

# Reduction of Congenital Torticollis in a Four Month Old Child with Vertebral Subluxation: A Case Report & Review of Literature

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## ABSTRACT

**Objective:** To document clinical changes after a course of chiropractic care and physical therapy in a pediatric patient presenting with congenital muscular torticollis (CMT) and vertebral subluxation.

**Clinical Features:** A four month old female with congenital torticollis presents to a chiropractic office, having previously undergone physical therapy, Cranial-Sacral Therapy and myofascial release therapy with limited improvement. Chiropractic exam revealed a left head tilt with severely decreased left cervical rotation as well as resistance upon passive flexion of the left arm. Vertebral subluxations were found in the cervical spine and pelvis.

**Intervention and Outcome:** The patient received chiropractic adjustments, stretching and trigger point therapy. Palpation,

range of motion and posture analysis were used to determine location of subluxation and needed correction. Through the course of care, postural as well as functional improvements were observed.

**Conclusion:** In this child, congenital muscular torticollis was markedly reduced with a combination of chiropractic care directed at reducing vertebral subluxation and physical therapy. Previous studies, pathophysiology and treatment pertaining to birth trauma, Congenital Muscular Torticollis and chiropractic are reviewed. Additional research is encouraged in order to further elucidate the best treatment strategy for these children.

**Key Words:** *Torticollis, chiropractic, congenital torticollis, sternomastoid torticollis, congenital muscular torticollis, vertebral subluxation*

## Introduction

The clinical term “torticollis” is derived from two Latin words, *tortus* meaning twisted and *collwn* meaning neck.<sup>1-3</sup> This clinical presentation is also called Wry-Neck. The definition of wry is twisted or distorted<sup>1,4</sup> and is derived from the old English term *wrgan* meaning to turn. Torticollis is a form of dystonia (prolonged muscle contraction) of the sternocleidomastoid (SCM) muscle and is considered a clinical sign associated with an underlying cause or condition, but is not considered a specific condition unto itself.<sup>1,4</sup> Congenital muscular torticollis is classically described as a lateral tilt of the head with the chin pointing to the opposite direction.<sup>5-7</sup>

There are various theories as to the etiology of congenital torticollis. They range from unknown to the hypothesis that there is a hematoma formation in the SCM from an intrauterine vascular disturbance, intrauterine malposition of the head, or due to compartment syndrome where the SCM shortens.<sup>7,8</sup> Birth injury, infections, and hereditary theories have all been discussed.<sup>8-10</sup>

The presence of congenital torticollis may be the result of sternocleidomastoid and trapezius contracture due to in-utero constraint, infection, structural or neurologic abnormalities, or from neoplasm and trauma.<sup>5,11-13</sup> It may be seen at birth, or at times, it is seen up to four weeks postnatal. There is often the presence of a “tumor-like” swelling on the side of contracture, found either by the pediatrician or the parents.<sup>9,12</sup> In these

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cases a fibrous nodule can be found in the belly of the sternocleidomastoid muscle called a pseudonodule. Pseudonodules have been reported in 10-20% of newborns born with torticollis, a result of an abnormal stretch of the SCM during the birthing process.

This process can cause the muscle fibers to tear and contract abnormally; consequently, at about 2 to 3 weeks of age, fibrous and pathological contracture of the damaged part of the muscle occurs.<sup>9</sup> Additionally, the presence of the "pseudotumor" may have a negative influence on motor development of the infant due to asymmetrical development and the fibrosis of the SCM with deformational plagiocephaly.<sup>14</sup>

Pederick, in a case report, discusses this relationship between congenital muscular torticollis and cranial distortion (plagiocephaly).<sup>15</sup> He discusses how the cause of Wry Neck is usually uncertain, but in many cases is due to birth difficulties and/or trauma. The reviewed case was of a seven month old male where upon examination he presented with the inability to turn his head to the right or to extend his head. His right SCM and scalene muscles were tense and there was a flattening of the left occipital and temporal bones and an apparent bulging of the right occipital and parietal areas. The chiropractic treatment consisted of low-force, long duration cranial adjusting and soft tissue massage to the entire body but with special attention to the neck region. The parent also applied simple fascial release procedures which helped resolve the problem. Pederick goes on to say that early attention to infants with CMT is warranted, due to the fact that it is usually associated with plagiocephaly, which has the potential to result in physical and mental limitations.

