EYE WITH AN ART- AN OCULAR PROSTHESIS - A CASE REPORT

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The facial appearance of a person is very important part of personality that directly affects the psychological and physical profile and eyes comprise one of the most important features of face.

When trauma or disease causes loss of an eye, the combined effort of an ophthalmologist and the maxillofacial Prosthodontist is mandatory to provide eye prosthesis to rehabilitate the concerned patient. This article presents case report of custom made ocular prosthesis by functional impression with fine details of eye socket and its fabrication along with consideration of good aesthetics.

Key words. Ocular prosthesis, wax conformer, robotic eye.

INTRODUCTION

The art of making artificial eye has been practiced since ancient time. The first ocular prosthesis was made by Roman and Egypt priests as early in fifth century BC. In those days, they were made up of painted clay attached to cloth & worn outside the socket. In the late sixteenth century, the Venetians started making artificial eye of glass but these glass eyes were crude and uncomfortable to wear and also very fragile but it remained the material of choice until Second World War. After that the development of synthetic plastic or acrylic resin occurred that facilitated fabrication of satisfactory aesthetic ocular prosthesis. The popularity of this acrylic based prosthesis has continued to increase over the years and in the present era, the vast majority of patients wear ocular prosthesis made up of acrylic resins.

CASE REPORT

A 27 year old male reported to Department of Prosthodontics, Govt. College of Dentistry, Indore with complaint of absent eyeball on left side, since birth. On examination left eye was sunken, anophthalmic and had normal tissue bed and palpebral tonicity.

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(a) Ocular impression

- 4% lignocaine hydrochloride topical solution was used as surface anesthetic agent to reduce irritability of mucosa while taking impression. A modified impression technique where an impression tray is in the shape of an ocular prosthesis was used.
- Autopolymerising resin impression tray was fabricated in the shape of eye shell & hollowed needle cover was attached as a handle.
- An impression in the shape of the space of eye socket is taken with alginate, which gels in about 2 minutes.

(b) Stone mold fabrication

After removal of impression from eye socket, a two piece mold is prepared using dental stone. The prepared mold was used in the construction of wax pattern.

(c) Altered scleral wax pattern fabrication

The altered scleral wax pattern was prepared by modified impression technique with medium body polyvinyl siloxane. This represent scleral blank of eye that was used to fabricate the final acrylic resin ocular prosthesis

(d) Fitting of iris on the scleral wax pattern

An acrylic iris cornea, which duplicates the patient own iris, is chosen and designed into the wax pattern.

It can be removed or placed in different positions in wax pattern to provide

(i) Proper direction of gaze in vertical & horizontal positions,

(ii) Desired prominence to the artificial eye

(iii) Optimum eyelid opening.

(e) Replication in scleral colored acrylic resin

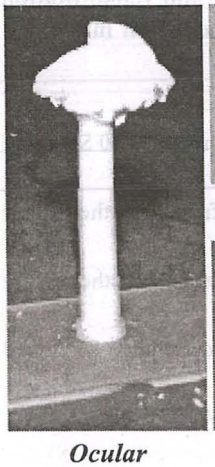
When all improvements have been made in the wax patterns, a new, final mould of wax pattern is made.

The wax is then removed and the iris is placed back into the mould in precisely the same position, as it had occupied in wax pattern.

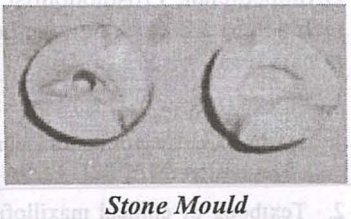
(f) Iris painting of acrylic eye

As soon as the eye is processed a thin layer of the acrylic is removed from front surface for color prepration. Veins (Fine fibers of dark red & tan flocks) are then painstakingly placed over the surface of prosthesis in such a manner as to duplicate the veining pattern of the companion eye. When the color is judged to be correct; the eye is returned to the final mold & cured.

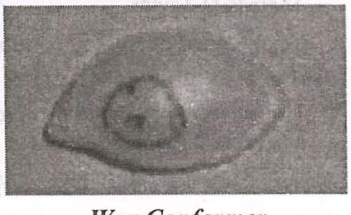
The finished and highly polished prosthesis is then placed in the eye socket & evaluated in all aspect.



