CASE REPORT

USE OF DIGITAL METHOD IN CUSTOMISATION FOR FABRICATION OF AN OCULAR PROSTHESIS - A CASE REPORT

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ABSTRACT

Loss of an eye can be physically and psychologically challenging for a patient. There are many techniques for iris customisation which can be employed to fabricate the ocular prosthesis . This is a case report where in Digital Photography was employed to customize the iris and fabricate an ocular prosthesis in a simple, fast and satisfactory manner.

KEY WORDS

Enucleation, Ocular prosthesis, Digital photography, Iris customisation.

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INTRODUCTION

Eyes are quintessential component of the facial complex as they are not only sensory organs for vision but also are dominant feature of the aesthetic appeal of a person. Hence, eyes are the first part of the body to be noted.[1] Thus the loss of an eye can physically and psychologically handicap an individual. There are multiple reasons for this impairment among which, trauma, congenital absence and tumors are the primary causes.

The surgical management is broadly classified as enucleation, evisceration and exenteration. Enucleation entails removal of the orbit while preserving all other orbital structures. Evisceration is the removal of the contents of the globe while keeping the sclera and the extraocular muscles intact. Exenteration involves the removal of the eye along with part of the bony orbit.

The primary means of rehabilitation of an ocular defect is by fabrication of an ocular prosthesis. These can be pre-fabricated or custom made. A well fabricated custom made prosthesis contributes immensely to the physical and mental well being of the patient by improving the patient's esthetics, restoring and maintaining the health of the remaining structures.[2]

In cases where there is loss of eye due to trauma and the healthy eye has suffered damage, it is difficult to charecterise the iris and sclera and achieve replication of the features of the contralateral eye in the ocular prosthesis.

The following is a case report wherein a digital technique of iris and scleral characterisation was followed to rehabilitate an ocular defect.

CASE REPORT

A 45- year old man walked into the department of prosthodontia with the chief complaint of missing anterior teeth (Fig 1). There was history of trauma to his face due to projectile injury from a blast at his work1 year ago for which both the eyes were badly damaged and the left eye being eviscerated 9 months ago. Examination of the right eye revealed

Fig 1- preoperative frontal view of patient.

FIG-2 : Customized scleral shell fitted with Syringe in central hole for impression with PVS.

FIG-3: light body injected into the defect while patient performed movement of eye.

Fig-4 final impression of defect.

Fig-5 : two piece mould

Fig-6 : Wax pattern tried in patient

Fig-7 : transparent graph grid method used to normal eye.

Fig-8 : high quality image of the contralateral eye. Pupillary asymmetry can

Fig-9: image of the eye was manipulated with software to generate different values. These printed out in self-adhesive glossy paper

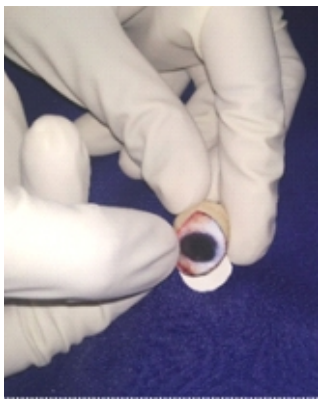

Fig 10 : image of appropriate shade and size was attached to scleral button.

Fig 11 : try in after the image was pasted on the scleral blank. The iris positioning and shade were satisfactory.

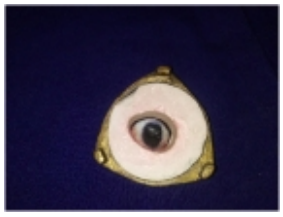

Fig 12: the assembly was flasked after try in and cured to add a layer of clear acrylic over the image.

Fig -13 : Prosthesis delivered after finishing and polishing.

asymmetric widening of the iris and redness in the scleral part.

A thorough examination of the socket revealed a healthy intraocular tissue bed and adequate depth between the upper and lower eyelids with adequate potential to open and close the eyelids.

Technique:

1. Primary impression of the defect was obtained with alginate (Algitex, DPI) by mixing it into a liquid consistency and injecting it into the defect with a syringe and asking the patient to do all the functional movements.

