

Custom Ocular Prosthesis: Modified Conformer For Expansion Contracted Anophthalmic Socket And Using Coffee For Coloring Iris

Nanda Iswa Maysfera¹, Haslinda Z Tamin², Putri Welda Utami Ritonga³

¹specialist Program In Prosthodontics, Faculty Of Dentistry, Universitas Sumatera Utara, Medan, Indonesia

²professor, Department Of Prosthodontics, Faculty Of Dentistry, Universitas Sumatera Utara, Medan, Indonesia

³lecturer, Department Of Prosthodontics, Faculty Of Dentistry, Universitas Sumatera Utara, Medan, Indonesia

Abstract:

Background: For individuals who have had enucleation, whether because of malignancy or trauma, using an ocular prosthesis is essential to enhancing their quality of life. Obviously, the primary goal of an ophthalmic patient is to ensure that eye prostheses are used properly in order to increase patient trust. Shallow or constrictive eye sockets impede an ophthalmic patient's ability to use ocular prostheses. In the creation of ocular prostheses, iris coloration can be accomplished in a variety of ways, although it doesn't appear that natural stains like coffee have been utilized frequently. In addition to using coffee as a natural iris pigment in eye prosthetics, this paper explains how to cure shallow eye sockets using a modified conformer.

Case Report: A 62-year-old male patient complained to the Dental Hospital Universitas Sumatera Utara that his left ocular prosthesis had been coming loose often for the past two months. When the patient was 19 years old, his left eye underwent an enucleation treatment due to trauma. The patient had been using a custom ocular prosthesis for the previous six years. Using a forn timer, the depth of the eye socket was determined to be 2 mm. Using modified conformer resembling a gradually enlarged sclera to increase the depth of forn timer and coffee with monopoly syrup for iris coloring. After three months of use of the conformer and two additional conformer sizes, the desired socket depth was found. Re-measure the patient's eye socket depth. From the measurement results, it was found that the depth of the inferior forn timer was 4 mm, which was an increase of 2 mm from before treatment.

Conclusion: Using a modified conformer can help to expand shallow forn timer. Besides being biocompatible, coffee can be used for iris coloring in the manufacture of ocular prosthesis as a substitute for color paint. Using a modified conformer increases the depth of forn timer. Coloring the iris with the coffee yields as good as other coloring methods.

Key Word: Ocular prostheses, shallow forn timer, conformer, iris, coffee.

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I. Introduction

Orbital defects may be associated with congenital deformities, tumors, cancer, or acquired traumatic lesions. Surgical procedures include evisceration, which is a procedure for removing the contents of the eyeball, leaving the sclera and/or cornea intact. Enucleation is the removal of the entire eyeball and exenteration is the removal of the entire orbital component (1).

Patients who suffered psychological trauma as a result of losing their eyes deserve an aesthetically pleasing and functioning ocular prostheses. Patients who experienced enucleation or evisceration might benefit from ocular prosthesis (1). An ocular prosthesis is a maxillofacial prosthesis that artificially replaces an eye lost due to trauma, surgery, or a congenital prosthesis does not replace the missing skin, mucosa, or nearby muscle (1; 2).

Ocular prosthesis can be classified as stock ocular prosthesis and custom ocular prosthesis. Close contact of the custom ocular prosthesis with the tissue improves tissue health by reducing fluid accumulation in the space between the prosthesis and the tissues thereby reducing the possibility of soft tissue irritation and bacterial growth. Custom ocular prosthesis can also distribute pressure more evenly and reduce the incidence of conjunctival abrasion compared to stock ocular prosthesis (1,2).

Making an ocular prosthesis must be supported by adequate eye socket conditions to support the prosthesis, both in terms of the size and shape of the eye sockets (3). In anophthalmia patients, the eye sockets may reduce, resulting in a shallow socket condition. Shallow sockets are the most common complaint of anophthalmia patient, associated with complaints of poor cosmetic appearance, associated volume deficits and

malposition of the eyelids. Several factors may be responsible for the inflammation of the socket and the discharge, such as the way it was cleaned and the age the prosthesis has been in use (4).

