Eur. J. Prosthodont. Rest. Dent., Vol.19, No. 2, pp 62-66
Printed in Great Britain

doi:10.1922/EJPRD_954Porwal05

Modified Technique for Retaining Silicone Auricular Prosthesis: A Case Report

Santosh Yamanappa Nelogi*, Naveen Halemane Chandrashekhar* and Amit Porwal*

Abstract - *Prosthetic rehabilitation of auricular defects can be a demanding procedure due to a broad variety of clinical presentations and a wide array of treatment options. The retention of auricular prostheses is a major factor influencing the successful outcome of rehabilitative treatment following cancer surgery or trauma. Auricular prostheses have been retained by methods including implants, adhesives and spectacle frames but the choice of repair ultimately depends on patient factors, amount of soft tissue loss, and location of the auricular defect. This article describes a newer technique of using resin template for silicone auricular prosthesis, for better retention and orientation. Moreover it is cost effective and aesthetically acceptable for patients who decline or need to postpone implant retained prosthesis reconstruction.*

KEY WORDS: Auricular prosthesis, Resin template, Silicone

INTRODUCTION

Rehabilitation of the patients with acquired or congenital deformity of the head and neck region is a difficult process requiring multidisciplinary association. The mental trauma associated with severe facial deformity would be immense, as the face is the most important non-verbal means of communication[1]. Additionally, it also affects one's social and professional life. Cosmetic rehabilitation provides such individuals professional and social acceptance and improves their quality of life.

An auricular defect can be caused by several conditions including trauma, congenital malformation, or surgical removal of neoplasm[2-3]. Acquired auricular deformities most commonly result from a wide range of traumatic injuries[4] in which, defect because of human bite constitutes major cause[5]. The severed ear is a major challenge for the head and neck surgeon or plastic surgeon to reconstruct due to the unique anatomical structure of the auricle.

Surgical reconstruction of an external ear to achieve facial balance often requires numerous surgical procedures spanning several years. Partial reconstruction of an ear must leave behind tissue, having sufficient cartilaginous rigidity to support the weight of the prosthesis and remain stable while making an impression. The various convolutions of remaining tissue can also be engaged, so that the prosthesis can be retained with some degree of predictability.

Total excision of an ear offers less opportunity for prosthesis retention, wherein an implant-retained and adhesive retained auricular prosthesis is an option that can be considered instead of surgical reconstruction[6, 7]. Implant-retained prosthesis may not be a treatment of choice for all cases; in such a condition a prosthesis that uses adhesives or spectacles as a mode of retention is required.

This article emphasizes the use of an anatomico-mechanical retentive mechanism with the use of acrylic resin template as an aid for retaining the silicone auricular prosthesis.

Case Report:

A 53-year-old male patient was referred to Department of Maxillo facial Prosthetics with a missing ear. The patient was involved in a road traffic accident, which resulted in almost complete amputation of his left ear. On examination, the patient's left ear was missing (fig-1) with only tragus retained. There was no injury or deformity to the right ear.

Different treatment options including cosmetic surgical intervention, implant retained and adhesive retained prosthesis were discussed with the patient. Patient refused any of the surgical interventions and it was found that the patient was allergic to adhesives, therefore, the only treatment option present was anatomico-mechanical mode of retention. Thus, it was planned for prosthetic replacement of the missing ear with retentive stud extending into the external auditory meatus [8-10].

The impression of defective and the non-defective side was made with irreversible hydrocolloid impression material. Before making an impression, orientation lines were marked on the face (Fig-2), one line bisecting the middle of the tragus vertically and the other line drawn from the ala to the middle of tragus horizontally. These lines helped in proper orientation of the wax pattern on the cast. A small piece of cotton, impregnated with petrolatum was tied to one end of dental floss and was placed in the ear next to the eardrum. The other end of the string was left out of the ear and an alginate impression of defective side and external auditory canal was made. The impressions were washed and disinfected with 2% gluteraldehyde solution, which were later poured with die stone to obtain the casts.

An acrylic resin template (DPI-Heat cure, Dental Products of India Ltd) was fabricated over the cast with stud extension, which engages the undercut in the external auditory canal

* M.D.S.

