

## Rehabilitation of a partial ear defect using silicone prosthesis by anatomical anchorage method - A case report

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Received - 17 November 2017

Initial Review - 13 December 2017

Published Online - 01 January 2018

### ABSTRACT

Restoration of congenital and acquired defects is an art and science in the field of maxillofacial prosthetics. Partial defect of the ear can leave tissue which may be adequate for supporting the prosthesis. Silicone prosthesis gives a simplified, cost-effective, and acceptable means of restoring the lost parts of the body to those who are reluctant to surgical reconstruction and other expensive treatment modalities. The aim of this article is to present and discuss a clinical case of acquired auricular defect managed by silicone prostheses by anatomical anchorage technique, which is easy to use and acceptable in appearance to the patient.

**Key words:** Anatomical anchorage, Auricular rehabilitation, Silicone prosthesis

Beauty is an entity which is always admired. The primary objective of prosthesis is to restore the lost esthetics and function and to preserve the remaining hard and soft tissues. It enables the patient to regain self-confidence and normal life in a society. Artificial replacements of lost body parts have been documented since ages. When patients are reluctant to surgical reconstructions, silicone prostheses are an alternative.

Ear defects occur due to congenital malformations, trauma, or as a result of tumor resection. Correction of these defects can be done by surgical, prosthetic, or a combination of these approaches. Prosthetic approach can give an esthetics and anatomically natural looking ear prosthesis [1,2]. Prosthetic ear helps to direct sound waves into the auditory canal and it can retain eyeglasses and hearing aid if required for the patient. It adds largely to provide psychological support for the patient [3].

Advantages of silicones used in maxillofacial prosthetics include excellent esthetics, biocompatibility, flexibility, ability to take extrinsic and intrinsic stains, moldability, translucency, ease of cleaning, and good marginal adaptation [4-6]. This article will give an insight in the fabrication of silicone auricular prosthesis for congenital and acquired defects. This article mentions a partial ear defect case managed by silicone auricular prosthesis by anatomical anchorage method.

### CASE REPORT

A 55-year-old male patient came to the department and reported of the missing ear on the right side. He gave a history of trauma to his right ear due to a fight, where his ear was bitten, and he

had to undergo surgery. On examination, he had a normal ear on the left side with normal hearing and partial ear on the right side (Fig. 1). The patient was found to have normal hearing on the right side.

A stepwise technique for fabrication of silicone ear prosthesis retained by anatomical structures was planned, which would be simulating with the patient's contralateral ear. The prosthesis shape, color, and anchorage must be as close as possible to the normal form of the ear.

#### Step 1- Impression Making and Obtaining Cast of Defect and Healthy Side

Petroleum jelly was applied around the surrounding area and hair to prevent the alginate impression material from sticking and for the easy removal of the impression (Fig. 1). To make an impression, the patient's head was tilted with the auricular area as parallel to the floor as possible. Impressions of both the ears are required. The impression of normal ear is required so as to get a mirror image, which represents the missing ear while sculpting the pattern of ear prosthesis. External auditory meatus was blocked with cotton pellet so prevents the flow of impression material into the auditory canal of normal ear. A plastic cylindrical container open at both ends of approximately was used to support the alginate impression material. Alginate impression of the defect and surrounding area was recorded. Moreover, the impression of normal right ear was also recorded. Over the impression material, plaster was placed to give support for alginate and prevent it from tearing. Impressions were checked for any voids and poured using Type IV dental stone.

**Step 2 - Sculpture and Fabrication of Defect Side by Wax**

Once the impressions are poured, the carving of the ear was started during which the measurements were constantly checked and matched with the normal ear (Fig. 2). More natural and accurate results are obtained when carving is done seeing the finer details of the normal ear of the patient itself.

**Step 3 - Try-in**

Try-in of the wax pattern (Fig. 3) was done to confirm for the symmetry in vertical and horizontal planes and the marginal integrity with the surrounding tissues. The projection of the ear in relation to the side of the head was also checked. Stippling was done on the wax pattern using hard brush bristles, to mimic the normal ear appearance. After try in, the wax prosthesis was sealed to the model and the leading edge was thinned, to allow the silicone edges to feather out to the natural skin.

**Step 4 - Investment and Fabrication of the Mold**

A three-piece mold was prepared which is considered to be easy in the placement of silicone material and the remaining

fabrication procedures of the prosthesis. The first pour is the base for the mold to be prepared; the model of the defect side with wax pattern is placed and embedded up to the leading edge. A separating medium was applied. 4-5 grooves were made above and posterior of the helix of the wax pattern. The second piece of the mold is formed by blocking the undercut below the helix with dental stone. Stone was allowed to set. Boxing with wax was done for the third pour. Again separating media (soap solution) were applied and were filled with stone. Dewaxing was completed leaving behind a three-piece mold (Fig. 4). This three-part mold is now ready for silicone packing.

**Step 5 - Processing of the Prosthesis and Proper Anchorage of the Prosthesis**

This forms a crucial step in the fabrication of prosthesis as it involves extrinsic, intrinsic coloration, and surface characterization which matches with the color and texture of skin of the patient, thus giving the prosthesis a life-like look.

