



CUSTOMISED EAR CONFORMERS: CASE REPORTS

¹Dr. Pavan T. P., ^{2*}Dr. Archana K. Sanketh, ³Dr. J. Sridevi, ⁴Dr. Mitha M. Shetty, ⁵Dr. Roshan Kumar and
⁶Dr. Supreetha S. Naik

^{1,2}Lecturer, Department of Prosthodontics, DAPMRV Dental College, Bangalore, Karnataka, India.

³Professor and Head of the Department, Department of Prosthodontics, DAPMRV Dental College, Bangalore,
Karnataka, India.

^{4,5}Reader, Department of Prosthodontics, DAPMRV Dental College, Bangalore, Karnataka, India.

⁶Lecturer, Department of Prosthodontics, DAPMRV Dental College, Bangalore, Karnataka, India.

*Corresponding Author: Dr. Archana K. Sanketh

Lecturer, Department of Prosthodontics, Dapmrv Dental College, Bangalore, Karnataka, India.

Article Received on 26/11/2018

Article Revised on 16/12/2018

Article Accepted on 06/01/2019

ABSTRACT

Surgical reconstruction is a viable option for auricular defects. However it may not be sufficient to achieve acceptable results. Skill and resources are of paramount importance in successful management of defects of the ear. Hence this article presents two cases of partial defects of the ear and their treatment with customised ear conformers post-surgical reconstruction. The purpose of this article is to put forth a simple, economical technique to treat patients with partial defects of the external ear as an adjunct or alternative to surgical reconstruction.

KEYWORDS: Customised ear prosthesis, auricular defect, helix, tragus, external acoustic meatus.

INTRODUCTION

The ears are paired organs, one on each side of the head. These organs are usually present in symmetry. However mild asymmetry is not uncommon. The ear is described as having 3 parts: the outer ear, the middle ear and the inner ear. Congenital malformations of the external ear affect the right side predominantly.^[1] Ear malformations may be genetic or acquired.

As prosthodontists we are concerned with the external ear and hence the anatomy, development and congenital anomalies of the external ear will be briefly described in this article.

Anatomy of the outer/External Ear (Figure 1)

The outer or external ear consists of the auricle, also called the pinna, and the external auditory meatus (ear canal).

The auricle^[2,3]

The auricle has an outer ridge - the helix and an inner ridge - the antihelix. It also includes a lobe inferiorly, which consists mainly of fatty tissue; and the tragus anteriorly, which is opposed by the antitragus.^[4]

The auricle presents 2 surfaces: medial and lateral. The lateral surface presents some natural elevations and depressions that include

a. **Concha**, a large depression that leads into the external auditory meatus.

b. **Helix**; consists of 2 limbs-anterior and posterior. The anterior limb ends as crus of helix, which divides the concha into smaller upper and bigger lower parts. The posterior limb ends below as the flabby ear lobe.

c. **Antihelix** is a prominent ridge present in front and parallel to the posterior part of helix, partially encircling the concha. The narrow channel between the helix and antihelix is named scaphoid fossa. Tragus is a small triangular flap present in front of the concha.

d. **Antitragus** is a small elevation opposite to tragus from which it's divided by an intertragic notch.

External acoustic meatus (external auditory canal)

The external auditory meatus (ear canal) consists of an outer cartilaginous portion, comprising one-third to one-half of its length, and an inner bony portion. The junction of these two sections is the osseo-cartilaginous junction.^[4]

The external acoustic meatus (external auditory canal) is formed by cartilage and temporal bone. The mandibular condyle sits anterior to the bony portion of the external acoustic meatus.

Development of the external ear^[5]

The external ear is formed by six mesenchymal buds called hillocks on the first and second branchial arches. Each bud gives rise to a particular part of the auricle. The tragus, root of the helix, and superior helix arise from the

first branchial arch, which is the mandibular arch. The antihelix, antitragus, and lobule arise from the second branchial arch or the hyoid arch. These hillocks fuse by the 12th week of gestation and development is complete by the 20th week. Developmental anomalies of the auricle are common as fusion of the hillocks is a complex process. The external auditory meatus is derived from the first branchial cleft.

To begin with, the auricle is located in the lower neck region of the embryo. As the mandible and maxilla develop, the auricular areas reach its final location by the 20th week.

