CASE STUDY

Upper Cervical Care in a Nine-Year-Old Female With Occipital Lobe Epilepsy: A Case Study

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ABSTRACT

Objective: The reduction of an upper cervical subluxation through chiropractic care in the case of a child with occipital lobe epilepsy is described.

Clinical Features: A nine-year-old girl presented with uncontrollable blinking of the left eye and fainting spells, previously diagnosed by a neurologist as occipital lobe epilepsy.

Intervention and Outcomes*:* High velocity and light force adjustments (Blair technique) were applied to the first cervical vertebra on three separate occasions. Other low force adjustments (Activator) were administered to various levels of the spinal column where vertebral subluxations existed. The patient's uncontrolled eye twitching decreased immediately following the first upper cervical adjustment and ceased completely 3 weeks following the final adjustment. The twitching has not resurfaced in approximately 2 years.

Conclusions*:* This case report demonstrated resolution of signs and symptoms associated with occipital lobe epilepsy in a child following the reduction of an upper cervical subluxation.

Key Indexing Terms: *Upper Cervical; Blair; Occipital Lobe Epilepsy; Epilepsy; Cervical Spine; Chiropractic, Subluxation*

Introduction

Epilepsy is a condition characterized by two or more seizures, brief attacks of altered consciousness and abnormal motor activity.[1,2] The etiology of epilepsy varies depending on the classification given, such as symptomatic or idiopathic. Symptomatic epilepsy suggests that there is an underlying brain lesion causing seizures whereas idiopathic epilepsy has no known cause. In addition, it is theorized that idiopathic epilepsy may have a genetic predisposition.[1-3] The seizures associated with epilepsy are distinct from febrile seizures seen in young children and is most likely caused by abnormal electrical discharges within the brain.[1,4]

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The worldwide population with epilepsy is estimated to be 10.5 million, 25% of which are children under the age of 15.[3] Approximately 4.7 per 1000 children under the age of 18 are diagnosed with epilepsy.[2] A study performed by Murphy[5] regarding the prevalence of epilepsy and epileptic seizures among 10-year-old children determined the lifetime prevalence to be 6 per 1,000 for this age group.

The types of seizures experienced with epilepsy can be partial or generalized with further sub-classifications such as tonic, atonic, absence, simple, or complex.[1-3,5] Partial epilepsy is localized to a particular lobe of the brain, most commonly the temporal or occipital lobes.[2] It is common for children with localized epilepsy to have normal neurological functioning and mental development.[2,6]

Although the etiology is still under investigation, it is clear that the nervous system of the epileptic child plays a vital role in the diagnosis and treatment. The most common treatment for epilepsy in children is the prescription of anti-convulsion medication, the same drugs prescribed to adults with epilepsy but in smaller doses. It is recommended that the patients remain on the medication for at least one year seizure-free before the drugs are discontinued. Another medical treatment involves stimulation of the vagus nerve in which a pacemaker is implanted into the patient. A magnet is utilized to activate the vagus nerve when the patient feels a seizure is imminent. This option is used in conjunction with anti-convulsion medication and does not have established long-term effectiveness.[1]

Occipital epilepsy, as described in this case, has been correlated with neonatal hypoglycemia given that the posterior quadrant of the brain is susceptible to anoxic-ischemic injury.[7,8] It is estimated that prenatal development or perinatal lesions account for approximately 40% of cases of occipital lobe epilepsy.[8] A recent study by Montassir[7] included several children diagnosed with occipital epilepsy demonstrating signs such as eye blinking and eye deviation. A study conducted by Kuzniecky[8] exhibited consistent findings as well as nystagmus, ictal vomiting, and diplopia. Eye fluttering and blinking was observed in 20% of patients but is not considered to be unique to occipital lobe epilepsy.[8]

Case Report

History

The patient was a 9-year-old female brought into the chiropractic clinic by her mother. The patient presented with uncontrollable blinking of the left eye. The major complaint was occipital epilepsy associated with abnormal eye movement, previously diagnosed by a neurologist. The neurologist recommended Neurontin, an anti-convulsion medication indicated in cases of partial seizures with epilepsy. Looking for an alternative to drug therapy, the patient's mother sought care at an upper cervical chiropractic clinic.

The patient was diagnosed with occipital epilepsy by a neurologist approximately one year prior to the onset of the left eye blinking. The uncontrollable eye movements began suddenly 2 weeks before the patient presented to the chiropractor. The blinking of the left eye was intermittent and accentuated when the patient was tired. The blinking would last for approximately 30 seconds each episode.

