

# A Light Weight Ocular Prosthesis Fabricated by A Simplified Technique: An Eye in a Day

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## ABSTRACT

**Introduction:** Solid ocular prosthetic devices have considerable weight which is borne by the lower eye lid. A light weight ocular prosthesis can thus promote patient comfort by allowing longer duration of wear. Conventional techniques are time consuming requiring a number of clinical and laboratory procedures.

**Case report:** This paper reports a case in which prosthetic rehabilitation of lost left eye was done with an innovative light weight ocular prosthesis which was delivered in a single appointment by taking the advantage of viscoelastic tissue conditioner as an impression material.

**Conclusion:** The light weight ocular prosthesis promotes patient comfort permitting long duration of prosthesis wear and the simplified technique of fabrication reduces the clinical time needed and minimizes a number of laboratory procedures.

**Keyword:** Ocular prosthesis

## INTRODUCTION

Solid ocular prosthetic devices have considerable weight which has to be borne by lower eyelid which may cause laxity of the eyelid in the long term. Construction of a hollow ocular prosthesis can solve this problem by reduction in the overall weight of the prosthesis by as much as 26%.<sup>1</sup> In addition the light weight ocular prostheses promotes patient comfort by allowing long duration of wear.

Various impression materials such as dental compound, dental waxes, irreversible hydrocolloid and elastomeric impression materials have been used to record the eye socket. These impression materials are used to modify the tissue surface of stock eye so as to improve its adaptation to the mobile tissue bed. The impression material in such instances undergoes conversion to acrylic resin in the laboratory resulting in a customized stock eye.

The limitation of the currently used impression materials is that it is not well tolerated when in prolonged contact with the soft tissues. Tissue intolerance may occur when the impression materials are left on the tissue side of stock eye for a prolonged period of time for the purpose of assessment. Irreversible hydrocolloid and elastomeric materials have an additional problem that these materials do not adhere well to the stock eye and use of mechanical undercuts or a chemical adhesive may be required.

Conventional techniques for fabrication of an ocular prosthesis are time consuming requiring a number of clinical and laboratory procedures.

This case report describes a technique in which a light weight ocular prosthesis can be delivered in a single appointment taking the advantage of viscoelastic tissue conditioner as an impression material.

## CASE REPORT

A 40 year old male patient reported to the department of

prosthodontics for prosthetic rehabilitation of his lost left eye. His right eye had normal vision. On eliciting history, it was found out that at the age of 8 years the patient had sustained an injury to his left eye by a bullet of a toy gun for which he was treated by surgical evisceration of the eye. Clinical examination revealed a completely healed left eye socket. Patient had no relevant medical history.

## Procedure

A suitable stock acrylic resin eye was selected. The dimensions and colour of iris-pupil complex and sclera similar to the contralateral normal eye was selected. The size, shape, and outline of the stock eye was selected according to the socket dimensions.

The stock ocular prosthesis was modified to be used as a custom tray. The periphery of the prosthesis was trimmed to fit the eye socket. The prosthesis was oriented to the desired visual axis by adding baseplate wax to the periphery.<sup>2</sup> The ocular prosthesis may be further shaped on its corneal surface by addition of baseplate wax to achieve normal eyelid posture if required. An orangewood stick was attached to center of iris by using sticky wax.

A tissue conditioner supplied as powder and liquid (Viscogel, De Trey Division, Dentsply Ltd., Surrey, England) was used as an impression material and was mixed according to manufacturer's instructions. The gel was applied to the tissue surface of the prosthesis in an even layer to fill the space between the prosthesis and tissue bed. The prosthesis was inserted in the eye socket and maintained in situ for about 20 minutes.

