

# CASE STUDY

## Improvement in Autism Spectrum Disorder Following Vertebral Subluxation Reduction: A Case Study

Ari Cohn D.C.<sup>1</sup>

### Abstract

**Objective:** To review and discuss successful chiropractic care in the case of a three year old male with Pervasive Developmental Disorder and Sensory Processing Disorder.

**Clinical Features:** A three year old boy presented with a diagnosis of Pervasive Developmental Disorder and Sensory Processing Disorder. His diagnosis was based upon observed developmental delays in the areas of communication skills and speech, cognitive function, gross and fine motor skills, ambulation, social and emotional development, and adaptive and self-help skills.

**Interventions and Outcomes:** Subjective data was collected from direct interview of the patient's mother as well as reports provided by the occupational therapists and physical therapists who provided care to the child. The objective data relating to chiropractic care had been obtained from static palpation of the patient's spine, surface electromyography and paraspinous thermography performed to determine the presence of components of vertebral subluxations. Diversified adjustments were used to reduce vertebral subluxations. Improvements were noted after four months of care.

**Conclusion:** This case demonstrates a link between chiropractic subluxation management and improvement of symptoms of Pervasive Developmental Disorder and Sensory Processing Disorder. More research in this area is warranted.

**Key words:** *Developmental delays, Developmental Delay Syndrome, Pervasive Developmental Delays, PDD, Autism Spectrum Disorders, ASD, Chiropractic, Subluxations, Pediatric, Learning disabilities, speech delay, motor skills, neurodevelopmental disorder, diversified technique, thermography, surface electromyography*

### Introduction

The term Pervasive Developmental Disorders (PDD) refers to a group or range of disorders characterized by a variety of delays in the development of socialization and communication skills.<sup>1,2</sup> Symptoms may be seen as early as infancy and will typically show up before 3 years of age.<sup>1,2</sup> These symptoms

generally include: problems with using and understanding language; difficulty relating to others, objects, and events; unusual play with toys and other objects; difficulty with changes in routine or familiar surroundings; and repetitive body movements or behavior patterns.<sup>1,2</sup>

The diagnosis of PDD can include disorders within the autism spectrum.<sup>1</sup> Autism Spectrum Disorders (ASD) are a group of developmental brain disorders characterized by impaired

1. Private Practice of Chiropractic, Princeton, NJ

social interaction, lack of communication skills, and limited range of activities and interests.<sup>1</sup> Autism is the most common and most severe along with the most extensively studied of the PDD group.<sup>1</sup> Other disorders that fall in the category of ASD include Asperger's Syndrome, Childhood Disintegrative Disorder and Rett's Syndrome.<sup>1</sup> These more specific diagnoses are given based on types and severity of symptoms displayed by the child.<sup>3,4</sup>

When a child is displaying symptoms on the Autism Spectrum but the symptoms do not fit a more specific diagnosis (eg. Asperger's, Autism etc.) because of differing ranges of severity, they are typically diagnosed with PDD.<sup>3,4</sup> Due to the generality of the PDD diagnosis these children may vary widely in ability, intelligence, and behavior.<sup>1,4</sup> Some children do not speak at all, while others speak in limited phrases; and some can have relatively normal language development.<sup>1,2</sup> Repetitive play and limited social skills are generally evident in children with any type of PDD. Unusual responses to sensory information, such as loud noises and lights, are also common.<sup>1,2</sup>

According to the National Institutes of Health, there is no known cure for PDD.<sup>1</sup> However there are a number of conventional treatments utilized to reduce the symptoms of PDD.<sup>1</sup> Numerous medications are available to deal with a variety of these behavioral issues including typical ADD medications, antidepressants, anti-seizures, and antipsychotics.<sup>5</sup> Occupational and physical therapy is also utilized to promote development and is generally considered safer than medication due to the vast array of prescription side effects.<sup>5</sup> The NIH recommends that each case be dealt with individually to cater to that child's specific set of issues.<sup>1,2</sup>

When children with PDD reach school age they are typically placed in smaller classes with one on one teaching individualized to their learning level.<sup>2</sup> Children with fewer delays can function well in standard special education classes or regular classes with additional support.<sup>2</sup> The U.S. Department of Education highly recommends that parents utilize early intervention for children with PDD.<sup>6</sup> These interventions, which include specialized educational programs and support services, are shown to improve linguistic, social, and emotional outcomes of children with disabilities.<sup>6</sup> PDD is not fatal and does not affect normal life expectancy.<sup>1</sup>

