

Improvement in motor developmental delay in a 15-month old male following chiropractic care to correct vertebral subluxation: A case report

By Janette McCormick¹, BSc(Chiro), DICCP and David G. Russell², BSc(Psych), BSc(Chiro), Cert TT

1. Private practice, Auckland, New Zealand

2. Clinical faculty, New Zealand College of Chiropractic, Auckland, New Zealand

Corresponding author: Janette McCormick, BSc(Chiro), DICCP. Email:janette@creatingwellness.co.nz

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ABSTRACT

Objective: To chronicle the improvements in a 15-month-old male presenting with motor developmental delay following chiropractic care for the correction of vertebral subluxation. **Methods:** Online review of the literature on motor development delay and chiropractic was performed using The Index to Chiropractic Literature, PubMed and Google Scholar. Search terms “motor development delay”, “children” “chiropractic” and “spinal manipulation” were used. **Clinical features:** A 15-month-old male with motor developmental delay presented for chiropractic care. He was able to sit unassisted, walk assisted, but could not crawl (creep) in any way, pull himself up to stand, stand alone, or walk alone. **Intervention and outcome:** The child received full spine chiropractic care for 10 visits over 16 weeks using Diversified technique (Activator™ instrument assisted) for the correction of vertebral subluxation. Throughout the chiropractic care the child developed the ability to crawl on hands and knees, pull himself up to stand, stand alone, and began to walk unassisted. **Conclusion:** A course of chiropractic care using Diversified technique for the correction of vertebral subluxation was associated with improvements in the child’s presenting motor development delay.

Keywords: : motor developmental delay; chiropractic; pediatric; spinal manipulation.

Introduction

Developmental delay is defined as a child who is not meeting a range of milestones at the expected rate of development.¹ Typically, this involves multiple areas of development including cognitive skills, social and emotional skills, speech and language skills, fine and gross motor skills and activities of daily living.¹ These alterations may be intermittent or sustained.² The World Health Organization has outlined windows of achievement for 6 gross motor development milestones (see Figure 1).³ A range of scales can be used to provide a grade to the level of the child’s delay such as the

Bayley (III) or the Nipissing District Developmental Screen. However, the accuracy of these is questionable.^{2,4} Developmental delays in infants and toddlers can have long-term residual effects if the underlying problem is not corrected.² In some parts of North America, it is becoming common practice to screen children at regular intervals from 9 to 30 months, because early detection and intervention of developmental delays improves the final prognosis.⁴

Current interventions include physical therapy, occupational therapy, speech therapy, psychological therapy and early special education.⁵ The effectiveness of some of these interventions is debatable as some literature shows that physical therapy and neurodevelopment treatment do not have a favorable effect on motor development in infants.⁶⁻⁸ There has been little growth in studies investigating improvement in gross motor skills over the past decade. However, programs to increase the development of gross motor skills have shown promising results, although the evidence of optimal dose and implementation is still weak.⁶⁻⁸

Chiropractic care for the pediatric population is growing in acceptance.^{9,10} While conditions such as colic are a common reason for parents choosing chiropractic care,^{11,12} Alcantara et al.¹³ reported ‘wellness care’ to be the most common reason for presenting to a chiropractor. Chiropractic care aims to

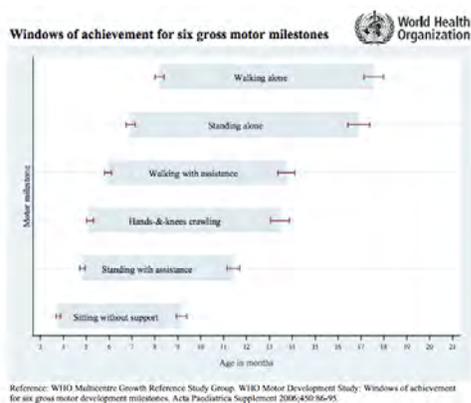


Figure 1. World Health Organization: Windows of achievement for 6 gross motor milestones³

optimize health and wellbeing through the enhancement of the nervous system function by removing nerve interference caused by vertebral subluxation.¹⁴ A vertebral subluxation represents an altered state of afferent input which can lead to maladaptive changes in central neural plasticity resulting in dysfunction.¹⁴

Current literature regarding the chiropractic management of infants and children with developmental delays is limited.¹⁵⁻¹⁸ The evidence to date suggests that chiropractic care may be beneficial for this population.¹⁵⁻¹⁸ The purpose of this case report is to chronicle the improvements in motor delays found in a 15-month-old male following Diversified technique chiropractic care for the correction of vertebral subluxation.