Accompanying blinking of the left eye was nystagmus, which also began 2 weeks ago. Nystagmus was evident to the doctor at the time of presentation and throughout the examination. The patient's mother also described the patient fainting a total of 3 times in the past year, approximately once every 3 months. Associated symptoms included seizures, tics, spasms, dizziness, and fainting. Other conditions the patient suffered from were constipation, seasonal allergies, rashes, itching, and lesions. The patient was delivered as a cesarean section at birth with no known complications. The family history of the patient included thyroid disease, high blood pressure, heart disease, and cancer.

Chiropractic Care

The primary technique used in this case was the Blair technique, a specific upper cervical analysis and adjustment developed by William G. Blair, DC. Blair performed research in the 1950's and 1960's hypothesizing that the first cervical vertebra is asymmetrical. The analysis utilized by the Blair technique to determine if an upper cervical subluxation exists includes paraspinal surface thermography, leg length inequality tests, and a series of x-rays of the cervical spine. The following procedures are derived from the Blair Upper Cervical Specific Technique Manual most recently updated in 2005.[9]

A thermal scan was performed on the posterior cervical region of the patient with a Tytron C-3000. The Tytron contains infrared probes that glide paraspinally from the 1st thoracic vertebra to the occipital brim. The autonomic nervous system controls cutaneous body temperature via the arteriole system and is activated by centers located in the spinal cord, brain stem, and hypothalamus.[10] The infrared technology of the Tytron detects skin temperature superficially to measure the integrity of the nervous system. Uematsu[11] states that these heat differentials can be used to determine if dysfunction of the autonomic nervous system is present. A study has shown that aberrant thermal temperature can decrease one's physical health perception, as seen on an SF-12.[12] In upper cervical techniques, pattern or break analyses are used to determine if there is neurological compromise. In this case a break analysis was used, noting any deflections greater than 0.5 degrees Celsius in one or more areas of the cervical spine.[13]

A significant break of 0.75 degrees Celsius was evident in the lower cervical spine of the patient indicating neurological compromise. Although paraspinal thermography is a commonly used measure of neural integrity in upper cervical techniques, Hart[12] mentions that it should not be used solely but in conjunction with other forms of chiropractic analysis. In the Blair technique, the thermal scan is the doctor's guide for when to adjust.[9]

A detailed leg check was performed on the patient to determine cervical involvement, as developed by J. Clay Thompson, DC and Clarence Prill, DC. The patient's right leg was ¼" short in the prone position with legs in extension and remained ¼" short with legs in flexion. There are four tests involved in the Prill leg check, all performed with the patient in the prone position and a series of commands were given to the patient to measure any postural imbalance.[9]

The first was the vertical test in which the patient was asked to lift her legs lightly up toward the ceiling while the doctor resisted the pressure. The second was the rotation test in which the patient was asked to internally rotate her feet while the doctor resisted the patient's pressure. The third was the medial test where the patient was asked to push her legs toward the median line while the doctor resisted and the fourth test was the lateral test where the patient was asked to push her legs apart while the doctor resisted the pressure. It is important to note that all tests were performed with a light, gentle pressure from the patient in order to isolate the muscles being tested. Each test corresponds to a subluxated cervical vertebra, C1, C2, C3, and C4, respectively. The Prill leg checks are based on the assumption that subluxation affects tone, as discovered by DD Palmer.[14] Prill found that if the vertebra involved were not neurologically irritated or subluxated, the legs would balance following the corresponding test. If the segment tested was subluxated, the muscle that is neurologically connected to that segment would be irritated, causing a structural imbalance, leading the legs to appear uneven.[9]

While the vertical test was performed on the patient in this case, her right leg remained short ¼" in the prone position indicating a subluxation at C1. All other Prill leg checks were negative on this patient on the initial visit, indicating no neurological compromise below the first cervical vertebra. It is important to note that the Prill leg checks were developed in order to determine where to adjust and were intended to be used in addition to x-ray analysis and thermography.[9]

Following the history and exam it was determined that the patient was a candidate for upper cervical chiropractic care and a Blair cervical radiographic series was performed. Four x-ray views were taken in the cervical spine beginning with a base posterior (BP). The patient was placed in a posture constant chair in order to reduce postural distortions and head clamps were used to reduce patient mobility during x-ray exposure. The central ray was aimed through the symphysis menti and the auditory meatus in order to visualize the atlas lateral masses, occipital condyles, foramen magnum, and neural canal on film. (Figure 1)

