

Prosthetic rehabilitation after orbital exenteration: A case series

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Orbital exenteration is executed by the ophthalmic surgeon to treat various neoplasms or non-malignant diseases. But it leads to several functional, esthetic and psychological problems for the patients. Orbital prosthesis is a good alternative for cosmetic and psychological rehabilitation, if reconstructive surgery is not possible or not desired by the patient. In the following article, different materials and retentive aids for fabrication of an orbital prosthesis given in the literature along with few novel methods have been discussed for four patients who underwent orbital exenteration. Factors that an ophthalmic surgeon should consider during surgery, which may later on help the prosthodontist to obtain good cosmetic results, are also discussed briefly. Remarkable results can be obtained if both work as a team for one common goal i.e. improvement of quality of life of the patient after orbital exenteration.

Key words: Acrylic eye prosthesis, light weight orbital prosthesis, orbital prosthesis, rhinocerebral mucormycosis, silicone eye prosthesis

An ophthalmic surgeon performs a radical procedure like orbital exenteration for the treatment of potentially life-threatening malignancies or relentlessly progressive conditions unresponsive to other treatments.^[1] Common

indications for orbital exenteration include neoplasms like basal cell carcinoma, melanoma or squamous cell carcinoma; painful blind eye; infection; recent injury; disfiguring blind eye; prevention of sympathetic ophthalmia etc.^[2] This leads to devastating cosmetic, functional and psychological problems in the patients.

Cosmetic rehabilitation with reconstructive surgical procedures may not be always feasible because of the large defect size or may not be desired by the patients because of the need for further surgical procedures, added cost, and multiple postoperative visits. So, in such cases, the surgeon should motivate the patient and refer him for the prosthetic rehabilitation in time. To obtain good cosmetic results, the orbital defect should have a stable bone cover, healthy boundaries, closed sinuses and should have maintained position of the eyebrow. The soft tissue defining the defect should be thin and immobile. Maintaining depth into the defect is also crucial to achieve the depth of the prosthesis to match with that of the natural eye.^[3]

A team approach between the surgeon and the maxillofacial prosthodontist can help in fabrication of a prosthesis that is economical, indiscernible with the adjacent natural tissues and retentive, so that the patient can wear it with full confidence.

This article presents a case series of four patients who were referred to the department of Prosthodontics and maxillofacial prostheses from the department of Ophthalmology, AIIMS for cosmetic rehabilitation. Our purpose is to discuss different types of materials for fabrication of orbital prosthesis and appropriate retentive aids. As the patient education begins at an early stage, proper guidance by the surgeon about the possibilities of rehabilitation can help to reduce the psychological distress to the patient during the course of the treatment.

Case Reports

Case 1: Light-weight spectacle retained acrylic prosthesis

Patient reported with both eyes exenterated three months earlier [Fig. 1a]. Exenteration of the right socket was done in 2009 because of squamous cell carcinoma. Patient was not referred for cosmetic rehabilitation at that time and was not aware about such possibility. Almost two years later, patient had to undergo exenteration of the left eye due to a similar lesion Patient had to leave his job because of lack of vision and was socially withdrawn because of facial deficit. This time patient was referred to the department of Prosthodontics for rehabilitation with artificial prosthesis.

Patient wanted an economical and user-friendly prosthesis for his cosmetic rehabilitation. So, spectacle retained acrylic

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prosthesis was delivered to him [Fig. 1b and c]. It fulfilled his requirements and patient could easily place or remove the prosthesis with the help of his tactile sensation.

Case 2: Adhesive retained silicone prosthesis

Patient reported with chief complaints like nasal regurgitation of food and esthetic disfigurement due to missing right eye and associated facial structures. Patient had the history of sinonasal carcinoma with extensive necrosis that involved right maxillary sinus, nasal cavity and right eye. Postoperative facial defect was large and continuous with the oral defect through a small opening [Fig. 2a]. So, separate prostheses were fabricated. Treatment options available for the patient were spectacle-retained prosthesis, adhesive-retained prosthesis or implant-retained prosthesis. Adhesive-retained prosthesis was the best suited option as patient had associated facial defect as well [Fig. 2b]. Acrylic prosthesis in such cases would be heavy and it is not possible to hide the margins of acrylic prosthesis with spectacle frame. Silicone gives more life like appearance and margins can be more precisely merged with the skin of the patient. Intraoral maxillary obturator fabricated in heat-cured acrylic was delivered to the patient to help in mastication and swallowing. Adhesive retained orbital prosthesis was delivered for cosmetic rehabilitation.

