

## Article

### **Neurodevelopment Delays in Children with Deformational Plagiocephaly**

Kordestani RK, Patel S, Bard DE, Gurwitch R, Panchal J.

*Plastic and Reconstructive Surgery* 2006, Vol. 117, Number 1, pp.207 to 218.

The purpose of this article is to determine if infants with deformational plagiocephaly or plagiocephaly without synostosis (fused skull suture), demonstrated cognitive or psychomotor development delays when compared to a standardized population. This study will expand on previous work published in 2001.

The study population includes a total of 110 consecutive patients. Each infant was assessed using the Bayley Scales of Infant Development-II scoring system. The developmental analysis was categorized as either mental or psychomotor using the mental developmental index or the psychomotor developmental index, respectively. The infants were then subcategorized into four groups: accelerated, normal, mild, severely delayed.

The results show infants with deformational plagiocephaly were found to have significantly different psychomotor development indexes and mental developmental indexes when compared with the standardized population. Looking at the mental developmental index scores none of the infants with deformational plagiocephaly were accelerated, 90% were normal, 7% were mildly delayed, and 3% were severely delayed. Looking at the psychomotor development scores again none of the infants with deformational plagiocephaly were accelerated, 74% were normal, 19% were delayed and 7% severely delayed.

In conclusion, this study indicates that before any intervention, infants with deformational plagiocephaly show significant delays in both mental and psychomotor development. In addition, no child in this study with deformational plagiocephaly demonstrated accelerated development.



## Article

### **Speech, Cognitive, and Behavioral Outcomes in Nonsyndromic Craniosynostosis**

Becker DB, Petersen JD, Kane AA, Cradock MM, Thomas K, Marsh JL.  
Plastic and Reconstructive Surgery Vol. 116 (2), Aug. 2005, pp. 400-407

This article seeks to more completely understand the prevalence of speech, cognitive and behavioral abnormalities in children with nonsynostotic cranial deformity (deformational plagiocephaly and brachycephaly) on the basis of the affected skull suture and age at diagnosis.

A review of patient charts with a diagnosis of nonsyndromic Craniosynostosis was performed between 1978 and 2000, noting diagnoses of speech-language, cognitive, or behavioral abnormalities. Findings were statistically analyzed for variance with regard to affected suture and diagnosis of abnormalities.

The number of patients with documented follow-up evaluations totaled 214. The average age of the child at the last follow-up visit was 6 years 4 months. Speech, cognitive and/or behavioral abnormalities were manifest in 49% of the patients with specific rates for each skull suture. This prevalence of abnormalities was a statistically significant increase from the general population. A logistic regression demonstrated that as a patient's age increased, the percentage of abnormal diagnoses also increased.

In conclusion, the reason for the association of nonsyndromic Craniosynostosis and speech, cognitive or behavioral abnormalities is yet unknown. However, nonsyndromic Craniosynostosis is often associated with cognitive, speech and /or behavioral abnormalities. Therefore, it is important that longitudinal cognitive, behavioral and speech assessment and treatment become an integral part of the overall care for children diagnosed with nonsyndromic cranial abnormalities.



## Article

### **Molding therapy of positional plagiocephaly: Subjective outcome and quality of life**

Govaert B, Michels A, Colla C, van der Hulst R.  
Journal of Craniofacial Surgery. 2008 Jan; 19 (1): 56-8

This article evaluates quality of life (QOL) and parental satisfaction in children diagnosed and treated with molding helmet therapy (MHT) for positional plagiocephaly. A retrospective chart review was performed on 166 children who had visited the craniofacial outpatient clinic in the University Hospital of Maastricht, The Netherlands between 2002 and 2003. Two questionnaires were sent to the parents of these children. The first was related to QOL issues and compared to a healthy control group. The second questionnaire evaluated the parents' satisfaction concerning the shape of their children's head before and after treatment.

Of the 166 children who visited the clinic 142 were diagnosed with positional plagiocephaly. The study group consisted of 111 boys and 31 girls. Ninety-eight were treated by use of a molding helmet and 44 had no treatment. Parents of all children treated with molding helmets were sent both questionnaires. Forty-six parents (47%) returned the questionnaires. The healthy control group consisted of 251 children between the ages of 1 and 5 years old and was used to validate the questionnaire in a previous study.

There were no significant differences in quality of life scores between the healthy control group and the children treated with molding helmet therapy. Of the 46 parents whose children had helmet therapy only two would not repeat or recommend this treatment. Reasons were unsatisfying result and, in one case, serious pressure spots with hair loss. Results showed no difference in quality of life between children treated with a molding helmet and the healthy control group. This study showed that molding helmet treatment in children with severe positional plagiocephaly does not have long-term adverse effects on quality of life. Differences in subjective rating show that helmet therapy has a good result on head shape. A 96% satisfaction rate shows that it is a pleasant therapy and gives a satisfying result.



