Resolution of Post-Concussion Seizures Following Atlas Orthogonal Technique

Roy Sweat DC\(^1\) & Trena Adams DC\(^2\)

**ABSTRACT**

**Objective:** To discuss seizure disorders secondary to head trauma and their resolution following reduction of subluxation utilizing Atlas Orthogonal chiropractic technique.

**Clinical Features:** A 76-year-old female suffering from post concussion seizures for a ten year duration, fluctuating blood pressure, visual disturbances, decreased hearing, wide gait, and an abnormal walking pattern.

**Intervention and Outcome:** The patient was adjusted following the Atlas Orthogonal chiropractic protocol. Precision adjustments were applied to the atlas using the Atlas Orthogonal percussion instrument. Immediately after the first adjustment the patient experienced a more normal gait and resolution of her altered walking pattern. The patient was managed for a duration of two months and reported a complete recovery from seizures, altered walking pattern, blood pressure stability and improved hearing.

**Conclusion:** Improvement in seizures and related sequelae followed the introduction of specific chiropractic care to reduce upper cervical subluxation. More research in this area is necessary.

**Key Words:** Atlas Orthogonal, chiropractic, seizures, vertebral subluxation, hearing loss, gait disturbance, blood pressure, hypertension, vertebral artery, cervical spine

**Introduction**

There are approximately 500,000 brain injuries in the United States every year. Of the people hospitalized for a brain injury only 5-7% ever experience a seizure disorder from their injury. Seizures within the first week of a brain injury, in the elderly, and immediate seizures (within 24 hours of a brain injury), are more likely to lead to post concussion seizures. People that suffer an immediate seizure are more likely to endure brain damage due to the increased intracranial pressure, metabolic imbalance and excessive amount of neurotransmitters produced.\(^1\)

There are many long lasting neurological and behavioral disorders that occur after a traumatic brain injury. 24% of people with mild traumatic brain injury have reported anxiety and people that sustain mild to moderate injury show 25-40% suffering from major depression. Other symptoms reported are decreases in attention span, planning ability, concentration, and memory. Somatic symptoms reported include headaches, dizziness, fatigue, nausea, seizures, and sleep disorders.\(^2\)

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1. Private Practice of Chiropractic, Tucker, GA
2. Graduate, Life University College of Chiropractic, Marietta, GA
When a slip and fall occurs, the velocity of the head striking the ground causes a forceful shifting of the brain inside the skull. In some cases this movement may not be severe enough to cause hemorrhage, however the movement may cause mechanical irritation to the vessels. This mechanical irritation can cause a vasoparalysis during acute injury. The arterioles, capillaries, and other small vessels in the brain immediately constrict which decreases the gaseous exchange in the terminal segments. The terminal segments have a high concentration of carbon dioxide and a low concentration of oxygen, which causes the vessel to lose muscle control causing dilation.

This mechanical irritation, disruption of blood flow, and decreased oxygen, causes or facilitates a further change in the vessels and parenchyma to become more permeable to blood serum causing electrolyte imbalances. The increased permeability in the vessel wall reduces the ability of the glial cells to control the extracellular potassium, calcium, and magnesium levels. The imbalance of these levels influence the voltage gated ion channels and lower the threshold of action potential of the neuron. These imbalances cause an increased stimulus to the neurons causing a seizure.3,4

People that suffer long term effects of a mild concussion would fall under the category of post concussion syndrome. Common complaints are of pain and spasms below the occiput in the area of the greater occipital nerve on the right and left side upon palpation. A headache that starts at the base of the skull and follows the path of the greater occipital nerve has been reported. The trauma may cause a sprain in the upper cervical region causing inflammation in the nerve roots in the upper cervical spine. An unstable feeling and dizziness are reported by patients that suffer a backward fall. Backward falls cause more damage to the labyrinthine and vestibular apparatus due to the inability to use the optical, labyrinthine and postural righting reflexes when falling. This may cause an unsteadiness and gait disturbance and may be associated with labyrinthitis.5

Case Report

Patient History

A 76-year-old Caucasian female was referred to the office by a neurologist for an upper cervical Atlas Orthogonal evaluation ten years after the patient’s symptoms began following a slip and fall injury. The patient stated that she jumped out of the shower and ran to answer the phone at which time her feet came out from under her. She was unable to brace herself for the fall and fell straight back on her head. She immediately experienced a seizure and severe migraine, which left her unable to talk or walk. She was rushed to the emergency room and admitted to the hospital where she was diagnosed with a concussion and post concussion seizure. She was taken for an MR and CT and was told they were unremarkable.

