Rehabilitation of orbital defect with silicone orbital prosthesis retained by dental implants

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Orbital defects can result from cancer, birth anomalies, or trauma leading to an onslaught of problems in the function and psyche of the patient. These defects are restored by surgical reconstruction and followed by placement of orbital prosthesis for cosmetic makeup. The use of dental implants in retaining orbital prosthesis improves patient acceptance of the prosthesis owing to better retention and stability than conventional adhesive retained prosthesis. This case report describes a custom-made magnetic retentive assembly anchored by a dental implant which offers the orbital prosthesis the simplicity of self-alignment and ease of use.

Key words: Implant retained silicone prosthesis, magnet implant retained prosthesis, maxillofacial prosthesis, orbital prosthesis

Orbital exenteration is a disfiguring procedure wherein the entire contents of the orbit comprising the periorbita, appendages, and eyelids will be excised by the ophthalmic surgeon. It creates a massive deformity on the face and demoralizes the patient due to the psychological impact. Orbital exenteration leads to functional and esthetic impairment and poses a challenge for the reconstructive surgeon. This type of surgical removal of the orbit is limited for the treatment of potentially life bullying malignancies arising from the orbit and adjacent areas.[1] Apart from the visual deficiency, it results in a marked social infirmity.

The main cause for the exenteration is the incidence of the periocular skin cancers. The incidence of cancer is influenced by the geographical area and racial group.[2] The most common tumor is the basal cell carcinoma which accounts for 90% in most cases. Squamous cell and sebaceous gland carcinoma occur approximately in 4–6% each.[3,4] Squamous cell carcinoma and sebaceous gland carcinoma were the most common indications for orbital exenteration in India.[5]

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Cosmetic rehabilitation of the orbital defects is done by placement of a custom made orbital prosthesis in the defect. This prosthesis is usually fabricated by the anaplastologists or prosthodontists. A maxillofacial prosthodontist studies the orbital defect and may plan for an osseointegrated implant retained orbital prosthesis. Since prosthodontists restore the implants in the oral cavity, it may be more apt for them to execute a treatment plan for implant retained orbital prosthesis in terms of selecting the appropriate attachments design and material.

Retention of the orbital prosthesis is a key factor for success of the prosthesis. Spectacle frame, anatomical undercuts, and adhesives are the most commonly used means of retentive media for the orbital prosthesis.[6,7] Although there have been reports in the literature regarding retaining the orbital prosthesis using osseointegrated implants,[8] the different methods of securing the orbital prosthesis to the dental implants are very scanty in ophthalmic literature. This paper describes a unique way of economically anchoring the dental implants using magnetic attachment assembly for retention of silicone orbital prosthesis and may help the ophthalmologist to suggest a rehabilitation remedy to the orbital exenterated patients.

Case Report

A 27-year-old male patient was referred to the Department of Prosthodontics at our institution. The patient complained of facial asymmetry and poor looks due to loss of the right eye. A history of retinoblastoma, followed by exenteration of the orbit was recorded. The surgical intervention had been carried out when the patient was 5 months old; thereby the growth was retarded. The facial asymmetry was apparent as the anophthalmic defect included the right orbit and extended laterally along the outer canthus of the eye, toward the temporal region as well along the malar eminence toward the zygomatic arch. The patient underwent a computed tomography scan on basis of which a stereolithographic model was fabricated. A mock surgery on the stereolithography model [Fig. 1] revealed optimal bone thickness along the inferolateral orbital rim composed of zygomatic bone while the lateral aspect of superolateral rim composed of frontal bone showed moderately optimal bone in terms of thickness and density.

A surgical stent was fabricated as per the mock preparation. After obtaining patient's written consent, implant surgical procedure was done under short general anesthesia. Two intraoral dental implants were placed depending on the availability of the bone at the defect site. A 3.75 mm × 10 mm implant was placed in inferolateral region and 3.75 mm × 8 mm implant was placed in superolateral region [Fig. 2]. A healing

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period of 4 months was given following which the extra oral radiographs - posteroanterior waters and lateral cephalogram [Fig. 3] were made. The defect impression was made with implant components in place [Fig. 4]. A metal framework was cast to attach it to the implant abutment with the magnetic keepers embedded in it [Fig. 5]. The metal framework was threaded onto implant in the patients defect. The wax orbital prosthesis had the corresponding magnets embedded in it [Fig. 6]. The wax trial was taken [Fig. 7]. Finally, the silicone orbital prosthesis was placed *in situ* [Fig. 8]. Intrinsic coloring was done to blend the silicone with the adjacent skin color.

The evaluation of the final prosthesis showed excellent retention and stability with facial expressions and head movement. The patient was extremely pleased with the final outcome, and there was also a marked improvement in his social interaction and self-esteem.

Hygiene maintenance instructions were given to the patient to maintain cleanliness. Cotton buds, an interspace toothbrush with soft bristles and floss were the advised cleaning aids.

