

## Management of Phthisis Bulbi Using Scleral Shell Ocular Prosthesis

Subia<sup>1\*</sup> Sneha S Mantri<sup>2</sup> Abhilasha Bhasin<sup>3</sup>

<sup>1</sup>PG Student, Department of Prosthodontics & Crown and Bridge, Hitkarini Dental College and Hospital, Jabalpur, India.

<sup>2</sup>Professor and Head, Department of Prosthodontics & Crown and Bridge, Hitkarini Dental College and Hospital, Jabalpur, India.

<sup>3</sup>Reader, Department of Prosthodontics & Crown and Bridge, Hitkarini Dental College and Hospital, Jabalpur, India.

### ABSTRACT

**Background:** This case report describes cosmetic rehabilitation of a patient suffering with Phthisis Bulbi and Central heterochromic eye by a custom scleral shell ocular prosthesis. An innovative combination of modified impression technique, centralization of iris and characterization of scleral shell has been attempted to simulate the form, size and color of contralateral natural eye. The fabricated prosthesis was light in weight, aesthetically pleasing, and economic.

**Keywords:** Ocular, scleral shell, iris, pupil, custom made, prosthesis, Phthisis Bulbi, Central heterochromia.

### INTRODUCTION

Loss or disfigurement of eye could be due to some congenital anomaly, acquired infection or pathology.<sup>1</sup> It has a great impact on facial appearance that affects one's social life and emotional health. A maxillofacial prosthesis is any prosthesis used to replace part or all of any stomatognathic and/or craniofacial structures.<sup>2</sup> Phthisis refers to a progressive wasting condition while Phthisis Bulbi/ Phthisical eye is a shrunken, non-functional eye due to inflammation, injury or post-surgical complication. Treatment includes insertion of a prosthesis which may be preceded by enucleation of the eye.<sup>3</sup> Central heterochromia is an eye condition where there are two colors in the same iris; the central (pupillary) zone of the iris is a different color than the mid-peripheral (ciliary) zone, with the true iris color being the outer color.<sup>4</sup>

The prosthesis employed to restore eye defects in the orbital region can be broadly classified as ocular and orbital prosthesis.<sup>3</sup> An ocular prosthesis can be given as full thickness prosthesis or a scleral shell of 1.5mm thickness. According to the world dictionary of ophthalmic prosthesis by Kelly et al. a scleral shell is defined as any ocular prosthetic device fitted

over a residual globe like phthisis bulbi, atrophic bulbi or microphthalmos.<sup>3</sup> A custom-made ocular prosthesis increases the adaptability, movement of the eye ball, and exactly matches the iris position as that of the adjacent natural eye.<sup>5</sup> Various materials have been used for the fabrication of a custom made (CMP) or a readymade "stock" shell. The most commonly used material has been PMMA (Poly methyl methacrylate) resin. Its popularity owes to its ease of being moulded into any desired shape and its inert nature.

This article presents a case report describing the steps in fabrication of custom scleral shell prosthesis for a patient suffering with Phthisis Bulbi and Central heterochromic eye.

### CASE REPORT

A 23 year old male patient reported to the Department of Prosthodontics, Hitkarini Dental College and Hospital, Jabalpur for prosthetic rehabilitation of his disfigured right eye. History revealed that the patient had suffered an infection of both eyes post natal, due to which he had lost vision of his right eye. The right eye had shrunken and cicatrized over the years.

Received: Jan. 15, 2019; Accepted: Mar. 19, 2019

\*Correspondence Dr. Subia.

Department of Prosthodontics & Crown and Bridge, Hitkarini Dental College and Hospital, Jabalpur, India.

Email: mohdrazikhan97@gmail.com



Fig 1: Preoperative facial profile picture.



Fig 2: Wax pattern trial by Gid method.



Fig 3: Iris centralization.



