CASE STUDY

Improvement in Behavior, Communication & Sociability in a Child with Autism Following Chiropractic Care for Vertebral Subluxation: A Case Report and Review of the Literature

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Abstract

Objective: To describe the health outcomes experienced by a three-year-old child with autism receiving chiropractic care for the management of vertebral subluxation.

Clinical features: A three–year-old male with autism and a history of chronic constipation, fussy eating, easy gagging and vomiting, poor sleeping habits, poor weight gain and hyper-sensitivity to touch. Postural abnormalities were found in conjunction with indicators of vertebral subluxation throughout the spine.

Intervention & Outcomes: Chiropractic care for vertebral subluxation was provided for 9 visits over 12 weeks. The patient demonstrated improvement in behavior, communication and sociability. Improvement in dysautonomia and posture was concomitant with reduction in vertebral subluxation.

Conclusion: A course of chiropractic care was concomitant with improvements in behavior, communication and sociability in a three-year-old male with autism. More research is needed to investigate the role chiropractors may play in helping similar patients so as to inform clinical practice and future research designs.

Key words: *Autism, Autism Spectrum Disorder, chiropractic, paediatric, diversified technique, Activator, vertebral subluxation, chiropractic adjustment, spinal manipulation*

Introduction

Autism and Autism Spectrum Disorder (ASD) is a developmental disability that has the potential to cause significant social, communication and behavioral challenges.[1] Diagnosis is based on clinical observations using criteria established in *The Diagnostic and Statistical Manual of Mental Disorders*, and focuses on the patient's developmental history as well as their core behaviors and in several settings.[2,3] ASD can be diagnosed in children from the age of 2, however more commonly after the age of 4, and is far more common in males.[1]

ASD has increased in prevalence over the past 10 years, more than doubling in the USA from 1 in 150 children (2000-2002) to 1 in 68 children (2010-2012).[1] Other westernized regions show a similar prevalence; in Canada the reported prevalence is 1 in 94 children,[4] 1 in 100 people in New Zealand and the United Kingdom,[5,6] and 1 in 150 people in Australia.[7] This prevalence comes at a significant economic

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burden, in the USA alone it is estimated to cost between US$11.5 billion – US$60.9 billion annually, an average increase in medical costs of US$4,110–US$6,200 per year per child or adolescent.[1]

Currently there is no cure for autism and ASD, at best current medical interventions focus on managing co-morbid symptoms such as attention deficit hyperactivity disorder, obsessive-compulsive disorder and clinical depression.[1,8,9]

According to Wong et al. complementary and alternative medicine (CAM) is widely used with more than half of parents of children diagnosed with ASD reported as using at least one form of CAM therapy. The majority of parents report some improvement after utilizing a CAM therapy.[10] It has been reported that of all the CAM therapies, chiropractic is the most commonly used for the general pediatric population.[11,12]

There is a growing body of evidence reporting the positive impact of chiropractic care on patients presenting with Autism and ASD, with steep growth in the evidence over the past 5 years according to two recent systematic reviews of the literature available specific to the topic.[13,14]

Alcantara et al. reviewed 5 studies (1 clinical trial, 1 case series and 3 case studies), concluding that given the evidence available "a trial of chiropractic care for sufferers of autism is prudent and warranted."[13] Kronau et al., 5 years later, reviewed 13 studies (including 10 additional case studies, 3 not peer-reviewed) and concluded that chiropractic care for autistic patients "may have the potential to create a positive effect on the severity of their symptoms."[14] However, it is recognized there is a need for higher level research to definitively draw a causal link between improvement in autistic patients and chiropractic care.[8,13-17]

Chiropractic care aims to optimize health and wellbeing through the enhancement of nervous system function by removing nerve interference caused by vertebral subluxations.[18] The Australian Spinal Research Foundation developed a conceptual definition that describes what a vertebral subluxation does, stating "A vertebral subluxation is a diminished state of being, comprising of a state of reduced coherence, altered biomechanical function, altered neurological function and altered adaptability."[19] Another model focusing on joint movement abnormalities and not confined to the spine includes speculated neuroplastic changes. It describes a central segmental motor control problem that involves a joint, such as a vertebral motion segment, that is not moving appropriately, resulting in ongoing maladaptive neural plastic changes that interfere with the central nervous system.[20] The correction of vertebral subluxations is achieved through chiropractic adjustments that are typically manually performed.[21-23]

To inform clinical practice the purpose of this case report is to describe the improvements in behavior, communication and sociability of a 3-year-old male with autism receiving chiropractic care for vertebral subluxation.

