OCULAR PROSTHESIS

PERSPECTIVE REVIEW OF PROSTHODONTIC ASPECTS

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DEDICATION

To all of our students who challenge us daily and enrich our lives

Haslinda Z. Tamin

PREFACE
Haslinda Z. Tamin

Prosthodontics Specialist Program is one of the specialist programs in the field of dentistry. One of the skills for a prosthodontics specialist is to be able to perform patient rehabilitation following a maxillofacial surgery, specifically with an ocular prosthesis. As such, it becomes one of the minimal requirements for residents who attend the Prosthodontics Specialist Program.

As a lecturer in charge of the "Ocular Prosthesis" course at the Prosthodontics Specialist Program in the Faculty of Dentistry, Universitas Sumatera Utara (Program Pendidikan Dokter Gigi Spesialis Fakultas Kedokteran Gigi Universitas Sumatera Utara – PPDGS FKG USU), I was required to comprehend the meaning and application of the education philosophy from both a theoretical and practical perspective to explore the objectives, methods, and principles of prosthodontic education in general and particularly in Ocular Prosthesis. Those experiences build my intention to write a book on ocular prostheses based on the advancements in science and technology, as well as the clinical work done throughout the whole process of guiding residents in the Prosthodontics Specialist Program.

The Ocular Prosthesis Lecture at PPDGS FKG USU was held in Block 7 which is the Maxillofacial Rehabilitation Block. To maximize the residents' understanding in accordance with the principle of student-centered learning, during the face-to-face learning activities carried out, residents are required to discuss journals that include literature reviews and case reports based on the Evidence Based Practice (EBP) principle, specifically focusing on the best and latest practices that can be implemented in the Clinic of Prostodonsia Rumah Sakit Gigi dan Mulut USU (RSGM USU).

By participating in the journal reading discussions of ocular prostheses, residents are expected to develop better understandings and problem-solving skills that can be applied through Evidence Based Practice (EBP). This will hopefully help the residents solve ocular prosthesis cases at the clinic, in line with advancements in science and technology. Moreover, it enables them to swiftly generate innovations that cater to the specific conditions and requirements of patients. The opportunity to create case reports, which were presented at both national and international meetings and published in renowned international journals, was made possible by the implemented innovations.

Through the process of journal reading and the implementation of clinical strategies, various problems in the placement of ocular prosthesis patients can be identified, analyzed, and evaluated. It has been discovered that a crucial component for early diagnosis, the eyelid depth measuring device, is currently unavailable. Through the SWOT analysis that was conducted, a solution was obtained by creating an **Eyelid Depth**

Measuring Tool for Patients Without Eyeballs that has obtained a **Patent Certificate** from the Ministry of Law and Human Rights (**IDS000006452**) on August 22, 2023. It is expected that by utilizing the device, optimal aesthetic and functional outcomes will be attained in the field of ocular prosthesis care.

Hopefully this book will encourage motivation and innovation for prosthodontists, especially prostodonthics residents and junior staff at the Prostodonthics Department at FKG USU, as well as other universities and education centers.

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Haslinda Z. Tamin

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CONTENTS

EVIDENCE BASED PRACTISE

Haslinda Z Tamin

One of a prostodontist's areas of competence is creating ocular prosthesis. This is because a prosthodontist not only manages the edentulus through the manufacture of dentures but also treats maxillofacial rehabilitation patients, who also construct maxillofacial prosthesis such as feeding plates, eyes, ears, noses, and obturators. The procedure of manufacturing an ocular prosthesis is, in theory, identical to that of making a denture.

Loss of eye in a person can be due to congenital, trauma, or pathological causes. Treatments that can be performed for eye surgery include evisceration and enucleation. Evisceration is a surgical technique in which the sclera and connective tissue remain in the orbital cavity but the contents of the eyeball are removed. Insertion of an ocular prosthesis (stock ocular prosthesis) is the proper treatment for evisceration; however, in certain cases, it may be possible to insertion an ocular prosthesis (custom ocular prosthesis) with certain modifications. Enucleation is a surgical procedure that involves removing the entire eyeball by removing the tissue that binds it in the orbital cavity. The appropriate treatment for enucleation is the insertion of an ocular prosthesis.

