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Prosthetic Rehabilitation of an Orbital and Facial Defect: A Clinical Report

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Abstract

For patients undergoing radical head and neck surgery, the deformity or physical defect adds to the agony. Rehabilitation of patients with such deformities is a challenge for the maxillofacial prosthodontist to enhance the esthetics and give psychological strength to the patient. This clinical report describes the rehabilitation, using a silicone prosthesis, of a large facial and orbital defect due to mucoepidermoid carcinoma.

The loss of facial structures by congenital deformity or trauma may cause psychological impact and can affect the patient's quality of life (QoL). Marunick et al classified midfacial defects into two major categories: midline midfacial defects, which include the nose and/or upper lip, and lateral defects, which include the cheek and orbital contents.[1] Congenital deformities and trauma may also lead to similar facial and orbital deformities requiring prostheses for rehabilitation.[2] Facial deformities affect speech, mastication, QoL, and psychology.[3,4] Maxillofacial prosthodontists restore lost or compromised facial anatomy due to cancer, accidents, gunshot injuries, or congenital defects.[5] Rehabilitation of large facial defects requires alloplastic material, and although the field of plastic surgery has advanced, the skill of a prosthodontist in providing an appropriate prosthesis to such a patient becomes imperative. It raises spirits and helps in easing the minds of the patients, enabling them to lead a near-normal life. Prosthetic rehabilitation of facial and orbital defects shortens hospitalization, speeds recovery, and reduces medical expenses.[6] The bulk of the prosthesis may cause discomfort to the patient with a large defect. There is little literature regarding reducing the bulk of the prosthesis. This article details a procedure to reduce the weight of the facial prosthesis.

Clinical report

A 33-year-old male patient reported to Faculty of Dental Science, Sri Ramachandra University, Chennai, India for prosthetic rehabilitation for his facial and orbital defect. He had a history of resection of mucoepidermoid carcinoma from the hard palate, zygomatic arch, and orbital fossa on the right side with infratemporal fossa clearance, along with a rectus abdominus free-flap reconstruction 5 years prior. The intraoral examination revealed a partially edentulous maxilla, rehabilitated by removable partial denture, and an anopthalmic socket with facial defect on his right side (Fig 1). The surgical wound was completely healed. The patient was unaware of the facility to rehabilitate his defect. When he came to know about the available facility in our university, he contacted us. The patient was motivated to rehabilitate his defect. Various treatment options were discussed, and his economic status limited us to the silicone prosthesis. We explained the clinical procedures to the patient before fabrication of the prosthesis.

Impression making

Topography of the anopthalmic socket, facial defect, and adjacent region were recorded accurately with rubber base elastomeric impression materials. Light-body impression material (Aquasil LV, Type I Low viscosity, Dentsply, York, PA) was placed over the anatomical structures to be recorded and medium-body impression material (Aquasil LV) added. Prior to the setting of impression material, ice cream sticks were placed (Fig 2) along with heavy-body impression material (Aquasil Monophase) to stabilize the impression. A cast was fabricated with type III gypsum product (Orthokal, Kalabhai, India).

Figure 1 Pretreatment picture of the patient with orbital and facial defect.

Fabrication of facial moulage

Gauze pieces soaked with paraffin were placed in the nostrils before making the facial moulage. Irreversible hydrocolloid impression material (Zelgan2002, Dentsply) was used to make the impression. Gauze pieces were kept over the hydrocolloid impression for reinforcement and made to set along with it. Type II gypsum product was also added to provide adequate support. The facial moulage thus made was used to compare the normal facial contour with the wax pattern of the defect side.

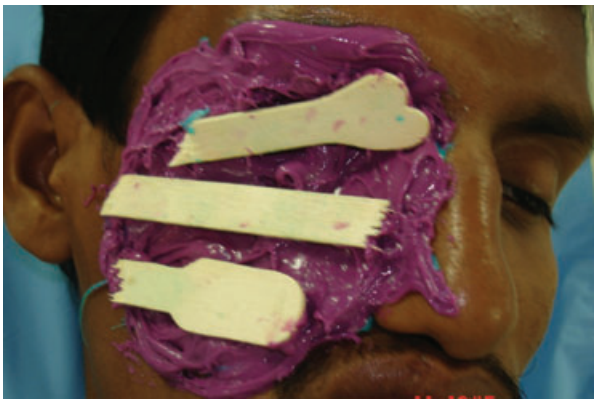

Figure 2 Impression making of defect side.

