

Rehabilitation of an Auricular Defect using Spectacle Retained Silicone Ear Prosthesis and Ear Stent

Kasim Mohamed, Anandkumar Vaidyanathan, Umamaheswari Mani, Yadharth Bhatia
Padmanabhan Thallam Veeravalli

ABSTRACT

Auricular defects resulting from skin cancer, trauma or congenital cause present reconstructive challenges. Surgical reconstruction may provide effective results for smaller and larger defects. However, some patients do not prefer surgical intervention for rehabilitation due to fear of pain. The use of silicone material for fabrication of facial prosthesis has made it possible to acceptably restore what has been lost. The application of skill and resources in the correct direction can provide the needy patients good treatment options that are cost-effective and esthetically acceptable. This article describes a simple clinical technique to rehabilitate patients with auricular defects. The purpose of this treatment was to minimize the extent of surgical intervention and to restore the lost facial structure to patient's satisfaction in a manner that was both cosmetically elegant and cost-effective.

Keywords: Ear prosthesis, Ear stent, Silicone prosthesis and spectacle retention.

How to cite this article: Mohamed K, Vaidyanathan A, Mani U, Bhatia Y, Veeravalli PT. Rehabilitation of an Auricular Defect using Spectacle Retained Silicone Ear Prosthesis and Ear Stent. *Int J Prosthodont Restor Dent* 2012;2(1):29-33.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Quality of life can be severely affected by physical defects, especially if the defect involves the maxillofacial region. Auricular defects can be congenital, manifesting in form of malformation of the organ, or acquired, as in case of burns, trauma or road traffic accidents.¹ Auricular reconstruction poses a challenge for surgeons since it is a field of facial plastic surgery. Smaller defects may be repaired by primary closure, wedge repair, skin grafts, advancement or transposition flaps, or the chondrocutaneous helical rim advancement flap. Larger defects involving significant loss of cartilage often require staged island pedicle or interpolation pedicle flaps.² Complete loss of the auricle may be reconstructed with the use of an autogenous rib cartilage graft in a multistage procedure. However, some patients prefer not to undergo additional surgical procedures. Hence, prosthetic reconstruction has now become an established alternative to techniques using autogenous tissues.^{3,4} Replacing the missing or deformed organs to provide the patient with a near normal life is a challenge and the clinical appearance of these affected individuals can be drastically improved by maxillofacial prosthesis and/

or cosmetic surgery.⁵ The introduction of silicone-based materials in the field of maxillofacial prosthetics, along with the skill of the operator has now made it possible to achieve wonders in terms of rehabilitating the patients in need. An auricular prosthesis artificially restores the ear which has been lost due to radical cancer surgery, amputation, burns, and/or congenital defects. This case report portrays the fabrication of a spectacle-retained silicone auricular prosthesis with an ear stent for a unilateral missing ear.

CASE REPORT

A 52-year-old male patient reported to the Department of Oral and Maxillofacial Prosthetics, with a chief complaint of missing left ear. The patient had lost the full left ear in an accident. The only structure remaining was the tragus (Fig. 1). The caudal part of the ear was missing but the external auditory canal was kept patent with the help of an acrylic stent, making the ear functionally normal. Patient's right ear was functionally and structurally normal. There were no associated features of microtia or any other syndrome. Patient was devoid of any systemic disease and had never undergone any reconstructive procedure to restore the deformed ear.

Considering patient's age and economic status, spectacle retained ear prosthesis was selected as the treatment of choice. The patient was informed about the treatment procedure, expected treatment outcome and consent was taken from the patient and family members.



Fig. 1: Preoperative photograph

FABRICATION TECHNIQUE

Impression Making

The patient was instructed to sit on the dental chair and asked to turn the head to the right side for adequate access to the defect. The area was cleaned and dried. In order to record the intricate details of the defect, a layer of low viscosity silicone impression material (Aquasil LV; Dentsply, Germany) was injected over the defect. The impression should extend to the angle of the mandible inferiorly, and to the patient's hairline superiorly. Anteriorly the impression should extend 1 cm beyond the tragus of the ear and posteriorly 1 cm beyond the mastoid process. Stabilizing sticks were placed over the low viscosity material before it set, to facilitate impression removal (Fig. 2A). A second layer of medium viscosity impression material (Aquasil Monophase; Dentsply, Germany) was injected over the low viscosity material (Fig. 2B). Finally, a layer of putty impression material (Aquasil Soft Putty; Dentsply, Germany) was adapted under light finger pressure over the medium viscosity material (Fig. 2C). After the impression was removed, it was disinfected using 2% glutaraldehyde solution and a cast was poured in type III gypsum material (Orthokal; Kalabhai Corp., Mumbai, India). This was used as the master cast for the fabrication of the prosthesis.