The manufacture of artificial eyes or ocular prostheses has been known to humans since ancient times. The use of ocular prosthesis aids in the resolution of many psychosocial issues; nonetheless, there are a number of consequences and concerns linked with their use. An ocular prosthesis is a device inserted to replace a natural eye that has been injured or diseased. A prosthodontist attempts to provide emotional and mental support to other people who have lost their eyesight. Although current technology does not allow the eye to see, it can help patients with eyeball loss feel better about their emotional, psychological, physical, and social health.

Various types of ocular prostheses have been developed to meet the aesthetic and psychological needs of patients. A well-positioned ocular prosthetic will support the eyelid, allow for normal eye opening, regain some degree of movement, and have a lovely appearance. Ocular prosthesis is formed from polymethyl methacrylate resin or glass and can be obtained pre-made or customized. However, digital reproduction is now possible with sophisticated photographic methods. The maximum adaptation of specifically designed ocular prosthesis to eye tissue enables comfort while also restoring full physiological function to the eye organs.

OCULAR PROSTHESIS HISTORY

Period 2613 – 2494 BC

According to popular mythology, the Egyptians invented ocular prosthesis during the "Golden Age of the Old Kingdom of Egypt Dynasty IV." Ancient civilizations such as the Babylonians and Samaritans

most likely also used the art of ocular prosthesis in statues and the practice of mummification using gemstones, silver, or metals.

Period 2900 – 2800 BC

The world's oldest ocular prosthesis was discovered in Iran's Burn City in 2006. Archaeologists determined that this eye comes from around 2900–2800 BC and was discovered still imbedded in the skull eye socket of a lady aged 28–32. It's a semi-spherical eye with a diameter of more than 2.5 cm, made from a light substance/ lightweight material. This ocular prosthesis is considered to be the first eye prosthesis in medical history. Initially, it appeared that eye design was related to aesthetic factors.

Ocular Prosthesis: The future Of Looking Back

The Dawn of Modern Prostheses (1561)

Ambrose Pare, a French dentist, is considered a pioneer of modern ocular prosthesis. Due to the rarity of enucleation before the mid-1800s, the hypoblephara eye was created specifically to be used on atrophic eyes. He used glass and porcelain to make ocular prosthesis.

The 19th century

A German craftsman (later known as the Ocularis) began traveling around the United States and other parts of the world, spending days in one location after another making eyes and fitting them into patients. Making plastic ocular prostheses is a technique that was developed by the U.S. military along with some private practitioners. In the US, plastic has ~~taken over~~ emerged as the material of choice for eye imitations since World War II.

Period 1849

In the early 19th century, France became the center of manufacturing ocular prostheses. The term ocularist first appeared in 1849, thanks to Boissonneau. In 1851, Peter Gouglemann, a student of Boisonneau, established a studio dedicated to ocular prosthesis in New York. During World War II, shortage of glass led to the use of acrylic, which is commonly used in dentistry, and methyl methacrylate.

The 20th century

The American Society of Ocularists was formed in 1957; the perfection of eye implants and surgical procedures have improved the final results that can be achieved by ophthalmologists. A lot of breakthroughs and improvements have been made in the last five decades, both in terms of material and technical aspects. Today's eye medicine has evolved through the discoveries and techniques of many people. Eye defects can be congenital or acquired as a result of removal surgery, which can be indicated in some cases, such as trauma, cancer, microftalmitis, endoftalmosis, and supracoroid bleeding. Eye defects can be corrected with ocular prostheses that have many functions, such as restoring

aesthetics, preventing the formation of eyelids, protecting the anophthalmic cavity, orienting the lacrimal flow, and avoiding accumulation in these cavities. Furthermore, ocular prosthetic rehabilitation is associated with psychosocial improvement after eye prosthetics are able to enhance interpersonal relationships positively, leading to a positive impact on quality of life.