According to Miller, infants with deformational plagiocephaly comprise a high risk group and present with subtle signs of cerebral dysfunction<sup>16</sup> And in a study by Davies, he describes resolution of vertebral subluxation and plagiocephaly in 25 infants undergoing chiropractic care.<sup>17</sup>

Utilization of passive range of motion stretching exercises are among the conservative current medical treatments for Congenital Muscular Torticollis.<sup>1,11,18,19</sup> This would be performed by the primary caregiver two to four times per day and at four months of age the infant would undergo a re-evaluation.

If the infant's head tilt is equal to or greater than six degrees, then a cervical, tubular brace/collar is used. This is worn during the infant's waking hours.<sup>1,2,11,18,20</sup> If this approach does not resolve the torticollis within one year, surgical intervention may be recommended. There are two surgical procedures which may be performed. The first is a surgical division of the sternocleidomastoid muscle and the other is the surgical resection of the spinal accessory nerve and/or the anterior and posterior divisions of the first three cervical motor roots.<sup>1,16,19,20</sup> These surgeries are not without risks and so attempts to reduce CMT without surgical intervention should be explored.

## Case Report

### History

A four month old female patient presented with congenital torticollis of the left sternocleidomastoid muscle. The patient's mother had noticed a lump on the infant's left sternocleidomastoid muscle accompanied by a left head tilt at three weeks of age. The infant was prescribed physical therapy by her pediatrician once a week, which she underwent for three months prior to seeing a chiropractor with some improvement in right cervical passive side bending.

The physical therapy included Myofascial Release Therapy, Cranial Sacral Therapy, and massage. She was additionally fitted for a TOT collar, however the mother was not compliant with its use. A TOT collar (Tubular Orthosis for Torticollis) is used to treat infants with CMT. It is a device made from soft plastic tubing that fits around the neck. Hard plastic pieces fit in between the soft tubing and are cut to fit the infants neck so that they hit the base of the skull. When the child tilts their head and hits these harder pieces, it is uncomfortable and they straighten their head.

Parental education included a home exercise program for stretching and strengthening and the application of kinesiotape. The patient was not prescribed any over the counter or prescription medications.

While pregnant, the primigravid mother suffered moderate to severe left sciatic pain and experienced a large amount of swelling, especially in the lower extremities. The pregnancy was ten days past the due date and the delivery was considered traumatic. The mother was induced in the hospital with Pitocin, which is used to initiate contractions and Cervidil, which is used to help dilate the cervix. Once induced, the midwife-assisted labor had a total duration of eight hours with one and a half hours pushing. Inhalation of meconium was noted, however, the newborn was not kept in NICU. The infant was eight pounds eleven ounces and had a second APGAR score of 9. The newborn was breastfed for six weeks and was administered the DPT, Polio and Rotavirus vaccines at two months of age.

The mother noticed from the beginning that the infant had difficulty latching on to the right breast due to restricted left head rotation and head tilt. Supplementation was introduced at six weeks due to mother's inability to provide enough breast milk.

### Examination

Initially the patient presented to the physical therapist with a diagnosis of torticollis from her pediatrician. As described by the physical therapist, she had limited passive cervical range of motion as follows: left cervical rotation 50 degrees; right cervical rotation 75 degrees; left cervical side bending 65 degrees; right cervical side bending 10 degrees. She presented with tightness in her left sternocleidomastoid, platysma, and sub-occipital extensor muscles.

Upon examination, the chiropractor confirmed a left lateral head tilt as well as a restricted flexion of the child's left arm (90 degrees). Upon palpation of the cervical spine, spasm of the left sternocleidomastoid muscle was found along with hypomobility on the left at the level of atlas vertebrae with hypertonicity of the suboccipital musculature - all indicating an

upper cervical subluxation.

