

CUSTOM-MADE OCULAR PROSTHESIS : AN INTERDISCIPLINARY APPROACH TO OCULAR REHABILITATION

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ABSTRACT:

One of the most significant facial features constitutes the eye and losing the eye is often followed by social, psychological and emotional trauma to the patient. In such situations, collaboration among health professionals is the key to positive and predictable patient outcomes. Effective interdisciplinary approaches in healthcare decrease cost, reduce morbidity, and significantly improve the quality of life of the patients. In an effort to enhance the rehabilitation of ocular abnormalities, this case report aims to inform readers about one such interdisciplinary approach involving prosthodontists and ophthalmologists.

Key words: ocular prosthesis, fabrication, interdisciplinary.

INTRODUCTION:

Maxillofacial Prosthodontics is a branch of prosthodontics that deals with restoration and/or replacement of stomatognathic and craniofacial structures with prosthesis that may or may not be removed on a regular or elective basis. Maxillofacial prosthesis replaces the missing structures such as eyes, nose, ear and craniofacial structures which might be congenitally absent, surgically removed or lost due to trauma. An ocular prosthesis does not replace vision; however, significantly masks the defect, improves aesthetics and restores the confidence of the patient. A maxillofacial prosthodontist can help fabricate a custom made ocular

as well as orbital prosthesis to rehabilitate the patient and improve the quality of life for such patients.^[1]

Surgical procedures adopted for removal of eye are classified by Peyman, Saunders and Goldberg into three general categories, namely, Enucleation, evisceration and extenteration.^[2]

According to Scoll (1982) enucleation is a surgical procedure in which globe along with the attached portion of the optic nerve are excised from the orbit. Evisceration is the removal of eye contents while leaving the sclera and extraocular muscles intact. Exenteration is the most radical of the three procedures and involves the removal of eye, adnexa and part of the bony orbit.

The retention of any maxillofacial prosthesis depends on the amount of undercut present in the remaining tissue. Prosthodontists and ophthalmologists can work in conjunction to create a tissue bed that favors retention and appraises the quality of life of the prosthesis. This case report highlights the rehabilitation of patient with a custom-made ocular prosthesis following evisceration.^[3]

CASE DETAILS:

CASE 1:

A 67-year-old male reported to the Department of Prosthodontics with a chief complaint of unpleasant appearance of the face due to missing left eye. Reported history of traumatic injury to the left eye which was followed by evisceration. On examination, the socket had a well healed tissue bed without any infection. Patient reported wearing a stock ocular prosthesis with poor retention and esthetics. The tissue bed was irrigated with saline and thin layer of Vaseline was applied prior to every stage of fabrication of the prosthesis. (Fig1)



Fig 1: Pre op images of the defect

Primary impression: Primary impressions was obtained in two stages. First stage

involved the fabrication of a scaffold of the ocular defect and the surrounding facial structures such as the eyelid, zygomatic arch and the lateral border of the nose. This scaffold was made in impression compound and the borders were marked as superior, inferior, medial and lateral. Following this, holes were made in the impression scaffold for adequate retention of irreversible hydrocolloid. The second stage involved making the impression using irreversible hydrocolloid. The irreversible hydrocolloid was syringed into by defect and some of it was loaded onto the intaglio surface of the impression compound and an impression was made by orienting the impression compound onto the defect using border marking and applying gentle pressure. Patient was instructed to gaze directly forward at a fixed point at least 6 feet away. This will provide impression of the site with the muscles captured in neutral position. The Fig 2 shows the complete impression of the defect.^[4]



Fig 2: Primary impression

Fabrication of a custom tray for final impression:

The impression was poured in dental stone (type 3) following beading and boxing of the impression. A spacer wax was adapted onto the tissue bed on the cast and a custom tray was fabricated in clear auto-polymerising acrylic resin.

