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Case Report

Prosthetic rehabilitation of a unilateral ocular enucleation – case report

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ABSTRACT:
The eye is not only a vital organ for eyesight, but also it plays an essential role in facial composition and expression. When affected by a disease with functional loss it can have a severe psychological impact on one's personality and also hamper day to day activity. Removal of one eye or any of its components are defined by different names like enucleation, exenteration and evisceration. The main difference being the extent of surrounding tissue removal during the procedure. We present a case of an elderly male person who had lost his left eye due to trauma and who presented with a healthy intraocular tissue bed. A custom tray was fabricated for making the impression of the ocular defect. A stock eye prosthesis shell was selected and then modified to adapt the surface anatomy of the tissue bed within the ocular defect. The final prosthesis was inserted after a clinical trial procedure. Stains were used to customize the scleral portion of artificial prosthesis. Instructions regarding the use and maintenance were given. The patient was highly satisfied with the outcome of the prosthesis.
Keywords: enucleation, exentaration, evisceration, stock eye, sclera

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INTRODUCTION

The rehabilitation of maxillofacial region has been considered to play a significant part in quality of life improvement (QOLI) of those who have congenital or acquired defects of facial organs. [1] Disfigurement in such cases is complex because of the complexity of anatomical structures and their close intertwined anatomical relations. The disease of one organ may also impact the function of other organs. [2] An important aspect of the success of such complex prosthesis depends largely on the extent and the location of the defect. [3] Traumatic injuries likewise, to the facial structure result in widespread deformity that has similar repercussions (aesthetic, functional and psychological). [4] Trauma to the eye can result in loss of the eye because of the fluid content of the organ. A puncture sustained during trauma renders the organ irreparable and useless, which is therefore removed during trauma repair. The earliest form of eye prosthesis found in literature dates back to 2900 – 2800 BCE. [5] In present times, different materials have been implicated in the ocular prosthetic rehabilitation, which include acrylic resin (prefabricated, modified, handmade), ceramic, silicone and implant supported. [6] The stock eyes are developed commercially in different shapes (shell, hook or shelf, curled back, bent, peanut, reverse). [4] Since the eye ball is attached by multiple different muscles that regulate its movement, full recovery of function is almost impossible when using a prosthetic eye because of anatomical damage and its direct/indirect effects or due to secondary intention healing.[7] Advances in fabrication of artificial eye that are customized have allowed clinicians to match the custom eye with adjacent eye and advance in fabrication technique like impression making and laboratory fabrication.
This article in the form of a case report presents prosthetic rehabilitation of an elderly individual with a modified stock eye prosthesis.

CASE REPORT

An elderly aged male reported to department of oral medicine with chief complained of missing left eye, which was lost as a result of trauma 7 years back. The patient was referred to the Prosthodontic department for the needful. The patient's medical history

disclosed that the patient was assaulted with a sharp knife that resulted in severe injury to the left eye. The eye was removed in a hospital within few hours of admission. The patient was a farmer by profession and had no systemic medical problems. Extra oral examination revealed the left eye was left open during normal conversation and the tissue within the orbit were visible from a distance (Fig 1A). The tissue bed within the orbit showed healthy mucosa and with adequate depth between the upper and lower fences. The movements of the tissue bed were analysed and both mesial and distal movements would raise the tissue bed anteriorly and superiorly by a distance of 2 millimetres. Treatment presented to the patient was a modified ocular prosthesis that could be easily removed by the patient at will. All clinical and laboratory procedures were performed under the strict guidelines for infection control during covid 19 pandemic. [8]

A direct putty impression (Affinis; Coltene AG, Altstatten; Switzerland) was made of the unaffected right eye to measure the dimensions that would be required for the selection of stock eye shell. A cast was poured with dental stone (Goldstone; Asian chemicals, Rajkot, Gujarat, India) and trimmed accordingly, (Fig 1 B, C).

Figure 1: (A) Extra oral view of the patient showing the intraocular tissue bed at rest (B) Putty impression of the right eye and the cast (C) Trimmed cast to prepare a tray and select the stock eye shell (D) Modified disposable syringe (E) Modified disposable syringe tried as a special tray to conform within the boundaries of ocular cavity.

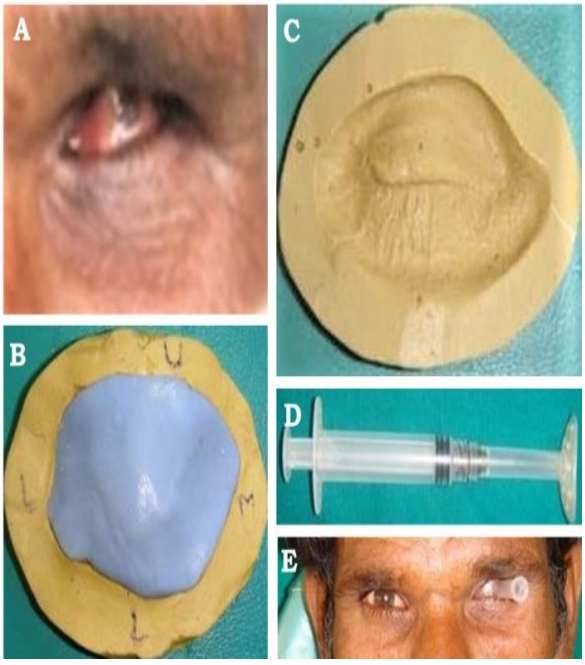
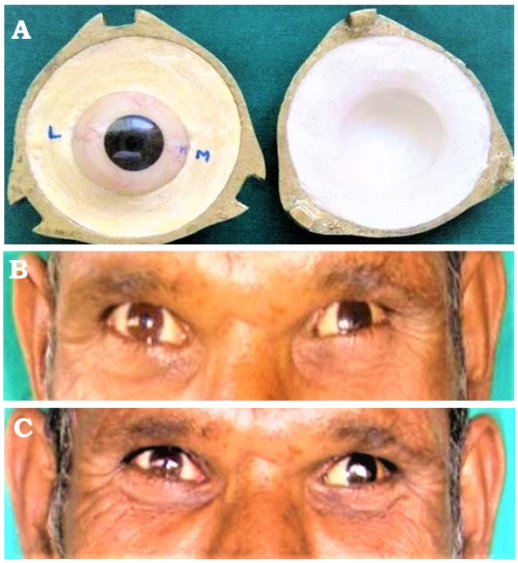


