Case Report

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FABRICATION OF A HOLLOW FACIAL PROSTHESIS FOR REHABILITATING A LARGE FACIAL DEFECT USING AN INNOVATIVE DOUBLE PACKING TECHNIQUE-A CASE REPORT

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ABSTRACT:

Extensive maxillofacial defects due to a congenital or acquired condition can results in grave functional and cosmetic deformities. For many facial conditions, surgical reconstruction is the most effective approach to restore appearance and normal function. However, such reconstructive surgery is not always possible or desirable. In such cases, a facial prosthesis may be an alternative treatment. These prostheses should be "realistic enough" to allow the wearer to maintain social interaction while minimizing discomfort to the underlying tissues. However, retention of a large facial prosthesis can be challenging because of its size and weight. The following clinical report describes a modified technique to fabricate a hollow heat-polymerizing polymethyl-methacrylate resin facial prosthesis using an innovative double packing technique to preclude the need of an intervening material for the creation of hollow space. The resultant hollow facial prosthesis was structurally durable and light in weight enhancing retention and comfort of the patient.

Key Words: Maxillofacial defects, hollow facial prosthesis

Key Messages: To improve the retention of a large facial prosthesis, light weightiness is desirable thus a hollow prosthetic framework is needed. An innovative double packing technique can be used to successfully create this hollow space without any complex procedure of using an intervening material.

INTRODUCTION:

Facial disfigurement may be caused by many types of acquired or congenital defects but the psychological trauma inflicted upon the patients is same. These defects are rarely rehabilitated by surgical reconstruction alone and usually require a facial prosthesis to restore function and appearance of the patient. By using a facial prosthetic device, a patient can avoid uncomfortable experiences and also shield the underlying hard and soft tissues. The maxillofacial prosthesis is a custom sculpted device made of acrylic, silicone or a combination of both, that is worn on the top of the skin to restore normal facial contours and appearance.

Rehabilitation of large extra oral defects by a facial prosthesis usually challenges the creative ability of the prosthodontist

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and also poses difficulty in retention because of its size and weight [1].This article describes an innovative double packing technique to create a uniform space between the outer and tissue surface of the facial prosthesis as retention of a large facial prosthesis can be challenging because of its size and weight irrespective of the material used for fabrication.[1-2]

CASE DETAIL:

A 56 year old male patient reported to department of Prosthodontics with a chief complaint of facial scarring and loss of eye on the right side of face as a result of electrical burns suffered 5 years back. On clinical examination, the defect was found to be concave in shape and was covered with extensive scar tissue. Superiorly the defect extended up to the hairline, anteriorly till the right corner of mouth and posteriorly till right tragus and involving the right eye (Fig. 1 & 2).The ideal treatment for this case was surgical facial reconstruction which was ruled out because of unwillingness of patient due to financial constraints so a facial prosthesis was planned for his rehabilitation.

STEPS IN FABRICATION OF THE HOLLOW FACIAL PROSTHESIS

***Recording the defect area*:** The first and most crucial step was to record the details of the defect in a facial moulage and creating a model of the same. To prepare the defect for impression, first patient's eye and nostrils were protected with a gauge piece and breathing was secured using a hollow plastic tube. After this the face was confined with X-ray sheets using adhesive tape and a thin mix of irreversible hydrocolloid (Dentalgin; Prime Dental Products, Mumbai, India) was poured into it. After setting, the resultant facial moulage was inspected for any inaccuracy and poured in Type III gypsum material (Kalstone; Kalabhai Karson, Mumbai, India) to obtain the model or positive replica of the face (Fig.3).

***Fabrication of wax pattern and iris positioning*:** The next challenging step was sculpting the prosthesis out of wax. For this, the boundaries of the defect were delineated on the model of the face and a pattern of modelling wax (Modelling wax; Deepti Dental Products, Ratnagiri, Maharashtra, India) was carved out taking the opposite side of face as guideline for contour reproduction. After this an artificial stock eye was selected based on the shade of contralateral eye and positioning of iris was done by visual judgement method as suggested by Benson in 1977 [2]. The wax sculpture was evaluated by positioning it on the patient's face(Fig 4).To record the finer details of the defect, a light body polyvinyl siloxane (Reprosil; Dentsply DeTrey GmbH, Konstanz, Germany) secondary impression was made using wax pattern as a custom tray(Fig.5). This was carried out to enhance the adaptation of the prosthesis to the defect.