The 21st century: The Next Generation of Ocular Prosthesis

Most of the ocular prostheses that are currently made are half-shell-shaped and are placed on top of an ocular muscle implant. In the late 1940s and early 1950s, many types of implants were developed. Although these implants show excellent mobility, most will cause necrosis, infection, or exposure, which in the end will lead to their removal. The first materials used to make these implants were glass, plastic, cartilage, and silicone. The material is biocompatible, non-toxic, and contains 500μm-diameter pores. This structure allows the tissue to grow inside the implant, which will substantially reduce the likelihood of migration. Nowadays, ball-shaped and porous implants are becoming increasingly popular. Several techniques have been used in the manufacture and insertion of ocular prosthesis, such as the insertion of stock eyes, modifying stock eyes by creating eye defect impressions, and custom eye techniques. Custom eye prostheses provide a more aesthetic fusion and an accurate match between the sclera and the conjunctive eye iris. Although the custom ocular prosthetic procedure is a time-consuming trial and error approach, its aesthetic and functional results justify such an extra effort. Various techniques such as grids that stick to glasses, grid graphs, pupilometers; and Benson's visual evaluation have been used in the past for pupil alignment. However, these techniques are difficult to stabilize well and are subjective. Specially made eye prostheses are made using digital images using digital liquidity ratio cameras and iris position determination is done using pupil alignment techniques to enhance the natural aesthetics and accuracy of the ocular prosthesis. Although the custom eye prosthetic method is a time-consuming trial-and-error process, the visual and functional benefits warrant the extra effort. Various methods for pupil alignment have previously been employed, including grids that stick to glasses, grid graphs, pupilometers, and Benson's visual evaluation. However, these procedures are difficult to stabilize and subjective. To improve the natural aesthetics and precision of the eye prostheses, digital images are used from digital liquidity ratio cameras, and the iris position is determined utilizing pupil alignment procedures.

Period of Digital Ocular Prosthetics

Nowadays, ocular prostheses appear to be extremely lifelike. A healthy eye moves naturally, whereas a prosthetic eye does not or has restricted movements,

which results in an asymmetry that causes many wearers to feel uncomfortable. The digital ocular prosthesis enhances facial appearance and functions as a sensory organ of vision. The acrylic plastic prosthesis was digitally improved to match the patient's natural residual eyes in terms of size and colour. Some circumstances, such as congenital deformities, irreversible injuries, or tumors, necessitate a surgical operation and result in the loss or absence of unfavourable eyes. For precise and successful ocular rehabilitation, a multidisciplinary team's management approach and methodology are essential. The eye is a vital organ that not only functions to see but also as an important element in facial expression. Eye loss has a tremendous impact on one's self-esteem as well as social and professional interactions. Cosmetic rehabilitation with well-constructed ocular prostheses enhances the individual's social and professional qualities.

EVIDENCE BASED PRACTISE (EBP)

EBP is about making the right clinical decision to provide the best treatment to the patient. In practice, the choice to use certain modalities of treatment is based on a variety of factors, including education, clinical experience, colleague recommendations, research findings, and advice from patients. Although there are many sources of evidence available, the EBP process is quickly becoming the standard for practitioners to use to make appropriate clinical decisions. EBP is a scientific method of collecting systematic research findings as evidence needed to choose the best treatment. The American Dental Association (ADA) defines EBP as an approach to health care that requires a wise integration of systematic assessments and clinically relevant scientific evidence related to the patient's medical condition and history with the prostodontist's clinical expertise and patient care needs and preferences. The EBP encourages the collection and interpretation of evidence derived from research to determine or reject a visit option. The EBP process also embraces and encourages lifelong learning.

EBP Process

Scientific evidence is constantly evolving, and the information is easily accessible. The problem with having direct access to a lot of available data is managing that volume of data. Even as new information adds or replaces existing data, some traditional sources become unusable anymore. It becomes a challenge for practitioners to keep up with the latest scientific developments and applications that allow for better treatment. It's important because properly applied knowledge can directly improve the quality of patient care. EBP was developed to help clinicians evaluate, qualify, and recognize the most useful evidence to apply to a particular situation. EBP has a five-step process called FIVE A:

1. ASK : ask clinical questions that can be answered
2. ACQUIRE : obtain best evidence

3. APPRAISE : assess the strength and relevance of information
4. APPLY : implement suitable action
5. ASSESS : evaluation of results

This structured approach allows practitioners to be effective consumers of high-quality, relevant, and reliable information with the aim of improving the quality of care.

1. Ask

To find the best answers, it takes the most appropriate questions. Good clinical research uses the most appropriate words to formulate answers to questions related to treatment. There are several methods available that can help practitioners ask the "right" questions. One of the formats used to generate searchable questions is *PICO*, and its acronym component is::

P : population, patient, or problem

I : intervention

C : comparison

O : outcome

The PICO format helps identify the search. Start by combining the most significant patient problem (P in PICO) with intervention therapy (I in Pico). If there are too many results from such searches or there is no answer, then add the intervention comparison (C in PCO) to the search. It is understandable that there are some questions that may not have comparisons. The use of the PICO format forces a curious clinic to clarify the question component with the aim of paving the way for finding meaningful answers and determining the desired results. (O dalam PICO). To illustrate this process using EBP, PICO was developed for clinical questions.