2. The primary impression was boxed and poured to obtain primary mould from which customised scleral shell was made of acrylic resin (DPI).

3. After trying in of the shell in the patient's eye a central hole was made into it to ensure fitting of a syringe and peripheral holes were made for retention of the PVS impression material.(Fig 2)

4. Light body PVS(Affinis, Coltene) was loaded in the syringe and with the scleral shell inserted in the eye, Light body was slowly injected while the patient performed all the functional movements of the right eye. (Fig 3)

5. The final impression obtained(Fig 4) was boxed and poured in two pieces to make the final mould. (Fig 5)

6. A wax pattern was fabricated from the mould and was tried in the patient to check for accuracy of fit and bulge. (Fig 6)

7. Wax pattern was flasked , dewaxed and the mould was packed with scleral acrylic resin of appropriate shade and cured to obtain the scleral blank.

8. Transparent graph-grid method was used to record the position and size of the iris. The vertical lines coinciding with the medial and distal extremities of the iris of the natural eye were marked A and B on the right side and on the left side A' to B', at conversational gaze. Likewise, the horizontal lines referring to the inferior and superior limits of the iris were marked C, D on right and C', D' on the left side corresponding to the Y-axis, respectively. Also the medial end of the iris to medial canthus distance was recorded . Size of the iris was recorded to be 11.9 mm and distance between medial to lateral canthus was found to be 19.9mm. (Fig 7)

9. A high-quality image of the contralateral eye was taken with the help of a DSLR camera (Nikon D2500) and the data was transferred to computer. (Fig 8)

10. The image was sized with the help of Adobe Photoshop software (version 7.0) according to the measurements obtained during recording by graph-grid method. Several images of different values (fig 9) were generated and subsequently printed out in a self-adhesive glossy paper.

11. Printed the image that most closely matched the shade and Value of the contralateral eye was chosen, attached to the acrylic button(Fig 10) and the assembly was tried in the patient. (fig 11)

12. After iris positioning and shade were satisfactory , the acrylic button was taken out of the patients eye and heat cured clear acrylic resin was packed and cured over the part of the acrylic button containing the image. (fig 12)

13. Final delivery was done to the patient after finishing and polishing . (fig 13)

DISCUSSION

One of the primary criteria for a prosthesis to be successful is that it should be as close in appearance to natural tissues as possible. This is of paramount importance when rehabilitating a missing eye as it is one of the most aesthetically sensitive area of face, if not the entire body. Authors agree in general that close matching the natural eye is the key to mask the loss and achieve an aesthetic outcome for patients with an ocular defect .[3]

Although various methods have been described by different authors for fabrication of ocular prosthesis, the characterization of iris and/or sclera is done manually. The traditional method described by Taylor, the iris is painted manually on paper and the scleral part is characterized by adding plastic fibres as veins on mono-poly layer. In another modified technique a pre-fabricated acrylic scleral blank is modified and relined to gain acceptable fit.

Recently, scleral and iris customization using digital photography has been gaining support as suggested by current literature.[4,5] Kale et al, has suggested a method wherein both scleral and iris characterisation was done by digital photography and vacuum pressing of clear co-polyester sheet onto photopaper.[6]

The technique followed in this article has the advantage of being technically simple, economical and operator friendly as it saves chair side time. It also helps in achieving aesthetically satisfactory results in cases where the contralateral eye has an asymmetrical pupil and/or have dilated blood vessels in the sclera due to trauma. These are difficult to replicate in the conventional technique using prefabricated scleral shell or iris disc painting method. Though the operator has to have a sound working knowledge of the digital photography software to ensure success , it is not difficult to master and can be done with ease.

CONCLUSION

There are various methods of scleral and iris characterisation that can be employed during fabrication of ocular prosthesis. Each has its own specific indication, advantage and disadvantage and which when used judiciously might lead to success. The technique using Digital Photography is a new and novel method which can prove to be a simple, cost-effective and operator friendly method which can lead to highly satisfactory ocular prosthesis in a diverse array of situations regarding ocular defects.

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