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RESEARCH ARTICLE

COMPARISON OF TWO DIFFERENT TECHNIQUES OF FABRICATION OF AN OCULAR PROSTHESIS- A CONVENTIONAL PAINT ON TECHNIQUE AND A DIGITAL PHOTOGRAPHY TECHNIQUE – REPORT OF TWO CASES

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ABSTRACT

Loss of an eye can be disfiguring esthetically and psychologically. This article describes the use of two techniques for fabricating an ocular prosthesis namely the conventional paint on technique and the digital photography technique. A sequence of fabrication steps have been described for both the techniques. Both the techniques have their advantages and disadvantages.

Key Words:

Ocular Prosthesis,
Digital Technique,
Conventional Paint-On Technique.

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INTRODUCTION

Loss of an eye can be disfiguring esthetically as well as psychologically. This deformity causes functional loss and more importantly social stigma for the patients. There can be various reasons for an ophthalmic socket that includes trauma, malignancy, and infections. Ocular prosthesis have been used for centuries to provide cosmetic rehabilitation of an ocular defect (Beumer, 1996) Ocular Prosthesis help to mask this major deformity, even though they do not restore vision. There are various techniques of restoring ocular defect in literature. This case report includes two techniques of fabricating an ocular prosthesis – A Modified Conventional Paint on technique and Digital Photography Technique.

CASE REPORT 1: A 64 year old male patient was referred from the department of Ophthalmology to the department of Prosthodontics, for the restoration of his right ocular defect. On History taking trauma was identified as the cause for enucleation of the eye (Figure 1). On examination of the socket, the tissue bed was found to be healthy and free of infections and both the eyelids were intact.

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Patient reported with a stock eye the iris of which closely matched to the color of the patient's natural iris. It was planned to give the patient an ocular prosthesis fabricated by the modified conventional paint on technique.

Conventional paint on technique

Impression Procedure

- The stock eye was used to make the custom tray for making the impression of the ocular defect (Miller, 1996) A putty mold was made from the stock eye in which clear autopolymerising resin was used to form the tray. (Figure 2)
- The tray was trimmed and smoothened. An opening was made in the centre of this tray to attach the tip of an automixing syringe, which could aid as the handle. Multiple holes were drilled around it to relieve pressure while making of the impression.
- After securing the automixing tip, the tray was tried into the patient's eye and the tray extension was evaluated. The patient was explained about the procedure and was made to sit in an erect position. The eyelids and eyelashes of the patient were lubricated with petroleum jelly before



Figure 1. Preoperative Ocular defect



Figure 2. Putty impression of the stock eye



Figure 3. Making the impression of the ocular defect



Figure 4. Wax conformer trial



Figure 5. Finished and polished ocular prosthesis by conventional paint on technique

- The impression procedure so as to facilitate easy removal of the impression.
- The automixing tip was then attached to an addition silicone light body cartridge (AquasilDentsply) which was injected into the patient’s eye with the help of a dispensing gun (Shenoy, 2007) (Figure 3). The patient was instructed to make movements of the normal eyeball in all directions to facilitate the proper flow of the impression material and then stare at a fixed distant spot.
- Once the material was set, the impression was retrieved and inspected for any voids or defects.



Figure 6. Preoperative Ocular Defect



Figure 7. Iris positioning using graph grid method



Figure 8. Photograph of contralateral eye printed in glossy vinyl paper in different brightness and contrast



Figure 9. Finished and polished ocular prosthesis by digital photography technique

Wax conformer fabrication and trial

- This impression was then poured with Type III dental stone using a two mould technique where the first pour was limited till the height of contour of the impression (Beumer, 1996) Orientation notches were made. A layer of separating medium was applied before the second pour was made.
- Molten modelling wax (Deepti Dental Products of India Pvt. Ltd.) was poured into the mould space once the impression was removed. Once it hardens, the wax block was retrieved and smoothed.
- This wax conformer was tried in the patient's eye and it was adjusted as per the comfort of the patient and also the contour was adjusted by evaluating from the frontal and lateral aspect to match that of the contralateral eye. (Figure 4)