Figure 1. *Patient's photograph*

Figure 2. *Orientation lines marked on face*

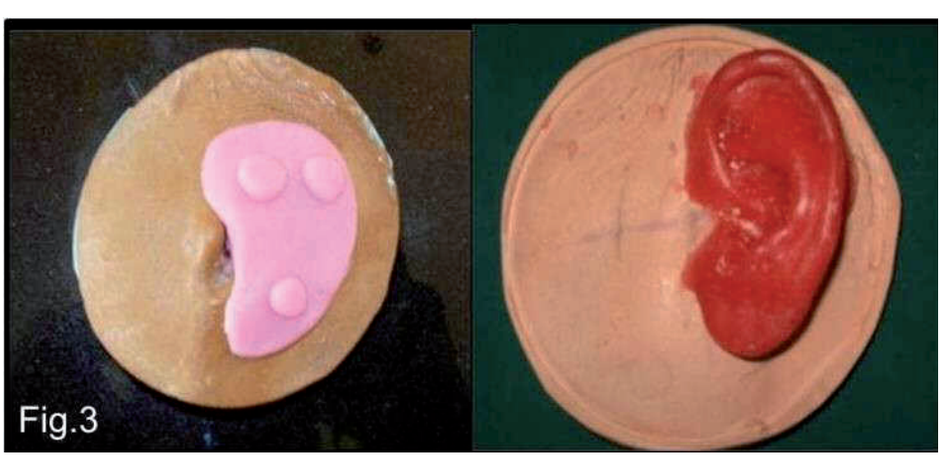

Figure 3. *Acrylic resin template with wax pattern*

Figure 4. *Triple stage flasking technique*

Figure 5. *Profile and back view of the patient*

Figure 6. *Pre and post treatment photograph*

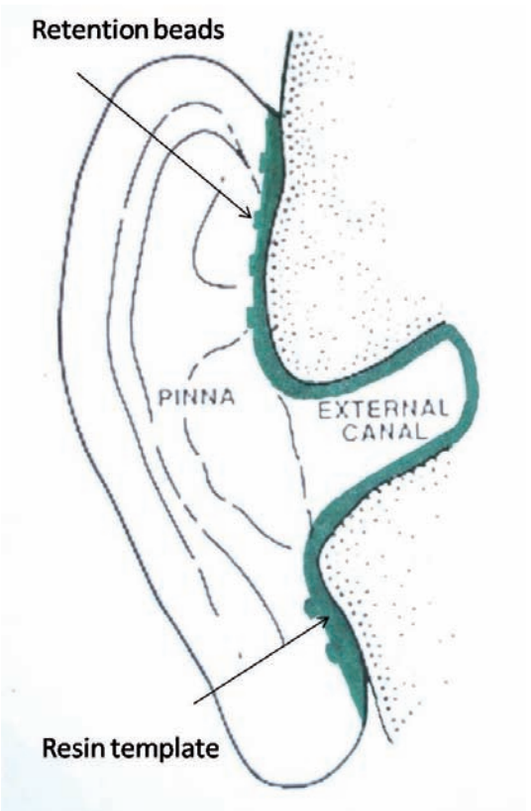

Figure 7. *Schematic diagram showing retentive template with auditory extension*

that helped in orientation of the prosthesis. Beads were made on the outer surface of the template, which helped in mechanical retention of the silicone prosthesis. Later, a wax pattern was fabricated by mirror image technique on the acrylic resin template to replicate the missing ear (Fig-3) [11].

During the trial, the position, shape and size of the wax pattern was evaluated and when found satisfactory, it was flasked using triple stage technique[12] (Fig-4). After dewaxing, medical grade RTV silicone (Factor II, Inc. Lakeside, AZ USA) was painted into the cavity of the 3-piece stone mold as a thin semitransparent glaze to simulate superficial vasculature, pigmentation, and surface irregularities. A more opaque base color silicone mixture was then poured to fill the rest of the mold and was allowed to polymerize at room temperature. Finally, the ear prosthesis was recovered from the 3-piece stone mold, trimmed and finished for extrinsic coloration. Subsequently a hole was made in the prosthesis through the stud to facilitate hearing. Later on, the prosthesis was attached to the spectacle frame and was delivered to the patient (Fig -5, 6). Even though the prosthesis was self retentive because of the stud extending into the external auditory meatus, the spectacle frame augmented the retention of the prosthesis. The patient was recalled after 24 hours and was asked whether there was any discomfort or irritation to the tissues. When it was found that patient was comfortable wearing the prosthesis, regular recall check up was scheduled after an interval of 1, 2 and 6 months. At each recall, the prosthesis was evaluated and the tissues were examined for any irritation resulting from the stud extending into the auditory meatus. It was found that the stud did not irritate the surrounding tissues.

