Complete Summary

GUIDELINE TITLE

Prevention and management of positional skull deformities in infants.

BIBLIOGRAPHIC SOURCE(S)

Persing J, James H, Swanson J, Kattwinkel J. Prevention and management of positional skull deformities in infants. American Academy of Pediatrics Committee on Practice and Ambulatory Medicine, Section on Plastic Surgery and Section on Neurological Surgery. Pediatrics 2003 Jul;112(1 Pt 1):199-202. [10 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

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SCOPE

DISEASE/CONDITION(S)

Positional skull deformities:

- Deformational plagiocephaly
- Lambdoid craniosynostosis

GUIDELINE CATEGORY

Diagnosis
Management
Prevention

CLINICAL SPECIALTY

Family Practice
Nursing
Pediatrics
Preventive Medicine

INTENDED USERS

Health Care Providers
Nurses
Physician Assistants
Physicians
Students

GUIDELINE OBJECTIVE(S)

To provide guidelines for the prevention, diagnosis, and management of positional skull deformity in an otherwise normal infant without evidence of associated anomalies, syndromes, or spinal disease

TARGET POPULATION

Normal infants without evidence of associated cranial anomalies, syndromes, or spinal disease

INTERVENTIONS AND PRACTICES CONSIDERED

Prevention

1. Parent education
2. Spending time in the prone position when awake and being observed

Diagnosis

1. History and physical examination at birth and at each health visit up to 1 year of age (looking down at the top of the head, examining the face, assessing neck movements)
2. Differentiating between deformational plagiocephaly and lambdoid craniosynostosis

Note: Imaging studies were considered but deemed unnecessary in most situations

Management

1. Preventive counseling
2. Mechanical adjustments and exercises
3. Skull-molding helmets
4. Neurosurgeon referral
5. Surgery, if indicated

MAJOR OUTCOMES CONSIDERED

Prevention of deformational plagiocephaly

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Committee)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Prevention

The pediatrician or other primary care clinician should educate parents as well as other health care professionals, such as those in newborn care units, on methods to decrease the risk of development of deformational plagiocephaly.

A certain amount of prone positioning, or "tummy time," while the infant is awake and being observed is recommended to help prevent the development of flat spots on the occiput and to facilitate development of upper shoulder girdle strength necessary for timely attainment of certain motor milestones ("Changing concepts," 2000). Beginning at birth, most deformational plagiocephaly also can be prevented by nightly alternating the supine head position (i.e., left and right occiputs) during sleep and periodically changing the orientation of the infant to outside activity such as is likely to occur at the door of the room.

Diagnosis

Diagnosis of cranial asymmetry in general, and deformational plagiocephaly in particular, can be determined on examination at birth and at each health supervision visit up to 1 year of age. It is important for the pediatrician or other examiner to look down at the top of the head, view the position of the ears, and note the position of the cheekbones (zygomas). By doing this, the typical deformational plagiocephaly, which forms a parallelogram, will be observed. In addition to the usually unilateral flattening of the occipital area, there may be ipsilateral frontal (forehead) and parietal bossing, cheekbone prominence, and anterior ear displacement ipsilateral to the flattened occiput (refer to Figure 1 in the original guideline document).

Examination of the face also may lead to detection of abnormalities, such as head tilt and contralateral facial flattening.

An assessment of neck movements also should be made to confirm or rule out the presence of torticollis. Infants with torticollis have some limitation of active rotation of their heads away from the flattened side of the occiput. The rotating chair or stool test is a procedure to assist in the diagnosis of torticollis associated with deformational plagiocephaly. The examiner sits on a rotating chair or stool and holds the infant facing the parent. Although the parent attempts to keep the infant interested in maintaining eye contact, the examiner rotates with the infant on the chair or stool and observes the infant's head movements. The difference between movement toward and away from the flattened side is helpful in making the diagnosis of torticollis associated with deformational plagiocephaly.

The diagnosis of deformational plagiocephaly in infancy is made primarily on the basis of history and is confirmed by the physical examination. If the patient had a typical rounded head at birth and after a few weeks or months has parallelogram deformity and occipital flattening, the diagnosis of deformational plagiocephaly should be made. On the other hand, if the head has occipital flattening at the time of birth, the diagnosis of lambdoid craniosynostosis should be considered. Like deformational plagiocephaly, lambdoid craniosynostosis produces a flat occiput on one side of the head and prominence on the contralateral side, and deformation may become more severe with time. The degree of frontal asymmetry is generally less but similar in pattern to deformational plagiocephaly, which is frontal prominence ipsilateral to occipital flattening. The pattern of other associated features, however, almost always differs from deformational plagiocephaly. Specifically, the ear ipsilateral to the flattened occiput is typically posterior and displaced inferiorly when compared with the contralateral ear. The posterior basal skull also is tilted with the mastoid process in this region unusually prominent. Facial deformity typically is minimal, if present at all. However, in very rare instances, the deformities seen with lambdoid craniosynostosis may be similar to those of deformational plagiocephaly (Menard and David, 1998).

Skull Radiographs and Cranial Computed Tomography Scans

Because the diagnosis of deformational plagiocephaly is made on the basis of history and findings on physical examination, imaging studies are unnecessary in most situations. Additionally, their interpretations, if obtained, may be misleading to clinicians. In cases of atypical skull pattern or moderate or severe skull deformity, skull radiographs may be used to explore the possibility of a diagnosis other than deformational plagiocephaly, such as craniosynostosis. A computed tomography scan evaluation may be further helpful for cases in which doubt remains after clinical and radiographic examinations. Radiographs will show obliteration of the lambdoid suture, and computed tomography scans will demonstrate a premature bridging of bone across the lambdoid suture and a constricted posterior cranial fossa ipsilateral to the fused lambdoid suture in cases of lambdoid craniosynostosis.

