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CASE REPORT

Custom prosthetic rehabilitation of ocular defect in elderly

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ABSTRACT

Eye loss may cause deformities on patient's face that furthermore affect their psychosocial state. Ocular prosthesis is found to be effective to rehabilitate patients with eye loss due to trauma, congenital eye defect, tumor, or surgery. Elderly patients have special needs and limitations, such as communication, financial status, and access to healthcare providers. Through this case report, we present a successful fabrication of custom-made ocular prosthesis for elderly patient following right oculi enucleation. A 71-year-old male patient came with chief complaint of losing his old ocular prosthesis and wanted a new one. Initial impression was made with irreversible hydrocolloid. Final impression of patient's eye socket was made using individual custom tray and light body addition silicone impression material. A wax model was made and tried on patient, then processed with white acrylic resin to match patient's contralateral sclera color. Iris and pupil positioning were done, and ocular prosthesis was drawn to match patient's contralateral eye. The patient was satisfied with his new custom-made ocular prosthesis because of better fitting, comfort, and aesthetics compared to his old fabricated ocular prosthesis. Ocular prosthetic rehabilitation in elderly is associated with improvement of psychosocial status which leads to better quality of life. (IJP 2025;6(1):40-43)

Introduction

One of the most noticeable features of someone's face is their eyes which-play an important role in facial expression. Several unfortunate events such as trauma, congenital eye defects, or tumors may need surgical interventions that lead to loss of eye.[1] This condition is then followed by loss of vision and change of facial features which can lead to affect the patient's psychological and social state.[2]

Ocular prostheses have been used for a long time in the field of maxillofacial prosthetics as a way to rehabilitate patients who suffer from eye loss. The term of ocular prosthesis is described in the Glossary of Prosthodontic Terms as a maxillofacial prosthesis that artificially replaces a missing eye as a result of trauma, surgery, or congenital defect but the prosthesis does not replace missing eyelids or adjacent skin, mucosa, or muscle.[3] An ocular defect can be treated by prefabricated or custom-made ocular prosthesis. Custom-made ocular prosthesis usually provides better fitting and look like the patient's natural eyes hence helping them to feel more comfortable in wearing their prosthesis.[4]

The older population is now prevalent among patients in clinical settings, largely due to longer life expectancies. Many of today's elderly patients have socially active lives, seek information about their health, and remain engaged in society, leading to higher expectations for medical care. On the other side, elderly patients also have several limitations such as financial constraints, diminished cognitive and physical abilities, difficulty in communication, and some have suffered from low motivation. Treating elderly patients may have its challenges as many needs special care and treatment modification.[5]

An ocular prosthesis may enhance the physical appearance of patients who suffer from vision loss due to injury or illness that leads to eyeball loss. One of the primary goals in restoring anophthalmic socket with an ocular prosthesis is to enhance the patient's ability to manage the challenging rehabilitation of the eye loss and increase their quality of life.

Case Report

A 71-year-old male patient came to RSU Islam Klaten and reported to the Department of Prosthodontics, Faculty of Dentistry, Universitas Gadjah Mada with a defect in his right eye. A subjective and objective examination was done on this patient. The history of the patient revealed that this patient had undergone surgery to remove his right eye due to an infection that was caused by a chemical burn of fertilizer. Enucleation of the right bulbous right oculi causes an ocular defect that affects this patient's facial appearance. After the surgery, the ophthalmologist put a stock ocular prosthesis without telling the patient or his family. Three months after the surgery, the said stock ocular prosthesis was lost while this patient worked and hadn't worn any ocular prosthesis until his visit to RSU Islam Klaten. This patient felt embarrassed to go outside because he felt handicapped and wanted to make a new ocular prosthesis with a better fit and resembled his natural eye. An extraoral examination of the patient showed an ocular defect with a deep socket on the patient's right side figure

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Figure 1. A. Extraoral photograph, B. Inside socket

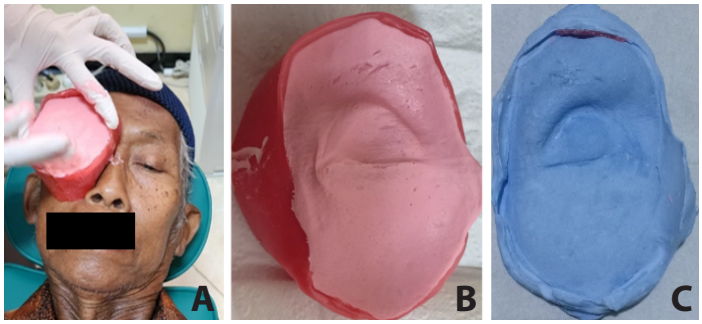

Figure 2. A. Initial impression making, B. Initial impression, C. Study model

Figure 3. A. Custom tray, B. Custom tray try-in, C. Final impression making

Figure 4. A. Scleral wax pattern try-in, B. Scleral color selection

1. The right eye socket has healed completely and retains muscle activity of surrounding muscles but often eye discharge was found on the anophthalmic socket. The treatment plan for this case is to fabricate a custom-made ocular prosthesis.