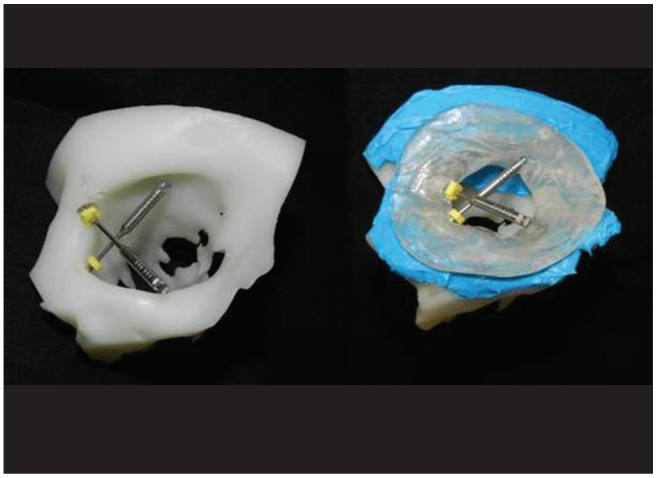

Figure 1: Stereolithography model with pilot drill orientation and surgical template

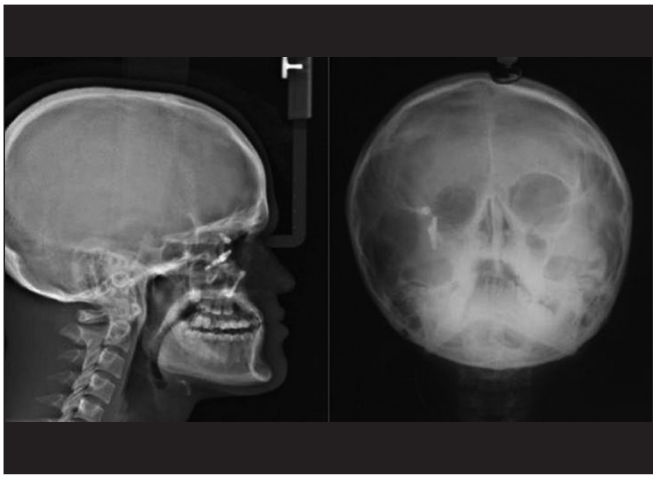

Figure 3: Extraoral radiographs-cephalogram and posteroanterior waters view showing position of implants

Discussion

After the orbital resection, the ophthalmic surgeon may opt to do the surgical reconstruction. The surgical reconstruction has limitations in age, the medical condition, remnant tissue, postradiation status of tissues, and esthetics. Surgical reconstruction creates a patch on the defect, and all the raw areas are closed. There will be no defect undercut remaining for the prosthesis retention. In such cases, spectacles, adhesives, and osseointegrated dental implants may be the choice for retaining the prosthesis. However, with spectacles and adhesives, the patient may lose confidence since they may not hold the prosthesis firmly to the skin. In addition, there are few limitations with spectacle retained prosthesis that spectacles ever being removed in public. Therefore, implants are the viable and valid alternative for retaining the prosthesis. It may be beneficial to have a little amount of defect depth to accommodate the prosthesis bulk. The surgeon may retain small defect portion after reconstruction to accommodate the prosthesis bulk.

Considering the size of the defect and economic constraints, a novel design of using "multipurpose magnetic keepers" housed in a bar was fabricated. This assembly consisted of

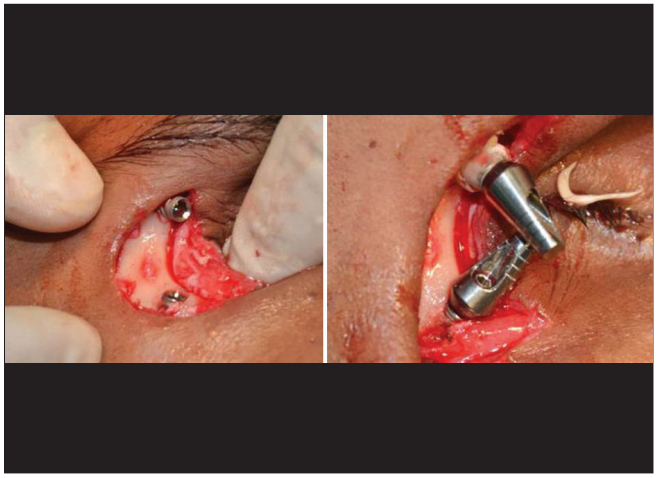

Figure 2: Implant placement along the superolateral and inferolateral orbital rim