### *Treatment*

A *Toggle* upper cervical adjustment was performed on the left side of atlas with a Webster Toggle Headpiece. (See Figure 1 & 2) The Webster Toggle Headpiece is a specially designed pediatric “drop” piece used to facilitate certain chiropractic adjustments for children under three years of age.<sup>20</sup>

The patient was sent home at the end of the first visit with instructions for the mother to return in two days and to continue with the ongoing adjunctive therapies.

On the second visit, there was difficulty turning her head to the left. Hypertonicity and restriction were found upon motion palpation of the first and fifth cervical vertebrae. The atlas was once again adjusted on the left with the infant headpiece and C5 was adjusted with a handheld, low force, high speed, mechanical adjusting instrument known as an Activator.<sup>21</sup> Cranial work was instituted and left arm stretches were also performed. The cranial work performed throughout care included: The Frontal Lift, Parietal Lift, and Occipital Lift.<sup>22</sup> (See Figures 3-5)

The patient was seen for her third visit two days later. On this day, there was still difficulty turning her head to the left, however, range of motion of the left arm had improved. Hypertonicity and hypomobility were noted at atlas and C5 and these levels were adjusted as described above.

On the fourth visit posture was noted to be improved. Increased range of motion of the left arm was also noted. Hypertonicity and hypomobility were found upon palpation of atlas and C5 which were adjusted with the established protocol.

On the fifth visit, the patient exhibited improved cervical rotation, reduced head tilt as well as increased flexion of the left arm. On this day, hypertonicity and hypomobility were found at atlas on the left and at the sacrum. Atlas was adjusted on the left with the infant headpiece and sacrum was adjusted with the Activator instrument.

After a period of six days, the patient came in for her sixth visit. An exacerbation of the torticollis was noted as the head tilt had returned and left arm flexion was restricted. There was spasm of the SCM. Hypertonicity of the suboccipital musculature and hypermobility of Atlas on the left was noted and this was adjusted using the infant headpiece. Fixation and hypertonicity were noted at the first thoracic segment and sacrum and these segments were adjusted with the Activator instrument. Active trigger points were noted in the upper thoracic region and the trapezius muscle, which were stimulated until release was observed in the cervical musculature.

Three days later, the seventh patient visit occurred. Torticollis signs remained unchanged. Multiple subluxations were found with hypertonicity and hypomobility at the level of atlas, which was adjusted with the infant headpiece, and C5 which was adjusted with the Activator Instrument. Cranial work was done on the patient's right side with sustained manual contact.

On the eighth visit, five days later, the torticollis was visibly better. Improved left head rotation, as well as left arm flexion was noted. Hypertonicity and hypomobility at atlas and C5 were found and adjusted as mentioned previously. Cranial work was done on the right side with a sustained right manual contact.

Five days later, the patient was seen for the ninth time. On this visit, the patient condition was continuing to show improvement. Her occiput was adjusted on the left as well as her sacrum, both with the Activator instrument after palpating hypertonicity and hypomobility at those levels.

Presently the infant is eight months old and remains under chiropractic care on an as needed basis. Exacerbations occur when she is stressed and tired.

### **Discussion**

#### *Pathophysiology*

The complex anatomy and the intricate nerve pathways of the cervical spine, requires a close look at the relationship between structure and function. According to Chung: the Accessory nerve, or cranial nerve XI, is formed by the union of cranial and spinal roots. Cranial roots arise from the medulla oblongata below the roots of the vagus nerve. Spinal roots arise from the lateral aspect of the cervical region of the spinal cord between C1 and C3, and unite to form a trunk that ascends between the dorsal and ventral roots of the spinal nerves in the vertebral canal and passes through the foramen magnum. The spinal portion innervates the sternocleidomastoid and trapezius muscle and provides branchiomotor (SVE) fibers to the sternocleidomastoid and trapezius muscle. When the Accessory nerve has a lesion, the arm cannot be abducted beyond the horizontal position as a result of an inability to rotate the scapula.<sup>23</sup>

One study of rotatory torticollis, reported greater muscle activity in sternocleidomastoid (SCM) muscle and splenius muscle (on the side responsible for rotation) as compared with the corresponding muscles on the other side.<sup>24</sup> Within chiropractic protocol and analysis, it is theorized that a spinal lesion due to subluxation secondary to trauma may cause CMT.