## Article

### **Management of Deformational Plagiocephaly: Repositioning versus Orthotic Therapy**

Graham JM Jr., Gomez M, Halberg A, Earl DL, Kreutzman JT, Cui J, Guo X.  
Journal of Pediatrics. 2005 Feb; 146 (2): 258-62

This article compares positioning with Orthotic cranial remolding therapy in 298 consecutive infants referred for correction of head asymmetry. Of the 298 children included in the study 176 infants were treated with repositioning, 159 were treated with Orthotic remolding helmets and 37 were treated with a remolding helmet after the initial repositioning treatment failed.

Comparisons of the reduction in the diagonal difference were made between the two groups. Diagonal difference refers to a caliper measurement of the head extending from the forehead above the left eye to right side of the head behind the ear. This measurement is done for both sides of the head and the difference in these measurements is examined.

Results for infants treated with repositioning at an average starting age of 4.8 months and an average diagonal difference of 1.05cm was a reduction in the diagonal difference of .55cm (meaning the flat side of the skull improved .55cm). For infants treated with a cranial remolding orthosis at an average starting age of 6.6 months and an average diagonal difference of 1.13cm, the average reduction in the diagonal difference was .71cm ( flat side of the head improved .71cm). Helmets were routinely used for infants older than 6 months with a diagonal difference greater than 1 cm. Results of the study demonstrate that infants treated with an orthosis at an early age, younger than 6 months old, had a shorter treatment time with the remolding orthosis and had a better outcome.



## Article

### **Molding helmet therapy in the treatment of Brachycephaly and Plagiocephaly**

Teichgraeber JF, Seymour-Dempsey K, Baumgartner JE, Xia JJ, Waller AL, Gateno J.  
*Journal of Craniofacial Surgery*, 2004 Jan; 15 (1): 118-23

This article compares the use of a remolding helmet in the treatment of deformational plagiocephaly (DP and deformational brachycephaly (DB). Four hundred twenty-eight children with DP or DB were included in the study. Of this group 132 (32%) were treated with repositioning alone. The balance of the group, 292 (68%), were treated with a remolding helmet. Deformational Brachycephaly accounted for 64 or 21.9% and deformational plagiocephaly accounted for 248 or 78.1%. All children were evaluated by both a craniofacial surgeon and a pediatrician. Anthropomorphic measurements were used to assess the efficacy of treatment. Measurements were made before treatment began and at two month intervals until the completion of therapy.

Results showed a statistically significant improvement in all children treated with a remolding helmet. Overall, the children with deformational plagiocephaly normalized their head shapes; however, the head shapes of the children with deformational brachycephaly did not normalize despite statistically significant improvements in their Cephalic Index. (Cephalic Index is the ratio of the width of the head divided by the length of the head. SEE the “DEFORMITIES and TREATMENT” tab on the menu bar).

In conclusion it was noted that orthotic cranial remolding is an effective treatment of deformational head shape abnormalities. Cranial orthoses were most effective on posterior plagiocephaly than in children with posterior brachycephaly or “Back-To-Sleep” head shape.



## Article

### **Predictors of Severity in Deformational Plagiocephaly**

Oh, Albert K. MD; Hoy, Erik A. MD; Rogers, Gary F. MD, JD, MBA, MPH  
*Journal of Craniofacial Surgery*, March 2009, Vol. 20, Issue- pp.685-689.

This study seeks to identify the relationship between the predisposing factors for Deformational Plagiocephaly and the severity of skull flattening. The study was conducted between January 2006 and December 2007 at the Hasbro Children's Hospital, Providence, Rhode Island and Children's Hospital Boston, Massachusetts. Parents completed a questionnaire and physicians performed a focused physical exam which included industry standard cranial measurements. Of the 576 patients with cranial asymmetry who were enrolled, 142 were excluded leaving 434 patients with Deformational Plagiocephaly in the study.

There are many published reports of the risk factors which can lead to Deformational Plagiocephaly. These factors include supine positioning, first born infants, prematurity, developmental delay among others. While these factors are known to contribute to the development of Deformational Plagiocephaly, the influence of each on the degree of asymmetry has not been determined. The researchers developed a study to determine the relationship between predisposing factors for Deformational Plagiocephaly and the severity of skull flattening.

The researchers examined a number of factors in infants and in maternal variables associated with pregnancy. One notable finding was that severity of head flattening was not associated with infant sleeping position. The researchers could not demonstrate a logical correlation to indicate more severe flattening from supine (back) positioning. No association was found between the use of wedge pillows and the severity of head flattening, calling into question the effectiveness of these devices in preventing Deformational Plagiocephaly.

Other findings include; a trend toward less flattening in infants who sleep prone (on their stomachs), or in positions that were alternated, a lower gestational age was associated with more severe flattening, boys had significantly more cranial asymmetry than girls, boys are at a higher risk for more severe flattening and that multiple birth pregnancies had a disproportionately higher rate of deformational plagiocephaly cases than the general population.

The great significance of this study is the fact that the researchers were able to find direct correlations between a variety of variables and the severity of deformational plagiocephaly in infants. Ultimately, they have shown that there are clear risk factors for more severe flattening in infants.

Their findings also concur with other studies supporting the widely supported belief that the development of plagiocephaly is progressive, beginning during early infancy.

