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Case Report

Dentistry Section

# A Case Report on the Rehabilitation of an Ear Deformity using an Implant Supported Auricular Prosthesis

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## ABSTRACT

Extraoral implant retained prostheses have been shown to be a reliable therapy choice for maxillofacial rehabilitation. The clinical and laboratory steps for creating an auricular prosthesis are described in this case report. A 27-year-old male patient met with a road traffic accident, lost his left ear, and developed an ear deformity. The patient then sought out rehabilitation. Extraoral implants and Hader bar-and-clip retention were used to ensure that the auricular prosthesis was properly connected to the implant. The patient was satisfied with the prosthesis remarkable support, retention, and aesthetic abilities. Treatment success depends on factors like patient acceptability, aesthetics, compatibility, durability, and prosthetic considerations like material availability, processing ease, and ease of duplication that make the prosthesis look natural and give the patient social confidence.

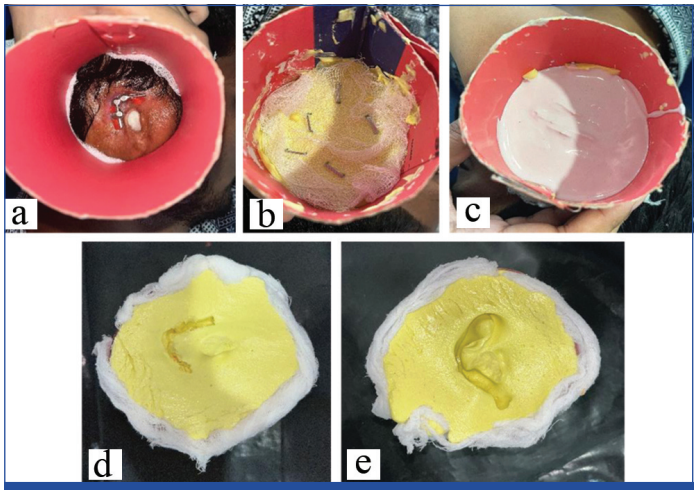
**Keywords:** Auricular prosthesis, Hader bar-and-clip attachment, Implant-supported maxillofacial prosthesis

## CASE REPORT

A 27-year-old male patient reported to the Department of Prosthodontics at Sharad Pawar Dental College and Hospital, Sawangi, Datta Meghe Institute of Higher Education and Research, Wardha, Maharashtra with a complaint of discoloured and ill-fitting ear prosthesis. History revealed that he had lost his left ear in an automobile accident six years ago for which auricular implants were placed. On examination, the prosthesis was manufactured of medicalgrade maxillofacial silicone, had lost its elasticity, and became discoloured due to prolonged use and exposure to the outside environment. Its elastic clips also lost its elasticity and could not retain the prosthesis. The implants were stable and immobile. The surrounding skin was normal with no evidence of redness or other indication of inflammation and the patient did not experience any pain or discomfort [Table/Fig-1].


**[Table/Fig-1]:** Preoperative images of the patient. a) Lateral view with old silicone auricular prosthesis; b) Lateral view with Hader bar attached to the implants.

To imitate the anatomy of the deformed side, impressions were taken of the defect region and the normal side of ear as well. To facilitate the process of retrieving the impression, petroleum jelly was applied to the hair at the defect site. Alginate (Vignette Chromatic, Dentsply Sirona) was then used to create the impression, and dental plaster (Dental Plaster, Kalabhai, Kaldent) was used on top of it as a backing for the alginate in order to maintain its strength. The impression obtained was then boxed and poured [Table/Fig-2].



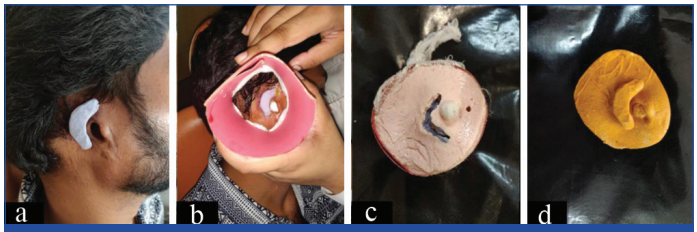

**[Table/Fig-2]:** Alginate impression of left and right auricular region. a) Blocking out of undercuts; b) Adjustment of cardboard tray; c) Placement of gauze and staple pins over alginate impression; d) Pouring of plaster over alginate impression; e) Impression of the normal ear.

A clear acrylic stent was created on the casts after blocking the undercuts [Table/Fig-3]. The wax pattern was kept in position with the help of clips, which are a part of hader bar and clip attachment that were included in the acrylic stent. The stent was then duplicated using polyvinyl siloxane material of a putty consistency, and this index was used for processing. Also, a wax replica of the right normal ear was made to represent the left deformed ear's appearance. The wax pattern was meticulously altered during the following clinical session to preserve the patient's facial symmetry and aesthetics [Table/Fig-4]. Following the patient's approval of the wax trial, shade matching was performed in the daylight [Table/Fig-5], using the silicone kit from Technovent. To replicate the patient's natural skin texture, intrinsic pigments of white (P105), yellow (P106), brown (P108), brilliant red (P112), black (P109), and flocking powder in the hues of red (P301), and purple (P302) were used. An impression was made with the putty index which replicated the clear acrylic stent, this was placed on the hader bar. For fabrication of the prosthesis, cast obtained from this impression was used [Table/Fig-6].

