Rehabilitating an Ocular Defect with a Custom Made Ocular Prosthesis: A Clinical Report

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Abstract

An ocular prosthesis is a replacement of the ocular part of the eye in patients due to trauma, benign or malignant lesion or congenital anomaly, there is the loss of the eye. Prosthetic rehabilitation with a customized ocular prosthesis that is proportioned and similar in appearance to that of the contralateral natural eye is needed. This maintains the volume of the orbital socket and also helps create an illusion of the presence of a healthy eye. It provides the individual confidence to adapt to a normal lifestyle and prevent them from going into psychological distress. Various techniques have been advocated for the fabrication of the ocular prosthesis comprising the use of the stock prosthesis, custom made prosthesis and micro-implants for the rehabilitation of the ocular part of the eye. A cosmetically approvable and pleasing ocular prosthesis are those which reproduces the colour, appearance and orientation of the iris to that of the contralateral natural eye. This clinical report describes a simple, economical and time-saving method for the fabrication of the customised ocular prosthesis in a patient with the ocular defect.

Keywords: *ocular defect, ocular prosthesis, eye, ocular impression, iris*

Introduction

Loss of any maxillofacial tissue or organ per se causes a substantial impact physically, physiologically, socially as well as on the psychosomatic aspect of the affected person and which can be a result of any congenital anomalies, trauma, or because of any surgical intervention. [(1)] Eyes form a major part of the human facial feature and appearance. Loss of eye not only compromises the appearance but also hampers the self-esteem of the individual. The surgical interventions associated with the removal of the eye are evisceration, enucleation, and exenteration. Based upon the surgical technique undertaken, rehabilitation of the ocular or orbital defect is done either using the available stock eye prosthesis or customised eye prosthesis or sometimes with the use of micro-implants for better retention. [(2,3)]

The Stock eye prosthesis is available in various shapes, size and colours which are used for short-term rehabilitation of the ocular defects. [(3,4,5)] . A customised ocular prosthesis is advantageous than the stock prosthesis as they help in better eyelid movements with equal distribution of pressure thereby reducing the occurrence of any ulceration, proper fit and natural appearance obtained from the size and shape of the iris, customising the sclera part of the prosthesis according to the patients need[(6,7,8)]. This clinical report describes a simplified technique used in the fabrication of customised ocular prosthesis to achieve optimal fit and giving the patient natural appearance.

Case Report

A 37-year-old male visited the Department of Prosthodontics, Institute of Dental Science, Bhubaneshwar with the complaint of ill-fitting eye prosthesis. The patient history revealed that he suffered from anterior staphyloma after which the ocular part was surgically enucleated 12 years back, and he was

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using implant-supported ocular prosthesis for the past 5 years. The patient complained of watering and itching of the eye with the use of the ocular prosthesis. Upon examination, the right eye bed was able to coordinate and synchronous movements like that of the left eye. The right eye socket appeared to shrunken as compared to the left eye (Figure 1). The patient was explained regarding the treatment protocol and fabrication of the semi customised ocular prosthesis was planned.

Irreversible hydrocolloid along with the Plaster Of Paris was used to make a primary impression of the extraoral eye impression. To make, the impression stable small pieces of gauges were incorporated into the Plaster Of Paris. Upon the retrieval of the impression, a cast is poured using Type -III Dental Stone (Figure 2). On this primary cast, a custom tray is fabricated using the pink self-cure resin (DPI-RR Cold Cure). In this custom- tray, a large hole was made in the centre to which a 10ml syringe was attached that served as a passage for the light body polyvinylsiloxane impression material (Affinis) (Figure 3A). Five to Six escape holes were made for the mechanical locking of the impression material to the tray. First, the custom tray was checked for the fit inside the eye socket and further adjustments were done according to the need. The patient was made to sit in an upright position, the custom tray along with the syringe containing the light body polyvinylsiloxane impression material was placed into the socket. Once the position is confirmed, then the light body material was injected through the inlet and the patient was asked to do different eye movements i.e. lateral, upward and downward movements so that a proper impression can be recorded (Figure 3B).

Once the second impression is obtained, a mold was obtained by immersing the secondary impression into the alginate mixture in a bowl until the level of the syringe hub tip (Figure 3C). As the alginate sets, a cut is made as shown in the figure to retrieve the impression.

The wax pattern was obtained by pouring the molten wax (baseplate wax and inlay wax combined in the ratio of 1:2) inside the alginate mold. As the wax hardens, the alginate mold was cut and the pattern was retrieved which was further shaped and carved to simulate as the scleral part of the missing eye. The wax pattern was then checked inside the patient's right eye socket for the shape, size, fullness and retention on doing various eye movements i.e. the lateral movements, circular motion and up and down movements (Figure 4A). Following this, the shade of the iris button was matched with the contralateral natural eye, then it was trimmed from the stock prosthesis and iris button was positioned in the centre of wax pattern by taking the contralateral iris as a reference by marking the distance between the inner canthus and outer canthus of the eye (Figure 4B).

