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"Silicone Auricular Prosthesis" Enhancing Patients Quality Of Life!!

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Abstract-
Rehabilitating a patient with facial defects presents significant challenges. A viable alternative to surgical reconstruction is the creation of a silicone auricular prosthesis. The replacement of anatomical parts involves both art and science. These prostheses offer a cost-effective and acceptable solution for patients who prefer to avoid surgical procedures. This article discusses the process of fabrication of an adhesive retained silicone auricular prosthesis.

Keywords- *silicone prosthesis, adhesive, auricular defect.*

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I. Introduction-

Physical defects can significantly impact quality of life, particularly when they affect the maxillofacial region. Auricular defects, which may be congenital (resulting in malformed ears) or acquired (due to burns, trauma, or accidents), present unique challenges in facial plastic surgery [1]. While smaller defects can often be addressed with primary closure, wedge repair, skin grafts, or various flap techniques, larger defects involving substantial cartilage loss typically necessitate more complex solutions such as staged pedicle flaps [2]. Complete auricular loss often requires reconstruction using autogenous rib cartilage in a multistage procedure. However, not all patients opt for additional surgeries, making prosthetic reconstruction a well-established alternative to autogenous tissue techniques. The goal of maxillofacial prosthetics and cosmetic surgery is to replace missing or deformed organs and provide patients with a near-normal appearance [3]. The advent of silicone-based materials in maxillofacial prosthetics, combined with skilled craftsmanship, has significantly enhanced the rehabilitation of patients with auricular defects. Silicone auricular prostheses offer a non-surgical solution to restore the appearance of ears lost due to cancer surgery, amputation, burns, or congenital defects [4]. This case report illustrates the fabrication of an adhesive retained silicone auricular prosthesis for a patient with a unilateral missing ear.

Case report- A 42-year-old male patient reported to the Department of Prosthodontics, Crown and bridge & Implantology Rishiraj college of dental sciences and research centre, Bhopal with a complaint of missing left ear (Figure 1). History revealed that he had lost his left ear in an acid burn accident 20 years ago. On examination, auditory meatus opening and ear lobule is present and patient had undergone two bone grafting surgeries for further reconstruction of ear. Hearing capability was not compromised on both sides. The surrounding skin was stretched due to scar formation after acid burn with no evidence of redness or other indication of inflammation and the patient did not have any pain or discomfort. The rehabilitation choice like surgical autogenous reconstruction implant retained with soft tissue undercuts, skin adhesives, and other mechanical methods of retention were explained to the patient. Because the patient was apprehensive for surgical procedures, he opted for the prosthetic approach. Thus, the silicone prosthesis with adhesive was opted as the treatment of choice.

Patient education and counseling was performed regarding the nature of function and limitations of the prosthesis, and preoperative photographs were taken for further assessment and evaluation.

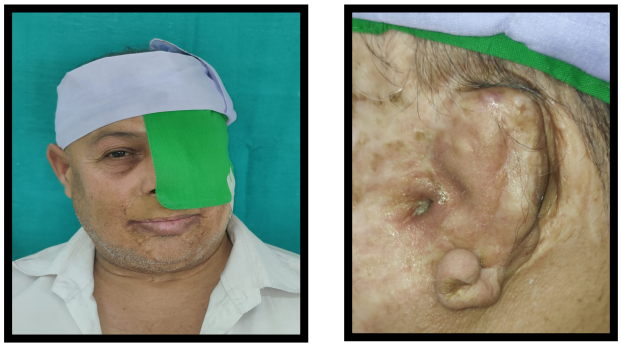

Figure. 1- Pre-Operative Profile And Auricular Defect Photograph

Procedure-

The patient was seated on the dental chair in an upright position. The external ear canal was sealed with gauze to prevent ingress of impression material. Petroleum jelly was applied to the rudimentary ear and the skin around it. Impressions of the auricular defect as well as the contralateral normal ear were taken with irreversible hydrocolloid (Alginate Gelmak, Brulon Internation Inida) following standard procedures. An impression tray is boxed with modeling wax used to support the hydrocolloid impression material. Once set, it was removed carefully from the undercuts to prevent tear of the material. The impression was inspected for accuracy. (Fig. 2) the impression was then poured with dental stone (gemstone, shruti products), by the standard procedures. Similar method was done for the contralateral side and the impression was poured with molten modelling wax (Pyrax Polymers).

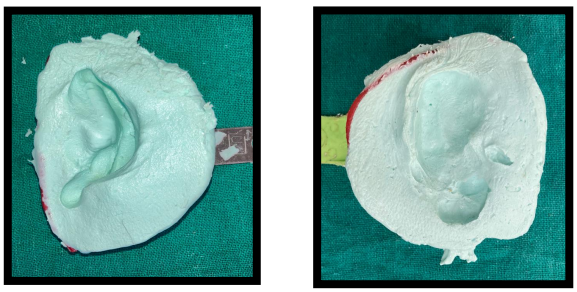

Figure. 2- Alginate impression of auricular defect and contralateral ear

Donor ear impression was also taken (Figure 3) and poured with modelling wax to imitate the anatomy as close as possible but due to the anatomic limitations from the patient's previous bone grafting surgery it was not possible to use the donor ear wax pattern as it will be bulkier and would not be supported by the undercuts present in the rudimentary ear.