Fig 4: Postoperative facial profile picture

A thorough examination of the defective eye revealed a healthy intraocular tissue bed with cicatrized iris and adequate potential to open and close the eyelids. All the possible treatment options were considered, explained to the patient and a

decision was made to fabricate a custom made scleral shell ocular prosthesis. (Fig 1)

## TECHNIQUE

- I. **Obtaining Facial moulage** - An Alginate impression (Vignette, Dentsply, India) of the upper half of the face involving both the eyes was made to obtain a facial moulage in dental stone.
- II. **Primary Impression** - Tip of a disposable plastic syringe was attached to the stock perforated auto polymerizing resin impression tray that was fabricated over the facial moulage of the defective eye using self-cure PMMA resin. (DPI RR cold cure resin, India) (Fig 2). 2% lignocaine hydrochloride topical gel (Neon) and 0.5% proparacaine hydrochloride ophthalmic drops (Paracain) were used as anesthetic agent to reduce irritability while making the impression. Impression of the defected eye was made using alginate impression material (Vignette, Dentsply, India). The material was mixed and loaded into the socket and the tray was seated and stabilized by holding its stem. The impression retrieved was verified for any inaccuracies and poured using dental stone to obtain a primary cast.
- III. **Final impression** - A second custom ocular impression tray was fabricated in a similar design as before using the primary cast and final impression (Poly vinyl silicone impression material) (Advanced Kerr, Prodent, Sao Paulo), was made. (Fig 3a)
- IV. **Fabricating wax pattern** - Wax pattern from the ocular impression was made employing the "Double alginate technique". A thin mix of alginate impression material was poured into the empty plastic disposable cup (Fig 3b). While the same alginate impression material was applied with a brush over the inner concave tissue surface of the impression and inserted into the cup. The stem was held firmly till the material was set. The alginate mold was removed along with impression from the cup. The alginate mold was partially incised with sharp instrument with incision line crossing the stem of impression tray for

easy retrieval of the wax pattern. The alginate mold thus obtained was filled with molten wax through the sprue hole created by the stem of the tray. The wax pattern was retrieved and refined. (Fig 3c)

- V. **Wax pattern try in by Grid method** -The wax ocular pattern was evaluated by observing the extension into the fornices. The height of convexity of the wax pattern was matched as that of the natural eye (Fig). The patient was instructed to wear a zero power spectacle with an attached transparent graph sheet. The landmarks like the facial midline, intercanthal distance, and distance from the center of iris to the inner and outer canthus were marked with a marker over the graph sheet. (Fig 4a, 4b)
- VI. **Centralization of iris** - An empty refill stem of a ball pen was attached to the wax pattern at position corresponding to the pupil of the natural eye (Fig). Accurate positioning of the button was done by asking the patient to do various functional movements like gazing straight ahead at a distant object and looking around at things in a clockwise and anticlockwise fashion. Thus the direction of the stem was also observed. Centralization of the iris and marking of the corneal plane was checked and verified by using a customized occlusal plane analyzer (Fig 5).
- VII. **Iris button painting and Scleral shell characterization** - The diameter of the iris and the pupil of the patient's natural eye were measured and a clear ethyl cellulosic stock iris disk (iris button) of corresponding size (11.5mm) was selected. Firstly the iris was painted with striations according to the patient's natural eye using (Camlin oil paints). Starting with the black iris center, sunray pattern of yellow orange and brown streaks were painted and merged shades of pear green, algae green to coral green at the periphery. Finally a layer of monopoly solution was smeared over the painted iris for securing the painted surface.
- VIII. The wax pattern was flasked along with plastic refill stem. A void was left in the space of the plastic refill stem after the de-waxing

procedure. This void was replaced by painted iris button into the de waxed flask. Characterization of the veined surface of the sclera part of the prosthesis was done by using rayon thread fibrils (Leucitone 99, Dentsply, India) and stains of colors mixed in clear heat cure PMMA resin. (DPI heat cure resin, India). These were painted with a brush gently extending around the medial and lateral canthus and around the brim of the iris button to give it a more realist look. The flask was packed with white heat-polymerizing acrylic resin. A thin cellophane sheet was kept in between the white acrylic and the upper flask, during trial packing for initial 10 min to allow the excess to flow out. Curing cycle was set to 90 min. The final scleral shell - ocular prosthesis was finished and polished and inserted into the patient's eye.