An alginate impression was made of the patient's contralateral ear and the cast was made. It was used as a reference for sculpting the wax pattern of the prosthesis.

Sculpting the Ear

The extent of the final prosthesis was marked and separating medium was applied over the master cast. A clear self-

polymerizing acrylic plate 1 mm thick was fabricated on it. It facilitated in supporting the wax pattern of the ear and later in the attachment of the spectacle to the final prosthesis. A modeling wax sheet (Hindustan modeling wax No. 2, The Hindustan Dental Products, Hyderabad, India) was rolled and placed over the acrylic plate and the ear was sculpted as close as possible to the patient's right ear, by using the contralateral ear as guide (Fig. 3A).

Try-in Procedure

The sculpted ear was tried on the patient and the length, width, orientation and placement of the ear (antero-posterior/superoinferior) was verified as to make it symmetrical with the contralateral ear (Fig. 3B). To simulate natural ear, stippling was done using a hard brush during finishing and polishing of the wax pattern.

Investing and Processing

A solid base was fabricated for the working cast. Orientation grooves were placed. The wax pattern was invested in type III gypsum material (Orthokal; Kalabhai Corp., Mumbai, India). The mold was poured in three stages. Orientation grooves were given after every pour to ascertain the re-positioning of the components after dewaxing. Conventional dewaxing was done to obtain the mold for the silicone rubber during packing into the mold. Care must be taken to completely remove the wax as it tends to interfere with the vulcanization of silicone rubber during packing into the mold.

During shade matching silicone material (Cosmesil Prosthetic System, South Wales, UK) was manipulated according to the manufacturer's instructions. Maxillofacial rubber part A (M511) and maxillofacial rubber part B



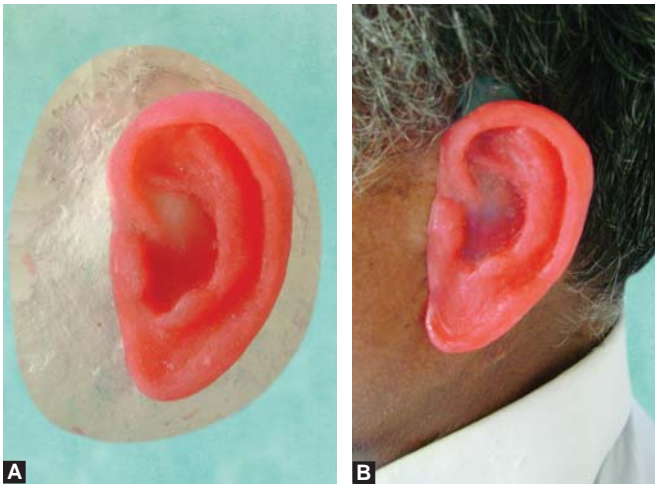
Fig. 2A: Impression-making sticks placed over the light body material



Fig. 2B: Medium viscosity impression material over low viscosity impression



Fig. 2C: Putty consistency impression material adapted over the medium body impression



Figs 3A and B: (A) Wax pattern for auricular prosthesis, (B) sculpted wax pattern tried on patient



Fig. 4A: Final prosthesis after extrinsic staining perforated to accommodate stent

(Standard—M511) in the ratio of 10:1 were used. The material was measured using electronic weighing machine.

The patient's basic skin and intrinsic colors were added to the silicone during manipulation to obtain the closest shade match with the patient's contralateral ear. Once the operator and the patient were satisfied with the shade match, the material was packed into the mold layer by layer. The acrylic plate was repositioned on the mold and primer was (Platinum primer G611, Cosmesil Prosthetic System, South Wales, UK) used for bonding between acrylic substructure and silicon. Several coats of primer were applied in particular interval to enhance bonding. After adequate material was packed, the three components of the mold were repositioned with the help of the orientation grooves and kept under pressure with the help of bench press for a period of 24 hours.

After curing, the three components of the mold were separated to retrieve the silicone ear prosthesis. Rubber trimmers specially designed for silicone materials were used to finish the prosthesis. The patient was then recalled and during trying of the final prosthesis, the supporting acrylic plate was perforated to facilitate the use of the ear stent by patient (Fig. 4A).

