A CASE REPORT

PROSTHETIC REHABILITATION OF AN ORBITAL AND PERIORBITAL DEFECT: A CASE REPORT

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ABSTRACT:

Losing an eye can be a fatal experience for a patient. The deformed appearance of the face resulting after an oncosurgery may results in psychological trauma as well as social embarrassment for the patient. It is a challenge to manage the defect on the face with surgery. Maxillofacial Prosthodontist can fabricate and rehabilitate defects with orbital and periorbital prosthesis. The defect can be restored with custom made orbital prosthesis consisting of orbital globe made up of heat cured acrylic resin and periorbital prosthesis made up of silicon elastomeric material, which can give real life like appearance and also improves the quality of life of the patient. The patient can feel more comfortable and accepted in the social circle. A multidisciplinary approach and team management are essential in providing more accurate and effective rehabilitation of such defects. This case report presents the fabrication of a custom made orbital and periorbital prosthesis for a patient.

Key words: Exenteration, Oncosurgery, Maxillofacial rehabilitation.

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INTRODUCTION:

Orbital exenteration is the term given to a surgical procedure consisting of removal of entire orbital content including part or all of eyelids and periorbital tissue. The term orbital exenteration was first described by George Bartischcin in 1583 [1]. This surgical procedure is mainly done to treat unyielding progressive and life threatening malignancies, which is not responding to any other treatment modalities like medications and chemotherapy [1].

After the surgery, a large defect with a huge empty space is visible on the face [3]. Even though such defects can be prosthetically rehabilitated, the vision of the eye can never be restored, but the prosthesis which gives life like effect and looks more natural can be fabricated [1]. Fabrication of orbital and periorbital prosthesis is one of the challenging and most difficult procedures for prosthodontist. The custom made prosthesis, should be more accurate and correctly match the contralateral eye; this ameliorates the patient's self-acceptance [4].

This case report describes fabrication of a custom made orbital and periorbital prosthesis used to rehabilitate a facial defect of a patient who has undergone an orbital exenteration of the left eye. The most economical materials available, the heat cure acrylic resin was used to fabricate orbital prosthesis and medical graded silicon elastomeric material was used to fabricate the periorbital prosthesis [2].

CASE REPORT:

A 42year-old male patient, reported to the department of prosthodontics department in our dental hospital with chief complaint of missing left eye and wanted it to be replaced. The case history reviled that the patient was diagnosed with inverted papilloma and squamous cell carcinoma of left eye and maxilla. The patient was treated surgically; excision of the left eye was performed followed by radiation therapy for 3 months Fig 1a.

After evaluating the case history informed consent was obtained from the patient, the anophthalmic socket and defect region was inspected, palpated and evaluated. The treatment was planned to fabricate a custom made orbital and periorbital prosthesis.

An impression compound was molded and adapted mediolaterally and superoinferiorly over the orbital and periorbital defect to make custom made impression tray Fig 1b. The area of the defect was lubricated with petroleum jelly and the impression was made using Irreversible hydrocolloid impression material (Neocolloid Alginate Impression Material). Subsequently, beading and boxing of an impression was made.

Cast was poured in two sections, where first half of sectional cast was poured with dental stone type 2 and orientation holes were made on the cast to maintain the exact orientation and placement of second poured cast Fig 1c. The second cast was poured with type 4 dental stone (Pearl Stone) Fig 1d.


Fig. 1a:orbital and periorbital defect

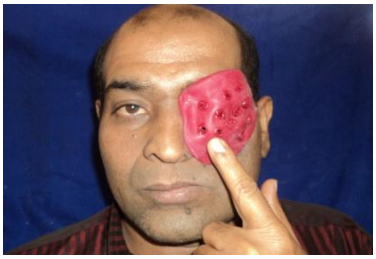
Fig. 1b:custom made impression tray

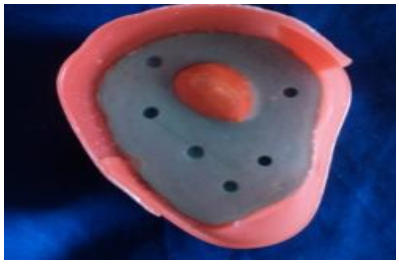
Fig. 1c: beading and boxing of master cast


Fig. 1d: master cast


Fig. 1e:predictable iris positioning technique

Orientation of ocular prosthesis:

The two halves of cast were separated and the molten wax was poured into the orbital mold space, after the wax was set, the wax model similar to the contour and size of the orbital globe was retrieved from the cast and was carved. This wax pattern was transferred to the patient's anophthalmic area; patient was instructed to look straight into observer's eyes. The waxed up orbital globe was adjusted in patient's orbital defect in accordance with the contralateral eye. When the desired size and position of waxed up orbital globe was obtained, the custom made iris disk with self cured acrylic resin was fabricated and placed onto the waxed up orbital globe model and the conformer was attached onto the iris disk [2]. The predictable iris positioning technique was used to confirm the position of iris so that the iris will exactly match the position iris of contralateral eye [6] Fig 1e.