Final impression:

A final impression was also made in two stage. First stage involved making the scaffold in putty consistency of addition silicone. At this stage, the custom tray remained inside the defect and adequate relief of the putty was provided around the custom tray handle for allowing proper movements of the tissue bed during impression. Light body consistency of addition silicone was injected into the socket and the custom tray was pressed into the defect following which the putty consistency scaffold was oriented into position. The patient was asked to move both his eyes up and down, which facilitated the flow of the impression material into all aspects of the socket. Fig 3 shows the complete final impression with an appreciable improvement in defect being recorded.^[5]



Fig 3: final impression, fabrication of split cast and wax pattern

Fabrication of a split mold and wax pattern:

This impression was then invested to obtain a two-piece split cast mould. After the stone was set; the two parts of the split cast were separated and the impression material along with the tray was removed. In order to prepare the

wax pattern for the prosthesis, the inner surface of the mould was coated with separating medium. Wax was heated, and molten wax was poured into the mould.⁸ Then the mould was opened to retrieve the wax pattern. The wax pattern was highly polished and free from dust and debris when placed in the socket.^[6,7] Fig 3

Trial of wax pattern and iris centration:

At the time of the wax pattern trial, the following was taken care of: Areas of discomfort or pressure points were relieved, The eye contour and lid configuration were checked from all different angles, during which asking the patient to open his eye and by manual palpation with the eyes closed. The height of convexity was centered over the pupil, which is slightly medial to the midline between the inner and outer canthi. The eyelid was closing completely over the wax pattern.

The contours and palpebral fissure were resembling the adjacent natural eye. Iris centration was done using vernier calliper. Also, his eye movements were checked for symmetry and function and it was seen that the wax pattern moved and synchronised in harmony with the patient's natural eye movements. A cornea of similar size and colour was selected and then placed on the pre-determined position in the wax pattern and the wax pattern is tried in(Fig 4). Shade selection of the sclera is done using the natural eye as the shade guide. Eye movements are crosschecked at this stage.(Fig 4)



Fig 4: Iris centralization and shade and size determination.



Fig 5: Anterior indexing

Processing of the pattern:

Scleral wax pattern was finished to obtain a smooth surface free from dust and debris. The finished scleral wax pattern was invested in the flask (Fig 5). The base flask was filled with dental plaster and the wax pattern was embedded in the plaster to the height of curvature of the pattern. After, the plaster was set, separating medium was applied and counter-flasking was completed using a mixture of stone and plaster. After it was set, wax was removed by dewaxing. The iris and mold were cleaned to remove all the wax residue and the mold was painted with separating medium. Tooth colored acrylic resin polymer and monomer was mixed in a ceramic jar in the ratio of 3:1 and packed in the mold in the

dough stage. The mold was closed and polymerized for 2 hours by short curing cycle. After curing, the mold was allowed to cool down to room temperature. The resulting scleral blank with iris was deflasked carefully. It was trimmed with acrylic trimming burs and polished with Buff and pumice to obtain a smooth surface glossy surface.

Try in and characterization:

The Scleral blank with iris was tried in the eye socket. The position and gaze of the artificial eye was observed. Over-supported areas in the eyelids were modified by removing acrylic resin from the scleral blank by checking for the movements of ocular prosthesis in all directions. It was modified till the prosthesis had movements in harmony with the adjacent natural eye.

After the try-in of the prosthesis, the sclera was characterized to match the natural eye of the patient. A close-up view photograph of the patient was taken to observe the scleral pattern of the patient.^[5] It was seen that there was a slight yellowish hue present on the medial side of the natural eye and few

blood vessels. The acrylic resin on the sclera blank was trimmed upto a depth of 1 mm around the iris with an acrylic trimming bur.^[5] A combination of yellow and brown acrylic paint was mixed with monomer as thinning agent . This mixture was applied on the trimmed surface to simulate the color of the natural eye. To simulate the blood vessels, red nylon strands were placed on this mixture. Then a layer of spacer wax was placed over the scleral region around the iris keeping the iris exposed.⁴ This was done to cover and protect the pigments and nylon strands from spreading. The prosthesis was again flaked and counter-flaked . After stone was set, the two halves of the flasks were separated and the layer of spacer wax was carefully removed. To prevent the pigments and nylon strands from spreading, dewaxing was not done. Clear heat cure acrylic was mixed and packed over the scleral blank and polymerized again using short curing cycle.^[5] The ocular prosthesis was carefully retrieved from the flask, trimmed and finely polished to obtain a glass like finish

Final prosthesis insertion:

Before inserting the prosthesis in the socket, it was washed with soap solution and cleaned thoroughly with water before inserting in the eye socket.^[5] A drop of ophthalmic eye solution (Tear Drop; Prescribed by the Ophthalmologist) was applied on the surface of the prosthesis to facilitate smooth insertion. The final prosthesis was inserted in the eye socket.(Fig 6) Esthetic appearance of the prosthesis was compared with the

natural eye. Harmonious movement of the prosthesis were examined by instructing the patient to perform movements in various directions. Necessary adjustments were made and final finishing and polishing was carried out. The patient was instructed on how to remove and place the prosthesis and was advised to remove the prosthesis during night. Cleaning of prosthesis with soap solution was recommended. Recall was done in 1, 3 days, 1 week and 1 month. The fit of the prosthesis was to be evaluated every 6 months.