Ocular Impression



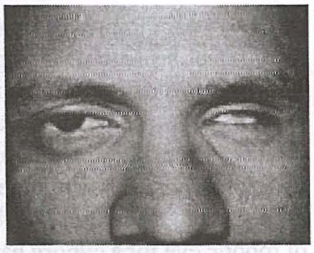
Stone Mould



Wax Conformer



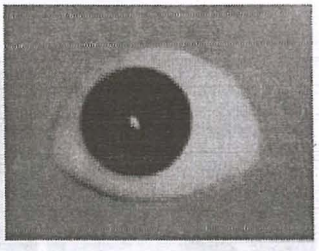
Wax Conformer trial



Pre-Treatment



Post-Treatment



Ocular Prosthesis

- Never clean or soak your artificial eye in alcohol.
- Remove the ocular prosthesis only as necessary
- Prosthesis should be cleaned by using an antibacterial soap.

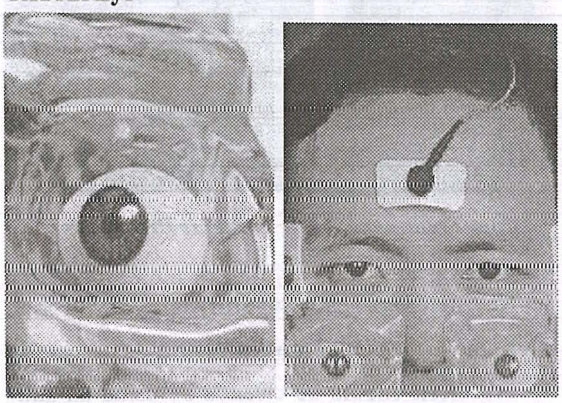
DISCUSSION

Some success can be obtained with the stock prosthesis because the mucosa can easily be displaced. But the patient will experience some discomfort because the mucosal surface of prosthesis does not fit snuggly with posterior surface of socket and that may lead to collection of mucus & debris in the voids which can cause irritation & infection of the non-conforming prosthesis. A custom made ocular prosthesis prepared by this technique provides the close adaptation to tissue bed to produce desired movements.and a more natural surface for normal lacrimal tear function and Voids that collect mucus and debris are minimized hence there is relative safety from irritation and infection.

So, the optimum cosmetic and functional result of a custom ocular prosthesis enhances the patient's rehabilitation to a normal life style. BUT still there is

lot of scope for improvisation as this prosthesis lacks life like feel, sense (touch/temperature/pressure), function (vision), natural movements (muscle & organ movements), permanent fixation. Our success to achieve human like functions in machines has inspired us to incorporate machine technologies in humans giving rise to specialty called bionics. The blue prints of robotic eye for a cyborg have opened a new era of developing devices & technologies to impart form, function and esthetics to a debilitated individual.

Robotic Eye



The demonstration of a robotic eye capable of movements similar to human eye through electronically controlled sensor which connects the robotic eye to the temporal region of an individual is highly encouraging. Patients with optic nerve deficit / damage will be able to get an eye prosthesis fitted with a miniature camera connected to the optic cortex through a microchip implanted surgically inside the brain to interpret visual signals.

Tissue/Bio Engineering

Evolutionary capability of lizard to regenerate its lost tail has fantasized man to probe in to the field of genetic engineering to acquire the capability of in - vivo/vitro tissue/organ regeneration. Tissue engineering is developing newer techniques to rebuild craniofacial structures with newer function & esthetics. Preclinical recombinant proteins gene transfer, cell based strategies are currently being developed to augment endogenous tissue repair and create structure for replacement.

- **Nano Technology** The era of nanotechnology is fast approaching which was unheard two decades ago. All disciplines of human life will be impacted by advances in nanotechnology in the near future. Nanotechnology is about manipulating matter, atom by atom. Just as robots assemble cars from a set of predefined parts, ***Nanorobots*** will assemble thing from atomic and molecular building blocks.

CONCLUSION

Though in the present era satisfactory custom made prosthesis can be fabricated which improves aesthetic appearance of the patient, provides comfort and eye movement in unison with natural eye of the patient and also plays a psycho-supportive role, still we are yet to achieve what we dreamt for. Robotic systems are posing the possible prospects for the prosthesis of future which will be able to mimic natural eye in form, functions and aesthetics. The tissue engineering and nanotechnology are the fields emerging rapidly to give a ray of hope that a time will come when no prosthesis will be required, rather we will be able to regenerate lost human body parts. This can only be achieved if Engineers, Orthopedician, Prosthodontist and rehabilitation technicians are working together as an interdisciplinary team.

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