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Sponsored by: Congress of Neurological Surgeons and the Section on Pediatric Neurosurgery.

Endorsed by: Joint Guidelines Committee of the American Association of Neurological Surgeons, (AANS) the Congress of Neurological Surgeons (CNS); American Academy of Pediatrics (AAP).

No part of this article has been published or submitted for publication elsewhere.

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Received, August 16, 2016.

Accepted, August 17, 2016.

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 Congress of Neurological Surgeons.

Congress of Neurological Surgeons Systematic Review and Evidence-Based Guideline on the Management of Patients With Positional Plagiocephaly: The Role of Repositioning

BACKGROUND: Plagiocephaly, involving positional deformity of the calvarium in infants, is one of the most common reasons for pediatric neurosurgical consultation.

OBJECTIVE: To answer the question: "what is the evidence for the effectiveness of repositioning for positional plagiocephaly?" Treatment recommendations are provided based on the available evidence.

METHODS: The National Library of Medicine MEDLINE database and the Cochrane Library were queried using MeSH headings and key words relevant to repositioning as a means to treat plagiocephaly and brachycephaly. Abstracts were reviewed to identify which studies met the inclusion criteria. An evidentiary table was assembled summarizing the studies and the quality of evidence (Classes I-III). Based on the quality of the literature, a recommendation was rendered (Level I, II, or III).

RESULTS: There were 3 randomized trials (Class I), 1 prospective cohort study (Class II), and 6 retrospective cohort studies (Class III). Repositioning education was found to be equal to a repositioning device and inferior to a physical therapy program. Five of the 7 cohort studies comparing repositioning with a helmet reported helmets to be better and take less time.

CONCLUSION: Within the limits of this systematic review, repositioning education is effective in affording some degree of correction in virtually all infants with positional plagiocephaly or brachycephaly. Most studies suggest that a molding helmet corrects asymmetry more rapidly and to a greater degree than repositioning education. In a Class I study, repositioning education was as effective as repositioning education in conjunction with a repositioning wrap/device. Another Class I study demonstrated that a bedding pillow was superior to physical therapy for some infants. However, in keeping with the American Academy of Pediatrics' warning against the use of soft positioning pillows in the sleeping environment, the Task Force recommends physical therapy over any positioning device. The full guidelines document can be located at https://www.cns.org/guidelines/guidelines-management-patients-positional-plagiocephaly/Chapter_3.

KEY WORDS: Infants, Plagiocephaly, Positional plagiocephaly, Practice guidelines, Repositioning

Neurosurgery 79:E627–E629, 2016

DOI: 10.1227/NEU.0000000000001428

www.neurosurgery-online.com

Since the recommendation by the American Academy of Pediatrics, made in 1992, that infants be placed on their back to sleep to reduce the risk of sudden infant death syndrome, plagiocephaly, involving a positional deformity of the calvarium in infants, has been one of the most common reasons for pediatric neurosurgical consultation.¹ There are 2 types of plagiocephaly. The most common is referred to as posterior

plagiocephaly, in which there is unilateral flattening of the parieto-occipital region, resulting in a rhomboid-like shift of the calvarium with an anterior shift of the ipsilateral ear and bulging or bossing of the ipsilateral forehead. The second, less common, variant is sometimes called brachycephaly, in which there is flattening of the entire occipital region, resulting in a foreshortened head in the anterior-posterior dimension. However,

the term *brachycephaly* is also used in children with craniosynostosis. Henceforth, the authors refer to a nonsynostotic calvarial positional deformity as plagiocephaly.

With very rare exception, plagiocephaly is a nonoperative condition.² Treatments include observation, physical therapy, particularly in the presence of torticollis, repositioning education, and assistive devices and helmet therapy. High rates of parental satisfaction have been reported regardless of treatment type.³ Plagiocephaly has been the topic of numerous review articles.⁴⁻¹⁰ The purpose of this systematic review is to address the question: does repositioning (education or with an assistive device) provide effective treatment for plagiocephaly?

METHODS

The Congress of Neurological Surgeons (CNS) and the Section on Pediatric Neurosurgery initiated a systematic review of the literature and evidence-based guidelines relevant to the management of positional plagiocephaly (https://www.cns.org/guidelines/guidelines-management-patients-positional-plagiocephaly/Chapter_1).

