

Plagiocephaly: The Oblique Skull; A method of chiropractic correction, with a case report.

Steve Williams, Charles L. Blum, and Simon Billings

Abstract: Introduction: Plagiocephaly is general term used to describe cranial asymmetry. Pathogenically, plagiocephaly is classified as synostotic (SP), caused by abnormal sutural development or deformational (DP) (non-synostotic or positional), caused by external forces acting on the cranium. Commonly accepted treatments for DP include alternate sleeping postures, carefully monitoring the child when placed in a prone position, as well as in resistant cases use of cranial orthoses or helmets. Chiropractic -Sacro Occipital Technique (SOT) cranial care might offer a conservative option that is a bridge between alternate sleeping and use of a helmet.

Case Report - Assessment: This case report presents a four and a half month old male child presenting at a chiropractor's office. The child's working diagnosis was: (1) Occipital condyle compression, (2) Plagiocephaly; and (3) KISS syndrome type 1. Specific SOT cranial treatment was used to correct the child's presenting plagiocephaly. This patient received 12 treatments over a period of 3 months and showed a significant improvement in head shape.

Discussion: DP has some concomitant syndromes that might be coincidental or related in a primary or secondary manner, which include scoliosis, KISS, and torticollis. From a biological plausibility standpoint it would seem that allowing the brain to grow in a symmetrical fashion, balanced stress on vascular membranes, and maintaining normal anchoring of muscular attachments would be beneficial. Recent research has indeed found a relationship between DP and neurodevelopmental delays and that posterior DP may even affect visual field development.

Conclusion: The purpose of this paper was to offer an alternative view of how DF might be treated in a chiropractor's office and at what stage intervention might prove effective. Since parents often are not willing to 'just wait and see' and are leaning towards some degree of intervention, chiropractic cranial care appears to be a viable intermediate therapy and may facilitate a reduced need for helmet therapy.

Indexing Terms: Paediatric care, chiropractic, sacro-occipital technique, cranial technique, plagiocephaly correction.

Introduction

Plagiocephaly is general term used to describe cranial asymmetry. Pathogenically, plagiocephaly is classified as synostotic, caused by abnormal sutural development or deformational (non-synostotic or positional), believed to be caused by external forces acting on the cranium. Synostotic plagiocephaly (SP) (occurring in less than 1% of all cases of plagiocephaly), is relatively rare in comparison to deformational plagiocephaly (DP), and related to closure at the coronal (anterior) or lambdoidal (posterior) sutures. (1) The incidence of plagiocephaly (noticeable cranial flattening) was estimated in a study (N=342) by Littlefield (2) to be approximately 15% while in another study (N=201) by Peitsch (3) to be 13% of births studied.

... a successful outcome was achieved by adjusting the sacrum followed by any spinal subluxations, and then the cranium using a specific cranial correction.'



Differentiating between SP and DP is extremely important for health practitioners since children with synostosis often will require surgical intervention. Losee determined on CT scan that posterior SP is characterized by nearly complete sutural obliteration with ectocranial ridging, whereas DP patients showed sutural narrowing with endocranial ridging on. (4) Also with lambdoidal synostosis the ear ipsilateral to the side of occipital flattening is typically posterior, compared to the contralateral ear, whereas in posterior DP the ipsilateral ear is anterior on the side of skull flattening. (5)

Bruneteau and Mulliken used cranial landmarks for the differential diagnosis of frontal DP. (6) When viewed from the vertex, the side of frontal flattening will tend to have an anterior displacement of the ipsilateral ear and sparing of the face in unilateral coronal synostosis. DP will tend to have a posteriorly displaced ear on the side of frontal flattening and facial mirroring of the flattened frontal bone.

Various studies were reviewed that discussed plagiocephaly diagnosis, treatment, and possible related conditions, from *MANTIS*, *PubMed*, and *Google Scholar* using terms which had plagiocephaly in the subject heading. While there is extensive literature on the topic, there is an understanding that more research is needed and many aspects of treatment and associated developmental relationships are still under investigation.

Since plagiocephaly patients currently being treated in chiropractic offices are those with DP it is important to determine what risks or benefits might be offered. DP is more commonly seen in males, with the right side being affected more than the left side. Peitsch noted that (N=201) over 50% of newborns from a twin birth commonly present with DP. (3) Since 1992 there has been an increase in posterior DP. This is assumed to be associated with the *American Academy of Pediatrics* recommending supine sleeping to prevent the risk of sudden infant death syndrome (SIDS). (7) While this has been successful in reducing the incidence of SIDS it has led to an increase in posterior DP.

Commonly accepted treatments for DP include alternate sleeping postures, carefully monitoring the child when placed in a prone position, as well as in resistant cases use of cranial orthoses or helmets. While the cranial orthoses have been shown to be successful in aiding cases of DP they are not without some drawbacks. Bridges et al found that there are significant psychosocial effects of placing a child in a helmet, at times children will find the helmet uncomfortable, and there are risks associated with the general anaesthetic frequently required for adequate fitting of the helmet. (8) Chiropractic (sacro occipital technique) cranial care might offer a conservative option that is a bridge between alternate sleeping and use of a helmet.

Case Report

Assessment

This case report presents a four and a half month old male child presenting at a chiropractor's office. The mother noticed the child's head was flat on the right side and he kept head his head in right rotation when sleeping. She sought chiropractic care for her child's head shape when repositioning during sleep did not appear to be helping his condition. (Figure 1)

Labour and birth took three and a half hours in total and two other prior births were also relatively unremarkable. The mother reported that the infant exhibited colicky symptoms until the age of 3 months, had two episodes of conjunctivitis, and suffered from mild eczema particularly at the elbows and knees.