The main focus of government PDD research is based around attempting to understand the neurological basis of the disorder and on developing techniques to diagnose, treat, prevent, and ultimately cure the problem.<sup>1,2</sup> One of the major concerns the government has with PDD is that it effects a significant percentage of the population and these percentages are increasing.<sup>1,2</sup>

An epidemiologic survey done in 2002 confirmed the prevalence of PDD to be 1 in 150 children.<sup>7</sup> Another survey done only four years later in 2006 showed that the rate was up to 1 in 110 children.<sup>8</sup> The authors of the 2006 survey stated that the results indicated an increased prevalence of PDD among U.S. children and recommended that it be viewed as an urgent public health concern.<sup>8</sup>

There have been many published studies linking chiropractic

care to the improvement and or resolution of a broad range of conditions.<sup>9-12</sup> These conditions range from resolution of ear infections and asthma to improvement of autism symptoms.<sup>9-12</sup> The reason there is such a broad range of conditions that chiropractic seems to help is because the purpose of chiropractic is not to treat any one condition.<sup>13-14</sup>

One of the basic premises of chiropractic since its inception has been that when there are disturbances in a person's nervous system (vertebral subluxations) a multitude of health problems can occur.<sup>13-14</sup> When a chiropractic adjustment is given with the intent of correcting a disturbance in the nervous system (a vertebral subluxation) proper nerve function is restored, allowing the body to work as efficiently and effectively as possible which can lead to the resolution of a great variety of health issues.<sup>13-15</sup>

The premise is that when the body is reacting more accurately to its surrounding it will be better equipped to avoid injuries, stave off illnesses and repair damage that has occurred.<sup>15</sup> For children, it is contended that when everything in their body is running smoothly and efficiently it allows stronger and healthier development.<sup>15,16</sup>

Numerous studies have demonstrated improvement in children with developmental problems undergoing chiropractic care.<sup>11, 17-23</sup> These studies included children with autism, ADD, ADHD, cerebral palsy and developmental delays in general.<sup>11,17-23</sup> When chiropractic care is viewed not as a treatment for any one individual problem but as a method to improve the functional capability of a person's nervous system it becomes clear how a multitude of neurological and developmental disorders could improve and even resolve.

## Case Report

### History

A 33 month old boy was brought to a private practice chiropractic office by his mother to help him with what had been diagnosed as Pervasive Developmental Disorder and Sensory Processing Disorder. He was born vaginally with the use of forceps at 39 weeks of gestation (full term) at 7lbs. 4oz. The patient was required to stay in the NICU for 4 days due to a fever caused by an undetermined infection.

Reports from the patient's pediatrician about his physical condition included concerns about microdontia (small teeth) and a larger than normal head circumference as well as low general muscle tone and delays in ability to interact. The results of an MRI performed on the boy's cranium were negative. His vision and hearing were both reported as normal.

At 33 months of age the patient displayed communication skills appropriate for 20 months, cognitive skills for 19-24 months, gross motor skills for 24 months, fine motor skills for 19 months, social and emotional skills for 24-28 months, and self-help skills for 21-25 months. He was listed as having over 25% delays in fine motor skills, communication, cognition, social and emotional skills, and adaptive behavior.

His verbal skills were notably below the level of his peers. He

preferred to crawl rather than walk and he would avoid cross crawling and used his fists to “scoot” around. A child usually begins crawling by 6-7 months of age and typically masters it by 12 months.<sup>24</sup> Cross crawling as opposed to scooting or other movement methods has a variety of developmental values and is telling of a child’s developmental progress.<sup>25</sup>

The act of cross crawling displays muscle development throughout the entire body from hand and foot arches to neck and back musculature.<sup>25</sup> It demonstrates the ability to coordinate complex movement patterns and focus the eyes on near-point objects, as well as the ability to distinguish neurological input from mechanoreceptors and proprioceptors throughout the body.<sup>25</sup>

When an older child cannot cross crawl it indicates a failure to learn proper proprioception and coordination of limb movement, along with a failure to develop proper muscle balance or strength.<sup>25</sup> Cross crawling is a crucial part of physical and neurological development.<sup>25</sup> The patient was diagnosed by his pediatrician with low overall muscle tone. His pediatrician also thought that the patient had a sensory perception issue due to his bruxism (teeth grinding) and rocking.

