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Research Article

"TEAR TO AN EYE" – PROSTHETIC REHABILITATION OF AN ENUCLEATED EYE

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ABSTRACT

Eyes are the most sensitive of all the sense organs and the most prone to be damaged. Loss of an eye physically, socially, emotionally, and psychologically affects the patient. Due to the lack of lubrication in patients with anopthalmic sockets, experience dryness, discomfort, irritation, and bacterial infection. This case report bestows a novel hollow ocular prosthesis fabricated with a reservoir containing lubricant, which slowly releases into the ophthalmic cavity upon blinking.

INTRODUCTION

"The love for life is next to love for face"- Dr. Sushrutha

Eyes are generally the first features of the face to be noticed. It is a vital organ not only in terms of vision but also is an important component of facial expression. Unfortunately, the eyes are the most sensitive of all the sense organs and the most prone to be damaged. Peyman, Saunders, and Goldberg classified surgical removal of eyes into three types – Evisceration in which the contents of the globe are removed leaving an intact sclera, Enucleation where the entire eyeball is removed after severing the muscles of the optic nerve, Exenteration where the entire contents of the orbit including the eyelids and surrounding tissues are removed.[1,2]

Loss of an eye physically, emotionally, socially, and psychologically disturbs the patient. Rehabilitation of a congenital or acquired eye defect should not only provide an esthetic comfort to the patient but also psychological well-being. An ocular prosthesis can be either stock or custom – made. The stock prosthesis is available in standard sizes, shapes, and colors.[3] In addition to appearance, comfort is also a prime consideration to most wearers. Eye prosthesis patients often complaint of dryness, discomfort, irritation, and bacterial infection is making it difficult and uncomfortable to wear the prosthesis.[4] This article bestows a novel technique in the fabrication of a hollow ocular prosthesis with a lubricant reservoir in the superior aspect of the prosthesis, which releases the lubricant into the ophthalmic cavity through the exit hole upon blinking.

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On clinical examination, it revealed dryness of the socket, so to prevent the problems caused by dryness, it was decided to give an eye prosthesis with a lubricant reservoir. The lubricant reservoir in the hollow ocular prosthesis is present on the superior aspect of the eye prosthesis. A removable cap is used to close the reservoir, which also makes it easy for the patient to load the lubricant. An exit hole of 0.5mm was drilled on the anterior aspect of the prosthesis that has a connection with the reservoir containing the lubricant. When the patient blinks his eyes, a negative pressure is created by the upper eyelid which causes the lubricant to flow from the reservoir to the anterior aspect of the prosthesis.[4]

Case Report

A 33-year-old male patient reported to the Department of Prosthodontics for the rehabilitation of his lost right eye. The patient history revealed that the right eye was surgically enucleated as a result of trauma 1 year back, and he was using stock eye prosthesis for the past 6 months. Clinical examination revealed a completely healed right eye socket. No relevant medical history was reported by the patient. Thus it was decided to fabricate a customized ocular prosthesis. (Figure-1A)

Technique

A primary impression was made with an irreversible hydrocolloid material of the eye socket by asking the patient to move his eyes in all directions for the proper flow of the material into all aspects of the socket. Impression was then beaded and boxed to obtain a two-piece split cast. (Figure-1B)
A special tray was fabricated with self-cure clear acrylic resin with perforations for retention of the material from the two-piece split cast. To this tray, a disposable impression tip was

attached for the delivery of the impression material. (Figure-1C)The impression was made with light body material (3M ESPE), and the patient was asked to move his eyes in all directions for proper recording of the socket in all aspects. (Figure – 1D) The final impression was then beaded and boxed, and a two-piece split cast was poured. (Figure-2A) To this cast, molten wax was poured to obtain a wax prosthesis for wax trial. The wax trial was done in the patient to check for the contours and competency of the eyelid. (Figure-2B)

The wax pattern was then invested in the flask, dewaxed, and packed with heat cure clear acrylic mixed with veins. (Figure-2C) It was then bench cured, followed by conventional curing using lost salt technique and deflasked. (Figure-2D) The prosthesis was then trimmed, finished, and polished, and sclera try-in was done in the patient. The patient's left eye photograph was taken, and an iris matching with it was trimmed out from a stock eye and placed on to the sclera fabricated. Iris's position was confirmed using a transparent grid. (Figure-3A) Around 1mm of the sclera around the iris on the anterior aspect was trimmed to incorporate the clear acrylic. To the trimmed, scleral portion, veins were incorporated to give a look of blood vessels, and the iris was fixed in its position. The heat cure clear acrylic material was then packed into the previous mould obtained, and the prosthesis was placed in such a position to obtain a clear acrylic layer on the anterior aspect of the prosthesis to give it a glossy appearance. (Figure-3B)