Figure 3 Wax try-in.

Orientation of ocular prosthesis

A suitable acrylic resin ocular prosthesis, with the color of its iris/pupil complex, dimensions, and sclera similar to the contralateral eye, was selected and adapted in the anophthalmic area of the working cast with the baseplate wax. This wax pattern was transferred to the patient's anophthalmic area, and the patient was instructed to look straight. The stock ocular prosthesis was adjusted anteroposteriorly, mediolaterally, and superioinferiorly in accordance with the contralateral eye. The oriented ocular prosthesis with wax pattern was then transferred to the working cast. The eyelids were sculpted by using baseplate wax.

Making wax pattern of facial defect

After sculpting the eyelids, modeling wax was added to the defect side of the face and sculpted by comparing the normal contralateral side of the face (Fig 3).

Laboratory procedures

In the tissue side of the wax pattern, wax was scooped out (2.5 cm diameter in zygomatic region, 2 cm diameter in other areas) to reduce the bulk of the prosthesis. Scooped-out areas were marked approximately in back of the cast, and

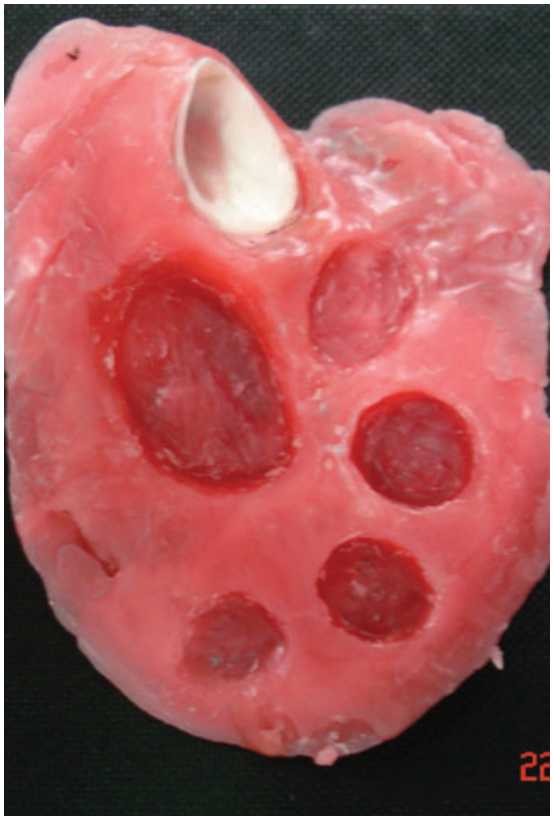

Figure 4 Scooped-out areas of wax pattern to reduce the bulk of the prosthesis.

perforations were made (Fig 4). Edges of the wax pattern were marked in the working cast, and the entire thickness was scraped 1 mm along the edges. The wax pattern was adapted well to the cast and made thin to obtain a good adaptation of the final prosthesis. The wax pattern was sealed to the cast. Scooped out areas of the wax pattern were filled with dental stone through the perforations, which were made earlier. A base for the working cast was fabricated with dental stone. Two small (3-mm long) acrylic stumps were stabilized on either side of the stock ocular prosthesis iris. This was done to stabilize the ocular prosthesis during and after the dewaxing procedures. Four

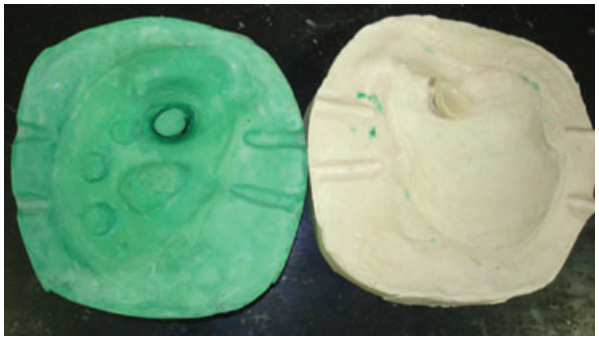

Figure 5 Mold for fabrication of prosthesis.

Figure 6 Prosthesis after extrinsic stain.

Figure 7 Prosthesis with eyeglasses.

orientation grooves were made in the surface of the working cast. Boxing was done with modeling wax. Separating media (cold mold seal) was applied. Dental stone was painted on the ocular and eyelid areas. The remaining dental stone was poured over it. Dewaxing was done. The mold was fabricated for the prosthesis (Fig 5). Separating media was applied and allowed to dry.

