Case Report

Prosthetic rehabilitation of an orbital defect for a patient with hemifacial atrophy

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Abstract

Removal of an eye may be indicated in cases of congenital abnormality, severe trauma, or disease such as an infection, tumor, or malignancy. The disfigurement associated with a loss of an eye is often accompanied with physical problems, psychological trauma, and a poor quality of life. A prosthetic replacement is the treatment of choice to return the individual to his normal vocation by producing an acceptable and life-like appearance. This article describes prosthetic rehabilitation of a 19-year-old male suffering from facial hemiatrophy with the loss of his left eye due to retinoblastoma when he was 2-year-old using medically graded silicone material. The technique used is simple, cost effective, and easy way for fabrication and rehabilitation of an orbital defect using silicone prosthesis where retention is achieved by a combination of silicone adhesives and tapes, and to a very small extent by bony and soft tissue undercut, hence providing better esthetic and psychological outcome. The acrylic part of the prosthesis was adhered to the socket with the help of a two-way silicon adhesive tape. Since the patient had lost his eye when he was 2-year-old, the development of eye and periorbital tissue on the defect side lead to hemiatrophy; in our approach, we have attempted to build the prosthesis in par with the normal side so that the fullness on the defect side was restored to that of the contralateral side. The fabricated facial prosthesis was durable, esthetic, and had good retention.

Key Words: Adhesives, facial hemiatrophy, orbital prosthesis, retinoblastoma, silicones

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INTRODUCTION

The human eye is a sense organ which aids in vision and is an important component of the face. Removal of this organ may be indicated in cases of congenital abnormality, severe trauma, or disease such as an infection, tumor, or malignancy.[1,2]

Retinoblastoma is the most common intraocular malignancy in children and is reported to affect 1 in 15,000 to 1 in 18,000 live births.[3] Studies from India show a 2–3-fold higher incidence of tumors of the eye.[4] Surgical procedures adopted for the removal of an eye are classified into three general categories: Enucleation, evisceration, and exenteration. Exenteration is the most radical of the three procedures and involves removal of the eye, adnexa, and the part of the bony orbit.[5] The disfigurement associated with loss of an eye is often

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accompanied with physical problems, psychological trauma, and a poor quality of life.

The main purpose of maxillofacial prosthesis is to restore facial structures with artificial substitutes. Prosthesis for orbital defects is made from a variety of materials, such as polymethyl methacrylate, polyurethane elastomer, silicone elastomer, or urethane backed medical grade silicone. They are mainly retained using mechanical means such as anatomical undercuts, spectacle frames, or by the use of osseointegrated extraoral implants.[6,7] Silicone prosthesis has been preferred to those made of acrylic resin, due to their consistency and resilience, which closely resemble those of human skin, in addition to the final esthetics and relative comfort of this material.

This case report highlights a technique to rehabilitate an orbit of a patient with hemifacial atrophy by a maxillofacial prosthesis using medically graded silicone material.

CASE REPORT

A 19-year-old male suffering from facial disfigurement with the loss of his left eye was referred to the Department of Prosthodontics for maxillofacial prostheses. History revealed exenteration of orbit on the left side when the patient was 2-year-old due to the eradication of retinoblastoma causing gross facial hemiatrophy on the left side of the face over the period of time. Examination of the patient showed a large orbital defect on the left side [Figure 1] with no definite bony or soft tissue undercuts to aid in retention of the prosthesis. The treatment aimed at the reconstruction of ocular surface as well as the soft tissue around it using medically graded silicone retained with silicone adhesives and tapes.

Procedure

Impression making

After evaluation and inspection of the anophthalmic socket and defect region [Figure 1], the diameter of iris and pupil on the intact side was measured using a pair of Boley gauge caliper.

The eyebrow and eyelashes were lightly lubricated. Two direct impressions were made; one was the whole face, and other was just the defect area (for fabrication of the base for prosthesis support) using an irreversible hydrocolloid (Tropicalgin, Zhermack) supported by dental plaster (Kamaraju Co.). Subsequently, a cast was obtained using dental stone type III (goldstone) [Figure 2].