Shallow sockets are classified according to severity as follows: (a) Grade 0: socket with healthy conjunctiva, deep and well-formed fornixes; (b) Grade 1: socket with a characteristic shallow or flat lower fornix; (c) Grade 2: socket with loss of the upper and lower fornix; (d) Grade 3: socket with complete loss of the fornix; (e) Grade 4: socket with complete loss of fornix and reduced palpebral aperture both horizontally and vertically; (f) Grade 5: when there is recurrence of contractions after repeated reconstruction (4). Several approaches have been made to overcome shallow socket conditions. Among them with surgical procedures and the use of conformers. The surgical procedure itself certainly requires a lot of consideration in its implementation so that the use of a conformer to gradually develop into an alternate therapeutic option in dealing with shallow sockets (5).

On the other hand, iris coloring also has its own challenges. Among the methods that have been used so far are photography and painting. To get the iris color that is identical to the contralateral eye is of course needed when using the painting method. Many painting media and also painting paints are used, such as paper media and iris buttons as well as oil and acrylic paints (6). The author attempts to develop a natural alternative to iris coloring by using coffee. The purpose of this article is to describe the procedure for making eye prostheses in patients with shallow eye sockets using a conformer which increases in size gradually so as to obtain the desired socket depth for retention of eye prostheses and iris coloring using coffee mixed with monopoly syrup.

II. Case Report

A 62-year-old male patient came to the USU General Hospital with complaints that the patient's left eye prosthesis was often detached and could not be used for the past 2 months. The patient's left eye was traumatized by a blow and an enucleation procedure was performed when he was 19 years old. The patient used a custom eye prosthesis for the last 6 years before it became loose and unusable (Figure 1a and 1b).



Figure 1. (a) Condition of patient's eye socket; (b) use of old ocular prosthesis; (c) Superior fornix depth measurement of 6 mm.; (d) Measuring the depth of the inferior fornix 2 mm.

Based on objective examination, it can be seen that there is no irritation or infection in the eye socket. The eyelid muscles are still good so that they can open and close on their own. Check the depth of the eye socket using a forn timer (Figure 1b). The depth of the inferior fornix was 2 mm and the superior socket was 6 mm (Figure 1c). Based on the results of this examination, it was concluded that the patient's eye socket was shallow and not good enough for retention of the ocular prosthesis. On the first visit, anamnesis and objective examination were carried out. Based on these examinations, it can be concluded that the patient has lost the left oculi bulb due to trauma with the diagnosis of Shallow Degree 1 Anophthalmia socket sinistra post enucleation.

The next step is to make an anatomical impression tray according to the patient's original eye size using self-cured acrylic material. The patient's eyelashes were smeared with vaseline and then anatomical impression was performed. The patient is instructed to move his eyes in all directions to get the edge of the eye area at the

time of impression. After immersing the impression into a type IV dental stone and waxing up the sclera, an anatomical wax pattern try in was performed. From the results of making the mold, the anatomical wax pattern is made conformer with clear acrylic heat curing material. The conformer was made to resemble the shape of the sclera (Figure 2a).