Shade matching and packing

An adequate amount of silicone material was dispensed (RTV silicone, Cosmesil, Heidelberg, Germany) on the ceramic tile. Intrinsic color pigments and flocking (Platinum Series, Cosmesil) were added and mixed to achieve the shade of the skin color of the contralateral side of the face. Silicone material was packed and kept for polymerization for 24 hours in a bench press. After 24 hours, molds were separated, the silicone prosthesis retrieved, and finishing done. The prosthesis was tried on the patient before extrinsic staining.

Extrinsic staining

After try-in of the silicone prosthesis, it was cleaned with acetone. Extrinsic stains (Extrinsic Kit P702, Cosmesil) were added in single part silicone and applied over the prosthesis to match the contralateral side. To cure the single part of silicone, the prosthesis was kept in a dry oven 60°C maintained for half an hour. Dry air was blown over the prosthesis with the help of a hair dryer to cure the single part silicone. Prosthetic eyelashes were attached using artificial hair. The prosthesis was tried on the patient (Fig 6). Minor modifications were done for adaptation. Limitation of the prosthesis and its retention was explained to the patient, and he gave consent. Satisfactory retention was achieved by engaging anatomical undercuts, using skin adhesive and glasses (Fig 7). Care was taken that the nosepiece of the glasses engaged part of the prosthesis to gain additional retention.

Discussion

The standard treatment for large tumors in the head and neck region has been surgical excision, with or without radiation therapy.[7] The prosthodontist plays a role in the rehabilitation of patients who have undergone radical maxillofacial surgery. After healing is partially or fully completed, the patient is first seen by the prosthodontist. Old photographs should be used to help attain an esthetic result if no preoperative records are available.[8] Large defects require both surgical reconstruction and a facial prosthesis to restore function and esthetics.[9]

The replacement of the facial defect and lost eye promotes physical and psychological well-being. These patients need psychological care immediately after diagnosis to reduce the burden and preparation for treatment.[10] An accurate alignment of the artificial eye plays a major role in the success of the orbital prosthesis. The esthetics achieved at the end of the treatment depend on the amount of tissue removed, good contour of the inferior margin, and minimal sagging due to the weight of the prosthesis. The anatomy of the defect can be recorded accurately by rapid prototyping rather than conventional impression techniques to restore the facial prosthesis.[11] Various methods of retention of a facial prosthesis are eye patches, spectacles, magnets, adhesives, or a combination of those and osseointegrated implants. Although osseointegrated implants provide superior retention,[12-14] the described patient's unwillingness for another surgery and his economic status limited us to a silicone prosthesis. The implant-retained prosthesis does not always completely restore function, but contributes to relief from disease-related social restrictions.[14] A facial prosthesis is composed of acrylic resin, silicone, and polyurethane. Fiber-reinforced composite prostheses provide a stable margin, satisfy esthetic needs, and can weigh less, but require sophisticated techniques and are expensive.[15]

Silicone elastomers are characterized by excellent heat stability and are chemically inert, particularly in body tissues.[16] Flexibility of silicone becomes advantageous when the defect includes movable soft tissue. Silicones can be easily processed, cleaned, molded, and colored to give a texture and appearance closely simulating skin. Fabrication of a prosthesis is relatively short, and the clinician has much control over the color, shape, and size. The facial prosthesis may require replacement because the elastomer and its additives undergo changes.[17] New polymeric materials like methacryloxypropyl-terminatedpolydimethylsiloxane have been developed with enhanced mechanical properties, such as high tear strength, low hardness, and low enough viscosity for fabrication of facial prostheses.[18]

The success of most non-implant-retained extraoral prostheses depends on retention derived from skin adhesives. Since the adaptation was not good in the superior margin of the prosthesis due to the tissue changes and fabrication errors despite meticulous care taken during fabrication, skin adhesive was advised for that area. The disadvantages of skin adhesive are decreased bond strength over a period of time, allergic reactions, and inability to completely remove the residues of adhesive.

Conclusion

The objective of maxillofacial prosthetics is restoration of esthetics and function. The advantage of the maxillofacial prosthesis is less or no requirement for surgery, and the prosthesis gives a near-natural appearance. This clinical report describes a technique to reduce the bulk of an orbital and facial silicone prosthesis, retained by anatomical undercuts, adhesive, and glasses. The lightness of the silicone prosthesis also aids in better retention. The use of a silicone prosthesis is a boon to patients who cannot afford expensive treatment.

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