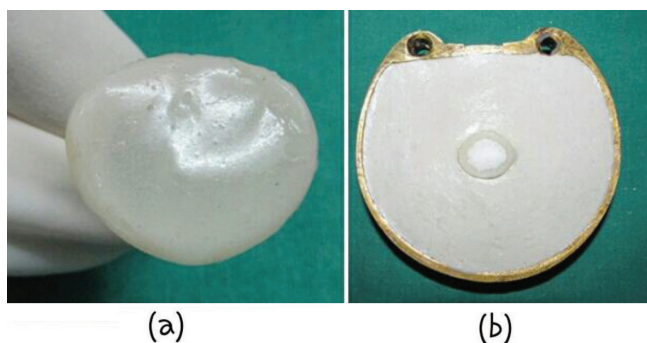
The visual axis of the prosthesis was controlled by holding the orangewood stick as gelation of impression material takes place. (Prior orientation of the prosthesis with appropriate reduction or wax additions to the periphery, may allow unassisted axial orientation of the prosthesis in the socket.) The patient was instructed to gaze ahead at a distance and to shut the eyelids intermittently. (Having the patient gaze ahead helps fix the position of the tissues of the socket and aligns the axes of both pupils. Closure of eyelids enables the patient to express fluid from lacrimal glands, which helps reduce dehydration and discomfort of the eye socket).<sup>3</sup> After the material sets, the impression surface was evaluated. (figure 1a)

Instead of fabricating a master cast and a wax conformer, the same stock eye lined with tissue conditioner was used for try-

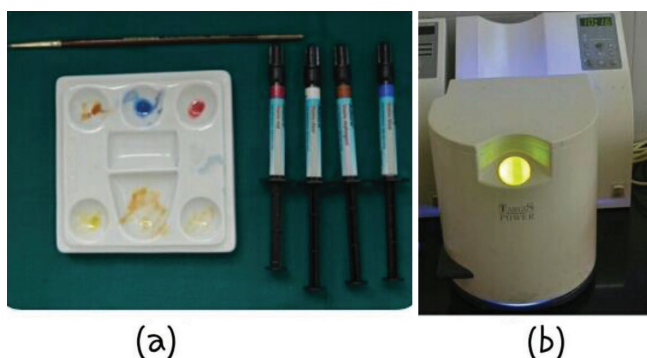
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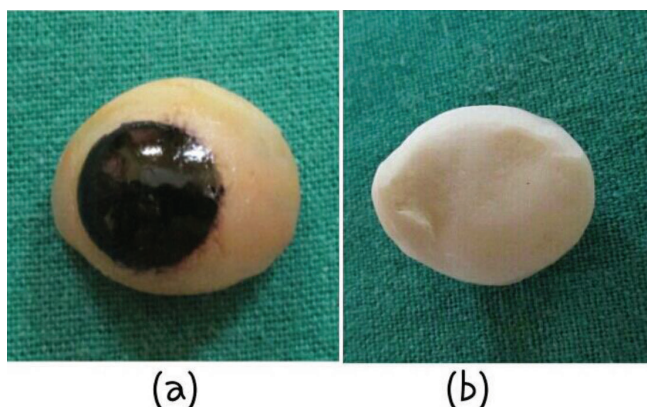
**How to cite this article:** Aditya Anil Kavlekar, Meena A. Aras, Vidya Chitre. A light weight ocular prosthesis fabricated by a simplified technique: An eye in a day. International Journal of Contemporary Medical Research 2016;3(6):1591-1593.



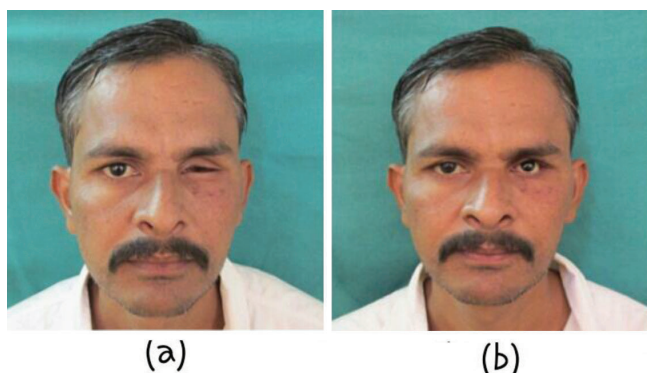
**Figure-1:** (a) Impression made using tissue conditioner as impression material; (b) Lost salt technique followed by adding appropriate amount of salt to tissue side of stock eye.



**Figure-2:** (a) Painting of the sclera with SR Adoro light cure stains; (b) Targis power light curing unit.



**Figure-3:** Completed Light weight ocular prosthesis. (a) Anterior view; (b) Posterior view.



**Figure-4:** (a) Pre-operative photograph; (b) Postoperative photograph.

in. Factors such as lid support, iris position and orientation of visual axis were evaluated.