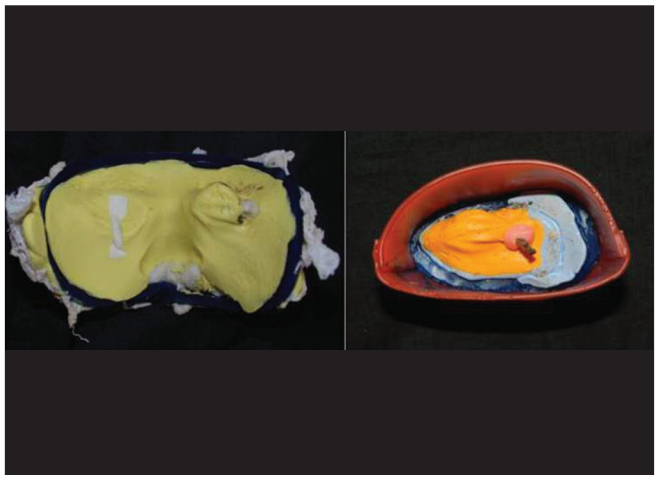

Figure 4: Facial moulage and direct implant level impression

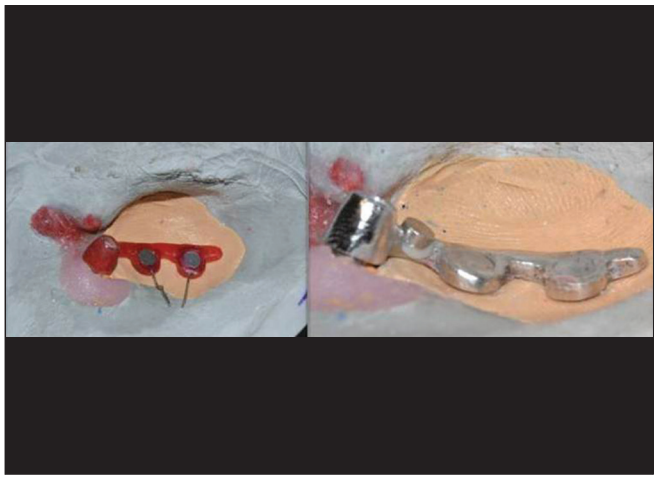

Figure 5: Retentive assembly-pattern and casting with embedded keepers and cemented indigenous Samarium cobalt magnet

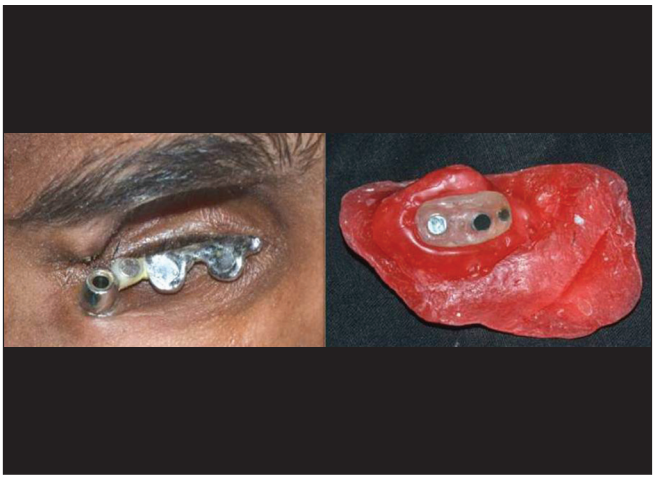

Figure 6: Trial of metal sleeve-retentive assembly and acrylic shim with magnets aligned with their keepers

Figure 7: Sculpted wax pattern trial in front view and lateral view

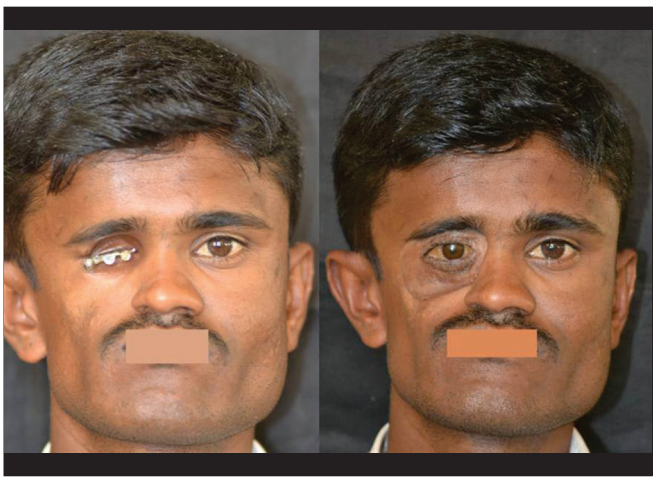

Figure 8: Pretreatment and posttreatment photograph of the patient

keeper bar and dental magnets which are ordinarily available for prosthesis use along with an indigenous samarium-cobalt magnet. Magnets were embedded in an acrylic resin index corresponding to the keepers. The magnets were embedded in a teflon sleeve to prevent corrosion of magnets.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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