Considering the direct relationship between the upper cervical spine and spanning musculature, it is reasonable to hypothesize that an upper cervical subluxation its correction through adjustment and myofascial therapy, may alter the outcome of CMT. Gottleib points out that a newborn's vertebrae are not completely ossified and can be easily distorted by even natural uterine contractions. With the addition of unphysiologic traction and torsion, this would increase the probability of injury to the neonate. The protective structures surrounding the central nervous system are able to stretch more than the less elastic neural tissues, thereby resulting in damage to the cord when excessive force is used during delivery.<sup>15,25</sup>

#### *Birth Trauma*

As mentioned earlier, one factor cited in numerous studies

was that of birth history where difficulties during labor are associated with children being born with CMT.<sup>7,25</sup> 30-60% of infant torticollis patients have had a difficult birth history.<sup>10</sup> Celayir also states that mothers of children born with CMT have described labor and delivery as being especially difficult.<sup>8</sup> According to Fallon, the etiology of torticollis in the neonate can be due to the stretching of the SCM during delivery which results in the development of a pseudotumor and subluxation of the upper cervical vertebrae from malposition in-utero or a difficult birth.<sup>9</sup>

Congenital torticollis, also known as congenital muscular torticollis (CMT), is a unilateral contracture of the sternocleidomastoid muscle. It is often found in correlation with a breech presentation or with a malposition, such as posterior presentation.<sup>9,11</sup> Primigravidity, maternal hypertension, oligohydramnios and growth retardation are also known to be correlated with CMT. Torticollis is also often found in conjunction with a second congenital birth deformity such as hip dysplasia, mandibular asymmetry and postural scoliosis.<sup>12</sup> The intrauterine malposition theory suggests congenital dysplasia of the hip is associated with congenital muscular torticollis, along with breech presentation.<sup>11</sup> It is important to note that if the torticollis is due to a congenital vertebral anomaly, which would be detected by radiological studies, it may not immediately be found due to an underdeveloped cervical spine.<sup>11</sup>

It is important to note that prevention and correction of breech presentation is a common practice focus of some chiropractors. By allowing the mother's body to achieve an ideal pelvic alignment, a fetus can move liberally and thus ultimately reach the optimal vertex position for birth. A technique which chiropractors use to relieve musculoskeletal causes of intrauterine constraint is called the Webster In-Utero Constraint Technique. In a survey conducted by Pistolesi, chiropractors surveyed reported a high rate of success using this technique in the eighth month of pregnancy.<sup>26</sup> Further investigation regarding women under regular chiropractic care during pregnancy, their incidence of difficult or complicated labor and the percentage of neonatal presentations such as CMT is warranted.

Longitudinal traction in breech deliveries can cause injury to the spinal cord. Most cases of cord traction occur with breech delivery.<sup>25,27</sup> Lesions to the lower cervical and upper thoracic levels are also associated with breech deliveries and the entire spinal cord and brain stem can be injured during the birthing process. Gross injuries, which reflect conditions such as torticollis, can be easily traced back to the birth process; but the less obvious traumas yield defects that may remain undiagnosed for a lifetime. All too often distressed neonates are often mislabeled as difficult labor or impingement of the umbilical cord during labor. Gottlieb concludes that manual treatment of birth trauma injuries to the neuromusculoskeletal system could be beneficial to many patients, and it is well within the means of current practice in chiropractic and manual medicine.<sup>25</sup>

In a paper by Fallon and Fysh they discuss the prevalence of torticollis with an abnormal fetal position. The frank breech birthing position is reportedly associated with the highest incidence of torticollis. They state that torticollis affects 34%

of all infants born in that position. They also go on to state that the most common type of congenital torticollis is that which is associated with the subluxation of the upper cervical spine and that chiropractic adjustments of the upper cervical spine have been effective in resolving congenital torticollis.<sup>9</sup>

Biedermann describes a syndrome of kinematic imbalances secondary to suboccipital strain which has torticollis as one of its main symptoms.<sup>28</sup> He studied over 600 children who were mainly referred due to torticollis and other postural abnormalities of the head along with motor difficulties. Birth trauma was revealed in a higher proportion than the general population. Treatment included upper cervical manipulation – usually only once – with marked improvement.

