Introduction

Myelopathy is a complex condition that could arise from many underlying problems. The diagnosis is mainly derived from the recognition of symptoms that are consistent with the central nervous system pathology which could involve the trunk, arms, and legs. Myelopathy spares the head in most situations.1

While the exact pathophysiology of myelopathy is unknown, it is accepted to be a disorder that involves compressive forces on the spine, likely due to multiple factors.2 Cord compression can occur due to a disc herniation, or degenerative changes from degenerative joint disease, intervertebral disc, ligaments, and connective tissue.2,4 These mechanical factors in turn result in direct injury to the neurons and glia, which can lead to ischemia, excitotoxicity, and apoptosis.2

The motor complaints that can be associated with myelopathy include sudden weakness, paralysis, clumsiness, fatigue, paresthesias, numbness, dysesthesias and bladder issues.1,6 Other disturbances would include alterations in gait, loss of dexterity in fine motor tasks, and subjective sensations in the upper and/or lower extremities.5,6 Some of the physical findings upon physical examination include muscle wasting, changes in coordination, and reflex abnormalities with upper and/or lower extremity alterations.5,7

Case Study

Resolution of Neurological Symptoms Related to a Myelopathy after Receiving Chiropractic Care: A Case Report

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Abstract

Objective: To present the chiropractic care of a patient with symptoms of myelopathy.

Clinical Features: A 51 year old female presented with weakness/numbness of the left arm and hand with difficulty grasping and holding objects, weakness/numbness in the left leg and occasional right leg numbness. She had been dealing with these symptoms for approximately four months and was unsure of the cause. The day before presentation she had been push mowing her yard. The next morning the symptoms in her left arm had gotten worse and now she was having trouble ambulating.

Invention and Outcome: High velocity, low amplitude, and contact specific adjustments using Gonstead protocol were utilized in the areas of vertebral subluxation. The patient also received functional rehabilitation. After twenty-four adjustments the patient's grip strength improved, reflexes improved, the patient was able to ambulate without any problems and her balance improved.

Conclusion: The chiropractic care of an individual with neurological symptoms associated with myelopathy showed significant improvement within 5 months of care. It is postulated that the resolution of the patient's symptoms are due to reduction in subluxations at several levels within the spinal column, however more research is warranted.

Key Words: Chiropractic, subluxation, myelopathy, numbness, weakness, grip strength, reflex
Myelopathy is a very difficult disorder to diagnose. The symptoms can vary from individual to individual. Mechanical compression of the cord by any process that inhibits circulation could be included in the differential list.\(^6\) The most common cause of myelopathy, especially in the cervical spine is spondylotic myelopathy which is produced by encroachment on the cervical spinal cord by osteophytes.\(^3,4,7,8\) Cervical spondylosis results from the universal process of degeneration of the disks and joints within the cervical spine.\(^3\) These osteophytic formations can grow off the vertebral bodies, zygapophyseal joints, or the ligamentum flava.\(^2,4\)

Cervical myelopathy is one of the most commonly acquired types of spinal cord dysfunction among individuals who are older than 55 years of age.\(^2\) In the following case report, a patient is presented with neurological symptoms that are associated with a cervical myelopathy. Some studies suggest that an individual with cervical myelopathy is an absolute contra-indication to manipulation. The clinical outcome of the patient involved in this study showed remarkable results after chiropractic care.

**Case Report**

**Patient History**

The patient in this report is a 51 year old female homemaker. She was a diabetic and was taking Humulin that was prescribed by her medical doctor (MD). She was not taking any other medications at the time of presentation. Four months before she began chiropractic care, she began to experience numbness and a burning sensation in her left arm.

She went to see her MD after a couple of months of dealing with the symptoms and he diagnosed her with a neuropathy in the left arm. He prescribed Neurontin to take orally. A few weeks later she was outside push mowing her yard. After she finished mowing, she went into her home, ate dinner, showered and went to bed. When she got up the next morning, she was experiencing weakness/numbness in her left arm and hand, numbness in the left leg, and some intermittent numbness in the right leg.

The next morning she called her MD and he sent her to have a CT scan done of the brain. The CT showed that ventricles were normal in regards to size and shape for a patient that was 51 years old. There was no evidence of any intracerebral bleed, mass, or any other significant abnormality. The bone windows to visualize the paranasal sinuses were also clear. There was no noted increase or decrease in the attenuation of the right cerebral hemisphere to explain her symptoms on the left side of her body. The final impression of the CT scan was normal. After the CT was completed she did not go back to the MD.

