

Do Cranial Remolding Orthoses Work?

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Abstract

Context: The infant skull is inherently pliable at birth and skull growth patterns can be affected by deformational forces if the forces are applied for an extended amount of time. Cranial Remolding Orthoses (CROs) are commonly used as a treatment method to return a deformed skull to a normalized shape.

Objective: Patient outcomes were reviewed to determine if CRO treatment duration and post-treatment residual asymmetry were influenced by treatment initiation age and initial severity.

Methods: University of Texas Southwestern Medical Center researchers performed a retrospective chart review of infants who completed treatment with a CRO at Level 4 Prosthetics and Orthotics' Texas offices between January 2013 and June 2017.

In total, 2423 charts were reviewed to find 499 subjects with deformational plagiocephaly who completed CRO treatment. CRO treatment entailed wearing the orthosis 23 hours per day until the head shape was corrected; the CRO was regularly adjusted for growth.

Treatment duration, post-treatment asymmetry, and the asymmetry correction rate were statistically examined.

Results: Treatment duration was generally longer and post-treatment asymmetry was higher for infants with more severe starting head shapes and infants who began treatment at an older age. The asymmetry correction rate was faster for younger infants.

Conclusions: CRO treatment significantly improved the head shape of all age and severity groups. When treating infants with deformational plagiocephaly, success appears to be better when starting CRO treatment at a younger age.

Keywords: Plagiocephaly; Orthotic devices; Non-synostotic plagiocephaly; Cranial remolding orthosis

Abbreviation: CRO: Cranial Remolding Orthosis

Description

The use of a Cranial Remolding Orthosis (CRO) to treat deformational head shapes has been a topic of interest in recent years [1,2]. A systematic review of the evidence by the Congress of Neurological Surgeons published in 2016 gave support for the use of CROs in older infants and infants with moderate to severe asymmetry, but was only able to provide a Level II recommendation (uncertain clinical certainty) [1]. There is a need for further examination into the effectiveness of this treatment.

The article "Effects of Initial Age and Severity on Cranial Remolding Orthotic Treatment for Infants with Deformational Plagiocephaly" was recently published in the *Journal of Clinical Medicine* [3] and has already received multiple international citations. It is a study which examines patient outcomes for infants with isolated deformational plagiocephaly who were treated with a Cranial Remolding Orthosis (CRO). In this retrospective chart review, the orthotic treatment duration, post treatment residual cranial asymmetry, and asymmetry correction rate for 499 infants were examined.

The treating orthotists had the infants wear the CRO for 23 hours per day, 7 days per week until the head shape was normalized or the infant's growth seemed to be slowed to the point of not seeing further changes. Initial age was adjusted to account for subject's prematurity. The CROs were adjusted at frequent intervals throughout the treatment process in order to actively direct cranial correction [4,5].

The researchers divided these infants into 20 groups based on their age and asymmetry when CRO treatment was initiated. Treatment duration trends were examined and showed moderate, severe, and very severe infants have statistically longer treatment durations when CRO use was initiated at an older age. It was also shown that for infants 4 months and older, infants with higher starting asymmetry within the same age category have statistically longer treatment durations. Interestingly, it was also shown that residual post treatment cranial asymmetry was statistically worse within each age group as initial severity increased, meaning that even within the same age group; infants are not achieving

the same treatment outcomes by simply wearing the orthosis longer. The best outcomes were seen in the younger age groups regardless of starting severity or treatment duration [6,7].

Discussion and Conclusion

This is an interesting conclusion as some authors have shown superior results when a CRO is initiated prior to 6 months of age but based on this study, 6 months does not seem to be a critical turning point for successful patient outcomes. Instead, early intervention is emphasized for all patients. An examination into the mean monthly asymmetry rate of change shows that as infant's age, the correction rate decreases. The authors propose that this may be associated with a decreasing growth rate as infant's age.

Study limitations include only using one brand of CRO at 3 offices of a single company, excluding patients who did not complete treatment or who had underlying medical conditions, a lack of a control group, and the examination of only one type of deformational head shape (isolated plagiocephaly).

The authors have published additional results in the Journal of Craniofacial Surgery and also examined the asymmetrical brachycephaly head shape. They plan to publish results of an examination into the brachycephaly head shape soon.

Conflicts of Interest

Tiffany Graham, MSPO, CPO, LPO, FAAOP was a prior employee of Level 4 Prosthetics and Orthotics. She was not employed by Level 4 during the course of this study and Level 4 did not actively participate in this study's data collection or analysis. The NIH had no role in the design, execution, interpretation, or writing of the study.

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