Deformational Plagiocephaly & Cranial Remolding in Infants

Section on Pediatrics

FACT SHEET

What Is Deformational Plagiocephaly?

- Deformational plagiocephaly refers to distortion of the skull that occurs in response to prenatal and postnatal external compression forces. It is non-synostotic in origin, meaning that the sutures of the skull are open and have not prematurely fused.
- One in three infants has some degree of skull distortion.
- Male babies are 1.58 to 3 times more prone than female babies to have deformational plagiocephaly.
- There has been an increased prevalence of plagiocephaly since 1992, following the American Academy of Pediatrics' "Back to Sleep Campaign" recommending that infants be placed in supine to decrease the risk of sudden infant death syndrome (SIDS).

Characteristics of a Newborn Skull

- Highly soft and pliable, with spaces called sutures in between the plates of bones.
- Variable shape due to the inherent plasticity, intrauterine constraint, and journey through the birth canal; also influenced by cranial size, shape, and growth.
- Total of eight sutures and six fontanels accommodate increased growth of the skull as the brain is actively growing.

The head shape should assume a normal shape within 6 weeks after birth. An abnormal head shape continuing beyond 6 weeks of age should be evaluated by a physician.

What Are the Causes of Skull Deformation?

Intrauterine and extrauterine factors

- Uterine crowding due to a large fetus, multiple fetuses, or oligohydramnios.
- Small maternal pelvis and/or prominent lumbar spine.
- The left occiput anterior (LOA) position in utero predisposes the fetal head to unilateral pressure.

Neonatal factors (birth and neonatal period)

- First-born infant.
- Pressure on the head by a tight birth canal.
- Forceps delivery and prolonged labor.
- Macrocephaly, hydrocephalus.
- Infants born prematurely or with low birth weight.
- Torticollis.
- Plagiocephaly that occurs after birth and worsens.
- Hypotonic infants presenting with weak neck muscles.
- Congenital hip and spine problems.

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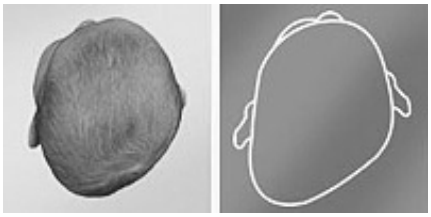
Environmental factors

- Preference to turn head to one side while sleeping.
- Sleeping and playing in the supine position with very little or no time spent in prone.
- Excess time spent in infant carriers, car seats, and strollers.
- Prolonged placement in one position in the neonatal intensive care unit (NICU).
- Prolonged position secondary to medical and orthopedic treatments (for example, Pavlic harness, feeding tubes).

What Are the Types of Skull Deformation?

Plagiocephaly



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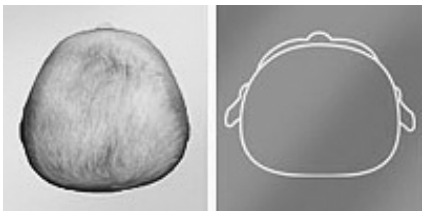
- Unilateral occipital flattening, anterior progression of the ear on the same side as the flattened occiput, varying degrees of ipsilateral frontal and contralateral posterior parietal bossing (parallelogram shape).
- Severe cases can involve the eyes, cheeks, and jaw.
- Strongly associated with congenital muscular torticollis, congenital hip dislocation, and congenital scoliosis.
- Right occipital flattening more common than left occipital flattening (2:1).
- Severity is determined by the number of skull quadrants involved in the deformity with or without the presence of facial and jaw asymmetry.

Brachycephaly



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- Wide skull with short length.
- Prominent or bossed forehead.
- Increased height of the cranial vault.
- Central occipital flattening.
- Severity determined by the number of deviations above the mean for Cephalic Index (CI) and frontal involvement of the forehead and facial structures.
- CI is higher for infants who sleep supine and spend extended time in supine positions.
- CI = (Width/Length) x 100.

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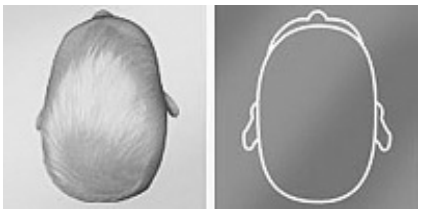
Scaphocephaly



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- Long and narrow skull shape.
- Shape is common in babies who spend extended time in NICU or are positioned side-lying.
- Severity determined by the number of deviations below the mean for CI.
- CI = (Width/Length) x 100.

How Can Head Symmetry Be Promoted?

Early diagnosis, treatment, and counseling are vital in the first 2 to 4 weeks after birth when the skull is most deformable. Therapists should make sure to differentiate from other causes of abnormal head shapes, including Craniosynostosis, Craniofacial syndromes, and Caput Succedaneum.

First Line of Action: Parental Education, Repositioning, and Exercises

Goal: Shift the infant off the flattened areas to enable the head to assume a symmetric shape.

- Alternate the head position in supine (right cheek to mattress one time, left cheek next).
- When awake and supervised, prop the baby onto one side with a foam wedge or a towel rolled lengthwise along the baby's back.
- Conduct supervised "tummy time" in the waking hours to improve the baby's muscle strength and development and keep the baby off the back of the head.
- Watch for "high guard" positioning and ensure that the infant has opportunities for midline play.
- Limit time in car seats, infant seats, swings, and strollers.
- Frequently change the position of the crib or the orientation of the baby in the crib to reduce the baby's tendency to look in the same direction.
- Change positions when feeding, carrying, and holding the baby.
- Provide supervised upright play as soon as the baby has upright head control.
- Interact with the baby from different sides, during feeding, changing, and playing.
- Encourage side-lying play.
- Under the direction of a physical therapist or physician, perform neck range of motion exercises for torticollis as needed.

Second Line of Action: Cranial Orthoses

Indications

- No response to repositioning therapy
- Secondary changes of the skull or frontal involvement

Contraindications

- Craniosynostosis
- Unshunted hydrocephalus
- Children beyond 18 months of corrected age
- Babies under 3 months of corrected age

Types of cranial orthoses (helmets and bands)

All cranial orthoses require FDA clearance; Photos provided courtesy of Orthomerica and Children's Healthcare of Atlanta

Goals and principles of use

- Encourage symmetrical skull growth by providing total contact over prominent areas of the skull and providing relief inside the orthosis where growth is desired.

Factors affecting correction

Age at beginning of treatment, type and severity of deformation, and caregiver adherence with the treatment program all affect treatment.

- Average age range for initiating treatment is 4 to 12 months
- Overall age range for treatment is 3 to 18 months
- Optimum age range for initiating treatment is 4 to 8 months
- Worn 23 hours per day for a period of 2 to 6 months
- Follow up is 1 week after the initial fit and every 2 weeks thereafter

***Final Line of Action*: Surgery**

- Rare in deformational plagiocephaly without synostosis
- Used in severe deformities resistant to non-surgical measures

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For More Information

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