CASE REPORT

Various Steps Involved in Fabrication of an Ocular Prosthesis: A Case Report

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ABSTRACT

Ocular and orbital disorders leading to surgical procedures which generally results in ocular defects, if immediate intervention are done to preserve the anophthalmic socket size and giving the conformers to the patient, might lead to contractures of tissue after the surgical procedures. As in most of the cases the conformers are not given, this leads to delayed collapse of space for ocular prosthesis. This article describes an alternative two-step impression technique for ocular prosthesis which employs two materials of different consistencies. This method of two step impression provide better adaptation to underlying tissues and also digital images which are used very frequently in the present age plays an important role in matching the color of prosthesis very accurately. The increased mobility of the prosthesis leading to improvements in facial contours, and improved esthetics and also giving the patient a physiological comfort, security & a self-confidence which is lost after the defect.

KEYWORDS: Ocular Prosthesis, Ocular Defect, Artificial Eye, Impression Technique, Custom impression tray

INTRODUCTION

An ocular prosthesis is one technique sensitive procedure for the accurate duplication of natural color, size, contour and ocular orientation which will provide realism and symmetry to the need of patient. There are sequence of steps for construction of ocular prosthesis which involves, the critical areas of fabrication and artistic techniques important for the successful prosthetic treatment.

A main objective in restoration of an anophthalmic socket with an ocular prosthesis is to enable the patient to better cope with the difficult process of rehabilitation.[1] The loss of part of the face effects mainly; physical, social, and psychological behaviour of the people affected.[2] The maxillofacial prosthesis are those which restore and replace stomatognathic and associated facial structures with artificial substitutes which was mainly to improve the patient's esthetics, restore and maintain health of the remaining structures, and consequently provide physical and mental well-being.[3] The loss or absence of an eye which are caused by a congenital defect, irreparable trauma, tumor, a painful blind eye, sympathetic ophthalmia evaluate the need for histologic confirmation of a suspected diagnosis.[4]

The surgical management ocular defect include: evisceration, enucleation, or exenteration. Evisceration is surgical procedure in which the intraocular contents of the globe are removed, leaving the sclera, Tenon's capsule, conjunctiva, extraocular muscles, and optic nerve undisturbed.[4] Enucleation is the surgical removal of the globe and a portion of the optic nerve from the orbit.[4] Exenteration is the en bloc removal of the entire orbit, usually involving partial or total removal of the eyelids, and is performed primarily for eradication of malignant orbital tumors.[4] The conformer plays an important role in minimizes the changes of the socket size, maintains the shape of conjunctival fornices, and prevents scar tissue from contractures which is distorting factor for the socket bed during tissue healing.[5,6] After the tissue healing has been complete then conformer is replaced by permanent ocular prosthesis.

There are numerous techniques for processing of an ocular prosthesis.[5,7,12,14] Mathews et al[8] classified ocular impression and fitting techniques which suggest using an improved technique for custom fabrication of ocular impression tray to obtain a better-fitting custom-made ocular prosthesis. They advocated the use of an existing ocular prosthesis or a conformer for an impression tray and modified the technique which were suggested by Miller.[9] Miller's technique requires a minimal armamentarium which relies only on patient presenting with some prosthesis or conformer in place.[8] Many authors advocated the use of conformers or ocular prosthesis early Although early ocular prosthesis or conformer insertion has been advocated by many investigators,[5,6,10] If the prosthesis or conformer is given to patient before completion of healing, leading to settlement and sinking of prosthesis in early interval of time before the final prosthesis.[10]

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To meet this criteria for acceptability, an impression should have accurate records of posterior wall, superior and inferior fornices of palpebrae and also the postion of palpebere to the posterior wall.[11,13]

The article described the various steps involved in fabrication of ocular prosthesis using stock eye; case done in Department of Prosthodontics, Himachal Institute of Dental Sciences in Poanta Sahib, Himachal Pradesh.

