

## What is plagiocephaly?

Plagiocephaly is a malformation of the head characterized by a persistent flat spot on the back or side of the skull, leading to asymmetry (unevenness) and skewing of the head and face. Acting on evidence that back sleeping reduced the incidence of sudden infant death syndrome (SIDS), the American Academy of Pediatrics (AAP) launched their "Back to Sleep" campaign in 1992. The AAP position was widely followed and led to a significant reduction in SIDS. One of the unwanted consequences was an increase in the number of infants that developed head flattening and asymmetry. This sparked concern and controversy regarding the causes and implications of shape changes. The information in this brochure is based on scientific evidence and the professional experience of our group. For more information, we welcome questions during your consultation.

*You may also be interested in our video overview of plagiocephaly available at [on.chbos.org/plagiovid](http://on.chbos.org/plagiovid).*

## How does flattening occur?

Flattening occurs when the infant's rapidly growing head tries to expand and meets resistance, usually from a bed or other flat resting surface. This is similar to how a pumpkin grows flat in a field: it cannot grow through the ground, so it grows around the obstructing surface and begins to conform to its shape. The average age that flattening is noticed by parents is at six to eight weeks of life. Some experts incorrectly suggest that the softness of the infant's head is the reason; however, one merely has to lay a newborn's head on such a surface and observe that such immediate flattening does not occur to disprove this widely held belief.

## Why does flattening only occur in some infants?

Studies show only 20 to 25 percent of infants who sleep on their back develop significant flattening. Thus, back sleeping plays a role but is not the cause. Any factor that limits the ability of the infant to naturally reposition his head during the first few months of life can lead to cranial flattening. Muscular torticollis, a neck muscle imbalance caused by prolonged fetal head constraint during pregnancy, is the biggest risk factor and is present in over 90 percent of affected infants. Not surprisingly, many of the risk factors (multiple gestation births, a low amount of amniotic fluid, being a first born) have a space-limiting effect on the developing fetus. Prematurity and developmental delay can also limit an infant's ability to move his head, but are less common causes.

## When does flattening stop?

Flattening can develop in at-risk infants until they achieve head control, usually around three months of age in normal, full-term babies. Once the infant can move his head more effectively, the flattening will not worsen. Accordingly, premature or developmentally delayed infants may experience a longer period during which flattening may progress. This is why these infants are at a statistically higher risk of developing plagiocephaly or brachycephaly.

## Does the flattening go away once an infant begins to roll over or sit?

Flattening may look less noticeable with growth. There are several explanations for why this occurs. First, although the flattening will cease to progress after three months of age, the child's head will continue to grow rapidly. Therefore, the flattening becomes proportionately smaller-appearing on a larger head. Consider an indentation on a baseball, and the same size indentation on a soccer ball. Clearly, the smaller baseball will look more affected. Additionally, flattening is less noticeable when viewed from the back of the head. As a child grows taller, the visual perspective of his back will change from a top-down (more obvious) to a further back (posterior) vantage (less obvious). As adults, we generally see each other's heads from a posterior or side view. This makes head asymmetry look much less visible. Lastly, hair can conceal a great deal of flattening. (This camouflage may be less helpful for infants who later in life wear their hair very short or lose hair.)

## Are there any medical implications of cranial flattening?

There is no convincing evidence that deformational flattening has any

effect on brain development, vision, temporomandibular joint function or hearing. Even facial asymmetry in cases of plagiocephaly seems to improve with growth. The only lasting effect is on the shape of the head.

## Can flattening be prevented?

There are two primary methods to prevent flattening: alternating the point of contact between the head and the resting surface or bed (repositioning); or changing the sleep surface from flat to concave, or curving inward (alternative sleep surface). Conceptually, consistent repositioning of an infant's head to alternate the point of contact with the resting surface should prevent flattening. However, parents may find such techniques difficult in infants with torticollis—the very infants who are most likely to experience flattening. Repositioning is generally ineffective at reversing established flattening. Alternative sleep surfaces provide a contoured surface to redistribute contact pressure over a larger surface area. There are many ways to apply this concept. Most surfaces do not expand as the head grows and, therefore, are relatively ineffective. The Plagio Cradle, a device developed at Boston Children's Hospital, is the only device that has been proven effective in a controlled study.<sup>1</sup>

## What is the role of physical therapy?

Physical therapy is often recommended for infants with plagiocephaly who also have torticollis. This therapy will aid in improving neck mobility and, if started early, can limit the degree of flattening that can occur during the first few months of life. In this sense, physical therapy can prevent further flattening but will not correct changes that have already occurred.

