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Orbital prosthesis fabrication- an esthetic solution for post mucormycosis orbital defect

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Abstract

Eyes are vital organ not only for vision but also for the facial expression. An orbital prosthesis is a good alternative to surgical reconstruction for cosmetic and psychological rehabilitation of the patient. It should be aesthetic, durable, light weight, economical, and most importantly retentive. This case report describes the fabrication of an orbital prosthesis using medical grade silicone in a patient treated for mucormycosis with extenteration of left eye providing an acceptable and esthetic result.

Keywords: Orbital Prosthesis, Mechanical Retention, Silicone, Sealer, Die Pins

Introduction

Disfigurement of the face due to exenteration of an eye is a very traumatic event in a person's life not only physically but also psychologically and emotionally as face and eyes are the identities of the person.[1] Any facial deformity is a severe debilitating factor for the psychology of an individual. Restoring these patients with a facial prosthesis that facades the defect is a very demanding task. Nevertheless when appropriately made it is the finest service that can be rendered to a patient who feels socially secluded because of the facial deficiency.[2] Orbital prosthesis presents an attractive and viable alternative when esthetic and functional demands are beyond the capacity of local reconstructive efforts. Prosthesis for orbital defects can be made from a variety of materials such as poly-methyl methacrylate, polyurethane elastomer, silicone elastomer, or urethane backed medical grade silicone. Retention also play a key role in success of the maxillofacial prosthesis(i.e.,

anatomic, adhesives, and mechanical). The most accepted mode for improving retention is through use of osseointegrated implants. But due to many reasons like inadequate bone, added surgery, extra cost for the implant and past radiation history, it becomes complicated. Eyegalss frames offer an additional high degree of bonding , mainly to acrylic prosthesis and helps in camouflaging.[1] A multidisciplinary management and team approach are essential in providing accurate and effective rehabilitation and follow-up care for the patient. This article describes a simplified method for the fabrication of a silicone orbital prosthesis mechanically retained from the defect and camouflaging with eyeglass frames.

Case Report

A male patient aged 50 years, reported to the Department of Prosthodontics, Government Dental College & Hospital, Ahmedabad for the replacement of his exenterated left eye. Patient's left eye was surgically removed enbloc because of fungal infection (mucormycosis).

Examination showed a completely healed ocular socket. There was no pain or discomfort in the defect region. Definite bony undercuts were found on the superior and inferior borders of the socket which ultimately aided in retention of the prosthesis.

Technique

1. To study the case in detail, a full facial impression from forehead region to nose was made with the patient in an upright position and the remaining right eye passively closed.
2. The eyebrow and eyelashes were lightly lubricated. Then a direct impression was made using irreversible hydrocolloid with reinforcement by dental plaster(kaldent, kalabhai karson Pvt. Ltd) {figure 1(a)}. Subsequently, a cast was poured in dental stone type II (Goldstone, kalabhai karson Pvt. Ltd) {figure 1(b)}
3. Facial molage model was retrieved followed by custom tray fabrication [figure 2(a)] then final impression was recorded with addition silicon light body impression material(president light body system, coltene) after evaluation of periorbital extensions [figure 2(b)] and master cast was made with die stone(type 4 gypsum product) (pearlstone, asian chemicals) [figure 2(c)].
4. The diameter of the iris on the intact side was measured using a pair of Boley Gauge calipers {figure 3(a)}.
5. For correct orientation of the eye shell in the defect area, many methods are reported in the literature. Facial measurements were used to orient the shell in this case . The right eye of the patient was maintained in the conversational gaze. A series of vertical lines were marked on the patient's face; line (A) through the midline of the face eye and a line (B) through the medial canthus of the eye and line (C) through the pupil of the right eye and a line (D) through the lateral canthus of the eye. The distance between lines (A) and (B) was measured and a vertical line (B^1) was drawn on the defect side from the midline (A). The distance between lines (A) and (C) was measured and a vertical line (C^1) was drawn on the defect side from the midline (A). The distance between lines (A) and (D) was measured and a vertical line (D^1) was drawn on the defect side from the midline (A). {figure 3(b)}. These facial measurements were transferred to the *working model* to assist in wax pattern fabrication.[3,5]
6. Stock eye was oriented using facebow transfer (Hanau springbow) as a reference {figure 3(c)}.

