Calibrated pressureless impression technique of ocular prosthesis for eviscerated socket: a case report

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ABSTRACT
Ocular prosthesis for post evisceration socket often has feeble adaptation to the surrounding tissue due to high sensitivity. Excessive pressure given by impression technique would lead to irritably intaglio and bulky palpebral contour of the prosthesis. This article describes a modified method of functional impression which made it easier not only to record the tissue bed surface of the defect but also to get the right contour of the palpebral surface at the same time. A 60-year-old male came to Dental Hospital Universitas Sumatera Utara with evisceration defect as a result of traumatic injury 40 years ago. He complained a facial disfigurement that made him formidable with social interaction. Pressureless impression combined with calibrated tray was planned for the patient. Light body PVS material was injected into the socket under slight pressure and the conformer made from visible light cure acrylic resin was in position as a tray. Vertical and horizontal lines marked in the conformer calibrate with the facial marking as a guidance for 3-D position. The method is intended to get the fast, accurate position offering the patient ocular prosthesis with great comfort as well as to provide facial contours that improve the patient's psychological and physical outlook.
Keywords: evisceration, customized ocular prosthesis, functional impression, pressureless impression, calibrated conformer
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INTRODUCTION

Loss of facial tissue or organs can have significant physiological, social, and psychosomatic effects on the affected individual and may arise as a result of congenital defects, trauma, neoplastic disease or surgical intervention.[1] Surgical management of eye removal can be classified into three categories: evisceration, enucleation, and exenteration.[2,3] Exenteration is the removal of the entire contents of the orbit, including the extraocular muscle. Enucleation is the surgical removal of the entire eye opthalm and part of the optic nerve from the orbit. Evisceration is an excisional procedure to remove intraocular contents, leaving the sclera, and sometimes the cornea.[4]

Prosthetic rehabilitation can be performed with stock ocular prosthesis (prefabricated) or custom-made ocular prosthesis.[5] Stock ocular prosthesis are available in standard sizes, shapes, and colors and can be used for postoperative temporary purposes. Custom made ocular prosthesis have several advantages over stock eye prosthesis such as better esthetics obtained from control over iris and pupil size as well as iris and sclera color, their surface is in close contact with the surrounding tissue which makes for better eye movement and a more even distribution of pressure, making it more comfortable to use.[6,7]

Fluid accumulation in the prosthesis surface and eye tissue is often become a problem due to unfitness of ocular prosthesis caused by over compressive impression. Fluid accumulation can cause tissue irritation and promote bacterial growth in the eye.[8] This article suggests a novel impression technique to get a fast and accurate positioning to provide post-evisceration ocular prosthesis with the aim of achieving tight tissue contact for better comfort and esthetics.

CASE

A 60-year-old male came to Dental Hospital Universitas Sumatera Utara with evisceration defect as a result of traumatic injury at work 40 years ago (Fig.1). He had a complaint of facial disfigurement that made him uncomfortable with social interaction. Upon examination, the defective right eyelid was retracted. Intra ocular tissue bed and muscles were intact and free of inflammation. For the contralateral eye, lid position and palpebral fissure in the open and close position was normal, no nystagmus and no history of strabismus. A custom-made polyethylene ocular conformer was fabricacated (Fig.2A). Separating medium is applied to the patient's eyebrows and eyelashes and preliminary impression was taken using irreversible hydrocolloid (GC aroma fine plus normal set). The material was mixed according to the manufacturer's instructions, put into a disposable 3 cc syringe and injected into the defective right eye socket (Fig.2B).

Figure 1 Pretreatment photograph

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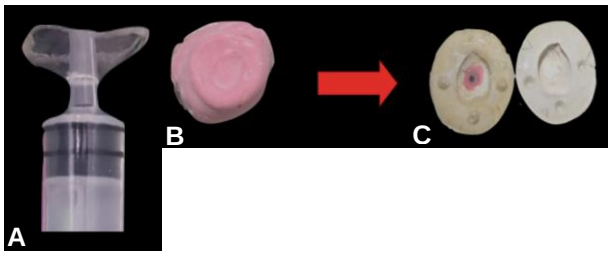

Figure 2A Custom made polyethylene ocular tray, **B** preliminary impression, **C** split cast with indentation grooves

A split cast with four indentation grooves was made using dental stone type II (Fig.2C). Molten wax was poured into the split cast to obtain wax pattern of the sclera. Try in the wax pattern to examine size, contour and retention in functional movement.

Figure 3A Wax pattern try-in, **B** putty mold for fabrication of functional impression conformer

After the wax pattern is confirm (Fig.3A), a horizontal line from mesial to distal canthus and vertical line marking on the wax-up convexity was made. The marked wax pattern was then copied to the putty as a mold for custom functional impression conformer to obtain the palpebral contour. When putting the wax into the putty, it should not pass through the largest part of the convexity to maintain the right countour of the palpebral. Custom functional impression conformer with escape hole were then fabricated using visible light cure acrylic resin (Fig.3B).

Functional impression was taken using light body addition poly-vinyl-siloxane (PVS) elastomeric impression material (Zhermack elite P&P). The patient was instructed to sit upright with the head back and hold his gaze in a straight-forward position. The PVS was injected into the socket under slight pressure and the conformer made from visible light cure acrylic resin was in position as a tray. Vertical and horizontal lines marked in the conformer calibrate with the facial marking as a guidance for 3-D position to avoid excessive pressure on the eye socket. Patient was then instructed to perform eye movements while the impression material sets (Fig.4A).

