

Acquired partial auricular defect rehabilitation aided by four-part mold technique and spectrophotometer

ABSTRACT

Patients with auricular defects benefit greatly by an ear prosthesis. However, during the fabrication of auricular prosthesis, difficulties can be faced in obtaining a satisfactory outcome, such as tearing of the prosthesis, fracture of the mold and poor color matching. An 18 year old male lost part of his left auricle in an assault and battery because of which the patient was suffering from adverse psychosocial impact. Surgical reconstruction was ruled out because of patient's desire and financial constraints. Partial auricular prosthesis using four part mold technique and spectrophotometer was fabricated leading to a desirable outcome. Four part mold technique prevented fracture of mold and made retrieval of prosthesis easier. Spectrophotometer reduced the duration of patient visit and the artistic skill required for colour matching in trial and error method.

Keywords: Acquired partial auricular defect, four-part mold technique, spectrophotometer

INTRODUCTION

Auricular defects can be briefly classified as congenital or acquired deformities. Acquired type usually occurs due to blunt trauma, thermal injuries, bite injuries in a battery and assault or due to dog bite, road traffic accidents, or surgical removal of tumoral lesions.^[1-4] Such patients usually face functional as well as psychological problems which in turn affects their social life. Being considerate in such aspects, reconstruction of these acquired defects should be performed to ensure a better quality of life.

Among various reconstructive options available either surgically or prosthetically, the choice usually depends on factors such as location, size, type of the defect, systemic or local health status, and preferences of the patient.^[5-7] Surgical reconstruction of the human ear is an extremely complex procedure. However, it has certain advantages over prosthetic options such as more stability, enhanced psychological benefit to patient, and elimination of defect site. In certain cases, where, surgical reconstruction is not considered suitable for reconstructing the defect, due to systemic, financial, or psychological causes or because

of recurrent failures, provision of prosthesis may be a better option for rehabilitation of ear defects.^[8,9] Unlike surgical reconstruction, usually, prosthetic rehabilitation has excellent esthetics as the prosthesis can be made to resemble the contralateral ear to maximum extent by sculpting.

Conventionally, three-part mold technique is performed during fabrication of the partial auricular prosthesis. One major problem faced with this three-part mold technique is

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the fracture of the elevated part of the mold, which fits into the natural concha and triangular fossa.^[10] The traditional method of color mixing involves trial and error method of mixing different pigments and dyes to the base with the disadvantage being unable to compensate for metamerism. The recent advancement, spectrophotometer compensates for metamerism making it superior choice for accurate, repeatable color measurement and reduces the patient's visit. This article gives insight in the fabrication of auricular silicone prosthesis using a four-part mold technique aided by spectrophotometer.

CASE REPORT

An 18-year-old male patient reported to the Department of Prosthodontics with the chief complaint of bad appearance of the face due to partial missing left ear. The patient had lost part of his auricle in an assault and battery 1 year back. On examination, the patient had normal hearing in both ears and partial left ear defect with missing helix, antihelix, scapha, concha cymba, and helix crus. Tragus, antitragus, and lobus of the left ear were retained [Figure 1]. Patient was informed of all possible options for reconstruction and their merits and demerits and consent for prosthetic rehabilitation was obtained.

A partial auricular prosthesis was fabricated with technique described in following manner.

1. Initially, petroleum jelly was applied around the surrounding area and hair to prevent the alginate from sticking to the tissues and for the easy removal of the impression. The patient's head was tilted with the auricular area parallel to the floor. External acoustic meatus was blocked with the cotton pellet to prevent the flow of impression material into the auditory canal. The modeling wax was shaped around the defect

to support the impression material. Impressions of both ears were made using irreversible hydrocolloid. (Zelgan, Dentsply India Pvt. Ltd., Delhi, India) The models were poured with Type-III gypsum product (Kalabhai Karson Pvt. Ltd., Mumbai, Maharashtra, India) [Figure 2a]

2. Donor impression was taken which resembled more or less with the patient's ear and modeling wax was poured into it. Further changes in the wax pattern over the adapted Poly Vinyl Chloride sheet were made comparing the patient's contralateral ear model. Try-in of the wax pattern was done to confirm symmetry in vertical and horizontal planes and marginal integrity with surrounding tissues. The projection of the ear in relation to the side of the head was also checked [Figure 2b]. The wax pattern was extended to cover the remnant ear as well so that it aided in additional retention with extended margins and better camouflage. Stippling was done on the wax pattern using gauze piece to mimic natural appearance. 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
3. To prevent mold fracture and aid easy retrieval of silicone material, a four-part mold was prepared. The base of the mold along with wax pattern merged to the cast was the first pour. Over the first pour, separating medium was applied, and the orientation grooves were made above and on the posterior part of the helix of the wax pattern in the first pour [Figure 2c]. The second pour was made with white dental stone (Orthokal, Kalabhai Karson, India) and allowed to set. For easy retrieval of the prosthesis, third pour with die stone was made in the center of the ear which had many depressed parts such as cymba and cavum. A die pin was placed in the third pour and allowed to