Management

Management of deformational plagiocephaly involves preventive counseling of parents, mechanical adjustments, and exercises. Parental compliance with the

management plan is pivotal in lessening the likelihood and severity of skull deformity. Skull molding helmets are an option for patients with severe deformity or skull shape that is refractory to therapeutic physical adjustments and position changes. Surgery is rarely necessary but may be indicated in severe refractory cases of deformational plagiocephaly or in patients with craniosynostosis.

Preventive Counseling

To prevent the deformity, parents should be counseled during the newborn period (by 2 to 4 weeks of age) when the skull is maximally deformable. Parents should be instructed to lay the infant down to sleep in the supine position, alternating positions (i.e., left and right occiputs). When awake and being observed, the infant should spend time in the prone position. The infant should spend minimal time in car seats (when not a passenger in a vehicle) or other seating that maintains supine positioning.

Once deformational plagiocephaly has developed, these same preventive strategies may be used to minimize progression. Additionally, it is important to monitor head shape closely until there is confidence that improvement will continue, usually when the infant is old enough to sit, crawl, and spend less time on his or her back, and until any associated torticollis is completely corrected.

Mechanical Adjustments and Exercises

Once deformational plagiocephaly is diagnosed, parents should be made aware of the condition and the mechanical adjustments that can be instituted. In general, most infants improve if the appropriate measures are conducted for a 2- to 3-month period. These include positioning the infant so that the rounded side of the head is placed dependent against the mattress.

Additionally, the position of the crib in the room may be changed to require the child to look away from the flattened side to see the parents and others in his or her room. The pediatrician should continue to encourage supervised "tummy time" on firm surfaces when the infant is awake and being observed. Torticollis perpetuates the position of the head on the flattened side and can add to a greater facial deformity. Therefore, if torticollis is present, neck motion exercises should be taught to the parents as part of management.

Neck exercises should be done with each diaper change. There are 3 repetitions per exercise, and it is estimated to take approximately 2 additional minutes per diaper change. One hand is placed on the child's upper chest, and the other hand rotates the child's head gently so that the chin touches the shoulder. This is held for approximately 10 seconds. The head is then rotated toward the opposite side and held for the same count. This will stretch out the sternocleidomastoid. Next, the head is tilted so that the infant's ear touches his or her shoulder. Again, the position is held for a count of 10 and repeated for the opposite side. This second exercise stretches the trapezius muscle. Additionally, the parents may be taught the rotating chair or stool technique to enhance neck motion in the infant.

Referral

If there is progression or lack of improvement of the skull deformity after a trial of mechanical adjustments, then referral to a pediatric neurosurgeon, a general neurosurgeon with expertise in pediatrics, or a craniofacial surgeon or craniofacial anomalies team should be considered. The purpose of this referral is to obtain the expertise of the pediatric surgical specialist on whether the correct diagnosis has been made and to direct the subsequent management, which may include molding helmets or surgery. Additionally, referral to a physical therapist may be considered if torticollis does not improve with neck stretching exercises within 2 to 3 months.

Skull-Molding Helmets

Several ancient civilizations have used head-molding devices in infants to reshape a typically shaped skull into a different but desired skull form. Conversely, skull-molding helmets can be used to correct atypical skull shapes, and similar devices are now proposed for this purpose. However, results from 1 study suggest that repositioning infants may produce improvement in mild to moderate cases similar to that reported with external orthotic devices (Moss, 1997). Another study has linked the use of helmets with an improvement over that achieved by repositioning alone (Mulliken et al., 1999). The best response for helmets occurs in the age range of 4 to 12 months because of the greater malleability of the young infant skull bone and the normalizing effect of the rapid growth of the brain. There is less modification of the cranial configuration when used after 12 months of age.

The use of helmets and other related devices seems to be beneficial primarily when there has been a lack of response to mechanical adjustments and exercises. In most situations, an improvement to repositioning and neck exercise is seen over a 2- to 3-month period if these measures are instituted as soon as the condition is recognized. Because use of skull-molding helmets incurs significant cost, further studies are needed to identify outcomes with and without them.

Surgery

Management of deformational skull deformities can include surgery. Surgery is almost always indicated for craniosynostosis, and it has been used in rare instances for deformational plagiocephaly without synostosis when the deformities are severe and resistant to nonsurgical measures.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting each recommendation is not specifically stated.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate preventive measures, diagnosis, and management of positional skull deformity in otherwise normal infants

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

The guidance in this report does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

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Neurological Surgery. Pediatrics 2003 Jul;112(1 Pt 1):199-202. [10 references]
PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

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2003 Jul

GUIDELINE DEVELOPER(S)

American Academy of Pediatrics - Medical Specialty Society

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American Academy of Pediatrics

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Section on Plastic Surgery
Section on Neurological Surgery

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

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GUIDELINE AVAILABILITY

Electronic copies: Available from the American Academy of Pediatrics (AAP) Web site.

Print copies: Available from American Academy of Pediatrics, 141 Northwest Point Blvd., P.O. Box 927, Elk Grove Village, IL 60009-0927.

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on February 20, 2004. The information was verified by the guideline developer on March 29, 2004.

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