CASE STUDY

Resolution of Chronic Headaches, Improved Sociability, Health & Physical Behavior in a Child with Autism, ADHD and Obsessive Compulsive Disorder Following Chiropractic Care to Reduce Vertebral Subluxation: A Case Report & Review of Literature

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Abstract

Objective: To describe the positive health outcomes in a child with headaches, autism, ADHD and OCD undergoing chiropractic care.

Clinical Features: A. 11-year-old male with autism presented for care with complaints of headaches concomitant with a medical diagnosis of Autism, Attention Deficit Hyperactivity Disorder and Obsessive Compulsive Disorder. His headaches affected his school attendance and sleep. Prescribed pain medication provided temporarily relief. The patient was determined to have subluxations at the left ilium (i.e., PI_1IN_5), the S_2 vertebrae (i.e., P-L sacrum), the T_8 vertebrae (i.e., PRS), the C_2 vertebrae (i.e., PRS), the C_1 vertebrae (i.e., AIRP) and the occiput (i.e., AS-RS-RA).

Intervention and Outcome: The patient was cared for with a combination of Gonstead and Thompson Techniques. The patient's headache symptoms improved as did his behavioral problems as measured by the Autism Treatment Evaluation Checklist for parents. His quality of life improved as measured by the PROMIS-25 parent proxy measure. The PROMIS-29 demonstrated compromised quality of life in the patient's father while the IPC-18 showed the patient's father as experiencing a positive interpersonal process with his son's healthcare.

Conclusion: This study provided supporting evidence on the benefits of chiropractic care in patients with ASD, document the burden of raising a child with ASD and parental satisfaction with their child's chiropractic care.

Keywords: *Chiropractic, vertebral subluxation, adjustment, headaches, autism, ADHD, obsessive compulsive*

Introduction

Characterized with limitations in social behaviors and communication, repetitive behaviors and stereotyped interests, autism spectrum disorders (ASD) are a group of neurodevelopmental conditions.[1] In the United States, according to the CDC's Autism and Developmental Disabilities Monitoring (ADDM) Network, it is estimated that 1 in 68 children are identified as autistic.[2] Globally, systematic reviews of prevalence estimates vary given differences in research design. Williams et al.[3] estimated global ASD prevalence of 20 per 10,000 while Baxter et al.[4] estimated prevalence of 7.6 per 1000 or one in 132 persons worldwide.

Given that no pharmacological treatment is effective or has been approved by the US Food and Drug Administration

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(FDA) for the core symptoms of ASD, and the pharmacological challenges in managing the behavioral symptoms associated with this developmental disorder,[5] many parents with a child with autism are turning to alternative therapies to augment their child's care.[6-7] Of the practitioner-based alternative therapies, chiropractic is the most popular for children[8-9] and for children diagnosed with ASD.[10] Towards continuing efforts to evidence-informed practice and research, we describe the chiropractic care of a child with headaches concomitant with a medical diagnosis of ASD.

Case Report

History

Accompanied by a parent, an 11-year-old male presented for chiropractic consultation and possible care with a chief complaint of constant "sharp, burning and fast" (i.e., duration of headache attacks would only last for a second) headaches in various locations throughout the patient's head with a maximum frequency of 30 per day but also described as constant throughout the day. The patient is described as very slender and presented to the chiropractic office nervously pacing and asking many inquisitive (i.e., intellectual) questions. The patient asked the attending chiropractor if it's "gonna hurt" and indicated as being very nervous about being touched. Upon further inquiry, the patient indicated to the right frontal region as the most common location with headache intensity rated as ranging from 2-8 on the 11-item numeric rating scale (NRS) for pain (i.e., 0=no pain; 10=maximum pain). The patient had additional complaints of intermittent right leg pain with occasional right knee pain and constipation.

The patient's headaches began approximately 8-10 months prior with uncertainty about what makes it worse at the beginning of his care. The patient's headache attacks were greatly affecting his quality of life (QoL) in a number of ways but most notably missed classroom time (i.e., the patient had to often attend the care of the school nurse) with the school staff having to gauge his headache frequency and intensity prior to attending the care of the school nurse. At the time of consultation, the patient's father admitted that they had managed the patient's pain complaint with medications. The patient's headaches have frequently awaken him at night along with his parents.