**Chiropractic Examination**

Three days after the CT was completed, the patient was referred by her brother to see the chiropractor. Upon physical examination, the patient appeared to have an ectomorphic body type. The patient’s movement appeared to be guarded. Her gait was altered due to the fact that she was having to drag her left leg. Her grip strength was assessed with a dynamometer, which measured strength in pounds. The first attempt with her right hand was 22; the second attempt was 30. The average strength in her right hand, which is her dominant hand, was 26. The first attempt with the left hand was 0 and the second attempt was 0. The average with the left hand was 0.

Neurological testing of the deep tendon reflexes (DTR) were assessed as well. The right biceps were normal (+2), right triceps were normal (+2), and right brachioradialis were normal (+2). On the left side the biceps were decreased (+1), triceps were decreased (+1) and brachioradialis were decreased (+1). DTR’s in the right leg, Patella and Achilles, were normal (+2). The DTR’s in the left leg, Patella and Achilles, were completely absent (0). The reflexes were graded based on Wexler’s scale. Clonus was present while testing the wrist and feet. Neurological pinwheel assessment was performed on the arms and face, sensation was equal bilaterally.

Upon cranial nerve examination there was a normal response to both direct and indirect light as well as the accommodation reflex. Her pupils were equal, but they responded sluggishly to light. All extraocular movements, including superior and inferior recti, superior and inferior oblique, and the medial and lateral recti, were intact. There was no evidence of any diplopia or scotomata. The patient was able to perform all facial movements, including smiling, frowning, puffing out her cheeks, raising her eyebrows and closing her eyes tightly. No asymmetry or other abnormalities were noted while performing the facial movements. Examination of the throat and laryngeal musculature was normal. There was no deviation, atrophy or asymmetry of the tongue.

Orthopedic evaluation indicated that shoulder depressor, maximal cervical compression for cervical nerve root compression, Soto Hall, Spinal percussion, Adson’s and Allen’s were negative. During auscultation the carotid arteries were clear, but the pulse was irregular. Gradual hyperextension and rotation were negative for dizziness. The radial pulse was equal and strong on the left and right.

During palpation there was moderate tenderness noted throughout the cervical spine, thoracic spine, and sacral region. Mild non-spinal tenderness was noted in the trapezius and rhomboid musculature. The piriiformis musculature revealed moderate tenderness bilaterally. There was also evidence of bilateral muscle spasm of the psoas muscle in the lumbar spine, which indicated that the muscle was in a state of long term contraction. Subluxations were detected at T1, T4, T12, L2, sacrum, right and left ilium.

Cervical range of motion (ROM) testing was also assessed using a goniometer. Cervical flexion was 65 degrees (normal = 50 degrees); extension was 50 degrees (normal = 60 degrees); left lateral flexion was 25 degrees (normal = 45 degrees); right lateral flexion was 35 degrees (normal = 45 degrees); left and right rotation was 55 degrees respectively (normal = 60 degrees).

X-ray views included lateral cervical, left and right cervical obliques, lateral lumbar and AP full spine. Osteoporosis was mild within the cervical spine. Osteophytes were noted at C3-C4, C4-C5 and C5-C6. Anterolisthesis was noted at C5, due to
a healed compression fracture. There was also an increase in the lordosis of the cervical spine. The thoracic radiograph indicated subluxations at T1, T4 and T12.

The lumbar radiograph revealed no apparent fractures or gross osseous pathology. Osteoporosis was mild within the lumbar spine. Osteophytes were also noted at L2-L3, L3-L4, L4-L5 and L5-S1. A hypolordosis was noted within the lumbar spine.

The subluxations were determined from using Gonstead x-ray analysis. The first x-ray analysis line, called the Femoral Head Line (FHL), was drawn across the top of the femoral heads. Next, there is a perpendicular line which is called the sacral center line (SCL) drawn in the middle of the FHL towards the pubic symphysis. The ilium that has misaligned further away from the SCL is designated as the external ilium (EX), and the one that is closer to the line is called internal ilium (IN). It should be noted that both ilium misalign as a unit around the sacrum.

The thoracic subluxations were determined during palpation. The subluxations are confirmed with AP and lateral views of this region. The side of body rotation is determined by examining the pedicle shadows on the AP view. When the vertebral body rotates laterally to the right or left, the pedicle shadow on the side of rotation becomes narrowed. Horizontal plane lines are drawn at the bottom of the pedicles on each vertebral body within the thoracic spine.

The involved vertebra is compared to the vertebra below to determine if there is any lateral wedging. The distance between the two horizontal planes is determined. The side that has the larger measurement indicates the side of lateral wedging. There can be an instance in which the distance is equal between the two horizontal plane lines. This means that there is no lateral wedging at the involved vertebral level.

