CASE STUDY

Behavioral and Learning Changes Secondary to Chiropractic Care to Reduce Subluxations in a Child with Attention Deficit Hyperactivity Disorder: A Case Study

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ABSTRACT

Objective: Attention Deficit Hyperactivity Disorder (ADHD) is extremely subjective in both diagnosis and treatment. No single cause has yet been determined for this disorder nor has there been a single treatment plan that is effective in a majority of cases. This paper proposes a possible etiology for some cases of ADHD with respect to concentration and hyperactivity along with a possible positive association with chiropractic adjustments.

Clinical Features: A case history is presented of an 8-year-old child with many learning and behavioral disorders that are associated with ADHD and temporally related to a fall incurred 18 months prior to being seen at this office. Physical examination revealed limited cervical ranges of motion, radiological examination noted a cervical base angle of 23 degrees, and sacro occipital technique examination had findings consistent with a sacroiliac hypermobility syndrome (category 2).

Intervention and Outcome: For the first two months of care the patient was seen once a week with every adjustment consisting of SOT pelvic blocking procedures and cervical adjustments. While prior to care the child's symptoms had been stable for 18 months, following two months of care his mother noted positive changes in behavior and reduction in his complaints of headaches and neck pain symptoms. During the two month period of treatment, reports from his teachers at school remarked on the positive changes in his behavior and improvements in academic performance.

Conclusion: There are many causes to ADHD as well as other learning and behavioral disorders; therefore conclusions cannot be conclusively drawn by a single case study. A possible conclusion that can be drawn in this case is that adjusting spinal lesions (e.g., subluxations) appeared to reduce the child's pain and discomfort, which allowed him the ability to concentrate, learn and "sit still." Further studies with controls need to be conducted in this area to determine the effectiveness of chiropractic care in aiding the symptoms of children who are classified as ADHD.

Key Words: ADD, ADHD, sacro occipital technique, SOT, Chiropractic, craniosacral, dural function, CSF flow, behavioral disturbances, learning disabilities, subluxation.

Introduction

Anecdotal stories of patients entering chiropractic clinics for vertebrogenic symptoms and finding pain relief as well as relief from seemingly unrelated problems is commonly accepted. There is research from the 1920's by Winsor who linked diseased organs and spinal deformities and aberrant spinal function.[1] This work was continued by Schmorl, Korr, Sunderland, Lewitt and others investigating the pathways and consequences of spinal dysfunction on organ function and in some cases the effect spinal manipulation might have on certain disease states.[2-5]

It has been difficult to assess whether or not changes can occur intellectually and/or behaviorally with spinal adjustments. It is worthy to note that there is evidence that behavioral changes can be affected by pain and/or organic dysfunction.[6-10] There is also evidence that behavioral changes occur after a trauma or head injury.[11-14] Postconcussion Syndrome can produce behavioral changes in the form of anxiety, apathy and depression. [15-20]

Anyone who has had a headache knows that a headache affect's one's ability to concentrate. Headache sufferers are more likely to suffer from a psychological disturbance such as depression and anxiety, and psychological disturbances often carry with it symptoms of a headache.[21-22]

With children who are learning disabled and/or classified as Attention Deficit Hyperactivity Disorder (ADHD), it is important to determine whether their symptoms are due to chronic headaches or pain, are their problems purely neurophysiological or are they possibly psychological in nature? The most common allopathic treatment for ADHD is Ritalin.[23] However, Ritalin carries with it many side effects such as growth suppression, rashes, headache, stomachache, psychosis, insomnia and anorexia.[24-26]

Because of these side effects, a conservative approach to treatment of ADHD needs to be pursued. One possible type of

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conservative approach can be chiropractic therapy. Can chiropractic care assist in creating changes in behavioral and learning function?

The aetiology of ADHD is not clearly understood at this time, however several theories have been proposed which include biochemical, sensorimotor, physiological and behavioral dysfunction.[27] The primary signs associated with ADHD are inattention or difficulty concentrating, impulsivity and hyperactivity, which are featured as difficulty in staying seated and in later years is seen as continuous movement of the lower extremities. Associated signs include difficulty with visual motor tasks such as printing and copying.