7. The wax pattern(Ruthinium group modeling hard wax) was carved with necessary details with the help of mirror image of right eye and try-in was done {figure 4(b)}. Evaluation of eye shell position and feather margin from front and lateral view was assessed {figure 4(a)}.
8. Posterior indexing method was used for stabilising the eye shell during processing. A hole was made through the rear portion of the processing cast through which a needle cap filled with auto polymerizing resin(DPI RR cold cure) was inserted to contact and index the posterior surface of the eye shell {figure 4(c)}.[3,7]
9. Dental stone(Goldstone, kalabhai karson Pvt. Ltd) was used for mould preparation as it was easy to construct, accurate, and inexpensive. The processing cast along with the indexed pattern was invested in dental stone and dewaxed {figure 5(a,b).
10. Color matching was done using trial and error method by taking skin adjacent to the defect as reference. Silicone material (Bredent UK) was mixed as per the manufacturer instructions. Intrinsic stains were added to achieve shade matching. Packing of silicone was done with syringe {figure 6(a)} and the prosthesis was deflasked following polymerization after 24hours (overnight curing) {figure 6(b,c)}.[8,9]
11. Discrepancy in the shade matching was compensated by using extrinsic shades. A sealer was applied after the stains set {figure 7(a)}. [4]
12. Patient was called for insertion and artificial eyelashes and eye brows were attached to the same density as it was present on the right eye.
13. Home care instructions were given, cleaning with soap and warm water once per day.
14. Patient was advised to continue the use of his reading glasses which further helped to camouflage the margins of the prosthesis {figure 7(b)}.
15. The patient was asked to report on a six month basis for evaluation of the prosthesis condition.

Discussion:

The challenges faced during constructing an orbital prosthesis are; obtaining a satisfactory working model without tissue compression, proper orientation of the ocular portion in harmony with the remaining eye, reproducing the contour and anatomy of the periorbital tissues, determining proper gaze and interlid opening and obtaining a satisfactory colour match.[3]

There are various retentive features have been used for orbital prosthesis, some of them are they include eye patches, prosthesis fastened to spectacle frame extensions from the denture, magnets, adhesives, and osseointegrated implants.[6] In modern days the prosthesis are secured with adhesives that are readily available, easily applied, and provide satisfactory retention, but for a limited period of time. Their, continual use of adhesives may cause allergic response or irritation. Each retentive methods have their own negative features. Use of anatomic retention that extends in to the undercuts give the best mechanical retention.

In the present case pre-fabricated stock eye was used due to its availability in varying shades and size. The orientation of the stock eye should resemble the contralateral eye in all the three planes. This remains an important challenge in the fabrication of orbital prosthesis as the orientation of the stock eye may change during dewaxing. This can be prevented by sealing the stock eye to a template[4]

Conclusion:

A good interaction between the prosthodontist and the surgeon makes the surgical site more favourable for

prosthetic rehabilitation. As major area for esthetics is face, with the aid of the orbital prosthesis, there is a boost in the patients confidence level. In addition, the prosthesis design incorporated retention features during the function, which is the major criteria for the success of the prosthesis. The mechanical retention was used which made the prosthesis economical and esthetically pleasing.