After completion of the history, physical examination and x-rays, the patient was given a diagnosis of cervical subluxation with associated myalgia, cervical spondylosis with myelopathy, thoracic subluxation, thoracic radiculitis, sacroiliac sprain/strain, sacrum subluxation and lumbar radiculitis.

Chiropractic Care

The patient returned the following day. She was given a report of findings (ROF) based on the physical examination and x-rays. The patient received a contact specific, high velocity, low amplitude adjustment using Gonstead protocol. The adjustment was delivered to the patient while she was lying prone on a high-low table. At T1 a spinous contact was made using a modified diversified setup to correct a PRS. A double thenar setup was utilized to contact the transverse process (TP) at T4 and T12. The listing at T4 was PLI and the listing at T12 was PLI. The subluxations that were found in the pelvic region were also adjusted. There was an EX on the right ilium and an IN on the left ilium. The ilium corrections were also done while the patient was prone because she was having difficulty getting up and down off the table.

There was no adjustment delivered to her cervical spine at any time during her care. Since the patient was having neurological issues, the doctor of chiropractic felt that the cervical spine was already under stress and did not want to potentially add any stress.

During the first visit she received transcutaneous electrical nerve stimulation (TENS), with heat pack on the neck region and low back region. After the initial visit, the patient’s presentation determined which type of rehabilitation she received. The high voltage galvanic stimulation, which was placed on the shoulder and pulled down the left arm and hand, was used to stimulate the peripheral nervous system. When the muscle stimulation was used, it was either placed on the trapezius, rhomboids or quadratus laborum to help with muscle spasm.

She was instructed to return three times a week for three weeks. When the patient arrived for her third visit it was noted that she was able to move her left hand. After two weeks of care, she was not having any difficulty ambulating. She was able to walk with more stability and could make a fist with her left hand. By the third week of care the patient indicated that her left arm was 50% improved and her left leg had improved 70%.

After 5 months and 24 adjustments she reported for re-evaluation. During this visit, the patient underwent a re-examination. Her complaints at this time were low back pain and an achy left arm at times. All of the reflexes in the left upper extremity such as biceps, triceps and brachioradialis improved from a (+1) to normal (+2). The patella reflex on the left went from absent (0) to normal (+2). The Achilles tendon on the left went from absent (0) to (+1). The patient’s grip strength went from an average of 0 to an average of 20 on the left. There was also an increase in cervical left lateral flexion from 25 degrees to 30 degrees and an increase in right lateral flexion from 35 degrees to 40 degrees. Her gait was normal. She did not have any difficulty ambulating.

Discussion

There are several treatment options available for myelopathy, such as alternative modalities which includes epidural steroid injections, physical therapy and nonsteroidal medications. Other treatments include surgery, which includes osteotomy, laminectomy, vertebroplasty, resection, fusion and shunting. Spinal manipulation therapy includes a variety of options such as low velocity high amplitude technique, high velocity low amplitude, spinal stretching or manipulation under the effects of anaesthesia.

Toto presented an 84 year old male that had been struck by a car and knocked to the ground landing on his right hip. The patient had hip views taken in the hospital and the results were read as negative. The patient then presented to a chiropractic office where a complete neurological examination and x-rays of the cervical spine were taken. The conclusion of this report stated that due to cord compression from osteophytes and degenerative changes that cervical manipulation would be contra-indicated in the presence of cervical spondylotic myelopathy.

A study by Crawford et al reported two male patients with
signs and symptoms of a myelopathy. The first patient was referred for neurological consultation.\textsuperscript{11} He had a laminectomy at C5 and C6. Fourteen months following the surgery he remained asymptomatic and the myoclonic jerks had ceased. There was a sensory difference noted between the left and right hand. The second patient was not a candidate for surgery because he had a previous history of myocardial infarction.

He underwent a course of treatment which included mobilization of the lumbosacral region and sacroiliac joint manipulation.\textsuperscript{11} Two months after care he had no back pain but was still experiencing symptoms of claudication. The conclusion of this study stresses the importance of a thorough neurological examination on a patient suspected of cervical spondylotic myelopathy (CSM) and states that forceful neurological examination on a patient suspected of cervical spondylotic myelopathy (CSM) should not be an absolute contraindication to manipulation.

A case series reported by Murphy et al. included 27 patients with findings of cervical spinal cord encroachment that was indicated on magnetic resonance imaging (MRI).\textsuperscript{13} These patients did not have an acute myelopathy and they did not have any advanced signal changes within the spinal cord. The conclusion of this study indicated that cervical spinal cord encroachment should not be an absolute contraindication to manipulation.