There has not been any consensus regarding particular organic or neurological indicators for the diagnosis of the specific condition of ADHD. Some researchers are investigating a relationship between ADHD and EEG readings.[28,29]However, DSM-IV criteria for ADD include nine signs of inattention, six signs of hyperactivity and three signs of impulsivity. All signs do not have to be present and should be present in at least two settings (e.g. at home and school).[27] The diagnosis is based mainly on behavior and history as well as school reports.[30] Historically ADHD has been referred to as hyperactivity or minimal brain dysfunction.[31]

The following is a case history of a child who entered this chiropractic clinic with many typical signs of inattention, hyperactivity and impulsivity. The behavior was displayed at home and school and was reported by his teachers and parents. A possible aetiology for some cases of ADHD is suggested with respect to concentration and hyperactivity, and a rationale as to why chiropractic adjustments were successful in one case.

Case Description

An 8-year-old patient presented to a chiropractic clinic with his mother. His mother described his symptoms and related problems, which included severe headaches, cervical pain and constant "blood shot" eyes, she was unsure as to the reason and she remarked that the allopathic doctor had no explanation for its occurrence.

His mother reported he constantly rolled his eyes and moved his head around. On more specific questioning, other complaints included stomach pains, an inability to sit still, incoordination, behavioral problems and learning difficulties. She commented that he could not read or write properly. She reported that his teachers complained of him being disruptive in class and inattentive.

The majority of these problems presented following a fall 18 months previously. The boy had fallen from the top of a slide in a playground, was knocked unconscious and suffered a concussion. His history also included a car accident at 17 months old and a series of other falls and accidents where he sustained head trauma.

Physical examination revealed some decrease in active cervical lateral range of motion, a positive straight cervical foramina compression produced pain in the mid cervical region. Upon palpation, the boy reported tenderness over the second cervical vertebra on the right and third cervical vertebra on the left. Some swelling was noted over the transverse processes of C2 on the right and C3 on the left. The triceps and biceps deep tendon reflexes appeared normal.

Radiological examination consisted of a static A-P and lateral cervical and a bilateral lateral flexion of the cervicals, which revealed a posterior head posture, based on cervical gravitational analysis.[32-33]

Following orthopedic and neurological examinations, Sacro Occipital Technique (SOT) examination and adjusting procedures were chosen as the protocol for therapy. Due to the apprehension of the mother and the patient, it was decided that a technique that required as little force as possible was indicated.

SOT examination revealed a sprain to the hyaline part of the sacro-iliac joint, which is referred to as a 'Category 2'. A category 2 has ramifications that can involve the cervical spine and produce problems in the proprioceptive aspect of the nervous system.[34-39]

For the first two months of care, the patient was seen once a week. The adjustments were similar and consisted of SOT blocking procedures and cervical adjustments.

At his third appointment, his mother brought in his weekly spelling tests for the previous three weeks (Figure 1). The initial spelling test dated February 8, 1991 was just prior to his first adjustment. The one dated the 15th of February was the day after his first adjustment and the one dated the 22nd of February was the day after his second adjustment. His mother commented that the first spelling test was typical of all previous examinations for the previous year. As his chiropractic care progressed his mother continued to comment that his tests were showing similar results as the third test as shown in Figure 1. After one month of care the boy's teachers and family noted behavioral changes at home and at school. Of particular note was his ability to "sit still and concentrate without disturbing the other children."