The patient reports she experienced rapid fluctuations in her blood pressure. The patient was treated with blood pressure medication to stabilize her blood pressure as the hospital tried to determine the cause of the unstable pressure.

She continued to complain of a migraine, difficulty talking, a swaying feeling upon standing, and a wide gait while walking with a left forward direction. She was informed that her MRI and CT were unremarkable and after 3 months in the hospital she was released. At the time of her release she was no longer experiencing migraines and her blood pressure appeared to stabilize.

She did however continue to have difficulties walking while the other symptoms of speech difficulties and unstable blood pressure seemed to improve. She was able to continue her occupation as a painter and her concussion symptoms of migraines and seizures were infrequent and seemed to last a short time. She did notice that she was no longer able to turn her head over her shoulder to look behind her and she would have to turn the entire body.

Ten years later, after returning from vacation, her symptoms worsened. She began experiencing positional seizures, when she would bend forward she would experience a seizure that would leave her unable to walk or talk for several days. She had a wide gait, left sided walking and swaying that got progressively worse. When she was able to walk, she experienced extreme exhaustion. She began noticing that when she became exhausted from activities she would again experience a seizure. She went to her family practitioner and her blood pressure was noted to be over 200 mm/hg systolic. She was immediately referred to the emergency room for an MRI, CT, and sonogram.

Once again, the results were unremarkable. She was referred for physical therapy and prescribed anxiety meds and was released. The patient declined the physical therapy and insisted to the doctors she was not experiencing anxiety or depression.

She continued to experience the same symptoms with progressively increasing frequency and duration of the seizures and returned to her family practitioner at which time she was referred to the first neurologist. The neurologist told her that she needed eye and ear coordination training and anxiety meds. She refused both insisting she did not have an anxiety disorder.

Hospitalization

While at the family practitioner’s office for her husband’s appointment, she experienced an exacerbation. Her blood pressure was taken and determined to have dropped dangerously low so she was taken to the hospital by ambulance. She then received her third MRI and CT scan. She was told once again that they were unremarkable. She was told that they felt she was experiencing mini strokes and she was going to need a pacemaker to stabilize her. Her blood pressure then began to stabilize and a pacemaker was not needed. She was released from the hospital.

After the release from the hospital, while painting, she noticed that she was no longer able to see as clear as she use to and the colors of the paint seemed to be dull. She was no longer seeing the brightness of the colors. She also realized she was not able to read for very long before her eyes became

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extremely tired.

She sought out an optometrist who determined she was in the beginning stages of cataracts. He stated that her left eye was a lazy eye and would shut down while reading and all the strain was placed on the right eye, which then became fatigued. She eventually stopped reading for any length of time.

Her symptoms as well as blood pressure fluctuation continued and she returned to her family practitioner at which time he referred her to her second neurologist. After her neurological exam, she was referred for an Atlas Orthogonal evaluation.

**Chiropractic Examination**

The patient was consulted for Atlas Orthogonal chiropractic care. A supine comparative leg measurement and scanning palpation of the left and right C1 and C2 nerves were performed. Any positive findings indicate a direct neurological insult since the C1 and C2 nerves do not exit through an IVF but exit the spine posteriorly above and below the atlas posterior arch. The palpatory findings include checking for swelling, muscle contractions, spasms, as well as osseous protuberances. These findings are graded from 1-3. A combined leg length discrepancy and a grade 2-3 on scanning palpation indicates the atlas has subluxated out of the orthogonal position.5

The objective findings on exam included: CN III dysfunction evident by the inability of the medial rectus of the left eye to draw the eye inward during the Cardinal Field of Gaze. The supine comparative leg measurements showed a discrepancy between the right and left leg indicating a possible atlas subluxation.

