

An Innovative Technique for Fabricating a Custom-Made Ocular Prosthesis in a Pediatric Patient: A Case Report

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Abstract:- Eye is a vital organ not only in terms of vision but also an important component of facial expression. Loss of eye causes psychological effect and physical distress to the patient. Ocular prosthesis is artificial replacement of the eye to improve esthetic, psychological condition, self-confidence and social acceptance, ameliorate the quality of life. Although prefabricated ocular prostheses are available, custom made prosthesis are preferred because of its qualities like better movements of the eyelid, even distribution of pressure, better fit, comfort and esthetic. The size, shape, color of the iris, pupil and sclera can also be properly customized making it look more natural. Ocular prosthesis given in pediatric patient prevent from tissue constrictions in future and restore remaining structures This article describes the case report on prosthetic rehabilitation of an ocular defect with custom made ocular prosthesis in pediatric patient.

Keywords:- Enucleation, Custom Made Ocular Prosthesis, Ocular Impression, Iris Painting, Scleral Shell.

I. INTRODUCTION

Loss of eye cause severe physical and psychological distress due to facial disfigurement. It could be because of malignancies, congenital defect, irreparable trauma, painful blind eye or sympathetic ophthalmia.¹ Depending on the severity of the involvement, the surgical management may include one of three approaches: evisceration (where the contents of the globe are removed leaving the sclera intact), enucleation (most common, where the entire eyeball is removed after severing the muscles and the optic nerve) and exenteration (where the entire contents of the orbit including the eyelids and the surrounding tissues are removed)².

Prosthetic rehabilitation of an ocular defect can be done either with stock eye prosthesis (prefabricated) or custom-made ocular prosthesis. Stock ocular prosthesis are available in standard sizes, shapes, and colors. They can be used for interim or postoperative purposes. However, custom made prosthesis have several advantages compared to prefabricated prosthesis like better movement of eye lids, even distribution of pressure, enhanced fit and comfort. The better adaptation improves facial contour, and enhanced

esthetics can be gained from the control over the size of the iris, pupil and color of the iris and sclera.^{3,4} This case report demonstrates an innovative technique for fabricating custom ocular prosthesis with manual iris and sclera painting in pediatric patient which provides esthetically satisfactory result with comfortable and better fit.

II. CASE REPORT

A six years old female patient visited the Department of Prosthodontics and Crown & Bridge with chief complaint of defect in her left eye (**Figure 1**) since 1 year. The history revealed that the patient was diagnosed with retinoblastoma and enucleation was done for the same 1 year ago. On examination there was no sign of inflammation, pain and sensitivity. The muscle function of both the upper and lower eyelid seemed to be normal. A customized ocular prosthesis with manual iris and sclera painting was planned for the patient. All the steps were explained properly to the parents of the patient and informed consent were also taken before starting any procedure.

➤ Impression Making

It is common for children to be anxious during their first dental visit. So before starting the procedure the patient was made calm and comfortable by using various techniques like “Tell-Show-Do”, Distraction and Nonverbal communication. Once the patient was calm, she was made to sit comfortably on the dental chair and Vaseline application was done onto the eyelash and borders of the eye so that impression will not stick to it. Patient was asked to look straight and polyvinyl siloxane impression material was injected directly into the ocular socket. Direct impression technique helps to overcome the interferences experienced during closure of lids. After injecting impression material, the patient was asked to close her eye and move slowly in all the directions. Impression was gently removed (**Figure 2**) by massaging the lower lid downwards and then sliding the impression out from the upper eyelid in an arc like path.⁵

➤ Making a Model

A small mold with wax was prepared and dental stone was mixed and poured into it. The impression was placed over the stone model. After setting of the stone, separating media was applied over it and next layer of die stone was

poured to it. Thus, split cast model was prepared to create mold cavity (**Figure 3**).

➤ *Fabrication of Wax Pattern*

Melted wax was poured into the first model and second model was placed over it. Two models were held together until the wax hardened. After that the wax pattern was removed carefully and carved properly to give the proper contour and margin. Medial and lateral side marking was done on the stone model to have orientation while try in. (**Figure 4**).

➤ *Wax Pattern Try in and Positioning of Iris*

The wax pattern was placed inside the ocular socket and the patient was instructed to move eye in all directions (**Figure 5**). Iris position determination was done by using modified eye glass. The distance from corneal limbus to the respective medial and lateral canthus of the natural eye was measured and marked on the eye glass using marker. Later, the same measurements were transferred to the defective eye side and iris position was located.⁶ (**Figure 6**).