Literature Search

The Task Force collaborated with medical librarians to search the National Library of Medicine/PubMed database and the Cochrane Library for the period from 1966 to October 2014 using the MeSH subject headings and PubMed search strategies. Manual searches of bibliographies were also conducted. The search returned 38 articles; another 7 articles were found from a search of bibliographies. Twenty-four were excluded based on a review of the abstract. Ten articles satisfied the inclusion for this systematic review and meta-analysis, including 3 randomized trials, 1 prospective cohort, and 6 retrospective cohort studies (https://www.cns.org/guidelines/guidelines-management-patients-positional-plagiocephaly/Chapter_3).

Rating Quality of Diagnostic Evidence

For diagnostic-type papers, evidence classification had definitions targeted toward diagnosis. The issues addressed by papers on diagnosis are related to the ability of the diagnostic test to successfully distinguish between patients who have and do not have a disease or pertinent finding (https://www.cns.org/guidelines/guidelines-management-patients-positional-plagiocephaly/Chapter_3). Additional information regarding the hierarchy classification of evidence can be located at <https://www.cns.org/guidelines/guideline-procedures-policies/guideline-development-methodology>.

RECOMMENDATION

1. Repositioning is an effective treatment for deformational plagiocephaly. However, there is Class I evidence from a single study and Class II evidence from several studies that repositioning is inferior to physical therapy and the use of a helmet, respectively. Strength of recommendation: Level I (high clinical certainty; repositioning being inferior to physical therapy); Level II (moderate clinical certainty; repositioning being inferior to helmet use).

CONCLUSION

Positional plagiocephaly and brachycephaly are very common nowadays. This systematic review has demonstrated that either repositioning therapy or devices may be effective as the sole therapy, improving cranial asymmetry, particularly for mild to moderate deformity. Three randomized trials were included in our review. Each study compared different pairs of treatments. One trial found no difference between repositioning education and a repositioning device, and another found repositioning education was inferior to a physical therapy intervention program. Even though there is a European randomized trial that suggested that a bedding pillow was superior to daily stretching exercises in certain forms of positional deformity, we cannot at this time endorse any sleep positioning device as it would be contrary to the repeated recommendations set forth by the American Academy of Pediatrics Task Force on sudden infant death syndrome to avoid placing any soft surface bedding in the infant's crib.¹¹ Seven of 10 articles that were included in this review evaluated repositioning education (without a specified device) compared with a helmet or headband. The majority of these cohort studies (1 prospective, 6 retrospective) demonstrated that helmet therapy provides a greater degree of correction in a shorter period of time than repositioning. Thus, helmets should be the preferred treatment for severe positional deformity.

Disclosures

These evidence-based clinical practice guidelines were funded exclusively by the Congress of Neurological Surgeons and the Section on Pediatric Neurosurgery of the Congress of Neurological Surgeons and the American Association of Neurological Surgeons, which received no funding from outside commercial sources to support the development of this document. The authors have no personal, financial, or institutional interest in any of the drugs, materials, or devices described in this article.

Disclaimer of Liability

This clinical systematic review and evidence-based guideline was developed by a physician volunteer task force as an educational tool that reflects the current state of knowledge at the time of completion. The presentations are designed to provide an accurate review of the subject matter covered. This guideline is disseminated with the understanding that the recommendations by the authors and consultants who have collaborated in its development are not meant to replace the individualized care and treatment advice from a patient's physician(s). If medical advice or assistance is required, the services of a physician should be sought. The recommendations contained in this guideline may not be suitable for use in all circumstances. The choice to implement any particular recommendation contained in this guideline must be made by a managing physician in light of the situation of each particular patient and on the basis of existing resources.

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Acknowledgments

The guidelines task force would like to acknowledge the Congress of Neurological Surgeons Guidelines Committee for their contributions throughout the development of the guideline, the American Association of Neurological Surgeons/Congress of Neurological Surgeons Joint Guidelines Committee for their review, comments, and suggestions throughout peer review, as well as Pamela Shaw, MSLIS, MS, for assistance with the literature searches. Throughout the review process the reviewers and authors were blinded from one another. At this time the guidelines task force would like to acknowledge the following individual peer reviewers for their contributions: Sepideh Amin-Hanjani, MD; Maya Babu, MD; Kimon Bekelis, MD; Faiz Ahmad, MD; Daniel Resnick, MD; Patricia Raksin, MD; Jeffrey Olson, MD; Krystal Tomei, MD.