The Blair technique is based on the principle that "malformation is the rule – not the exception."[9] Blair spent several years conducting studies using x-rays and human atlas specimens from cadavers demonstrating that the atlas lateral masses are not mirror images of one another. Gottlieb[15] supports this notion based on his study of 30 atlas specimens from human cadavers. His study demonstrated that none of the atlas facets were symmetric in shape, border, depth, and angle. Not only are the atlas facets and occipital condyles asymmetrical from right to left but also from individual to individual.[15] It is for this reason that BP views are warranted on all patients. Asymmetry of the atlanto-occipital (A/O) articulations indicates the necessity for specific x-rays in order to determine the exact misalignment of atlas. Based on research performed by Blair[9] and Gottlieb,[15] static and motion palpation are not sufficient criteria alone to determine the direction of an atlas misalignment or if a subluxation even exists. Furthermore, the radiographic analysis of the A/O articulation should be used in conjunction with other forms of chiropractic analysis.[16]

The BP view is analyzed to plot and measure the convergence angles of the right and left atlas lateral masses and occipital condyles. The normal range of convergence angles is 18 – 33 degrees.[9] The convergence angles of the patient in this case were 31 degrees on the left and 30 degrees on the right. (Figure 1) The convergence angles calculated from the base posterior view were then used to take the right and left protracto views.

For the left protracto view, the patient was rotated to her left 31 degrees. The central ray allows the anterolateral margin of the atlanto-occipital (A/O) articulation to be visualized through the maxillary sinus on film. (Figure 2) This protocol was repeated for the right protracto view with the patient rotated 30 degrees to the right. (Figure 3)

The results of these views determined the patient's atlas listing. The Blair system consists of four primary atlas listings. The occipital condyles are convex inferiorly fitting perfectly into the concave shape of the superior surface of the atlas lateral masses.[17] Based on the biomechanics of this complex, any movement of the atlas must be multi-directional. Using the anterior tubercle as the reference point, when the atlas misaligns anteriorly, it must also misalign superiorly. The same principle applies to a posterior misalignment of the atlas, in which case it must also misalign inferiorly.[9,18]

An overlap of the anterolateral margin of the left atlas lateral mass under the left occipital condyle was evident on the left protracto view indicating a 3-directional atlas listing of anterior, superior, and left (ASL). (Figure 2) The same finding was demonstrated on the right protracto view (ASR). (Figure 3) This case exhibits a double listing, in which case the primary atlas listing is derived from the larger misalignment of the two. The right overlap, in this case, is greater than the left and so the atlas listing is recorded as ASR-ASL 41/30. It was necessary to obtain two angles for this listing, the left slope angle of the atlanto-occipital articulation found on the left protracto view and the right convergence angle previously found on the base posterior view.

The last x-ray obtained was a lateral stereo cervical view in order to determine if any cervical misalignments existed below C1. The proper protocol for the Blair x-ray analysis is to take two left lateral stereo views and two right lateral stereo views to accommodate for any asymmetries or postural distortions.[9] In the case of a pediatric patient, it was decided by the doctor to only take one lateral stereo view to reduce unnecessary x-ray exposure to the patient.

The analysis of the lateral stereo view showed an overlap of the C2 right facet on the C3 right facet, indicating a listing of anterior, right, and superior (ARS) with a slope angle of 51 degrees. The C4 right facet was also overlapped on the C5 right facet indicating a listing of ARS with a slope angle of 35 degrees.

The initial C1 adjustment was administered in August of 2007 with the listing ASR-ASL 41/30. The patient was lying on her left side on a Nicholas side posture table with a dropping headpiece. A protractor with an extra arm perpendicular to the angle desired was utilized. The doctor stood anterior to the patient using the left A/O slope angle of 41 degrees as her stance line facing superiorly. The right convergence angle was used so that the doctor could end the adjustment with her shoulders at 30 degrees in reference to the floor. The doctor performed a clockwise tissue pull over the right atlas transverse process with her left index finger and then placed her right pisoform on the segmental contact point with her forearm running along the 41 degrees angle of the protractor.

A light force, high velocity adjustment was delivered with 180 degrees clockwise torque. No downward thrust was introduced to the patient, only the speed of the torque to drop the headpiece. The torque is utilized to unlock the A/O articulation and allow the atlas to realign. The dropping headpiece was used to stabilize the mastoid process to confirm movement of atlas alone. The patient then rested in a supine position with a cervical support for 20 minutes. Three atlas adjustments were delivered over the course of 5 months in which the same protocol was followed.