Following the wax trial, the flasking , dewaxing and packing of the mold was done with heat cure tooth coloured acrylic resin mixed with part of heat cure clear acrylic resin (COLTENE, Heat cure acrylic, India) (figure-5A, B). The shade of the scleral part was initially matched with the contralateral natural eye. After the curing has been done, the ocular prosthesis is trimmed, finished and polished with pumice powder. Fine red embroidery threads are painted on to the scleral part of the eye this mimics the blood vessels that is present in the natural eye giving the prosthesis a life-like appearance. To keep the blood vessel fibres in place, the scleral portion is painted with a thin layer of monomer polymer liquid which is then allowed to set (figure 5C). The ocular prosthesis was polished, checked for any sharp edges, later was inserted into a patient's eye (figure 6). The patient was given certain post insertion instructions which he had to follow for the maintenance of the prosthesis. He was recalled for a follow after 7days, 15days and 1 month.

Post Insertion Instruction[9]:

1. Never use rubbing alcohol or any other astringent to clean the prosthesis as it can break the prosthesis.

2. Remove the ocular prosthesis at night while sleeping. Frequent removal and insertion of the prosthesis are not advised as it can irritate the socket.

3. Always store the prosthesis in cold water when removed.

4. Always clean the ocular prosthesis with antibacterial soap between your fingertips.

5. If there is any feeling of dryness, the patient is instructed to use eye drops along with the artificial eye.

7. The patient is advised for follow-up visits once a year at least.

Figure 1 : Patient with right ocular defect

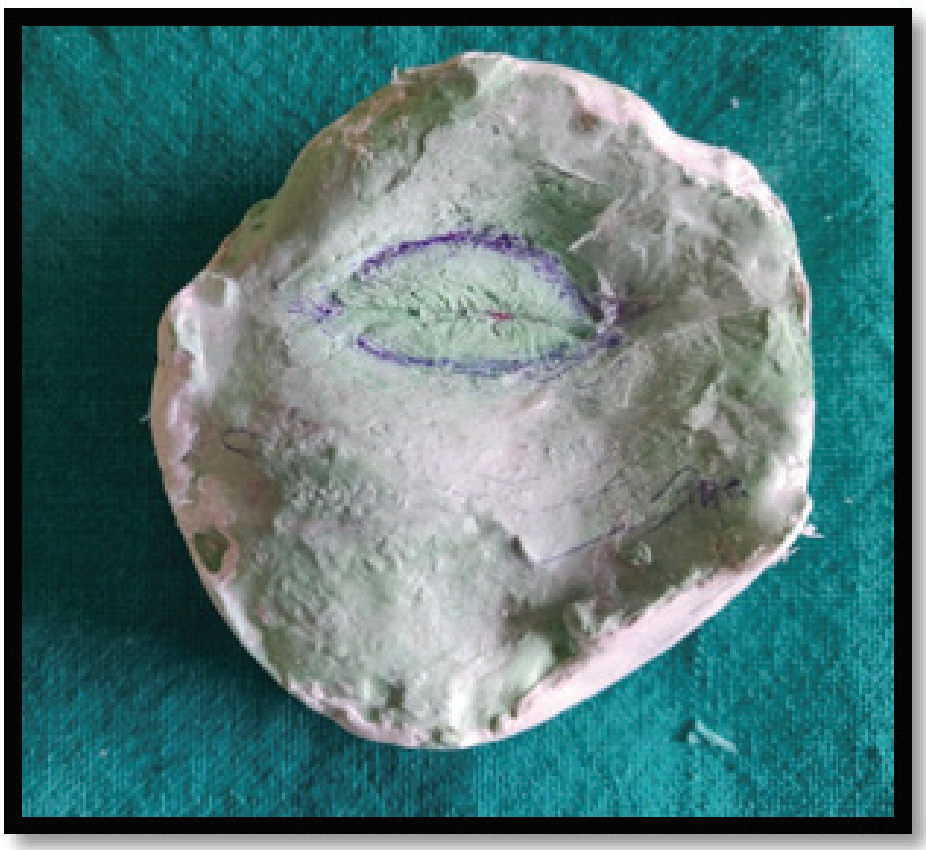

Figure 2 : Primary Cast

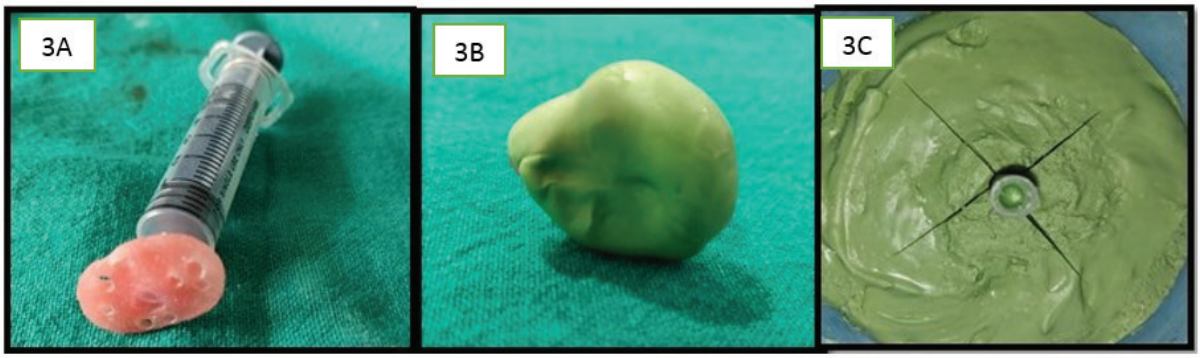

Figure 3 : A: Customised impression tray with injector, B: secondary impression using light body polyvinylsiloxane impression material, C: secondary impression immersed into alginate mixture to obtain a mold.

Figure 4: A: Wax Trial, B: Positioning of the iris button

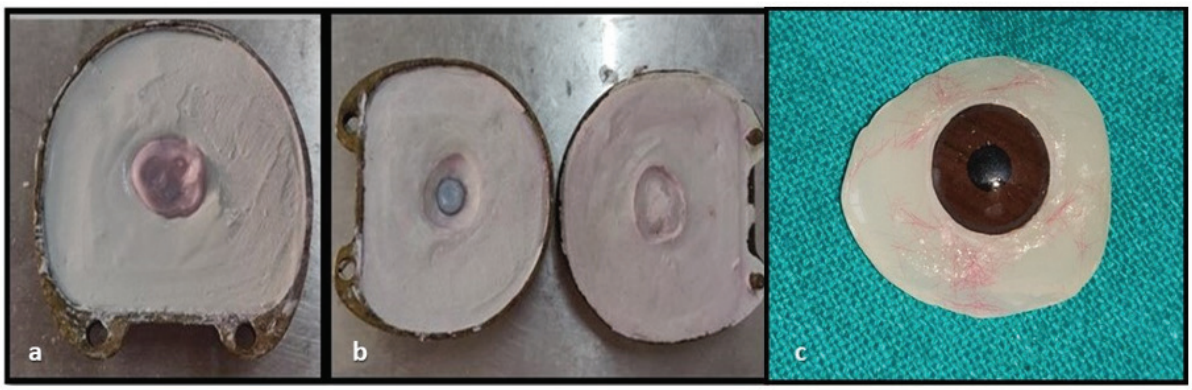

Figure 5 : A: Investment of the Wax Pattern B : Dewaxing and Packing of the Mold

Figure 6 : Patient with Definitive Ocular Prosthesis

Discussion

