

Implant-retained orbital prosthesis

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An 11-year-old woman reported with rhabdomyosarcoma of the right eye, with cranial involvement. The patient had received multimodal treatment comprising chemotherapy and orbital exenteration. Implant-retained orbital restoration was considered after a decade of the curative treatment. One implant was placed in the supraorbital ridge and the other implant, in the frontal process of the zygoma. Subsequently, implant-supported magnet-retained prosthesis was fabricated.

Key words: Implants, orbital prosthesis, magnets, silicone

INTRODUCTION

Restoration of aesthetics and function is the main objective of maxillofacial prosthetic rehabilitation following ablative surgery for malignant tumors. Conventionally, the retention of facial prosthesis is achieved by engaging tissue undercuts and by using RTV silicone adhesive (silica-reinforced organopolysiloxane) or two-sided tapes. The adhesive can cause acute skin reactions (redness and inflammation) due to presence of the acetic acid, which is released during the curing process. The retention is unreliable and inadequate since perspiration and oil secretion causes displacement even on applying slight force and can cause embarrassment to the patient in the society and thus has a negative impact. Another disadvantage of using adhesives is the need for frequent application, which results in the deterioration of the prosthesis.^[1] The introduction of osseointegrated implant-retained prosthesis alleviates the problem of questionable and unsatisfactory retention. The development of a clinically successful osseointegration procedure for intraoral prosthetic treatment has progressed to the extent of the prosthetic replacement of extraoral structures. Appreciable aesthetics is achieved although the function is not restored. Increased retention improves comfort as well as the level of confidence in the patient while wearing a facial prosthesis at work and in social settings. Without the need for daily application of adhesives, convenience for the patient is improved while concurrently increasing the overall life span of the prosthesis.^[2] Patients have benefited with the placement of fixtures for a bone-anchored hearing aid in 1977 and a bone-anchored auricular prosthesis in

1979, at the university of Gothenburg.^[3] This case report describes the rehabilitation of a patient with an orbital defect following exenteration of the eye to rehabilitate an operated case of rhabdomyosarcoma.

CASE REPORT

In 1996, an 11-year-old female patient reported with swelling and pain in the upper right eyelid. Histopathological diagnosis revealed rhabdomyosarcoma. The ultrasound finding of the tumor showed extra- and intracranial involvement. She was treated with chemotherapy followed by surgical exenteration of the eye. After surgery, she received a second protocol of maintenance chemotherapy. After completion of the treatment regime, she was referred for orbital prosthesis.[Figure 1]. Conventional silicone adhesive-retained eye prosthesis was fabricated, but the patient's skin was found to be allergic to the adhesive. After concealing the deformity for more than a decade with colored glass spectacles and attaining full growth she decided to opt for implant-retained orbital prosthesis.

Procedure

1. Orthopantomogram and computerized tomography scan images were obtained to determine the thickness of the bone available at the intended site of implant insertion. The CT scan showed pneumatization of the right frontal sinus thus limiting the site for the insertion of the implants. The bone height available around the defect was less than 1 cm.
2. An alginate impression of the patients face was prepared. It was reinforced with gauze strips and



Figure 1: Pre-operative view of the orbit



Figure 7: Metal framework on the face with magnet

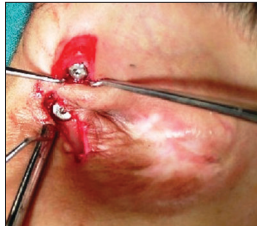


Figure 2: Surgical insertion of the implants

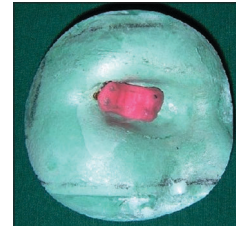


Figure 8: Acrylic substructure adapted on the metal framework



Figure 3: Attachment of healing screws on UMA abutments after exposure



Figure 9: Trial of eye prosthesis carved in clay



Figure 4: Impression with implant analogue

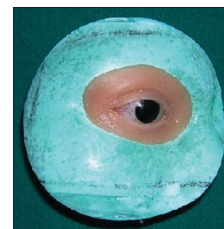


Figure 10: Silicone eye prosthesis on the model



Figure 5: Working model with implant analogue and wax pattern of the framework

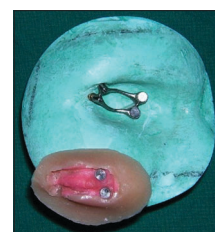


Figure 11: Tissue surface of the silicone eye prosthesis on the model

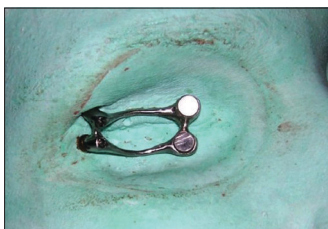


Figure 6: Metal framework fixed on the model with magnets



Figure 12: Final orbital prosthesis on face

covered with plaster of Paris and the diagnostic cast in the dental stone was obtained to assess the favorable position of the implant.