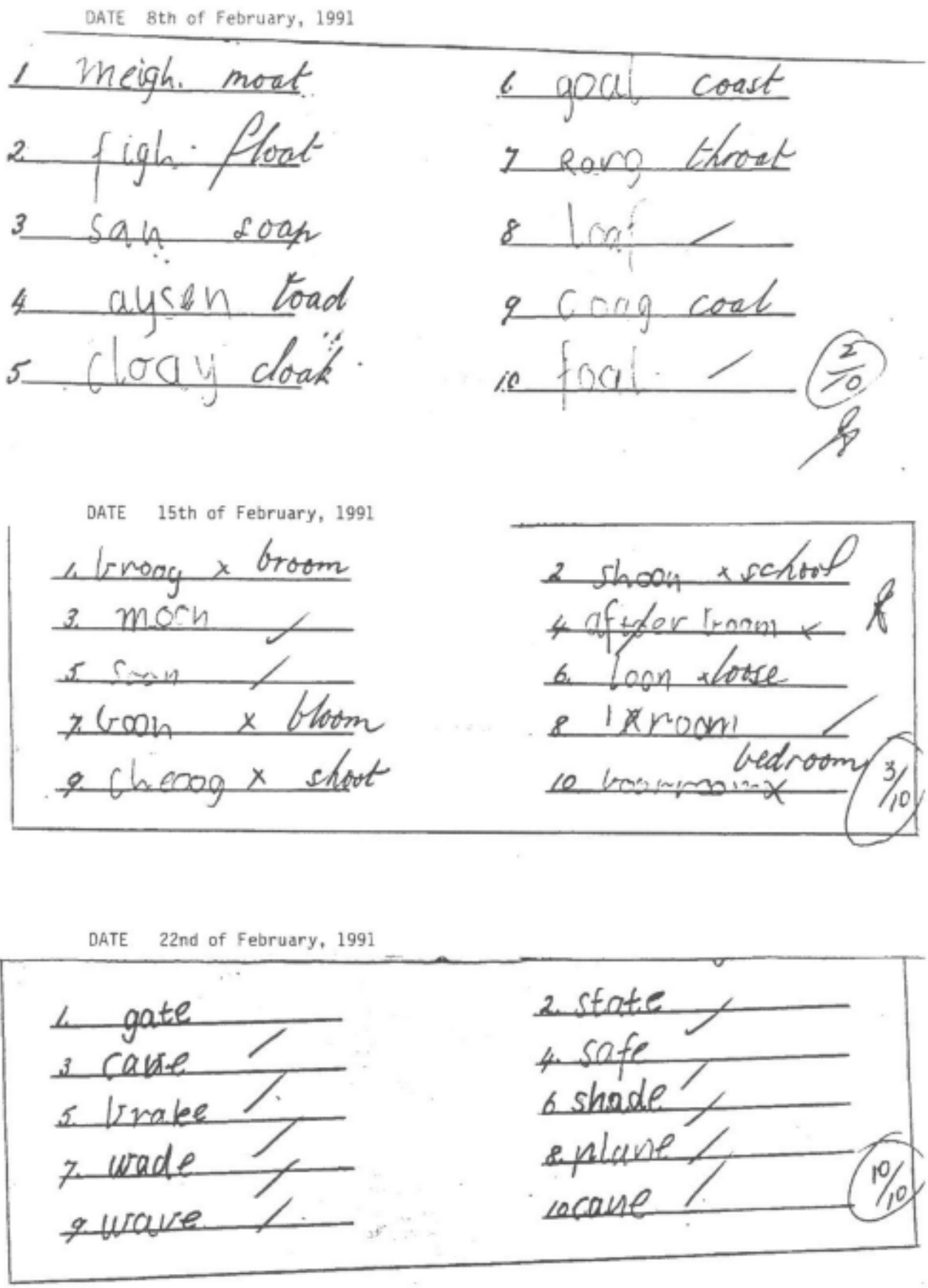
Through his first two months of care his mother continued to note changes in behavior and reduction in the original symptoms of headaches and neck pain, the eyes cleared and his stomach problems abated. Reports from his teachers at school remarked on change in behavior and improvement in academic performance.

This child is reported by his mother to have had normal development, activity and learning skills until an accident from a slide. It was not until this accident that the child in this study began to show behavioral changes and changes in learning ability. Because it was suggested that he had experienced chronic headaches, he was unable to recognize this as abnormal. The patient was adjusted weekly for 2 months. By October, time between treatments had increased to once per month and in November he was referred to a chiropractor closer to home.

Discussion

This particular case is interesting because the symptoms began after a fall 18 months prior to commencing treatment. While Post Concussion Syndrome has symptoms including headaches and difficulty in concentration, it also includes apathy, depression and anxiety. This patient did not exhibit those latter types of psychological disturbances.