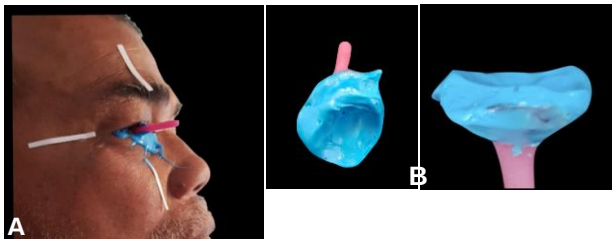

Figure 4A 3-D position was obtained, **B** functional impression

The impressions are then removed and examined for the results of the functional impression (Fig.4B). Following the functional impression, work model was made by split cast technique using type IV dental stone material and wax pattern of sclera was being made. The size and position of the iris were determined from the contralateral eye using inter pupillary distance (IPD) ruler (Fig.5A). The colour of iris was obtained by oil color painting (Windsor & Newton oil colour) (Fig.5B) and colour of sclera was obtained by using dental shade guide (Vita classical) (Fig.5C).

Figure 5A Obtaining iris position and diameter, **B** oil painted iris disk, **C** finished iris button

The iris button was mounted onto the wax pattern. Try in of wax pattern ensuring size, tissue support to simulate eye movement and eyelid coverage as well as iris color and position during movement and at rest (Fig.6A). Flasking and dewaxing was carried out. During flasking, the iris button position is maintained using an acrylic mount (Fig. 6B).

Packing of heat cured acrylic resin with a color

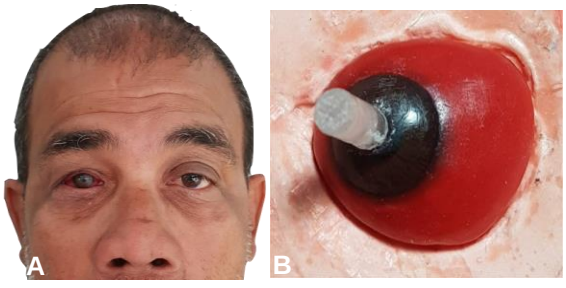

Figure 6A Try in final wax pattern, **B** iris button mounting

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that has been adjusted to the color of the patient's sclera (Fig.7A). After completion, the sclera was then trimmed and its convexity was then reduced by ± 2 mm for staining and veining of the scleral by attaching red dacron polyester fibers to the prosthesis using the monomer-polymer syrup mimicking the contralateral eye and packed with heat-cured clear acrylic resin to restore the initial convexity of the sclera. The ocular prosthesis was polished, cleaned and inserted to the patient eye socket (Fig.7B).

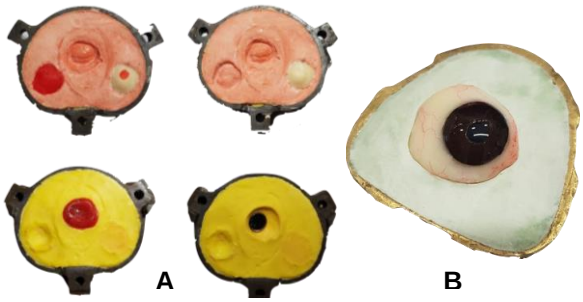

Figure 6A Flasking dan dewaxing, **B** custom ocular prosthesis after polishing

During insertion, the ocular prosthesis is evaluated for esthetics, retention and comfort. Postinsertion instructions were explained to the patient and the patient was instructed for periodic controls for 1 week, 1 month and every 6 months (Fig.8).

Figure 8 Before-after photograph

DISCUSSION

Compared to custom made ocular prostheses, stock ocular prostheses have several disadvantages, such as unfitness, constant tissue irritation due to bacterial growth in the fluid that accumulates at the prosthesis-tissue interface and poor aesthetics. Custom made ocular prosthetic prevents drooping of the eyelid, supports muscle function in the eyelid, maintains the palpebral opening, and provides a similar appearance to the real eye.[10]

Post evisceration eye socket still has sensitive tissue remaining which requires more careful work procedures, especially the impression procedure. Impression has a big role in the final result of the prosthesis. Good and accurate impression will produce artificial eyes that are fit and comfortable to use. Post evisceration eye socket impression procedures should use low-viscosity impression materials such as irreversible hydrocolloids and light body silicone elastomers with custom made pressure-free impression tray.[7,11]

In this case report, the discussion focuses on the functional impression procedure. In this case, the post-evisceration anophthalmic socket has been present for a long time to cause the superior palpebral conjunctiva to retract because it is not supported by the eye opthalm. Physiologic impression tray plays an important role to cover the convexity of the artificial eye opthalm to be made so that the superior palpebral conjunctiva can be supported again. In this case, the convexity is maintained by making marks on the tray and the area outside the eye socket to get the exact 3-D position of the tray, so that an accurate impression is obtained. Another important step in the impression is the tight adaptation of the intaglio surface of the ocular prosthesis to the posterior wall of the eye socket and must not over press against the posterior wall of the eye socket. Using a light body as an impression material can provide an advantage because the impression material can flow easily and imprint the eye socket clearly in a functional state which will eventually result in tight adaptation and facilitate functional movement of the ocular prosthesis. The impression technique in this case can maintain the position of the impression tray well where there is no excessive pressure on the eye socket that affects the accuracy of the intaglio area of the resulting ocular prosthesis.

It is concluded that ocular prosthesis for post-evisceration socket often has feeble adaptation to the surrounding tissue due to high sensitivity. The technique for fabricating custom ocular impression tray and the physiologic presureless impression technique in this case by marking the tray and calibrating it to the area outside the eye socket contributes to provide a fast and accurate impression in terms of convexity and well fitted intaglio of the prostesis so that an even distribution of pressure throughout the defect can make a tight adaptation of tissue-ocular prosthesis interface, solving the issue of unfitness and discomfort of the ocular prosthesis.

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