The prosthesis was then trimmed, finished, and polished and checked in the patient for extent, fit, and comfort. On the posterosuperior aspect of the prosthesis, a hole was drilled, and the residual salt crystals were flushed out. The rubber cap of an insulin syringe was used as a lid to close the reservoir. A 0.5mm exit hole was drilled on the anterior and superior aspect of the prosthesis, which leads to the reservoir. The reservoir was then filled with lubricant, and the reservoir was closed with the cap. (Figure-3C) The patient was instructed on how to fill and close the cap of the reservoir. Instructions were given regarding placement and removal of the prosthesis, cleaning, and maintenance of it. Follow-up of the prosthesis was done after 24 hours, 1 week, 1 month, and 3 months, and after 1 year. No post-insertion problem was reported by the patient, and the patient was satisfied with the prosthesis. (Figure-3D)

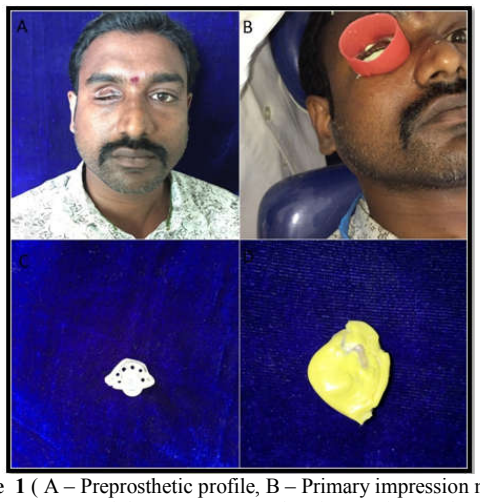

Figure 1 (A – Preprosthetic profile, B – Primary impression made with alginate, C – Special tray , D – Secondary impression made with light body)

Figure 2 (A – Two piece master cast , B – Wax trial , C – Investing of the prosthesis, D – Packing with lost salt technique)

Figure 3 (A – Sclera trial and iris positioning, B – Fabrication of reservoir, C –Fabrication of exit hole, D – Postprosthetic profile)

DISCUSSION

Loss of an eye physically, emotionally, socially, and psychologically affects the patient. Patients complain of the prosthetic eye causing discomfort, dryness, irritation, and bacterial infection, making the wear of prosthesis very uncomfortable for them.[4,5] There are some pieces of literature available on eye prosthesis with reservoirs. Some of them are - Allen L et al.,[6] reported that patients who use prosthetic eye suffer from dryness of the socket because they do not produce much tear fluid as do the normal people. So such patients use artificial lubricants to keep the socket wet, and also these lubricants provide relief from irritation. Kim SE et al.,[7] in their prospective study, found that mean tear meniscus depth, tear meniscus area, and tear meniscus volume also were lower in the artificial eye when compared to that in the normal eye. According to Kim JH et al.,[8] the constant irritation on prolonged prosthesis wear was because of cytological changes caused due to decreased goblet cell density and increased nucleus – to – cytoplasm ratio, which results in decreased

mucus production in anopthalmic patients wearing eye prosthesis.

Some researchers developed artificial prosthesis to fulfill some of the problems faced with a conventional prosthesis. Kelly KV[9] developed a self – lubricating ocular prosthesis to solve the problems caused due to dry socket, which he called as speech-language pathology. Kavlekar AA et al.,[4] fabricated a hollow ocular prosthesis with a functional lubricant reservoir as a solution for discomforts caused by dry eyes.

In the present article, a novel technique has been described to fabricate a hollow ocular prosthesis with a lubricant reservoir using the 'Lost salt technique' to solve the problems caused due to inadequate lubrication of the prosthetic eye. The lost salt technique was recommended by Aggarwal H et al.[10] Many pieces of literature have mentioned regarding techniques in which Styrofoam and lost salt technique are used to decrease the weight of the ocular prosthesis. But this may not be used when there are shallow sockets.[1]
[1,12]

In this case report, eye prosthesis was fabricated hollow using a lost salt technique, and a reservoir was inbuilt for carrying the lubricant. The lubricant was released from the reservoir through a 0.5mm exit hole created in the anterior and superior aspect of the prosthesis, which leads into the reservoir. On the blinking of the eyes, negative pressure was created, which causes the release of the fluid into the ophthalmic cavity, which gives a life-like appearance to the prosthesis. The patient was instructed on the loading of the reservoir via the removable cap, and he was also instructed regarding the care and maintenance of the prosthesis. Iris positioning is one of the toughest steps in the fabrication of an ocular prosthesis. Roberts AC[13] suggested the use of a pupillometer for the accurate positioning of the iris, while Kumar P et al[12] aligned the iris disk on the cast itself using the previously transferred papillary mark. In the present technique, the transparent grid was used to position the iris.[14] A rubber cap from a syringe was used to cover the reservoir. As the eye socket is very sensitive, there are more chances of infection and inflammation, and thus the patient was always advised to keep the socket and the prosthesis clean and to report in case of any discomfort. Regular follow-ups were conducted.

CONCLUSION

Eyes being the vital and most noticed feature of the face plays an important role in one's life, and thus loss of an eye not only makes a person physically handicapped but also psychologically. The use of a customized prosthesis is superior aesthetically and functionally over a stock prosthesis. A hollow ocular prosthesis with a lubricant reservoir is described here, which has acceptable fit, esthetics, and retention and which also eliminates the problems caused due to dry eyes. Rehabilitation of an extraoral prosthesis is also as important as an intraoral prosthesis for a prosthodontist, and it is an art and science.

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