Inattention is described as difficulty concentrating, or sustaining attention in work or play. Can the result of pain and/or subclinical symptoms influence behavior, performance and concentration? There is a wealth of evidence to prove that pain does affect behavior and performance. The ability to concentrate



DATE 8th of February, 1991

1 meigh. moat
2 figh. float
3 sah soap
4 alysen toad
5 cloay cloak
6 goal coast
7 roro throat
8 loaf /
9 Coag coal
10 foal / 2/10

DATE 15th of February, 1991

1 broag x broom
3 moch /
5 soon /
7 broom x bloom
9 cheoog x shoot
2 shoon x school
4 after broom x
6 loon loose
8 broom /
10 bedroom 3/10

DATE 22nd of February, 1991

1 gate
3 cave /
5 brake /
7 wade /
9 wave /
2 state /
4 safe
6 shade /
8 plave /
10 cave / 10/10

Figure 1 - Spelling Test Results after three weeks of Chiropractic care

can also be affected due to aberrant neurological input such as elevated levels of pain.[40-44] Is it possible that some children classified as ADHD are functioning in some level of pain or are experiencing subclinical spinal dysfunction prior to the diagnosis of ADHD? If a child has had chronic pain and/or discomfort, do they recognize it as abnormal? Some articles recognize that the aetiology for learning disorders can include perinatal injury.[45-48] It can be postulated therefore that perinatal injuries could be responsible for some low grade, consistent headaches or other subclinical symptom that may subsequently mimic symptoms of ADHD.

In this particular case, one possible conclusion might be that headaches and neck pain were the main reason for his inability to concentrate. Once his pain was relieved, his ability to concentrate improved. There is sufficient reason to believe that this boy's ability to concentrate was affected by his headaches. As his headaches subsided his ability to concentrate and his ability to function at school improved. Further research is needed to determine if ADHD may have a subclinical component, which cannot be detected through normal clinical findings. In veterinary practice, behavior is utilized as a measure of level of pain.[49] Children who are unable to report their subjective symptoms clearly might not be able to function as accurate historians and it is possible that all the doctor has for the diagnosis are clinical findings and behavior.

In this case, the radiological and physical examinations were suggestive of trauma-induced headaches, which appeared to have a vertebrogenic component.[50] Recent findings of connective tissue bridges between the posterior muscles of the upper cervical spine and the dura further confirm that many headaches can have a vertebrogenic origin.[51-53]

ADHD is a "persistent and frequent pattern of developmentally inappropriate inattention and impulsivity, with or without hyperacvity."[27] While organic factors may play a role in the diagnosis of ADHD, there is little evidence that children with ADHD have any real organic clinical findings since evaluations usually focus on brain function. The major factors in diagnosis are behavioral and visual-motor tasks.[53] The child's writing in the spelling tests in figure 1, suggests improved visual motor skills. This improvement began following treatment and was sustained during the duration of his care.

Impulsivity is an important aspect of ADHD. It is described as constant shifting from one activity to another, interrupting or intruding on others.[27] This patient exhibited destructive behavior as described by his teachers. His mother and teachers noticed that he repeatedly shifted from one activity to another and was unable to maintain a continued focused attention. Both parents and teachers noted significant changes in this area of his behavior after care was started.

Another sign of ADHD is hyperactivity, which is described as difficulty staying seated, or fidgeting or squirming. A theoretical rationale for this squirming or fidgeting might be due to a subjects desire to find an antalgic position due to sacral and/or sacroiliac dysfunction.

Some researchers have theorized that sacroiliac function or craniosacral function is involved with driving cerebral spinal fluid (CSF) around the brain and spinal cord.[55-56] The CSF is important for the regulation of the extracellular environment of the neurons to the brain and central nervous system.[57] The CSF is also important for nutrition and waste removal and contains hormones, neurotransmitters and other bioactive substances. Without proper CSF flow through the central nervous system, aberrant neurological function is possible.There have been several studies documenting impaired CSF flow which cause headaches and other neurological symptoms such as tinnitus, vertigo, vestibulocochlear dysfunction and Chiari deformation.[58-63] Where there is no obvious cause of CSF hypotension or decreased CSF circulation, the resultant hypotension and its' complications is referred to as spontaneous. Interestingly, CSF hypotension has also been reported in cases of head injury.[64] In this case study, the subject had suffered several head injuries with concussion that occurred 18 months prior to beginning treatment at this office and was believed to precipitate his symptomatology.