Ocular defects are a major maxillofacial defect that requires prosthetic rehabilitation to improve the quality of life of the patient and also boost their confidence. [10, 11] After the surgical removal of an eye, the prosthodontists play a major role in prosthetic rehabilitation procedure by providing the patient with an ocular prosthesis changing his appearance after the loss of the eye.

The customized ocular prosthesis is one of the most acceptable treatment options that satisfy the patient's need and also helps the clinician to achieve the desired goals through the meticulous work duplication of the sclera and matching of the iris. This not only requires the skill and efficiency of the clinician but also is a time-consuming procedure.

A stock ocular prosthesis is available in different shapes, sizes and colour according to the need of the patient. [12] With the advancement in techniques and availability of the newer materials, enucleated eye socket can be rehabilitated with a modified stock ocular prosthesis according to the precise fit of the patient eye. But the aesthetic of the customised ocular prosthesis is better than that of a stock ocular prosthesis. Furthermore, in the customised prosthesis, the scleral convexity can be reduced according to the patient's various eye movements which is difficult in case of stock eye prosthesis. The custom ocular prosthesis also prevents the shrinking of the eye socket thus retaining the shape of the eye socket, improves the muscular functions of the eyelids thus gradually providing a natural appearance to the rehabilitated prosthesis[13].

However Subjective errors may take place while the centralisation and placement of the iris button in the wax pattern, which is the limitation of the technique described.

Conclusion

The aesthetics of a custom made ocular prosthesis was a boon to the patient as compared to

that of a stock ocular prosthesis. The technique described in the clinical report is a simple, cost-effective procedure that provides the patient with an aesthetically appealing ocular prosthesis thus increasing the quality of life of the patient that has a deep psychological as well as the physiological impact on his personality and appearance.

Consent for publication: The patient has given valid and informed consent for publication of this case and related images

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Ethical Issues: None

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