As an illustration: Ocular Prosthesis Impression Technique

A clinician is trying to determine the best ocular impression technique to be used to make an ocular prosthesis for a shallow socket condition.

PICO components are as follows:
P: eye post enucleation with a shallow socket condition
I: modification of impression techniques
C: impression technique
O: ocular prosthesis retention

From the PICO, a question can be sought: What is the best modification of the impression technique to be done for the manufacture of an ocular prosthesis in a shallow socket condition?

2. Acquire

To answer the best ocular impression technique on shallow socket conditions, the next step is to obtain information. Potential sources of information are original research studies, systematic reviews, evidence base journals and more. Successful use of ABP tools and resources can make searches more efficient and less time-consuming. One approach is to narrow the scope of the questions given and categorize according to the research design choices. (Figure 1) The research design refers to randomized control trials, cohort studies, case control studies, cases series and expert opinions.

Figure 1. Evidence Structure for a Clinical Question Related to Therapy

Evidence base clinical guidance and recommendations are at the top. According to the ADA "clinical recommendations are useful tools that can be utilized by practitioners in clinical assessment, patient preferences to make treatment decisions".

3. Appraise

Finding relevant information is not the end of the process; it's just a step towards using that information to address clinical problems. The information collected must be evaluated objectively to determine the validity and reliability of the data. This determination cannot be made simply by reading the abstract of a journal article. Critical assessment is the process of evaluating the three main aspects of a study objectively: - Is the test valid? - What is the result? - Does the result relate to the problem? Evidence is also assessed based on quality, quantity, consistency, and relevance.

4. Apply

After collecting the best available evidence, the clinician must decide whether to apply the evidence to a particular patient or not, based on the circumstances. The process of collecting and enhancing relevant and reliable evidence enables us to make quality decisions to support treatment.

5. Assess

Understanding the impact of applied evidence is critical in the evaluation process. The clinician should compare changes based on the reprediction results to measure the recommended treatment. For questions about modifications. For questions about the modification of the impression technique to be performed, the result will relate to the retention of the ocular prosthesis to be carved (O in PICO). Finally, if the clinician follows the patient's treatment and determines through advanced examination where the impression modifications are advantageous, these assessment reports can contribute to the literature and so improve lifetime learning.

EBP guides the appropriate clinical decision to deliver the best treatment to the patient. An ocular prosthesis that is fitted to the patient's expectations and conditions gives optimum adaption, mobility, and comfort, all of which contribute to increasing the quality of life.

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CASE REPORT 1

CASE SERIES: FABRICATION OF MODIFIED CUSTOM OCULAR PROSTHESIS WITH NEW IRIS POSITIONING METHOD USING EYEBROW RULER FOR A POST ENUCLEATION GERIATRIC PATIENT

Wennie Fransisca, Haslinda Z Tamin, Ariyani, Putri Welda Utami Ritonga

ABSTRACT

Post-surgical conditions that cause eyeball loss will reduce the quality of life, especially in elderly patients. Making custom ocular prostheses in elderly patients will restore aesthetics and confidence so that they will restore quality of life, but in the manufacturing process a special approach is needed for the physical and psychological conditions of the elderly who have changed so that special techniques are needed in the approach and manufacture of eye prostheses to match the color, contour, the size and position of the patient's iris. This case report will discuss the proper custom ocular prosthesis manufacturing technique for 2 elderly patients using an eyebrow ruler to determine the iris position and modification of the coloring technique to match the patient's existing eyes. Female patients aged 52 years and 60 years came to the USU FKG prosthodontics clinicwant to make artificial eyes. The diagnosis of both patients was post-enucleation syndrome with blepharoptosis. Both patients were madecustom ocular prosthesesstarting from the process of anatomical printing, physiological printing, making of sclera wax, iris buttons, measurement of the iris position with the eyebrow ruler, white acrylic shaping, modification of iris coloring, clear acrylic shaping to the insertion of prostheses and controls. Custom ocular prostheses plays an important role in the rehabilitation and restoration of the quality of life of post-enucleation elderly patients. Determining the location of the iris is a challenge in itself because of the elderly who find it difficult to accept directions. The use of simple yet accurate tools such as an eyebrow ruler and modification of the iris coloring technique to match the patient's eye color will support the success of the treatment. Making custom ocular prostheses in elderly patients requires a special approach and innovative methods to produce prostheses that are aesthetically pleasing, retentive and provide good patient comfort.

