Cessation of Seizures, Behavioral Disturbances and Improvement in Cognitive Developmental Delay Following Upper Cervical Chiropractic Care in a 2 Year Old: A Case Report

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ABSTRACT

Objective: To evaluate and discuss the effect of knee-chest upper cervical chiropractic care on 2-year-old male patient with seizures, behavioral disturbances and cognitive developmental delay following head trauma.

Clinical Features: The patient is a 2-year old male who suffered with seizures, behavioral disturbances and cognitive developmental delays following head trauma. He experienced 1-3 seizures per week and on some occasions up to three per day. He was combative, angry and uncooperative with the parents. The patient had a developmental impairment of his language use. The parents sought chiropractic care one year and three months after the injury.

Intervention & Outcomes: After performing a case history, physical examination and chiropractic evaluation it was determined that the patient had a subluxation of the C1 (atlas) vertebra. The patient received knee-chest upper cervical chiropractic care for a period of 5.5 months, which amounted to a total of seven visits. He was checked for vertebral subluxation during every visit and was adjusted three times over the course of care. There was improvement and eventual cessation of his seizure activity following the chiropractic care. There was also improvement in the patient’s behavior and cognitive development.

Conclusion: The findings presented in this case study suggest that upper cervical chiropractic adjustments may benefit patients who suffer from seizures, behavioral disturbances and developmental delay.

Key Words: Upper Cervical Chiropractic, Knee Chest Technique, Atlas Vertebra, Subluxation, Seizure, Epilepsy, Pediatric

Introduction

Stedman’s Medical Dictionary¹ defines epilepsy as a chronic disorder characterized by paroxysmal brain function due to excessive neuronal discharge, and is usually associated with some alteration of consciousness. The diagnosis of epilepsy is dependent on the patient experiencing at least two unprovoked seizures.² Furthermore, the term epilepsy has been used to encompass a variety of different syndromes that have in common the symptomatic expression of recurrent unprovoked seizures.³,⁴ Seizures are the result of abnormal unregulated electrical discharges of the cerebral cortex.⁴ The use of electroencephalograms (EEG) and magnetic resonance imaging (MRI) assist in the detection of seizure activity in the brain and proper diagnosis.²,⁴ EEG and MRI studies can also

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be useful in determining the area of neuronal hyperactivity within the cerebral cortex and classifying the type of seizure.\textsuperscript{2} Cortical neurons have a normal electrical discharge rate of about 80 potentials per second; during a seizure this rate can increase to as high as 500 times per second.\textsuperscript{5} This altered activity of the brain can lead to altered awareness, emotional disturbance, abnormal sensations, involuntary movements, convulsions and muscle spasms.\textsuperscript{4,5}

Seizures can be classified as either generalized or partial. Generalized seizures involve aberrant neuronal electrical activity of the entire cerebral cortex, involving both hemispheres and usually involving a loss of consciousness. Generalized seizures most often occur in conjunction with metabolic and genetic disorders. Infantile spasms, absence, tonic-clonic, atonic and myoclonic seizures all fall under the classification of generalized seizures. Partial seizures involve aberrant electrical activity that begins in one hemisphere of the cerebral cortex. Partial seizures can manifest as simple (no loss of consciousness) or complex (impaired but not a total loss of consciousness).\textsuperscript{4,4}

Relevant to the patient involved in this case is a category of seizure known as posttraumatic seizure. These seizures begin after a trauma to the head and brain has been endured. Posttraumatic seizures occur after 25–75\% of head injuries that cause skull fractures, intracranial hemorrhages or focal neurological deficits.\textsuperscript{4} According to Chen et al.,\textsuperscript{6} the working definition of posttraumatic epilepsy is the occurrence of two or more unprovoked seizures after a head injury. Unprovoked seizures are those occurring more than a week after the head injury. Conversely, provoked seizures are those occurring within the first seven days after the head injury.\textsuperscript{6}

According to the CDC\textsuperscript{7}, epilepsy affects about 2 million Americans with a diagnosis rate of about 140,000 new cases per year. On average about 10\% of people will experience a seizure at some point in life and 3\% will have a diagnosis of epilepsy by the age of 80. Epilepsy results in an estimated annual cost of $15.5 billion in medical costs, lost and reduced earnings and production. Epilepsy has negative effects on the quality of life of those with this disorder.\textsuperscript{8,8} Bishop\textsuperscript{8} asserts that epilepsy can have broad effects on one’s quality of life that spans across interpersonal, intrapersonal and extrapersonal domains.