Several areas of impressions such as eyebrows, eyelashes, and the lining of the anophthalmic socket were lubricated using a separating medium (petroleum jelly). A custom tray was made using modeling wax and irreversible hydrocolloid was used as impression material for the initial impression figure 2.

The custom tray was created by shaping self-cure resin around the wax pattern obtained from the initial impression figure 3A. A custom tray was tried and adjusted before doing the impression and petroleum jelly was applied to the patient's eyelashes before the impression figure 3B. The 'final impression of the anophthalmic socket was made using the addition silicone impression material with light body consistency figure 3C. The patient was instructed to see straight ahead, perform all movements of the eyeball, and also blink his eyes when the impression was taken. The final impression was taken out from the patient socket using the handle of the custom tray when it was completely set.

The negative impression is filled in two parts. The first part of the mold is filled with a mixture of hard plaster until the widest part of the socket base, excess hard plaster is then smoothed out. Before the setting time ends, two or three grooves were made on the surface of the hard plaster which will later serve as keys. The hard plaster is then coated with petroleum jelly, and the second part of the mold is filled with a mixture of hard plaster. After the working model hardens, the impression material and impression tray are removed from the working model. The working model can be separated into two parts.

The scleral model was fabricated with modeling wax based on the working model impression. Try-in of the scleral model. The patient was instructed to sit upright and relax then the scleral model was inserted into the socket figure 4A. The scleral model should feel comfortable during eye movement and not irritate the underlying tissue. Determination of scleral color was done using photography with the assistance of a shade guide figure 4B. The results of the scleral model and color determination photograph are sent to the laboratory for the fabrication of the acrylic sclera.

The acrylic sclera was inserted into the patient's eye socket and then adjusted until natural eye contour was achieved and there was no discomfort when the patient performed all eye movements. Fitting and retention were also observed during this visit. The center of pupil and the diameter of iris were identified and marked on the blank acrylic sclera with the help of vernier caliper figure 5. A photograph of the patient's contralateral eye was taken to give guidance to the laboratory in drawing a natural iris on the prosthesis.

The prosthesis was inserted and assessed for any discomfort during eye closure or opening figure 6. The patient received instructions on how to remove and reinsert the prosthesis. Follow-up appointments were scheduled at 1 week, 1 month, and every 6 months to polish the prosthesis. The results of the post-operative assessments demonstrated a successful, efficient, and aesthetically

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pleasing rehabilitation of the ocular defect, resulting in a nearly normal appearance for the patient.

Extra care was given to this patient due to his age and psycho-social condition. Instruction was given in detail to patient and his family such as ways to care for and clean the prosthesis, when and how to wear it, and also how to manage his eye discharge that started after he was wearing his old prefabricated prosthesis.

One week follow-up showed no irritation on the surrounding tissues, good retention, and the patient was satisfied with his new ocular prosthesis. The initial eye discharge also lessened but he sometimes felt dryness on his ocular prosthesis side. This was handled with an artificial tear that happened to be relieving the dry eye syndrome.

Discussion

Ocular absence can arise from congenital factors or result from surgical interventions, necessitated by various conditions such as irreparable trauma, tumor, blindness painful eyes, microphthalmos, endophthalmitis, and suprachoroidal hemorrhage. Prosthetic solutions offer corrective measures for such ocular defects, serving multiple functions including aesthetic restoration, prevention of eyelid deformation, protection of the anophthalmic cavity, guidance of lacrimal flow, and prevention of fluid accumulation within the cavity.[6] It also reinstates natural eye-opening, provides support to the eyelid, enables partial movement restoration, and presents an aesthetically pleasing appearance with satisfactory mobility.[7] Moreover, ocular prosthetic rehabilitation plays a significant role in psychosocial enhancement, as prosthesis can positively influence interpersonal relationships, consequently improving overall quality of life.[8,9]

Before initiating the prosthesis design process, it is crucial to evaluate the psychological aspect to establish rapport and gain the patient's confidence. Additionally, conducting a thorough medical history assessment is essential, including the underlying condition that necessitated the excision or enucleation. This comprehensive evaluation helps identify any potential risks of recurrence and ensures a holistic approach to the patient's care.[10]

