

Two sisters with plagiocephaly: one treated with a cranial band and the other with sacro occipital technique cranial care; A comparative case report

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Abstract: Plagiocephaly (non-synostotic) in otherwise normal children is a relatively frequent occurrence (3-61% with mean at 47%) with a common therapeutic option utilising the cranial helmet (band). This study seeks to evaluate two-sisters with plagiocephaly (2-years-apart) and compare outcomes of one that received helmet care and the other only SOT cranial care (SCC).

Clinical Features: Both sisters were treated at this chiropractic clinic with the older sister first seen at age 4-years-old having used a cranial helmet for her plagiocephaly. The younger sister with a similar-type plagiocephaly was seen from age 3-6 months for SCC instead of a helmet intervention.

Intervention/Outcome: The older-sister (helmet) initially seen at age four was found to still have some cranial asymmetry, though not profound, however she had significant scoliosis and cervical spine imbalance which has persisted over approximately 3-years of care. The younger-sister (SCC) has good cranial symmetry, no scoliosis, cervical imbalance, or leg length functional inequality for the past 3-years.

Conclusion: More extensive research is needed to help determine if there are instances when SCC may offer an alternative to cranial helmets and if helmets while aesthetically improving cranial appearance might have secondary adverse affects not occurring with SCC.

Indexing Terms: Facial palsy, chiropractic, sacro-occipital technique, comparative cases.

Introduction

A common therapeutic approach for nonsynostotic plagiocephaly (NP) with congenital torticollis (CT) in otherwise normal children is the utilisation of a cranial orthosis (CO). This study introduces SOT Cranial Therapy (SCT) as an additional therapeutic option by examining a case of two-sisters (2-years apart) with NP and CT receiving two-different treatment approaches. The outcomes, costs and practicality of therapy are discussed.

Plagiocephaly refers to an asymmetry or flattening of areas of the skull, often causing a parallelogram formation as observed from the top of the head, referred to as a parallelogram plagiocephaly (PP). The back of the head will generally demonstrate an anterior or flattened occiput on the same side as an

... this case report compares sisters with similar plagiocephalic clinical presentations, one treated with a helmet and the other with SOT cranial therapy'



anterior frontal and zygoma. This is also referred to as a positional or deformational plagiocephaly (DP), being non-synostotic. Some studies report that the incidence of DP has increased (1, 2) while another systematic review reports incidence of being stable over the past 4 decades. (3) Generally a guide for differentiating synostotic plagiocephaly (SP) from DP is that with SP the side of frontal flattening will have an anterior displacement of ipsilateral ear and sparing of the face, whereas with DP the side of frontal flattening will have a posterior displacement of ipsilateral ear and facial mirroring of a flattened frontal bone. (4) Mawji et al noted that DP in otherwise normal children is a relatively frequent occurrence (3-61% with mean at 47%) with a common therapeutic option utilising the cranial helmet (band). (5)

Proposed causes vary. In utero crowding, as in bicornate uterus or twins, may contribute to a congenital torticollis or skull flattening. The torticollis can create asymmetrical pull on the occiput and/or temporal bones, further predisposing cranial asymmetry. In one study (N=201) they found over 50% of new-borns from a twin birth have some degree of skull distortion. (5) Low birth weight, advanced maternal age, assisted delivery, first born child, male sex, cumulative exposure to the supine position, and neck problems may increase the risk of positional plagiocephaly. (1, 3) Genetic factors are suspect as well.

Cranial asymmetry can also contribute to unfavourable supine sleeping positions, which, in theory, may cause further flattening of cranial bones. Most studies suggest that to reduce the risk of DP, infants should '*experience a variety of positions while they are awake and supervised, and early treatment may be warranted for infants with neck problems and/or strong head preference.*' (3, 7, 8) The presence of a concomitant congenital torticollis is not uncommon in cases of DP. As noted, Mawji et al reported that DP in otherwise normal children is a relatively frequent occurrence (mean 47%).

Methods

Two sisters were seen at this chiropractic clinic. Both had a similar type DP with congenital torticollis in infancy. The older sister first presented at this clinic at age 4y old after having used a CO from 4-6 months old for her DP. A cranial orthosis⁹ (DOC Band) had been prescribed for her DP, along with neck stretching for a concomitant CT. She wore the orthosis for 3 months, 23 hours/day during 4-6 months of age. She received the prescribed neck stretches for 3 months.

The second daughter, born 1 year 8 months later, presented to this clinic seeking an alternative to CO intervention. She received SCT and infant chiropractic manipulative therapy¹⁰ for 4 months between the ages of 10.5 weeks and 7 months. Cranial sutural techniques were employed to release restrictions; directional therapy was applied to reposition cranial asymmetry; ankle suspension technique reduced meningeal torsion tension patterns, massage techniques rehabilitated imbalanced musculature, and gentle cervical manipulation reduced vertebral imbalance. She maintained cranial and postural symmetry from 7 months to 5-years-old, which was the last time she was evaluated by me.