Extrinsic Staining

Extrinsic stains provided by the manufacturer were used to give the prosthesis a better esthetic appearance. Acetone was used to clean the prosthesis superficially. Depending upon the patient's contralateral ear, the stains were mixed with one part silicon sealant-G531 and applied over the finished prosthesis until a satisfactory shade was achieved.

The prosthesis was then subjected to dry heat at a temperature of 55 to 60°C for a period of 30 minutes. Moist gauze is constantly placed on the prosthesis after the



Fig. 4B: Final prosthesis attached to spectacle

application of extrinsic stains to mimic the surface characteristics of the skin.

Spectacle Attachment

In the final visit the spectacle was attached to the acrylic plate using clear autopolymerizing acrylic resin (Fig. 4B). The silicone ear prosthesis was placed in the predetermined position which was checked with the contralateral ear (Figs 5A, 5B and 6A). The patient was educated about use and maintenance of the prosthesis. On review after 24 hours, a marginal opening on the anterior margin of the prosthesis was present. This opening was probably due to incorrect positioning of the spectacle by the patient. It was rectified by instructing the patient to wear the spectacles in correct position. The patient was again instructed about the importance of spectacle positioning when using the prosthesis. He was also educated to camouflage the anterior margins of the prosthesis by growing the hair. When patient was reviewed after 1 week, he complained of pressure and



Figs 5A and B: (A) Final prosthesis placed on the patient, (B) frontal view

discomfort during wear of the prosthesis. From his conversation we elicited that he has been wearing it continuously. Hence, he was instructed to wear the prosthesis only 12 hours in a day and to maintain hygiene in that region. The prosthesis was modified to accommodate the ear stent that the patient was wearing to maintain the patency of the external auditory meatus (Fig. 6B).

DISCUSSION

Acceptable esthetics in restoring a prominent facial defect, such as a malformed ear is a challenging task for maxillofacial prosthodontist. Leading life with this kind of a physical deformity is very stressful and often depressing for the patient. It directly affects the patient's mental, social and psychological well being.

Traditionally, acrylic resin had been the material of choice for fabrication of auricular prosthesis, as it is an economically viable treatment option.⁶ Recently there has been immense progress in the field of maxillofacial

prosthetics and the introduction of the silicone-based materials has enabled the clinicians to provide quality health care to the patients in need.⁷ It has proved superior to acrylic in terms of patient's adaptation, shade matching, texture and esthetics.

The various options available to retain the silicone ear prosthesis are: Implant-retained prosthesis, adhesive-retained prosthesis, hair band retained prosthesis and spectacle retained prosthesis.⁸ Implant retention, though promising was not opted for this patient due financial constraint and apprehension toward surgical procedures. Increasing age leads to greater failure of osseointegrated implants in the temporal bone. Blood flow in the temporal bone correlates well with patient's ages, and this factor may be of importance for understanding why age influences implant-survival.⁵ The most frequent prosthetic complication in implant-retained prosthesis is retention degradation of retentive elements.⁹ Adhesive-retained prosthesis was also not considered owing to difficulties in orientation, home care maintenance and decreased longevity. Adhesives-require patience and precision of the wearer to obtain correct initial placement of the prosthesis. This may be very difficult for older patients who have limited vision and dexterity in addition to the challenge of focusing on one side of the head while looking in the mirror. Silicone-based adhesives require solvents for cleaning the prosthesis, which accelerate deterioration of the prosthetic margins. Allergic contact dermatitis is known to occur with skin adhesive.^{2,10} Newer technique of using resin template for silicone auricular prosthesis for a spectacle-retained prosthesis, has been used for better retention and orientation. Moreover, it is cost-effective and esthetically acceptable for patients who decline or need to postpone implant-retained prosthesis reconstruction.¹¹ Therefore, the treatment option chosen for this patient discussed in this case report was spectacle-retained prosthesis with acrylic resin substructure.

A spectacle-retained auricular prosthesis has many potential advantages compared to the other treatment modalities. They are easy to fabricate and require lesser chair-side time. The assembly is cost-effective, easy to maintain by the patient and repair by the operator as and when needed. It is the most common retentive aid that could be used effectively in patients who are not willing for any surgical procedure.