Case Report

History

A 3-year-old male with autism was presented for a chiropractic consultation by his parents, who had previously experienced chiropractic care. The primary health concerns noted by his parents were chronic constipation, fussy eating, easily gags and vomits, poor sleeping habits, poor weight gain and hyper sensitivity to touch.

His sleeping problems were described as waking at night with anxiety and being hard to wake in the morning. His aversion to touch and fabric made him agitated and restless, which is common in cases of autism. Additionally, he had experienced chronic ear and sinus infections since infancy, and the parents noted that he fell often for no apparent reason as if he temporarily lost consciousness.

The child's history revealed a typically normal birth, however bruising on his eyes was noted as being present. At 6-weeks he had surgery to correct pyloric stenosis. He has been fully immunised and had been formally assessed and reported as having "Autism Spectrum Disorder". He generally met all his developmental milestones by 1 year of age, though was reported as being unable to roll evenly and cross crawl. Since 1 year of age his development and weight gain have slowed, and his parents reported his emotional development to not be "on track" and that he does not interact well with other children, adults and teachers. His diet was highly processed, high in calories and sugar. The rest of his history was unremarkable.

Examination

Postural examination, measured through visual analysis, revealed a significantly higher left hip, shoulder and occiput. Spinal range of motion (ROM) assessment was performed and, though difficult to measure accurately due to the patients agitated behavior, appeared to be within normal limits.

Initial chiropractic examination for vertebral subluxation was performed with the child in the seated and standing position as he would not lay prone, and was difficult to perform as he was agitated about being touched by the chiropractor. The examination revealed evidence of subluxation at the left SI joint, L5, T10, T4, C5, C2 and C1.

Thermography studies were recorded using the Insight Millennium™. Thermography is commonly used as an assessment instrument in chiropractic practice as a measure of autonomic nervous system function.[24,25] Thermography is considered to have good to excellent reliability.[25] Thermography revealed extreme overactivity at C1 to C2 and L4 to S1, moderate overactivity at C3 and C5, and mild overactivity at C4 and L3. (see figure 1)

Intervention

Full spine chiropractic care was administered over a period of 12-weeks where the patient was seen weekly for 6 visits and then bi-weekly for 3 visits. Vertebral subluxation was assessed using commonly used clinical indicators of

restricted inter-segmental range of motion, asymmetric intervertebral muscle tension and abnormal spinal joint play.[26,27] Chiropractic adjustments were made using the Activator Instrument™ as a force applicator. Diversified analysis was used - primarily motion and static palpation - to locate levels of vertebral subluxation with the focus on the restoration of proper joint motion within the spine.[28]

Outcomes

During the course of chiropractic care the patient's parents reported several improvements to his behavior, communication, sociability, frequency of falls and sleeping patterns. Little subjective change was noted on the first three visits. On the 4th visit the parents reported no falls since the last appointment, this continued for the remainder of the initial course of chiropractic care. From the 5th visit changes in behavior were reported. On the 6th visit the parents reported his vocabulary had increased significantly and he was speaking in sentences more frequently, he was interacting well with others and showing compassion. On the 8th visit it was reported he was sleeping well and not waking with anxiety any longer. At this time, he also started a course of behavioral therapy, which was to be done in conjunction with other therapies. For a complete summary of subjective observations by visit see table 1.

Postural examination improved revealing a reduction in hip, shoulder and occiput unleveling. Spinal ROM remained within the same normal limits as the initial examination.

Vertebral subluxations were adjusted as indicated by motion and static palpation findings utilizing the Activator instrument with the number of adjustments made each visit ranging from 1 to 6. The most commonly adjusted segments were C1 (67% of visits) and Sacrum (45% of visits), for a complete summary of levels adjusted per visit see table 1.

Significant changes, indicating improvement in dysautonomia,[25] were recorded in thermography after the progress examination. Thermography findings normalised in all areas except C1, which had significantly reduced (see figure 2).