- IX. The patient was trained to insert and remove the prosthesis efficiently and instructed on cleaning the shell using a mild soap or baby shampoo every time before insertion. There after a 6 month follow up was done for prosthesis evaluation and adjustment.

## DISCUSSION

The rehabilitation of the ocular defect in a case of Phthisis Bulbi is a complex task owing to inadequate depth of the defect area. A custom scleral shell - ocular prosthesis is an option due to better adaptability to the underlying ocular bed, better simulation of color and movement to the natural eye. According to Beumer et al, a prefabricated prosthesis lacks intimate contact and even pressure distribution to the tissue bed, hence a custom made ocular prosthesis is preferred.<sup>7</sup>

The heat cure methyl methacrylate resin is the material of choice owing to its easy availability, quick fabrication, and fracture resistance.<sup>9</sup> The modified impression technique used here employs polyvinyl siloxane impression material which is beneficial in recording finer details and can be used applied in defects with adequate depth between fornices<sup>10</sup>. Centralization of the iris for ocular prosthesis has been less published. Roberts et al, used a pupillometer for the pupil alignment of the eye prosthesis.<sup>11</sup> The method used here using a

transparent grid template attached over a spectacle, which helped in easy and comfortable stabilization of the graph template and accurately located the iris position.<sup>12</sup> Considering feasibility of the ocular prosthesis customization of the iris was done by painting of the iris button. This is easily made, feasible, eco-friendly and economical. Authors also advocated that it is using rayon fibers is an easy method.<sup>13</sup>

Thus the method described gave good result from patient's satisfaction, ease and acceptance. Moreover, the procedure can be carried out in small clinic setup.

## CONCLUSION

The use of custom-made scleral shell ocular prosthesis has been a boon to the patient who cannot afford the lucrative treatment options available. The procedure used here is reasonable, feasible and can be carried out in a small clinical set-up. This method has provided good results from patient esthetics, acceptance, and satisfaction.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

## REFERENCES

1. Doshi P, Aruna B. Prosthetic management of patient with ocular defect. J Indian Prosthodont Soc 2005; 5:37-8.
2. The Glossary of prosthodontic terms. J Prosthet Dent 1999;81:39-110
3. Raizada K, Rani D. Ocular prosthesis: Review. Contact lens & Anterior eye.2007; 30:152-62.
4. Imesch, PD, Wallow IHL, Albert DM. The color of the human eye: A review of morphologic correlates and of some conditions that affect iridial pigmentation. Survey of Ophthalmology.1997; 41:117-23.
5. Gunaseelaraj R, Karthikeyan S, Kumar MN, Balamurugan T, Jagadeeshwaran AN. Custom-made ocular prosthesis. J Pharm Bio allied Sci. 2012; 4:177-9.
6. Alam MS, Sugavaneswaran M, Arumaikkannu G, Mukherjee B. An innovative method of ocular prosthesis fabrication by bio-CAD and rapid 3-D printing technology: A pilot study.Orbit.2017:1-5.
7. Beumer J, Curtis TA. Maxillofacial Rehabilitation Prosthodontic and Surgical Considerations; 431-49.
8. Clinical Maxillofacial Prosthetics; Thomas D. Taylor; p233-76.
9. Shashidhar MP, Thombre HK, Prosthetic rehabilitation of a serving soldier with custom made ocular prosthesis, Medical Journal Armed Forces India. 2012:1-3.
10. Manoj SS. Modified Impression Technique for Fabrication of a Custom Made Ocular Prosthesis. Anaplastology.2014; 129:1-3.
11. Roberts CA: An instrument to achieve pupil alignment in eye prosthesis. J Prosthet Dent 1969; 22:487-9.
12. Guttal SS, Patil NP, Vernekar N, Porwal A. A Simple Method of Positioning the Iris Disk on a Custom-Made Ocular Prosthesis. A Clinical Report. 2008; 17:223-7.
13. Bankoti P, Singhal MK, Nair C, Chandra P. Characterization of an eye prosthesis using monopoly syrup. Indian J Dent Res 2016; 27:553-8.