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A Novel Technique to Fabricate Iris Shading of Ocular Prosthesis - A Case Report

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Authors' contributions

This work was carried out in collaboration between all authors. Author PAK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DG and HS managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

The eye is a vital organ not only in terms of vision but also being an important component of facial expression. Loss of an eye or a disfigured eye has a far-reaching impact on an individual's psychology. Additionally it affects ones social and professional life. The need for artificial eye's can sometimes be made satisfied by stock prosthesis that are available in standard sizes, shapes and colors.

Proper positioning of the iris disk in the sclera is vital in fabricating the custom made artificial eye to mimic natural appearance if not, may result in squint eyed appearance.

There are many techniques to fabricate the ocular prosthesis to mimic the natural eye. The present technique is simple and economical to fabricate the ocular prosthesis with commercially available color contact lens.

Keywords: Eye prosthesis; iris; ocular prosthesis.

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1. INTRODUCTION

The loss or missing of any part of the face may affect the social and mental well being of the patient. In such cases, maxillofacial prosthesis will help in improving the patient's appearance, function and psychological attitude by restoring the lost structures [1,2].

Eye is a vital organ in terms of vision and an important component of facial expression. The loss or absence of an eye may be caused by a congenital defect, irreparable trauma, tumor, a painful blind eye, sympathetic ophthalmia [3,4].

Peyman, Saunders and Goldberg (1987), categorized the surgical removal of the eye in to three types: 1) Enucleation- which involves removal of globe and attached potion of the optic nerve. 2) Eviseration- which is removal of globe leaving the sclera and extra ocular muscles intact. 3) Exenteration- radical removal of the eye, adnexa, and part of the bony orbit [5,6].

The disfigurement associated with eye loss can cause significant physical and emotional disturbance. [7] For effective management of such cases multidisciplinary treatment approach is required [8,9]. Therefore, the combined efforts of the ophthalmologist, the plastic surgeon, and the maxillofacial prosthodontist are essential to restore the patient's quality of life.

2. CASE REPORT

A 30 year old female patient reported to Department of Prosthodontics and Crown and Bridge, KLE V.K. Institute of Dental Sciences, Belagavi, with the chief complaint of ill fitting eye prosthesis of the right eye and also not happy with the present prosthesis.

On history, right eye was removed 2 years back. On clinical examination, it was observed that the right eye was enucleated without any abnormality of the palpebral fissure on opening and closing movements of the eye. The enucleated eye was thoroughly examined for the muscular abnormality, internal anatomy of the socket in resting position, condition of the conjunctiva, depth of fairness and presenting of Cal de sac to decide the type of custom ocular prosthesis that would meet the needs of the patient [10] (Fig. 1).

For the fabrication of the custom ocular prosthesis, the primary impression of the defected eye socket was made using elastomeric impression material (Aquasil LV, DENTSPLY, USA) by injecting the material in to the eye socket using 2 ml disposable syringe (UNLOCK, Hindustan syringes & medical devices Ltd, India) (Fig. 2).

Fig. 1. Right eye defect

Fig. 2. Primary impression of the defect

Impression was poured with die stone (Kalrock, Kalabhai Karson Pvt Ltd, India) and then custom tray was made using auto polymersing acrylic resin (DPI-RR Cold Cure, Dental Products of India). For making the final impression the custom tray is attached to the hub of the disposable syringe (Fig. 3).

Final impression was made using by elastomeric impression (Aquasil LV, Dentsply, USA) material by injecting through disposable syringe. Cast was poured and basic sclera wax-conformer was made using modeling wax (Hindustan modeling wax No.2, The Hindustan Dental Products, and India).Try in was done of the basic sclera wax-conformer (Fig. 4). Wax was added or trimmed to achieve proper contours of the prosthesis by opening and closing functional movements of the eyelids [10]. To locate the position of the iris, the transparent graph grid method was used.

In this method, the mid line was marked passing through the forehead, tip of the nose and center of the chin. The distance from left eye medial

cantus and center of the pupil to the midline was measured followed by equidistant symmetrical markings were done for the right eye on the graph grid. This marked graph grid was used for the consecutive appointments [10]. (Fig. 5) For customization of sclera, shade selection was done from the left eye. Adjusted wax-conformer was then invested and dewaxed.

Fig. 3. Conformer for the final impression

Fig. 4. Try in of sclera wax pattern

To achieve the selected shade of the sclera, before mixing, the blue coloured articulating paper was dipped in the heat cure monomer to get the bluish tinge and then the polymer was added (DPI, Self-cure tooth molding powder). To this mixture fibers of red silk were added in the mixture to customize veins. Curing, deflasking and finishing was done for the customized sclera portion.

For customization of iris part colored contact lenses (O2 Max – Lot N o: SP20151228) were used to match the adjacent natural eye. Brown colored contact lens was selected which had brown radial coloration on a transparent colorless base.

Fig. 5. Facial markings transferred using transparent grid

To mimic base color, at the selected locations, iris was painted with black acrylic color and on top of it brown colored contact lens was placed after adjusting their size according to the iris of left eye (Fig. 6). Followed by a thin layer of Clear acrylic resin (DPI-RR Cold Cure, Dental Products of India) was veneered on the outer surface of the prosthesis to secure the lens. The final prosthesis was subjected to finishing and polishing.

Fig. 6. Brown contact lens placed on customized sclera

A prosthesis was then inserted and evaluated for the fit, comfort, retention and esthetics [11]. The necessary corrections were carried out and post insertion instructions were given to the patient and follow-up check-up was scheduled (Fig. 7).

Fig. 7. Pre and post operative

3. DISCUSSION

The rehabilitation of the orbital defect is a complex task. Eye defects constitute an important maxillofacial deficiency, which requires prosthetic replacement. A custom-made eye prosthesis provides lifelike natural appearance by reproducing natural color, contour, size, symmetry, orientation and intimate tissue adaptation. Positioning of the iris is an important step in fabrication of the custom-made ocular prosthesis, which helps to achieve better aesthetics and self esteem of the patient.

To orient the iris bilaterally symmetrical, its placement in the sclera is very critical. Many methods were advocated to orient the iris, pupillometer was suggested by Roberts for precise alignment of the pupil but it may not feasible to use in all cases.

The method described in this article involves the simple procedure of using transparent grid template to accurately locate and position the iris on the custom made ocular prosthesis rather than relying purely on visual assessment [12].

Custom ocular prosthesis has many advantages like improved esthetic appearance, proper fit to the shape of the socket, retains muscular activity and prevents collection of the ocular fluid in the cavity [13]. Using contact lenses for customization of the ocular prostheses presents good aesthetics and more lifelike appearance. The present technique requires minimal artistic skills, easy availability of the material, simple and less time consuming procedure but however the long term evaluation is required for the aging related changes and color stability of the ocular prosthesis.

Post-insertion care of prosthesis [14]:

1. Prosthesis should be removed once a day to be cleaned-The adhesive is removed with a rolling motion of the ball of the finger or thumb. Foreign substances should be removed - Prosthesis washed with mild soap and brush.
2. Skin in contact with prosthesis should be cleaned.
3. The prosthesis should not be worn while sleeping Prosthesis is stored in a container away from direct light or heat. Isopropyl alcohol may be used to remove the oily residue.
4. To prevent premature discoloration of the prosthesis, it should not be exposed to cigarette smoke.

4. CONCLUSION

There are several techniques to customize ocular prostheses. This technique helps us to customize ocular prosthesis by using commercially available lens in an easy way by reducing time and materials.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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