An ear is recognised as being abnormal based on the general shape of the ear, position of the ear relative to other facial landmarks, its anatomy and the general size.^[6]

Classification of Congenital Anomalies of the External Ear

Numerous classifications have been proposed for ear malformations. It would be inapt to say that one classification would be appropriate for all ear anomalies. A simple classification put forth by Dr Foucar H O includes the following^[7]:-

1. Complete absence of the external auricle and meatus with or without development of the inner and middle ear.
2. Absence of the external auricle-complete or incomplete.
3. Ectopic ear. It is usually small, tilted and displaced downwards and forwards.
4. Supernumerary tags, usually in front of or below the ear or on a line from the tragus to the angle of the mouth.
5. Preauricular sinus.
6. Prominent ears.
7. Faun ear or incomplete folding of the helix or outer rim of the ear.
8. Abnormally small ears.
9. Abnormally large ears.
10. Asymmetry, one ear being normal and the other either larger or smaller.
11. Large lobule.
12. Adherent lobule.

Rehabilitation of partial defects of the ear poses a challenge both for the surgeon and the prosthodontist. This could be attributed to the basic anatomy of the ear with elevations, depressions, convexities and concavities. Auricular defects whether congenital or acquired can cause considerable psychological trauma to the patient and thus appropriate rehabilitation needs to be carried out. This paper discusses two cases of auricular defects and their management with customised ear conformers.

Case 1

A 35 year old male patient was referred by a private plastic surgeon for the prosthetic management of

congenital auricular defect on the right side. On examination the patient's right ear was found to be surgically reconstructed using right costal cartilage (Figure 3). The external auditory meatus was patent with the ear lobe intact. The patient's hearing ability was unaltered. The adherence of the reconstructed portion of the ear posteriorly onto the scalp was making the reconstructed ear look unesthetic. (figure 4). Also an inward collapse of the reconstructed portion was noted. Hence to counter this problem, an ear conformer was planned and executed. The patient was positioned in a comfortable position in the dental chair. The defect area was boxed with wax and an alginate impression was made of the defect area (Figure 5, 6) and then poured in die stone (Figure 7). An orthodontic wire (21 gauge/ 0.8mm) was conformed on the outer and rear aspect of the reconstructed helix and held in place with acrylic struts. A acrylic conformer was then fabricated to hold the helix in position preventing a collapse. The ear conformer encircled the ear along the posterior to the tragus in front in order to gain better stability and retention (Figures 8).

Case 2

An 18 year old patient reported with a congenitally malformed external ear on the right side. The opening of the external auditory meatus was not patent. The patient's hearing was unimpaired Surgical reconstruction of the congenitally missing ear had been performed (Figure 9). Spectacles were used as a means to camouflage the area following surgery. However the patient's acceptance was poor as she had persistent headache even with plain glasses. A repeated inward collapse of the helix was noted. Thus in order to maintain the position of the ear, a customised conformer was planned. The steps in fabrication of the conformer were similar to the earlier case except that the ear conformer here had a lesser extent of coverage (figure 10). This was because of the firmness of the cartilage.

The patients in both the cases were given maintenance instructions. An everyday routine of cleaning with a soft bristled brush and water was advised. A 24 hour, 7 day and 1 month follow up was carried out and the patients reported no complaints.

The patients were counselled to keep the conformers on throughout the day and continue through the night for a period of 3 months. It was anticipated that the tissues would get stabilised over a period of 90 days and the patients could discontinue the ear conformers.

A few limitations with the ear conformers discussed here could be poor dimensional stability and skin irritation from the residual monomer content (though it was not seen in these patients).

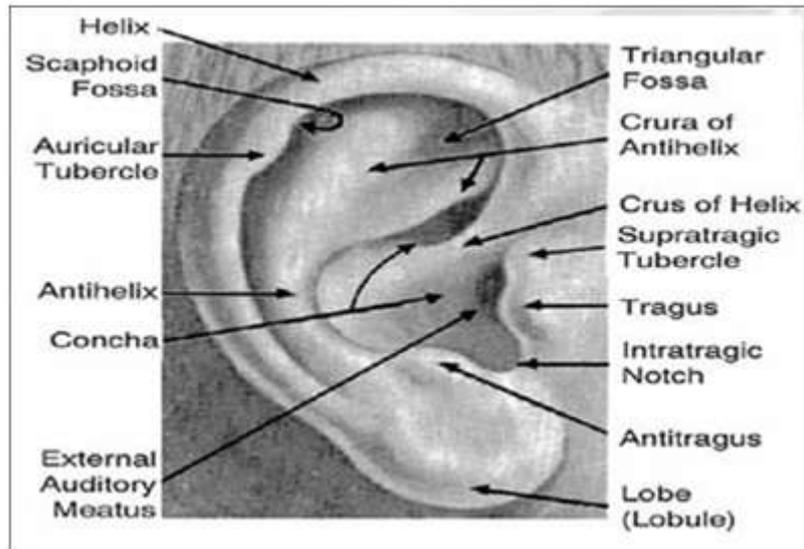


Figure 1: Anatomy of the external ear.

