Artistic and functional approach to rejuvenate the acquired ocular imperfections – A case report.

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Abstract:
Facial features are the most important non-verbal means of communication. The mutilation of a portion of the face can cause a heavy impact on the self-image and personality of an individual which may lead to physical and psychological distress. The loss of eye requires early rehabilitation so that the patient may return to a normal life. The primary objective, in each case, is to construct a prosthesis that will restore the defect, improve esthetics, and thereby benefit the morale of the patient. With the evolution of maxillofacial rehabilitation, ocular prosthesis has proved to be a boon. An ocular prosthesis replicates anatomy of human eye utilizing prosthetic materials to imitate healthy eye and surrounding tissue. Therefore, it is rightly said, "maxillofacial rehabilitation adds life to years". The present case report enlightens the technique of fabrication, aesthetics achieved, and functionality of ocular prosthesis.

Key-words: Esthetics, maxillofacial rehabilitation, ocular prosthesis.

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Introduction:

Facial features are the most important non-verbal means of communication. The disfigurement of a portion of the face can cause a heavy impact on the self-image and personality of an individual which may lead to physical and psychological distress. Ocular prostheses prove to have advantages such as improved esthetics gained from upgraded control over the size of the iris, pupil, and color of the iris and sclera, improved eyelid movements, reduced incidence of ulceration, recent advances in fit, comfort, and adaptation has enhanced facial contours.[1] Anecdotal reports and relics from ancient civilizations indicate replacement of ocular defects with an artificial eye has been practiced for thousands of years. [2]

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Case History:

A 35-year-old male patient reported to the Department of Prosthodontics from the Department of Ophthalmology for the replacement of his missing eye. The patient presented a history of enucleation because of traumatic injury to the right eye 2 years before followed by the enucleation of the same 4 months ago. Examination of the eye socket was done. Examination revealed healthy conjunctiva with no signs of infection or inflammation covering the posterior wall of the anophthalmic socket and showing synchronous movements. (Figure 1a and 1b)

After careful examination of the area of the defect and treatment planning, the procedure was explained to the patient and consent was taken for making photographic records. The customized

ocular prosthesis was fabricated to comfortably fit the socket, using prefabricated stock iris which closely matched to the natural eye.

The patient should be prepared and reassured about the procedure of impression making. The patient is asked to keep the contralateral normal eye open and fixate the gaze. Diagnostic impression was made by alginate using the sterile injection without needle for injecting the alginate into the socket and also this serves for holding impression material in place [figure 2]. The impression thus obtained was poured with a two-piece stone mould technique using the type-III dental stone. Four indexing keys were properly made on 1st poured type-III dental stone. A thin layer of separating medium was applied and allowed to dry before second pour with type -III dental stone. As the cast was produced and trimmed, the superior, inferior, medial, distal sides were marked for reorientation, and undercuts were blocked with wax.

The custom impression tray was fabricated using clear acrylic self-cure polymethyl methacrylate (DPI) (Figure 3). It was evaluated for any overextension in the ocular defect and corrected. Multiple perforations were made in the tray to avoid any compression of ocular tissues and a hole of 3-4 mm diameter was made at the approximate location of pupil. The dispensing tip was attached to the custom tray using auto polymerizing resin to support the custom tray and to dispense final impression material. Border molding was completed, tray adhesive applied and medium body addition silicon, Aquasil (Dentsply, USA) was injected into the socket. The patient was instructed to perform normal eye movements which included the closure of eyelid and moving the other eye in an upward and downward direction as well as right and left movement (Figure 4).

The cast was fabricated by two-piece mould technique as previously discussed wherein type IV dental stone (Ultrarock, Kalabhai, India) was used for the pouring of base and type III dental stone was used for pouring counter mould. Mould was calibrated as mesial, distal, superiorly and inferiorly again (Figure 5). Wax pattern was fabricated using a two-piece mould and a wax pattern trial was done to confirm contour and confirm the scleral extensions. The ocular moulage, when done correctly, permits the juxtaposition of the prostheses over anophthalmic socket. Contralateral natural eye was used as reference for selection of size, shade and position of the iris. Iris which most closely matched was selected from stock eyes. The scleral part of the stock eye was carefully trimmed off using an acrylic trimmer. Centralization of the iris was done using Vernier caliper and position of iris on the contralateral side as a guide (Figure 6). Stock iris was positioned on the scleral wax pattern and the border was sealed using a hot instrument. The position of the iris was confirmed (Figure 7). Shade selection for the sclera was done using the natural eye as a guide.