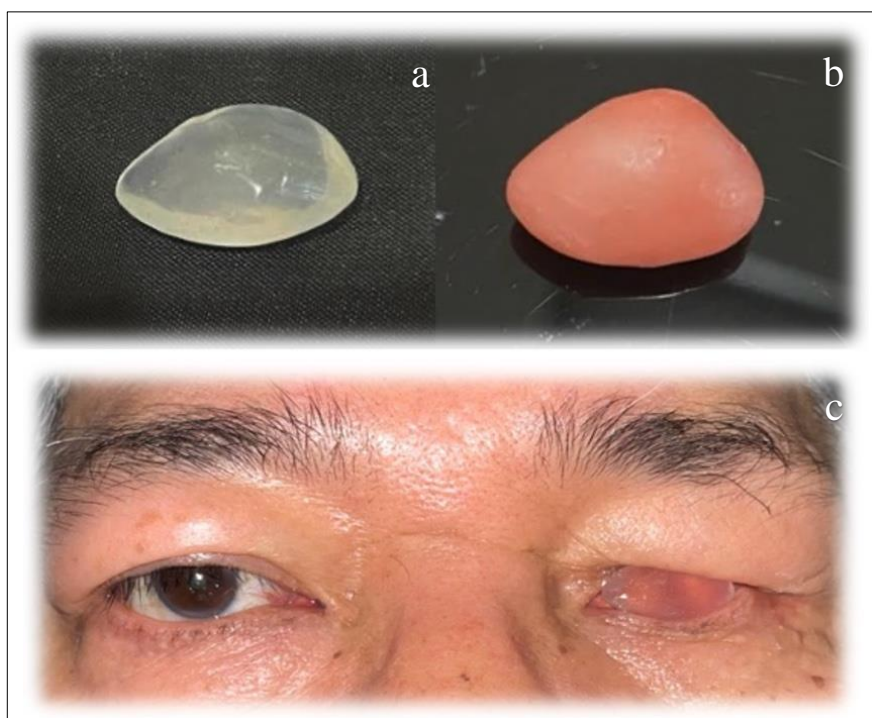


Figure 2. (a) Sclera-shaped conformers; (b) conformers increased in size with wax droplets; (c) Use of conformers.

On the second visit a try in conformer was carried out. The patient was asked to open and close both eyelids using the conformer (Figure 2c). Patients were asked to use a conformer for 3 weeks. After 3 weeks, the size of the conformer was increased by dripping wax on the middle, mesial and lateral parts (Figure 2b). Furthermore, making molds from conformers that have been adjusted and packed with clear acrylic. The addition of the conformer size was carried out in stages every 3 weeks. The patient is given an exercise protocol to increase the tonicity of the eyelid muscles and to increase eye opening. The exercise protocol includes: Opening, closing, right and left lateral movements with different conformer sizes. The patient was recalled for control at one-month intervals.

After three months of use of the conformer and two additional conformer sizes, the desired socket depth was found. Re-measure the patient's eye socket depth. From the measurement results, it was found that the depth of the inferior fornix was 4 mm, which was an increase of 2 mm from before treatment (Figure 3). Where a depth of 4 mm is considered sufficient to obtain good retention for ocular prostheses.



Figure 3. Measuring the depth of inferior fornix after using conformer with a forn timer of 4 mm.

After finding the desired socket depth, physiological impression is carried out. Create a physiological custom impression tray from the conformers that have been used. Before impression, and reduce the conformer on the intaglio anterior parts by approximately 1 mm for the place for the printed material. Smooth the entire surface of the conformer and pass the physiological ladle. Impression with polyvinyl siloxane light body. Insert the conformer which functions as a functional impression tray into the eye socket. The patient performs various physiological eye movements up, down, left and right to get the boundaries of the periphery of the eye. After setting the light body, remove all printouts. Pay attention to the print, the hope is to obtain the largest possible contact area and obtain the natural anterior convexity according to physiological movements.

After waxing the sclera and wax try in, prepare for iris staining. First of all, make iris buttons with clear heat curing acrylic using iris button molds. Then, monopoly syrup is made using clear acrylic. Monopoly syrup is made by mixing polymer: monomer (1:10). Monomer is poured according to size into a beaker glass, then heated in a kettle with boiling water. The monomer is continuously stirred until warm, then the polymer powder which has been weighed is added gradually; Sambal continues to stir slowly. After getting the desired consistency, put the monopoly syrup into a dark bottle, then after it's cold, put it in the refrigerator until it's ready to use (Figure 4a) (6).

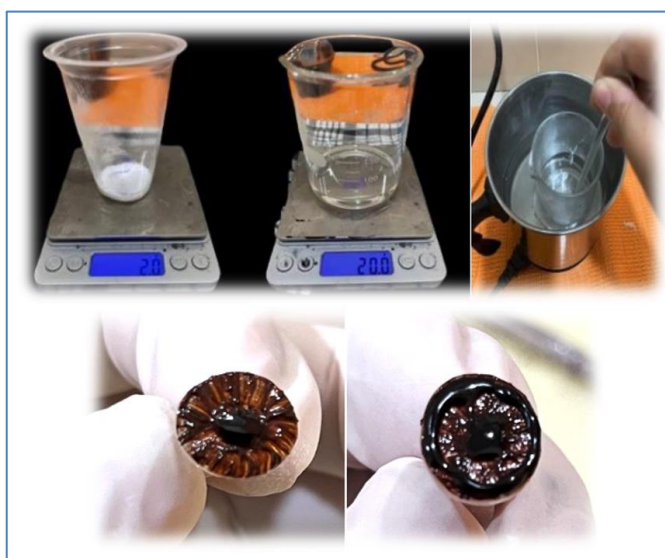


Figure 4. a. The process of making monopoly syrup; b. The process of coloring the irises with a mixture of coffee and monopoly syrup.

