Non-Surgical Correction For Childhood Ear Deformities

Congenital ear deformities occur in one in three children, of which deformations such as misshapen ears are most common. Ear molding is a highly effective method for the non-invasive correction of ear deformations in newborns, with a success rate of more than 90 per cent if commenced within the first few days after birth.

By Dr Chia Hui Ling

Ear molding to correct deformations in newborns can obviate the need for surgery, provided that molding takes place within the first six weeks of life. After this narrow golden window of opportunity has passed, the molding method becomes less or not effective. Corrective surgery will be the likely recourse, which can only be carried out after four years of age.

Thus, identification of congenital ear deformities and prompt referral for assessment and intervention is extremely time-critical, as the effectiveness of the molding method plummets with age.

COMMON CHILDHOOD EAR DEFORMITIES

Ear deformities can be broadly divided into two categories: deformations and malformations. Deformations form the majority of ear deformities, and are typically misshapen ears with minimal deficiency in ear cartilage and skin. Common types of ear deformations include cup ears, lidding and helical deformities, which are outlined in Table 1. Ear deformations are amenable to molding.

Ear malformations are more severe deformities where there is a deficiency of ear cartilage and/or skin. The most severe forms are microtia – where the child has a rudimentary ear appendage, and anotia – where the child has no ear at all.

Ear malformations cannot be fully corrected with molding, and reconstructive surgery is the recommended treatment. The age indicated for surgery to correct ear malformations depends on the type of deformity.

While ear deformations do not affect a child's hearing, studies have shown that children and adults with ear deformities experience significantly more psychological distress, anxiety, self-consciousness, behavioural problems and social avoidance.

NON-SURGICAL EAR SHAPING

Ear molding can be highly effective in correcting ear deformations without surgery when initiated between the second or third day to six weeks of a newborn's life, during which the cartilage is pliable and moldable due to high levels of maternal oestrogen present in the child's circulation. Beyond this period of time, splinting becomes less or no longer effective, and the child can only undergo corrective surgery after four years of age, when the ears have grown to nearly their full size.

The process of ear molding involves wearing a customised splint continuously for a period of time to correct and maintain the shape of the ear, and the patient is reviewed weekly to monitor the progress of the correction. If initiated early, the duration of molding ranges from two to six weeks, depending on the severity of the deformation. The pliability of the newborn's cartilage allows the deformity

Figure 1. Child with cup / constricted ear, helical rim and conchal crus deformities.

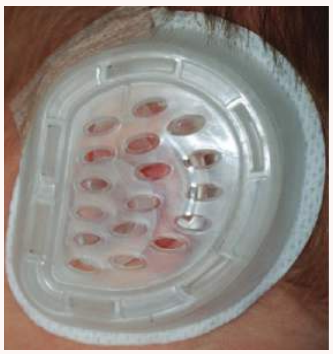


Figure 2. Same child wearing an ear molding device to correct the deformities.

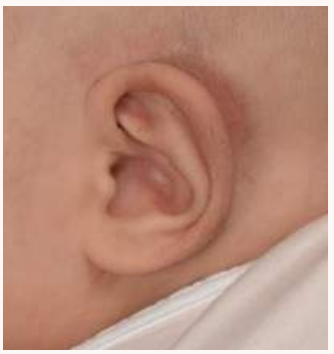


Figure 3. Same child with an improved ear form post-ear molding.

to be corrected, and the results – after a period of molding or splinting – are permanent.

Possible complications can include minor skin irritation and excoriations from splints and adhesive tapes used during molding. These are self-limiting and often resolve within a few days. Recurrence of the ear deformity after termination of splinting can be a late complication; this is more common in babies who commenced molding later in life.

Ear molding must be carried out by a medical practitioner trained in correcting ear deformities, as it is crucial to identify the abnormality accurately and customise the splint accordingly. Babies born in KK Women's and Children's Hospital (KKH) who have ear deformities are referred to the Department of Plastic, Reconstructive and Aesthetic Surgery for assessment and diagnosis as early as possible after birth. For babies diagnosed with ear deformations, when molding is initiated at day two to three of life, the rate of successful ear correction is more than 95 per cent.

At KKH, molding techniques are also increasingly being used to improve ear malformations. Patients who undergo this form of non-surgical correction can expect to require less invasive surgery in future to reconstruct their ear form, or no surgery if they find the improved ear form acceptable.

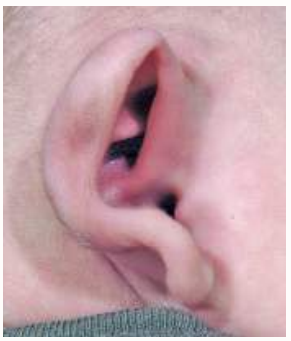
EARLY INTERVENTION CRUCIAL FOR SUCCESSFUL EAR MOLDING

At present, KKH performs ear molding for an average of 50 newborns each year. However, the number of children undergoing ear molding remains low compared to the incidence of childhood ear deformations in Singapore. This may be due to the lack of public awareness of ear molding as a viable and non-invasive corrective measure, as well as the late presentation of patients beyond the optimal age for successful molding.

As some ear deformations in newborns can be subtle and easily missed, caregivers and community healthcare practitioners are encouraged to examine the ears of newborns using the three-step approach outlined in Table 2, to identify less obvious deformations. Generally, the earlier a child receives intervention, the better their projected outcomes. Thus, should an infant be suspected to have an ear deformity, they should be promptly referred for tertiary assessment and diagnosis.