TECHNIQUE

1. Inspect the anophthalmic socket and defect region. Measure the diameter of the iris and pupil on the intact side, preferably in daylight. Then, instruct the patient to stare at infinity, and take photographs, including frontal images of the entire face and orbital regions and images of the existing eye. Fig. 1(a).
2. Lightly lubricate the eyebrow and eyelashes with petroleum jelly on the defect side. Clean the socket by injecting cooled saline solution into it and dry with cotton pellets. Then quickly proceed to making the primary or diagnostic ocular impression.
3. Take the modelling wax (DPI) and soften it by putting wax in rubber bowl with hot water and adapt on the side of face with properly placed around the defect Fig. 1(b).
4. The 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 and poured the alginate on outside the eye socket with placing the paper clips embedded in the alginate Fig. 1(c).
5. As the impression made, provide backing with plaster of paris type-II (ultradent) for support of it. Then the impression were taken out with a gentle care Fig. 1(e) and the impression were boxed with modelling wax Fig. 1(f) and poured with 2 step technique using the type-IV dental stone (ultradent) and properly made 4 indexing keys on 1st poured type-IV dental stone Fig. 1(g) and separating medium cold mould seal (DPI) was applied before 2nd pour with type-IV dental stone Fig. 1(h).
6. As the cast was produced and properly trimmed, Fig. 1(i) marked superior, inferior, medial , distal and undercuts were blocked with wax and special tray was fabricated with self-cure poly methyl methacrylate (DPI) Fig. 1(j), (k).
7. The special tray was evaluated for any overextension in the ocular defect and corrected before final impression and also the hole created in special tray and coated with tray adhesive, with injection and vinyl polysiloxane light body (coltene /wahldent , Germany) with little injecting in the injection Fig. 1(L) as simultaneous with backing with alginate (DPI) with repeating the paper clips and supporting it with fast setting plaster of paris type-II dental stone (ultradent).
8. The cast were fabricated as previously and as marked mesial, distal, superiorly and inferiorly again. The prefabricated eye shell as matched with patient's digital images taken at different angles and then eye placed in the cast and fitted by triming Fig. 1(m). The space between the ocular anterior wall and the inner surface of stock eye was filled with softened modelling wax.
9. The wax relined stock eye was adjusted by softening the wax in hot water and the patient was asked to do various eye movements which included closure of eyelid and moving the other eye in upward and downward direction as well as right and left movement. this adjusted wax relined stock eye was finally adjusted for fullness and esthetics by centering the pupils Fig. 1(n),(o).
10. The wax-in trial ocular prosthesis was replaced by clear heat cure poly methyl methacrylate resin (DPI, India) Fig. 1(p). The ocular prosthesis was trimmed Fig. 1(q), (r) and polished. The finished and polished ocular prosthesis was inserted. Fig. 1(s),(t). Post insertion instruction were given and patient was recalled for follow-ups.

Fig. 1 (a)

Fig. 1 (b)

Fig. 1 (c)

Fig. 1 (d)

Fig. 1 (e)

Fig. 1 (f)

Fig. 1 (g)

Fig. 1 (h)

Fig. 1 (i)

Fig. 1 (j)

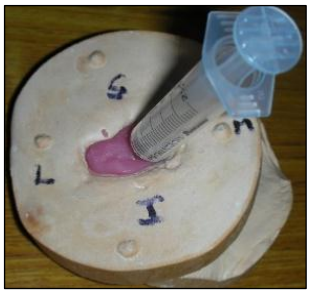

Fig. 1 (k)

Fig. 1 (l)

Fig. 1 (m)

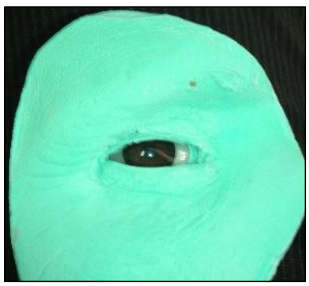

Fig. 1 (n)

Fig. 1 (o)

Fig. 1 (p)

Fig. 1 (q)

Fig. 1 (r)

Fig. 1 (s)

Fig. 1 (t)

DISCUSSION

The desirability and effectiveness of various impression techniques depend on various factors like patient's presentation, space for prosthesis, equipment, available materials, operator experience and mainly patient physiocology. The impression technique which described has proven to be very good & satisfactory in the rehabilitation of the anophthalmic patients. This technique also helps in correct and closely adaptation of ocular prosthesis to the remaining substructure, globe and muscle tissue, which ultimately help in less risk of microorganism and secretion to be accumulated in the defect. Immediate placement of conformers are always difficult in the patients.

As the two step technique is involved in the case it leads to accurate fit and esthetics and also the movements[14] which were asked to do by patient during trial of the prosthesis plays an important role in the adaptation of ocular prosthesis. As the above procedure is very cost effective and less time consuming than the other techniques.[5,8,13,15-20] The construction of ocular prosthesis requires minimal armamentarium and is very cost-effective.

As the patient were not given any conformers after the enucleation so there will be definitive chances that after an interval of time the ocular prosthesis which were given

would settle and sink properly into the socket and which will lead to again relining of the prosthesis. The medical history of patient and general examination did not reveal any suspicions for possible predisposition to allergic reactions, and no signs of toxic reactions were witnessed after the delivery of the interim prosthesis. But the potential for toxic and allergic reactions should always be taken into account, and if a possible predisposition is suspected, a patch test should be done to rule out or confirm that possibility.[12,21] According to the results of the patch test, a reliable plastic material can be chosen and adapted to this technique.

The main disadvantage is that some of patient are allergic to acrylic resin and also the autopolymerising resin is a good substitute for this[12] but in that resin there is a lack of trial appointment. The color and size, and also the position of the iris relative to the eyelids are adjusted in the laboratory, according to initially made measurements, from digital photographs.

CONCLUSION

The delayed ocular prosthesis fabrication after enucleation may require multiple remakes of the delivered prosthesis due to the alterations to the size and shape of the anophthalmic socket. The two step impression technique for the ocular prosthesis construction provides accurate adaptability to the surrounding tissue and greater comfort, security and physiologically a self-confidence which will helps in his daily life.

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