### *Treatment*

Manual stretching, passive stretching exercises (PSE), Botox injections and surgery have all been traditionally used in the treatment of CMT. Daily, non-invasive approaches performed by the parents may contribute to the success of intervention such as feeding the infant in the prone position on both the right and left sides while the patient is awake.<sup>29</sup> In another study of 452 patients with CMT with pseudotumor, 8% of patients receiving manual stretching of the SCM experienced a sudden giving-way or snapping of the SCM.<sup>30</sup>

In another chiropractic case, a decrease of hypertonicity in the cervicothoracic musculature was reported. In her paper, Colin, reviews the clinical chiropractic intervention of a seven month old infant who had been medically diagnosed with torticollis related to birth trauma. The infant was three weeks premature at birth, was jaundice and had no sucking reflex. The mother reported that the birthing process had been traumatic. It had begun before she was able to leave her apartment for the hospital, as the baby's head had already begun to present. The mother stated she was certain the head was "dangling" out of the birth canal for several minutes before she had given birth in the lobby of the hospital. The baby was born with a noticeable torticollis and so the mother first sought treatment from a physical therapist, which was reportedly ineffective. At three weeks old the infant was brought to a chiropractor. After six visits involving low force adjusting and myofascial release work, the case was completely resolved. At the one year check-up, the infant was still clear of torticollis.<sup>31</sup>

In a case study by Hyman, she discusses the clinical manifestation of a three month old infant boy who presented with congenital muscular torticollis and facial asymmetry for chiropractic care. After six weeks of chiropractic care, there was marked reduction of CMT and facial asymmetry and complete resolution by ten weeks of the case. These results were attributed to the correction of vertebral subluxation.<sup>1</sup>

In a case report by Moore, she focuses on a pediatric torticollis case not related to birth trauma but due to a fall. The treatment of a four year old, who fell head first off a bed, consisted of massage and chiropractic adjustments. The boy presented with left lateral head tilt and mild right head rotation. This position is typical for an atlantoaxial rotatory fixation where usually the presenting sign is torticollis. The patient was unable to move his head around properly without pain and muscle guarding. Light massage and trigger point

therapy were performed on the paraspinal musculature followed by a Diversified spinal adjustment to C3/4. Two weeks after the treatment, the patient returned to the clinic with no clinical signs or symptoms of the fixation or torticollis.<sup>32</sup>

In a report of three cases of acute cervical torticollis in adults Bolton describes the identification of upper cervical subluxations in all three cases. All cases were managed utilizing Palmer Upper Cervical Specific technique and all three cases resolved.<sup>33</sup>

Guttman describes a syndrome involving subluxation resulting in a blocked Atlantal nerve in infants and small children.<sup>34</sup> He describes a clinical picture of central motor impairment, impairments of vegetative regulatory functions, and lowered resistance to infections. He reviews three case studies of children with the diagnosis including one with torticollis that resolved following two adjustments to reduce upper cervical subluxation.

### Conclusion

In chiropractic, the principle of removing nerve interference caused by vertebral subluxation is done through the use of specific chiropractic adjustments. Once reduced, reconstruction of the pathophysiological changes that had occurred to the nerve, muscle, ligamentous, vascular and connective tissue, caused by subluxation can occur.<sup>35</sup> The body is then permitted to regain homeostasis.<sup>36</sup>

This case of congenital torticollis was markedly reduced with a combination of physical therapy and chiropractic care. These results are believed to be due to the integration of physical therapy along with the correction of the infant's vertebral subluxations by utilizing specific adjustments.