***Colour matching and first packing of the wax pattern*:** As there was a variation in skin tone of the patient, the shade of the contra lateral side of face was recorded on tongue blades to act as a reference

during acrylic packing procedure in the absence of patient.

The next step was to create a mold and fabrication of final prosthesis in heat polymerizing polymethyl-methacrylate (PMMA) (Trevalon; Dentsply, York, PA, USA). First the wax pattern was flasked in a customized dental flask as its size was too big even for a big maxillofacial flask. To differentiate between the tissue and the facial sides, two pours were done in Type II and Type III gypsum product respectively and dewaxing was carried out to obtain the mold (Fig. 6). After this, the shaded tongue blades (obtained in the presence of patient) were used as a guide to paint the facial side of the mold to act as a shade reference during acrylic packing procedure.

Oil based pigments were added to the monomer and by mixing clear and pink acrylic, color of the resin was matched to the patient's skin color. The indices made on the two halves of the mold helped in reorienting them precisely during the packing procedure. A long curing cycle was performed and prosthesis was retrieved, finished and polished taking utmost care to preserve the mold for a second packing procedure.

***Second packing procedure for creating a hollow prosthesis*:** Due to the large size of the defect, the resultant acrylic prosthesis was too heavy and would have caused discomfort and difficulty in retention, so it was decided to hollow out the prosthesis. For this, the tissue surface of the prosthesis was trimmed out, leaving a uniform 2mm thickness of acrylic everywhere as determined by measuring caliper (Fig. 7). Then a uniform thin layer of acrylic in the dough stage was adapted on the tissue side (white) of the preserved mold (Fig. 8). As the hollowed out prosthesis was convex and the tissue surface of the mold was concave, only the border areas of the prosthesis came in contact with this freshly packed acrylic. The other facial side (green) of the mold was reoriented back carefully with the help of indices on the mold. A long curing cycle was performed again and the hollow prosthesis was obtained. The gypsum-mold was preserved for future re-packing in case of discolored or damaged prosthesis.

***Finishing touch and retention of the prosthesis*:** To give a finishing touch, the prosthesis was externally painted to match the patient's skin tone precisely. False eyelashes and eyebrow was used to give the natural appearance (Fig. 9). Retention for this hollow prosthesis was obtained by patient's own spectacles with a string tied around the head (Fig 10 & 11). The patient was given hygiene instructions for cleaning the prosthesis and was advised to attend recall visits every 4 to 5 months. Two years after prosthesis insertion the prosthesis was still serviceable and the patient was satisfied.

DISCUSSION:

The choice between surgical reconstruction and prosthetic restoration of large facial defects remains a difficult one and depends on the extent and etiology of the defect, as well as on the

requirements and economical condition of the patient. Acceptable cosmetic results usually can be obtained for patients with large maxillofacial defects using a facial prosthesis provided the fit and retention of the prosthesis should be of high-quality. Prostheses are intended to be as similar as possible to the natural anatomy of each individual. Their purpose is to cover up, shield, and mask facial disfigurements or underdevelopments.

Silicone is the material of choice for making facial prosthesis because of its flexibility and life like appearance. In this case, a hollow prosthesis was needed to decrease the weight of the prosthesis because of the extensive size of the defect. Creating a hollow prosthesis using only silicone material is not feasible because of the low tear strength of this material in thin sections as well as chances of collapse of the thin outer and inner surfaces. A combination of acrylic and silicone has many reported disadvantages like degradation of the silicone properties, delamination of silicone from the PMMA base, reduced marginal integrity of the facial prosthesis, resulting in open margins, and poor simulation of facial expressions due to the rigidity and heavy-weight of the PMMA base [3, 4]. So it was decided to proceed with a hollow facial prosthesis made up of only heat cure acrylic material.