There was a noted grade 3 at the left C2 spinal nerve ganglia and a grade 2 at the right C2 ganglia as well as grade 2 at the C1 spinal nerve on both the left and the right. The subjective findings upon exam were noted with extreme pain when palpating over the C2 ganglia. There was less pain when palpating the C1 nerves. At this time an atlas subluxation was suspected and x-rays were ordered.

**Radiology**

A series of upper cervical specific radiographs were taken which included: Anterior to posterior open mouth, sagittal, frontal, horizontal, and anterior to posterior lower cervical. The patient is seated in the Atlas Orthogonal positioning chair in-between the bucky and x-ray tube which are fixed at a distance of 46” on a c-arm unit. The patient is positioned for the x-ray at which time a head clamp is placed on the patient to maintain postural integrity.

There are 5 main measurements taken to determine atlas subluxation. Atlas Cephalic Displacement (ACD), Atlas Horizontal Rotation (AHR), Axis Spinous Angle (AxSp), Cervical Spine Angle (CSz), and the Atlas Frontal Plane Line (AFP). The precise calculation of these measurements determines how far from orthogonal the atlas subluxated along the x, y, and z axis.

Along the X-axis, sagittal view, the atlas plane line should be around 14 degrees with even spacing of the atlas between the axis spinous process and the occiput.

The cervical curve should be lordotic. Along the Z-axis, frontal view, the normal position of the cranium and the cervical spine should be vertical while the atlas should be level. These positions are at 90-degree angles to each other. Along the Y-axis, horizontal view, there should be a 90-degree angle of the central portion of the skull and the posterior aspects of the facets of atlas. If the angle is not at 90-degrees, this indicates an atlas rotation. Analysis of the x-rays revealed the patient had an atlas subluxation and the patient agreed to care.

**Atlas Orthogonal Intervention**

The patient was placed on the Atlas Orthogonal adjusting table in the side lying position. The patient’s head was placed on the mastoid support headpiece with the tip of the mastoid process ½” above the bottom edge of the head piece. The patient was centered on the headpiece with the baseline protractor aligning the hard palate on the horizontal plane and the external auditory meatus aligned with zero on the vertical plane. This aligns the atlas for the specific vectors analyzed on the x-rays. The headpiece was then tilted until the external auditory meatus on the opposite side could be felt. The headpiece was then elevated based on the x-ray analysis.

The Atlas Orthogonal percussion instrument was set up on the Y and Z vectors found on x-ray analysis. The stylus was placed in the tragus notch between the mastoid process and the ramus of the mandible. A light force non-rotational adjustment was given using the Atlas Orthogonal instrument.

**Outcome**

Immediately following the adjustment the patient was seated for a post scanning palpation of the C1 and C2 nerves. Objective findings during post palpation included: a decrease in C2 left ganglia from a grade 3 to a grade 2, and a marked decrease in the right C1, C2 and left C1 nerves from a grade 2 to being completely clear, no grade. The leg length comparative measurements revealed balancing of the pre-adjustment analysis. The patient rested for approximately 10 minutes after the adjustment.

The subjective findings included the ability to look over her shoulders, a less wide gait and the ability to walk straight. She was no longer feeling like a seizure was coming on. The patient was then post x-rayed and the analysis showed a marked improvement of the x, y, and z axis with the head, atlas, and cervical spine in a more orthogonal position.

The patient’s management plan was 3 times a week for 2 weeks with negative findings on scanning palpation and leg length comparisons which would indicate the adjustment is holding and the atlas is in the orthogonal position. Once the patient was able to hold the orthogonal position she would be decreased to 2 times per for 3 weeks or determination that the atlas remained in the orthogonal position. She then decreased her visits to once per week for 2 weeks, then once every two weeks, and then to once per month.
The patient’s short-term goals were a 50% improvement of symptoms by 30 days including a longer duration between seizures. The long-term goal was 80%-100% improvement by 90 days with a marked improvement of motor function with normal gait and a longer duration between seizures.

Two months after care the patient was re-evaluated and the objective findings were a negative Cardinal Field of Gaze as well as a negative leg length comparative discrepancy and negative palpatory findings. The subjective findings were an absence of seizures since the first adjustment, normal, pain free cervical rotation, normal gait, increased energy, improved clarity and brightness in her vision and improved hearing. The patient has her blood pressure checked regularly with her family practitioner and no longer experiences blood pressure fluctuation. The patient continues to be evaluated once a month to maintain the orthogonal position.