Scleral blank fabrication and trial

- The adjusted wax pattern was flaked, dewaxed and then packed with heat cure acrylic resin (DPI heat cure, Dental Products of India Ltd.), and zinc oxide eugenol powder (Pro Dent). The curing was done as per the reverse curing cycle to reduce the monomer content

(Jorge, 2007) wherein the prosthesis was cured for 95°C for 20 mins and then in boiling water for 20 mins.

- The scleral blank obtained was smoothed and polished and this was evaluated by trying in the patient's eye. The contour and comfort of the patient was reconfirmed.

Iris positioning:

- The conventional graph grid method (Guttal, 2008) was used to position the iris according to the contralateral eye.
- Iris from the stock eye was then cut and secured in the scleral blank in the position which was determined.

Paint on technique and final prostehsis fabrication

- Light cure composite stains (SR Adoro) were used to paint the sclera to match the color of the natural eye (Kavlekar, 2017)
- Once the ocular prosthesis closely matched the natural eye, the stains were cured.
- A thin layer of wax was evenly applied over the prosthesis and it was repacked with clear heat cure acrylic resin and cured.
- Once the final prosthesis was obtained, it was finished and polished and delivered to the patient (Figure 5)

Case report 2:

A 57 year old female patient reported to the Department of Prosthodontics for rehabilitation of the left ocular defect (Figure 6). Facial disfigurement due to the defect was the chief complaint of the patient. On examination, the ocular socket had a healthy tissue bed. The patient was unhappy with the esthetics of the modified stock eye prosthesis which she was using for two months. On evaluation of the medical records, it was identified that the patient had corneal ulceration which led to the enucleation of her eye.

Digital photography technique:

All the procedures until iris positioning was similar to the conventional technique.

- Impression was made using a custom tray with addition silicone light body.
- Wax conformer was then fabricated and tried in the patient.
- It was invested, and packed to obtain the scleral blank.
- Iris positioning was done using the Graph Grid. (Figure 7)
- A DSLR camera (Canon EOS 3000D) was used to click a high quality photograph of the patient's unaffected eye.
- This photograph was then edited using an editing software (Photoshop 7.0, Adobe System Inc.) in varying contrast and brightness and also the size of the sclera and iris was adjusted (Artopoulou, 2006). This photograph was printed on a glossy vinyl paper which was self-adhesive. (Figure 8)
- Then the best match sticker to the unaffected eye was selected and it was glued over the scleral blank which was tried and adjusted in the patient's eye.
- After evaluating it for esthetics, a layer of clear protective coating (G Coat) was applied over the prosthesis and cured. The prosthesis was then delivered to the patient. (Figure 9)

DISCUSSION

Numerous techniques have been reported for fabrication of an ocular prosthesis in literature. All the techniques have their pros and cons. Intimate contact was necessary between the ocular prosthesis and the tissue bed to distribute even pressure. So a prefabricated prosthesis must be avoided (Beumer, 1996) Conventional paint on technique requires good artistic skill to replicate the color of the natural sclera in the prosthesis. It provides good esthetic results and closely adapts to the tissue bed unlike the prefabricated prosthesis (Taicher, 1985). But this technique requires more chair side time. Digital photography technique provides acceptable esthetics as it closely resembles the unaffected eye with minimal modifications (Artopoulou, 2006). The technique is relatively simple, requires less artistic skill, and also less treatment time. But it requires a good quality digital camera and basic software knowledge to edit and modify the images.

Conclusion

Ocular prosthesis have been evolving over the years and various techniques and materials have been in use for its fabrication. The techniques described in this article has their own advantages and disadvantages. The patient acceptance and comfort was better with the Paint on technique. Although, the treatment time was less for the digital imaging technique.

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