Case 3: Silicone prosthesis attached to obturator with pin and socket of an electricity plug

Patient underwent orbital exenteration and maxillectomy of the right side because of rhinocerebral mucormycosis. Patient was diabetic and complained of nasal regurgitation of food and was not able to go in public because of esthetic disfigurement. Extra orally, tissue was healthy but no definite bony or soft tissue undercut was found to help in the retention of the prosthesis [Fig. 3a]. As the intraoral and extraoral defects were continuous, orbital prosthesis was plugged with the help of pin of electric plug (patrix) into the socket (matrix) attached to the bulb of maxillary obturator for the retention of the prosthesis [Fig. 3b and c]. Patient was instructed to seat the obturator first and then wear the eye prosthesis [Fig. 3d and e].

Case 4: Silicone prosthesis attached to the obturator using magnetic buttons

Patient underwent orbital exenteration and maxillectomy of the

right side because of squamous cell carcinoma eroding the right orbital floor, posterior wall of maxilla, infratemporal fossa, right hard palate, medial wall of maxilla, right nasal cavity and right ethmoidal air sinuses. This led to the formation of continuous intraoral and extraoral defects [Fig. 4a]. Patient was conscious about her looks but had financial constraints. Magnetic button of wallet (to carry money etc.) was attached to the bulb of the obturator and the counterpart was attached to the tissue side of the acrylic conformer of the silicone orbital prosthesis [Fig. 4b and c]. Patient was instructed to first insert the obturator in the mouth and then the two magnetic parts seated like a matrix and patrix over each other when the orbital prosthesis was placed over the socket [Fig. 4d]. The magnetic forces helped the patient to seat the prosthesis in correct position.

Discussion

An orbital prosthesis should be aesthetic, durable, light weight, economical, and most importantly retentive. Choice of material and retentive aid depend upon patient's esthetic demands, size and type of defect, type of lifestyle, financial condition etc.

Most commonly used materials for fabrication of facial prosthesis are acrylic and silicone elastomers. Acrylic offers advantages like adequate longevity, remarkable aging properties, low cost, easy to process, better adherence of prosthesis to spectacle frame and minimal maintenance. The rigidity of acrylic resin is seldom a problem, as the tissue bed is rarely movable.^[4,5] Silicone materials are preferred nowadays, as they provide better marginal adaptation and more life like appearance than acrylic. But they are expensive and lack the ability of chemical/mechanical bonding with the eyeglass frame.^[6]

Various methods of retention include prosthesis fastened to spectacle frame,^[5] anatomic retention using conformer^[7] or acrylic resin template relined by a resilient denture liner,^[8] adhesives,^[9,10] stud attachments,^[11] implants with magnetic attachments etc.^[9,12,13] Although spectacle-retained prosthesis is an economical retentive aid but the frame becomes bulky and it becomes mandatory for the patient to wear spectacles every time he wants to use the prosthesis. Adhesives are being commonly used in the form of sprays, crèmes or tapes but the possibility of misalignment and allergy to the adhesive are the important drawbacks reported in literature.^[9,10] So, its use on



Figure 1: (a) Patient with bilateral orbital exenteration, (b) Spectacle-retained prosthesis, (c) Final prosthesis on patient's face



Figure 2: (a) Patient with large orbital and facial defect, (b) Adhesive retained silicone prosthesis



Figure 3: (a) Continuous orbital and maxillary defects, (b) Acrylic conformer with undercut for silicone prosthesis, (c) Tissue surface of obturator showing matrix, (d) Tissue surface of orbital prosthesis showing matrix, (e): Final prosthesis on patient's face



Figure 5: Scooped out wax from tissue side of prosthesis

sensitive skin, unhealed sockets with or without exudates is not recommended. In the patient described above with bilateral exenteration, manual dexterity required for correct orientation of prosthesis and daily application and removal of adhesive was not feasible due to total lack of vision. So, spectacle retained prosthesis was the best suited option for him.

Retention can also be obtained to some extent from bony or soft tissue undercuts at the defect site. But these were not sufficient in the cases mentioned above. So, in cases 3 and 4, novel methods of retention-like pin and socket of electric plug and magnetic buttons of wallet were used. These are indicated especially for patients having continuous orbital and maxillary defects with missing anatomic undercuts. These methods are economical, provide satisfactory retention and do not necessitate the use of adhesives or spectacles. The only disadvantage is that the patients require manual dexterity to position the prosthesis accurately. But this can be learnt easily with time. There may also be corrosion or loss of magnetism with time,^[5] but unlike other magnets being commonly used; magnetic buttons used here are very cheap and easily available. So, these can be replaced easily without damaging or replacing the existing prosthesis.