The patient's next visit was 6 days following the initial atlas adjustment and the patient's mother reported that the left eye blinking had decreased in frequency. The paraspinal thermal scan showed increased symmetry compared to the initial thermal scan (Figures 4 and 5). The patient's legs were balanced in the prone position and all Prill leg checks were negative. Based on clinical experience, this indicated that there was no neurological compromise stemming from the cervical spine. Misalignments below the cervical region were adjusted utilizing the activator method. This method was used for the remainder of care for fixated segments below C5 whether cervical subluxations were present or not.

Aside from the 3 atlas adjustments administered over the course of 5 months, there were 2 other occasions when the Prill leg check indicated cervical involvement. The Blair adjustment was delivered to C2 and C4 at the times indicated. The C2 and C4 listings were in the same 3-directional misalignment as the atlas and the same adjustment was administered to these levels using 90 degrees torque and the slope angles measured previously as the doctor's stance lines.

Outcomes

The patient's symptoms decreased progressively and were only present at night. Then, after two months of care, the patient's mother reported that her blinking had ceased completely. The patient was not seen again until 6 weeks later when the blinking returned. The patient reported pain and a headache following a fall. The nature of the fall was unclear. It was after this incident that 2 more atlas adjustments were delivered in 2 consecutive visits, marking her last office visit. It was documented that the signs and symptoms had decreased significantly. The mother of the patient expected results were met and therefore discontinued care. Communication between the patient's parents and the doctor has remained open and no incident of the patient's eye blinking or other signs and symptoms have been reported since discontinuation of care.

Discussion

Chiropractic Literature

The peer-reviewed chiropractic literature supporting chiropractic care in the case of children with epilepsy and seizure disorders is not substantial, but is promising. The articles published on the reduction and resolution of signs and symptoms associated with epilepsy are predominately case studies focused on the elimination of vertebral subluxations. The results are favorable and an excellent starting point for further investigation.

Brown[4] describes a case study of a 5-month-old male who reportedly suffered from 8 seizures per day before beginning

reportedly suffered from 8 seizures per day before beginning chiropractic care. After 6 weeks of care under the activator method, an entire week passed without the patient experiencing a seizure. No long-term results were reported in this case, although the short-term effects were positive.

A case study reported by Hyman[19] describes a five-year-old male whose seizures reduced from 2-3 seizures every 2 hours to 0 to 1 seizure per day while under chiropractic care. The patient was previously prescribed anti-seizure medication with no change in seizure activity over the course of 6 months. The techniques utilized were Palmer Toggle Recoil technique on C1 and Thompson terminal point drop technique on the remainder of the spine. The patient's pediatric neurologist discontinued the use of anti-seizure medication due to the reduction of severity, duration, and frequency of seizures.

Amalu[20] describes the case of a five-year-old male with cortical blindness, cerebral palsy, epilepsy, and recurring otitis media. Amalu describes the patient experiencing 30 seizures per day at the initial consultation and contracting approximately one ear infection per month. The analysis used for this case was thermography and leg length inequality tests. After 10 months of upper cervical chiropractic management under the knee-chest technique, the patient was free from all medication and classified as non-epileptic by his neurologist.

Proposed Mechanisms

In this case of occipital lobe epilepsy, seizures were infrequent and not the primary focus in the management plan. The patient's uncontrollable left eye blinking was the chief concern of the patient's parents and was the sign measured throughout care to track the patient's progress.

Because epilepsy is of a neurological nature, it is plausible to trace the etiology back to the central nervous system. The upper cervical complex (consisting of the occiput, atlas, and axis) is unique due to its biomechanical instability and high concentration of spinal mechanoreceptors.[21] Because of the distinctive anatomy of the atlas, it misaligns in a 3-directional torque.[14] It is proposed that this puts pressure on the brainstem,[22] the control center of sensory and motor functions in the face and head region.[10]

In the case of occipital lobe epilepsy, the possible etiologies are somewhat limiting. Over the past 20 years, as more individuals with epileptic conditions have sought chiropractic care as an alternative to medical and surgical intervention, the following mechanisms of action have been proposed.