An added advantage in this prosthesis is an ear stent that has been fabricated to maintain the patency of canal. Stenosis of external auditory meatus may be congenital or acquired chronic inflammation of the EAM, chronic ear infection, mastoidectomy tumor resection and traumatic insults to the ear. Restenosis after surgery is common in



Figs 6A and B: (A) Side view of prosthesis, (B) final prosthesis with ear stent

30% of cases as a result of repair of stenosed EAM. Various materials have been used to maintain the patency of canals, such as cotton balls with antibacterial ointment, expanding cellulose wicks, rigid conformers made of acrylic resin.¹²

A few limitations faced using this technique includes the open anterior margin of the prosthesis which is esthetically not acceptable. The patient can camouflage that area using hair, making the margin less conspicuous. Also, the prosthesis often tends to change the orientation if the spectacles are not worn correctly. Repeated practice helps the patient to develop his own sense and way to use the assembly to best esthetic appearance for patients who are not willing for implant-retained prosthesis.

CONCLUSION

The procedure suggested in this case report provides an alternative treatment option for surgical ear reconstructions due to financial constraints or apprehension to surgical procedure. Spectacle-retained silicone ear prosthesis can prove to be a more economical and less complex treatment modality, compared to implant-retained facial prosthesis. Prosthetic reconstruction of ear, following trauma or resection leads to a successful rehabilitation adapted to the patient's needs by such anatomically retained prosthesis.

REFERENCES

1. Dib LL, de Oliveira JA, Neves RI, Sandoval RL, Nannmark U. Auricular rehabilitation by means of bone grafting from the iliac crest in combination with porous extra-oral implants: A case report. *Clin Implant Dent Relat Res* 2007;9:228-32.
2. Butler DF, Gion GG, Rapini RP. Silicone auricular prosthesis. *J Am Acad Dermatol* 2000;43:687-90.
3. Tjellstrom A, Lindstrom J, Nysten, et al. The bone-anchored auricular episthesis. *Laryngoscope* 1981;91:811-15.
4. Holgers KM, Bjursten LM, Thomsen P, Ericson L, Tjellstrom A. Experience with percutaneous titanium implants in the head and neck: A clinical and histological study. *J Invest Surg* 1989; 2:7-16.
5. Gumieiro EH, Dib LL, Jahn RS, dos Santos JF Jr, Nannmark U, Granström G, et al. Bone-anchored titanium implants for auricular rehabilitation: Case report and review of literature. *Sao Paulo Med J* 2009;127:160-65.
6. Khindria SK, Bansal S, Kansal M. Maxillofacial prosthetic materials. *J Indian Prosthodont Soc* 2009;9:2-5.
7. Phillips RW, et al. Materials for the fabrication of maxillo-facial prosthesis. In: Chalian VA (Ed). *Maxillofacial prosthetics multidisciplinary practice*; Baltimore: Williams & Wilkins Co 1972:89-107.
8. Keerl R, Weber R, Scholtes W, Draf W, Heieis G, Trainer D. Prosthetic rehabilitation after craniofacial surgery. *Skull Base Surgery* 1996;6:207-13.
9. Aydin C, Karakova S, Yilmaz H, Yilmaz C. Implant retained Auricular prosthesis: An assessment of implant success and complications. *Int J Prosthodont* 21:241-44.
10. Parel SM. Diminishing dependence on adhesive for retention of facial prostheses. *J Prosthet Dent* 1980;43:552-60.
11. Nelogi SY, Chandrasekar NH, Porwal A. Modified technique for retaining silicone auricular prosthesis: A case report. *Eur J Prosthodont Restor Dent* 2011;19:62-66.
12. Savion I, Good J, Sharon-Buller A. An acrylic resin conformer for prevention of stenosis of external acoustic meatus. *The Laryngoscope* 2005;115:2006-09.

ABOUT THE AUTHORS

Kasim Mohamed (Corresponding Author)

Senior Lecturer, Department of Prosthodontics, Faculty of Dental Sciences, Sri Ramachandra University, Chennai, Tamil Nadu, India
e-mail: mohamedkasim9@yahoo.com

Anandkumar Vaidyanathan

Professor, Department of Prosthodontics, Sri Ramachandra University Chennai, Tamil Nadu, India

Umamaheswari Mani

Associate Professor, Department of Prosthodontics, Sri Ramachandra University, Chennai, Tamil Nadu, India

Yadharth Bhatia

Senior Lecturer, Department of Prosthodontics, Sri Ramachandra University, Chennai, Tamil Nadu, India

Padmanabhan Thallam Veeravalli

Professor, Department of Prosthodontics, Sri Ramachandra University Chennai, Tamil Nadu, India