THE “EPIDEMIC” OF DEFORMATIONAL PLAGIOCEPHALY
AND THE AMERICAN ACADEMY OF PEDIATRICS’ RESPONSE

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The infant skull consists of bony plates separated by cartilaginous areas allowing the head to mold during the birth process and fuse at predictable times during a child’s life. Premature fusion, brain shape or external forces can cause abnormality in head shape. Infants sleep prone in many cultures. In 1992, the American Academy of Pediatrics’ recommended placing infants in a supine sleep position to decrease the risk of Sudden Infant Death Syndrome (SIDS). In the last 15 years, several tertiary care centers in the United States noticed a marked increase in the incidence of unintentionally flattened asymmetric infant skulls. The infants all had varying degree of unilateral occipital flattening, forehead protrusion, facial asymmetry, ears displaced anteriorly, and almost all slept on their backs.

Several clinical features differentiate deformational plagiocephaly from unilateral lambdoid craniosynostosis (Table 1). A “parallelogram” skull shape strongly suggests deformational plagiocephaly (Figure 1). More facial asymmetry may occur with deformational plagiocephaly due to the frontal protuberance on the ipsilateral side of the occipital flattening.

Infants with plagiocephaly were more likely to be male, first-born and premature, presumably due to the larger head of male infants, the more constricted pelvis affecting the infant’s ability to reposition his head. 60% of posterior plagiocephaly is right-sided, postulated due to the fetus lying in the left occiput anterior position in the maternal pelvis at the end of pregnancy. Infants from multiple births (twins, triplets, etc) with in utero crowding are at increased risk for deformational plagiocephaly. Bottle-fed infants in whom the bottle is always held in the same hand appear to develop a positional preference and a greater tendency to have deformational plagiocephaly. Infants placed prone, “tummy time,” less than three times a day were at increased risk for posterior plagiocephaly.

In September 1995 in the Netherlands, the prevalence of deformational plagiocephaly in 7609 children presenting for well-child examinations was almost ten percent of infants less than six months of age. Prospectively, 30% of 200 infants studied over a two year period developed either plagiocephaly, brachycephaly or both, giving an incidence rate of one out of three.

Supine-sleeping infants showed delayed motor milestones in gross motor movements requiring upper body strength (roll, sit, pull to stand) in comparison to a prone sleeping group;
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however, at 18 months, there were no significant difference in skills between the groups.9,10 39% of children with persistent deformational plagiocephaly received special educational services versus 7.7% of their siblings (controls), suggesting possible intellectual difference between children with plagiocephaly and those without.11 Children with plagiocephaly demonstrate a different distribution of mental and psychomotor development than children without plagiocephaly (Table 2).12 Auditory evoked responses in infants with plagiocephaly appear different than non-affected infants.13 Posterior cranial deformity may correct in six to twelve weeks with treatment, but the facial asymmetry may correct over a more prolonged period of time, up to 18 months.3 If the facial asymmetry persists, it may have adverse psychosocial consequences, similar to strabismus, which has been shown to hamper an adolescent’s interpersonal relationships.14

Recognizing the increased prevalence of deformational plagiocephaly coincided with the 1992 American Academy of Pediatrics (AAP) recommendation that increased the number of infants placed on their “Back to Sleep”, the AAP responded in July 2003: the Clinical Report “Prevention and Management of Positional Skull Deformities in Infants”.15 It made several recommendations.

The diagnosis of deformational plagiocephaly is made by history and physical examination. The clinician should assess any risk factors regarding the child’s birth and the parents’ assessment of head shape since birth. The clinician should view the infant’s head from the top at each health supervision visit. The “parallelogram” shape, with flattened occiput and the bulging ipsilateral forehead is pathognomonic for deformational plagiocephaly (Figure 2). Ear location should be compared. Anterior displacement of the ear ipsilateral to the occipital flattening suggests deformational plagiocephaly. Evaluation for torticollis is encouraged. Imaging studies are unnecessary in most situations, however if obtained, initial assessment is with skull radiographs. If equivocal, computerized tomography (CT) scans may be helpful to rule out lambdoid suture craniosynostosis. Clinicians should counsel caregivers on “tummy time” while the infant is awake and minimize the infant’s time in car seats and swings. Simple exercises or positioning maneuvers can avoid or diminish torticollis and plagiocephaly. Physical therapy may be needed. If after a 2-3 month interval, the skull shape is not improving significantly, referral to a specialist in either pediatric neurosurgery or craniofacial surgery should be made. “Helmets” (head orthoses) can be used in moderate to severe deformational plagiocephaly to improve head shape and facial asymmetry. Surgery is rarely indicated.

An increased incidence of deformational plagiocephaly was noted after 1992. While deformational plagiocephaly is associated with other factors, such as torticollis, uterine constraint, and hypotonia, the large increase is attributed to the American Academy of Pediatrics recommendation of the “Back to Sleep” campaign in 1992. The “almost epidemic eruption of
posterior plagiocephaly” demonstrates that the general population did follow the “Back to Sleep” recommendation. The AAP’s Clinical Report on the prevention and management of positional skull deformities in infants defines the clinical diagnosis of plagiocephaly and describes prevention and intervention. A “helmet” head orthosis is recommended for moderate or severe deformity or deformity that is unchanged with physical therapy.

BIBLIOGRAPHY


Identification of Deformational Plagiocephaly (DP) versus Unilateral Lambdoid Craniosynostosis

<table>
<thead>
<tr>
<th>Examination</th>
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<tr>
<td>Palpate lambdoidal suture</td>
<td>Palpable ridge suggests synostosis</td>
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<tr>
<td>Inspect by aerial view</td>
<td>“Parallelogram-shaped” head suggests DP</td>
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<tr>
<td>Check ear position</td>
<td>Ear on flattened side more posterior or inferior than the other ear suggests synostosis</td>
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<td>Ear on flattened side displaced more anterior than the other ear suggests DP</td>
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<td>Assess facial symmetry</td>
<td>Forehead protruding on the side of the flattening suggests DP</td>
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<td>Observe unilateral “bald spot”</td>
<td>A unilateral bald spot suggests DP</td>
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<td>Clinician should palpate occiput for flattening</td>
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Table 1: Signs distinguishing deformational plagiocephaly versus synostotic lambdoid suture. Adapted from: Biggs W. Diagnosis and Management of Positional Head Deformity. *Amer Fam Physician* May 1, 2003 67(9): 1953-1956
Figure 1. (B on right) The anterior protrusion of the forehead forms the characteristic parallelogram shape of the head of deformational plagiocephaly. The head shape of lambdoid suture synostosis is depicted at the left (A).
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<th>Mental development index</th>
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