Neonatal Ear Molding: Timing and Technique

Erin Elizabeth Anstadt, BA, a Dana Nicole Johns, MD, b Alvin Chi-Ming Kwok, MD, b Faizi Siddiqi, MD, b Barbu Gociman, MD, PhD b

aUniversity of Utah School of Medicine, Salt Lake City, Utah; and bDivision of Plastic and Reconstructive Surgery, University of Utah, Salt Lake City, Utah

Ms Anstadt drafted the initial manuscript and revised the manuscript; Drs Johns and Siddiqi critically reviewed and revised the manuscript; Dr Kwok reviewed and revised the manuscript and abstract; Dr Gociman conceptualized the treatment plan and carried out patient care, took the photographs, and critically reviewed the manuscript; and all authors approved the final manuscript as submitted.

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Address correspondence to Barbu Gociman, MD, PhD, Plastic Surgery/Craniofacial Surgery, University of Utah School of Medicine, Division of Plastic and Reconstructive Surgery, 30 N 1900 E Suite 3B400, Salt Lake City, UT 84132. E-mail: barbu.gociman@hsc.utah.edu

The incidence of auricular deformities is believed to be ~11.5 per 10,000 births, excluding children with microtia. Although not life-threatening, auricular deformities can cause undue distress for patients and their families. Although surgical procedures have traditionally been used to reconstruct congenital auricular deformities, ear molding has been gaining acceptance as an efficacious, noninvasive alternative for the treatment of newborns with ear deformations. We present the successful correction of bilateral Stahl’s ear deformity in a newborn through a straightforward, nonsurgical method implemented on the first day of life. The aim of this report is to make pediatric practitioners aware of an effective and simple molding technique appropriate for correction of congenital auricular anomalies. In addition, it stresses the importance of very early initiation of ear cartilage molding for achieving the desired outcome.

CASE REPORT

A healthy full-term newborn who had an uncomplicated delivery presented with bilateral Stahl’s ear deformities on his first day of life (Fig 1A). On examination, the patient’s ears had abnormal transverse antihelical crura and underdeveloped helices.
bilaterally. The physical examination was otherwise normal.

To mold the ear into a proper shape, a large metal paperclip was used. The paperclip was cut and bent to match the length and expected curvature of a normal helical rim. A small amount of patient's hair was clipped in the retroauricular area. The ear was thoroughly cleaned and dried (Fig 2A). Five strips of plastic tape (3M, St Paul, Minnesota) were cut into 3 × 20-mm pieces and applied to the posterior auricular skin (Fig 2B). The tapes were used to secure the preshaped paperclip along the base of the helix, reshaping both the helix and the antihelix (Fig 2C). Minimal force was needed to shape the neonatal pinna into a normal contour in this technique. The parents were taught the technique and observed performing it. They were instructed to promptly readjust the tape when displacement of the splint was noted. Within 1 week, the parents felt comfortable replacing the tape and monitoring the skin for breakdown. On average, the tape was replaced once daily, and no additional skin adhesives were needed for fixation of the splint. The parents reported no complications, confusion, or difficulty with maintaining the patient’s custom appliance. The splinting was performed continuously for 8 weeks. The patient was reassessed weekly in clinic to monitor progress. Besides minor skin irritation from the tape, no significant skin problems occurred necessitating discontinuation of the molding process. Complete reshaping of the ears was noted within the first few days after the molding was instituted. The excellent result was maintained at the 6-month follow-up clinic visit (Fig 1B).

**DISCUSSION**

Although not life-threatening, auricular deformities can cause undue distress for patients and their families. Compared with people with normally shaped ears, children and adults with deformed

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**FIGURE 1**

Typical results of ear molding initiated on the first day of life. A, Ear appearance at birth showing typical Stahl ear deformity with a transverse crus. B, Ear appearance at 6 months of age, after 2 months of molding.