Discussion

This case documents the improvement in behavior, communication and sociability in a 3-year-old male with autism receiving chiropractic care for vertebral subluxation. The reported results are consistent with similar presentations described in the literature.

Traditional medical treatment for people with autism and ASD focuses on medicating to reduce associated symptoms such as hyperactivity, aggression, self-injurious behaviors, depression and seizures.[1,8] There can be negative side effects of medicating which can outweigh the benefits.[1] Parents of children with autism and ASD are seeking alternatives to help support and improve the health of the child.[29,30]

Complementary and alternative medicine (CAM), which includes chiropractic care, is growing in popularity. CAM has been reported to be used by 11.8% of the general pediatric population in the United States alone, and a wide ranging 52% to 95% in children that have autism or ASD.[10,29,31,32] The primary reason that parents seek CAM intervention for their children is general health maintenance rather than a specific condition.[10,33] Chiropractic care is reported as being the most common complimentary and integrative medicine practice used for the general pediatric population.[11,12] However, usage is less common in the case of autism where occupational therapy, diet and supplements are more commonly sought.[10,29,32]

Despite the available evidence, Akins et al. conclude chiropractic to have "inconclusive safety", "inconclusive efficacy" and state that it should be "discouraged".[31] Miller et al. go so far as to claim there is no research available to support chiropractic care for children and young adults with autism.[30] Despite this, parents of children with autism still seek out CAM therapies, such as chiropractic, primarily because they have developed a lack of confidence with their physician(s), outdated thinking of their physician(s), and through positive recommendation from other parents who have children with autism.[29,30]

Chiropractic care for children and adolescents has been reported as being remarkably safe.[34-36] A survey of North American chiropractors specializing in the care of children found the majority perceived their level of patient safety to be "very good" or "excellent."[37] Given the apparent safety of chiropractic care and reported benefits it has been reported as reasonable to be a choice of care for people with autism and ASD.[13]

To assess the relevance to chiropractic a review of the literature on Autism and Chiropractic was performed. The Index to Chiropractic Literature (1980-2017) and PubMed (1966-2017) were consulted using the search terms "Chiropractic AND Autism" and "Autism AND Spinal Manipulation". Inclusion criteria for our review included only peer-reviewed articles. Our review found two systematic reviews,[13,14] one clinical trial,[38] three case series,[39-41] and 12 case reports.[42-53]

Of the 16 peer-reviewed clinical trials, case series and case studies reviewed, positive changes in patients presenting with Autism or ASD while receiving regular chiropractic care were described. Of these papers, 13 (81.25%) specifically reported assessment and correction of vertebral subluxation,[40-51,53] and all 16 reported using clinical spinal indicators commonly used in the assessment of vertebral subluxation.[38-53] Chiropractic care employed in the studies reviewed included 9 different techniques.[28,54-60] The most commonly used was Diversified technique,[38,42-45,47-49,51,53] however other chiropractic techniques reported were Network Spinal Analysis (NSA),[39] 3 upper cervical techniques (Atlas Orthogonal, NUCCA and Orthospinology),[38,41,46] Torque Release Technique, [50] Sacro-Occipital Technique (SOT), [52] Activator Methods Chiropractic Technique[40] and Thompson Terminal Point Technique.[40,49] Only 3 (18.75%) of the 16 studies reported additional intervention other than chiropractic care.[44,47,49]

In terms of the case presentations and outcomes, all subjects in all 16 studies had been formally/medically diagnosed with

Autism or ASD. Improvements in behavior were reported in 15 (93.75%) studies,[38-51,53] improvements in communication in nine (56.25%) studies[38,39,41,43,44,48-50,52] and improvements in sociability in 13 (81.25%) studies.[38-44,46,47,49-51,53] Only 8 (50%) of the studies reported the chiropractor using a validated instrument, such as the Autism Treatment Evaluation Checklist (ATEC),[62] to assess for the severity of the Autism or ASD symptoms.[38,39,41,43,44,47,49,51]

