

Case Report

Rehabilitation of a Patient with Auricular Defect- A Prosthodontic Approach

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Abstract:

Aim: Rehabilitation of the congenitally malformed external ear (microtia) with medical grade silicone in a young 21 year old male. **Background:** Loss of an auricle may be due to congenital disease, trauma, or surgical removal of benign or malignant tumors. Auricular defects can be repaired, or reconstructed with autogenous tissue, but this has its own limitations and additional surgical co morbidities. A good alternative is to develop an auricular prosthesis. To obtain an accurate morphology of prosthetic ear various methods have been used making use of technology. However, still the most commonly used method involves manual sculpting of the prosthetic ear and final prosthesis fabrication using medical grade silicon. **Case Report:** Patient presented with microtia involving right ear. Impression of defective and normal ear was made followed by sculpting of defective ear replicating the normal morphologic contours using clay. Room temperature vulcanizing medical grade silicone colour was matched as per the patient's skin tone and packed in a three piece mold for converting. The fabricated prosthetic ear was retained with an adhesive. The resulting prosthesis had an aesthetically pleasing colour matching and morphology very closely replicating the normal ear. **Conclusion:** Fabrication of auricular prosthesis using medical grade silicone and its retention using adhesive results in a satisfactory, cost effective and cosmetically acceptable rehabilitation of a patient with auricular defect.

Keywords: Medical grade silicone, adhesive, pigments, sculpting.

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Introduction

Loss of an auricle may be due to congenital disease, trauma, or surgical removal of benign or malignant tumors. Auricular defects can be repaired¹, or reconstructed with autogenous tissue², but this may be unsuitable in many situations³. Additionally the use of autogenous tissues requires harvesting a graft there by adding a surgical site. A good alternative is to develop an auricular prosthesis in a material such as room temperature vulcanizing (RTV) silicone rubber. The

anatomic morphology of the prosthesis, matching the morphology of the contralateral ear, is currently obtained by different methods:(i) producing a cast of the patient's contralateral ear by direct impression, and sculpting a mirror pattern corresponding to the missing ear; (ii) producing a cast using the ear of a family member or an individual with compatible ear morphology, and using it for producing the ear prosthesis; (iii) producing a cast of the patient's contralateral normal ear, and

creating its photo image on a transparent sheet (viewing the image from the reverse side gives the morphology of the ear prosthesis to be sculpted)⁴; or (iv) making a wax cast of the contralateral normal ear of the patient, sectioning the cast into 1-mm slices, and reversing the sections to create a mirrored pattern. The quality of outcome of the above methods depends on the skills of the anaplastologist and the technicians involved. Consistent good quality can be achieved using advanced technologies including computed tomography (CT), reverse engineering (RE), computer aided design (CAD), computer numeric control (CNC) machining and rapid prototyping (RP)⁵. An implant-retained auricular prosthesis is also an option that can be considered instead of surgical reconstruction^{6,7}. The application of craniofacial implants for facial disfigurement was first reported by Tjellström⁸. The use of implants has an obvious advantage of better retention but then it is also associated with the potential surgical complications and cost related factors.

Case Report

A 21 year old male patient reported with a congenitally malformed right external ear (microtia) (Figure 1 & 2).



Figure 1: Pre treatment Lateral view showing microtia.

Rehabilitation with medical grade silicone ear prosthesis retained with medical grade adhesive was planned.



Figure 2: Pre treatment Frontal view

Firstly Orientation lines were made using an indelible pencil on both, the normal as well as the affected side. A vertical line was drawn from above the helix, through the centre of external auditory meatus, and through and beyond the centre of the lobe of the natural ear. A horizontal line was drawn from the helix through the centre of the external auditory meatus and beyond the tragus of the natural ear. To coincide with the natural ear, the same lines were drawn on the defective ear side. The external acoustic meatus was blocked using wet gauze. Next the hairs within the impression area were coated with Vaseline. Boxing of area around the helix of ear was done using boxing wax. Next alginate was mixed in thin consistency (ratio: 1 part powder to $1\frac{1}{2}$ parts water). It was then poured gradually around the helix within the confines of the boxed wax, taking care to minimize chances of air bubbles. Same procedure was repeated on the defective side as well. L-shaped paper clips were used for reinforcement and plaster of paris was added as backing. Upon setting the alginate impression was removed carefully and placed in cold water to prevent distortion (Figure 3).

Orientation lines were retraced on both the impressions followed by boxing with boxing wax. The impressions were then poured with stone. The stone cast was separated from the impression. Next the sculpting of ear of the defective side was

done with clay replicating the morphology of the normal ear and considering the orientation marks (Figure 4).



Figure 3: Impression of the normal and defective ear.



Figure 4: Sculpted clay ear

Clay used was sulphur free sculpturing Tan colour clay. Try-in of the sculpted clay ear was done on patient's face and checked for the shape, orientation and extension.