Figure 1: Patient's partial left ear defect

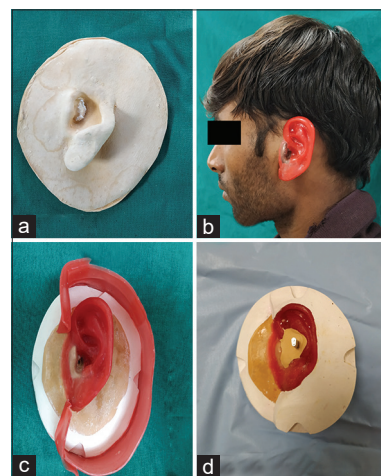


Figure 2: (a) Model of the defect. (b) Wax pattern try in. (c) Preparation for second part of mold to be poured. (d) Third pour in situ

set [Figure 2d]. Orientation grooves were placed in the second pour and separating media was applied over it. The fourth pour was made with white dental stone over it

4. Dewaxing was done leaving behind a four-part mold which could be packed with silicone [Figure 3a] Spectrophotometer (e-Skin) was used to match the color of patient's skin [Figure 3b]. According to quantity and coloration obtained from spectrophotometer readings, silicone mixing was done and packed into the four-part mold. Then, the mold with packed silicone was kept in the oven for 1 h at 100°C. Cured prosthesis was retrieved from the mold. Excess silicone was trimmed from the margins. Extrinsic coloration was done to match the exact patient's skin shade. Thereafter, the fit of the prosthesis was checked in place. The esthetics of the prosthesis was evaluated using visual analog scale and was scored to be excellent
5. For optimum retention of the prosthesis, the patient was advised to apply a thin coating of the adhesive (G609 Probond Adhesive) to the tissue side of the prosthesis and allowed to dry for 2 to 3 min until it cleared, before sticking [Figure 4a and b]. The patient was instructed to avoid excessive sun/dust exposure to increase life of prosthesis.^[11] The patient was recalled initially 1 week after prosthesis insertion and further at 1 month intervals for periodic evaluation and was found to be satisfied during the follow-up visit at 12 months.

DISCUSSION

In the traditional three-part mold technique, first pour was made with the mold in plaster up to the leading edge. Indentations were made in the helix area of the mold to allow the second pour of the mold to fit into the first mold precisely. After the second pour sets, third pour was made

to cover the wax pattern and the remaining second pour with indentations made on first and second pour. One major concern for this technique was probability of the fracture of the elevated portion of three pour mold could happen whenever the molds were being separated from each other. To overcome it, a four-piece mold fabrication was done with the extra pour being added as a third pour which filled up the depressed portions of the ear. The die pin placement in the third pour helped to accurately orient the fourth pour into the third pour. This four pour technique helped in retrieving the silicone from mold without tearing the prosthesis.

The third pour in this four-part mold technique may be made by different materials such as resin, putty, die stone, or dental stone. Here, preference of die stone was given over the resin, dental stone, and putty as the resin in dough stage when placed over the wax pattern of prosthesis could distort the carving done earlier, putty can inhibit the curing of silicone prosthesis and the die stone exhibits more rigidity than the dental stone. The exothermic reaction when compared between acrylic resin and gypsum products liberates heat of about 50–70 KJ/mol and 3900 cal/gmol (16.3 KJ/mol), respectively, making it obvious that gypsum products were less likely to distort wax pattern.

The spectrophotometer, being able to measure the amount of light absorbed by the skin, helped get instant readings and the exact quantity of different colored silicone to be mixed in appropriate amounts in contrast to traditional mixing. Thus, the usage of spectrophotometer gives an appreciable color matching, with minimum time consumption and reducing the patient's visit. The repeatability, accuracy, and recordability (aiding future prosthesis refabrication without repeat color matching) of

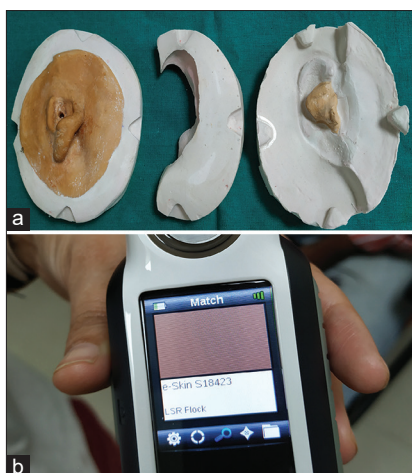


Figure 3: (a) Four-part mold. (b) Spectrophotometer showing readings



Figure 4: (a) Auricular prosthesis (lateral view). (b) Auricular prosthesis (profile view)

the spectrophotometer ensures its continued applicability in maxillofacial prosthetics in future as well. However, the extrinsic staining is required even after the usage of spectrophotometer for better results.

The retention of auricular prosthesis can be obtained either by the use of natural anatomical undercut, mechanical retention, adhesives, or extraoral implants. Various systems have been used to attach the prosthesis to the implant such as bar and clip retention, magnetic retention, bar splint/magnet retention, and ball attachment.^[12] The retention from the adequate anatomical structure allowed for the fabrication of prosthesis and further retention was obtained from adhesive.

Although the usage of adhesives is quite advantageous, there are certain limitations such as limited retention, potential for tissue irritation, and difficulty in orientation of the prosthesis, especially in patients with compromised manual dexterity.

CONCLUSION

Four-part mold technique helped to prevent fracture of mold and provided ease in retrieval of silicone prosthesis from the mold. Usage of spectrophotometer makes it easy for the prosthodontist to get an appreciable color matching with life-like appearance of the prosthesis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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