

# Rehabilitation of Eye Defect with Customised Ocular Prosthesis: A Case Report

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## ABSTRACT

The human eye is the most precious gift of god given to a man. It communicates a person to the outer world with vision, consciousness, way of expression and dignity. Loss of an eye and its vision is a big misfortune to a patient as it is a big sensory loss. This kind of disfigurement results in psychological and social disguise. The aim of such rehabilitation should be to restore back patient's dignity, self-confidence and mask the disfigurement and to give a normal aesthetic appearance. This case report represents the rehabilitation of an ocular defect of a seven year old girl who lost her eye due to a domestic injury, customized prosthesis was a polymethylmethacrylate ocular intraorbital prosthesis.

**KEYWORDS:** Ocular Prosthesis, Rehabilitation

## INTRODUCTION

A prosthesis of eye is a simulation of anatomical eye of human using prosthetic materials to create the illusion of a perfectly normal healthy eye and surrounding tissue. Replacement of lost eye by a prosthetic material has a significant space in the desire of an artificial eye and expectations of a person to look physically normal. This is mainly because of the great incidence of loss of eye due to pathological causes, traumatic injuries resulting from physical assault, traffic accidents, war injuries, urban violence and domestic injuries.<sup>1</sup>

The eye is an even organ and so its reproductions is challenging where factors to be considered in such type of rehabilitating treatment because of limited duration of ocular prostheses, which calls for successive changes throughout life. This is difficult for patients who are living in remote area and cannot come at regular intervals for the services.

Ocular prosthesis are either readymade (stock) or custom made. They may be made of either glass or methyl methacrylate resin. Glass is not the material of choice because it is fragile and breakable and surface deterioration from contact with orbital fluids that results in a usable life expectancy of only 18 to 24 months. Methyl methacrylate resin is considered superior for ocular prosthetic materials in terms of tissue compatibility, aesthetic capabilities, durability, colour stability, adaptability of form, cost, and availability. In this case PMMA material was used for the fabrication.

## CASE REPORT

A seven year old girl reported to the department of Pedodontics, college of dentistry, with a chief complaint of cavities in a few deciduous teeth. She was quite timid and not interactive. Extra oral examination showed

missing left eye. It was enucleated due to trauma by a sharp brass utensil at home when she fell on at the age of two. She was referred then to the department of Prosthodontics for a maxillofacial prosthetic rehabilitation. Patient's relative was explained about the treatment modality and its importance. Examination revealed enucleated left eye socket with healthy conjunctival lining and absence of infection. Treatment plan included fabrication of custom made ocular prosthesis.

**Impression procedure and wax pattern:** Medium body polyvinyl siloxane impression material (aquasil, Dentsply International) was injected into the left eye socket for making a primary impression [fig 1]. Once the material was filled, the head was moved to the vertical position and the patient was directed to make all bilateral and up and down movements of the eye. This facilitated the flow of the impression material to all aspects of the base of the socket. This primary impression was invested with type II dental plaster to obtain a cast on which a custom tray using self cure acrylic resin was fabricated [fig 2]. A



Fig.1

How to cite this article:

Verma N, Saxena A. Rehabilitation of Eye Defect with Customised Ocular Prosthesis: A Case Report. Int J Oral Health Med Res 2016;3(2):38-41.

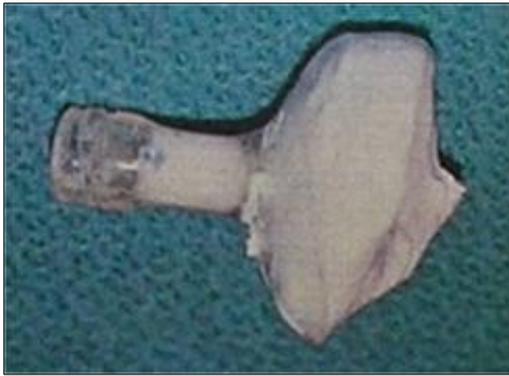


Fig.2

spacer of 0.5 mm was prepared on the inner surface of the special tray. A 3 mm diameter perforation was made on the custom tray at pupil location for injecting impression material. Multiple perforations were made on the remaining surface for mechanical retention [fig 3-4]. The custom tray was trimmed, polished and disinfected. It was tried in the patient's eye to check for extension and



Fig.3



Fig.4

orientation. The tray was placed in the socket and the syringe was loaded light body addition silicone, and an impression was made [fig 5]. Patient was again given instructions for doing all the eye movements. Impression

was checked for accuracy, and excess material was trimmed. After an acceptable impression was obtained a split cast mould was made by pouring in dental stone [fig 6]. On this cast replica molten wax was flowed to obtain a wax pattern for sclera, after finishing and polishing of fitting of wax pattern it is tried under eye lid for satisfactory outcome wax manipulated out of the socket and checked during opening and closing of the eye.

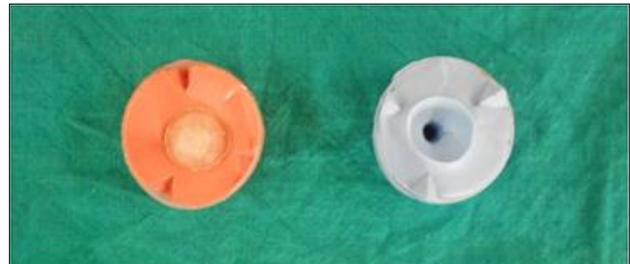


Fig.5



Fig.6

**Positioning the Iris:** The position of right eye iris was used as a guide, to mark expected position of the iris on a wax pattern. Prefabricated eye shell matching the patient's natural iris in colour and size was selected. Iris portion of this shell was separated by trimming away the scleral portion with the help of a carbide bur, for placement of the iris disc wax was scooped out from the wax pattern and special attention given for blending of iris disc with scleral pattern.

