

## **Case Report**

### **The Versatile Silicone: Case Report**

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**Abstract:** Management of patients with facial deformities require multidisciplinary approach. Maxillofacial prosthetic materials are used to replace facial parts lost through disease, trauma or congenital deformity. Silicone rubbers are the materials of choice. A case report is presented where an auricular prosthesis is fabricated with room temperature vulcanising (RTV) silicone. Donor impression was used to fabricate wax pattern.

**Keywords:** ear prosthesis, maxillofacial silicone material, prosthesis retention.

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#### **INTRODUCTION**

The search for materials to rehabilitate has been going on for a long time. Since the discovery of synthetic polymers, Elastomers have been used for over 50 years to fabricate facial prostheses for individuals missing facial anatomy due to resection, trauma, or congenital anomalies [1][2]. Today there is an increasing demand for maxillofacial prostheses, partly because of patients' increased awareness of treatment possibilities, and perhaps partly because of an increased number of patients with trauma or cancer. There is a need to restore or replace the lost stomatognathic and craniofacial structures, whether elective or by trauma [2][3]. Any prosthesis used to replace part or all of any stomatognathic and/or craniofacial structure are called as a maxillofacial prosthesis as the definition goes in the Glossary of Prosthodontic terms [3]. Any kind of deformity, facial or elsewhere may cause psychological and emotional disturbance to the patient as well as social annihilation [4]. Though multiple surgical techniques are reported for reconstruction, multiple surgical sites, questionable prognosis and added procedures deter the patients from seeking this treatment modality. In this case the maxillofacial

prostheses play a vital role in rehabilitation. The primary goal of the maxillofacial prosthodontist is to restore the patient's appearance, improve their self-esteem and help them lead as normal a life as possible [4] [5].

Traditionally, the fabrication of an auricular prosthesis is a complicated task involving multiple procedures [7]. Ear forms a major structure of the middle third of the face. A vital organ to facilitate hearing, it also contributes to the aesthetic value of the face [8]. Soft ear prosthesis, designed to replace a missing anatomical ear, must satisfy the following fundamental requirements: natural appearance, retention, comfort, and durability [9].

The Challenge of recreating preoperative anatomic contour is sometimes complicated by the absence of a preoperative record. This is common when the loss is congenital or unexpected as with the loss of human ear. In these conditions the preoperative bilaterally symmetry can be recreated using mirror image modelling [10]. Rehabilitation efforts can only be

successful when patient can appear in public without fear of attracting unwanted attention [11].

It is a case study showcasing the versatile application of the silicone maxillofacial material. Efforts are made towards making the prosthesis as much natural as possible and returning the patient to a normal social life.

### CASE REPORT

A 20 year old female patient reported to the department of Prosthodontics, Crown and Bridge and Implantology, College of Dental Sciences, Davangere, Karnataka with the complaint of congenitally missing left ear.

Examination of the left ear region revealed a rudimentary stump of cartilaginous tag light brown in colour. Patient's right ear was normal with normal hearing pattern.

A treatment plan was formulated to replace the ear with silicone prosthesis. As a part of protocol, and to ensure the patient's willingness and co-operation, an informed consent was signed before beginning the treatment.

### Fabrication

The fabrication of the silicone ear prosthesis consisted of making an impression of the contralateral normal ear, followed by fabrication of wax pattern and laboratory procedures to obtain the silicone prosthesis.

- Hydrocolloid impression is made of the residual cartilaginous tag on the left side. Stone replica is made of the cartilaginous tag. Impression is made with the patient in supine position (right side) as required. Condylar movements are kept at minimum to prevent tissue bed movement (Fig. 1).
- Lines were drawn; one vertically from above the helix, through the centre of the external auditory meatus, and through and beyond the centre of the lobe of the natural ear. A horizontal line from the helix through the centre of the external auditory meatus and beyond the tragus of the natural ear. Similar lines are drawn on the cartilaginous tag on the defective side. These are transferred from the impression to the stone replicas. They act as orientation lines in fabrication of the wax pattern.
- Prosthesis can be sculpted or a "donor technique" can be used. In this case the next of kin namely her mother acted as donor for the impression of the ear to re fabricated namely the left ear. Wax was poured into the irreversible hydrocolloid impression and a positive wax replica of the ear was obtained (Fig. 2).
- The obtained donor ear wax pattern was further sculpted to match the size and shape of the patient's normal right ear and trial was done (Fig.3). Shade matching was done in daylight to ascertain the particular shade (Fig. 4).

- The sculpted wax pattern while seated on the working cast is sealed in place. The posterior aspect is boxed first and type III dental stone is poured to register this surface. It is notched and lubricated after setting. The boxing wax is removed from the completed posterior segment. The whole wax pattern along with the completed posterior stone cast registration is boxed and type III dental stone is poured to obtain the 3 part stone mould. Aberrations and rough surfaces are removed to obtain a flush tight contact (Fig. 5).
- The basic colour silicone is mixed with the colour pigments in proportion as determined during shade matching. It is packed in the mould, closed tightly and left for curing for 24 hours. On completion of curing, the mould is removed. The prosthesis was trimmed, finished and checked on the patient's left side cartilaginous tag. Esthetics and shade match were verified (Fig. 6).
- The original cartilaginous tag provided enough undercuts for retention. However medical adhesive B – 402 was also applied in thin layers to the periphery of the silicone prosthesis for maximum and adequate retention.