Keywords: custom ocular prosthesis, eyebrow ruler, iris position, coloring technique

INTRODUCTION

A person's quality of life (QOL) depends on all five senses functioning properly. The eyes are the five main senses which are the first impression for a person and as the sense of sight.[1] Loss of vision can be caused by several things such as congenital defects, tumors, trauma or other pathological conditions that require surgery. Surgery on the eye is divided into evisceration, enucleation and exenseration.[1,2] Evisceration is the process of removing the contents of the eyeball by preserving the sclera and the optic nerve, enucleation is the process of removing the entire eyeball together with the optic nerve and leaving the muscle attachment as maximal as possible, exenseration is the process of removing eyeball and optic nerve accompanied by the eyelids and surrounding tissue.[2,3]

In cases of loss of eyeballs, especially cases of enucleation, it will lead to a decrease in a person's quality of life, so it is necessary to manufacture false eyeballs (ocular prosthesis) as a substitute for an eye that has been lost to restore aesthetics and improve psychological conditions and improve one's quality of life.[4,5] Ocular prosthesisis an artificial eye that is indicated to replace lost eyeballs in post-evisceration and enucleation patients. Ocular prosthesis is divided into stock ocular prosthesis (stock eye) and custom ocular prosthesis (custom eye).[1,2] Stock eye is a factory-made artificial eye that is produced according to standard sizes with

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a concave intaglio surface so that it is more indicated for post-eviseration patients, whereas A custom eye is an artificial eye that is made by imprinting it into the patient's eye socket and conforms to the shape of the patient's eye socket so that it is more indicated for post-enucleation patients due to differences in postoperative eye socket morphology which will change along with the patient's postoperative healing process. Custom eyes can adapt well according to the patient's eye socket tissue, can better restore the contour of the eyelid that has collapsed (ptosis) and is aesthetically better because it can follow the size, shape and color of the sclera and iris.[1,6]

In cases of loss of eyeballs, especially in elderly/geriatric patients, special treatment is needed because the physical condition and morphology of the muscles have decreased, such as the occurrence of ptosis (collapsed upper eyelid) accompanied by the patient's psychological condition which is not the same as that of young patients. This causes the treatment of elderly patients should not be for a long time and must be as comfortable as possible.[7,8] Determining the location of the iris is an important step to obtain a natural view of the eye and the same as the existing eye.[9] In elderly patients, the iris positioning technique should use a technique that is simple, fast but accurate results to reduce chairside time. In addition, the color of the sclera and iris of elderly patients is generally aging, so it needed modification of the iris coloration to mimic the condition of patient's eye color.

This case report will discuss the procedure for making a custom eye with a quick and easy modification of the iris measurement technique using an eyebrow ruler as well as modification of iris coloring to suit elderly patients.

DESCRIPTION

CASE 1

A 52-year-old female patient came to the RSGMP FKG USU prosthodontics department with a complaint that she wanted to replace an old artificial eye that had cracked and hurt when worn. From the patient's history it is known that the patient had left micropthalmia since birth which caused the left eyeball to be enucleated and an autograft from the thigh was made 20 years ago. On examination the ocular defect had healed well but was accompanied by

Figure 1. Patient's eye socket-1

Figure 2. Patient's old stock eye-1

post-enucleation syndrome and blepharoptosis. Mobility of the posterior wall of the ocular defect is lost, but opening and closing movements are still possible (Figure 1,2).

CASE 2

A 60-year-old female patient came to the prosthodontics department at the RSGMP FKG USU with a complaint that she wanted to make a new artificial eye because the old artificial eye had been lost. From the patient's history it is known that the patient had retinoblastoma since 28 years ago and was enucleated 1 year later. On examination, the right ocular defect was well healed with a deep socket with post-enucleation syndrome and loss of most of the extraocular muscle support with blepharoptosis. Mobility of the posterior wall of the ocular defect is gone, but opening and closing movements can still be performed but with the support of the orbicularis oculi muscle (Figure 3).