Fig. 2a:acrylic globe with iris

Fig. 2b:try in of orbital globe

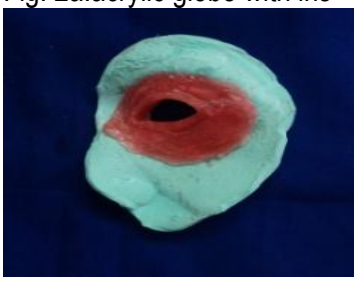

Fig.2c:wax pattern of periorbital prosthesis

Fig.2d:try in of periorbital prosthesis

Fig. 2e:fit in of orbital and periorbital prosthesis

After the desired position of iris was obtained, the wax model with the iris was then invested in dental plaster type 1, the conformer attached to the iris, was embedded into the plaster such that it prevents the displacement of iris after dewaxing procedure. The empty mold space obtained after the dewaxing procedure was packed with tooth colored heat cured poly methyl metha-acrylate of appropriate shade that matched exactly with sclera of contralateral eye. After polymerization, the heat cured acrylic orbital globe with iris and conformer attached, was retrieved from the flask, trimming of the prosthesis was done using acrylic trimming bur and finishing was done using sand paper and polishing buff was used to polish the prosthesis Fig 2a. The prosthesis was then tried in patient's anophthalmic defect to check and adjust the prosthesis within the defect.

The next step was painting of the iris disk. The clinician should have an artistic skill and should possess thorough knowledge about color and pigments used to paint the iris disk. In the past, various methods and techniques to paint an artificial iris were described [2]. Though many types of paints and color pigments are

available to paint the iris disk, in the present case acrylic based color pigments and stains were used to paint the iris disk, once the desired color of an iris disk was obtained. The product obtained was then tried in anopthalmic socket. The patient was asked to look straight to adjust the orientation and position of an orbital prosthesis to contralateral eye [2].

After the try-in procedure, the prosthesis was removed from the defect, red embroidery floss were then glued on the scleral part of the prosthesis using monopoly, which resembled blood vessels of natural eye [2]. The stone trimming bur was used to create the space for corneal prominence in the mold; the orbital globe was then packed with thin layer of heat cured clear acrylic resin. After polymerization, the prosthesis was retrieved from the flask; it was then properly trimmed and polished. After final finishing procedure of the orbital globe prosthesis, it was placed in the patient's orbital defect and manipulated into the position corresponding to the contralateral eye Fig 2b.

The periorbital prosthesis was fabricated by using medical graded silicon elastomers, the wax pattern was prepared for fabrication of periorbital prosthesis, the wax sheets were softened, manipulated and placed over the periorbital section of the cast for evaluating the proper position and contour of wax pattern and adjusted to match the periorbital tissue of contralateral eye.

After carving the wax pattern to desired eyelid aperture, the skin texture was established by carving wrinkles and folds found around the contralateral natural eye [7] Fig 2c. Once the desired position, shape and contour of the wax pattern similar to contralateral eye were achieved, the wax pattern was invested in plaster. After dewaxing procedure; the mold space obtained was packed with silicon elastomeric material, adequate amount of medical graded silicone elastomeric material was dispensed (Room temperature vulcanized silicone, Cosmosil) on the glass slab.

The shade matching procedure was carried out in the presence of the patient to match the skin shade. The silicon elastomer material was mixed with intrinsic color pigments, stains and flocking of various shades (Cosmosil) to achieve the exact skin shade of the contralateral side of the face. The silicone material was packed in the empty mold space obtained after dewaxing procedure, the material was subjected to bench cure for 12 hours, after polymerization of silicon elastomeric material the molds were separated; the periorbital prosthesis was retrieved, finishing and polishing was done. When desired intrinsic shade of a skin was obtained, the periorbital prosthesis was tried in patient to check for accuracy of shade and color of the skin on contralateral side of the face, once the desired skin shade was obtained, the extrinsic

stains were applied to do final finishing of the prosthesis [7] Fig 2d.

Extrinsic staining

Extrinsic stains (Cosmosil) were painted on periorbital prosthesis to match the skin shade on contralateral side of the face. Dry air was blown over the prosthesis with the help of a dry air syringe to cure the extrinsic stain. Later prosthetic eyelashes were stitched onto the periorbital prosthesis using a natural hair. The prosthesis was tried in patient's periorbital defect.

Few adjustments and minor modifications were done for better retention and marginal adaptation of the periorbital prosthesis. The patient was told about the limitation and retention aspect of the periorbital prosthesis. Satisfactory retention and stability was achieved by using skin adhesive (Beta Bond, Medical Graded Adhesives) and anatomical and soft tissue undercuts [2]. The patient was instructed to apply the skin adhesive over the defect area and leave it over for 2 minutes, so that the adhesive becomes more transparent and then to place the periorbital prosthesis over the defect. The frame of the eyeglass and anatomical undercuts engaged periorbital prosthesis to gain additional retention and stability Fig 2e. The patient was instructed about the use and follow up care of the orbital and periorbital prosthesis.