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Figure Legends

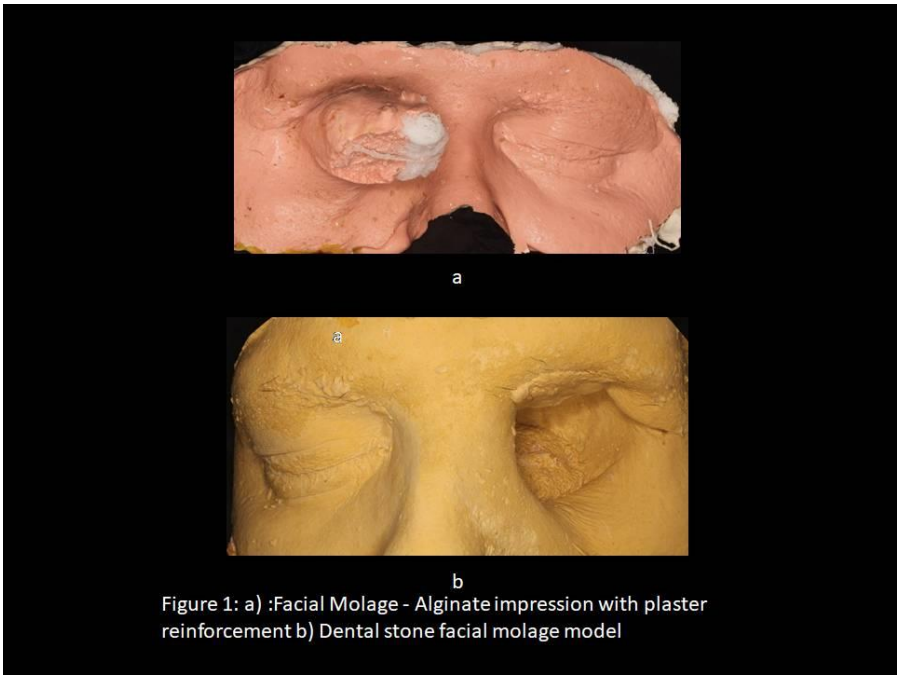


Figure 1: a) :Facial Molage - Alginate impression with plaster reinforcement b) Dental stone facial molage model

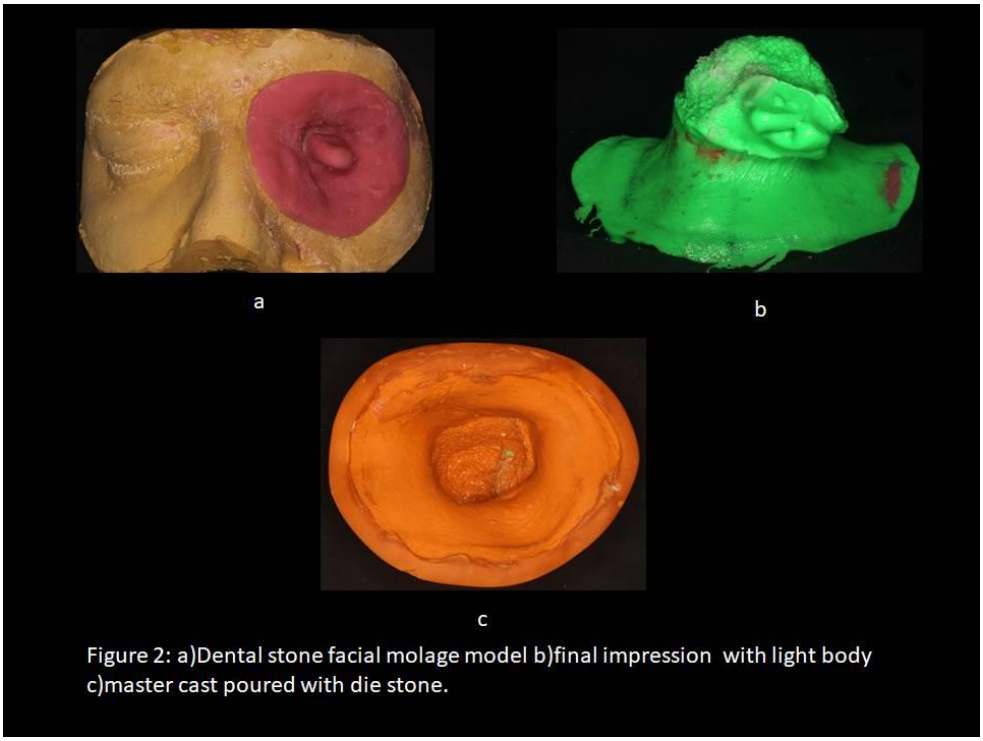


Figure 2: a)Dental stone facial molage model b)final impression with light body c)master cast poured with die stone.