Figure 4: (a) Pretreatment view of continuous orbital and maxillary defects, (b) Magnetic button attached to obturator bulb, (c) Prostheses attached with magnets like matrix and patrix, (d) Final silicone prosthesis

A hollow prosthesis can be fabricated to reduce the weight of the prosthesis, especially in case of bilateral prosthesis, or when size of the defect is very large. It is difficult to rehabilitate the patients with large defects as the size and the weight of the prosthesis increase. So, a hollow prosthesis can be made by scooping out the extra wax from the tissue side of the prosthesis before investing it [Fig. 5]. But, it is also difficult to achieve satisfactory esthetics if the width and depth of the socket after surgery is very less [Fig. 6a and b]. So, the operating surgeon should remove sufficient contents to obtain adequate width and depth of the socket.^[3]

Osseointegrated implants offer several advantages over adhesives or other mechanical retentive aids by providing better retention even in the case of a large defect or adverse anatomy of the defect, convenient positioning of the prosthesis, lesser influence of the environmental factors like perspiration, UV light, and increased shelflife of the prosthesis.^[14,15] All these

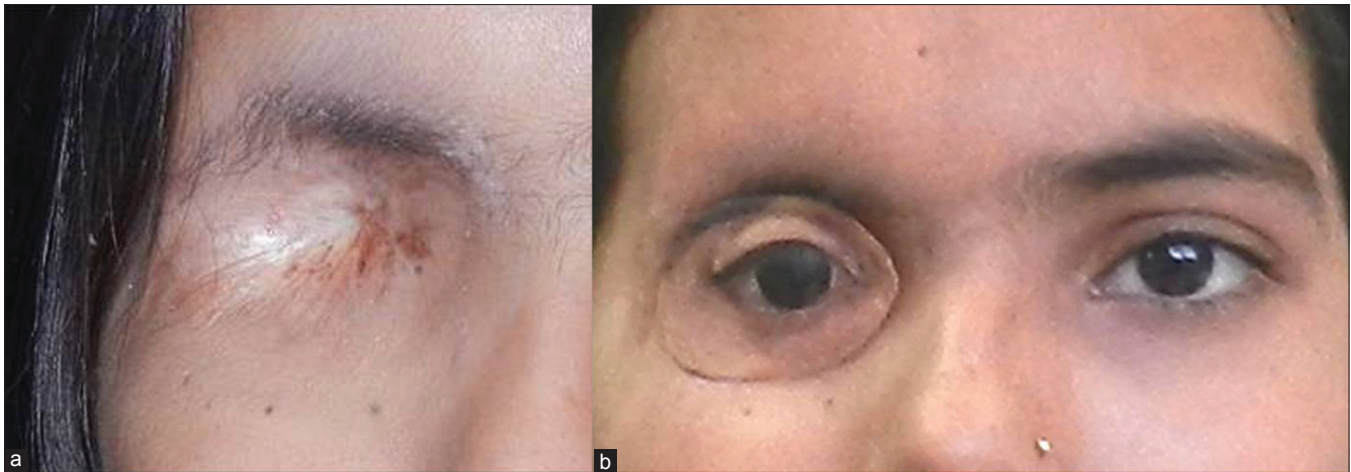


Figure 6: (a) Pretreatment view showing inadequate depth of socket, (b) Post-treatment view showing unsatisfactory esthetics

factors lead to greater patient acceptance, especially in young patients with active lifestyle. But implant placement should be well planned with a team effort between the surgeon and the prosthodontist to ensure that implant angulation or implant body or subsequent bar splint placement does not interfere with normal contours of the facial prosthesis.^[16]

However, controversy regarding the placement of implants in the orbit has been documented. Studies show a higher failure rate because of higher chances of soft tissue infections, decreased vascular perfusion, poor remodeling capacity of bone-implant surface and lack of stabilizing bone volume in proximity to the frontal sinus.^[14-18] Financial constraints, added surgeries, insufficient available bone, history of radiation, poor general health of the patients, higher risk of late failure, higher hygiene maintenance requirements usually restrict us from using this option commonly.^[18]

Conclusion

The role of ophthalmologist is crucial in terms of removal of lesion, obtaining suitable anatomy of the residual defect and motivation of the patient for cosmetic rehabilitation. The maxillofacial prosthodontist can successfully rehabilitate such patients by choosing appropriate material for prosthesis and retentive aid, based upon the esthetic and functional requirements of the patient. Collaborative efforts by both specialists can help in quick reintegration of patients with orbital defects.

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