#### *Examination*

A chiropractic examination was done on the patient at 33 months of age to determine if nervous system functional disturbances (vertebral subluxations) were present. The exam included static palpation of the spine, a paraspinal thermography study, and a surface electromyography study utilizing the Insight®. The static palpation of the spine was performed with the patient sitting on his mother’s lap. The surface electromyography study showed severe hypertonicity and muscle asymmetry at the levels C1-T8 and at T12 and L3. (See Figure 1) Paraspinal thermographic study showed temperature asymmetries at C2, C5, C7-T5. (See Figure 2, 3)

#### *Intervention*

The patient was put on a care schedule where he would be checked for vertebral subluxations two times per week for four weeks, and then once a week for four weeks at which time he would be reevaluated to determine the future frequency of care. Each visit consisted of a pre and post check for nervous system dysfunction (vertebral subluxation) by statically palpating the spine.

The patient was seated in his mother’s lap in a relaxed neutral position. The chiropractor statically palpated each vertebrae feeling for symmetry of motion and local muscle tone, a common practice to detect disturbances in a person’s nervous system (vertebral subluxations).<sup>26</sup> By detecting areas of aberrant tone, the doctor determined if there was poor nervous system function in that area. A chiropractic adjustment was done to that area and the area was rechecked to see if the tone of the muscles had normalized.

If a correction of the vertebral subluxation was made from the adjustment the outcome on the post adjustment check was a balanced symmetrical muscle tone around the vertebrae causing the vertebrae to be in a more neutral position. This

procedure was performed from S1-C1 at each visit, and any area shown to have a disturbance in the nervous system (vertebral subluxation) was adjusted at that visit. At any given visit the patient might have been adjusted in multiple areas or not at all depending on the findings of the palpatory exam.

#### *Outcome*

After undergoing care at the above mentioned intervals for 2 ½ months, at the first reevaluation there were noted improvements in objective tests as well as subjective improvements reported by the boy’s mother and therapists. The SEMG scans and the thermography studies showed a number of areas of improvement. (See Figures 4-7) The patient’s mother reported that her son’s communication skills had improved dramatically, he was walking and even starting to run, his bruxism had reduced and his language skills had improved overall.

She also reported that the occupational and physical therapists that were working with him had stated that they had never had a case improve this dramatically in such a short time period. They inquired whether she was supplementing their care. The only supplement being performed for her son was chiropractic. The therapists opined that the chiropractic care was speeding up his development. They provided her with all their clinical notes and suggested that she give them to the chiropractor to write up the case for publication.

After three and a half months of continuous care at a frequency of one visit per week with coinciding and continuous improvement in the patient’s condition, the patient had a one month interruption in chiropractic during a family vacation to California. During this time period the patient’s parents reported that his verbal skills plateaued. As soon as he returned from vacation he resumed chiropractic care, with no other therapies, and immediately his mother reported a dramatic and notable improvement in his verbal skills.

After a total of ten months of chiropractic care at a frequency of one visit per week the patient experienced significant improvements. His language skills had improved greatly and his sensory processing issues had reduced (it was reported “he seems much more comfortable in his personal space”). Also his bruxism had reduced, he was no longer “fist walking”, he had stopped swaying and rocking, he was stronger, and his low muscle tone did not seem to be an issue. His mother reported that he was also beginning to read at a level above his age. He was still not socializing quite at his level but he seemed to be improving in that area as well.

#### **Discussion**

In a period of ten months a three year old boy with multiple developmental delays who was diagnosed with Pervasive Developmental Disorder and Sensory Processing Disorder saw dramatic improvement in almost all areas of concern which began following the introduction of chiropractic care.

Many case studies of this nature usually view a correlation between an intervention and a resolution of a symptom or disease. This case study is unique in the fact that there was an additional correlation with a month-long lapse in care

coinciding with a plateau in the improvement of verbal skills, while as soon as care was resumed improvement in the patient's condition resumed. This interruption in care, which coincided with a cessation of improvements followed by an improvement in symptomatology with a resuming of care, strengthens the correlational relationship between chiropractic adjustments and the improvement in this child of multiple delay issues.

## Conclusion

There is a growing body of evidence in the literature relating chiropractic adjustments to the resolution of a variety of health problems. Chiropractic care when used to correct disturbances in the nervous system (subluxations) is not a treatment for any disease, illness or injury. However by reducing subluxations, a person's body will be better able to repair, heal, function and develop.

When these processes are improved in someone with developmental delays there appears to be a marked improvement in that person's ability to develop and thrive. In this case, not only was there an improvement with care, but once care stopped the improvement stopped. Upon the resumption of care the improvements resumed, thus solidifying the relationship between chiropractic adjustments and improvements in the developmental delays of this child.