Fabrication of stabilized acrylic base

Since the anophthalmic socket had a redundant eyelid tissue, which was functional during the movement of contralateral eye, it was intended to be blocked out [Figure 3] before fabricating a heat polymerized acrylic resin (DPI, heat cure) base plate over it, which supported the overlying prosthesis. This base aided in orienting the prosthetic eye in the same plane as that of contralateral eye and to build-up the soft tissue over the atrophic side of the face surrounding the orbit.

A sheet modeling wax (Hindustan modeling wax no. 2) was adapted to fabricate a heat-cured base of acrylic resin after making a wax pattern over the cast obtained during impression made from the defect side. The assembly was acrylized. The resin base was retrieved, finished, and polished. The fit of the base was checked on the cast [Figure 4] and later transferred to the patients face to check its stability by asking the patient to do functional movements such as smiling, opening and closing the eye, and raising the eye brow.

Locating the position of stock eye over the wax trial

Measurements were made from the patient's facial midline to the center of the pupil, and from the inner canthus of the eye

Figure 1: Frontal view of the defect

Figure 2: Facial moulage reinforced with plaster of paris

to the nasal bridge. Both the measurements were made when the patient was asked to look and fix the contralateral eye at distant gaze. These measurements were transferred to the cast to aid in the position of the ocular portion of the orbital prosthesis. A suitable stock ocular prosthesis closely matching the color, size, shape of the iris, and sclera of the other eye was selected as defect was relatively large. The eye was then secured in position on a bed of modeling wax based on measurements obtained, and the anteroposterior position was adjusted and verified on the patient when observed from the side profile and from the top of the head. Once the position was confirmed, the eyelids and the remaining portion was sculpted in wax and tried in the patient's orbital defect [Figure 5a and b].

Shade selection and polymerization

The wax sculpted prosthesis with the cast was flasked and dewaxed [Figure 6]. Room temperature vulcanizing medical-graded silicone material (M511 Cosmesil) was mixed, a mix of white, brown, and light red pigment stains were blended into the base color of silicon for intrinsic staining based on shade match with the patient's skin color. Silicone was packed and cured at room temperature for 24 h according to manufacturer's instructions. The following polymerization, the prosthesis was deflasked, retrieved, and finished.

Figure 3: Anophthalmic socket aperture blocked out

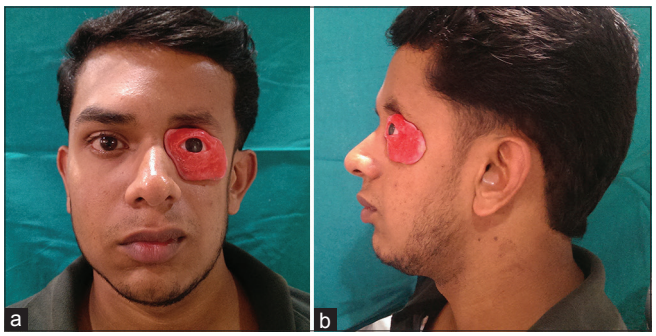

Figure 5: Trial positioning of the prosthesis (a) frontal view, (b) lateral view

Esthetic enhancement of the prosthesis

A slit was made on the silicone extending from the medial canthus of the eyelid to the lateral canthus of upper and lower eyelid, and artificial eye lash (MAC Cosmetics) was inserted between it and adhered for natural appearance [Figure 7].

Verification and retention of prosthesis

After trial insertion, the acrylic part of the prosthesis was adhered to the socket with the help of a two-way silicon adhesive tape. The silicone part extending from the free ends of the resin plate was coated with a layer of silicone adhesive (Technovent) to camouflage with the soft tissue around the atrophic side of the face. The prosthesis looked more naturally pleasing as patient used spectacle on his day to day basis as well as the atrophic side of the face looked comparatively better after the periorbital rehabilitation [Figure 8].