DISCUSSION

Prosthetic rehabilitation to restore the facial disfigurements with custom made prosthetic devices may improve the level of function and self-esteem for the patients[13]. Difficulties with facial prostheses may arise due to patient factors such as amount of soft tissue loss, location of the auricular defect, dynamic tissue beds, retentive quality of the area, and associated irritation of the tissue beds. Hence, the choice of rehabilitation depends on meticulous restoration of physical dimensions, external contour, and surface landmarks to ensure satisfactory aesthetic outcomes for the prosthodontist and their patients.

The existing treatment modalities for replacement of missing ear are surgical and prosthetic. Surgical reconstruction using autologous tissue is the most natural method of restoration of any missing tissue[14-16]. This requires multiple surgeries over a period of time and the resulting structure may not closely resemble the contra lateral ear or be positioned to provide facial balance[17]. Prosthetic replacement may provide an anatomically correct and esthetically pleasing prosthesis[18-20]. The prosthetic replacement options include adhesives retained, Implant retained or prosthesis using anatomico-mechanical undercuts as means of retention. Rehabilitation using adhesive retained silicone prostheses is a conservative and a reversible treatment. The disadvantages of using adhesive-retained auricular prostheses are: less retention, allergic reactions to the adhesive and difficult to maintain[10] and problems in orientating the prosthesis by the patient with compromised manual dexterity in the absence of key anatomical landmarks[20].

Implant-retained prosthesis may not be an ideal option in majority of cases including acquired defects[21] and patients, in general, do not always opt for implant placement because of financial constraints and apprehensions for surgical interventions. Also, the extra oral implant requires adequate thickness of the bone in the temporal and mastoid regions that may be deficient in certain cases.

Hence, replacement of an ear by surgical, by use of adhesives or by use of implants is not always possible or acceptable to the patient. Therefore, an ear prosthesis retained by anatomico-mechanical means is an option in all such cases[10]. The novel technique mentioned in this article uses an acrylic template with custom ear plug extension in auditory canal to retain silicon auricular prosthesis. The acrylic template fabricated was of 2mm thickness which closely adapted to underlying defect area and its contours with extension in external auditory canal (Fig.-7).

A search through the literature reveals a problem in repositioning and reorienting the auricular prosthesis, which is a major drawback for prosthesis retained by anatomico-mechanical retention. In this technique repositioning and reorienting a prosthesis was made possible because of the reorienting lines that were marked before an impression was made which was later transferred to the cast. A closely adapting acrylic template with reinforcement with spectacle frame enhanced the retention and orientation of the prosthesis. Utilization the external auditory canal provides the patient the reassurance of a firmly retained prosthesis without resorting to use of adhesives and their disadvantages.

Silicone auricular prosthesis with acrylic resin template extension in the external auditory canal provides retention,

helps in proper placement and provides stable base for the prosthesis. External auditory canal when used for retention and location of ear prosthesis for properly selected patient along with a eye glass temple piece, over superior margin of acrylic resin template can reduce or eliminate the use of adhesives in retaining the ear prosthesis[2, 20]. The technique mentioned here is mainly indicated where the patient has undergone radiotherapy and implants ware relative contraindicated, the patients allergic to adhesives and on mobile unsupported tissue which disturbs the adhesive bond. The prosthesis extension may diminish hearing on the affected side[1], to prevent this a patent hole was made in the prosthesis. This procedure also reduces the problem of adaptation of prosthesis as template is properly adapted to the defective side.

CONCLUSION

This article highlights the need for the Maxillofacial Prosthodontist to adopt a flexible and open approach during treatment planning in regard to the patient's socioeconomic as well as anatomic limitations. While many retentive options are available, the spectacle-retained prosthesis with acrylic resin template was considered to be the most appropriate treatment option in this case. The ultimate goal of any maxillofacial rehabilitation should be to satisfy the patient's needs and expectations while at the same time providing the best possible treatment.