Fig 6: Pre and post op images

CASE 2 :

A 37-year-old male reported to the Department of Prosthodontics with a chief complaint of missing left eye. He had a history of trauma to the eye 20 years ago and enucleation of the eye ball was done. On examination no muscular movement of the left eye was seen. Patient reported wearing a stock ocular prosthesis with poor retention and esthetics. There was adequate dept between the fronices for good retention. The tissue bed was irrigated with saline and thin layer of Vaseline was applied prior to every stage of fabrication of the prosthesis.(Fig 7)

Impressions were made as in the previous case and wax pattern was fabricated. The wax pattern was retrieved easily with the spilt cast method. (Fig 8) Finally, centralization of the iris and fabrication of the prosthesis was done as in the previous case. Characterization of the prosthesis was done according to the contralateral eye.(Fig 9)

The socket was washed with saline, eye drops were used as per the recommendations of the ophthalmologist. The prosthesis was disinfected with 0.5% chlorhexidine solution checked for the fit and contour during the final insertion.(Fig 10)



Fig 7: Pre op images

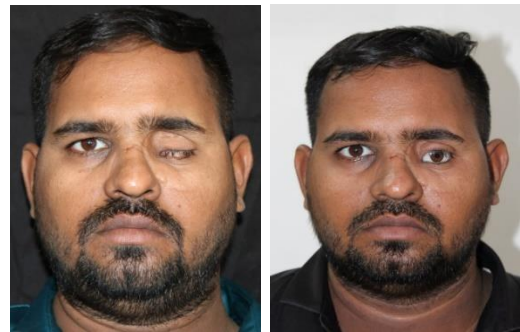


Fig 10: Pre and post op images.

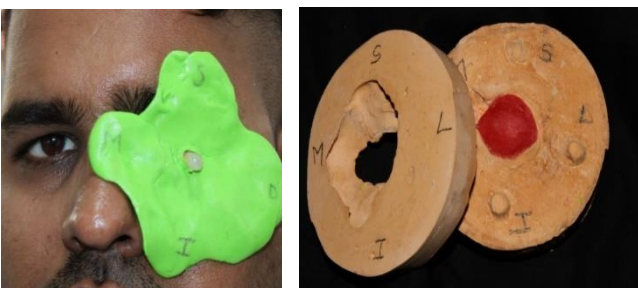


Fig 8: Impression and spiltcast fabrication



Fig 9: Iris centralization and prosthesis fabrication

DISCUSSION:

The physical appearance of an individual can have a great impact on their psychological well-being. Though the prosthetic eye cannot provide vision, but it is a patient preferred esthetic option to boost ones self-confidence. Ocular prosthesis can be custom made or pre fabricated. A custom made ocular prosthesis is superior to a pre fabricated prosthesis as they confirm accurately to the socket and are in harmony with the surrounding structures. This gives the patient the advantage of better adaptation and aesthetics in terms of the position of the iris, its shade and size. According to Beumer, a well adapted prosthesis which is in intimate contact with the tissue bed helps in even distribution of forces and better accepted by the patient.^[8]

Also, prosthesis made with poly-methyl methacrylic compared to glass are light in weight, unbreakable, easy to fabricate, can be customized in different shades and are inert to socket secretions.^[9]

CONCLUSION:

Interdisciplinary cooperation between Ophthalmologists and Prosthodontist could significantly help manage the consequences of ocular surgeries by improving the retentive bed created

during surgical approaches. Though these custom ocular prosthesis cannot replace the lost function they can help in significantly improving the appearance of the patient thus helping in restoring the patients lost confidence. Awareness among the possibility of such prosthetic options being available for the patients will help the ophthalmologists to direct the patients a maxillofacial prosthodontist for successful rehabilitation.

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