Case Study

Improved Behavioral Changes, Dysautonomia, Dysponesis and Quality of Life in an Adult with Autism Following Chiropractic Care to Correct Vertebral Subluxation: A Case Study & Review of the Literature

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Abstract

Objective: The purpose of this study is to report on the positive health outcomes following chiropractic in an adult with Autism Spectrum Disorder.

Clinical Features: A 22-year-old female with Autism Spectrum Disorder and experiencing anxiety, nervousness, menstrual disorder, restriction of daily activities including personal interaction in social settings and speech came for chiropractic care to improve overall health and improve social behaviors. Examination revealed vertebral subluxations, dysponesis and dysautonomia.

Intervention and Outcomes: The patient was adjusted utilizing Torque Release Technique (TRT) to correct vertebral subluxations. Thermography and surface electromyography were utilized to assess the neurological component of vertebral subluxation. The Autism Treatment Evaluation Checklist was used to determine improvement in social outcomes for the patient. Following eight sessions of TRT the patient experienced reduction in dysautonomia and dysponesis along with improved speech, reduction in rigid routines and improved sociability.

Conclusion: The patient in this study experienced improved health outcomes related to autism following chiropractic care. More research is needed in this population of patients.

Key Words: *Autism, Autism Spectrum Disorder, chiropractic, adjustment, spinal manipulation, Torque Release Technique, vertebral subluxation complex, subluxation, dysponesis, dysautonomia, limbic system, behavioral disorders*

Introduction

Autism Spectrum Disorder (ASD) is a life-long early developmental disorder that causes clinically significant impairment in social, occupational, or functional areas in the person's life that are not otherwise explained by intellectual disability or global developmental delay. There is a dyad of criteria that are concerned in the diagnosis of ASD. In the area of social communication, some examples include deficits in social-emotional interaction, reduced emotions, and poorly integrated verbal and non-verbal communication.

The second criteria exhibit restricted, repetitive behavior, interests or activities. Often examples of this include lining up toys, repetitive flapping of the hands, inflexible adherence to routines, rigid thinking patterns, fixated interests, and sensitivity to sensory imput.[1] The Global financial impact of autism is unknown[2], however the annual societal cost of the condition in the United states (US) and in the United Kingdom exceeds several billions.[3-4] In the US the Centers for Disease Control (CDC) reported that 1 in 68 children are classified as having ASD in 2014.[5]

The etiology of autism is still unknown, but it was previously thought that parenting and environmental factors were believed to be responsible for the stereotypical autistic behaviors exhibited; however, the evidence now points to a neurological basis for the disorder.

Imaging studies implicate the involvement of the limbic system, cerebellum, corpus collosum, basal ganglia and brainstem. There is increasing data indicating that underlying neurobiological processes involved in autism is on-going and that post-natal factors are important.[6] There is an increased risk of a diagnosis of ASD determined by an increased risk of environmental exposures to substances.[7]

Neuroanatomy

ASD early onset and familial pattern strongly suggests a biological brain basis.[8] Functional neuroanatomy of typical children and adults with ASD suggests diverse sets of the neural system affected while sparing many perceptual and cognitive systems.[9] The amygdala theoretically is given the central role for social perception and cognition. It is a fast responding structure that quickly reacts to emotional stimuli and signals to other parts of the brain.[10]

The amygdala integrates information that helps with emotional learning and with sensing fearful situations as a survival mechanism. The amygdala has attracted great interest as the social aspect of the brain. The neurons appear to be too small and densely packed in fMRI studies of ASD.[9] This might be supported by an atypical excitatory/inhibitory ratio observed in ASD neural systems.[11]

Therapeutic interventions

Autism was first identified and described in 1943 by Leo Kanner, a child psychiatrist at John Hopkins University.[12] Kanner emphasized the social and emotional features of the disorder. The critical diagnosis included poor eye contact, failure to develop peer relationships, abnormal intonation in voice and speech, body postures, and failure in interaction with other people.[9] While autism is a socially isolating disorder, children who are non-verbal ASD are further isolated due to severe communication barriers.[13]