**FIGURE 2**

Molding technique. A, The ear is thoroughly cleaned and dried. B, Strips of plastic tape are applied to the posterior auricular skin. C, The preshaped paperclip is secured along the base of the helix, reshaping both the helix and antihelix.
ears experience significantly more psychological distress, anxiety, self-consciousness, behavioral problems, and social avoidance. Clinicians can expect up to 30% of ear deformities to self-correct, but no reliable model exists for predicting those cases. If ear deformities are not corrected in the early neonatal period, surgical correction is often necessary and is typically completed after the child reaches age 5 or 6 years, when they have already been subjected to their peers’ scrutiny. Furthermore, otoplasty procedures are costly and carry the risk of significant complications including residual deformity, hematoma, cellulitis, and the need for additional surgeries. In fact, the reported residual deformity rate observed after surgical correction is up to 6 times higher than that of auricular molding. Thus, noninvasive interventions have been developed out of a need to optimize cosmetic results, to mitigate costs and the risks associated with otoplasty, and to improve the psychological well-being of these patients.

Congenital auricular anomalies are widely varied in terms of severity and type of anomaly. They are generally classified as deformations or true malformations. Deformations are characterized by a misshapen but fully developed pinna that is a result of atypical physical forces that occur in utero or postnatally. Deformations are usually categorized by the area of the ear that is affected, with the helix and antihelix being most commonly involved. Subtypes of deformities include prominent, lop, constricted, and Stahl’s ears. Malformations result from abnormalities in morphogenesis.

This report focuses on auricular deformations, because they make up the majority of congenital ear anomalies and can generally be corrected with molding alone. The pliable auricular components derived from the free ear fold, including the antihelix, helix, antitragus, and scaphoid and triangular fossae, are most susceptible to deformity as a result of their lack of medial support. The most common type of anomaly is a poorly defined superior crus and body of the antihelix, typically seen in prominent ears. In accordance with the mechanisms that created these deformations, it follows that these anomalies can be corrected by applying an opposing force to the auricle to reverse or reduce the deformity. Since 1980, various nonsurgical corrections for correcting auricular deformities have been described. Authors on this subject agree that adequate molding material should be delicate enough to reduce the risk of pressure ulcers, should be nonirritating to the skin to reduce risk of dermatitis, should be malleable to achieve the optimal ear shape, and should be readily available without exorbitant expense. Previous studies report success with a variety of splints, stents, and molds including Reston foam, dental material, lead-free soldering wire, feeding tubes, surgical tapes, wax, and vinyl polysiloxane impression material. In our experience, ease of assembly is another important feature, because primary care practitioners should be able to offer this solution to patients without requiring elaborate materials and instruments. Paramount to the success of this treatment modality is the parents’ ability to maintain the proper placement of the splint. Therefore, before patient discharge, comfort in application of the splint must be confirmed.

All splints should aim to recreate the normal distance and proportions between the auricular components and mastoid. Three molding forces are needed to correct the majority of deformities: a stent along the retroauricular sulcus that is able to form an antihelical fold, an anterior conformer able to recreate the natural curvature of the helical rim, and a helical rim retraction with arch formation. If significant cupping is present, an additional piece of tape can be used to approximate the pinna to the mastoid. The tools described in our methods are able to perform each of these functions with proper placement, negating the need for expensive molding devices previously described. If any concerns arise, instead of the metal splint the patient can be started or later transitioned to a softer custom fit elastomer splint.

To achieve permanent and satisfactory outcomes, timing of ear molding is critical. Although clinicians have shown that splinting should be completed by 3 months of age, most agree that earlier intervention optimizes cosmetic results. Maternal estrogen circulating in the newborn is hypothesized to affect the malleability of the
auricular cartilage in the early newborn period. The hormone typically peaks within 72 hours of birth and is thought to increase the concentration of hyaluronic acid in the cartilage, thereby increasing its plasticity.3 As the circulating levels of estrogen decrease after birth, the auricle becomes more elastic and firm. Current literature describes molding implemented over a timeline ranging from the first 3 days of life to the first 3 months of life.2,8 If molding is initiated after 3 weeks of birth, achieving a normal-appearing ear is less likely and requires longer durations of molding therapy.6 Our experience shows that treatment can be started on the first day of life without increased incidence of complications.

CONCLUSIONS
Congenital auricular anomalies are a pediatric public health issue rather than a surgical problem. It is critical for primary care practitioners to identify these deformities in the first days of life and initiate molding therapy early. Practitioners can refer patients to plastic surgeons for support if necessary. In most situations, however, the primary care provider can accomplish auricular molding by using the simple technique and materials we have presented in this report.

REFERENCES
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