Fig.1: Irreversible hydrocolloid impression of the residual cartilaginous tag of the left side



Fig.2: Donor wax pattern on the stone replica of the cartilaginous tag



**Fig.3: Wax pattern try in**



**Fig.4: Shade matching with the contralateral normal ear on the right side**



**Fig.5: 3 part stone flask**



**Fig.6: Postoperative final silicone prosthesis in place**

## DISCUSSION

The 1970s was a dynamic decade when many new polymers were introduced and investigated for their suitability as maxillofacial prosthetic materials. One type of polymer that came out of these tests with fairly good results is silicone rubber. Both condensation-type polymers using a tin compound or an organic acid as a catalyst, and addition-type polymers using a platinum compound as a catalyst are currently used for making maxillofacial prostheses [2]. The search for suitable materials has been going on for as long as there has been a desire to rehabilitate, but since the introduction of the synthetic polymers maxillofacial prostheses began to look more lifelike. The primary materials for facial prostheses are silicone elastomers [1] [2]. In this case report, the female patient complained of a congenitally missing ear. RTV silicone was used to fabricate an auricular prosthesis, and rehabilitate the patient.

There have been a number of reports listing desirable properties of maxillofacial prosthetic materials [2]. Over time various materials have been used and have been developed further. Wood, leather, polyurethane and polyvinyl chloride (PVC) have been used to produce aesthetic prosthesis, but silicone rubber has proved to be the most promising in achieving the desired life like effects [6]. Silicone elastomers were first used for external prosthesis by Barnhart in 1960. The preference for silicone especially the room temperature vulcanizing (RTV) have been overwhelming. Scientific investigations have demonstrated the superiority of high temperature vulcanizing (HTV) silicones which are generally stronger, tougher, and stiffer than RTV materials [5]. RTV maxillofacial silicone (MP Sai Enterprise, Mumbai, Maharashtra, India) was used to fabricate ear prosthesis in this case.

The taxonomy of the word prostheses is as complex as are the varieties of items made by humans for any utilitarian purpose. A prosthesis is an artificial replacement of an absent part of the human body; a therapeutic device to improve or alter function. Maxillofacial prosthetics is the branch of prosthodontics concerned with the restoration and/or replacement of the stomatognathic and craniofacial structures with prostheses that may or may not be removed on a regular or elective basis. An auricular prosthesis is a removable maxillofacial prosthesis that artificially restores part or the entire natural ear [3].

Currently, many injuries can be rescued by microsurgery through reimplantation. However, in some cases, reconstruction is either not advisable or partially successful [4]. It may not be advisable or possible in some cases such as poor prognosis or factors such as cost and medical morbidity of the patient. It is in this group of patients that prosthesis can be provided and may offer great psychological aid [6]. The patients in this case report wanted a non – invasive alternative for replacement of the congenitally missing ear.

Quality of life can be severely affected by congenital absence or loss of external ear either post surgically or due to trauma. Prosthesis for missing ear greatly adds to the aesthetics and psychological well-being of the patient. Traditionally, the fabrication of an auricular prosthesis is a complicated task involving multiple procedures. Several of these procedures are time consuming and require the patient to be present for an extended period [11]. The severe undercuts and pronounced convolutions of the ear's surface, presents a challenge in simulating a proportioned natural ear [8]. These undercuts present in the residual cartilaginous tag were blocked strategically and utilized for retention of the ear prosthesis in this case report.

Soft ear prosthesis, designed to replace a missing anatomical ear, must satisfy the following fundamental requirements: natural appearance, retention, comfort, and durability. The prosthesis should be made of a material that simulates normal healthy tissues with respect to: texture, translucency, weight, and colour. There may be conditions about the defect itself such as undercuts or hollowed out areas that can be used to advantage for retention. However, when other means of retention are not available, surgical assistance is often helpful [9].

Conventionally if pre-operative casts are not available, the prosthesis can be sculpted from the beginning. Alternately the donor technique can be employed. This is an easier technique. A relative/family member with ear contours that closely match with that of the patient is selected. The donor technique was followed in the present case report [10]. There are many methods of intrinsic and extrinsic coloration of maxillofacial silicone materials. The human ear has a variety of colour and hues on its surface [9]. For the above ear prosthesis the intrinsic pigments supplied by the manufacturer (MP Sai Enterprise, Mumbai) with the silicone were incorporated with the base silicone. This base colour obtained was matched with the patient's skin tone. Extrinsic colouration was then done on the finished and cured prosthesis to match the finer details of the patient's skin.

This article presents case report outlining the fabrication procedures for ear prosthesis, employing three piece stone moulds for the ear prosthesis for processing silicone. The donor technique was used for obtaining the wax patterns for the prostheses. RTV silicone was used for both the prosthesis.

Steps are showcased in fabrication of the prostheses, right from making impression, sculpting till processing, finishing and customization of the prostheses. Emphasis is laid on the retention of the prostheses and concealment of the tissue silicone interface and colour of the prostheses.

## CONCLUSION

Congenital absence or accidental loss of a body part can be very traumatic for the patient or the individual. The prosthetic restoration of the body part can bring back the self-esteem, confidence and ability to lead a normal or near normal life. Silicone is a versatile material that can be used for a number of maxillofacial and combination prosthesis, given its properties and customization capacity. Colour matching with the patient's complexion and surrounding tissue is of utmost importance. Concealment of the tissue silicone interface is a technique sensitive procedure. These procedures should be done in the presence of the patient with his active participation. Retention of the prosthesis can be achieved by various means, like implants, elastic bands, snug fitting rings adhesives etc. however what kind of retentive device to choose depends upon the case, condition of tissue bed and undercuts present in situ. Choice of the patient also plays a major role in deciding what treatment modality is to be used.

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