➤ *Fabrication of Scleral Shell*

Flasking, dewaxing and packing were done conventionally using white color acrylic matching the scleral color of contralateral eye. After curing scleral shell was removed, followed by finishing and polishing. Iris position and size that was measured during wax trail was marked over the scleral shell (**Figure 7**).

➤ *Painting of Iris and Sclera*

Careful observation of the color, size, and morphological elements of the patient's contralateral iris under indirect natural light was done. There are five basic parts to an iris painting: the pupil, the collarette, the stroma, the background (limbus), and the individual markings or striations.⁷ Coloring was done in layers to get more lifelike appearance. First layer was done for background color, 2nd layer for color around the pupil and 3rd layer for an additional lighter striation was applied. A black spot was painted in the center of the disk to represent the pupil (**Figure 8**). Each layer was allowed to completely set before applying the next coat. Conjunctival vascular patterns near medial, lateral canthi and circumcorneal region was also painted using red color on scleral shell.

➤ *Second-Stage Curing and Final Finishing & Polishing*

After painting of iris and sclera, painting was secured in place with monopoly syrup. The painted eye was placed back in the original mold and second stage curing was done using clear acrylic. Final finishing and polishing were done after curing to get natural glossy appearance (**Figure 9**).

➤ *Insertion and Instructions*

Before insertion the final finished prosthesis was disinfected in 70% isopropyl alcohol and 0.5% chlorhexidine solution and then thoroughly cleaned with saline solution. Prosthesis was inserted (**Figure 10**) and checked for fit, contour, and movements. As patient is pediatric patient, instructions were given to the parents regarding insertion and removal of the prosthesis and

maintenance of proper hygiene of the prosthesis. It was also explained that the prosthesis would require relining after some years as patient is in growing age.

III. DISCUSSION

Ocular prosthesis cannot restore the vision but can fulfil aesthetic as well as psychological requirements for a patient. An accurate impression is important for the development of an accurately fitting prosthesis. Several studies have suggested various techniques for fabricating artificial ocular prostheses.^{4,5,7} Improved esthetics can be achieved when color and position of the iris can be matched with the normal contralateral eye, and this can be made possible with ocular prosthesis which can be fully customized according to patient. In this case iris and scleral painting was done to match with contralateral eye and give more alike appearances. As this is the case of a pediatric patient it is important to maintain the size of the ocular defect otherwise it may lead to microphthalmia and it would be difficult to restore such defects in future.

IV. CONCLUSION

The optimum cosmetic results of a custom made ocular prosthesis enhance the patient's rehabilitation to a normal lifestyle. Ocular prosthesis in pediatric patient prevent tissue constrictions and restore remaining structures. Although patient cannot see with this prosthesis but it definitely restores esthetic and prevent psychological trauma.

REFERENCES

- [1]. Raflo GT. Enucleation and evisceration. In: Tasmun W, Jaeger E, (Editors). Duane's Clinical Ophthalmology, Revised edition. Vol. 5. Philadelphia: Lippincott-Raven; 1995. p. 1-25.
- [2]. Kaur A, Pavaiya A, Singh SV, Singh RD, Chand P. A simplified approach to fabrication of an ocular prosthesis: a case series. Indian J Dent Res. 2010; 21: 615-617.
- [3]. Beumer J, Zlotolow I. Restoration of facial defects, in Maxillofacial Rehabilitation-Prosthodontic and Surgical Considerations, Beumer, Ed. Mosby, St. Louis, Mo, USA, 1996, 350-364.
- [4]. Artopoulou II, Montgomery PC, Wesley PJ, Lemon JC. Digital imaging in the fabrication of ocular prostheses, Journal of Prosthetic Dentistry. 2006; 95(4):327-330.
- [5]. Vimal J, Singh RD, Chand P, Jurel SK, International Dental Journal of Student Research 2020;8(3):125–127
- [6]. Sagar P, Agarwal A, Lahori M. Journal of Pierre Fauchard Academy (India Section), Vol 35(1), DOI: 10.18311/jpfa/2021/26799, March 2021 p. 30-33
- [7]. Chaudhary R, Kumar D, Khattak A, *et al.* Ocular Prosthesis with an Art: A Case Report. Int J Experiment Dent Sci 2019;8(1):26–31.



Fig 1 Patient with Ocular Defect in Left Eye



Fig 2 Direct Impression of the Defect with Addition Silicon



Fig 3 Split cast model



Fig 4 Fabrication of Wax pattern



Fig 5 Wax pattern try in



Fig 6 Iris Positioning



Fig 9 Final ocular prosthesis



Fig 7 Iris Marking done on the Scleral shell



Fig 10 Ocular Prosthesis After Insertion



Fig 8 Iris Painting