**Trial of the wax pattern:** After the placement of iris, the wax pattern was polished and tried in the socket. Position, color, gaze, fit, comfort, support to the tissues and muscles of eye and aesthetics were compared with the right eye.

**Flasking and curing:** Wax pattern with iris disc was flaked in a crown flask. Lost wax technique was used for acrylization. Dewaxing completed and the placement of iris disc checked. Tooth moulding heat cured acrylic resin of appropriate shade was mixed and packed into the mold. Processing was done using short curing cycle. After processing prosthesis was recovered, preserving the split mold. Surface layer of the scleral portion was trimmed for 0.5 to 1mm. Nylon fibrils used to mimic veins which were gained from heat cure acrylic resin [fig 7-10]. The recovered prosthesis was finished and



Fig.7



Fig.8



Fig.9



Fig.10

polished followed by disinfection before insertion. Disinfection of prosthesis was done with 0.5% chlorhexidine and 70% isopropyl alcohol for 5 minutes.

**Insertion:** Prosthesis was inserted into the socket after rinsing in a sterile solution and checked for bilateral symmetry and patient comfort [fig 11]. The patient was trained for insertion and removal of the prosthesis. Patient was instructed to remove the prosthesis while sleeping to relax the muscles and was advised for follow up in every three months.



Fig.11

## DISCUSSION

Although the effects of enucleating in early childhood on facial symmetry and orbital volume are still debated, advantages of an ocular prosthesis in a school going child extends beyond aesthetics. It helps in building confidence in the child, makes them more acceptable and helps in developing their personality. Although the prosthesis cannot restore the vision but it reduces the psychological trauma of being without an eye. The art of making artificial eye has a historical background from Egyptians and Peruvian Indians but esthetic refinement was done after invention of refined plastics.<sup>3</sup>

It is always challenging for a Prosthodontist to give a maxillofacial prosthesis which demands blending of the prosthesis with facial structures and maintaining the symmetry in a natural way.<sup>5,6</sup>

Types of Maxillofacial defects can be classified as follows:

- Congenital defects- these develop during intrauterine life between 6<sup>th</sup> to 9<sup>th</sup> weeks of this period.
- Acquired defects- are present due to destruction to some degree of an originally normal maxillofacial structure.

Other causes of acquired defects are:

- Surgical eradication of tumours 85%
- Destructive inflammatory processes: Syphilis, T.B., and osteomyelitis.
- Traumatic injuries: mechanical, heat, chemical, electrical and irradiation agents.

Maxillofacial prosthesis can be classified as:

#### 1-INTRAORAL RESTORATION

- A-obturators
- B-Stents
- C-splints
- D-resection appliance

#### 2-EXTRAORAL RESTORATIONS:

- A-radium shield
- B-restoration of missing eye, ear and nose
- C-earplug for hearing aids

#### 3-COMBINED INTRA AND EXTRA ORAL:

As lost part of maxilla or mandible and part of the facial structure

#### 4-CRANIAL ONLAYS AND INLAYS:

Used in cranioplasty due to skull injury

#### 5-INTRA MANDIBULAR IMPLANT: to restore lost part of bone

Précising the discussion to ocular defect congenital defects of the eye can be classified as retinoblastoma, anophthalmia, and microphthalmia.

Acquired defects can be enumerated as: Phthisis bulbi, atrophic bulbi, post evisceration, post enucleation, post trauma and chemical injuries contracted socket following radiation.<sup>4</sup>

Fabrication of ocular prosthesis can be done by various methods and means like prosthetic contact lenses, scleral shell, and full thickness prosthesis. These kind of an ocular prosthesis can be classified according to the kind of fabricating material used as:

- Glass
- Silicone and
- Polymethylmethacrylate.

Glass was once the preferred material but due to difficulty in moulding and being fragile in nature is seldom used these days except in some parts of Europe. Stock eyes are also available of different types with the aid for retention like hook type, the conventional ones, and snellen eyes. Poly methyl methacrylate is the most commonly used material for custom eyes to be fabricated due to ease of moulding in any desired shape. Silicon is the material of choice in fabricating the orbital prosthesis with the periocular skin and pattern. It is nonreactive,

moulds easily and above all the desired skin texture can be created over the surface. Thus, there is need of careful examination and treatment planning for such patients to give them a quality life with dignity and esthetic rehabilitation.<sup>2,7</sup>

## SUMMARY

The loss of eye requires early replacement so that the patient may return to a normal esthetic life. Prosthetic replacement of eye helps the patient to live a normal happy life. Most patients get benefit from custom made ocular prosthesis that are modified to the individual needs. Ocular prosthesis requires meticulous patient evaluation, examination of the defect and supporting tissues of the eye and willingness of the patient/guardian. This approach is more time consuming, but the esthetic and functional results are better with this technique. The disfigurement resulting from the loss of an eye can cause significant psychological as well as social consequences. With the advancement in ophthalmic surgery and ocular prosthesis, patients can be rehabilitated very effectively. With the advancement in implant supporting ocular prosthesis the retention aids are greatly enhanced although expensive means but can be a good treatment option.

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Source of Support: Nil  
Conflict of Interest: Nil