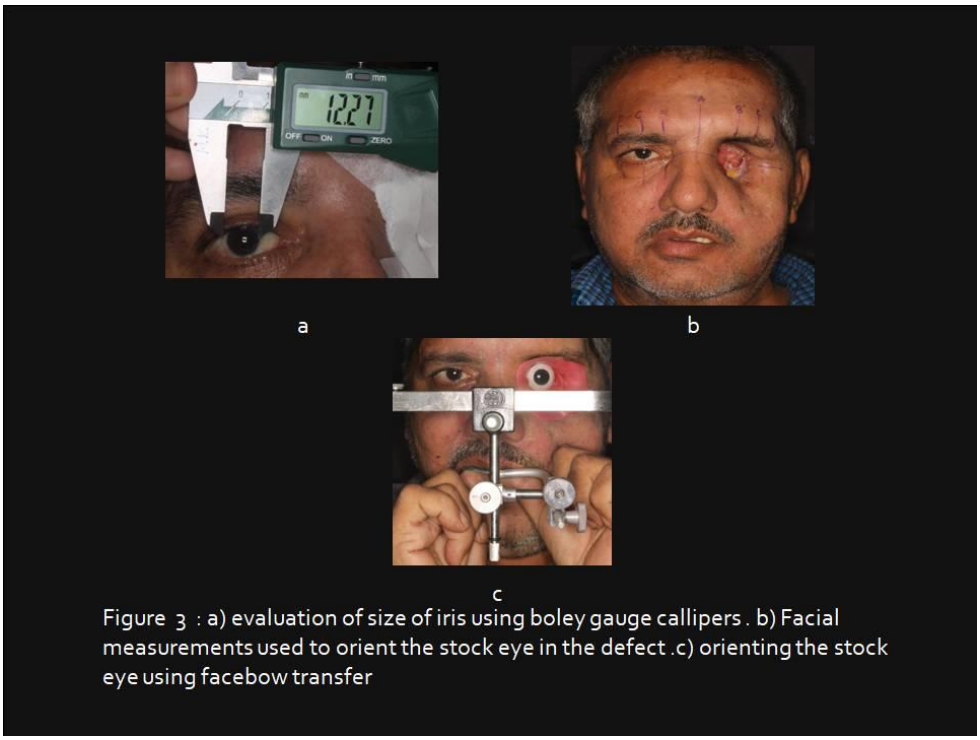


Figure 3 : a) evaluation of size of iris using boley gauge callipers . b) Facial measurements used to orient the stock eye in the defect .c) orienting the stock eye using facebow transfer