According to the patient's father, many medical specialist appointments have been made. The patient was referred to a neurologist for assessment and diagnostic imaging that included radiological examination, computer tomography (CT) and magnetic resonance imaging (MRI). According to the patient's father, all imaging studies were medically interpreted as "normal." The patient's neurologist provided a diagnosis of "anxiety headaches" and prescribed pain medications. The patient's father also indicated that his child only needed the prescribed medications at 2 times per month or less.

At the time of consultation, the patient's father denied seeking any other alternative practitioners for his child's complaint or the use of self-care approaches. Past medical history was notable for tympanostomy and adenoidectomy surgery at 1½ years of age, tonsillectomy and repeat tympanostomy at age 3 years and an appendectomy at age 5 years. The patient was also determined as having a pilonidal cyst as an infant which was visible on radiological imaging at the S_1 vertebral level.

The patient was also medically diagnosed with Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD) and Obsessive Compulsive Disorder (OCD).

Examination

The physical examination was notable for the following. On physical inspection, the patient had a left list of the head, a left short leg and an elevated right shoulder relative to the contralateral side. On digital palpation, there was tenderness and hypertonicity of the patient's right upper neck and bilaterally at the occipital region. There was mild hypertonicity of the thoracic paraspinals muscles at the T_8 vertebral level and bilaterally at the pectoralis muscles, at the lumbar paraspinals muscles and the quadratus lumborum muscles.

Motion palpation revealed restriction in motion on right lateral flexion and right rotation at the C0-C1 functional spinal unit (FSU) and at the C1-C2 FSU. The T8 vertebral body was right restricted on lateral flexion and right rotation. The sacrum was restricted on posterior-anterior (P-A) motion. Passive range of motion (ROM) with right cervical rotation approximated to 75^0 based on estimates and restricted compared to the contralateral motion. All others ROM were unremarkable.

Orthopedic testing revealed positive bilaterally on maximum foraminal compression. The shoulder depression test was positive on the right side, Cervical distraction was positive, bilaterally. Lumbar spine Kemp's test was negative, bilaterally, Erichsen's Test was positive on the left side. Neurological testing with respect to deep tendon reflexes, dermatome and myotome testing was not performed. Reflex testing was negative for rooting and positive with the palmar, Galant, Babinski, and ATNR testing.

Based on the history and physical examination, radiological imaging was obtained for spinographic purpose. Utilizing the Gonstead Technique spinographic analysis, the patient was determined to have the following subluxations: A left ilium (i.e., PI_1IN_5), the S2 vertebrae as P-L sacrum (i.e., left 45mm, right 38mm), the T8 vertebrae as PRS, the C2 vertebrae as PRS (on occasion), the C1 vertebrae as AIRP and the occiput as AS-RS-RA. Further evaluation was performed from occiput to S4 level of sacrum using the Nervoscope instrumentation and readings were found with the dual probe instrument on 3 consecutive glides at the spinal levels indicated the chiropractic care described below.

Intervention & Outcomes

With assent from the patient and consent from his father, a course of chiropractic care using elements of the Gonstead Technique and Thompson Technique was initiated. The frequency of care was initially scheduled at 2 times per week for 2 weeks, once per week for 7 weeks and once every 3

weeks and eventually to once month for 3 months. Of course, the recommended frequency was predicated on the attending clinician's experience with similar patients and the response of the patient to care. The initial spinal adjustments of the patient were performed in the following manner.

The patient's left sacrum was subluxated as ASIN. The patient was adjusted using the Thompson drop. With the patient in the prone position and the attending chiropractor on his left side, the chiropractor made contact with the patient with her superior hand to the medial aspect of the patient's left sacro-iliac (SI) joint. A thrust to release the drop-piece was applied with a line of drive (LOD) medial to lateral (M-L) and posterior-anterior (P-A).

The patient's S2 subluxation (i.e., P-L) was also addressed with the Thompson drop. The chiropractor stood on the left side of patient with the patient in the prone position. The chiropractor utilized her superior hand contacting the medial aspect of the patient's left second sacral segment (i.e., lateral to sacral crest and medial to the sacral foramen). The LOD was P-A, M-L and S-I.