The need for future research within chiropractic to prevent and correct torticollis is suggested. Additionally, due to the evidence of birth trauma and fetal presentation having a strong correlation with congenital conditions such as CMT, more research is indicated in the prediction, prevention and correction of such presentations.

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**Figures 1 & 2**

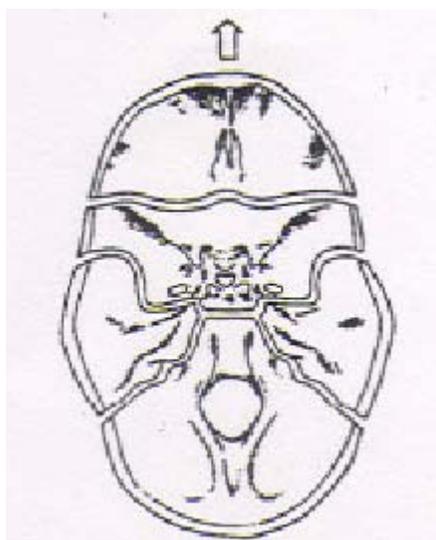


Infant Toggle Headpiece –  
Side View



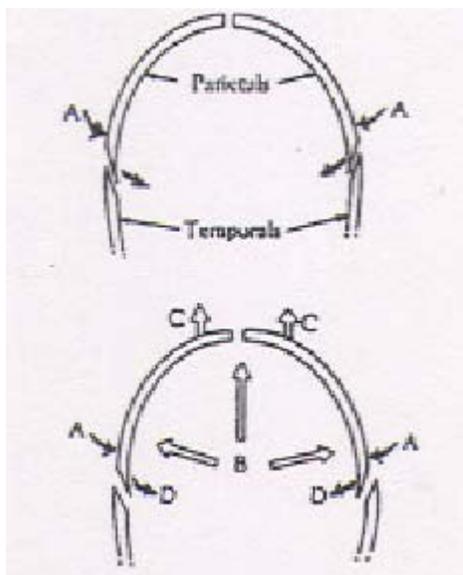
Infant Toggle Headpiece –  
Top View

**Figures 3-5**



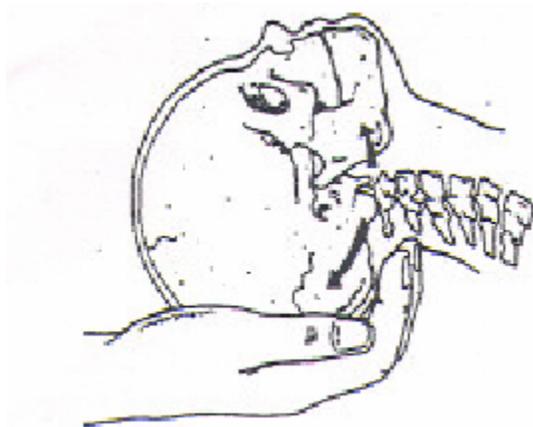
**Frontal Lift**

Contact the lateral edges of the frontal bone at the lateral aspect of the eyebrow. Your thumbs are crossed and gently stabilizing your hands to reduce tension coming from you. You will be using the frontal bone as a handle as you direct the dural membranes anterior and slightly superior to the patient's face.



**Parietal Lift**

Contact the temporal bone just below the parietal tuberosity, apply slight medial pressure with either the tip of the third digit (if the patient is supine) or between the thenar pads (if the patient is seated). Move superior to contact on the tuberosity (the widest point on the parietal). Lift the parietals gently superior to the patient's head.



**Occipital Lift**

Place the tips of the fingers at the base of the skull with the patient's head balanced over your palms. Wait for the muscles to relax before gently tractioning the skull superior and posterior. When working on babies and smaller children, direct your fingers laterally to gently spread the condyles and balance the four segments of the occiput. This will open the foramen magnum and allow for unhindered growth of the brain stem.

An alternate contact for small babies would be to use the lateral aspect of the index fingers. With the tips of your fingers touching, balance the C0-C1 junction over your fingers. Gently wait for the musculature to relax before applying very slight superior and lateral traction.