The shifting demographics in industrialized nations necessitate dentists to accommodate the increasing and diverse population of elderly patients. The aging population poses a significant challenge for modern societies. To promote both healthier and longer human lives, it is recommended to prioritize the creation of age-friendly environments and enhance social and healthcare facilities. This entails developing tailored approaches for dental and medical care to the varying levels of fitness, frailty, and dependency among older individuals. Dental and medical care for the elderly should be personalized, considering their unique daily routines and needs.[10,11]

Ocular prosthesis is usually classified into two types. The first one is stock eye prosthesis, which are available in various sizes, and the second is custom prosthesis. Stock eye prosthesis offer convenience as they are readily available, but they may not adapt perfectly to the ocular tissue bed. This can lead to issues like hollow spaces between the

Figure 5. Iris positioning

Figure 6. Ocular prosthesis after insertion

prosthesis and the tissue bed, which can accumulate mucus and increase the risk of infection. Custom prosthesis, on the other hand, are designed to fit the patient's tissues closely, provide more comfort, exact fitting on orbital socket that can lead to natural motility, and can better replicate the natural position of the sclera and iris.[12,13] Creating a custom prosthesis requires the prosthodontist to have a thorough understanding of ocular anatomy. They must accurately record ocular impressions to determine the precise iris position and address cosmetic concerns such as ptosis and reduced palpebral fissure in the affected eye.[12]

Custom-made ocular prosthesis offers superior aesthetic results, enhancing the natural appearance and balance of the patient's facial features, because they involve fabricating and painting both the iris and sclera to match the patient's natural eye. Iris painting, a crucial step in the fabrication process, is complex and time-consuming. It demands artistic skills to ensure accurate replication of iris details.[14,15]

However, despite their benefits, custom prosthesis may be limited by factors such as age, systemic health conditions, and financial constraints, which can impact their availability and utilization. Some conditions such as aging may contribute to complicating the manufacturing of custom ocular prosthesis. Sagging lower eyelids are one example of this complication. The weight of the

prosthesis, combined with the upward force exerted by the upper eyelid, can contribute to the downward displacement of the lower eyelid, resulting in drooping.[16] Individuals wearing prosthetic eyes also frequently exhibit decreased tear production, leading to symptoms such as dryness, irritation, discomfort, and discharge associated with dry eye syndrome.[17]

Fabricating extraoral prostheses such as ocular prosthesis involves both artistry and scientific precision. Achieving seamless integration with surrounding natural tissues in terms of form, color, and texture is paramount.[18] Acrylic resin emerges as a favorable material for ocular prosthesis fabrication due to its durability, biocompatibility, ease of coloring, cost-effectiveness, easy maintenance, and reliable mechanical retention. Hence, it stands out as one of the preferred materials for crafting ocular prosthesis.[19]

An aesthetically acceptable ocular prosthesis accurately replicates the color, size, shape, and contour of the iris, enabling the patient to resume a normal lifestyle. The pivotal step in crafting custom-made ocular prosthesis is the positioning of the iris. Precise size, color, and location of the iris that match contralateral healthy eye leads to a successful ocular prosthesis.[20,21] While using a stock eye prosthesis may offer cost savings, it often lacks perfect adaptation to the eye's tissue bed, leading to discomfort and falling short of the patient's expectations. Enhanced aesthetics are achievable when the color and position of the iris match those of the unaffected eye, achievable through a fully customized ocular prosthesis. Prosthetic rehabilitation with a custom-made ocular prosthesis typically delivers superior aesthetic and psychological outcomes compared to stock eye prosthesis.[22]

Conclusion

Ocular prosthesis serves as a valuable solution for patients with eye defects, aiding in the restoration of aesthetics and improving overall appearance. Furthermore, it plays a significant role in psychological rehabilitation, particularly in cases where vision loss is irreversible. By providing a sense of normalcy and completeness, a prosthetic eye can positively impact the emotional well-being of individuals coping with permanent vision loss, especially in the elderly. Future studies could investigate the use of advanced biocompatible materials, such as silicone elastomers or 3D-printed polymers, in the fabrication of ocular prostheses. These materials may offer improved durability, comfort, and aesthetic outcomes compared to traditional acrylic resin. Incorporating digital technologies like CAD/CAM systems and 3D printing into the fabrication process could also streamline production, enhance precision, and reduce costs. Research into the feasibility and effectiveness of these technologies in ocular prosthetics could be valuable.

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