The incidence of epilepsy is highest in children under the age of ten and in older people over the age of 70.\textsuperscript{10} A number of behavioral aspects, as well as cognitive and developmental deficiencies have been associated with various pediatric epilepsy syndromes.\textsuperscript{11} Related to this case and others is Landau-Kleffner syndrome, also known as acquired epileptic aphasia. According to Geotz,\textsuperscript{12} Landau-Kleffner syndrome is characterized by an acquired aphasia with epileptiform activity over the temporal or temporal-parietal-occipital regions and psychomotor and behavioral difficulties. Approximately 300 cases of Landau-Kleffner syndrome have been reported in the literature.\textsuperscript{12}

Case Report

Patient History

A two-year-old patient presented to the chiropractor after suffering from seizures, behavioral disturbances and developmental delays. The parents of the patient reported a traumatic event occurring 1 year and 4 months prior, in which the child fell from a height of roughly three feet, striking the occipital portion of his skull on the edge of a wooden deck. The child immediately went into seizure exhibiting bilateral contractions of his lower limb musculature. The parents took the injured child to the emergency care facility where his skull laceration was treated with four staples and he was prescribed pharmaceutical medication to alleviate pain. X-rays were taken and revealed no evidence of fracture. There were no neurological tests performed during this initial emergency room visit. Other than this incident, the parents did not make mention of any other traumas.

The parents noticed that their child’s seizure activity worsened in the days following the trauma. They sought medical care once more for further evaluation of their child. At this time an electroencephalogram (EEG) study was performed while the child was sleeping and showed no abnormal brain activity. However, an EEG was also performed while the child was awake and showed abnormal findings, consistent with seizure activity. Magnetic resonance imaging (MRI) and a computed tomography scan (CT) were also performed and showed no abnormalities. The child was prescribed Lamictal, an anti-seizure medication, at a dose of 25 mg to be taken twice per day. Use of anti-seizure medication is part of the standard medical treatment for this condition.\textsuperscript{6} The child’s seizures continued to worsen as time passed. He experienced an average of 3 seizures per week and occasionally up to 3 seizures per day.

In addition to the patient’s seizure activity the parents noticed behavioral changes in their son. The child became overly aggressive, combative, angry and generally uncooperative with his parents. The parents also became aware of developmental delays in the child’s language production, including his ability to form sentences, use vocabulary and recognize colors. Furthermore, the patient’s history revealed he was delivered via cesarean section and that he had jaundice at birth.

Examination

The clinical purpose of the chiropractic examination was to determine the presence of vertebral subluxation in the patient. The clinical focus of the chiropractor caring for this patient was the analysis, detection and correction of an upper cervical subluxation, primarily of the C1 and C2 vertebrae. The initial examination included the utilization of mastoid fossa thermal imaging using the Tytron C-3000 instrument which is accurate to within 1.0\(^\circ\) centigrade and sensitive to within .01\(^\circ\) centigrade.\textsuperscript{13} Use of paraspinal thermography has been shown to have good to excellent reliability in the measurement of paraspinal temperature.\textsuperscript{14} Use of paraspinal thermography has also been shown to have excellent inter-examiner and intra-examiner reproducibility.\textsuperscript{15} Use of the Tytron C-3000 instrument has shown to have very high intra-examiner and inter-examiner reliability.\textsuperscript{16} The chiropractor was unable to establish a pattern reading with the patient at the time of the examination due to the size of the instrument used. However, it was determined that the patient had a left mastoid fossa
temperature reading of .29° C at the time of examination. The chiropractor also observed a left short leg while checking for leg length inequality in the prone position. Analysis of leg length inequality is a commonly used criteria among chiropractors for the detection of vertebral subluxation. The use of prone leg length analysis has been shown to have good inter-examiner reliability.