Figure 3. Patient's eye socket-2

CASE MANAGEMENT

In both cases, a custom eye prosthesis was planned. Anatomical impression is done with a tray made of self-curing acrylic with an escape hole connected to a 10cc syringe and irreversible hydrocolloid (alginate) material. The impression material is stirred and then put into a syringe to be injected into the eye socket. After the impression material has hardened, it is then removed from the eye socket to check that all surfaces have been printed properly (Figure 4).

Figure 4. Anatomical Impression

Next, a physiological model is made by filling the lower part of the mold first using type III cast stone. After the bottom model hardens, the application of separating media on the surface of the mold. Then the second layer is poured back with type III stone. Markings are made on all four sides of the model for proper reorientation of the model. Next, the model wax is made by pouring liquid wax into the model. The wax is contoured according to the anatomical print and passed to the patient (Figure 5).

Figure 5. Modelling and try in

Figure 6. (A) Physiological tray making; (B) Physiological tray try in

After sclera try in, the physiological impression tray using self-cured clear acrylic made with two escape holes was placed into the putty mold and then passed to the patient. (Figure 6).

After the tray has been passed, then physiological tray is carried out with the PVS light body impression material. In the physiological impression process, the patient sits upright with the head supported on the headrest of the dental chair and is instructed to hold the gaze in a straight forward position. The light body material is injected using a tip wash through the tip of the mold into a physiological tray until it fills the entire eye socket. The patient is then instructed to close his eyes to allow excess material to drain out and then perform various eye movements to score functional movements. The impression is then removed and examined for results from physiological imprinting (Figure 7,8).

Figure 7. Case 1 physiological impression

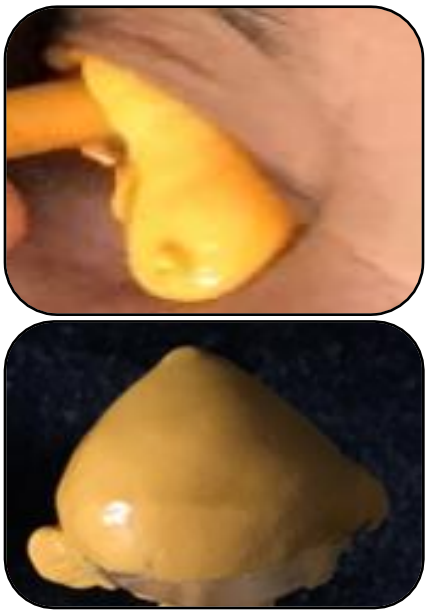

Figure 8. Case 2 physiological impression

The physiological impression results was then implanted into type IV plaster to obtain a working model using the split model technique. Then sclera wax is made by pouring modeling wax on the physiological impression. The size, location and color of the iris is determined by a healthy eye. The location of the iris is determined with the help of the eyebrow ruler. The eyebrow ruler is positioned in the middle of the patient's nose, then a photo of the patient is taken with a view distance of 20 cm from the patient's eyes. The patient is instructed to look straight ahead naturally and is instructed to maintain the direction of the eye's gaze on an object at least 3 feet in front and at eye level then the iris position and iris size are measured based on the measurements obtained from the eyebrow ruler with the sclera wax attached and when it is not attached (Figure 9).

A scleral wax try in is then performed to verify the size and support of the tissue to simulate eye movement and eyelid coverage. Patients were instructed to open and close their eyes, glance left and right and look down to ensure that retention was good. Next, make iris buttons according to the patient's eye color. First, the iris disc is drawn using acrylic paint and following the patient's iris pattern. After the paint was dry, the pupil was installed with a black disc with a diameter of 1.5 mm. Then, the iris button was kneaded with clear heat-cured acrylic (Figure 10).

Iris button then implanted in scleral wax according to the position of the iris that has been determined then a final pass is carried out before doubling (Figure 11).