## References

1. National Institute of Neurological Disorders and Strokes. Pervasive Developmental Disorders Information. <http://www.ninds.nih.gov/disorders/pdd/pdd.htm> 3/10/11.
2. [http://kidshealth.org/parent/medical/learning/pervasive\\_develop\\_disorders.html](http://kidshealth.org/parent/medical/learning/pervasive_develop_disorders.html) 3/2/11.
3. CDC. Autism and Developmental Disabilities Monitoring <http://www.cdc.gov/ncbddd/autism/addm.html>. 3/25/11
4. PDD-NOS(Pervasive Developmental Disorder - Not Otherwise Specified). [http://www.autismspeaks.org/navigating/pdd\\_nos.php](http://www.autismspeaks.org/navigating/pdd_nos.php). 3/25/11.
5. Antipsychotic drugs and autism. <http://www.autism-help.org/points-medication-antipsychotics.htm> 4/3/11.
6. U.S Department of Education. Early Intervention and Assessment for Young Children with Disabilities. <http://www2.ed.gov/programs/earlyintervention/index.html>
7. Autism and Developmental Disabilities Monitoring Network Surveillance Year 2002 Principal Investigators; Centers for Disease Control and Prevention. Prevalence of autism spectrum disorders--autism and developmental disabilities monitoring network, 14 sites, United States, 2002. *MMWR Surveill Summ*. Feb 9 2007;56(1):12-28.
8. Prevalence of autism spectrum disorders - Autism and Developmental Disabilities Monitoring Network, United States, 2006. *MMWR Surveill Summ*. 2009 Dec 18;58(10):1-20.
9. Fallon J. The role of chiropractic adjustment in the care and treatment of 332 children with otitis media. *Journal of Clinical Chiropractic Pediatrics* 1997; 2(2):167-183.

10. McMorland G, Suter E, Casha S, Plessis S, Hurlbert J. Manipulation or Microdiscectomy for Sciatica? A Prospective Randomized Clinical Study. *J Manip Physiol Ther*. Volume 33, Issue 8, Pages 576-584 (October 2010)
11. Khorshid K, Sweat R, Zemba D, Zemba B. Clinical Efficacy of Upper Cervical Versus Full Spine Chiropractic Care on Children with Autism: A Randomized Clinical Trial. *JVSR J. Vertebral Subluxation Res*. March 9, 2006 p.1-7.
12. Fedorchuk C. Correction of Subluxation and Reduction of Dysponesis in a 7 Year-Old Child Suffering From Chronic Cough and Asthma: A Case Report. *J Vertebral Subluxation Res*. November 26, 2007.
13. Alderson R, Muhs. The Effects of Mild Compression on Spinal Nerve Roots with Implications for Models of Vertebral Subluxation and the Clinical Effects of Chiropractic Adjustment. *J. Vertebral Subluxation Res*. May, 2001 Vol 4, No. 2, p 1-13
14. Stevenson, R.W. Chiropractic Textbook, Vol. 14. 1927, Palmer School of Chiropractic.
15. Cohn A. Chiropractic and the Neuroimmune Connection. *J. Vertebral Subluxation Res*. September 30, 2008, pp 1-5
16. Masarsky M, Todres-Masarslky M. Somatovisceral aspects of chiropractic: An evidence-based approach. Churchill Livingstone, 2001.
17. Cuthbert S, Rosner A: Applied Kinesiology methods for a 10-year old child with headaches, neck pain, asthma, and reading disabilities. *Journal of chiropractic Medicine*. Vol 9, issue 3, pages 138-145.
18. Marini N, Marini S: Improvement in autism in a child coupled with reduction in vertebral subluxations: a case study selective review of the literature. *J pediatric, maternal and family health* July 5 2010.
19. Lovett L, Blum C. Behavioral and Learning Changes Secondary to Chiropractic Care to Reduce Subluxations in a Child with Attention Deficit Hyperactivity Disorder: A Case Study. *J. Vertebral Subluxation Res*. Oct 4, 2006
20. McCoy M, Malakhova E. Improvement in Paraspinal Muscle Tone, Autonomic Function and Quality of Life in Four Children with Cerebral Palsy Undergoing Subluxation-Based Chiropractic Care: Four Retrospective Case Studies and Review of the Literature. *J. Vertebral Subluxation Res*. June 21, 2006.
21. Barns T. Chiropractic management of the special needs child. *Top Clin Chiro* 1997; 4(4):9.
22. Hoffmann, N, Russell D. Improvement in a 3½-year-old Autistic Child Following Chiropractic Intervention to Reduce Vertebral Subluxation. *J. Vertebral Subluxation Res*. March 24, 2008.
23. Young A. Chiropractic Management of a Child with ADD/ADHD: A Case Report. *J. Vertebral Subluxation Res*. Sept. 6, 2007
24. Baby Center Medical Advisory Board. Developmental Milestones: Crawling. [http://www.babycenter.com/0\\_developmental-milestones-crawling\\_6501.bc](http://www.babycenter.com/0_developmental-milestones-crawling_6501.bc) 3/30/11.
25. Doman R, Doman E. Down Syndrome: The Importance of Crawling on the Stomach. National Association for ChildDevelopment. [http://nacd.org/newsletter/1009\\_down\\_syndrome\\_crawling.php](http://nacd.org/newsletter/1009_down_syndrome_crawling.php)