Results

The older daughter was treated with a cranial orthosis, which was removed by 6 months old. Following CO therapy, improved cranial balance was visualised, although there was still asymmetry of her eyes, ears and comparable widths of the sides of her face. Her cervical curve improved, though her left occiput was still lower on the left compared to the right. (Figure 1) The first time she was evaluated at this office was at 4-years-old. She was still presenting with a low left occiput, and a right anterior frontal and parietal. Additionally, she presented with a mild to moderate compensatory scoliosis. A series of 2 cranial/spinal manipulations were performed when she was 4 years old. She was re-evaluated in my clinic at age 7. At that time full, cranial

symmetry was demonstrated though a mild to moderate compensatory scoliosis was still apparent, with the same low left occiput presentation.

The younger daughter had a DP similar to her older sister. The final visit for SCT treatment of her DP and CT showed resolution and symmetry cranially and musculoskeletally. (Figure 2) Cranial/spinal re-evaluations were performed at this clinic as follow-up visits at 2, 4 and 5 years of age, all demonstrating continued cranial, craniofacial, occipital, and spinal balance and symmetry.

Figure 1. First Daughter Treated with Cranial Orthosis Therapy



First Daughter 3 Months Old – Prior to Cranial Orthosis Therapy



First Daughter 7 Months Old – Post Cranial Orthosis Therapy

Figure 2. Second Daughter Treated with SCT and Chiropractic Care



Second Daughter, 6 Days Old, Prior to Chiropractic Cranial Care



Second Daughter at 7 Months Post Chiropractic Cranial Care

Discussion

Allopathic treatment of DP generally takes three approaches:

- ▶ watch and hope for resolution without intervention
- ▶ reposition frequently to keep the child off the flat side of the head, and
- ▶ CO therapy (a 'helmet' or 'band').

Cranial Orthoses attempt to reduce skull asymmetry by inhibiting the expansive areas, hoping to redirect cranial growth into the deficient areas. Treatment can last from 5 weeks to 4 months generally in infants 4-18 months of age. Costs are approximately between US\$2,300-4000 and the 6-18 ounce (170-510g) CO is worn 23 hours/day, which would seem to create stress to the head and neck, especially while sleeping. Sixty five percent of subjects reported adverse events in a study by Lee, Kim and Kwon. '*Heat rash was most common in 35.4% of cases studied, pressure sores (25.6%), itchiness (7.3%), discomfort (4.9%), bacterial abscess (1.2%) and corneous (1.2%).*' (11)

Allopathic treatment for CT tends to focus on strengthening the 'weak' muscles and forcefully stretching the shortened cervical muscles. Based on the child's response, this type of intervention does appear to create significant stress, often exhibited by screaming and struggling. When these procedures are not effective, sometimes procedures with greater risks such as injections of Botulinum toxin (12) or even surgical interventions (13) are utilised.

SCT, along with gentle chiropractic manipulation, may be a viable alternative to allopathic treatment of infants with DP and congenital torticollis. Instead of restricting continued cranial expansion to match the deficient cranial areas, SCT attempts to release cranial sutural restriction in the deficient areas so cranial expansion will naturally fill in the deficiencies during normal growth and no restriction to cranial expansion is necessary. Ankle suspension technique uses the baby's weight to reduce torsion in the spinal sleeve and its cranial attachments that can cause an imbalance in the meningeal pull within the cranial vault. Gentle chiropractic manipulative therapy's focus is to restore vertebral malposition associated with torticollis presentation. Therapeutic massage lengthens and relaxes tight musculature, as well as increasing circulation and healing to damaged tissues, ultimately decreasing the drag on the occiput and temporal bones. The practicality and cost savings of a half dozen chiropractic visits at an average of \$65 per visits, as compared to the expense, discomfort and inconvenience of wearing a CO 23 hours/day 34 may be a more favourable option to parent and infant alike.