Figure 9. Iris positioning with eyebrow ruler

Figure 10. Iris button making in process

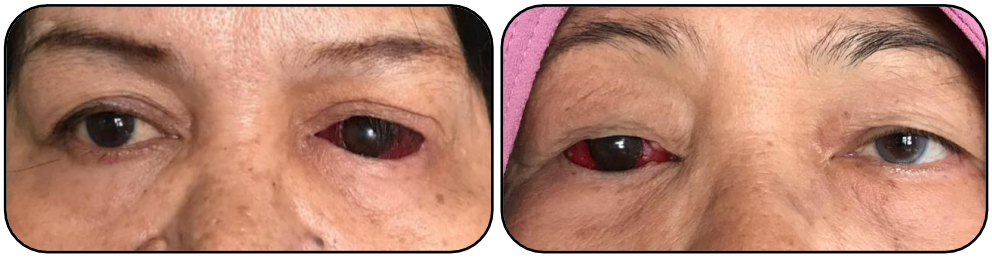

Figure 11. Final try in

After the final pass, it was then rubbed with white acrylic according to the color of the patient's sclera. Then during flashing, the position of the iris button is maintained by attaching a clear acrylic rod to the center of the iris button. After the dewaxing, packing and curing, finishing and polishing procedures, a putty index was made as a guide to reduce the sclera's convexity by ± 2mm for clear acrylic spots, then stained the sclera according to the patient's eye color. In this process, a gray-white halo is added

following the aging patient's original eye by using clear acrylic mixed with white and gray acrylic paint (Figure 12).

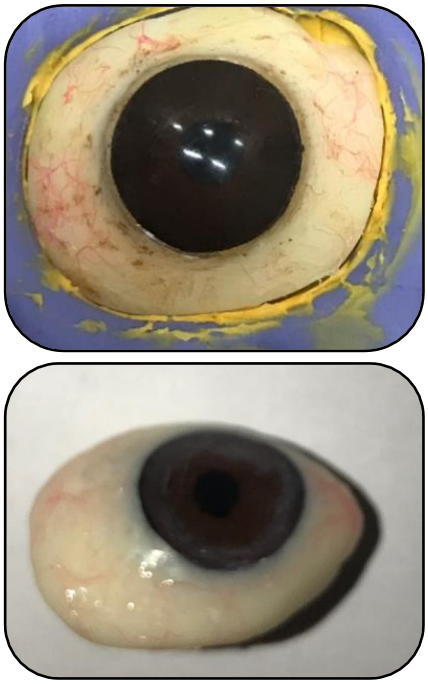

Figure 12. Eye characterization

Next the restoration of sclera convexity using clear heat cure acrylic resin is made. After the curing process is complete, the ocular prosthesis is finished, polished and disinfected before being placed on the patient. After installation, the patient was instructed to control post-installation after 7 days, 14 days and 30 days after installation (Figure 13,14).

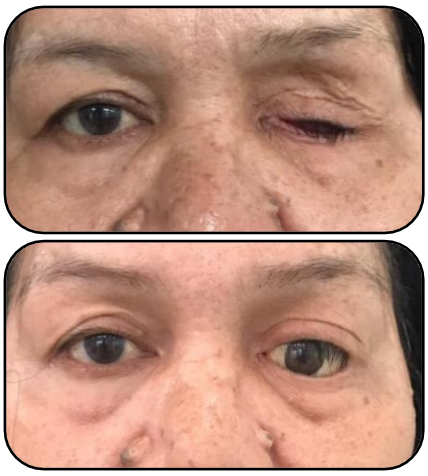

Figure 13. Custom eye insertion of patient-1

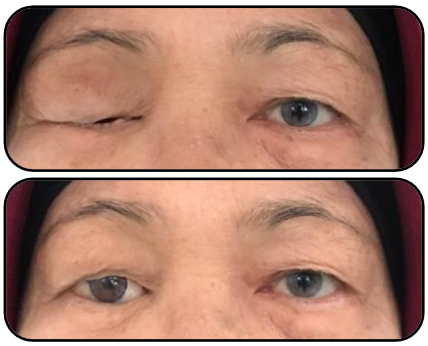

Figure 14. Custom eye insertion of patient-2

DISCUSSION

Custom eyes play an important role in the rehabilitation and restoration of the quality of life of post-enucleation patients. Making a custom eye is a prosthodontic specialist's competence which requires complex procedures starting from the molding process to installation which requires repeated visits.

When the impression is done, the entire surface of the eye socket will be completely printed. So that the resulting ocular prosthesis will be more retentive and stable. The fine adaptation of the custom eye distributes pressure evenly over the entire tissue surface of the eye socket compared to the stock eye, thereby helping to reduce the incidence of conjunctival abrasion and ulceration. In addition, it also improves the health of eye tissue by reducing the risk of fluid retention on the interfacial surface between the prosthesis and the tissue due to the tight contact of the ocular prosthesis and following muscle movement. A custom-

made ocular prosthesis will also provide a more aesthetic result because the iris and sclera are specially made and painted according to the shape, contour and color of the patient's original eye which is still there.