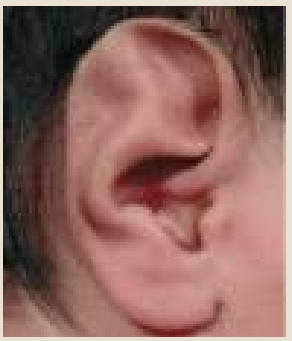
TABLE 1. COMMON TYPES OF EAR DEFORMATIONS

PROMINENT / CUP EAR



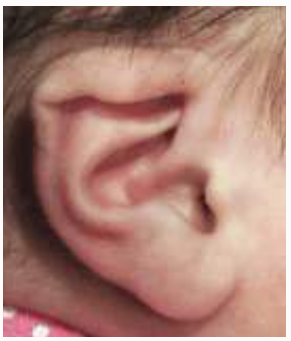
- Prominent ear is an abnormally protruding ear
- Cup ear deformity is an advanced form of prominent ear with an incomplete opening of the ear
- Often characterised by very stiff and resistant cartilage around the scapha and helical rim that can feel as though a string envelopes the helical rim

STAHL'S EAR



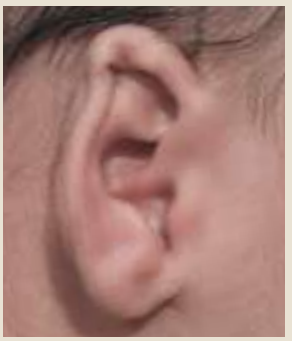
- Characterised by a transverse crus extending outward from the anti-helix, rather than continuing upward in a gentle bend as the superior limb of the triangular fossa
- Often presents with multiple or a combination of deformities

LIDDING / LOP EAR



- A folding over the helical rim or upper third of the ear
- Occurs when the superior limb of the anti-helix or the fossa fails to properly form
- Lop ear is the severe expression of lidding

HELICAL RIM DEFORMITY



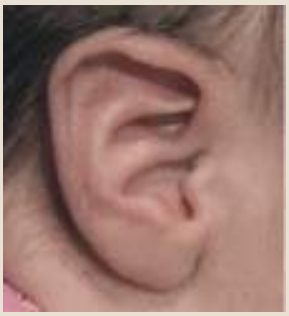
- Irregularities or compression that may occur anywhere along the entire circumference of the helical rim

Continued on page 12...

Continued from page 11...

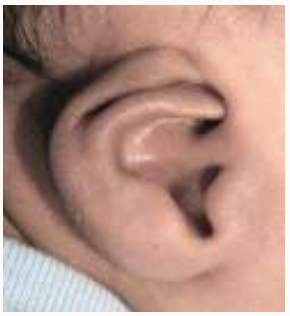
TABLE 1. COMMON TYPES OF EAR DEFORMATIONS

CONCHAL CRUS



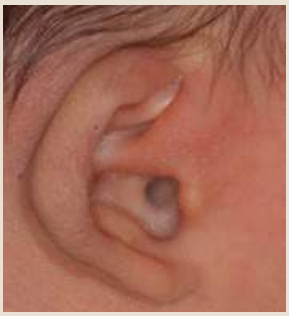
- An abnormal fold of cartilage crossing the mid-portion of the concha symba that appears to divide the ear into half
- Often results in prominent ear

CRYPTOTIA



- The ear cartilage framework appears buried beneath the skin with no apparent sulcus (where the ear meets the skull) or skin behind the ear

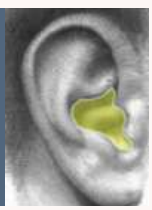
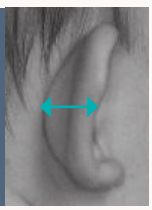
MIXED DEFORMITIES



- The child in the photo above has cup ear, helical rim deformity and conchal crus
- A combination of multiple deformities in the ear

"Identification of congenital ear deformities and prompt referral for assessment and intervention is extremely time-critical, as the effectiveness of the molding method plummets with age."

TABLE 2. THREE-STEP APPROACH TO IDENTIFYING EAR DEFORMATIONS IN CHILDREN

STEPS	NORMAL APPEARANCE	ABNORMAL APPEARANCE	NAME OF DEFORMATION
STEP 1 OUTER RIM (HELIX) 	• Smooth and rounded	• Flattening of the rim • Pointy or pixie ears • Notching abnormal folding of the rim	• Lidding • Stahl's ear • Helical rim deformity
STEP 2 INNER BOWL (CONCHA) 	• Partial crus • Height of concha around one-third of the height of the ear	• Prominent crus • Large conchal bowl	• Conchal crus • Prominent ear
STEP 3 PROMINENCE 	• The distance between the rim and the head should not exceed 7mm	• The distance between the rim and the head is 8mm or more	• Prominent ear or cup ear

Dr Chia Hui Ling, Consultant, Department of Plastic, Reconstructive and Aesthetic Surgery, KK Women's and Children's Hospital

Dr Chia has a special interest in plastic surgery pertaining to women and children, including paediatric plastic surgery, breast reconstruction and aesthetic surgery. In 2015, she underwent training in craniomaxillofacial surgery under the AOCMF Fellowship Program in United Kingdom and further completed a fellowship in plastic surgery with the JW Lee Center for Global Medicine at Seoul National University Hospital, South Korea.