There has been limited research discussing chiropractic care of DP, or comparison studies between CO use and chiropractic cranial care only, or even integrated CO and chiropractic cranial care employed concurrently. Davies studied chiropractic care as an alternative to CO related care and performed a retrospective study of chiropractic management of 25 cases with DP. He found '*under chiropractic care alone, all 25 of the patients reviewed achieved complete resolution.*' (14) Case reports have noted successful care of children with DP treated with chiropractic manipulation (15, 16, 17, 18, 19, 20, 21, 22, 23) as well as with cranial manipulative care, (24, 25, 26, 27, 28, 29) particularly associated with difficulty breastfeeding, congenital torticollis, and other concomitant presentations. Also, there are specific cranial studies that focused on SCT, which demonstrate successful outcomes treating children with DP. (30, 31, 32)

It does appear that cranial palpation might offer a tool to assess and treat DP. In one study (33) the records of 649 children seen in an osteopathic practice in Lyon, France, were reviewed retrospectively, for gender, age at presentation, birth history, obstetrical, presenting complaint, side of posterior plagiocephaly, side of frontal plagiocephaly, torticollis, motion pattern of the occipital bone upon the atlas, and motion pattern of the spheno-occipital synchondrosis. Sergueef et al '*found a significant correlation between the lateral strain pattern of the spheno-occipital*

synchondrosis and plagiocephaly and between rotational dysfunction of the occiput upon the atlas and the side of posterior plagiocephaly.' (33)

SCT and gentle chiropractic manipulation offer a viable option as treatment for plagiocephaly with congenital torticollis. The logic of releasing cranial restriction to enhance normal growth of a developing cranial vault suggests better brain growth and expansion, rather than a cranial orthosis restricting areas (and the growth of their contents) to force expansion elsewhere. Chiropractic infant techniques reduce the risk of damage or stress to already restricted cervical musculature in a congenital torticollis by using massage and gentle vertebra repositioning. The goal ultimately is to offer restoration to the underlying anatomy, more closely addressing the anatomical cause of torticollis. It is also noteworthy that the child and parent would be spared the painful neck stretches.

There are always limitations to case studies such as placebo or ideomotor effects, and particularly with a comparative study. Even with sisters, their natural progression could vary regardless of any chiropractic intervention. It is possible the older sister in this case had some asymmetrical body use preference that was unnoticed, yet still affected her growth and development, or she was genetically predisposed to a compensatory scoliosis. Closer monitoring and improved data collection is recommended.

Conclusion

In this case study, SCT for DP and chiropractic care for CT gave results comparable, if not favourable to CO care. SCT and chiropractic care was less expensive than CO treatment, and in the parents opinion, more comfortable for the infant and easier on the day-to-day routine.

More extensive research is needed to determine when SCT may offer consistent and comparable, if not better, outcomes to that of CO therapy (bands or helmets), and if cranial orthoses, while aesthetically improving cranial appearance, might have secondary adverse effects not occurring with SCT.

Further study into SCT for children with DP in a large patient population would be indicated to determine the efficacy of this care both comparative to CO care, or to augment CO care. A trial of SCT care is warranted for reasons of cost, practicality or convenience, or for children that are resistant or unresponsive to CO care.

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Informed consent to chiropractic care, signed by the patient's parent, and parental consent to the publication of this case including the images of the patient, is held by the practitioner.

