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Case Report

Ocular Prosthesis: Giving Life-Like Appearance - A Case Report

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Abstract

Because the eye is a vital organ for vision, its loss impairs vision and results in a visible change in the face. An eye can be lost due to trauma, congenital defects, or any pathology. Early rehabilitation of the amputated eye is recommended. A maxillofacial prosthesis that artificially replaces a missing eye and restores facial appearance is known as an ocular prosthesis. In this case report, we created a customized ocular prosthesis for the patient, which he accepted and gave him a life-like appearance.

Key words: Customized ocular prosthesis, Iris positioning, Polyvinyl siloxane, Stock eye

INTRODUCTION

The Eye is an important part of the face to provide vision as it is a vital organ for vision, the unfortunate loss of the eye not only affects vision but also gives a notifiable change in the face. Loss of the eye may be due to trauma, congenital defects, or any pathology. Early rehabilitation of the lost eye is recommended.

An ocular prosthesis is a maxillofacial prosthesis that artificially replaces a missing eye and restores the facial appearance. Prosthetic eyes have been used since at least 2,900 BC. Clay was first used for the fabrication of prosthetic eyes, followed by wood and ivory, silver and gold that had been enameled, glass, and, finally, plastic made of polymethyl methacrylate (PMMA). The transition from glass to PMMA was completed at the same time as a change in the industry that provided and fitted prosthetic eyes. It was possible to create custom PMMA eyes, but doing so required a different set of abilities than what optometrists had been successfully using with glass for the previous 500 years. The change from glass to PMMA eyes 70 years ago caused significant technological and professional disruption, which may account for the nearly complete absence of prosthetic eye literature today.[1]

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CASE DESCRIPTION

A 68-years-old male patient reported to the Department of Prosthodontics Crown and Bridge and implantology with the chief complaint of replacing the old left ocular prosthesis. The patient met with an accident 45 years back following which an enucleation surgery was performed with respect to the left eye. He had got his first artificial eye 40 years back which was a stock eye. Since then he had changed the prosthesis twice and the one he was wearing recently was a stock eye that he was using for 10 years. On general examination, the individual was found to be calm, conscious, and alert. He was well-oriented to time, place, and person. His build was moderate and his vitals were within normal range. On local examination (left eye) it was found that he had a defect with a shrunken orbit and intact tissue bed [Figure 1]. His upper eyelid was also shrunken due to scar tissue. On examining the stock eye, it was seen that the superior border was sharp medially and impinging

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onto the patient's soft tissues. The shade of the iris and scleral part of the stock eye was also not in coordination with the patient's natural contralateral eye.

Case History, Consent, and General Examination

A detailed case history was recorded proper clinical examination was done. The patient was informed about the treatment procedure, time, and cost. A consent was taken from the patient before the start of the treatment.

Impressions

A pre-fabricated tray with a stem was made using auto polymerizing PMMA (DPI, India) [Figure 2], which was then adjusted to fit the patient's eye socket and relief holes were made using fine dental bur. The pre-customized tray with stem was placed onto the patient's left eye socket, and light body polyvinyl siloxane impression material (Manufacturer: FLEXCEED, GC India dental Pvt. Ltd.) was injected from the syringe into the patient's socket. The patient was instructed to perform movements such as looking up, down, right, and left in order to record the entire borders of the socket. After ensuring that the impression material was set, the impression was carefully removed from the socket [Figure 3].

Fabrication of Cast

Beading and boxing of the made impression was done which was then poured with type III gypsum product (Kalabhai) until the impression surface was reached. The cast was obtained using a two-pour technique [Figure 4].

Fabrication of Wax Pattern

A layer of petroleum jelly (Vaseline) was applied over the obtained cast. A layer of molten wax was poured into both the pieces of the stone cast which was then joined together to obtain a wax pattern. The wax pattern was removed from the mold after the wax had cooled.

Selection of Custom Made Iris

To mimic the iris of the patient's contralateral eye, several stock eyes were used. The clinician matched them with the natural eye and the one resembling most with the contralateral eye was selected.

