impulses. It helps maintain a homeostatic environment through autonomic reflexes.[23]

Upper cervical research suggests that blood flow to the NTS may be affected during a vertebral subluxation due to an occlusion of the posterior inferior cerebellar artery that helps give circulation to the NTS.[24] Another integral part of the brain stem that may be affected by spinal cord torsion and may affect fibromyalgia patients as well is the locus coeruleus.

The locus coeruleus is involved in the perception of pain as well as sleep and stress responses. The nucleus tractus solitarus and locus coeruleus have both been associated with modulation of pain transmission. They both play a role in the descending inhibition of nociception from the brainstem.[25] In addition to abnormal pain perception, disruption of normal sleep can occur due to an adrenergic response from the locus coeruleus.[26,27]

The sympathetic nervous system has also shown been to originate in the locus coeruleus as well as other cells within the medulla and pons.[28] The sympathetic nervous system is responsible for the "flight or flight" response and may have an effect on fibromyalgia patients. Chronic stress from having fibromyalgia can cause exacerbation of symptoms such as increased arousal, irritability, muscle tension and hyperventilation.[29] Though it is speculative that torsion of the spinal cord due to trauma to the upper cervical vertebrae may cause the NTS and LC to function abnormally this hypothesis should be further explored.

Conclusion

While drugs can aid in depression of fibromyalgia symptoms temporarily, more fibromyalgia patients are seeking non analgesic routes due to pain killers' effectiveness waning over time.[30] In a 2007 study it is estimated that about 34% of fibromyalgia patients spend $100-$1,000 per month in addition to their insurance in order to see a healthcare provider. It is also estimated that fibromyalgia costs the U.S. between $12 billion-14 billion dollars each year, a 1-2% loss of the nation's overall productivity.[31]

A practice-based observational study could show the cost benefits of chiropractic care for fibromyalgia vs. a medical doctor's practice based on pharmacological avenues. It would be beneficial to observe these patients over time to see which management has more long term benefits due to fibromyalgia's chronic nature. Though there are several case studies in which a fibromyalgia patient benefited from chiropractic care, there is need for more extended research.

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Figures

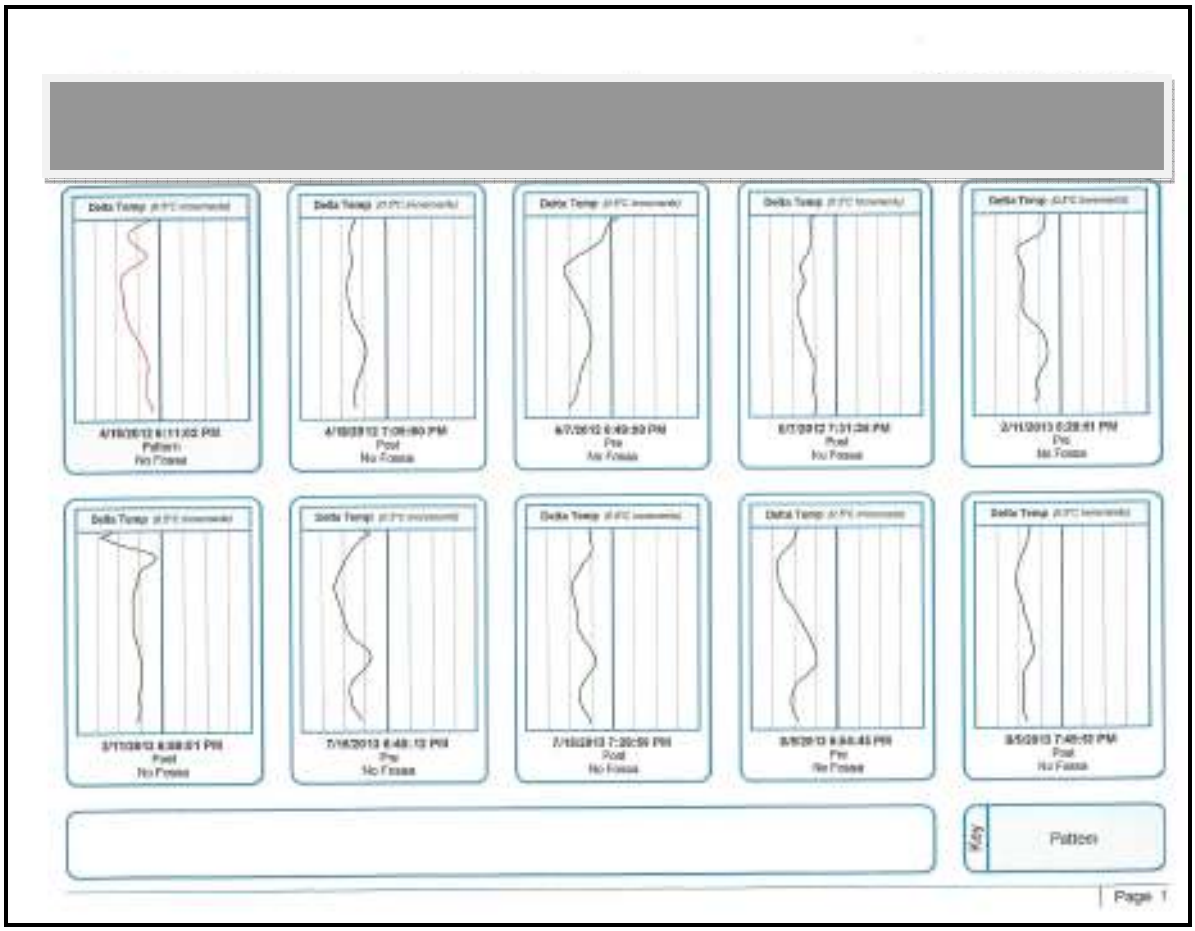

Figure 1. Tytron thermography readings of the neck with pattern

Figure 2. Lateral Cervical X-Ray showing improved lordosis of the neck.

Table 1. Pre and Post SF-36 Scores		
	SF-36 Pre	**SF-36 Post**
Physical Function	35	85
Role-Physical	0	100
Body Pain	32	44
General Health	15	67
Vitality	25	30
Social Functioning	38	13
Role Emotional	0	100
Mental Health	32	40
Health Reported	0	++
Physical Health	21	65
Mental Health	22	50
Total SF-36	22	60