Case report

Rapid fabrication of silicone orbital prosthesis using conventional methods

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Abstract

Restoration of orbital defects with silicone prosthesis has been a well-documented and accepted treatment option. Adhesive retained prosthesis offer the patients with adequate retention and treatment satisfaction. However, marginal breakdown and discoloration are common problems associated with these prostheses, necessitating their refabrication. Fabrication of a silicone orbital prosthesis is time consuming and requires multiple clinical and laboratory procedures. This technical article describes simple and cost effective steps for rapid fabrication of a silicone prosthesis using conventional methods.

Introduction

Exenteration of the eye can lead to a debilitating defect that can negatively affect patient’s quality of life. To minimize these effects, exenterated orbital defects are rehabilitated using facial prosthesis, which mimic the patients’ normal anatomy. Silicone elastomers are the most widely used material for prosthesis fabrication due to their acceptable color integration and texture [1]. However, they have to be refabricated every 1.5–2 years due to the damaging effects of weathering and regular wear and tear [2].

The conventional method of silicone prosthesis fabrication requires several clinical settings and laboratory hours to be completed. Computer-aided design and computer-aided manufacturing technologies (CAD–CAM) have helped to reduce this time significantly [3] but they are not readily accessible to most clinicians primarily due to high equipment cost and lack of technical expertise. The objective of this article is to describe clinical and laboratory steps to duplicate patient’s existing prosthesis in order to fabricate a new one in a relatively short period of time, reducing the patient’s burden of multiple visits to the clinic.

Technique

(1) Take chair-side impression of the defect side using polyvinyl siloxane impression material (Multisil Epithetik soft and hard form; bredent GmbH & Co. KG, Senden, Germany) (Fig. 1). Use wooden sticks as a matrix for the impression material.

(2) Fabricate a working cast of the defect side by pouring the impression with Type IV dental stone (Nok Stone; Lafarge, Thonburi, Thailand) (Fig. 2).

(3) Mix irreversible hydrocolloid impression material (Kromopan; Lascod SpA, Firenza, Italy) and place it on the lower half of a metal flask (Varsity Flask; Hanau, NY).
Remove the ocular prosthesis from the existing silicone orbital prosthesis. Place the orbital prosthesis in the impression material such that the cameo surface of the prosthesis faces downwards and the margins of the silicone prosthesis are submerged in the impression material.

(4) After the impression material sets, place the upper half of the flask. Mix irreversible hydrocolloid impression material and pour it into the flask to adequately cover the intaglio surface of the prosthesis.

(5) Separate the upper and lower halves of the flask, after the impression material sets. Carefully remove the silicone orbital prosthesis from the flask.

(6) Using a circular hollow tube of 10 mm diameter remove the irreversible hydrocolloid impression material from the upper part of the flask to create a channel which can access the mold space formed after removal of the orbital prosthesis (Fig. 3).

(7) Place the upper and lower halves of the metal flask together. Heat baseplate wax (Cavex TT 100 Soft; Cavex, Haarlem, Netherlands) at 60 °C in a water-bath (Hanau Low Temperature Water Bath; Teledyne Hanau, NY) and pour the molten wax through the channel into the mold space (Fig. 4).

(8) Separate the upper and lower halves of the metal flask after the wax solidifies to obtain a wax replica of the existing orbital prosthesis (Fig. 5).

(9) Remove wax from the intaglio surface of the wax replica until the space for the ocular prosthesis is reached.

(10) Place the patient’s existing ocular prosthesis in the wax replica using an intaglio approach and seal with baseplate wax (Fig. 6).

(11) Clinically evaluate the wax replica in the patient and verify the position of the ocular prosthesis (Fig. 7).

(12) Adapt the margins of the wax replica on the new working cast and perform necessary adjustments on the wax-up to replicate the patient’s non-defect side.
Try-in the final wax replica to confirm its form and adaptation. Place the wax replica on the stone mold and seal with margins with baseplate wax. Attach a 1 cm long acrylic resin rod to the center of the ocular prosthesis using a cyanoacrylate adhesive. Apply separating medium (F-901 Separating Film Tinfoil Substitute; Factor II Inc., Ariz) on the working cast. Adapt boxing wax (Boxing Strips; Kerr Corp., Calif) along the periphery of the new working cast and pour type IV dental stone in it to fabricate a two-piece mold.

After complete setting of the mold, perform de-waxing. The ocular prosthesis will be attached to the intaglio surface of the upper half of the two-piece mold (Fig. 8). Apply separating medium (F-901 Separating Film Tinfoil Substitute; Factor II Inc., Ariz) to the surfaces of the upper and lower halves of the two-piece mold.

Dispense room temperature vulcanizing silicone (Multi-sil-Epithetik; bredent GmbH & Co. KG) in a mixing pad and add intrinsic color pigments (Intrinsic coloring kit, Factor II Inc.) to obtain a base shade matching to that of the patient.

Pack the silicone into the upper and lower halves of the stone mold.

After complete polymerization, separate the two halves of the mold (Fig. 9). Remove the ocular prosthesis from the upper half of the two-piece mold and place it in the new silicone prosthesis. Trim the excess flash and perform chair-side extrinsic staining.

Fix the extrinsic staining with a silicone medical adhesive (A-564; Medical Adhesive, Factor II Inc.) and deliver the new orbital prosthesis to the patient (Fig. 10).

Discussion

The fabrication of silicone prosthesis has a significant positive impact on the patient’s quality of life [4,5]. Although implant retained prosthesis offers greater retention and overall treatment satisfaction [4], an adhesive retained prosthesis is a cost effective and noninvasive treatment option. However, frequent aftercare is one of the major drawbacks associated with silicone prosthesis. Discolouration and breakdown of the margins following use is commonly observed with adhesive retained prosthesis [5]. This can affect the overall retention and esthetics of the prosthesis, necessitating their refabrication.

Unlike auricular and nasal prostheses, the previous stone mold cannot be reused during refabrication of orbital prosthesis because it comprises of two parts – the acrylic ocular prosthesis and the silicone prosthesis. It is difficult to reattach the ocular prosthesis back into the correct orientation in
the mold, once it is removed. The described duplication technique is simple and cost effective, and a new prosthesis can be fabricated within two appointments. By following these steps, a wax replica of the prosthesis can be easily obtained which saves a significant amount of time as compared to carving an entirely new wax-up. During the wax trial, the margins can be reconfirmed to the new working cast for better adaptation. The form and counters of the wax replica can be clinically adjusted and verified to improve upon the esthetics of the original prosthesis.

Adequate knowledge of the materials and laboratory skills are required to obtain the ideal results. Irreversible hydrocolloid impression material provides good reproduction of the details for duplication but delayed pouring may affect its dimensional stability [6]. Baseplate wax was used because of its easy availability, reusability and low cost. To prevent distortion of the baseplate wax, adequate time should be given for the material to cool down. It is recommended that the wax replica be clinically tried to reconfirm the form and marginal adaptation before silicone is packed. However, if the prosthesis is lost, this technique cannot be applied as it involves the duplication of the existing prosthesis to fabricate a new one.

**Conclusion**

This straightforward technique for duplication of existing silicone orbital prosthesis is both cost effective and time saving for the clinician and the patient. It is suitable for rapid prosthesis fabrication when digital duplication and milling techniques are not available.

**References**