Medical grade room temperature vulcanizing silicone (Cosmosil) was mixed after reweighing the uncolored silicone and liquid catalyst, as per manufacturer’s instruction. Primary colors such as blue, yellow, and red are taken in proper



Figure 1: Preoperative view of the defective ear



Figure 3: Try in of the wax pattern



Figure 2: Wax mock up

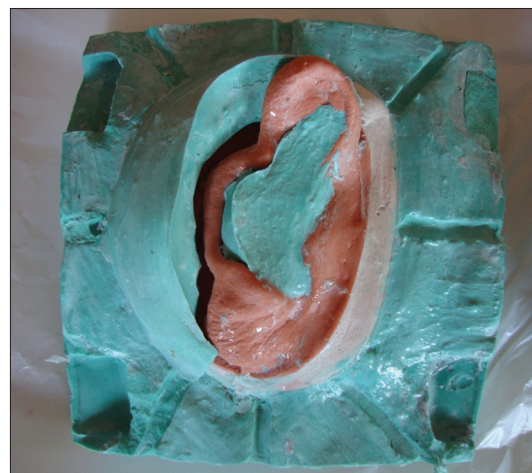


Figure 4: Three piece mould

proportions and mixed to obtain a base shade. Additional shades were prepared and added to match with the contralateral ear so as to give a natural appearance. Then, this shaded silicone is applied into the mold. To create the characteristics of microvasculature, colored rayon fibers were added on the surface layer. Now, the mold with packed silicone is kept for bench curing for 24 h. Cured prosthesis was removed from the mold and cleansed with soap. Excess silicone was trimmed from the margins. Extrinsic stains were coated on the prosthesis to match the skin shade. As the prosthesis was designed to gain anatomic anchorage, it was important to provide a snug fit of the silicone prosthesis to the tissue of the residual ear. Moreover, this snug fit of the silicone prosthesis was obtained by accurate reduction of the prosthesis which covered the defect ear to 0.5–1mm in thickness and 10mm in width. This ensured that the silicone extended over the residual ear with an esthetics and tight fit (Fig. 5). The patient was given instructions for placement and removal of the ear prosthesis. The patient was also advised not to wear the prosthesis continuously to prevent bacterial and fungal growth.

## DISCUSSION

Anchorage of auricular prostheses is an important factor which decides on the outcome of rehabilitative treatment. Anatomic undercut areas can be created by planning before and after surgery, as a mode of suspension for maxillofacial prosthesis. Anatomical anchorage can also be obtained by already existing anatomical structures. Ear defect treatment always presents as a challenge due to its complex structure and anatomy, which can be treated by thorough skill, knowledge, and its effective application. Ear defects are reconstructed by surgery or by silicone prosthesis, which is a conservative method. Choosing between surgery and provision of prosthesis for those patients with extensive injury to the ear is difficult. Hence, treatment plan always depends on size, etiology, and patient's wish. Resistance to the forces of displacement of the prosthesis from the correct position is an essential feature. Retention and resistance can be achieved by various methods such as using adhesives, implants, and mechanical aids [7-10].



Figure 5: Post operative view with ear prosthesis

Anchorage forms an important concept in the ear prosthesis provision. In this article, the case presented shows a large part of the ear undamaged, and hence, anchorage from the undamaged part of the ear was preferred as a mode of anatomic anchorage. It resists the forces of displacement of the prosthesis from its position. Anchorage depends on the size of the prosthesis [11]. The prosthesis replacing the defect area should have the weight and size of the missing part of the ear to improve the anchorage which is achieved. Hence, the modeling process using wax should be done with minimum material to reduce the weight. Apart from the size, the position and appearance also are important [11]. In this case, the residual ear was used as an anatomical anchorage, and to merge the borders, adhesive was used.

Surgical autogenous reconstruction often leads to extensive procedures, post-operative pain, and scarring which can be intolerable to the patient. Mechanical retention, by glasses, presents the possibility of dislodgement of the prosthesis [12], whereas implants not being cost-effective, and due to the prolonged treatment time, patients tend to be reluctant toward implant treatment option. Therefore, cost-effective and simple way of anatomical anchorage method of cosmetic ear prostheses is acceptable, comfortable, and satisfactory treatment option.

## CONCLUSION

Residual ears present as a form of anchorage which is esthetically and psychologically acceptable. To create a natural looking and life like ear prosthesis, reproducing the exact anatomy and surface characteristics requires both skill and knowledge. The choice between surgical and prosthetic rehabilitation of large defects is a difficult decision. The size, etiology of the defect, and affordability always decide the treatment plan. Economic and time factor involved in implant-supported prosthetic ear makes patient opt for custom-made prosthesis. The patient comfort and satisfaction with the prosthesis is the best outcome of a successful treatment.

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*Funding: None; Conflict of Interest: None Stated.*

**How to cite this article:** Kanathila H, Pangi AM. Rehabilitation of a partial ear defect using silicone prosthesis by anatomical anchorage method - A case report. *Indian J Case Reports*. 2018;4(1):46-49.