Increased bulk of the PMMA framework was always a worry for the prosthodontists. So there are various methods reported in literature to create a hollow prosthesis [5-8]. The main drawbacks of these techniques are need for the placement of an intervening material for creating a hollow space and again difficulty in removing the same. This article describes an innovative double packing technique to make the prosthesis hollow. The advantage of this technique is that there is no need to place an intervening material to create a hollow space between the two surfaces and also the uniformity of the resulting space can be controlled. Other drawbacks of using acrylic material for the prosthesis are poor adaptation of the margins with the remaining facial tissues. This was overcome by making the acrylic margins as thin as possible to provide maximum merging of the borders of prosthesis with the surrounding normal tissues.

Various methods of auxiliary retention for facial prostheses have been described in the literature; they include eyeglasses, extensions from the prosthesis to engage tissue undercuts, magnets, adhesives, combinations of the above, and osseointegrated implants [9-14]. Although osseointegrated implants may provide the most dependable prosthesis retention; additional surgeries, expenditures, inadequate bone, and prior radiation to the area may contraindicate this type of treatment [15,16].The prosthetic rehabilitation of the patient with a spectacles retained hollow facial prosthesis is presented in this article. The light-weight facial prosthesis facilitates better retention with spectacles with a string tied around the head and there was no need to use any skin adhesive to provide additional retention. Hence this

was good for maintaining the health of the underlying tissues.

Patient was advised to remove the prosthesis daily for cleaning and to prevent irritation of the underlying tissues. Also instructions were given to avoid exposure to direct sunlight, chemicals and disinfectants to prevent discoloration of the prosthesis. Periodic recall appointments at the interval of 6 months were advised for assessment of the prosthesis (retention, stability and support) and the supporting tissues.

CONCLUSION:

The retention of a large prosthesis is a major factor influencing the successful outcome of rehabilitative treatment for the prosthetic replacement of congenital or acquired defects. The perfect adaptation and excellent retention of the lightweight hollow facial prosthesis facilitated aesthetic rehabilitation of the defect thus making it a promising and economical substitute to the conventional silicone prosthesis, especially for the restoration of extensive maxillofacial defects. Thus by no means should a prosthetic restoration be considered a substitute for plastic reconstruction but in certain circumstances, it may be an alternative because it is the God given right of every human being to appear human.

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FIGURES:

FIGURE 1: Pre-treatment frontal view of the patient

FIGURE 2: Pre-treatment profile view of the patient

FIGURE 3: Model of face showing outlined defect

FIGURE 4: Try in of prosthesis

FIGURE 5: Secondary impression to record finer details

FIGURE 6: Molds after dewaxing showing distinct facial and tissue sides

FIGURE 7: Acrylic trimmed from tissue side to make prosthesis hollow

FIGURE 8: Second packing of acrylic on the tissue side of the preserved mold

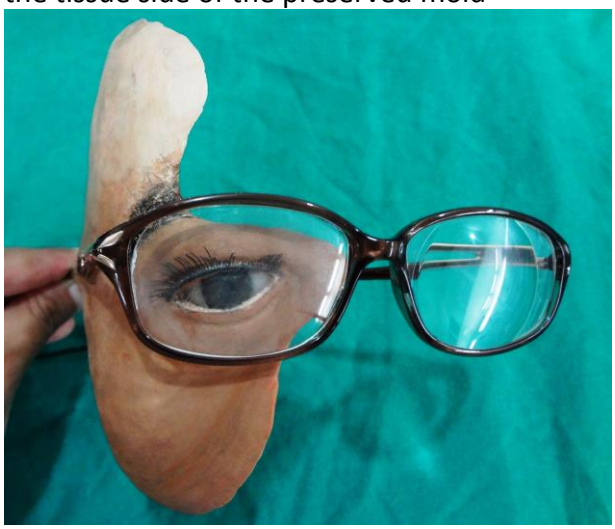

FIGURE 9: Spectacles retained hollow facial prosthesis

FIGURE 10: Hollow facial prosthesis in profile view

FIGURE 11: Hollow facial prosthesis in frontal view