The wax pattern was flasked, mould was created. De-waxing of the mould was done followed by silicone packing into the mould

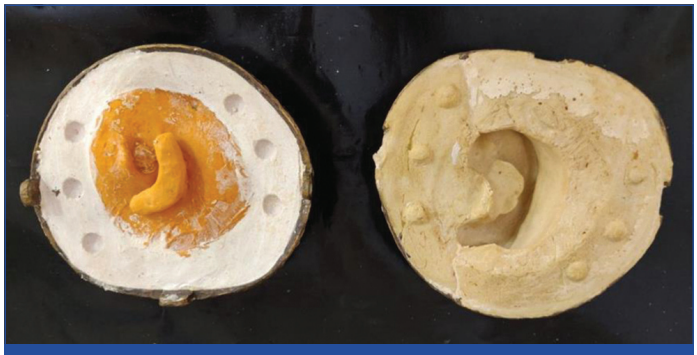

**[Table/Fig-3]:** Clear acrylic stent with clip attachment placed on the Hader bar. a) Elastic clips attached over the Hader bar; b) Clear acrylic stent placed over the Hader bar and clip attachment.

**[Table/Fig-4]:** Wax try-in to evaluate the aesthetics and fit of the prosthesis.
**[Table/Fig-5]:** Shade matching by using the trial and error method. (Images from left to right)




**[Table/Fig-6]:** Impression with putty index in place for fabrication of prosthesis. a) Placement of putty index in place; b) Adjustment of cardboard tray; c) Alginate impression; d) Cast obtained for fabrication of the prosthesis.

[Table/ Fig-7]. Heat-vulcanised silicone was employed (Silicone M511, Technovent) for the fabrication of the auricular prosthesis. After that, the packed silicone was dried in a hot air oven in accordance with the manufacturer's instructions. The silicone ear prosthetic was fabricated after cooling the mould.



**[Table/Fig-7]:** Mold fabrication for packing of silicone.

The prosthesis was then polished and finished using silicone polishing and finishing burs. After mimicking the contralateral ear and concealing the margins to the surrounding tissue with extrinsic staining, an extrinsic sealant was used to seal the extrinsic stains. The acrylic stent was then attached to the prosthesis in the space created in the silicone ear by the putty index. The prosthesis was finally put in place and postinsertion instructions on cleaning and maintaining the prosthesis were given to the patient [Table/Fig-8]. Patient was satisfied with the aesthetic and retentive outcome of the prosthesis. Also, the patient was advised to follow-up every six-months, to ensure the stability of the retentive components and extrinsic staining of the prosthesis which was unremarkable.


**[Table/Fig-8]:** Final prosthesis placement. a) Frontal view; b) Lateral view.

## DISCUSSION

In addition to functional issues, major psychological issues related to facial deformities may make a person avoid social interaction. In light of this, addressing cosmetic issues should be the primary goal of maxillofacial rehabilitation [1]. Most of the authors relate the long term success of the maxillofacial prosthesis with tissue health but retention is the key to a facial prosthesis long-term success. Implants, skin adhesives, and anatomic undercuts are crucial components in ensuring adequate retention. For maxillofacial rehabilitation, extraoral implant retained prostheses are a reliable therapy choice [2]. For the patient, implant-retained auricular prostheses offer several benefits, including ease, security, reliable retention and placement, the absence of adhesives, and preservation of marginal integrity and long life. Because of its predictable outcomes, the implant-retained auricular prosthesis has emerged as a feasible therapeutic option for individuals with auricular deformities.

The discolouration of the medical-grade maxillofacial silicone used to make maxillofacial prostheses, which happens over time as a result of continual exposure to the outside environment, is another issue with maxillofacial prostheses [3]. As a result, the prosthesis must be routinely replaced. The patient complained of discolouration and lack of retention in the prosthesis fabricated six years ago and wanted it replaced, therefore the case report details the re-fabrication of an implant-supported bar and clip attachment auricular prosthesis. Craniofacial implants provide great support and retention capabilities and enhance a patient's look and quality of life when used to retain extraoral prosthetics like ears. However, careful planning about the quantity, position, and orientation of the implants as well as the proper attachment of the auricular prosthesis to the implant retention structure is required to provide an acceptable result.

