



# Nonsurgical Correction of Congenital Concha Cavum Deformity Using a Commercial Ear Molding Device

Jia Kim<sup>1</sup> · Hyoseok Seo<sup>1</sup> · Sung-Won Choi<sup>1</sup> · Soo-Keun Kong<sup>1,2</sup> · Se-Joon Oh<sup>1,2</sup>

<sup>1</sup>*Department of Otorhinolaryngology and Biomedical Research Institute, Pusan National University Hospital, Busan;*

<sup>2</sup>*Department of Otorhinolaryngology, Pusan National University School of Medicine, Busan, Korea*

With the recent introduction of commercial auricular molding devices, nonsurgical ear correction has become an important option for the treatment of mild neonatal auricular deformities. Most studies on the treatment of auricular deformities using commercial ear molding devices have dealt with deformities such as prominent ear, cup ear, lop ear, cryptotia, Stahl's ear, and helical rim deformity [1]. However, the nonsurgical correction of relatively uncommon deformities, such as concha cavum deformities, has not been addressed in the literature. In particular, in concha cavum deformities, the narrowing of the external auditory canal may cause functional problems such as hearing loss; thus, it is necessary to treat this condition as soon as possible, for both cosmetic and functional reasons. This study aimed to investigate whether congenital concha cavum deformities could be corrected nonsurgically using a commercial ear molding device. This study was approved by the local Institutional Ethics Review Board of Pusan National University Hospital (No. 2107-009-105). All patients' caregiver provided written informed consent before starting the study.

A concha cavum deformity was confirmed in three of the 83 ears that underwent nonsurgical ear correction using a commercial ear molding device between May 2018 and December 2020, and splinting was performed in these three ears (Fig. 1A and C). The deformity was a state in which the cavum of the conchal cartilage convexly protruded and the external auditory canal was narrowed. All patients were newborns within 1 month of

birth, and they underwent nonsurgical auricular correction using EarWell (Becon Medical, Naperville, IL, USA) on the day of the visit based on their caregivers' decision.

The EarWell system was applied as follows: the EarWell system, which is made of thermoplastic elastomer, comprises four main components that work together as a mold to correct the auricle: a posterior cradle, retractors (large, middle, and small), a conchal bowl former, and an anterior shell (Fig. 2A). After shaving the hair 2–3 cm above the hairline, the posterior cradle was fitted around the auricle, pulling the ear through a central opening. Retractors made of soft rubber were used to hold the helix in position. These retractors were held in place by the inner adhesive side of the posterior cradle at the helix position to be corrected. A conchal former was placed around the root of the helix within the conchal bowl, which pressed on the convex conchal cartilage to secure and shape the external auditory canal (Fig. 2B). Next, the posterior cradle was covered by the anterior shell, forcing it to be applied to the conchal former and retractors (Fig. 2C). In all patients, the ear molding device was in place for 4 weeks, with removal after 2 weeks to check the skin condition. At the end of the 4-week correction period, the concha cavum deformity was completely corrected in all patients, and the partial occlusion of the external auditory canal was also normalized (Fig. 1B and D). There was no evidence of recurrence of corrected concha cavum even after 6 months.

The auricular cartilage of a newborn is incredibly malleable for correction due to the influence of circulating maternal estrogen [2]. Therefore, nonsurgical ear molding in neonates by forcing the auricle into the proper position for several weeks is potentially a good way to manage mild auricular deformities while avoiding future surgery. There are various types of auricular anomalies; however, it is known that nonsurgical ear correction can be applied to mild deformities that generally have a fully developed auricle with a partially abnormal shape [3]. Nonsur-