Fabrication of Iris Button

To mark the location and position of the iris, measurements were taken using a transparent graph. Vertical lines were drawn to correspond with the medial, middle, and lateral extremities of the patient's contralateral iris, and a

Figure 1: Pre-operative

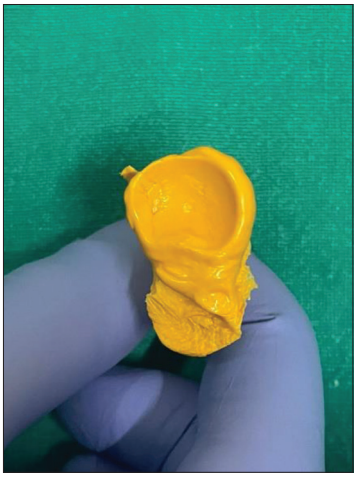

Figure 3: Impression of the ocular tissue bed

Figure 2: Custom ocular tray

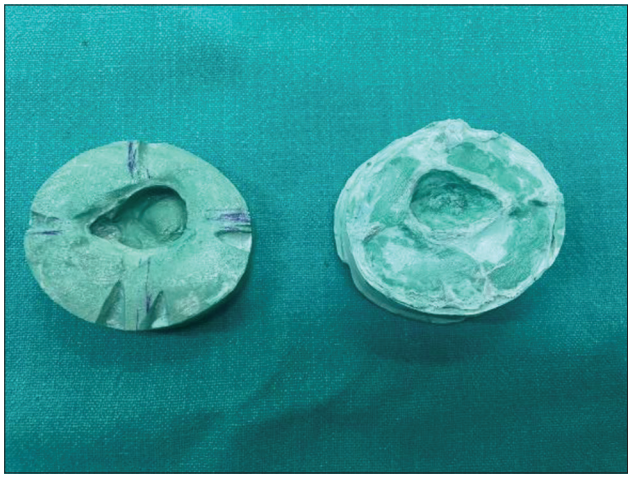

Figure 4: Cast obtained using two pour technique

horizontal line was drawn to correspond with the Centre of the iris [Figure 5]. These lines were then transferred to the wax pattern and marked using a metallic scale. The selected stock eye is then trimmed for the iris based on the dimension of the transferred wax pattern. This button was then placed on the wax pattern according to the measured measurements.

Wax Trial

A try-in was performed to ensure proper fit, contour, and bulk correlating with the patient's contralateral eye. A second opinion was also taken from the patient as well his son [Figure 6].

Fabrication of Scleral Shell

Flasking

Following the wax pattern trial, the final cast was trimmed to fit the flask. The wax pattern was seated on the cast and sealed. To prevent iris displacement during dewaxing, a handle made of auto-polymerizing clear acrylic was attached to the iris. This assembly was then flasked in a brass flask.

Figure 5: Measurements recorded of the patient's contralateral eye

Figure 6: Wax trial

Dewaxing

The dewaxing was then performed after the final set, ensuring that entire wax was removed from the mold space.

Packing and flasking

This is the most important step, as it involves characterising the prosthesis before packing it with tooth-colored heat-cured polymethylmethacrylate of appropriate shade, matching the patient's sclera of normal eye. In and around the iris, a thin layer of heat-cured clear acrylic was applied evenly. The characterization is carried out in order to achieve the vitality required to give it a lifelike appearance while also blending in with the patient's natural appearance and cosmetics. After thorough shade matching, the mold was packed with heat-cure tooth colored acrylic resin of the selected shade (equal ratio of A and B) and left for bench curing to ensure complete polymerization. The said assembly was subjected to a long curing cycle of 4–6 h to avoid the presence of any residual monomer in the prosthesis, which is critical as it prevents the patient from rejecting the prosthesis due to irritation or sensitivity with regard to monomer.