Instructions and follow-up

Home care instructions like gentle removal of prosthesis at night with the aid of silicone adhesive remover were given. The patient was instructed to avoid extreme heat and the

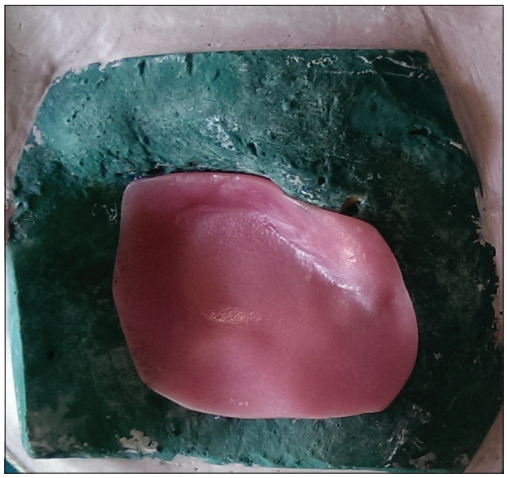

Figure 4: Heat-cured base of acrylic resin

Figure 6: Sculpted prosthesis with the duplicated cast was flasked

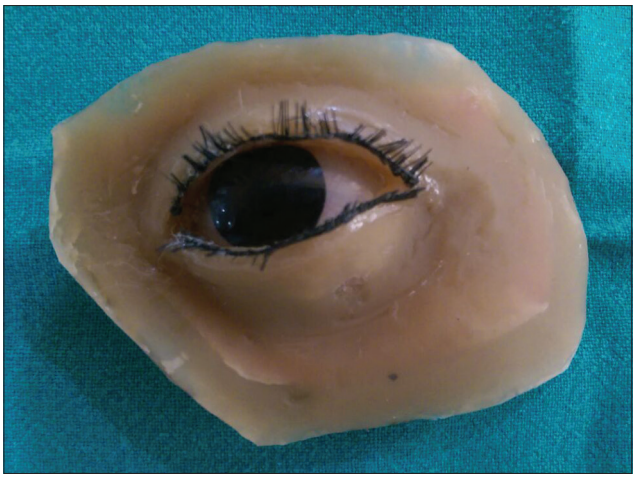

Figure 7: Dorsal view of finished prosthesis with eyelashes

Figure 8: Orbital rehabilitation (final outcome with patient wearing regular powered spectacle)

use of soiled hands while handling prosthesis, as that can cause degradation and discoloration of prosthesis. Frequent follow-up was carried out. The patient should be asked to return back a day after the treatment for any tissue reaction. Periodic recall intervals of 1-week and 1-month, respectively.

DISCUSSION

The treatment objective in the present case was to reconstruct the defect in par with the normal eye. The described technique provides a new rehabilitative modality as compared to previous case reports by using medically graded silicone retained with silicone adhesives and tapes. It explains a comprehensive approach to manage complications such as redundant functional eyelid tissue and hemiatrophy. Although custom-made prosthesis allows better esthetic and functional results to the patient in comparison to the stock prosthesis.[8] Nevertheless, a custom-made prosthesis is more expensive than a stock prosthesis, and several steps are required for its fabrication.[9] A modified stock prosthesis which matched well with the patient's contralateral eye was used. The eyelashes were placed in between the slits to provide a small amount of mechanical retention along with adhesion which simulated the natural appearance, compared to other articles were eyelashes were just adhered over the upper eyelid which could fall off when adhesion reduced with time.

To build the periorbital region medically graded silicone was used, since it had proven desirable material properties including flexibility, biocompatibility, ability to accept intrinsic and extrinsic colorants, chemical, and physical inertness, and moldability.[10]

Various methods of auxiliary retention for orbital prostheses include eyeglasses, but the patient did not want anchorage from spectacle. Hence, the retention of the orbital prosthesis was achieved by adhering the silicone adhesive tape to the acrylic base and silicone adhesive to the silicone part. Since patient used regular eye wear for better vision, the overall outcome of the prosthesis was pleasing to the patient.

This technique is a simple, cost effective, and easy way for fabrication and rehabilitation of an orbital defect using silicone prosthesis providing better esthetic and psychological outcome.

CONCLUSION

The advantages of this technique are:

- Firm acrylic base provides proper stability and support for the prosthesis and aids in orientation
- Technique can be implemented, especially, in cases with redundant eyelid tissue which can be functional; it needs to be blocked out before it can cause any movement of the overlying prosthesis
- It is more esthetic by providing attachment for eyelash within the eyelid simulating more natural appearance
- It has advantage in patients who do not want retention via glass frames
- Technique describes a method where in midfacial fullness is rehabilitated along with the eye, especially, can be implemented in cases with hemifacial atrophy which could be a result of externation of tumors during young age
- Cost effective, esthetic, and psychologically benefitting outcome for the patient.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients

understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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