Kronau et al.[14] conducted a systematic review of the literature on the chiropractic care of patients with autism and ASD. Twelve databases (Bio Med Central, Chiropractic Library Collaboration, Clinical Trials, Cochrane library, Dimdi, EBSCO host, Pubmed, Pubmed Central, Medline Plus, Osteopathic Research Digital Repository, Osteopathic Research Web and Physiotherapy Evidence Database) were searched. Inclusion criteria included: children and young adults aged 0-21 years with a diagnosis of autism or ASD; studies published in peer-review journals in English, German, or French. The review of 18 peer-reviewed journals revealed a total of 13 articles consisting of 1 randomized clinical trial (uncontrolled), 1 case series, and 11 case reports. The authors reviewed, in detail, the course of chiropractic care, technique(s) used, clinical indicators for intervention (primarily related to vertebral subluxation), outcome instrument(s) used, and results of chiropractic care. The systematic review reported general lack of quality, high level studies on chiropractic and autism, hence generalization of results to the pediatric and young adult population with autism are not supported. However, the results of the review indicate that chiropractic care may have the potential to create a positive effect on the severity of symptoms related to autism in children and young adults.

Since the systematic review by Kronau et al. there have been five other studies published (1 case series[39] and 4 case studies).[42,43,45,52,53] Two of the case studies[52,53] (1 an abstract from conference proceedings) were not included in their systematic review but published prior to their review being conducted.[52,53] Lumb and Feeley[39] reported a case series of 2 children (male aged 3-years and 8-months, and a female aged 3-years and 5-months) with autism receiving NSA over a 12-month period. Both presented with language delays as assessed with the Preschool Language Scale (PLS-4) instrument. Significant development in language was reported over the course of care. No other intervention was reported in conjunction with chiropractic care.

Boman and Wasem[42] reported on a 6-year-old male with autism receiving Diversified chiropractic care over a 6-week period. He presented with autism related symptoms including behavioral and sociability issues, and having poor sleeping and eating habits. While he was not assessed using a formal outcome instrument (such as the ATEC), subjective improvement in sleeping habits and attitude towards school work, and reduction in aggressive behavior were reported in conjunction with improvement in dysautonomia recorded with thermography studies. No other intervention was reported in conjunction with chiropractic care.

Pellegrino[43] reported on a 4-year-old male with ASD and language delays receiving Diversified chiropractic care over an 8-week period. He was non-verbal and was reported to have a diminished sense of pain. He was assessed using the ATEC, with improvement in all areas assessed ranging from 31.4% to 50% (sociability and sensory awareness being the most improved). No other intervention was reported in conjunction with chiropractic care.

Singh et al.[45] reported on a 7-year-old male with ASD, chronic diarrhea and nocturnal enuresis receiving Diversified chiropractic care over a 3-month period. While he was not assessed using formal outcome instrument (such as the ATEC), it was reported that he had a reduction in "temper tantrums" and improved awareness, and his sleeve chewing habit and nocturnal enuresis had resolved. No other intervention was reported in conjunction with chiropractic care.

Fox[53] reported on a 30-month-old female with mild autism and sensory abnormalities receiving Diversified chiropractic care over a 24-week period. She was non-verbal, and would only interact with her parents and grandmother. While she was not assessed using a formal outcome instrument (such as the ATEC), it was reported she began interacting with other family members and friends, was less irritable, and became more tolerant to touch. No other intervention was reported in conjunction with chiropractic care.

Bloink[52] reported on a 19-year-old female with ASD, characterized by pervasive language delays, receiving SOT chiropractic care over 1 visit. She was unable to speak until 11 years of age and at age 19 could speak coherently only if her head was in the flexed positon. While she was not assessed using formal outcome instrument (such as the ATEC), it was reported that she could speak coherently while looking forward immediately following chiropractic intervention. No other intervention was reported in conjunction with chiropractic care.

Current literature suggests that chiropractic care can improve symptoms related to autism.[13-15,39,42,43,45,52,53] The results from the current case study are congruent with previously reported studies investigating the effects of chiropractic care on the symptoms associated with autism.[38-53] Of note is the consistent reporting that assessment and correction of vertebral subluxation being associated with improvements, which gives weight to research that investigates the vertebral subluxation in general.[63,64] This study supports the use of chiropractic care for children and young adults with autism.