It has been demonstrated that the A-P diameter and shape and movement of the dural sac changes with anteroflexion and retroflexion of the lumbosacral spine. This change is compared to a neutral position, which can be evaluated both qualitatively and quantitatively.[65-66] CSF circulation is aided by respiratory and postural pressure changes.[67] These postural changes affect the diameter and shape of the dura that contains the CSF. Changes in the dura, brought on by posture and respiration affect flow of CSF around the spinal cord and is theorized to act in a similar manner to the way the heart pumps blood around the body. Pacchioni, who devoted his research to the structure and function of the dura, compared the function of the dura to cardiac muscle,[68] in that the cardiac muscle drives blood around the body the same way the dura, through periods of tension and relaxation, drives the CSF around the brain and spinal cord.

The patient presented with findings of a category 2 or posterior sacroiliac sprain which persisted for 2 months. Sacroiliac joint dysfunction is implicated to have an effect on the cranium and effect the coupled motion between the cranium and sacrum or craniosacral motion.[69-74] Impaired sacroiliac function or craniosacral function is also postulated to affect CSF flow.[75-78] Sacral motion is described as being nutational with the axis rotating around the second sacral tubercle, the point at where the strongest terminal aspect of the dura mater attaches. Motion of the sacrum is affected by flexion and extension of the trunk, (which also affects the diameter and shape of the dural sac) and is also affected by respiration, as is the dura.

It should be noted that CSF circulation is important to proper nervous system function, that balanced dural tensions are important to CSF flow, and that craniosacral function can affect the dura and consequent CSF flow. Therefore, it can be suggested that the inability of some ADHD children to sit still might be related to an inherent need of the body to drive CSF around the central nervous system and cope with the possibility of localized or generalized CSF hypotension.

It is of interest to consider whether an ADHD child's need to constantly move might also be a reflex action to increase motion of an impaired or subluxated sacroiliac joint. It is understandable that a child with a sacroiliac subluxation would find sitting for any length of time difficult.

Conclusion

In this single case study, the only care given was SOT and cervical chiropractic adjustments. Other than "over the counter" analgesics used, as reported by the mother, the child did not take any prescribed medication. There was no extra tutorial at school or at home. Initially the mother was very dubious that chiropractic care could have any effect but she was, as she described "at her wits end" and prepared to try anything. She initially commented that she "did not believe in chiropractic care".

The reduction in neck pain, headaches, stomach discomfort and eye irritation provided objective case history evidence but is of peripheral interest compared to the behavioral and learning changes. Ironically however, the headaches and neck pain prompted the mother to bring her son in for chiropractic care.

The child was adjusted using SOT methodology and indicators, and range of motion studies and orthopedic tests were found to normalize over the course of care. As greater mechanical and behavioral function was restored the child reported being free of pain, better able to concentrate, and learn similarly to his capacity prior to the accident he had sustained 18 months before he presented to the office. Restoring normal sacroiliac function, improved his level of activity and this is believed to aid his ability to sit still.

Of significance are the changes in his learning ability based on the form of weekly spelling tests. It is important to note the change in his writing as well as his spelling. This change in writing is indicative of his improved visual motor tasks. The improvement in spelling is also indicative of his improved learning skills as well as his improved ability to concentrate.

There may be many causes of ADHD as well as other learning and behavioral disorders. While conclusions cannot be drawn by a single case study, the results in this particular case indicate the need for further studies. It is suggested that by adjusting spinal lesions (i.e. subluxations) the child's pain and discomfort were reduced and this allowed him to better concentrate, learn and "sit still." This improved behavior resulted in better grades and a more attentive attitude. There are some recorded cases of chiropractic care aiding in the symptoms of ADHD [29,79-94] however, further studies with controls need to be conducted in this area to determine the effectiveness of chiropractic care in aiding the symptoms of children who are classified as ADHD.

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