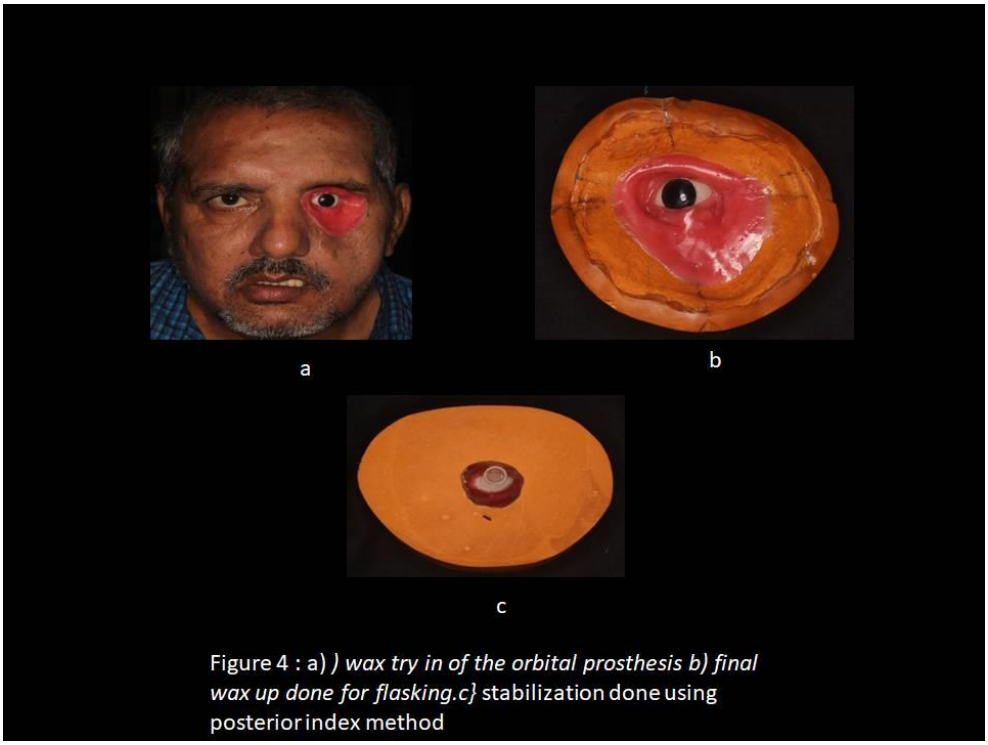


Figure 4 : a) *) wax try in of the orbital prosthesis b) final wax up done for flasking.c}* stabilization done using posterior index method

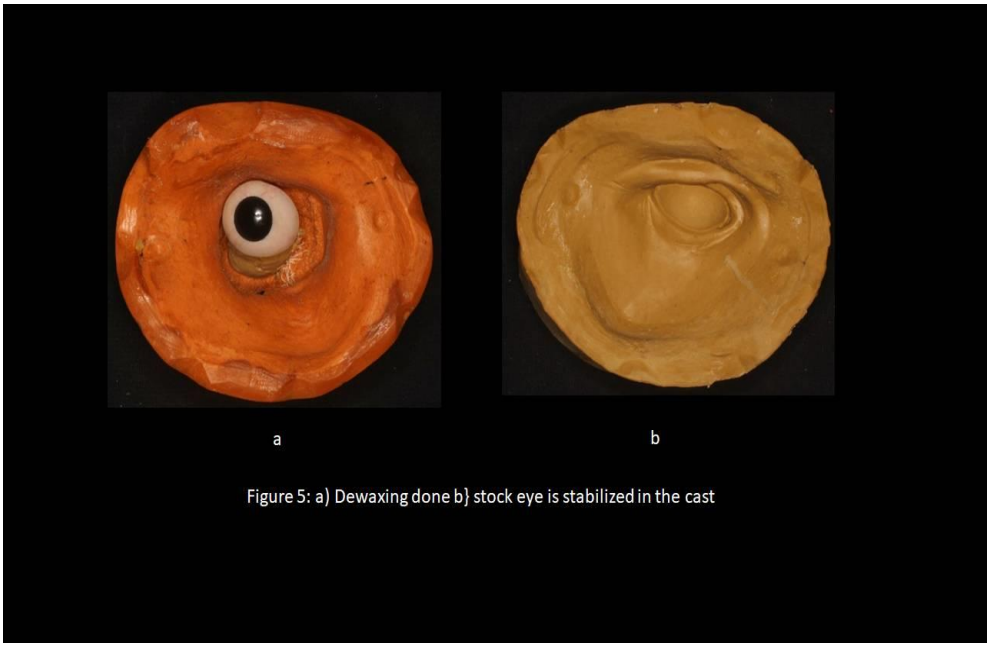
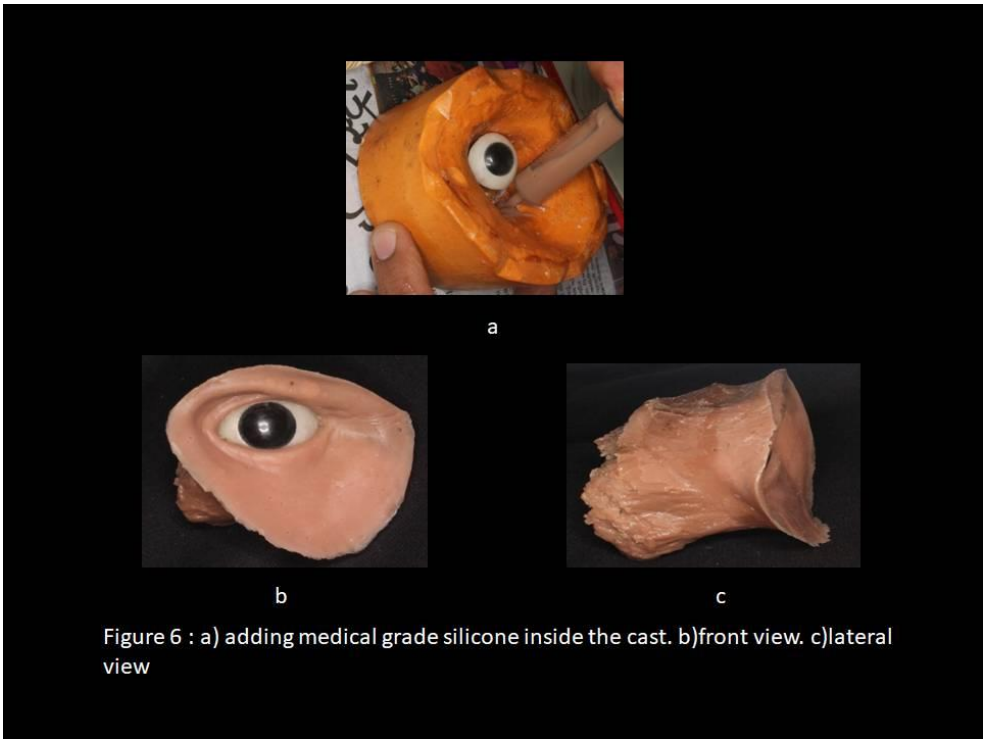