### Plagiocephaly

Plagiocephaly appears as flattening on one side of the head. This occurs in infants who consistently favor turning their head to one side (torticollis). Asymmetric growth of the head can result in facial asymmetry.



### Brachycephaly

Brachycephaly is caused by symmetrical flattening of the occipital bone area at the back, lower part of the skull. These infants have little or no rounding on the back of the head and a disproportionately wide head when viewed from the front. Asymmetric brachycephaly, a cross between plagiocephaly and brachycephaly, is the most common type.



### Torticollis

Torticollis causes the head to tilt to one side and the chin to rotate to the other. Parents will find their child always returns to a preferred head position, a clear sign of neck imbalance. As the child gains head control, the imbalance typically improves, although the flattening is often quite developed.

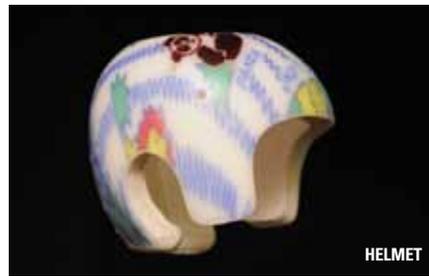
1. Rogers, G.F., Miller, J., Mulliken, J.B. Comparison of a modifiable cranial cup versus repositioning and cervical stretching for the early correction of deformational posterior plagiocephaly. In press, *Plast. Reconstr. Surg.*

## Is there a role for chiropractic or craniosacral therapy?

There is no scientific data to support the use of craniosacral therapy or chiropractic services to prevent or treat plagiocephaly.

## How is plagiocephaly treated?

For infants under three months of age, we prefer using a Plagio Cradle or, in very mild cases, repositioning. The Plagio Cradle is quite effective for infants under three months of age who are at risk for developing plagiocephaly (those who are born significantly premature or who show a clear head rotational preference) or who have already developed some flattening. It is more effective for plagiocephaly than brachycephaly. For infants over three months with moderate asymmetry or brachycephaly, we use a molding helmet (cranial orthosis). Helmet therapy is the most effective treatment



for established flattening. The helmet is a lightweight plastic shell with a foam liner and acts as a brace to redirect cranial growth. These have been in use since 1979 and have a very established track record of safety and successful treatment. The helmet does not squeeze or compress the infant's head. Rather, it creates a passive restraint to growth in areas that are overgrown while allowing uninhibited growth in areas that are flat. Studies have confirmed that this process does not inhibit brain and head growth, but merely redirects the growth to correct the shape. Because the head is constantly growing, the helmet must be worn 21 to 23 hours per day to get the maximal effect. It is most effective in younger infants (four to eight months) in whom the cranium is growing fastest. The helmet can still be effective in much older children (up to 18 months), but the treatment time is markedly longer and the correction less complete compared to younger infants.

### Locations

**Boston Children's Hospital** 617-355-7252  
300 Longwood Avenue, Boston, MA 02115

**Boston Children's North** 978-538-3600  
10 Centennial Drive, Peabody, MA 01960

**Boston Children's Hospital at Waltham**  
781-216-1600  
9 Hope Avenue, Waltham, MA 02453

[bostonchildrens.org/plastics](http://bostonchildrens.org/plastics)

### International

For families residing outside of the United States, contact Boston Children's International Center, which facilitates the medical review of patient records and appointment scheduling and provides assistance with customs and immigration, transportation and hotel and housing accommodations.

Visit [bostonchildrens.org/international](http://bostonchildrens.org/international) or call 01-617-355-5209.

# Plagiocephaly Diagnosis and treatment



**Boston Children's Hospital**  
Until every child is well<sup>SM</sup>



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Plastic and Oral Surgery