• Received December 28, 2021

Revised February 7, 2022

Accepted February 8, 2022

• Corresponding author: **Se-Joon Oh**

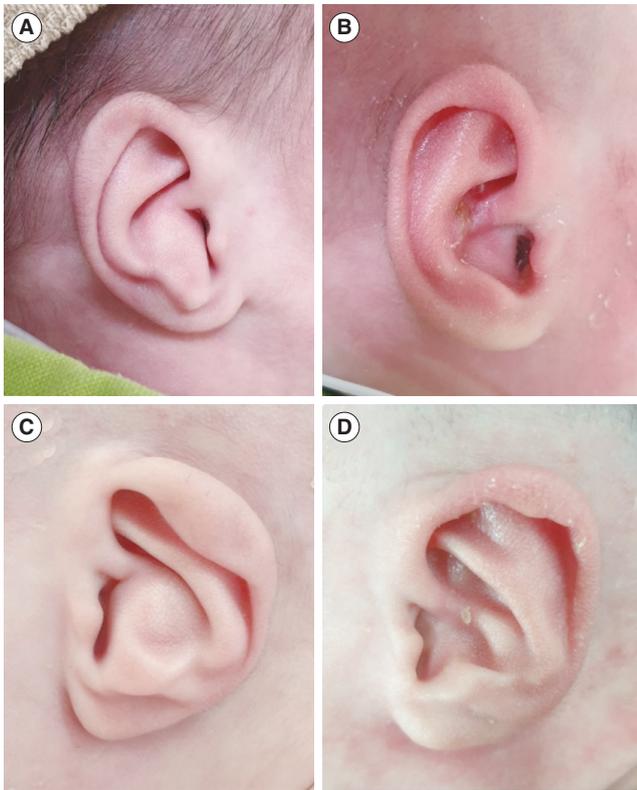
Department of Otorhinolaryngology, Pusan National University Hospital,  
Pusan National University School of Medicine, 179 Gudeok-ro, Seo-gu,  
Busan 49241, Korea

Tel: +82-51-240-7824, Fax: +82-51-246-8668

E-mail: entmania@pusan.ac.kr

Copyright © 2022 by Korean Society of Otorhinolaryngology-Head and Neck Surgery.

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.



**Fig. 1.** Concha cavum deformities treated with the EarWell correction system. (A) Case 1 before therapy. The concha cavum deformity with narrowing of the external auditory canal (EAC). (B) Case 1 after splinting for 4 weeks. The cavum of the conchal cartilage and EAC are normalized. (C) Case 2 before therapy. Cavum deformity, EAC narrowing, and lidding of the helix are observed. (D) Case 2 at 6 weeks after the end of treatment. The conchal cartilage and helix show excellent improvement.

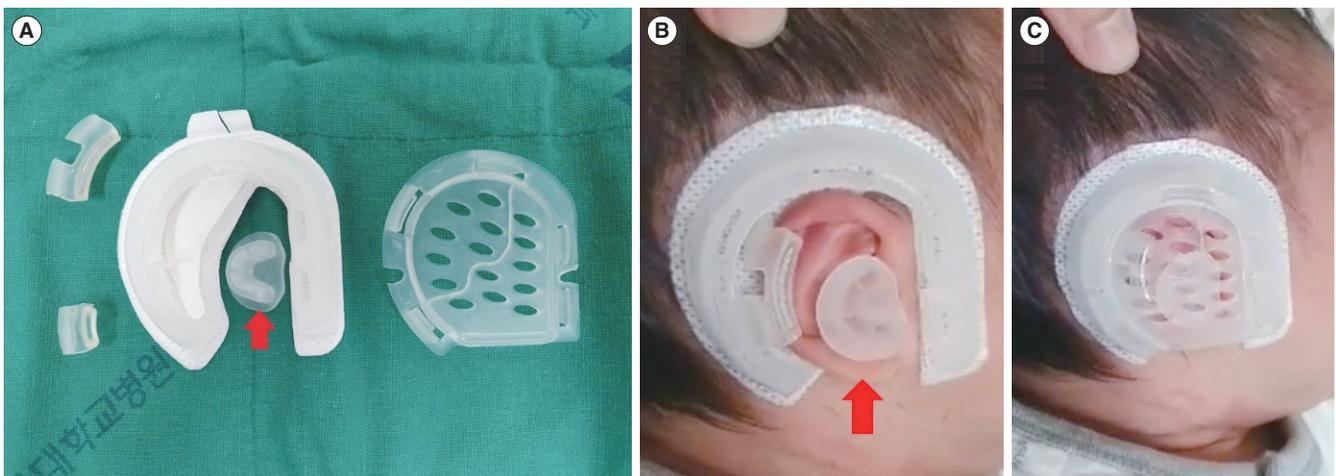
gical auricular molding to correct congenital auricular deformities was first attempted in the 1980s [4], and since Byrd developed the EarWell system, many studies have used it, with a success rate of over 90% [5].