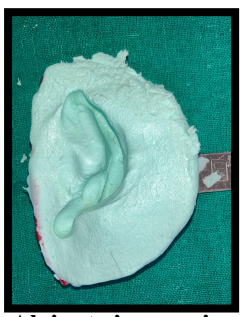

Figure. 3- Alginate impression of donor ear

Markings were made on the cast of the defect ear for the medio-lateral and superior-inferior extension of the prosthesis and markings for the elevation of the pinna were also taken for the prosthesis to have a life like appearance. Wax pattern was sculpted using the mirror image of the contra-lateral ear wax pattern (Figure 4). But due certain anatomic limitation we were not able to incorporate anti-helix, conchae, antitragus.

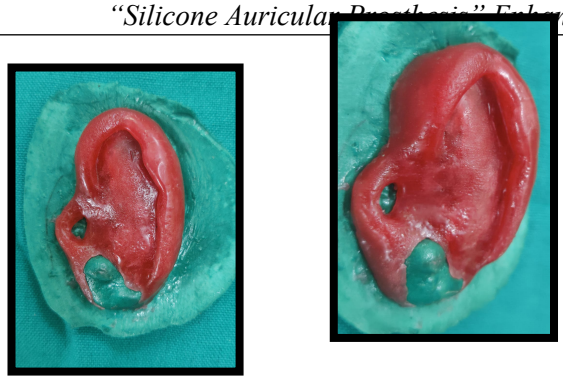

Figure. 4- Wax pattern

Wax pattern was tried on the patient and inspected for the fit of the prosthesis on the tissue, the correct horizontal alignment with the natural ear, the projection of the ear in relation to the side of the head and the integrity of the margins (Figure 5). To imitate natural ear, stippling was done using a hard brush during finishing and polishing of the wax pattern.

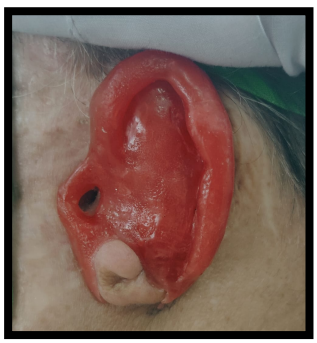

Figure. 5- Wax pattern try in

The wax prosthesis is now sealed to the model and the edges are thinned as much as possible so as to allow silicone edges to feather into the natural skin.

A three-part mould was made for easy placement of the silicone in the mould. To obtain a three-part mould, the top of the dental flask was used as a base, a cast was placed on this top of the flask along with the wax model of the ear, and dental stone was poured so that it flush with the surface of the flask. the cast leaves no undercut (Figure 6). After setting, two grooves were made in the stone at the back of the ear to reorient the mould piece. A separation medium was applied and die stone was mixed and filled onto the back of the ear wax pattern to flow just below the upper edge of the helix, which extends to the base of the helix and the junction of the lobe with the side. head without leaving any undercut. Once the second cast was seated, a similar grooving procedure was performed and a third pour was done using dental stone and the lid was placed and clamped and allowed to set.

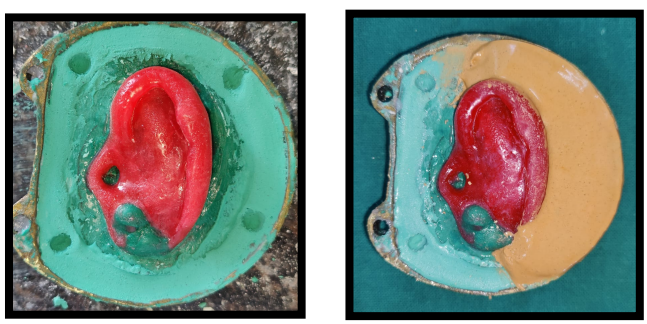

Figure.6- Three-piece mould

Dewaxing was done in the usual manner and the flask was opened carefully and all three pieces of mould were thoroughly cleaned with hot water to eliminate the residue of wax.