26. Haneline MT, Young M. A review of intraexaminer and interexaminer reliability of static spinal palpation: A 1 literature synthesis. J manipulative physiol ther. 2009;32(5):379-86.

Patient Name:  
Patient Number:  
Patient Identifier:

Practice Name:  
Practice Address:

Rolling Thermal Scan Segmental NCM on (04/14/2010 05:32 PM)  
8 degrees Fahrenheit



Figure 1

Static EMG Scan EMG Amplitude on (04/14/2010 05:37 PM)  
25 uV Scale Position: Seated Action: Neutral

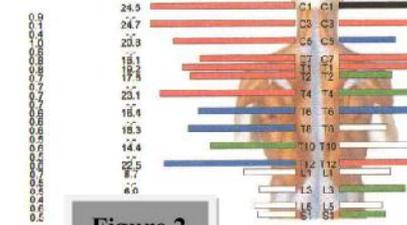


Figure 2

Static EMG Scan: Asymmetry on (04/14/2010 05:37 PM)  
200 % Position: Seated Action: Neutral

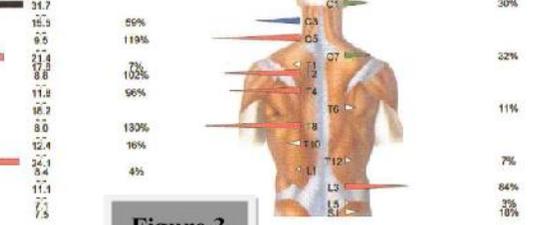


Figure 3

Rolling Thermal Scan Segmental NCM on (06/20/2010 05:10 PM)  
9 degrees Fahrenheit

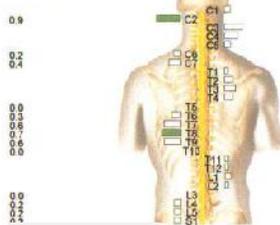


Figure 4

Static EMG Scan: EMG Amplitude on (06/20/2010 05:09 PM)  
25 uV Scale Position: Seated Action: Neutral

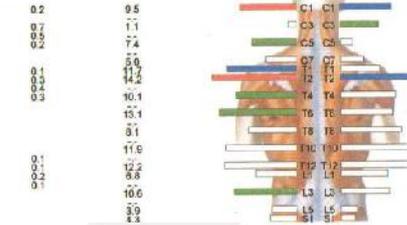


Figure 5

Static EMG Scan: Asymmetry on (06/20/2010 05:09 PM)  
200 % Position: Seated Action: Neutral

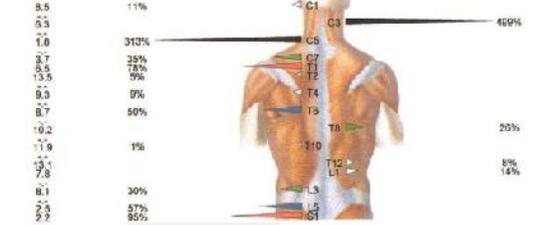


Figure 6

Figure 7. Comparative Static EMG Scan

Patient Name:  
Patient Number:  
Patient Identifier:

Practice Name:  
Practice Address:

Comparative Static EMG Scan on  
50 uV Scale Position: Seated Action: Neutral

▨ Increase  
▬ Decrease

(-15.0)  
--  
(-23.6)  
--  
(-13.4)  
--  
(-11.2)  
(-7.5)  
(-3.6)  
--  
(-13.0)  
--  
(-3.2)  
--  
(-10.2)  
--  
(-2.4)  
--  
(-10.3)  
(-1.9)  
--  
(4.5)  
--  
(-2.9)  
(-2.0)