Unfortunately, the most common form of treatment is medication. Risperidone, Ziprasidone, atypical antipsychotic medications, and psychostimulant medications are all utilized in treating symptoms of ASD. Other therapeutic procedures include positive parenting programs, childcare services, encouraging outward attention, enriching the environment, reinforcing value in social stimuli, preventing interfering behavior, practicing skills that are weak, improving nutrition and sleep quality.[14]

Case Report

History

A 22-year-old female diagnosed with autism spectrum disorder (ASD) presented to a chiropractic clinic by her mother with a chief complaint of menstrual pain and discomfort. Mother stated that the ASD was vaccine induced following an MMR vaccination in 1995. The child was approximately two at the time of vaccination. She wrote on intake “after vaccine (daughter) lost all verbals less than 12 hours after (vaccine administration)”.

The mother reported that the patient has anxiety, nervousness, menstrual disorders, and autism spectrum disorder. The mother notes that restriction of daily activities include personal interaction in social settings and speech. The reason the mother sought care for her daughter was for optimal health on all levels and increased interaction with others.

Examination

The physical examination was catered to the cooperation level of the patient. The initial chiropractic examination revealed that pain and discomfort in the upper cervical, upper thoracic, and upper levels of lumbar regions. Asymmetry of muscles show postural deficits in cervical, thoracic, and lumbar regions.

Postural analysis for asymmetries relate to the structure and function of the neuromusculoskelatal system.[15] Tissue palpation of the paraspinal musculature revealed spasms bilaterally in all three regions previously indicated. Global range of motion (ROM) was decreased in cervical, thoracic, and lumbar active ROM tests. Motion palpation of cervical, thoracic, and lumbar regions indicated segmental dysfunction and loss of segmental ROM at occiput, C1, C2, T1, T2, T3, T4, L1, and L2. Examination revealed multiple levels of vertebral subluxation.

Intervention & Outcomes

Chiropractic care consisted of utilizing Torque Release Technique (TRT) and the Integrator™ instrument to correct vertebral subluxation. The patient was checked and adjusted eight times over the course of 30 days using TRT protocols. Following care, the mother reported that the patient was “talking more”. She also indicated that initially rigid routines were a “serious problem”, but now is only a “minor problem”.

The Autism Treatment Evaluation Checklist (ATEC) was developed by the Autism Research Institute in San Diego, CA to effectively monitor the progress of treatment for patients with ASD.[16] In this patient, there was an improvement of 41% in the subscale of sociability and 24% improvement in the subscale of health/physical/behavior. Total improvement was 18% following chiropractic care generated from the pre and post ATEC questionnaire and online grading. ATEC is a potentially useful instrument for collecting information on a wide variety of behaviors and skills in people with ASD.[17]

Pre and post thermography was utilized as a measure of autonomic nervous system function and to assess dysautonomia in relation to the vertebral subluxation. The skin serves as the body’s thermoregulatory system and is governed by autonomic nerve impulses generated from the hypothalamus and the brain as a whole.[18] The system is both anatomically and physiologically symmetrical.[19] See figure 1.1 to see pre autonomic dysfunction indicated by asymmetry of skin temperature differentials and figure 1.2 for post adjustment findings. The asymmetry of the scan was significantly improved in cervical, thoracic, and lumbar regions.

Figure 2.1 and Figure 2.2 show pre and post surface electromyography (sEMG) findings, respectively. Static paraspinal electromyography was used to be an objective measure of analysis for the practitioner to monitor the muscular and neurological components of vertebral subluxation as well as to assess for dysponesis.[20]

McCoy et al state "technology such as sEMG exists to provide objective evidence of the components of vertebral subluxation, monitor adaptability, and document the results of chiropractic care."[21] sEMG supports examination findings of asymmetrical muscular contraction, areas of muscle splinting, severity of any particular condition, aberrant muscle recruitment, dysponesis, responses to dysafferentation, and responses to chiropractic adjustments.[22] The post adjustment findings (Figure 2.2) show improvement of muscular and neurological components and reduction in dysponesis following correction of vertebral subluxation over the course of only 8 chiropractic adjustments utilizing TRT protocol.