Methods

To assess the relevance to chiropractic, an online review of the literature on motor development delay and chiropractic was performed. The Index to Chiropractic Literature, PubMed and Google Scholar were consulted using the search terms “motor development delay”, “child” “chiropractic” and “spinal manipulation”. Databases were searched from inception through July 2017, with utilized studies, clinical trials and case reports, all being peer-reviewed.

Case Report

History: A 15-month old male with motor developmental delay presented for chiropractic care. The child was not able to crawl (creep) in any way, pull himself up to stand, stand alone or walk; which would be expected to have already been achieved as developmental milestones,³ He was able to sit unassisted from around 6-months and rolled at around 9-months of age. He was born vaginally at 39-weeks gestation with ventouse assistance. The child weighed 2,500 grams at birth. He was breastfed for 6-months with solids being introduced around 6-months of age.

The child appeared to have no obvious speech delay; he said “mum” and “dad” and indicated that he wanted to be picked up by raising up his arms. He had been observed informally by a speech therapist who determined that his social and language skills were “not too delayed in any way.”

The parents reported that in the first 12-months of his life the child did not spend much time lying prone (‘tummy-time’). From an early age the child was placed in a sitting aid (Bumbo™ seat). The child was under the care of a caregiver during the day, and it was unknown what activities were undertaken by the child when with the caregiver.

Examination: Chiropractic examination revealed restricted joint play of the right sacrum, restricted joint play of the T5/ T6 area with increased paraspinal muscle tone bilaterally, and decreased left lateral flexion of C7 and restricted joint play, increased right paraspinal muscle tone. Observation of assisted walking showed minimal balance, core strength and coordination with steps. In an attempt to assess upper body strength, the child was placed on his hands and knees. He demonstrated difficulty in supporting himself in this position and made no attempt to move his limbs in any coordinated way.

Intervention: Full spine chiropractic care was administered over a period of 16-weeks where the child was seen weekly for 4 visits and then bi-weekly for 6 visits. Informed consent to receive chiropractic care was verbally obtained from the patients’ parents prior to initiation of the course of care. Vertebral subluxation was assessed using commonly used, and reliable, clinical indicators of restricted inter-segmental range of motion, asymmetric intervertebral muscle tension and abnormal spinal joint play.¹⁹⁻²¹

Chiropractic adjustments were made using Diversified

Visit	Vertebral segment adjusted/Chiropractic listing	Parent’s and chiropractor’s observations
1	PR sacrum, T6 BR, C7 BL	Agitated and uncooperative
2	PR sacrum, C7 BL	Unable to hold his own weight to do the cross crawl pattern
3	PR sacrum, L4 BR, T4 BR	On all fours and is able to cross crawl
4	PR sacrum, L4 BR, C7 BL	Pulling himself up to stand on furniture
5	L5 BR, C2, BR	Continuing crawl and pull himself up
6	T6 BR	Crawling well and letting go to stand
7	T12 BR, T8 BR	Father said he was talking a lot more
8	T10 BR, C7BL	Taking a few steps and seems happier
9	PR sacrum, C7 BL	Confidently taking more steps
10	PR sacrum C7 BL	Improved walking ability

Table 1. Vertebral segments adjusted each visit and observations of both the parents and chiropractor.

technique (Activator™ instrument assisted). Diversified is the most widely used chiropractic technique and system of adjusting that uses primarily motion and static palpation to locate levels of vertebral subluxation, and focuses on the restoration of proper biomechanics within the spine.²² Additionally, on the first visit he was passively assisted through the sequence of moving all 4 limbs in a coordinated cross crawl pattern. Home care advice included cessation of assisted walking, and encouragement of floor play and the use of swings and slides to support development of the vestibular system.

Outcomes: Over the course of chiropractic care, the child made significant progress in motor development. Following the first 2 visits, the child started to crawl on his hands and knees unassisted, and after the third visit he began to pull himself up to stand. At the sixth visit he was able to crawl on his hands and knees with ease and began letting go of assistance while in a standing position. From the seventh visit he began taking unassisted steps with increasing confidence. For a detailed list of reported changes in the child's motor development see Table 1. No adverse reactions were identified or reported during the course of chiropractic care.