Limitations

As this is an isolated clinical case the findings cannot be generalized. Reported improvement in symptoms related to autism were exclusively dependent on parent and practitioner subjective reports and observations as no validated assessment instrument, such as the ATEC was used. It is unknown if these improvements could simply be related to natural childhood development progression, familiarity with the chiropractor and practice environment, or correction of vertebral subluxation. Additionally, posture was visually analyzed by the chiropractor rather than using an objective measure leaving this up to the discretion of the chiropractor to record.

Conclusion

A course of chiropractic care was associated with improvements in behavior, communication and sociability in a 3-year-old male with autism. More research is needed to investigate the role chiropractors may play in helping similar patients so as to inform clinical practice and future higher-level research designs.

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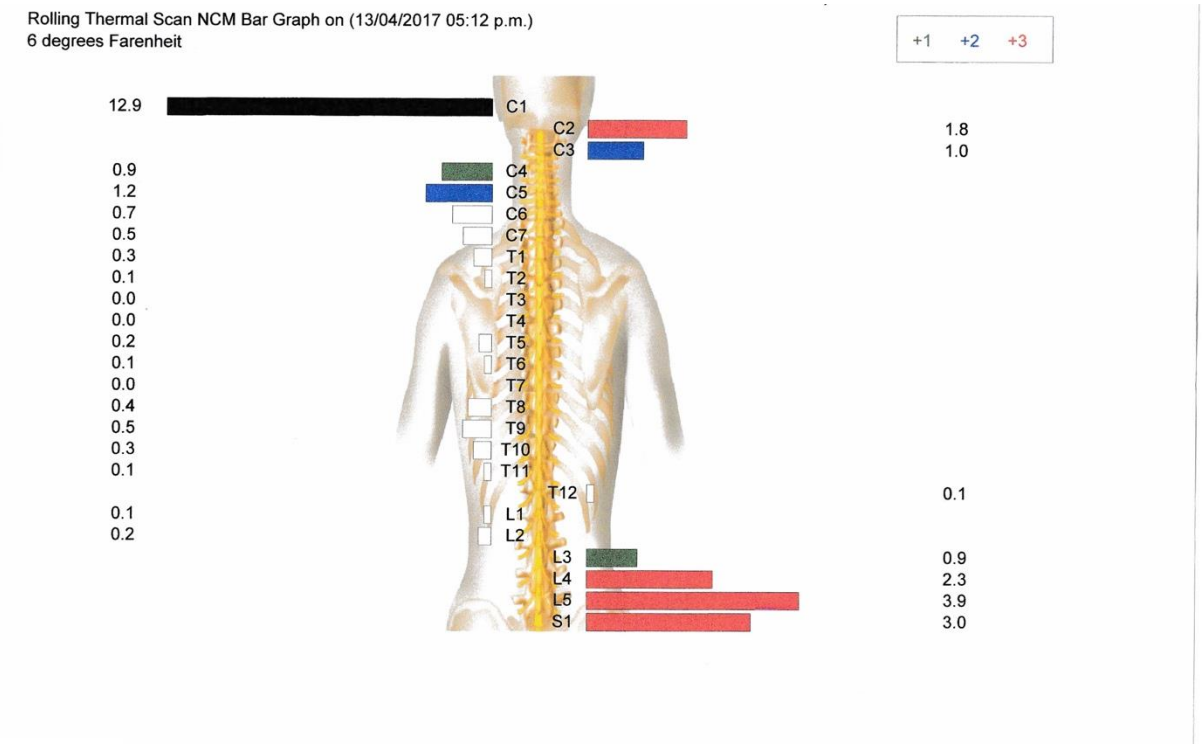