The stock eye lined with tissue conditioner was invested in dental flask. Upon separation of the flask, the tissue conditioner layer was separated from the stock eye. Lost salt technique was used to reduce the weight of the prosthesis by placing appropriate amount of salt on the tissue side of the stock eye (figure 1b), packing was done with a mixture of clear heat cure acrylic and zinc-oxide powder to achieve a whiter shade. Acrylization was done following which the prosthesis was retrieved and finished and polished.

Try-in of the prosthesis was done to check for extent, fit, comfort and iris position.

Characterization was done with the help of SR Adoro light cure stains and Targis power light curing unit so as to match the shade with the contralateral eye (figure 2 a,b). (Ivoclar vivadent SR adoro stains are urethane dimethacrylate (47-48wt%) and silicon dioxide (49-50 wt %). These stains are routinely used for characterization of acrylic denture teeth. These stains are cured in the Targis power light curing unit by prepolymerizing for one and a half minute and final curing of 16 minutes at a temperature of 104°C.)

Optiglar protective coating agent was applied to protect the characterization.

The prosthesis was delivered to the patient. (figure 3 and 4)

## DISCUSSION

Conventional techniques require about 4-5 appointments for construction of ocular prosthesis in addition to the lab procedures involved. However the technique presented in this case report allows the ocular prosthesis to be delivered in a single appointment. This reduces the clinical time needed and minimizes the lab procedures involved. A large variety of stock eyes should be available for this technique so that proper shade matching can be achieved.

Light weight ocular prosthesis reduces the weight which is borne by the lower eyelids thus promoting patient comfort for long duration of wear and minimizes the possibility of laxity of lower eyelids. Lost salt technique described is a simple method to hollow out the prosthesis. However this technique cannot be used in shallow sockets.

Tissue conditioner was used as an impression medium. It has the advantages of biocompatibility and ease of manipulation. Its nontoxic constituents are observed to be well tolerated by conjunctival or corneal epithelia and oral epithelia.<sup>4,5</sup> It provides a comfortable and healthy soft tissue response. Its biocompatibility permits the continued clinical use and the evaluation of ocular prosthesis, over an extended period (24 to 48 hours). The tissue conditioner gel is soft and has good flow characteristics that help to register the surface detail of the eye socket. Its softness and elasticity allows physiologic compression of the tissue bed during extended prosthetic use. The tissue conditioner impression material adheres well to ocular prosthesis, without the need for mechanical retention or chemical adhesive.<sup>6</sup>

However it may have disadvantages such as initial irritation to the conjunctivae if ethyl alcohol in the liquid is not thoroughly incorporated into the polyethyl methacrylate powder. If mixed in thick consistency and added excessively to the prosthesis, it may produce a protruded or exophthalmic ocular prosthesis. If soft tissue dehiscence is present over the implant, the tissue

conditioner may adhere to an exposed ocular implant made of acrylic resin or hydroxyapatite material. For this situation, the soft tissue dehiscence is repaired surgically before the impression is made. Most tissue conditioners are slightly fungicidal because of their alcohol content but once the alcohol has leached out, the material may harbor candida.<sup>5</sup> The tissue conditioner as an impression material should be converted to acrylic resin within 24 to 48 hours of use for the material to attain elasticity, preserve its accuracy, and avoid deterioration of its properties. Resin based stains (SR Adoro) have been used for characterization and to match the natural eye colour. Ivoclar vivadent SR Adoro stains are nothing but urethane dimethacrylate (47-48wt%) and silicon dioxide (49-50wt %) and these stains are routinely used for characterization of acrylic denture teeth. These stains are cured in the Targis power light curing unit, first prepolymerized for 1 ½ minute and final curing of 16 minutes creating a temperature of 104°C. They have a better handling properties compared to acrylic paints and have been able to provide excellent esthetic results. Optiglaze protective coating agent was applied to protect the characterization.

## CONCLUSION

This article describes a technique in which a light weight ocular prosthesis can be delivered in a day taking the advantage of viscoelastic tissue conditioner as an impression material. The light weight ocular prosthesis promotes patient comfort permitting long duration of prosthesis wear and the simplified technique of fabrication reduces the clinical time needed and minimizes a number of laboratory procedures.

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**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 14-04-2016; **Published online:** 13-05-2016