Non-surgical correction of congenital concha cavum deformity using commercial ear molding device

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Recently, with the introduction of commercial auricular molding devices, non-surgical ear correction has become an important option for the treatment of mild neonatal auricular deformities. Most of the studies on the treatment of auricular deformities using commercial ear molding devices dealt with deformities such as prominent ear, cup ear, lop ear, cryptotia, Stahl’s ear, and helical rim deformity.[1] However, the correction of relatively uncommon deformities, such as concha cavum deformities, has not been addressed in the literature. In particular, in this case, the narrowing of the external auditory canal may cause functional problems such as hearing loss; thus, it is necessary to treat it as soon as possible, not only for cosmetic reasons but also functional. This study aimed to investigate whether congenital concha cavum deformity could be corrected non-surgically using a commercial ear molding device. This study was approved by the local institutional ethics review board of Pusan National University Hospital, Busan, South Korea (Ethics Committee Decision no: 2107-009-105).

Concha cavum deformity was confirmed in three of the 83 ears that underwent non-surgical ear correction using commercial ear molding device between May 2018 and December 2020, and splinting was performed in these three ears (Fig 1A, C). The deformity was a state in which the cavum of the conchal cartilage was convexly protruded and the external auditory canal was narrowed. All patients were newborns within 1 month of birth, and they underwent non-surgical auricular correction using EarWell® (Becon Medical Ltd, Naperville, IL, USA) on the day of the visit under the decision of the caregivers.

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 molding to correct the auricle: the posterior cradle, retractors (large, middle, and small), conchal bowl
former, and 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 the external auditory canal and to
shape it (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 partial occlusion of the external
auditory canal was also normalized (Fig 1B, 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, non-surgical ear molding in
neonates by forcing the auricle into the proper position for several weeks is potentially a good
way to manage mild auricular deformity while avoiding future surgery. There are various
types of auricular anomalies; however, it is known that non-surgical ear correction can be
applied to mild deformities that have generally a fully developed auricle with a partially
abnormal shape.[3] Non-surgical auricular molding to correct congenital auricular deformities
had been 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 that 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 involving conchal
former may be preferred in these deformities, whereas 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 not a common auricular deformity, if
overlooked, it may cause external auditory canal stenosis and various functional deterioration.
Therefore, it can be treated by non-surgical ear correction using an ear molding device such
as EarWell® through early detection.

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References


Figure Legends

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

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