The T_8 was subluxated PRS and addressed with the Gonstead Technique. With the patient prone and the chiropractor on the right side of the patient, the chiropractor's superior hand contacted the right transverse process and a thrust was made with LOD of P-A, M-L and a S-I along with a torque. The C2 PRS was addressed with the Gonstead Technique and Thompson drop. When Gonstead Technique was utilized, the patient was seated in the cervical chair with the chiropractor standing slightly on the patient's right side from midline. A right hand chiropractic contact was made on the inferior (slightly lateral) aspect of the patient's C2 spinous process. A thrust with a LOD of P-A, I-S and L-M with torque was applied.

When Thompson Technique was utilized, the drop-piece was released with the patient in the prone position and the chiropractor standing on the right side of the patient. A thumb contact was made on the lateral aspect of the patient's C2 spinous process. The LOD of P-A, S-I and L-M. Subluxations of the C1 (i.e., AIRP) was addressed with the Gonstead Technique and the Activator instrument when the patient was highly anxious. When Gonstead Technique was utilized, the patient was seated in the cervical chair with the chiropractor standing slightly on the right side of seated patient. The chiropractor's first digit was placed on the patient's transverse process of C1 with the rest of the chiropractor's hand as flattened out underneath the patient's right occiput while the chiropractor's left hand was used in positioning and stabilizing the occiput on the left side. The LOD was right to left, P-A and I-S with a torque.

When the Activator instrument was used, the instrument was placed on a setting of 1 with contact to the right lateral aspect of C1 and the LOD being L-M and P-A. The patient's AS Occiput was addressed with the Gonstead Technique. A cervical block was used to stabilize the patient's cervical curve with the attending chiropractor standing posterior of the seated patient. The chiropractor's right hand was placed over left interlacing fingertips with digit 3 contacting the patient's frontal bone. The LOD was A-P and S-I with a scooping motion.

The patient was cared for in a similar manner with subsequent visits. The patient attended a total of 22 visits during the documented time period (i.e., 11 ½ months) for this narrative with the patient missing a few months of care due to summer travel and his sister's athletic schedule.

According to the attending chiropractor, the patient was a complex patient with many clinical variables under consideration beyond his presenting complaints. The chiropractor was able to earn the patient's trust in a very short time and was able to institute a course of chiropractic care. In addition to addressing the patient's initial complaint of "sharp, burning and fast" headaches, the chiropractor was also trying to determine any other sources of cause or headache triggers beyond the presence of spinal subluxation concomitant with the patient's ASD, ADHD and OCD behaviors. During the course of the patient's care, both parents and the patient experienced that continual chiropractic care was beneficial to the maintenance of the patient's health beyond improvement in the patient's headache complaint. As such, the patient continues to attend salutogenic visits on a monthly basis.

In addition to the clinical work-up as described above in the care of the patient, the attending chiropractor instituted a number of outcome measures in the care of patients with ASD. These include the use of the Autism Treatment Evaluation Checklist (ATEC),[11] and the Patient Reported Outcomes Measurement Information System[12] to measure QoL (i.e., the PROMIS-25 parent proxy and the PROMIS-29) as well as the Interpersonal Process of Care (i.e., IPC-18)[13] for parent satisfaction with their child's care. The results of these outcomes will be described in the discussion below.

Discussion

Publications addressing the chiropractic care of children with ASD have addressed the epidemiology, diagnosis, medical care as well as alternative therapies for children with ASD as well as other topics germane to the chiropractic care of children. We believe that this case report provides a unique perspective on the chiropractic care of a child with autism. Namely, the use of validated outcome measures to augment the subjective outcomes described in the case presented. These include the ATEC questionnaire,[11] the PROMIS-25 parent proxy measure for child QoL and the PROMIS-29 to measure the QoL of the parent with a child with autism.[12] We utilized the IPC-18[13] to measure interpersonal experience of the parent with their child's chiropractic care. Given the relative novelty of these outcomes in the chiropractic care of patients with ASD, we will focus our discussions on these outcomes in the context of the case reported.