Determining the location of the iris and the size of the iris is a challenge in itself because of the age of elderly patients who are difficult to accept directions. The use of simple but accurate tools will support the success of treatment.[10] This can be seen from the results of the manufacture of eye prostheses that are quite good and aesthetically pleasing in the case above. The use of a simple eyebrow ruler will speed up the patient visit process and have a fairly good level of accuracy because the measurements are in millimeters (mm) and the patient also does not need to stare at one direction for too long which can cause bias. Eyebrow ruler can also be obtained at an affordable price and the technique of use is very easy. The drawback of using this tool is that there are still no other studies that use this tool.

Iris coloration technique is an important step in the fabrication of an ocular prosthesis. The staining technique is very complicated, especially for elderly patients whose iris and sclera morphology have undergone significant changes. The iris coloring technique requires skills and modifications in the manufacturing stage in order to produce results that resemble real eyes. In the above case, coloring the iris disc by matching the acrylic color used with the patient's original eye color is the right step to obtain the desired result. The addition of a modified halo with clear acrylic mixed with acrylic paint can also mimic the iris of an aging patient, where there has been a loss of iris color pigment and causes transillumination of shadows around the iris.

Manufacture of the eye prostheses must be retentive, restore the eyelid contour and provide comfort for the patient. A retentive and adaptive prosthesis will restore the patient's quality of life. The use of ocular prostheses should be controlled periodically because the inside of the eye is a soft tissue that is very sensitive to friction and prone to infection.

CONCLUSION

Making ocular/custom eye prostheses in elderly patients requires a special approach and innovative methods to produce prostheses that are aesthetically pleasing, retentive and provide good patient comfort.

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CASE REPORT 2

MODIFIED IMPRESSION TECHNIQUE FOR EVISCERATION EYE OCULAR PROSTHESIS

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ABSTRACT

To produce a comfortable ocular prosthesis, a good and correct impression technique is needed. Patients with evisceration cases have a very high sensitivity to ocular prosthesis, due to that even a few excess part of the prosthesis may cause inconvenience to them. To overcome this case, an impression technique was modified by using a custom ocular tray obtained from a wax pattern that provides good support for the surrounding tissue, as well as impression without a tube for impression material. A 21 years old female patient came to Department of Prosthodontics, RSGM FKG USU, she requested an ocular prosthesis because the patient felt unconfident with her current condition. The patient was diagnosed with post-evisceration socket syndrome in the right eye. The impression results obtained with this technique produce good tissue adaptation and there is no overextension in the ocular prosthesis that is produced, because the edge and convexity of the mold is obtained from the functional movements of the patient's eyes. Operator's error during impression procedure can also be avoided due to the absence of a tube for impression material that is held by the operator so that there is no external force affecting the impression result. This modified impression technique produces an ocular prosthesis which is comfortable, has a natural shape and good adaptation.

Keywords: ocular prosthesis, evisceration, impression technique

INTRODUCTION

Evisceration is a surgical procedure for removing the intraocular contents of the eyeball, without removing the sclera, Tenon's capsule, conjunctiva, extraocular muscles and the optic nerve.[1] The most suitable prosthesis for this case is a custom cover shell or scleral cover shell prosthesis.[2]

Ocular prosthesis must have a good adaptation to the surrounding ocular tissue. One of the way to get a good prosthesis is through impression techniques. Various impression techniques exist in the form of direct impression (external impression), impression with a stock ocular tray, impression with a custom ocular tray, impression with an ocular prosthesis, modifications to the ocular prosthesis, and waxed scleral blank techniques.[3,4]

Each of the impression techniques have an advantages and disadvantages. For evisceration cases, the patient's eyes will feel very uncomfortable if there is even a little bit of excess. Therefore, the authors modified the impression technique by using a custom ocular tray obtained from a wax pattern which provides good support for the surrounding tissue and impress without tubes of the impression material.

CASE DESCRIPTION

A 21-year-old female patient sought an ocular prosthesis from the prosthodontics department at USU Medical Hospital because she was self-conscious about her physical appearance (Figure 1). The child had a history of both of his eyes swollen at the age of nine months due to a high fever. After receiving an eye compress at the clinic, the patient's left eye was cured but the right eye remained swollen. Hospital treatment was continued despite the examination's findings that no sickness existed. The patient

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