Vertebral Subluxation

One model of vertebral subluxation has five components: spinal kinesiopathology, neuropathology, myopathology, histopathology, and biochemical changes.[23] The spinal segment has many nociceptive and mechanoreceptive structures in which if there is biomechanical dysfunction then it can lead to aberrant input into the CNS and thus lead to dysponesis and dysautonomia.[24] Kent also noted that alterations in mechanoreceptor function may affect postural tone which is what TRT addresses in the technique's protocol. Thus, correcting the specific vertebral subluxation restores normal afferent input into the CNS.[24] The chiropractic adjustment removes the subluxation and resets joint mechanoreception resulting in more appropriate adaption and response to the environment.[25]

Torque Release Technique

Torque Release Technique (TRT) is a tonal approach in chiropractic care to address vertebral subluxation.[26] Tonal approaches view the spine and nervous system as a functional unit and emphasize the importance of functional outcomes.[27] TRT was developed by Dr. Jay M. Holder and incorporates several of the most popular chiropractic techniques.[28] The protocol is a non-linear timing to locate the primary subluxation to adjust and only adjust a maximum of three segments on any given visit.

To assess for the primary subluxation, the practitioner utilizes a bilateral myotactic Achilles reflex and pressure testing while analyzing functional leg length inequality to determine proper line of correction.[28] Prioritization of primary subluxations is determined from the statistical data that was previously derived from human subjects. After adjusting the primary subluxation, all secondary and tertiary subluxations will dissipate due to the fact that they are compensatory in nature.

TRT recognizes that both tonal and segmental subluxations are possible as a result of cord pressure and tension as described in Stephenson's Chiropractic text-book.[29] Holder focuses on dural attachment points at the sphenoid, Occiput, C1, C2, C5, sacrum and coccyx as these are the most common subluxations from research.[29,30] There are priorities when performing TRT and just makes the analysis more efficient in finding subluxations. Shriner states:

"Priority one checks for lateral occiput, lateral sacrum, coccyx, and sphenoid. Priority two consists of the subluxations found by performing the Cervical Syndrome Test, Bilateral Cervical Syndrome and the Wrong-un Test. Priority three analyzes the subluxations associated with the Derefield test. The five priorities go on to check C2, C7, L3, L5 and any other levels in the spinal column."

The integrator is the first FDA approved chiropractic adjusting instrument. It produces a high velocity thrust with recoil along with a torque to provide the exact neurological impulse to adjust the subluxation. Dr. Holder has utilized TRT in research linking subluxation-based chiropractic and well-being via the Brain Reward Cascade.[31]

The Brain Reward Cascade model describes serotonin secretion from the hypothalamus stimulating the release of encephalin, GABA, and dopamine thus stimulating pathways in the amygdala activating a sense of well-being.[32] Research shows that proprioceptive input into the nervous system triggers mechanoreceptor stimulation up to the cerebellum which transmits signals to the thalamus and hypothalamus which has effects on the limbic system of the brain.[33]

Therefore, a chiropractic adjustment will stimulate proprioception and have the capacity to alter brain activity in the Amygdala and Cerebellum and thus the Limbic system providing an increased sense of well-being.

Discussion

The 3-D model of vertebral subluxation describes three dysfunctions of the body: dyskinesia, dysautonomia, and dysponesis.[34] Dyskinesia refers to improper movement of the body. Dysautonomia refers to imbalance in the nervous system that goes to every cell, tissue, and organ in the body. Dysautonomia can be measured using thermal cutaneous heat differientals.[18] We can see significant increases in function of the autonomic nervous system (ANS) by looking at the heat differentials from our thermography scans (Figure 1.1 and 1.2).

Dysponesis is abnormal tonic muscle activity from aberrant electrical signaling.[34] sEMG is a good measure of dysponesis by picking up errors in energy expenditure. We can see from Figure 2.1 (pre-adjustment) and 2.2 (post-adjustment) that there was better energy regulation post the 8 adjustments that were performed. With improvement in areas in the nervous system we also saw improvements in the patients ASD symptomology as it correlates to socialization and behavior.