Various types of commercial ear molding devices are also known, although most mainly target the correction of the helical rim, scapha, and antihelix, which are the upper one-third of the ear. However, among the subunits of the EarWell system, the conchal former was used to cover the cavum and cymba of the conchal cartilage and to correct the conchal crus deformity, which is an abnormal fold of cartilage crossing the mid-portion of the concha that appears to divide the ear in half. In this study, the conchal former played an important role in correcting the concha cavum deformity by compressing the deformed area, suggesting that the EarWell system, which includes a conchal former, may be preferred in these deformities. In contrast, it is not easily corrected by other commercial ear molding devices because they usually positioned at the groove of the helix (scaphal hollow) and cannot affect the conchal area.

In conclusion, although concha cavum deformity is an uncommon condition, if overlooked, it may cause external auditory canal stenosis and functional deterioration. Therefore, it can be treated by nonsurgical ear correction using an ear molding device such as EarWell if it is detected early.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.



**Fig. 2.** The EarWell system and its application to auricular deformities. (A) The EarWell system comprises four main components: a posterior cradle, retractors, a conchal bowl former, and an anterior shell. The red arrow points to the conchal bowl former, which is important for correcting concha cavum deformity. (B) The EarWell system attached to the auricle, before covering the anterior shell. The red arrow points to where the conchal bowl former is positioned in the cavum and cymba regions of the concha area. (C) The EarWell system after covering the anterior shell and the completion of all procedures.

## ORCID

Jia Kim <https://orcid.org/0000-0001-9797-5135>  
Hyoseok Seo <https://orcid.org/0000-0001-6480-3281>  
Sung-Won Choi <https://orcid.org/0000-0002-7463-7720>  
Soo-Keun Kong <https://orcid.org/0000-0002-6783-3766>  
Se-Joon Oh <https://orcid.org/0000-0001-8910-0064>

## AUTHOR CONTRIBUTIONS

Conceptualization: SJO. Data curation: JK. Formal analysis: HS.  
Methodology: SJO. Project administration: SKK. Visualization:  
SKK. Writing—original draft: SJO. Writing—review & editing: SJO.

## REFERENCES

1. Feijen MM, van Cruchten C, Payne PE, van der Hulst RR. Non-surgical correction of congenital ear anomalies: a review of the literature. *Plast Reconstr Surg Glob Open*. 2020 Nov;8(11):e3250.
2. Kenny FM, Angsusingha K, Stinson D, Hotchkiss J. Unconjugated estrogens in the perinatal period. *Pediatr Res*. 1973 Oct;7(10):826-31.
3. Kim M, Lee HM, Choi SW, Lee S, Kim C, Kong SK, et al. A longitudinal study of changes of congenital auricular deformity regarding self-correction. *J Plast Reconstr Aesthet Surg*. 2021 Oct;74(10):2705-11.
4. Kurozumi N, Ono S, Ishida H. Non-surgical correction of a congenital lop ear deformity by splinting with Reston foam. *Br J Plast Surg*. 1982 Apr;35(2):181-2.
5. Byrd HS, Langevin CJ, Ghidoni LA. Ear molding in newborn infants with auricular deformities. *Plast Reconstr Surg*. 2010 Oct;126(4):1191-200.