Radiographic Results:

An anterior to posterior open mouth (APOM) and a lateral cervical x-ray were taken of the patient. A vertex or base posterior x-ray is also commonly taken to assess subluxation of the upper cervical spine. However, a vertex x-ray was not taken on this patient. The purpose of these x-rays is to determine the structural malposition of the subluxated vertebra, a common practice among upper cervical chiropractors. The lateral cervical x-ray revealed an angle of 13° between the atlas vertebra plane line and the hard palate line. From this measurement it was concluded that the atlas vertebra was subluxated in an anterior and superior malposition, with the anterior tubercle of atlas being the point of reference. The APOM x-ray revealed an atlas laterally of 2mm to the right in relation of the right C1 lateral mass to the center of the foramen magnum. The subluxation listing (alphabetical representation of the misalignment) determined from the x-ray was an ASR. No other pathology or abnormal structural problems were found.

Intervention

The initial examination and x-rays revealed the presence of a vertebral subluxation at the level of C1. The criteria needed to warrant an adjustment was a mastoid fossa thermography reading of greater that 0.25° C and the presence of a short leg upon leg length analysis. These criteria were met on the initial visit so the patient received an adjustment using the Knee Chest Upper Cervical Specific (KCUCS) technique. The adjustment was delivered with the chiropractor using a pisiform contact to the right posterior arch of the atlas vertebra. The patient’s head is maintained in a right rotation for the duration of the adjustment.

The patient was checked for subluxation once a week over the course of the next month following the first visit. The patient did not meet the criteria for adjustment on those four visits. On the sixth office visit (1.5 months after the initial visit), it was determined that the patient had a subluxation present and he was adjusted accordingly. The seventh office visit occurred 4 months later (5.5 months after the initial visit) and the patient was adjusted after analysis determined there was a subluxation present. Thus, the patient was seen 7 times by the chiropractor and received a total of 3 adjustments over a 5.5-month time span. It should be noted that the parents live two hours away from the chiropractor, turning each office visit into a 5-hour trip.

Outcomes

The patient experienced an increase in seizure activity after the first adjustment was given. This clinical occurrence has been previously documented by another chiropractor caring for a seizure patient. Following the initial spike in seizure activity, the patient’s parents noticed a decline in seizures within two weeks of the first adjustment. The patient’s seizure activity steadily declined and eventually resolved 51 days after the first adjustment. The patient discontinued the use of his anti-seizure medication 2.5 months after the first adjustment, as directed by his neurologist. The child remained seizure free for three months at which time he experienced one mild seizure. At that time, the parents brought the patient back to the chiropractor to be checked for subluxation. Since that time the patient has remained seizure free.

In addition to the resolution of seizures the parents noticed significant changes in their child’s behavior. They stated that his language use has improved and increased. The child is now able to speak in complete sentences, is singing songs and has expanded his vocabulary significantly. The patient no longer exhibits aggressive, angry or uncooperative behavior towards his parents. The parents stated that their son is much more loving and calm.

Discussion

The purpose of this case study is to discuss the relationship between upper cervical specific chiropractic care and a reduction in seizures, as well as improvement in behavioral disturbance and cognitive developmental delay. The medical standard of care for epilepsy and seizure disorders is the use of pharmaceutical antiepileptic (AEDs) agents. AED’s have been shown to be 60-70% effective in reducing seizure activity. However, according to Sillanpaa and Schmidt, the treatment outcomes can be hard to predict in patients with childhood-onset epilepsy. The medical treatment of epilepsy and seizure disorders presents unique challenges due to the many varieties of symptomatic presentation that may result from many different causes. There is evidence to suggest that some pediatric patients utilize both conventional medical methods of care as well as alternative methods, chiropractic being one of the more popular. One recent study shows that 14% of chiropractic patients are under the age of 18 and that chiropractic is the most commonly used form of complementary and alternative medicine for children and adolescents.