The Autism Treatment Evaluation Checklist

The Autism Treatment Evaluation Checklist or ATEC was developed by Rimland and Edelson of the Autism Research Institute[11] to measure the effectiveness of any treatment intervention for autism. The ATEC is a 25-item questionnaire designed to be completed by parents, teachers, or caretakers. It consists of 4 subtests: I. Speech/Language Communication (14 items); II. Sociability (20 items); III. Sensory/ Cognitive

Awareness (18 items); and IV. Health/Physical/Behavior (25 items**).**

The ATEC is not a diagnostic checklist. Scoring utilized the online survey provided by the Autism Research Institute (ATEC. Accessed Mar 22, 2018 at: http://www.surveygizmo.com/s3/1329619/Autism-Treatment-Evaluation-Checklist-revised). The subscale scores as well as a total score were used for comparison between baseline and comparative measurements. The lower the score, the fewer the problems experienced by the child and reflects an improvement.[14] ATEC has been shown to have significant correlation ($\rho = .71$) between total ATEC and the Childhood Autism Rating Scale (CARS) for the Quantitative Evaluation of Autism. Sensitivity, specificity, and receiver operating characteristic confirmed the association between CARS and ATEC domains leading to validation of the utility of the parentally completed ATEC in comparison with an established, professional-related measure of autism.[15]

For the child presented in this case report, we observed an overall improvement in the patient's autism based on overall ATEC score from 44 to 36 (see Table 1). We also observed improvements in the subscales of sociability (Scores 11 to 7), and health/physical behavior (Scores 31 to 24) but not in sensory/cognitive awareness (Score remained at 8). Although the total ATEC score decreased from 44 to 36 indicating improvement in symptoms of autism due to chiropractic care, this scoring becomes more clinically relevant when one considers that the expected longitudinal change in ATEC score due to "treatment as usual" for an 11-year-old in a 1 year period is with a baseline score of 42 or 48 is expected to change only to 40 and 44, respectively.[16] Others in chiropractic have also implemented the ATEC questionnaire in clinical practice with positive outcomes with chiropractic care. Pellegrino[17], Marini and Marini[18] Khorsid et al.[19] all have utilized the ATEC survey as an outcome measure of the chiropractic care of a child with autism.

PROMIS

In this case report, the chiropractor utilized 2 outcome measures. One, to measure the QoL of the parent with an autistic child (i.e., PROMIS-29) (see Table 2) and the other to measure the QoL of an autistic child by parent proxy (i.e., PROMIS-25 parent proxy) (see Table 3). PROMIS was part of an initiative, funded under the National Institutes of Health (NIH) Roadmap for Medical Research (2004) to create reliable and valid precise patient-reported outcomes that exceeded the psychometric performance of existing legacy.[20] The PROMIS instruments are not only reliable and valid but are flexible (i.e., applied as paper & pencil, online and with the use of desktop or iPad), inclusive (i.e., utility in a number of patient populations) and comparable (i.e., amenable for comparative research or comparison trials.[20] The PROMIS surveys utilize T score metrics with a mean of 50 and a standard deviation of 10. The higher the T score, the greater the QoL domain.

Within autism care and research, it's well documented that parental stress and distress can affect child adjustment and behavior and vice versa.[21-23] Towards investigating this phenomenon in the chiropractic milieu, we utilized the PROMIS-29 to measure parental QoL. Our findings revealed that the parent of the child reported, when compared to a convenience sample of chiropractic patients[24] has compromised mental health as measured by anxiety and to some extent, physical functioning. When compared to a representative sample of the US population,[25] we observed the T scores for the parent in this case report as experiencing compromised anxiety and physical functioning. Overall, this parent has a better QoL in terms of depression, fatigue, sleep disturbance and pain interference when compared to a representative sample of the US population. Our findings confirm the existing literature documenting compromised QoL of parents with a child with autism.[26]

In terms of the PROMIS-25 parent proxy measure (see Table 3), we observed an improvement in Depression but a decrement in fatigue T scores. All other QoL domains remained constant from baseline to comparative measurement. When compared to a convenience sample of pediatric patients assessed with the PROMIS-25 parent proxy measure attending chiropractic care in a practice-based research network[27], we observed in this patient an overall compromise in physical functioning mobility, anxiety, and depression but not in peer relationships and pain interference. The magnitude of these deficits were further underscored when one considers that children presenting for chiropractic care (i.e., as in the population of comparison for this patient) were found to have compromised QoL comparable to children suffering from chronic kidney disease.