Figure 2: (A) Modified stock eye in the processing flask (B) Superior eye movement showing mild displacement of the prosthesis evident at medial side (C) Inferior eye movement showing a stable prosthesis



To prepare the final impression of the tissue bed, a 5 millilitre disposable syringe (Dispovan, Mumbai, India) was modified (Fig 1D) and tried in the patient's left eye (Fig 1E). The anterior portion of the syringe was modified in terms of surface (concave) and provision of holes. Final impression was made by injecting light body consistency (Affinis; Coltene AG, Altstatten; Switzerland) of addition silicone elastomeric impression material. The impression was later boxed using boxing wax (Hindustan Dental Products, Hyderabad, Andhra Pradesh, India) and a cast was poured to yield a two piece mould. A matching stock eye shell (Ajanta exports, India) was selected in terms of iris and pupil since the scleral portion was not matched. The shell was trimmed to create a better fit on the working cast. The inaccuracies were removed by using liquid BioInk (Bausch Intraoral Ink, Canada) on the shell surface. [9] The contact areas were thus trimmed accordingly. For the characterization of the shell conventional denture stains (M.P. Sai Enterprise) and vein fibres were used. The scleral portion shade was then tried at the next clinic appointment. Modelling wax was added to the under surface of the stock shell and then placed in the ocular cavity. The patient was asked to move the eyes in different directions and accordingly the wax was either removed or added using the trial and error method. The final contour was established when the trial prosthesis was more stable during functional movements. The laboratory procedure for replacement of the modelling wax with heat cure denture base resin (Stellon De Trey; Dental Products of India Ltd., Mumbai, India) was performed using routine steps of denture fabrication with compression moulding technique (Fig 2A). The prosthesis was retrieved and excess resin was removed after which final finishing and polishing was done. During

insertion the prosthesis was disinfected using isopropyl alcohol (70%) (Cero, IPA) for a period of 5 minutes followed by rinsing with normal saline solution. The patient was asked to move the eyeball superiorly (Fig 2B) and inferiorly (Fig 2C). The modified eye prosthesis was stable in both positions, although there was more movement of the prosthesis during superior movement. Application of BioInk aided in the final adjustment of the prosthesis. Instructions regarding wear and maintenance were addressed to the patient. The patient was followed up after 24 hours and 1 month, during which he exclaimed his satisfaction with the outcome of the prosthesis.

DISCUSSION

A simple technique of modifying a stock eye shell has been described in this report. A stock eye prosthesis without a modified tissue surface is not indicated for long term wear as it will irritate and injure the underlying mucosa. Maxillofacial prosthesis includes a wide range of rehabilitation that can include a maxillary or a mandibular prosthesis (maxillectomy or hemimandibulectomy), [10] speech enhancing prosthesis (cleft palate), [11] occlusal splints (treat the effects of nervous disorders affecting arms), [12,13] ocular prostheses, [4] ear and nasal prosthesis. [14,15] Ideally a definitive ocular prosthesis should be inserted soon after socket healing to restore normal opening and support of eyelids and restore some degree of movement. Both are affected if healing takes place in the absence of a prosthesis. The technique of modifying a stock ocular prosthesis has been advocated first in the year 1979. [16] Other techniques have been mentioned that have used heat cure or self-cure tissue conditioner material as impression material. [17] Irrespective of the material used to reline the stock shell, the advantages of modifying the prefabricated prosthesis include improved adaptation, increased mobility, increased stability and retention, improved eyelid contours and support, enhanced esthetics especially scleral colour and shade and indirectly improved patient satisfaction. The completely customized eye prosthesis on the other hand is expensive and time consuming with less desirable results. [18] One of the biggest challenges in modified stock eye prosthesis is staining of the sclera to match the other eye. Since pupil and iris are dark in colour, changes are not visible, but even a slight change in a change of sclera makes the prosthesis apparent to the observer. From a clinical standpoint, it is also imperative that esthetics for ocular prosthesis are analysed in multi dimensions (biological, mechanical and psychological) as mentioned in the literature. [19] For any modified prosthesis, the difference between the two resins – stock and resin used for modification should be considered. For patients who lack of lubrication within the socket, artificial lubricants (tears) containing vitamin E and oleo there are recommended and should wear continuously to avoid placing the acrylic in water. When acrylic resin is placed in water overnight as will be the case if the patient removes the eye prosthesis, the water gets absorbed by acrylic resulting not only in dimensional changes but also changes in flexural strength. [20] Water sorption by the acrylic results in volumetric changes of the prosthesis and may cause a decrease in retention and stability of the prosthesis. Patients should be therefore advised in such cases to follow up regularly for the period of at least 3 months, so that such alterations in volume can be accommodated or adjusted.

CONCLUSION

An ideal and properly fitting ocular prosthesis presents patients with loss of eye an option to improve his quality of life by enhancing his facial aesthetics and improving facial contours altered due to removal of the eyeball. For the modified stock ocular prosthesis, the adaptation of tissue surface of the prosthesis is one of the clinically challenging steps which should be approached with patience and common sense.

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CONFLICT OF INTEREST

None

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