Three Piece Mold Fabrication

Once having tried in the clay pattern, it was replaced on the master cast. 'V' shaped orientation notches were made in the master cast at the periphery. Boxing of the master cast was done with boxing wax. Wax blocks were placed superiorly at anterior part of helix and at the lobule inferiorly extending up to the periphery of cast where boxing was done, thus separating the clay pattern on the master cast into anterior and posterior sections. Then two coats of separating medium were applied on the posterior section. Die stone was poured in the posterior section till the crest of the clay pattern. Once initial set of

the die stone was achieved, two orientation ditches were prepared in the centre of the posterior section. After the setting of the die stone, separating medium was applied in two coats over the anterior section as well as the set surface of the posterior section. Next the die stone was poured into the anterior section as well as over the surface of the posterior section thus covering the entire boxed pattern till the surface. After setting what was achieved was three piece mold comprising of; the anterior mold, the posterior mold and the original master cast (Figure 5).



Figure 5: Three piece mold

The molds were then smoothened with scalpel to eliminate any sharp edges and cleaned with xylene. Now the anterior and posterior molds were oriented using the orientation ditches. Room Temperature Vulcanizing (RTV) medical grade silicone (MDX4-4210, Dow Corning) was used for fabrication of the prosthesis. Silicon was mixed as per the manufacturer's instructions. Base colours used for achieving the colour matching were red, brown, white, yellow and violet. The colours were mixed with silicon on a glass slab using a metal spatula. Colour was matched as per the patient's skin tone using trial error method. Closely matched colour silicon was filled in a syringe which was used to fill silicon in the mold. The concha region which appears darker is packed with slightly darker shade silicon. Next the third piece of the mold, the original master cast was placed and the whole three piece mold was then clamped

leaving it for 24 hours. After 24 hours of room temperature curing, the mold was opened and the ear prosthesis was carefully retrieved. Excess at the borders was trimmed using sharp scissors (Figure 6).



Figure 6: Final finished prosthesis

Since the patient had a reddish brown tinge on normal side, some extrinsic staining was done on the prosthesis. The fabricated prosthetic ear was retained with a medical grade silicon adhesive. Adhesive used was pressure sensitive medical silicon adhesive (Secure Medical Adhesive, FACTOR II). The resulting prosthesis had an aesthetically pleasing colour matching and morphology closely replicating the normal ear (Figure 7 & 8). Also the retention of prosthesis using the adhesive was satisfactory eliminating the need of spectacles and elastic bands.



Figure 7: Post treatment Lateral view

Discussion

Achieving esthetic results in the facial area is important. Differences in height, form, and/or position of the ears are detectable



Figure 8: Post treatment Frontal view

and can result in unfavourable aesthetic results. Defects of external ear are a challenge to repair surgically because of extremely complex anatomy and the results are more often than not less than acceptable. It is emphasized by Edgerton's statement that, "creation of human ear of normal size, shape and delicacy has been achieved millions of times by God, but rarely, if ever by surgeons."⁹ Besides the surgical reconstruction of external ear isn't a single step procedure and requires several surgical interventions. Thus prosthetic rehabilitation is a feasible and acceptable solution in such situations.¹⁰ Fabrication of prosthetic ear can be done using medical grade silicon and acrylic resin. Silicon has certain obvious advantages over acrylic in that it has a more lifelike feel and consistency. The prosthesis can be retained by stabilizing it with frame of spectacle that patient has to wear or by attaching it to Branemark type bone anchored implants or by using a medical grade adhesive. Retention by spectacles makes it mandatory for the patient to wear the spectacles all the time while he/she wants the prosthesis. Branemark type bone anchored implants used for retention of ear prosthesis offer ease of handling and comfort but are very often associated with chronic skin problems, formation of Granulation tissue and local infections being the commonest.¹¹ Hence comparatively the

retention using adhesives is an effective, convenient and at the same time a cost effective means of retaining ear prosthesis. Proper colour matching of the silicon was a challenge that we faced but then with some trials and alterations in colour proportions we were able to achieve a pleasing and aesthetically acceptable colour matching. Also the retention with medical grade adhesive proved to be very efficient and easy to use for the patient. The duration of effectiveness of adhesive depends upon the climate and amount of perspiration that patient has in that region. Patient was called for follow up one week after prosthesis delivery to assess for the maintenance and evaluate the effectiveness of the adhesives. The results were very pleasing with excellent patient satisfaction and compliance. The patient required applying adhesive only once a day, however during summers it is expected that patient would require applying it twice a day.

Conclusion

Thus from our experience we could conclude that fabrication of auricular prosthesis using medical grade silicone and its retention using adhesive results in a satisfactory, cost effective and cosmetically acceptable rehabilitation of a patient with auricular defect.

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