Final finishing and polishing and characterization of final prosthesis

To provide maximum adaptation and overall success of the prosthesis, the finished prosthesis requires a highly polished surface with a glass-like finish. The eye socket is extremely sensitive, and any surface roughness or irregularity may cause the residual conjuctiva and related structures to react and reject the prosthesis. The ocular button stalk, flash, and irregularities were trimmed off from the surface. The prosthesis was finished and polished with pumice powder. Acrylic paints and thin camel paint brushes were used for the characterization of the scleral vessels. Epoxy resin was used to keep the paint in place.

Insertion of final prosthesis

The final prosthesis was inserted into the patients socket and checked for proper adaptation and contour [Figure 7]. The same was again compared with the contralateral eye

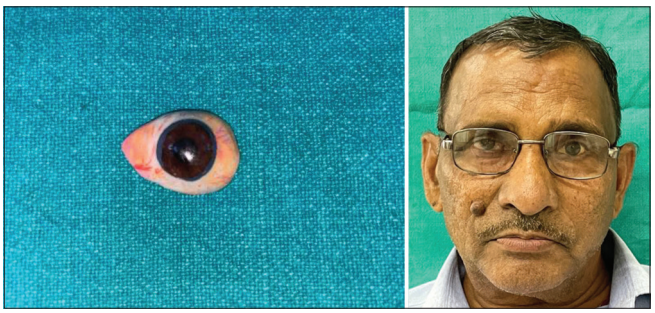

Figure 7: Final prosthesis

to invoke life-like appearance. Again, the opinion of the patient was taken into consideration.

The patient was given instructions which included instructions about wearing the prosthesis and its home care protocol which is given below:

1. Handling of the prosthesis should be done with caution and with clean hands. It is best to remove your acrylic prosthesis at night
2. To kill the surface bacteria, soak it in an antibacterial solution
3. Patient is asked to wash the prosthesis before wearing it.

The patient was recalled after a week. After this, he was asked to do a follow-up in every 6 months' time.

DISCUSSION

When the patient performs various movements, a well-made and properly planned ocular prosthesis maintains its orientation. With the introduction of newer materials, the socket can be finely recorded on which a custom built ocular acrylic prosthesis with exact fit and aesthetics can be fabricated.[2] Although prosthetic rehabilitation may be enhanced with the use of implants, can coordinate the movements with natural eye, as they are not always possible or feasible. The use of stock ocular prosthesis of appropriate size and color cannot be overlooked; however, a custom made ocular prosthesis provides better functional and aesthetically results.[3]

Ocular prostheses are available as ready-made or custom-made items made of glass or methyl methacrylate resin. Glass is not the preferred material since it is prone to damage and surface degeneration when in contact with orbital fluids, resulting in a useable life expectancy of only 18–24 months.[4] In terms of tissue compatibility, aesthetic compatibility, color durability and permanence, methyl methacrylate resin outperforms other ocular prosthetic materials.[5] Nowadays, using silicon instead of acrylic resin has advantages such as shorter treatment times, lighter prosthesis, and enhanced simplicity, making this technology an option for producing ocular prosthesis.[6]

CONCLUSION

Although the patient cannot see with the ocular prosthesis, it has restored his self-esteem and allowed him to face the world confidently. The usage of ocular prosthesis has significantly enhanced the patient's social life as well as his or her confidence.

Patients who cannot afford implant replacements have benefited from the use of custom-made ocular prostheses. Furthermore, as previously stated, the aesthetic and functional outcome of the prosthesis was significantly superior to that of the stock ocular prosthesis.[5]

CLINICAL SIGNIFICANCE

Stock eyes are readymade and are available in the market in a variety of corneal and scleral colors. Custom-made prostheses are made of high-density medical-grade PMMA that is both compatible with and resistant to breakage. Due to their lack of individual characteristics, "ready-made" prosthetic eyes are not recommended for any patient. Stock artificial eyes, unlike custom-made ocular prostheses, do not take into account the comfort, mobility, and cosmetic details that are unique to each individual. Aside from being uncomfortable to wear, they can reduce self-esteem because they appear "fake" or are unable to achieve good symmetry with the other eye. An ill-fitting eye can cause mucus/tearing issues and even damage to the socket tissue.

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