DISCUSSION:

After the cancer surgery of an eye, the orbital and periorbital defect on face has to be prosthetically replaced, either in the form of stock orbital prosthesis or custom made orbital prosthesis [2]. The difficulties faced during fabrication of custom made orbital prosthesis are; obtaining accurate impression of the defect without any compression or distortion of periorbital tissue, orientation of orbital globe in harmony with the contralateral eye, sculpturing the exact anatomy and position of the periorbital tissue, obtaining a satisfactory shade exactly matching to the skin complexion of contralateral side of the face [4].

Often, such custom-made orbital and periorbital prosthesis provide satisfactory cosmetic and aesthetically improved facial appearance, especially for the patients who lost their orbital structures through disease, oncosurgery, trauma and accident [2]. The most specific and recommended treatment modality for large tumors and malignancies in the head and neck region is by surgical excision, with or without chemotherapy. After surgical removal of orbital content and the periorbital tissue, it has to be restored with orbital and periorbital prosthesis. Hence the prosthodontist plays major role in fabricating and rehabilitating such large defects on face by performing radical maxillofacial oncosurgery [7]. The success of prosthesis and esthetic outcome achieved after the rehabilitation of orbital defect depends mainly

on the total amount of tissue excised during surgery, the availability of the tissue around the defect and also by maintaining the good position, size and contour of the prosthesis with good retention, improved stability, marginal adaptation and fit of the prosthesis to the surrounding tissue [7]. The retention and stability of the prosthesis is an important factor for the prosthesis to look more natural and esthetically pleasant; hence the maxillofacial prosthesis can be retained by various methods of retention, either by using anatomical undercuts, frame of eyeglasses, magnetic devices, adhesives and implants [5].

Although implants can provide better retention and stability of the prosthesis, the reported drawback of implants was high number of failure rates due to the effect of radiation therapy on bone morphology, compromised blood circulation in and around the defect [9]. In addition, expense of implant surgery, cost factor of the implants, long waiting period for proper osseointegration to take place was not tolerated by patient. Another major disadvantage was that due to psychological trauma of undergoing oncosurgery, the patient hardly agrees to undergo another surgery for implant placement. Thus, due to these factors clinicians had no better option rather than using custom made prosthesis for such patients [7]. The custom made periorbital prosthesis can be retained with help of frame of eyeglasses, anatomical undercuts, magnetic devices and skin adhesives. The skin adhesive may degrade and results in reduced strength and bonding property over a long period of time; some skin adhesives have been reported to cause hypersensitive reactions [7].

Although the success rate of implant supported prosthesis is very high, the prosthesis retained with skin adhesives, anatomical and soft tissue undercuts are more successful due to their ease of application and are comparatively less expensive then implant supported prosthesis [3]. Other materials commonly used for fabrication of orbital prosthesis are epoxy resin, metal and light cured materials, ceramics and resilient vinyl copolymer acrylic resin [4]. Silicon elastomeric materials are more commonly used, because they provide better stability and good marginal adaptation, which satisfies patient's cosmetic and esthetic needs; but the major disadvantage is that the manipulation of silicone requires more complex, advanced and multifaceted techniques which are rather more expensive [8]. The silicone elastomeric material posses' excellent physical properties with good heat stability and are chemically inert materials, particularly when they are used in fabrication of prosthesis used to restore body parts [8]. Silicon elastomeric material posses soft tissue like consistency, provide additional advantage when they are used to restore the defects in movable soft tissues. Silicon materials are available in various shades provided by manufacturers to give exact shade and texture

of skin which closely simulate and resemble shade of patient's skin complexion. The drawback of the silicon prosthesis is that, in the long term the prosthesis material degrades easily and its additives undergo changes when exposed to moisture, high temperature, UV lights and sunlight, thus creating a need for replacement by a new prosthesis. To overcome these disadvantages newer polymeric materials have been introduced like polyphopozenes, silicon block polymers, methacryloxypropyl terminated polydimethyl siloxane with enhanced mechanical, chemical and physical properties, such as increased elongation, high edge strength, improved heat stability, good tear strength, chemically inert, low hardness and viscosity for fabrication of maxillofacial prostheses [7]. Custom made prosthesis composed of orbital globe made up of heat cured acrylic resin and periorbital prosthesis made up of silicon elastomeric materials give patient a more lifelike appearance and esthetically improved looks.

CONCLUSION:

A case of orbital exenteration of left eye was managed with orbital and periorbital prosthesis. The prosthesis was made up of two separate parts. The orbital globe was made up of heat cure acrylic resin and the periorbital prosthesis was made up of silicon elastomeric material. The prosthesis was well retained with skin adhesives, additional retention was gained with help of frame of eyeglasses and anatomical undercuts, the patient was well convinced and satisfied with the prosthesis.

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