Figure 1. Thermography study at initial visit

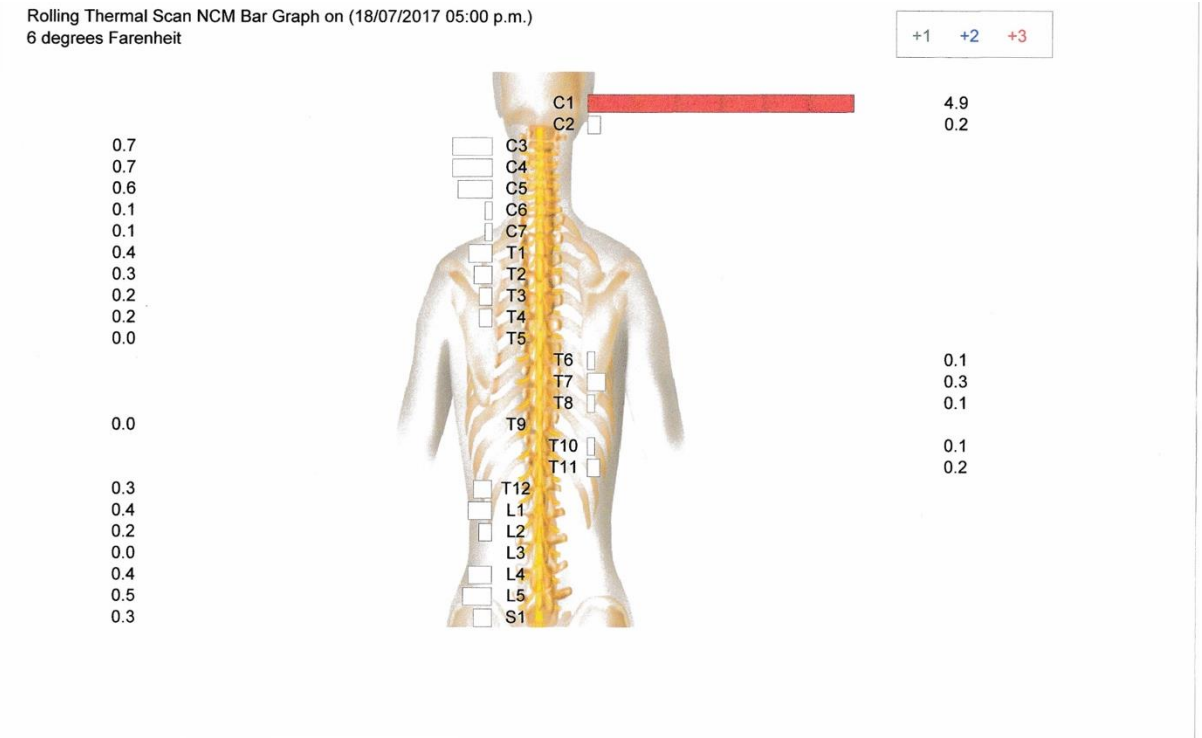

Figure 2. Thermography study at progress examination

Visit	Weeks Under Care	Levels Adjusted	Parent Subjective Report/ *Chiropractor Observations*
1		R PI ilium, L5 BL	*Very difficult to assess and adjust due to being agitated. Was very concerned about being touched and having the thermography assessment completed*
2	1 week	P-L Sacrum, R PI ilium, L5 BL, T4 BR, C5 BL, C1 Lat R	Head knock from a fall (face forward appeared to have lost consciousness before falling). *Very difficult to assess and adjust due to being agitated*
3	3 weeks	T6 BR, C1 Lat R	Had another fall, generally no changes in behaviour. *Very difficult to assess and adjust due to being agitated*
4	4 weeks	P-L Sacrum, T4 BR, C2 BL, C1 Lat R	No falls since last visit. *Less agitated when being assessed and adjusted*
5	5 weeks	L5 BR, C2 BL	Still no falls since last appointment, calmer behaviour. *Easily assessed and adjusted today*
6	6 weeks	P-L Sacrum, T5 BR	Still no falls, vocabulary has increased dramatically and speaking in sentences. Is interacting well with others and showing compassion. *Interacted with chiropractor, asked questions and was easily assessed and adjusted*
7	8 weeks	L4 BL, C1 Lat R	Still no falls, asking questions and engaging with others. *No issues being assessed and adjusted*
8	10 weeks	C1 Lat R	Has been sleeping well and not waking with anxiety. Language development is improving further. Started behavioural therapy this week as it is to be done in conjunction with other therapies.
9	12 weeks	P-L Sacrum, T10 BR, C1 Lat R	Had an ear infection, however still sleeping well and not falling. Actively asking to go to the chiropractors. *Very easily assessed and checked, and was able to sit showing minimal concern while having progress thermography scan completed*

Table 1. Adjustment and Subjective Report Summary by Visit