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Customized Ocular Prosthesis

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Abstract
Loss of an eye due to trauma, congenital anomalies, or malignancy results in marked esthetic, functional, and psychological impairment, necessitating timely prosthetic rehabilitation. Although prefabricated ocular prostheses are readily available, they often exhibit poor fit, limited motility, compromised esthetics, and inadequate comfort. In contrast, customized ocular prostheses provide superior adaptation to the anophthalmic socket, improved retention, better coordination with the contralateral eye, and enhanced esthetic outcomes, thereby significantly improving patient satisfaction and psychological well-being. This case report describes the rehabilitation of a 13- year-old female patient with a missing right eye following enucleation due to retinoblastoma seven years earlier. A customized ocular prosthesis was fabricated using a precise socket impression, wax pattern trial, accurate iris positioning, and detailed scleral characterization, followed by processing in heat-cured acrylic resin. The final prosthesis demonstrated satisfactory fit, comfort, and esthetics. This report highlights that customized ocular prosthesis is an effective, economical, and reliable treatment option, especially in pediatric patients, offering clear advantages over prefabricated prostheses in restoring facial symmetry, confidence, and quality of life.
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I. Introduction

The human eye is a highly specialized sensory organ that plays a vital role not only in vision but also in facial harmony and personal identity. Loss of an eye due to trauma, disease, congenital anomalies, or surgical intervention results in significant functional, psychological, and social challenges for affected individuals. In addition to visual impairment, the absence of an eye can lead to facial disfigurement, emotional distress, reduced self-confidence, and social withdrawal.

Although advances in medical science have improved surgical techniques and implant materials, restoration of vision following eye loss is not always possible. In such situations, ocular prosthetic rehabilitation offers an effective alternative by restoring facial aesthetics and improving the patient's quality of life. An ocular prosthesis is a maxillofacial prosthetic device designed to replace a missing natural eye following procedures such as enucleation, evisceration, or orbital exenteration.

Ocular prostheses may be stock or custom-made, with customized prostheses providing superior adaptation, comfort, and esthetics. These prostheses are commonly fabricated from biocompatible materials such as medical-grade acrylic resin or silicone elastomers. Properly designed ocular prostheses help maintain the contour of the eyelids, prevent socket contraction, and provide a natural appearance, thereby enhancing psychological well-being and social acceptance.

This article highlights the role of ocular prosthetic rehabilitation in restoring facial esthetics and emphasizes its significance as an integral component of maxillofacial prosthodontic care.

II. Case Report

A 13-year-old female patient reported to the Department of Prosthodontics, Crown and Bridge, Career Institute of Dental Sciences and Hospital, for prosthetic rehabilitation of her missing right eye. Her medical

history revealed that she had been diagnosed with retinoblastoma seven years earlier, following which the right eye was surgically removed.

Figure 1. Pre Operative

For further evaluation, the patient was referred to Career Medical College, where appropriate investigations were carried out to rule out recurrence of retinoblastoma. Clinical examination revealed signs of inflammation and redness in the anophthalmic socket. The patient had been previously wearing an ocular prosthesis but had discontinued its use due to irritation and discomfort. Lubricating eye drops were prescribed, and the patient was recalled after resolution of inflammation.

After seven days, the patient was re-evaluated. Following thorough clinical examination, all available treatment options were discussed with the patient and her guardian. Based on the patient's consent and esthetic expectations, a decision was made to fabricate a customized acrylic ocular prosthesis to closely match the natural appearance of the contralateral (left) eye.

For the primary impression, an alginate impression of the patient's previously used ocular prosthesis was made and poured using Type III dental stone. An ocular tray with multiple perforations was then fabricated and attached to the tip of a syringe.

Figure 2: Primary Impression

Figure 3: Ocular Tray

Light-body elastomeric impression material was loaded into the syringe and gently injected into the defect site. The patient was instructed to perform various eye movements to ensure accurate recording of the socket anatomy. After complete setting of the impression material, the impression was carefully removed and inspected for surface accuracy and absence of voids.

Figure 4: Impression made

The finalized impression was invested and poured in Type IV dental stone to obtain the master cast. Molten modeling wax was then poured into the lubricated master cast to fabricate a wax conformer. After finishing and contouring, the wax conformer was tried in the patient's socket, and its retention, comfort, and

stability were evaluated by asking the patient to perform different ocular movements.

Figure 5: Wax Pattern

Figure 6: Wax Pattern Trial

For orientation of iris , six lines were marked on the face .The contralateral natural eye's iris was gauged at a certain distance using a divider and using the same measurement the centre was marked on the wax and the stock iris was placed over that center point. Once the position of iris was confirmed than the wax pattern along with the iris was ready for acrylization.

Figure 7: Orientation of Iris

The wax pattern along with the prefabricated iris was subjected to dewaxing using the wax elimination technique to obtain the mold. A tooth-colored heat- cure acrylic resin was used for fabricating the scleral portion. The acrylic fibres of heat-cure polymer were used to mimic blood capillaries. The stock iris was processed simultaneously using the conventional acrylization procedure. After completion of polymerization, the customized ocular prosthesis was retrieved and finished. A clinical try-in was performed, during which the patient was asked to carry out various ocular movements to evaluate the adaptation, stability, and retention of the prosthesis.

The fabricated ocular prosthesis was carefully finished and polished using burs, pumice, and buffing agents, ensuring preservation of its convexity and anatomical contours to obtain a smooth, glossy surface. After thorough cleaning and application of an ocular lubricant, the prosthesis was gently inserted into the

anophthalmic socket.

Figure 8: Final prosthesis

The patient was educated on the proper insertion and removal of the prosthesis and was provided with simple, easy-to-follow instructions regarding its care and maintenance. The importance of regular follow-up visits and periodic repolishing was emphasized. After reinforcing all postoperative care instructions, the customized ocular prosthesis was delivered to the patient.

III. Discussion

Loss of an eye in childhood leads to significant esthetic and psychological challenges, making early ocular prosthetic rehabilitation essential.

Prefabricated ocular prostheses, although easily available, often show poor adaptation, limited motility, and discomfort, which can result in irritation and reduced patient acceptance.

Customized ocular prostheses provide superior fit, retention, comfort, and esthetics by accurately recording the anophthalmic socket anatomy. Precise iris positioning and use of heat-cured acrylic resin help achieve a natural appearance, durability, and biocompatibility. Improved coordination with socket movements further enhances esthetic outcomes.

Thus, customized ocular prosthetic rehabilitation offers a simple, economical, and effective solution, particularly in pediatric patients, by improving comfort, confidence, and overall quality of life.

IV. Conclusion

Customized ocular prosthetic rehabilitation is an effective and economical treatment option for patients with anophthalmic sockets, especially in pediatric cases. By providing better adaptation, comfort, retention, and esthetics than prefabricated prostheses, customized ocular prostheses help restore facial symmetry and improve patient confidence. Careful clinical and laboratory procedures, along with regular follow-up, are essential to ensure long-term success and enhanced quality of life.

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