**Discussion**

In understanding how an atlas subluxation can cause seizures we first need to understand the anatomy of the upper cervical spine. The close relationship and unusual shape of the occipito-atlanto-axial complex have a close relationship with the vertebral artery and the C1 and C2 nerves and the associated muscles of the upper cervical spine. There are several areas where the vertebral artery can become compressed.

The occipital condyles lay next to the foramen magnum and are convex in shape while the superior articular facets of the C1 vertebrae are concave resulting in a joint that is form fitting. There are no discs between the occiput and the first vertebrae. The joint is a synovial joint which allows for greater movement. There are many structures that secure this joint which include the posterior atlanto-occipital membrane that forms a tunnel for the C1 nerve and vertebral artery to pass through.

There are several muscles associated with the occipital-atlanto articulation. These muscles include splenius capitus, longissimus capitus, semispinalis, rectus capitus, oblique capitus inferior, oblique capitus superior, SCM, trapezius, rectus capitus posterior major and minor, oblique capitus superior. The surrounding structures in close proximity of this joint include the vertebral arteries, C1 and C2 nerves, the internal carotid artery, which lies between the temporo-mandibular joint and the occipital-atlanto articulation. If there is an increase in tone and tenderness of the musculature this indicates there is dysfunction in the upper cervical region, which may be related to an atlas subluxation.

**Vertebral Artery**

Of importance is the location of the vertebral artery and its relationship with the occipital-atlanto articulation. The vertebral artery enters the transverse foramen of C6 and exits the C2 transverse foramen and then enters the atlas transverse foramen. When the vertebral artery exits the atlas transverse foramen its course is posterior and medial to lay in the vertebral artery groove on the atlas lateral mass. It then moves anterior to enter the skull through the foramen magnum. The artery lies in the suboccipital triangle and is in close proximity of the C1 and C2 nerve root.

The vertebral arteries join together at the brainstem to form the basilar artery which supplies the posterior circulation of the brain. Vertebral artery blood flow has been extensively studied and it has been shown that upon cervical rotation there is a decrease in blood flow to the brain. This can be due to stretching or compression of the artery at the occipital-atlantoaxial complex.

Another area of concern for compression of the vertebral artery is the location under the muscles of the occipital triangle. As tissue is damaged or becomes inflamed it gives noxious input into the central nervous system. This input causes a reaction within the central nervous system and causes the neurons to increase their sensitivity by twenty fold and can cause central sensitization. This can cause functional and structural abnormalities in the neurons which may lead to chronic pain and other neurological signs and symptoms.

Studies have been conducted showing how subluxation affects the central nervous system. Some subluxations alter the vertebral artery flow while others directly affect the sensory input to the central nervous system. In a cat study of the vertebral artery and it’s affects on the vestibular neuron, neuronal impairment was immediately seen when the blood flow was reduced by 60%. It showed that there was an alteration of the hemodynamics in the vessels of the brain which caused an increased excitability in the neurons due to the decreased oxygen levels.

A multi site clinical study of heart rate variability over a 4 week period showed that chiropractic care positively influenced heart rate variability. Another study showed that adjusting areas of subluxation affects neuronal activities all the way to the cortical levels which affects inhibition and facilitation thereby altering the function of paraspinal muscles.

In a traumatic fall backward the impending force can subluxate the atlas. This causes soft tissue swelling in the suboccipital region which releases noxious input to the central nervous system causing a reaction leading to further tissue damage. If the swelling becomes chronic it can cause compression in the area. Suboccipital muscles, the vertebral artery, C1 and C2 nerves can be directly affected.

**Conclusion**

This case describes the successful management of an elderly patient with a ten year history of seizures and other neurological sequelae following head trauma. Medical management failed and she was referred for chiropractic evaluation and management. Following the identification of an upper cervical Subluxation, a specific adjustment was applied to reduce the atlas subluxation. The patient experienced immediate relief from her symptoms and complete resolution of her seizures and related neurological sequelae. More research in this area is needed.
References