ADDRESS FOR CORRESPONDENCE

Dr Amit Porwal, Reader, Department of Prosthetic Dentistry, Pacific Dental College and Hospital, Debari, Udaipur,Rajasthan – India 313001. E-mail: aporwal2000@gmail.com

REFERENCES

1. Collyerh. Facial Disfigurement-Successful Rehabilitation. Macmillan, London, 1984
2. Chung W, Robin C, Siu S, Adam C, Chu C, Frederick S, Chow WT. Magnet retained auricular prosthesis with an implant-supported composite bar: A clinical report. *J Prosthet Dent* 2003; **89**:446-449
3. Nishimurard, Roumans E, Sugal T, Moy PK. Auricular prosthesis and Osseointegrated implants: UCLA experience. *J Prosthet Dent* 1995; **73**:553-558
4. Steffen A, Katzbach R, Klaiber S. A comparison of ear reattachment methods: a review of 25 years since Pennington. *Plast Reconstr Surg* 2006; **118**: 1358—1364
5. Stierman KL, Lloyd KM, De Luca-Pytell DM, Phillips LG, Calhoun KH. Treatment and outcome of human bites in the head and neck. *Otolaryngol Head Neck Surg* 2003; **128**: 795—801
6. Tjellström A. Osseointegrated implants for replacement of absent or defective ears. *Clin Plast Surg* 1990; **17**:355-66
7. Parel SM, Holt GR, Bränemark PI, Tjellström A. Osseointegration and facial prosthetics. I*nt J Oral Maxillofac Implant* 1986; **1**:27-29
8. Boucher and Rahn; Maxillofacial prosthesis: Principles and Concepts. W.B. Saunders Company Philadelphia. 1970 pg113-114
9. Parel SM. Diminishing dependence on adhesives for retention of facial prosthesis. *J Prosthet Dent* 1980; **43**: 5: 552-560
10. Ulbulian AH. Facial Prosthetics. Charls C Thomas publisher Springfield1973, pg 364- 377
11. Lemon JC, Chambers MS, Wesley PJ, Martin JW. Technique for fabricating a mirror –Image Prosthetic Ear. *J Prosthet Dent* 1996; **75**; 292-3
12. Thomas D. Taylor. Clinical Maxillofacial Prosthetics. Quintessence publication Co. Inc, Illinois 2000. pg -242
13. Chang T, Garrett N, Roumanas E, Beumer J: Treatment satisfaction with facial Prostheses. *J Prosthet Dent* 2005; **94**:275-80
14. Mellette JR. Ear reconstruction with local flaps. *J Dermatol Surg Oncol* 1991; **17**:176-82
15. Johnson TM, Fader DJ. The staged retroauricular to auricular direct pedicle (interpolation) flap for helical ear reconstruction. *J Am Acad Dermatol* 1997; **37**:975-8
16. Brent B. Auricular repair with autogenous rib cartilage grafts: Two decades of experience with 600 cases. *Plast Reconstr Surg* 1992; **90**:355-74
17. Aydin C, Karakoca S, Yilmaz H, Yilmaz C. Implant retained auricular prosthesis : An assessment of implant success and prosthetic complications: *Int J Prosthodont* 2008;**21**:241- 244
18. Holgers KM, Tjellstrom A, Bjursten LM, Erlandsson BE. Soft tissue reaction around percutanious implants: A clinical study on skin penetrating titanium implants used for bone anchored auricular prosthesis. *Int J Oral Maxillofac Implants* 1987; **2**:35-39
19. Butler DF, Gion GG, Rapini RP. Silicone auricular prosthesis: *J Am Acad Dermatol*. 2000 Oct; **43**(4): 687-90
20. Beumer J, Curtis TA, Marunick MT. Maxillofacial Rehabilitation: Prosthodontic and Surgical Considerations St Louis: Ishiyaku *Euro America Inc*., 1996: 399- 402
21. Viaima CB. Nontypical Prosthesis of the year. *J Prosthet Dent* 1960: **10**:986