Kukurin described a 70 year old female that had neck pain, headaches and burning paresthesia on the entire left side of her body.\textsuperscript{13} The cervical stenosis was confirmed with MRI. This study was the first case that described the successful improvement of symptoms of cervical stenosis through chiropractic manipulation.

A case report by Murphy et al. involved a patient that had a surfboarding accident which resulted in a disk herniation at C5-C6.\textsuperscript{7} The patient had numbness and pain in the extremity but did not have signs or symptoms of a myelopathy. The patient presented to the chiropractic office for a full evaluation. Ten days after the initial visit the patient began to develop suggestive symptoms of a myelopathy.\textsuperscript{7}

The patient did not receive any type of manipulation during the initial visit. During the follow up visit the patient was evaluated again and was referred to his neurosurgeon. It was later determined that the patient had acute myelopathy which was secondary to the disk herniation at C5-C6. The conclusion of this study indicates that cervical manipulation should be used with caution when a patient presents with suggestive symptoms of a cervical myelopathy.

Chiropractors have a defining role that includes detecting subluxations and removing them so that the body can function to its optimal potential. The Vertebral Subluxation Complex (VSC) can be used to describe the diverse tissues that can be involved and the impact the subluxation can have on the individual’s ability to maintain homeostasis.\textsuperscript{14}

There were originally five components of the VSC: kinesiopathology, neuropathophysiology, myopathology, histopathology and biochemical.\textsuperscript{13,16} The VSC now includes nine components: kinesiology, neurology, myology, connective tissue pathology, angiology, inflammatory response, anatomy, physiology, and biochemistry.\textsuperscript{17} In regards to this study, we are going to look at neurological and kinesiological aspects of the VSC.

The neurological component involves disruption of the nerve root that interferes with the normal nerve root function, which can result in pain or other clinical neurological symptoms.\textsuperscript{14} The nerve root exits the spinal column through the intervertebral foramina. Each intervertebral motion segment is highly endowed by nociceptive and mechanoreceptive structures.\textsuperscript{17} Cord compression may also be secondary to vertebral Subluxation.\textsuperscript{17}

Biomechanical dysfunction may result in alteration of the normal nociception and/or mechanoreception, which can lead to abnormal afferent input to the CNS leading to dysponesis.\textsuperscript{17} Correction of these subluxations allows the maintenance of the axons in peripheral nerves to constantly be supplied with fresh cytoplasm elaborated within the cell bodies.\textsuperscript{15} The cytoplasm is continually moved along the entire length of the axon and its branches which supply the components that are necessary in the maintenance of the axon.\textsuperscript{15}

The kinesiological part of the VSC refers to the movement of the vertebral body into a subluxated position resulting in the lack of proper motion in the spinal column.\textsuperscript{17} The spinal x-rays and motion palpation that were performed during the physical exam indicated subluxations within the thoracic spine as well as the sacral region. Movement is essential for the prevention of contracture and adhesion formation within the joint and circulation also allows for proper function of the joint.\textsuperscript{15} Movement also allows proper orientation for collagen fibers to develop.\textsuperscript{15}

The patient’s spinal nerve roots and cord were under constant duress which allowed many of the components of the VSC to be apparent. The spinal nerve roots have both sensory and motor control to the tissues they innervate. The VSC results in nerve root dysfunction with loss of normal sensations and motor control of the upper and lower extremities. The patient in this case report had muscle spasm and muscular weakness in the upper and lower extremities.

She also exhibited swelling and inflammation in the spinal joints as well as the soft tissue. The motor control of the spinal nerve roots were compromised, which allowed contractions of the skeletal muscle and the smooth muscles thereby affecting blood flow in the paraspinal and extra-spinal soft tissues. Sustained contraction of the soft tissue resulted in fibrosis of the spinal and extra-spinal muscles and joints. These changes in the various tissues will alter the normal physiology in the areas of the body that are affected by the VSC.

When the patient’s VSC was reduced, this led to the reversal of abnormal function which allowed normal function of the various tissues. In this patient’s case, it decreased muscle spasm, improved muscle and joint function, decreased pain, and improved circulation into the soft tissues and extremities. There was also an improvement in her grip strength and ambulation. Without correction of the VSC, these conditions could have worsened or became permanent.
Conclusion

This article discussed the chiropractic care of a patient who presented to the office with neurological symptoms that resembled a myelopathy. After 5 months of conservative care, the patient’s symptoms have completely resolved. She is still under chiropractic care at this time and she is able to fulfill her daily activities without any difficulties. More research is needed to help validate chiropractic care and individuals with neurological symptoms that are associated with a myelopathy.

References