Then coloring is done by mixing monopoly syrup with coffee powder until smooth on a glass slab. Then using a brush do the coloring directly above the iris button. The iris button is coated with uv resin with the aim that it does not change color and shape when exposed to high temperatures (Figure 4b) (7).

After that, the iris position was determined using the pupillary distance ruler. Position the instrument on the patient by placing the notch on the bridge of the nose and adjusting it to accommodate the eye in the ocular opening. Measure the orientation, pupillary distance, and medio-lateral dimension of the natural iris from a graded scale. Then the measurement is transferred to the scleral pattern by marking it with a marker as the center of the pupil which becomes the center of the iris. A circle is formed as big as contralateral iris, 11.5 mm. The marked circle is blackened using a marker. Next do wax sclera try in. Try the sclera wax on the patient and fit it at the center point marked on the sclera. The iris button will be implanted into the wax sclera as deep as 2-3 mm according to the position determined during try in.

After processing sclera, the anterior surface of the sclera of the eye prosthesis was removed for approximately 1 mm with a putty index guide and then characterized using red wool thread resembling the blood vessels in the sclera then covered with clear acrylic. After that, do the re-processing of the sclera using clear acrylic and polishing using polishing burs and pumice. A custom ocular prosthesis was placed on the patient and evaluated for suitability, esthetics, and movement coordination with the contralateral eye. Post-insertion instructions are given to the patient, regarding how to insertion and maintain the custom ocular prosthesis (Figure 6.)



Figure 6. Before and after insertion ocular prosthesis

III. Discussion

Shallow socket conditions or socket contractures are usually caused by:

- radiation treatment (usually as a treatment for tumors that require removal of the eye)
- implant extrusion due to initial severe injury (burn, alkali or extensive laceration)
- surgical trauma inside the socket, causing excessive scar tissue formation).
- repeated socket operations.
- removing conformers or eye prostheses for a long time.

Clinical conditions in the eye sockets that shallow can cause patients to be unable to maintain eye prostheses, cause discharge due to irritation, and affect patient aesthetics.(5,8). Various techniques and materials are used to expand the orbital volume (3, 4, 5, 9):

- Conformers
- Orbital ball implant
- Mucosal graft
- Fat tissue grafts
- Bone and muscle grafts
- Hydrogel expander

Conformers is a clear acrylic shell that is placed into the eye socket or that is placed before the manufacture of an eye prosthesis. Use of a conformer can assist in formation of the fornix and expansion of the eye socket (5,10). Adequate fornix depth to maintain eye prosthesis in the socket is about 3 mm and using a conformer can increase the sulcus depth by 2-3 mm. The depth of the fornix is measured using a forn timer (11). According to Amornvit et al conformers play an important role in deepening the eye socket. A maintenance plan should be made for socket expansion which can be done using conformers. Step by step expansion should be done with gradual visits. Expected outcomes include maximum eye opening, upper eyelid support and stability of the prosthesis in the eye socket (3, 5, 9).

According to Jamayet et al a technique of coating the conformer with wax has been used to modify the conformer to obtain the correct size of the definitive ocular prosthesis. Because the ocular prosthesis will comfortably fill the anophthalmia socket to produce a normal appearance and near-normal movement. The goal of rehabilitation is to achieve a sufficiently large eye opening and increase in socket volume. Furthermore, fabrication of a definitive eye prosthesis provides a normal cosmetic appearance (3).

IV. Conclusion

In this case, the patient could not use her old eye prosthesis at all because of the shallow eye socket. The use of conformers that increase in size gradually is proven to be able to deepen the size of the patient's eye sockets, the conformer's eyes are enlarged 2 times. After using the stage 3 conformer the eye socket depth is increased by 2 mm. So that the eye socket increased from 2 mm to 4 mm. Iris coloring using natural ingredients in the form of coffee powder dissolved in monopoly syrup directly on the iris button has been proven to replace acrylic or oil paints which are commonly used for iris painting. Coffee powder is also easy to obtain in various brands and packages. Coffee grounds can be ground into a smooth, easy-to-apply preparation. The use of monopoly syrup as a mixing agent and also UV resin as a coating on the iris button surface is proven to provide stability of the coloring results and avoid color distortion during the kneading process (6).

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