The first mechanism is central nervous system facilitation[21] causing a lack of blood flow to the brainstem and brain. A misalignment of the atlas can cause hyperafferent activation irritating the sympathetic nerves in the upper cervical area causing the vertebral artery to spasm, leading to ischemia in vital areas of the central nervous system.[21,22] This process can lead to brain hibernation, in which a brain cell is inhibited due to ischemia, leading to an array of neurological signs and symptoms.[21] Once an external force is introduced to the atlas in a specific and precise line of correction, the pressure on the sympathetic nervous system is alleviated. The brain cells that were in a hibernation state can then return to their normal functions[21] and blood flow to the injured area is restored.[22] This theory is plausible in the case of occipital lobe epilepsy due to the occipital lobe's susceptibility to ischemic-anoxic conditions.[8]

Brainstem compromise as proposed by Kessinger[23] is another possible mechanism of injury causing occipital lobe epilepsy. The base of the occipital condyles or the arch of atlas have been proposed as structures that may compress this area. Kessinger[23] suggests that the medulla oblongata can be compressed by circumferential constriction of the neural canal due to a 3-directional atlas subluxation. Furthermore, depending on the atlas misalignment, neural pathways between the medulla, cavernoses plexus, and optic nucleus could also be compromised. Neural pathways associated with motor activity of the eye could have been insulted in this case.

The third mechanism involves ischemia to the occipital lobe, possibly due to occlusion of the vertebral artery. The vertebral arteries ascend through the transverse foramina of the first six cervical vertebrae and wrap around the atlas lateral masses before perforating the dura and passing through the foramen magnum. The right and left vertebral arteries join to form the basilar artery, which then divides into the posterior cerebral arteries. The posterior cerebral arteries are responsible for bloody supply to the occipital lobe.[17] Because of the intimate relationship between the vertebral artery and the atlas transverse process, vertebrobasilar insufficiency may impair blood flow to the occipital lobe.

The dentate ligament – cord distortion hypothesis also applies in this case. Not only does the upper cervical subluxation cause mechanical irritation on the tracts of the spinal cord, but also it can cause venous stasis occluding blood flow to various areas of the upper cervical cord.[24] Regarding the venous drainage system of the upper cervical spinal cord, Grostic[24] states, "because these veins operate at such low pressures, they are easily occluded by compressive forces." An atlas misalignment could lead to mechanical stress on the dentate ligaments, leading to deformation of the spinal cord, in turn causing a state of venous stasis.

The last proposed mechanism is inhibition of the vagal nerve trunk. The connection between the vagal nerve trunk and seizure disorders is equivocal, yet studies performed on stimulation of the vagal nerve trunk have been successful. The upper cervical subluxation could play a role in affecting the vagus nerve through the inferior vagal ganglion, which lies closely to the atlas transverse process.[25] It is dubious that the vagal nerve trunk is responsible for eye twitching present in occipital lobe epilepsy but may indirectly relate to the actual cause.

Because of the atlas's susceptibility to misalignment, several mechanisms could be responsible for the subluxation present in this case. The trauma associated with a cesarean section birth could have put torsion on the upper cervical area while the patient was extracted from the uterus. Allowing this injury to remain untreated for 8 years prior to the presence of neurological symptoms could be responsible for occipital lobe ischemia. The patient's symptoms did not cease until 3 weeks after the first atlas adjustment and resurfaced after the patient fell. It is possible that the patient's fall caused the aligned atlas to subluxate once again, interfering with nervous system function. The patient's eye blinking did not completely disappear until 3 weeks following the 3rd atlas adjustment suggesting that the original injury was significant.

Although this study's subjective findings regarding the patient's left eye blinking were favorable, objective findings of the patient's occipital lobe epilepsy were lacking. A deeper investigation into the nature of this patient's epileptic condition would make a stronger case for the use of chiropractic care in children with epilepsy. This case demonstrates that the upper cervical region may play a role in reducing signs and symptoms of neurologically based disorders, such as epilepsy. A study is warranted to investigate upper cervical care in neurologically compromised children to determine long-term effectiveness.

Conclusion

The relationship between an upper cervical subluxation and epileptic conditions in children exists but remains elusive. Evidence from this case supports the elimination of the upper cervical subluxation in the resolution of occipital lobe epilepsy signs and symptoms. Epilepsy is a neurological disorder and it is the opinion of this author that it should be treated conservatively in children before medical and surgical intervention.

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Figures

Figure 1: Blair Base Posterior view exhibiting the right and left convergence angles of the atlanto-occipital articulations.

Figure 2: Blair Left Protracto view demonstrating an overlap of the left atlas lateral mass relative to the left occipital condyle giving the listing ASL.

Figure 3: Blair Left Protracto view demonstrating an overlap of the left atlas lateral mass relative to the left occipital condyle giving the listing ASL.

Figure 4: Initial thermal scan performed representing a break of 0.75 degrees Celsius indicating neurological compromise.

Figure 5: Thermal scan performed one week after initial C1 adjustment representing paraspinal symmetry with no deviation beyond 0.5 degrees Celsius