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References

1. Ballardini E, Sisti M, Basaglia N, et al. Prevalence and characteristics of positional plagiocephaly in healthy full-term infants at 8-12 weeks of life. *Eur J Pediatr.* 2018;177(10):1547-54.
2. Feijen M, Franssen B, Vincken N, et al. Prevalence and Consequences of Positional Plagiocephaly and Brachycephaly. *J Craniofac Surg.* 2015;26(8):e770-3.
3. Bialocerkowski AE, Vladusic SL, Wei Ng C. Prevalence, risk factors, and natural history of positional plagiocephaly: a systematic review. *Dev Med Child Neurol.* 2008;50(8):577-86.
4. Bruneteau RJ, Mulliken JB . Frontal plagiocephaly: synostotic, compensational, or deformational. *Plast Reconstr Surg.* 1992;89(1):21-31.
5. Mawji A, Vollman AR, Hatfield J, et al. The incidence of positional plagiocephaly: a cohort study. *Pediatrics.* 2013;132(2):298-304. URL <http://pediatrics.aappublications.org/content/132/2/298.long>
6. Peitsch WK, Keefer CH, LaBrie RA, et al. Incidence of cranial asymmetry in healthy newborns. *Pediatrics.* 2002;110(6):e72.
7. Glasgow TS, Siddiqi F, Hoff C, et al. Deformational plagiocephaly: development of an objective measure and determination of its prevalence in primary care. *J Craniofac Surg.* 2007;18(1):85-92.
8. Aarnivala H, Vuollo V, Harila V, et al. Preventing deformational plagiocephaly through parent guidance: a randomized, controlled trial. *Eur J Pediatr.* 2015;174(9):1197-208.
9. Kelly KM, Joganic EF, Beals SP, et al. Helmet Treatment of Infants With Deformational Brachycephaly. *Glob Pediatr Health.* 2018;5:2333794X18805618.
10. Rosen MG. Pediatric Chiropractic Care. Wellseley, MA: Privately Published. 2018.
11. Lee HS, Kim SJ, Kwon JY. Parents' Perspectives and Clinical Effectiveness of Cranial-Molding Orthoses in Infants With Plagiocephaly. *Ann Rehabil Med.* 2018;42(5):737-47.
12. Collins A, Jankovic J. Botulinum toxin injection for congenital muscular torticollis presenting in children and adults. *Neurology.* 2006;67(6):1083-5.
13. Lepetsos P, Anastasopoulos PP, Leonidou A, et al. Surgical management of congenital torticollis in children older than 7 years with an average 10-year follow-up. *J Pediatr Orthop B.* 2017;26(6):580-4.
14. Davies NJ. Chiropractic management of deformational plagiocephaly in infants: An alternative to device-dependent therapy. *Chiropr J Aust.* 2002 Jun;32(2):52-5.
15. Walker S, Russell D. Resolution of deformational plagiocephaly in a four-month-old male following chiropractic care to reduce subluxations: A case report. *J Pediatr Matern & Fam Health - Chiropr.* 2017(2): 78-81.
16. Gordon BD. A retrospective study of the management of deformational plagiocephaly with chiropractic care. *Chiropr J Aust.* 2017;45(2):155-74.
17. Douglas NA, Browning, M. Chiropractic care for the cervical spine as a treatment for for plagiocephaly: A prospective cohort study. *J Clin Chiropr Pediatr.* 2016;15(3):1274-9.
18. Humphris TJ, Askin ASMM, Glucina-Russell TT. Resolution of non-synostotic plagiocephaly following chiropractic care: A case report. *J Clin Chiropr Pediatr.* 2014;14(3):1176-8.
19. Hash JL. Deformational plagiocephaly and chiropractic care: A narrative review and case report [review]. *J Clin Chiropr Pediatr.* 2014;14(2):1131-8.
20. Fairest C. Resolution of birth-related cranial asymmetry following chiropractic care: A case report [case report]. *J Clin Chiropr Pediatr.* 2013;14(1):1093-6.
21. Hoiriis K. Chiropractic Care for an Infant With Torticollis and Plagiocephaly: A Case Report. *J Chiropr Educ.* 2011;25(1):106-20.
22. Leighton JM. Non-synostotic deformational plagiocephaly: An evidence-based case report. *Clin Chiropr.* 2008;11(4):211-8.
23. Hobaek Siegenthaler M. Unresolved Congenital Torticollis and Its Consequences: A Report of 2 Cases. *J Chiropr Med.* 2017;16(3):257-61.
24. Ferranti M, Anastasio B, Varnum C. Chiropractic management of a 6-month-old male with deformational plagiocephaly, facial asymmetry, delayed constriction, and abdominal rigidity. *J Chiropr Educ.* 2017;31(1):48-83.

25. Ferranti M, Alcantara J, Adkins M. Resolution of breastfeeding difficulties and plagiocephaly in an infant undergoing chiropractic care [case report]. *J Pediatr Matern & Fam Health - Chiropr.* 2016(2):42-5.
26. Williams S. Improvement of congenital torticollis, plagiocephaly and breastfeeding issues in an infant following subluxation based chiropractic care: A case study [case report]. *J Pediatr Matern & Fam Health - Chiropr.* 2014;4:87-94.
27. Rubin D, Istok M. Resolution of infantile colic, torticollis, plagiocephaly and feeding difficulties following subluxation based chiropractic: A case report [case report]. *J Pediatr Matern & Fam Health - Chiropr.* 2013;2:24-7.
28. Doucet J, Alcantara J. Improvement in a pediatric patient with craniosynostosis undergoing chiropractic care. *Ann Vert Sublux Res.* 2011 Fall;2011(4):133-64.
29. Pederick FO. Treatment of an infant with wry neck associated with birth trauma: Case report. *Chiropr J Aust.* 2004;34(4):123-8.
30. Collins K, Alcantara J, Holt K. Resolution of breastfeeding and gastrointestinal complaints in infant twins with plagiocephaly and scaphocephaly following birth trauma: A case series. *J Pediatr Matern & Fam Health - Chiropr.* 2015(1):34-41.
31. Williams S, Blum CL, Billings S. Plagiocephaly: The oblique skull – a method of chiropractic correction. *Clin Chiropr.* 2010;13(2):195-6.
32. Quezada D. Chiropractic care of an infant with plagiocephaly. *J Clin Chiropr Pediatr.* 2004;6(1):342-8.
33. Sergueef N, Nelson KE, Glonek T, Palpatory diagnosis of plagiocephaly. *Complementary Therapies in Clinical Practice.* 2006;12(2):101-10.
34. Cummings C. Positional plagiocephaly. Canadian Pediatric Society. URL <http://www.cps.ca/en/documents/position/positional-plagiocephaly>. Last updated: May 8 2018.