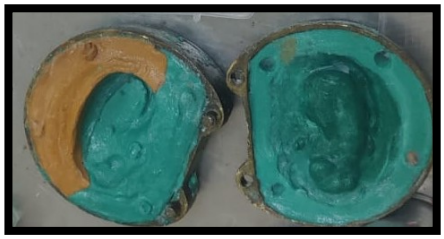

Figure.7- Dewaxing was done

Under natural day light, in presence of patient shade matching was done and photographs were also taken. A medical grade room temperature vulcanizing silicone is used to fabricate the prosthesis. For characterisation and pigmentation of the prosthesis the intrinsic stains (MP sai, enterprise) were used with the room temperature vulcanizing (RTV) silicone (MP sai, enterprise) for shade matching. Basic colours used were yellow, white, brown, purple and red (Figure.8). Colour pigments were added in increment to the silicone and was constantly checked for shade to match with the contralateral normal ear. Separate shades were decided to accurately replicate the various components of the patient's natural ear. Packing of the stained silicone material was done and three-piece mould was seated to make sure that all the margins were flushed together and was kept for 48 hours for further processing as per the manufacturer's instructions. After 48 hours the prosthesis was removed from the mould and inspected for the defects or porosities before being finished and trimmed by sharp parrot beak scissor. The final prosthesis was tried on the patient, retention of the prosthesis was achieved by the undercuts present by the bone grafting which was done previously and for retention at the tragus area skin adhesive was applied (medical grade adhesive, cosmosil) on to the intaglio surface for 1 to 2 minutes, then the adhesive turns clear giving the sign to the patient that the prosthesis is now ready to be placed on to the defect (Fig. 9)

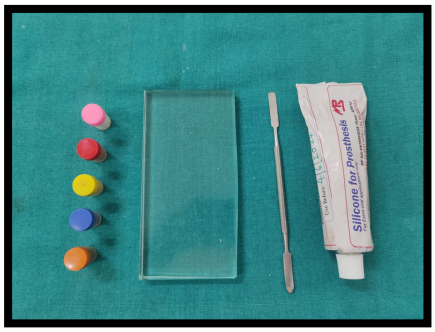

Figure.8- Silicone and intrinsic pigments

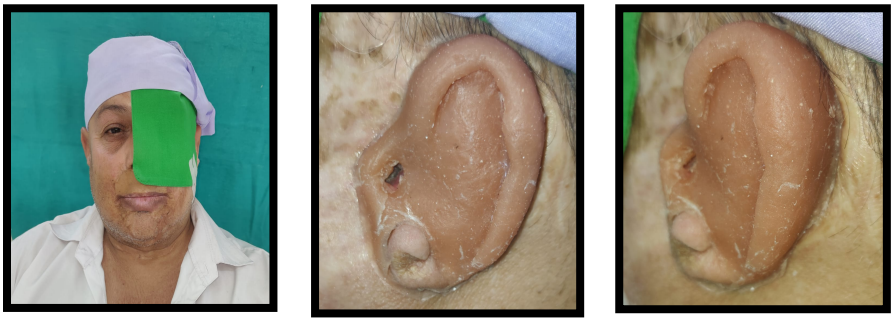

Figure.9- Final prosthesis

The patient was advised to use the prosthesis regularly and avoid exposure to direct sun due to the limitations of silicone used for the fabrication. He was instructed to regularly clean the prosthesis with a mild sodium lauryl sulphate solution and to keep the skin surface clean and free of natural oil secretions to ensure proper adhesion of the prosthesis. He was instructed not to wear the prosthesis while sleeping because any accidental pressure could cause it to warp or tear. Regular follow-up and assessment of the patient and the prosthesis was performed to ensure that there was no inflammatory skin reaction due to adhesive and that the prosthesis was properly maintained.

II. Discussion-

Auricular defects can be rehabilitated either by surgically or prosthetically. In majority of cases, prosthesis reconstruction is a preferred choice in comparison to surgical reconstruction. Recent techniques have been introduced for fabrication of auricular prosthesis like rapid prototyping, stereolithography, CAD-CAM technique, CT Scan imaging, MRI etc[5].

Retention of prosthesis plays a pivotal role in patient acceptance and compliance of prosthesis. Craniofacial implants provide effective retention along with good aesthetic result. However, for placement of implants prerequisites like presence of healthy bone, surgical placement, time, cost is matter of concern. Other retentive modes like utilization of mechanical undercuts, mechanical tools like (Spectacle frames, headbands etc.) or skin adhesives can also be successfully used in retention of auricular prosthesis. Adverse tissue reactions, discoloration, marginal deterioration of the prosthesis, loss of adhesion because of perspiration are disadvantage of skin adhesives. Craniofacial implants are excellent mode of retention as well as auricular prosthesis fabricated using CAD CAM technology, but these modalities are expensive [6]. In this case adhesive retained prosthesis was preferred considering patient's medical history and patient's desire to opt for non-surgical option and is cost effective and has yielded a satisfactory outcome.

III. Conclusion-

Silicone auricular prostheses offer an acceptable result for individuals seeking to restore the appearance and function of their external ears. With continued advancements in technology and materials, these prostheses are likely to become even more effective and accessible. Surgical intervention, patient choices and patient's medical status may contraindicate placement of craniofacial implants in patients with auricular defect. In such cases adhesives and utilization of mechanical undercuts serves as a good mode of retention for the prosthesis. Rehabilitation of patient with auricular defect not only yields aesthetically pleasing results but also renders great psychological benefit to the patient and helps to live life of normalcy in the society.

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