Discussion

Motor development improvements were reported in a 15-month-old male over the course of 16-weeks of chiropractic care. The child had initially presented with motor development delay, with inability to crawl in any manner, stand or walk unassisted. Common interventions for developmental delay involve a multi-disciplinary approach that includes physical therapy, occupational therapy, speech therapy, psychological therapy and early special education.⁵ Early motor development is important because it forms the basis for the development of verbal and non-verbal communication. Walking, for example, results in the child developing better social interactive skills with their caregivers.²³ Therefore, it is important to investigate the effect of chiropractic care on a child experiencing motor development delay.

While the chiropractic literature for this specific population is sparse, a literature review revealed 1 clinical trial and 3 case reports relevant to the current case report. Cuthbert and Barras¹⁵ conducted a study involving 157 children (aged 6 to 13 years) with various developmental syndromes. Each child was managed using Applied Kinesiology chiropractic technique over a visit duration ranging from two to five visits over a period of 5-days to 18-months. All children presented with motor system dysfunction assessed through manual muscle testing. All showed improvement in muscle strength, coordination and flexibility, and pronounced improvement in gross and fine motor function.

Ferranti and Alcantara¹⁶ reported the improvement of fine

and gross motor skills, and communication in a 2-year-old male following Diversified chiropractic care. The child was diagnosed using independently applied Peabody Developmental Motor Scales-2 (PDMS-2) and Preschool Language Scale-5 (PLS-5) instruments. Improvements in both assessments were noted in comparison to baseline assessments.

Troy et al.¹⁷ reported the improvement of developmental motor delays in a 4-year-old male following Diversified technique chiropractic care. Fifteen visits were attended over a course of 4-months. The child was diagnosed with dyspraxia at 1-year-old, was 15-months-old before he started to walk, and 3-years-old before verbalizing basic sounds. During the course of chiropractic care the child's vocabulary, and fine and gross motor control dramatically improved. The child was also undergoing speech therapy and various exercises were prescribed in conjunction with chiropractic care.

Quezada and Haan et al.¹⁸ reported the improvement of motor skills in an 8-month-old male following full spine and craniosacral chiropractic care. Seven visits were attended over a course of 24-days. The infant displayed an inability to sit unsupported, difficulty in holding his head up or supporting his upper body on his forearms while prone, and an asymmetrical, poorly executed belly crawl during the initial chiropractic consultation. The chiropractor prescribed exercises in conjunction with chiropractic care, which the mother complied with. A 7-month follow-up assessment indicated the child was ahead of expected milestones.

In all 3 case reports vertebral subluxation assessment and correction was described as the core clinical application of chiropractic care.¹⁶⁻¹⁸ The Australian Spinal Research Foundation developed a conceptual definition of vertebral subluxation that states, "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."²⁴ Vertebral subluxation has been described as being 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.²⁵ The correction of vertebral subluxations is achieved through chiropractic adjustments that are typically manually performed.²⁶⁻²⁸

Chiropractic care has been demonstrated to alter sensorimotor integration which is the coordination between incoming sensory information and the resulting motor processes.²⁹ Accurate sensorimotor integration is necessary for a number of daily activities such as being able to reach for objects, respond to a sound in a particular direction and responding to the ever changing environment.²⁹ Chiropractic care may be beneficial in supporting the development of a child as they

learn to accurately respond to their surroundings by allowing them to learn how to creep and walk.

Limitations

There are inherent limitations of a single case study. These include lack of a control group, and the inability to exclude spontaneous remission, or a self-limiting clinical presentation. We caution the reader that generalizations to a larger population cannot be made. In this case the assessment of motor developmental delay was not made through a formal assessment instrument, rather through subjective observations and reports of the parents and chiropractor. Addition-

ally, it is unknown whether the parents followed the home-care advice given, and if followed whether this resulted in the improved motor changes observed.

Conclusion

Chiropractic care, using Diversified technique for the correction of vertebral subluxation, was associated with improvements in the child's presenting motor development delay. More research is needed to investigate the role chiropractic may play in helping infants and children who present with similar conditions.

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