Limitations

Limitations to this study was that it was a single case. More adjustments to this current patient to correct vertebral subluxation over time could have resulted in stronger ATEC scores (patient is still under care). More research in the study of chiropractic adjustments removing subluxation that help relieve behavioral outcomes of people with ASD could be further investigated. Also, fMRIs of pre and post adjustments could help us get an idea if correcting subluxations helps neural input to the brain areas that are also affected in autism patients such as the amygdala and limbic system.

Conclusion

Following eight sessions with TRT chiropractic adjustments, autonomic and behavioral changes improved in a 22-year-old female with autism spectrum disorder. It is also noted that the patient became more verbal after the first assessment time frame. We can see from the ATEC scores that improved sociability and health/physical/behavior is evident. From the sEMG and thermal scans we can see improvement in dysponesis and dysautonomia in relation to reduction of vertebral subluxation.

Chiropractic is used to correct subluxations that result in improvement in autonomic nervous system function by normalizing mechanoreceptor signaling to the brain. The autonomic nervous system is closely related to autism symptomatology and we can see improvement in behavioral functioning correlating to the Limbic system. Improvements in behavior are correlated with the removal of VSC in autism spectrum patients.

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Appendix

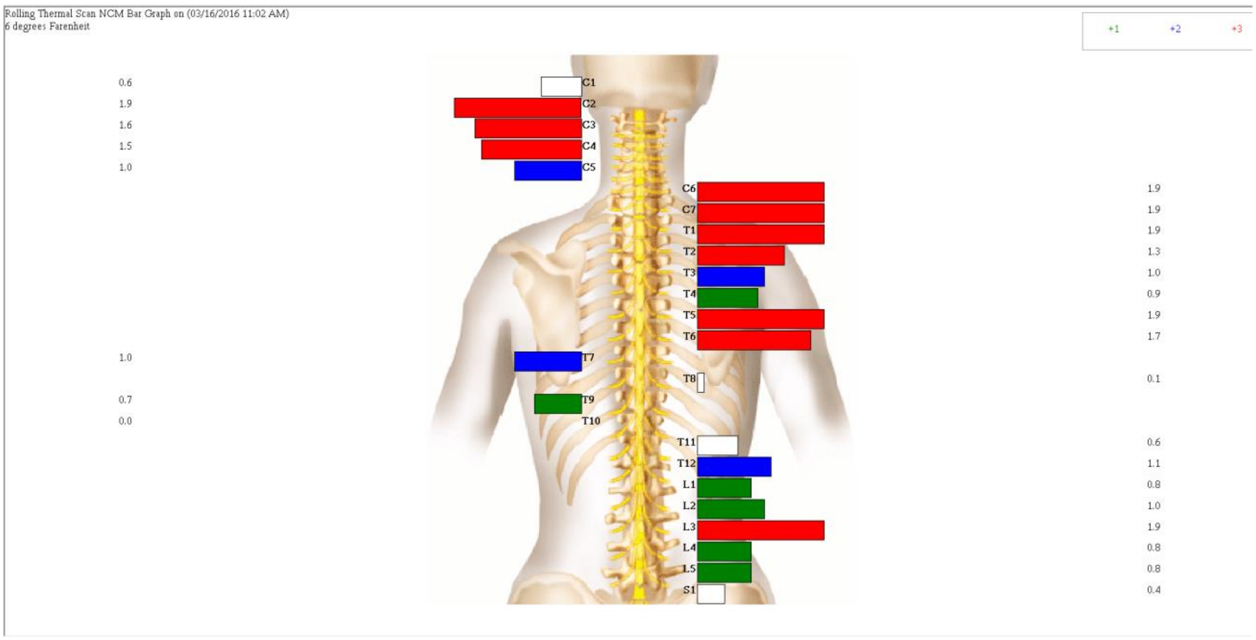

Figure 1.1 Pre Thermography

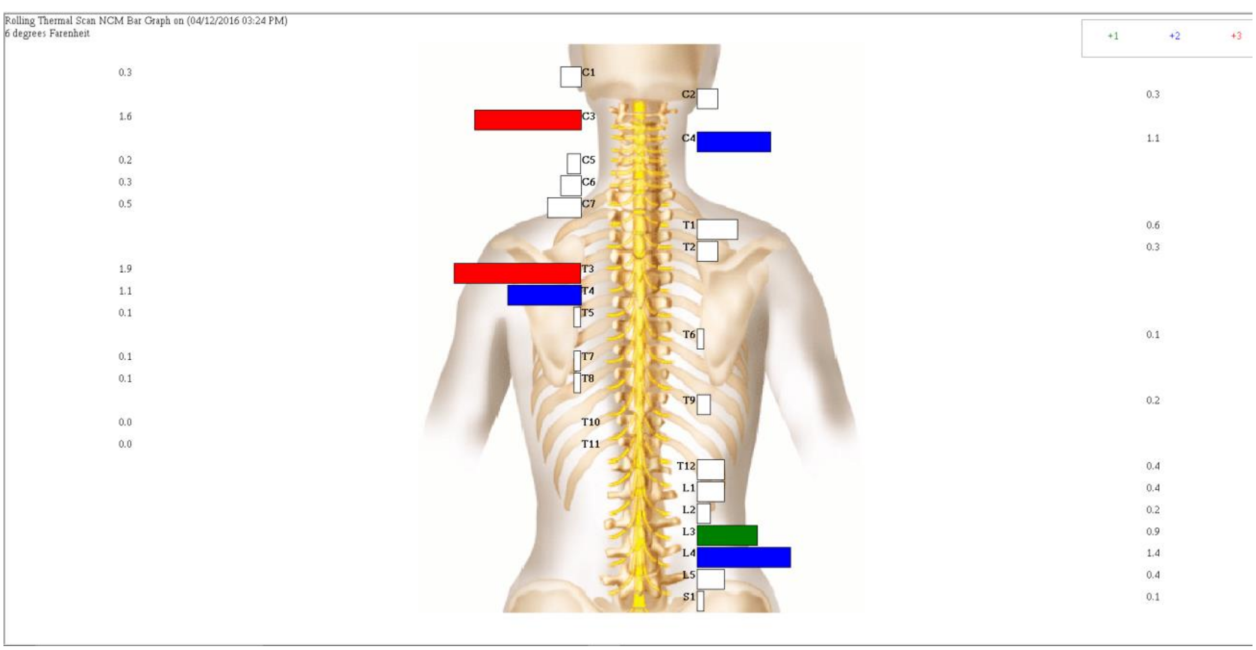

Figure 1.2 Post Thermography

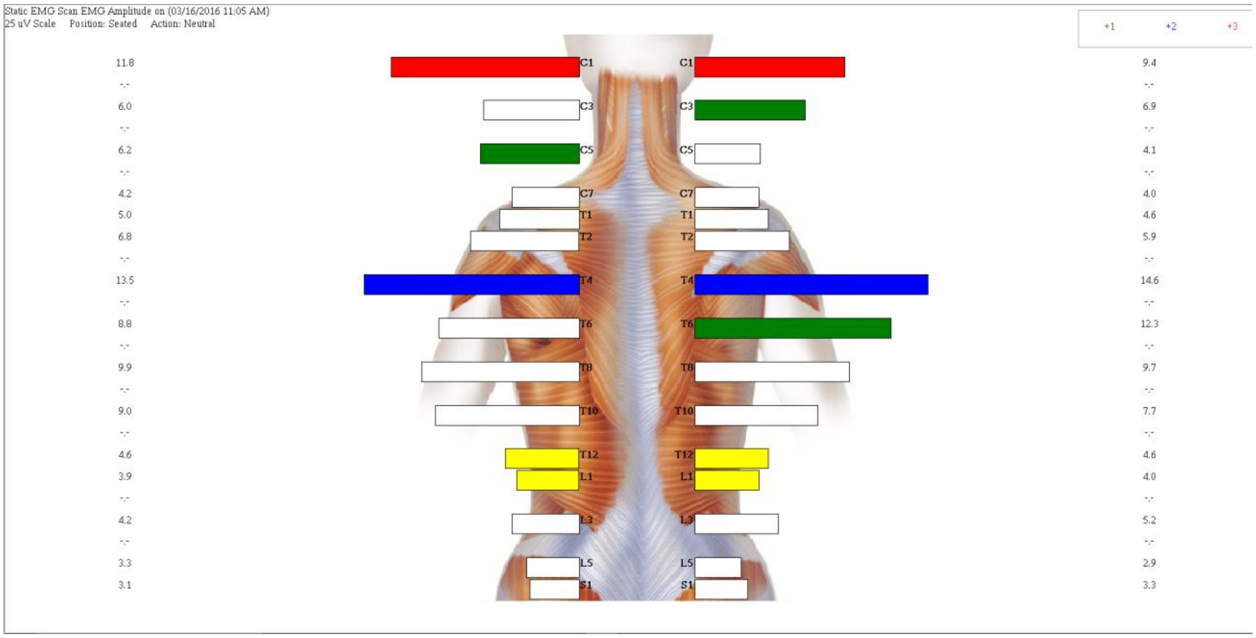

Figure 2.1 Pre sEMG

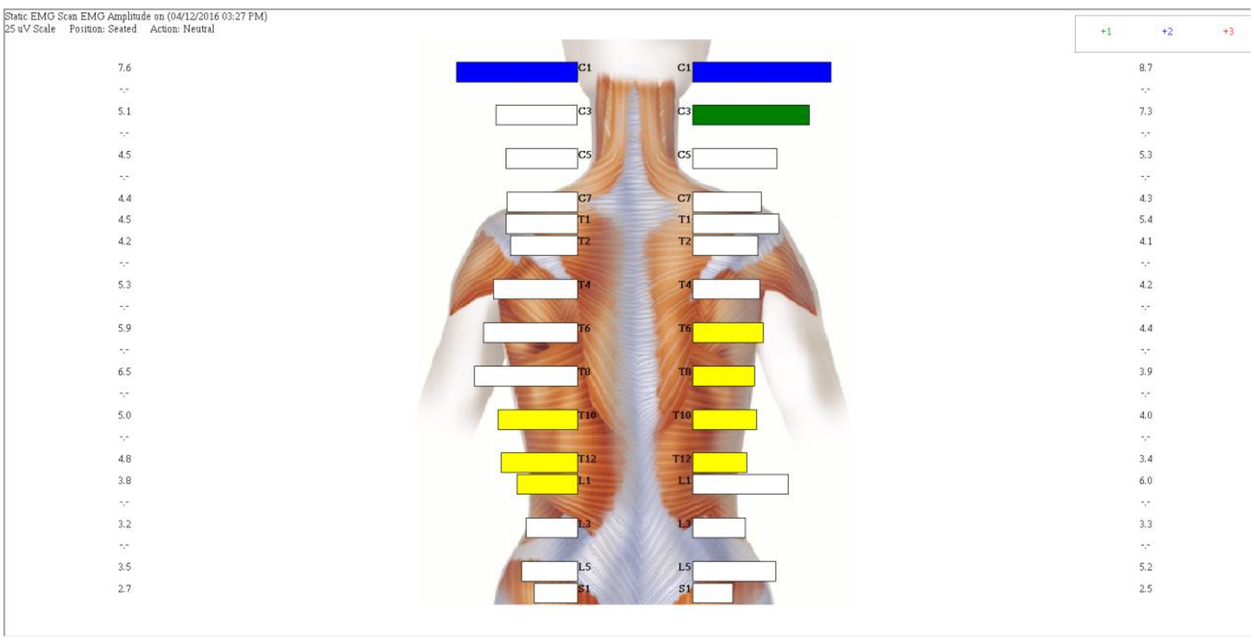

Figure 2.2 Post sEMG