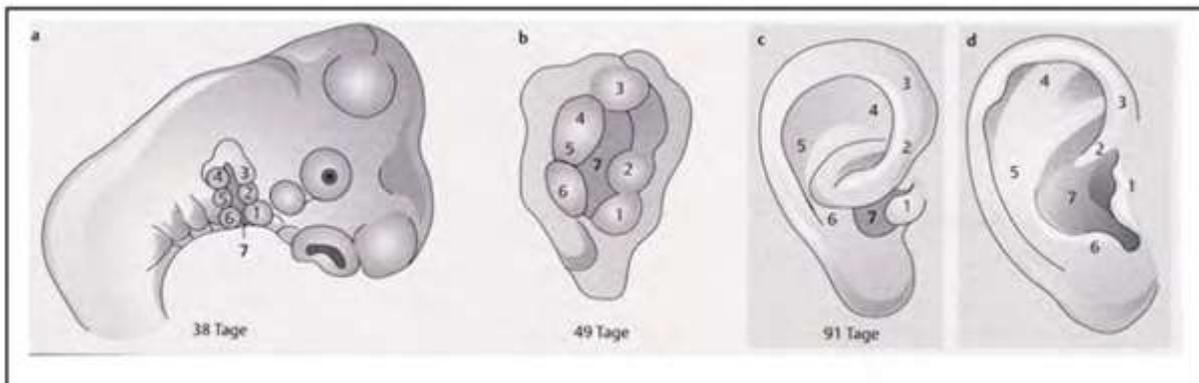


Figure 2: Development of the external ear.



Figure 3: Surgically reconstructed right ear.



Figure 4: Adherence of the reconstructed portion of the ear to the scalp.



Figure 5: Boxing of the defect area with wax.

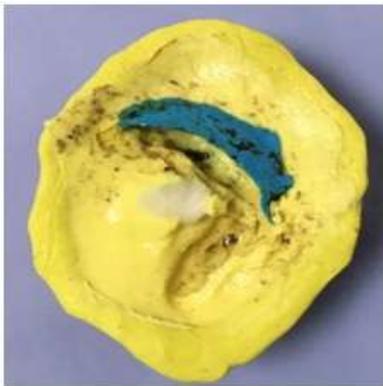


Figure 6: Alginate impression of the defect.



Figure 7: Cast of the defect in die stone.



Figure 8: Ear conformer in place.



Figure 9: Surgically reconstructed ear.



Figure 10: Ear conformer in position.

CONCLUSION

Patient satisfaction and acceptance in both cases was significantly superior to that achieved with only surgical reconstruction. So the customised ear conformers described in this article presents a simple prosthesis that is easy to fabricate and maintain with acceptable patient satisfaction. A successful outcome in auricular defects is accomplished through an interdisciplinary approach and a thorough understanding of the anatomy of the ear. Factors that influence the predictability of the prosthesis other than esthetics include comfort, functional performance, biocompatibility and retention.^[8]

REFERENCES

1. Bartel-Friedrich S, Wulke C: Classification and diagnosis of ear malformations. *GMS Current Topics in Otorhinolaryngology - Head and Neck Surgery*, 2007; 6. Doc05.
2. Glesson M. External and middle ear. In Standring S (ed). *Grays Anatomy: The Anatomical Basis of Clinical Practice*. 41st ed. Edinburgh: Churchill Livingstone/Elsevier, 2015; 624-640.
3. Netter FH. *Atlas of Human Anatomy*. 3rd edition. Philadelphia, PA: Elsevier Health Sciences, 2017; Chapter 18: Ear; pp 483-508.

4. Alvord LS, Farmer BL. Anatomy and orientation of the human external ear. *Journal-American academy of audiology*, 1997; 8: 383-390.
5. Pickrell BP, Hughes CD, Maricevich, R.S. Partial Ear Defects. *Seminars in Plastic Surgery*, 2017; 31(3).
6. Shonka Jr. DC, Park SS, Ear Defects. *Facial Plast Surg Clin N Am*, 2009; 17: 429–443.
7. Foucar HO. Congenital abnormalities of the external ear. *The Canadian Medical Association Journal*, 1940; 26-27. URL: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC538028/pdf/canmedaj00219-0035.pdf>
8. Nanda A, Jain V, Kabra SK. Avenues for rehabilitation of auricular defects. *Indian Journal of Dental Research*, 2012; 23(1).