Our findings echo the sentiment of others that while child-specific QoL is an important outcome within autism clinical interventions and research, a more holistic approach that encompasses not only the autistic child's wellbeing but also the parents and the whole family system should be examined.[21,28] We encourage documentation among chiropractic clinicians and researchers towards these efforts.

IPC-18

The IPC-18 is a patient-reported, multidimensional physician/patient interpersonal processes of care (IPC) instrument appropriate for patients from diverse backgrounds that allows reliable, valid, and unbiased comparisons across patient groups.[29] The IPC is highly associated with patient satisfaction.[30] As we documented in this case report, the parent reported experiencing good communication with her child's chiropractor, was involved in patient-centered decision making when it came to her child's chiropractic care an experienced positive interpersonal process style (see Table 4). Satisfied parents are more likely to comply and take a more active part in their child's care and tend to remain with a particular system of care like chiropractic.[31] To the best of our knowledge, this is the first utilization of the IPC-18 in a chiropractic case report. We encourage continued use of this instrument to measure the interpersonal experience of patients and parents alike in the chiropractic clinical setting.

In closing, we wish to comment on the generalizability of the case described. Based on the post-positivist paradigm of research where the ontology is one of a material world and an epistemology of objectivity, we caution the reader on the generalizability of the case reported due to confounding

effects. These include the national history and spontaneous remission and regression to the mean, the effects of placebo, the demand characteristics of the therapeutic encounter and subjective validation on the part of the patient. These factors play a role in confounding the positive outcomes reported in this case report. Conversely, we attune to the clinical and research framework of constructivism. Unlike the post positivist paradigm, the ontology is based on individual perception with epistemology emphasizing the meaning due to the human experience – in this case clinical experience. As such we encourage the readers of this case report to interpret the results reported in the context of their clinical experience in the care of similar patients.

Conclusion

This case report provides supporting evidence on the positive outcomes of chiropractic care for children with autism. We also brought to the forefront parental satisfaction with a child's chiropractic care and the compromised QoL of a parent caring for a child with autism. We encourage continued documentation of chiropractic care of similar patients in the interest of evidence-informed practice and research.

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Table 1. Baseline and comparative ATEC scoring		
	Baseline Scoring	Comparative Scoring
Speech/Language/Communication	2	0
Sociability	8	10
Sensory/Cognitive Awareness	7	2
Health/Physical Behavior	27	24
Subscale Totals	44	36

Table 2. PROMIS-29 scores for parent quality of life measure			
	Baseline Scoring (SE)	Alcantara et al.[20]	Rothrock et al.[25]
Physical Function	48 (3.1)	49.02	54
Anxiety	71.2 (2.7	50.14	46
Depression	41 (6.2)	47.80	46
Fatigue	33.7 (4.9)	51.02	44
Sleep Disturbance	46.2 (3.5)	49.88	----
Ability to Participate in Social Roles & Activities	27.5 (4.1)	-----	-------
Pain Interference	41.6 (6.1)	53.49	47
Pain NRS	1	-----	

Table 3. Baseline and comparative parental PROMIS-25 parent-proxy scoring			
	Baseline T Score (SE)	Comparative T Score (SE)	PROMIS-25 parent proxy[27]
Physical Function Mobility	48.9 (4.7)	48.9 (4.7)	52.58
Anxiety	68.7 (5.1)	68.7 (5.1)	44.21
Depression	60.7 (4.3)	56.7 (4.4)	43.60
Fatigue	40.6 (5.6)	44.1 (5.4)	43.92
Peer Relationships	38.9 (4.4)	38.9 (4.4)	52.88
Pain Interference	42 (4.9)	42 (4.9)	44.80
Pain NRS	1	0	----

Table 4. IPC-18 Scoring from the parent to measure their interpersonal experience with their child's chiropractic care.

	Sub-domain	
Communication	Lack of clarity	1.5
	Elicited concerns, responded	5
	Explained results	5
Patient-centered decision making	Decided together	5
Interpersonal style	Compassionate, respectful	1
	Discriminated due to race/ethnicity	1
	Disrespectful office staff	1