The plastic sleeve was attached to the iris using cyanoacrylate adhesive, to secure its position. This wax pattern was flasked and dewaxing was done. The wax-in trial ocular prosthesis was replaced by clear heat cure polymethyl methacrylate resin (DPI, India) and customized heat-cure tooth-colored acrylic (DPI Mumbai – Shade B) and characterization of the sclera was done using red silk fibers to simulate blood. The plastic sleeve on the ocular button, flash, and irregularities were removed from the surface. The ocular prosthesis was trimmed and polished using flour of pumice (Figure 8). The finished and polished ocular prosthesis was inserted. (Figures 9). Post insertion instructions

were given and the patient was recalled for follow-up yearly for evaluation of mucosa. This ensures to minimize any irritation of mucosa and increases the overall life of prostheses. Cosmetic optics can be used by the patient to give the camouflage effect and improve the esthetics of the patient (Figures 10).

Discussion:

The use of custom-made ocular prosthesis has been a boon for the patient's physical and psychological well-being and is presented as an economical option to the average patient who cannot afford the expensive treatment options available. The literature provides various techniques for fabricating ocular prostheses, ranging from prefabricated to custom-made prostheses. The technique mentioned in this article was easy to perform in dental clinic. Great adaptation and superior esthetics can be ensured with custom made prostheses. According to Beumer et al., the prefabricated prosthesis should be avoided as they fail to provide intimate contact between prostheses and tissue bed as they cause uneven distribution of pressure. It can also result in irritated mucosa and act as a potential cause of infection.[1] Hence, it was decided to fabricate a custom-made eye prosthesis. Several impression techniques have been proposed for making ocular impressions but its validness depends on the patient's presentation, operator experience, material and equipment available. The alginate impression was used in many case reports [3] but elastomeric impression material can produce a superior impression of the defect. Hence, of all the techniques, direct/external impression technique with low viscosity was used making a preliminary impression and custom tray impression were used as the final impression in this case. There was a modified impression technique with the fabrication of custom tray or using the stock conformer as a tray described by Allen and Webster [4], however, it would require another appointment but superior impression can be obtained. The procedure of centering is technique sensitive and requires more consideration to simulate the contralateral eye. McArthur [5] suggested a method using an ocular locator and fixed caliper to determine the position of iris. Raizada and Rani [6] described a couple of methods for positioning of iris and suggested that it is important to have ocularist opinion in the fabrication of prostheses. In this article, a technique to place prefabricated iris disk as accurately as possible by maintaining symmetry with the contralateral side and taking the measurement from midline using a digital Vernier caliper. This technique for centralization is simple and does not require any special instruments. The limitation of this technique is that it cannot be implemented in patients with asymmetric facial structure. Until 19th century, glass was preferred material used for the fabrication of ocular prostheses. With the introduction of polymethylmethacrylate (PMMA), it has become a material of choice. Custom made ocular prostheses using PMMA offer numerous advantages such as biocompatibility, better esthetics, durability, non-brittle, adaptability of form, ease of repair and polish, cost, and availability.[2] Various techniques have been used by various authors to simulate iris which is similar to patients' contralateral natural eye such as closely matched iris from prefabricated / stock eye [7], iris painting [8], or making a digital image of iris of patient’s contralateral natural eye.[9] In our case report, a customized ocular prosthesis was fabricated using iris from stock which closely matched to the natural eye. The prosthesis maintains the shape of socket, holds up the eye

lids and supports its muscular function, maintains palpebral opening, and gives patient a gaze similar to that of the natural eye.

Limitations of technique used in this case report were that technique for centralization of iris could not be used in patients with asymmetric facial structure, clinician has to be dependent on availability of stock eye with properly matched shade and size of iris, color stability of heat cured acrylic and bonding of iris to acrylic needs to evaluated at regular intervals.

Conclusion:

Ocular prostheses do not provide a new vision to the patient but it does provide a new outlook for themselves and others. It promotes physical and psychological healing for the patient, improves social acceptance and restores self-esteem. The literature provides two techniques for fabrication of ocular prosthesis, one is a pre-fabricated ocular prosthesis and the other is custom-made. Custom-made ocular prosthesis ensures accurate adaptation to the surrounding tissues and result in functionally as well as aesthetically accurate prosthetic outcome.

Declaration of patient consent

The authors certify that appropriate consent form was signed by the patient. In the form, the patient has given consent for images and other clinical information to be reported in the journal. The patient understands that name will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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Figures

Figure 1a

Figure 1b

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

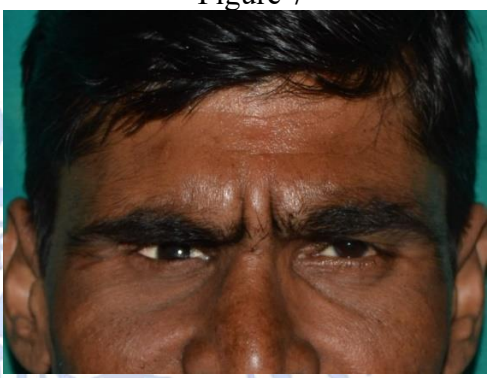

Figure 9

Figure 10