Better handling and reduced sensitivity to environmental changes are provided by intrinsic colour as opposed to external colouration [4]. Studies have shown that colouring pigments can become discoloured over time as a result of exposure to Ultraviolet (UV) radiation and extreme heat, and perspiration [5-7]. Numerous authors, such as Lemon JC et al., and Ishigami T et al., agreed that colour instability is triggered by UV ray, the deposition of microscopic residues in the material's surface pores, and the use of disinfecting agents, causing the constant remanufacture of facial prostheses [6,7]. According to Polyzois GL, after being

exposed to the environment for a year, facial silicone underwent visible colour changes [8]. The patient was instructed to refabricate the prosthesis as needed after being told about how the prosthesis weathers [9]. It's still important to make a prosthesis with a colour tone that blends in with the tissue next to the defect site [10]. The trial and error method was used for shade matching in the presence of daylight. Intrinsic shades used were White (P105), Yellow (P106), Brown (P108), Brilliant red (P112), Black (P109), and flocking powder of colours Red (P301) and Purple (P302) from the brand Technovent. First, a base white colour was added then all the shades mentioned above were added in the required amount with the trial and error method.

The best alternative for treating auricular defects is implant-retained auricular prosthesis, which restores the loss with superior retention and does not require the use of adhesives or mechanical devices like eyeglasses [11]. The thickest parts of the prosthesis will make it easier to hide the retentive components [12]. The most significant development is the ability to lessen reliance on adhesives, which eliminates adhesive-induced material degeneration/discolouration and skin reactions. There are many attachments available to keep implant-retained prostheses in place, for example, O-Ring and locator. An additional bar with clips or retentive components is typically needed for implant-retained auricular prostheses in addition to the artificial ear [13].

Recent advances in maxillofacial prosthesis are 3D printing of silicone prosthesis and tissue engineering for treating microtia. For 3D printing of silicone prosthesis the material used in printing is not genuine silicone and the biocompatibility of the material is questionable, more research in this field is needed [14]. On the other hand, to create functional tissue, a collection of high-density functionally dissociated cells is transplanted into an animal model after being seeded onto artificial biocompatible, biodegradable polymers [15]. Many avenues for prospective clinical applications have been made possible by tissue engineering experiments carried out in animal models.

## CONCLUSION(S)

In this case report, an attempt to provide a cost-effective and cosmetically acceptable auricular prosthesis was made which was aesthetically and functionally acceptable to him. Successful use of prosthesis might rely up on patient psychological acceptance and the patient's participation in the decision making process with realistic expectations is of vital significance.

## REFERENCES


[1] Butler DF, Gion GG, Rapini RP. Silicone auricular prosthesis. J Am Acad Dermatol. 2000;43(4):687-90.
[2] Nishimura RD, Roumanas E, Sugai T, Moy PK. Auricular prostheses and osseointegrated implants: UCLA experience. J Prosthet Dent. 1995;73(6):553-58.
[3] Hatamleh MM, Watts DC. Effect of extraoral aging conditions on colour stability of maxillofacial silicone elastomer: Colour stability of maxillofacial silicone elastomer. J Prosthodont. 2010;19(7):536-43.
[4] Ranabhatt R, Singh K, Siddharth R, Tripathi S, Arya D. Colour matching in facial prosthetics: A systematic review. J Indian Prosthodont Soc. 2017;17(1):5.
[5] Bishal AK, Wee AG, Barão VAR, Yuan JCC, Landers R, Sukotjo C, et al. Colour stability of maxillofacial prosthetic silicone functionalized with oxide nanocoating. J Prosthet Dent. 2019;121(3):538-43.
[6] Lemon JC, Chambers MS, Jacobsen ML, Powers JM. Colour stability of facial prostheses. J Prosthet Dent. 1995;74(6):613-18.
[7] Ishigami T, Tanaka Y, Kishimoto Y, Okadac M. A facial prosthesis made of porcelain fused to metal: A clinical report. J Prosthet Dent. 1997;77(6):564-67.
[8] Polyzois GL. Colour stability of facial silicone prosthetic polymers after outdoor weathering. J Prosthet Dent. 1999;82(4):447-50.
[9] Goiato MC, Pesqueira AA, Santos DM dos, Zavanelli AC, Ribeiro P do P. Colour stability comparison of silicone facial prostheses following disinfection. J Prosthodont. 2009;18(3):242-44.
[10] Demir N, Cevik P, Okutan Y, Ozturk AN, Colpan B. A different wax sculpture technique for implant-retained auricular prosthesis. Eur J Dent. 2015;9(4):433-7.
[11] Goswami R, Pahwa A, Saxena D, Chopra A. Orofacial rehabilitation with implants: A boon for retention. Ann Rom Soc Cell Biol. 2022;26(1):1451-58.
[12] Nazar SA, Nair VV, Kumar H, Ravichandran R. Retention in maxillofacial prosthetics: A review. Int J Appl Dent Sci. 2021;7(2):568-73.
[13] Nichlani G, Mittal DA, Joshi M, Ghadage M, Kadam N, Kamble SS. Retention in maxillofacial prostheses: A literature review. Int J Health Sci. 2022;6(S2):2151-63.
[14] Unkovskiy A, Wahl E, Huettig F, Keutel C, Spintzyk S. Multimaterial 3D printing of a definitive silicone auricular prosthesis: An improved technique. J Prosthet Dent. 2021;125(6):946-50.
[15] Melville JC, Mañón VA, Blackburn C, Young S. Current methods of maxillofacial tissue engineering. Oral Maxillofac Surg Clin. 2019;31(4):579-91.



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