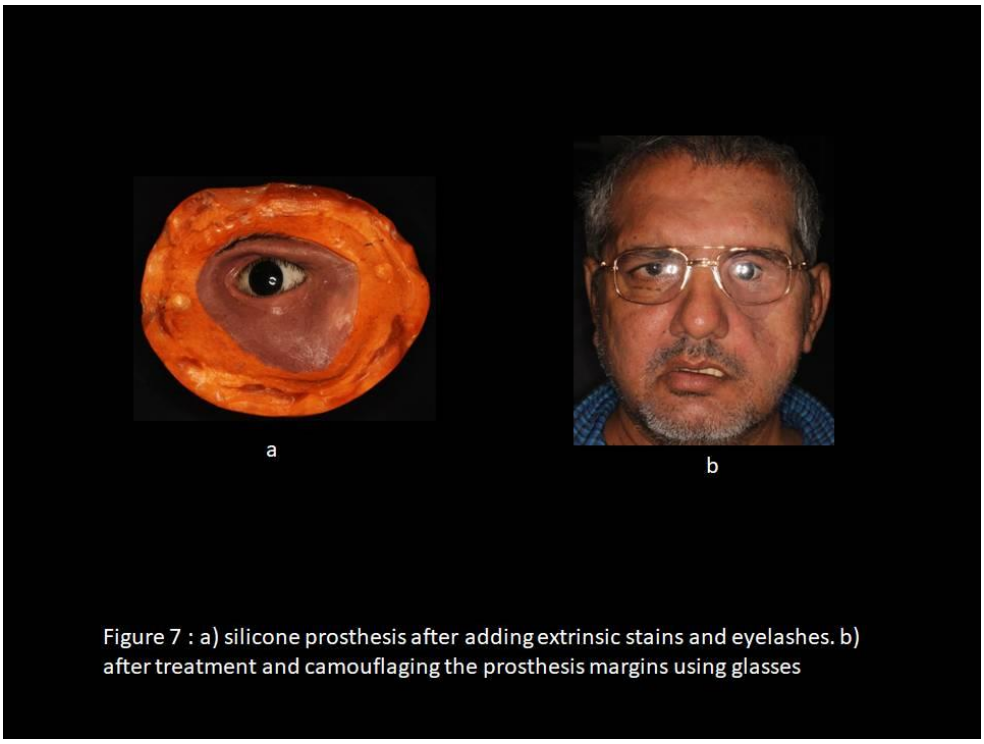
Figure 5: a) Dewaxing done b} stock eye is stabilized in the cast



a

b c

Figure 6 : a) adding medical grade silicone inside the cast. b)front view. c)lateral view



a b

Figure 7 : a) silicone prosthesis after adding extrinsic stains and eyelashes. b) after treatment and camouflaging the prosthesis margins using glasses