Chiropractic care, from its inception in 1895, has maintained a clinical focus on the detection and correction of vertebral subluxation. Stephenson described subluxation as having four parts. According to Stephenson in his 1927 text, to be considered a subluxation four things must occur. First, there must be a loss of juxtaposition of a vertebra with the one above, the one below, or both. Second, there must be occlusion of an opening. Third, there must be presence of nerve impingement. Last, there must be interference with the transmission of mental impulses. Thus it has been inferred that correction of vertebral subluxation can have positive effects on physiology by removing the interference to proper nerve function. Possibly the most well known study providing evidence that the correction of vertebral subluxation can influence physiology was performed by Bakris and Dickholtz et al. The pilot study conducted by Bakris and Dickholtz et al showed that correcting subluxation in the upper cervical spine using chiropractic adjustments resulted in lower blood pressure in patients with stage 1 hypertension.
There are published case reports documenting the outcome of chiropractic care on patients with epilepsy and seizure disorders. In 2001 Pistolese, published a review of the literature on chiropractic care of children with epilepsy and seizure disorder. His review uncovered 17 cases of pediatric epileptic patients receiving chiropractic care. Of those 17 cases, 14 had been taking medications for their condition, yet their treatment outcomes remained unsuccessful. Furthermore, 15 of those cases were rendered upper cervical adjustments, all of which reported positive outcomes. It should be noted that many of the cases that appeared in the review were not published in scientific or peer-reviewed journals. However, since Pistolese’s review is over ten years old there have been newer cases published in the literature since then.

One case by Elster, chronicles the care of a 23-year-old male patient with bipolar disorder, seizures, sleep disorders and migraine headaches. He received upper cervical adjustments and reported complete resolution of symptoms after 7 months of care. Hubbard et al., published a case about a 25-year-old woman suffering from myoclonic seizures. There was improvement in her symptoms following 12 weeks of upper cervical care. Hooper & Manis, published a case following the care of a patient with occipital lobe epilepsy. This patient experienced complete resolution of her seizures after 3 weeks of upper cervical chiropractic care. A recently published case with similar features to this one by Sweat & Adams describes the chiropractic care of a patient with post concussion seizures. This patient experienced 50% improvement in symptoms and longer duration between seizures in thirty days following upper cervical care.

It is evident from the above case studies and case reports that upper cervical chiropractic care may be beneficial for reducing symptomatic expression seizure disorders. The neurological mechanism by which correction of cervical subluxation aids in the reduction of seizures is not yet well understood. However, there have been theories postulated by some of the authors who published these cases. Kent offered a model of subluxation that may be helpful in understanding the mechanisms through which subluxation correction helps to regulate seizure activity.

The dysafferentation model of subluxation proposed by Kent is based on the premise that a subluxated vertebra will alter the afferent stimuli being relayed to the higher centers of the brain. Being that C1 vertebra is richly innervated with mechanoreceptors, alteration of position and or motion of this vertebra can lead to either too much or too little afferent signals being relayed to the cerebral cortex. Abhorrent afferent stimulus could potentiate a cascade of altered neuronal activity in both the brainstem and cerebral cortex. Thus, subluxation derived dysafferentation may lead to widespread activation of the brainstem, which has been shown to precede seizure activity in the cerebral cortex. Furthermore, it has been proposed that subluxation of the C1 vertebra places tensile stresses on the spinal cord via attachments of the dentate ligament. These abnormal stresses placed on the spinal cord that may produce neurological irritation and vascular compromise. Sweat and Adams assert that subluxation of the C1 vertebra can compromise the vertebral artery via mechanical compression. Thus a mechanical compression of the vertebral artery could lead to areas of cerebral ischemia via reduction in blood flow to the basilar arteries. Basilar artery occlusion has been related to seizures in other cases. Therefore, it is possible that adjustment of the C1 vertebra could potentially increase cerebral blood flow by removing the mechanical obstruction of the vertebral artery. These mechanisms remain untested and further research is needed to offer conclusive evidence as to their efficacy.

Conclusion

This case report outlines the chiropractic care of a 2-year-old boy who suffered with seizures, behavioral disturbances and cognitive developmental delays. After 5.5 months of care and consisting of three upper cervical adjustments, the patient is now seizure free, no longer exhibits behavioral problems and has shown improvement in both language development and cognitive abilities. This case is one example of how chiropractic care may be helpful in bringing balance back to a child’s nervous system. Though this is only one example, it adds to the ever growing number of case studies that have shown chiropractic care to be effective in helping to control seizures in children and in other non-musculoskeletal conditions. More research in this area should be explored to better inform the public and other healthcare practitioners as to the results of upper cervical chiropractic care.

References