Upon examination all neurological evaluations of deep tendon reflexes, cranial nerves (excluding olfactory), Moro, plantar grasp, grasp symmetric, tonic neck reflex, asymmetric tonic neck reflex, plantar reflex, trunk incurvation reflex, rooting and suck reflexes were all within normal limits. Subluxations were found via inverted hang (e.g., head rotation indicating upper

cervical subluxation) and both static and motion palpation by an experienced clinician. The inverted hang test is performed by holding the child above the ankles and supporting the child in an 'upside-down' position. (9) Spinal subluxations by this analysis found imbalance at C1, T7/8, left S2 sacral segment and the right occiput was compressed. A moderate right anterior-posterior strain (left anterior flattening – right side prominence) with a mild lateral strain of the cranium was observed.

Palpation of cranial bone imbalance in plagiocephaly is described in a study by Sergueef (N=649) and they concluded that a thorough neonatal cranial examination could help identify individuals predisposed to develop posterior plagiocephaly. (10) A study by Davies (N=25) (11) and another by Quezada (N=1) (12) describe successful chiropractic and SOT cranial care for children with plagiocephaly.

Working diagnosis

The child's working diagnosis was: (1) Occipital condyle compression on the right, (2) Plagiocephaly – Anterior-posterior compressive strain pattern; and (3) Kinematic imbalances due to sub-occipital strain (KISS) syndrome type 1.

Treatment/Intervention

At each treatment visit the sacrum was adjusted followed by any spinal subluxations, and then the cranium using a specific cranial correction. On the anterior or prominent side the lateral border of the thumb contacts over the infant's anterior brow area around the frontal notch with the forefinger contacting the ipsilateral temporal posterior to the ear. The direction of correction is bringing the right side posteriorward with this hand. The opposite hand contacts the contralateral temporal behind the ear on the other side with the lateral border of the forefinger. The direction of correction on the left (frontal flattened) side is anteriorward creating a sheer stress from the vault to the skull base.

A third contact is necessary so an assistant is required to pull the child's maxilla gently forward and lateral towards the left flat frontal side. The precise direction of pull is determined by the doctor's palpation at the vault contacts. When correction is obtained, a release will be felt in the vault in the form of a tissue 'give' or softening. Generally with treatment some immediate improvement in the visual appearance of the skull strain will be noted.

Results

This patient received 12 treatments over a period of 3 months and showed a significant improvement in head shape. (Figure 2) As viewed in the pre and post treatment pictures it is clear that the asymmetry was influenced and greater symmetry can be noted. Head and neck use was balanced following care and there was no need for further care or use a helmet.

Discussion

Current research suggests that treatment of DP can achieve a better outcome with early intervention. (13, 14). The young skull is malleable and interventions can create a significant effect, however they need to be performed by a skilled practitioner since this flexibility could also lead to iatrogenic issues if performed improperly. The adjustment directly works with reducing the external cranial vault asymmetry while the intraoral hard palate contact affects the structures internally. The pull on the maxilla is theorized to transfer stress via the vomer and/or the ipsilateral sphenopalatine to the dural membranes, assisting in bringing greater symmetry of the skull base.

There are some issues with the study of plagiocephaly, which involves the possibility that a child might improve without any intervention or with solely modification of position when at sleep. While the mother did attempt a wait and see approach, she became unsatisfied with her

child's progress and looked for another option. She felt that chiropractic care was the midway point between doing nothing and her child needing to use a helmet. Possible greater research studies with controls could help differentiate a subset of patients that respond best to chiropractic cranial care.

Figure 1: Pre-treatment



Figure 2: Post-treatment



DP has some concomitant syndromes that might be coincidental or related in a primary or secondary manner, which include scoliosis, (15) KISS, (16), and torticollis. (17) But there might be a question that other than for cosmetic reasons is a symmetrical head better than one that is asymmetrical? From a biological plausibility standpoint it would seem that allowing the brain to grow in a symmetrical fashion, balanced stress on vascular membranes, and maintaining normal anchoring of muscular attachments would be beneficial.

Since DP is sometimes associated with birth or intrauterine constraint, (18) it is interesting to see that a recent study found a relationship between foetal distress and birth interventions in children with developmental delay syndromes. (19) Recent research has indeed found a relationship between DP and neurodevelopmental delays. (20) Studies have also found that posterior DP may even affect visual field development. (21)

It is possible that with more vigilant care the mother might have prevented or helped reduce the child's presenting cranial pattern. It is also possible that a cranial orthosis might have also helped the child's rhomboid type plagiocephaly. It is always difficult to extrapolate one case to the population and this represents the typical difficulty and caution one must weigh in giving value to case reports.

Conclusion

The purpose of this paper was to offer an alternative view of how DF might be treated in a chiropractor's office and at what stage intervention might prove effective. Since parents often are not willing to 'just wait and see' and are leaning towards some degree of intervention, chiropractic cranial care appears to be a viable intermediate therapy. Cranial care might also be able to facilitate a reduced need for helmet therapy.

Further study is needed into chiropractic cranial care of plagiocephaly with careful attention given to differentiate synostotic types, which warrant a referral to neurosurgeon. Case series or cohorts with some controls could be used to investigate the efficacy of this treatment for children in need of care. At this time the care seems to offer low risk and with close monitoring of neurological functioning if the child is not responding to care they can be referred for further care.

Steve Williams
DC



Charles Blum
DC
drcblum@aol.com

Simon Williams
DC

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