3. The surgical procedure of implant insertion was carried out under general anesthesia. [Figure 2].
4. Two Endopore implants [4.1 mm × 7 mm (Innova life sciences)] were placed; one was placed in the lateral aspect of the supraorbital ridge and other, in the frontal process of the zygoma.
5. The implants were left submerged to osseointegrate for a period of three months.
6. The second stage surgery was performed and the implants were exposed. Healing caps were placed. [Figure 3]
7. The Universal modified abutments (Innova Life Sciences) with transfer copings were attached onto the implant. Impressions of the facial tissues with rubber base putty and light body wash (Provil Nova) were prepared. A die stone working model with implant analogue for the fabrication of the metal bar was obtained. [Figure 4]
8. Wax pattern for the metal bar was fabricated. [Figure 5]
9. The wax pattern was invested. The north pole of the magnet was incorporated into the metal bar. The metal casting was obtained, finished and polished. [Figure 6]
10. The metal bar was placed on the patient's face to ensure a passive fit. [Figure 7]
11. An acrylic base was adapted on the metal casting and the south pole of the magnets was incorporated into the acrylic base and placed on the patient's face. An artificial eye shell was selected by matching this cast with the normal eye and the prosthesis was carved in clay. [Figure 8]
12. The assessment of the position of the eye, the anatomic contour and shaping was done during the trial of the carved prosthesis on the patient's face. [Figure 9]
13. A two-piece mould of the carved prosthesis containing an eye shell and an acrylic base in the respective counterparts was obtained in a dental stone.
14. Intrinsic color pigments and flockings were added to a silicone elastomer (RTV) to achieve the shade of the facial skin color.
15. The acrylic base in the mould counterpart was painted with a bonding liquid to ensure bonding between the silicone and the acrylic.
16. This silicone elastomer (color matched) was poured into the mould and closed under pressure for 24 h for complete vulcanization.
17. The mould was carefully separated and the RTV orbital prosthesis was retrieved [Figures 10, 11].
18. Eyelashes were attached onto the upper and lower eyelids using silicone adhesive.
19. The metal bar was fitted onto the implants and

the orbital prosthesis was retained in position with the aid of the magnets [Figure 12].

DISCUSSION

Exenteration, first described by George Bartisch in 1583, is a radical procedure comprising the removal of the orbital contents, including orbital fat, conjunctival sac, globe and a part or all of the eyelids. This psychologically and anatomically disfiguring procedure is reserved to treat potentially life-threatening malignancies or relentless progressive conditions unresponsive to other treatments. Cosmetic rehabilitation should be planned subsequently although tumor eradication precedes cosmetic concern. The use of tissue-integrated fixtures to retain extraoral prostheses has overcome the complications associated with adhesives and mechanical devices such as spectacle frames.^[4] The placement of fixtures is considered in the region of the superior, inferior and lateral border of the orbit and the maxilla or zygomatic bone.^[5] We considered placement of only two implants. Pneumatization of the right frontal sinus and limited bone height as evident in the CT scan limited the area and the number of implants that could be placed. One implant was placed in the lateral aspect of the supraorbital ridge and the other, in the frontal process of the zygoma. Endopore implants were indicated as sintered porous surface of the implants that offer three times more surface area as than conventional implants, which would compensate for reduced bone height around the defect. The most widely used retention method for implant-supported prostheses is the bar-and-clip system. However, these systems have several disadvantages, such as making the prosthesis more rigid and hindering effective hygiene of the implant site. An alternative is the use of magnetic abutments, which are easy to use, improve hygiene and prosthesis retention and place less mechanical stress on the implant.^[6] The decision for the type of retention used clips, magnets or a combination is usually one of the choices of the surgeon. The proximity of the retention mechanism to mobile tissue, the activity of that tissue, the rigidity of the prosthesis and the dexterity of the patient, should be considered before that decision is finalized. The indications for selecting magnets instead of clips are high muscle activity adjacent to the prosthesis, moderate muscle activity combined with a rigid prosthesis or a patient with poor digital dexterity.^[3]

The cleaning of the prosthesis has been greatly simplified without the complications that result from the use of adhesives.

CONCLUSIONS

Implant supported prostheses overcomes problems such as movement of prosthesis, and soft-tissue irritation by adhesives. arising when the prosthesis is supported by tissues.

REFERENCES

1. Tolman DE, Jellstorm AT, Woods JE. Reconstructing the human face by using the tissue-integrated prosthesis. *Mayo Clin Proc* 1988;73:1171-5.
2. Moran WJ, Toljanic JA, Panje WR. Implant retained prosthetic rehabilitation of orbital defects. *Arch Otolaryngol Head Neck Surg* 1996;122:46-50.
3. Micheal RA, William ELV, Elizabeth F, Robert J. Prosthetic complications of extra-oral implants. *J Prosthet Dent* 1993;69:289-92.
4. Rahman I, Cook AE, Leatherbarrow B. Orbital exenteration: A 13 year Manchester experience. *Br J Ophthalmol* 2005;89:1335-40.
5. Masaki JH, Hatanaka T, Nagoya YO. Long term results of osseointegrated implant retained facial prosthesis: 5 year retrospective study. *J Med Sci* 2005;67:1099-166.
6. Rilo B, Ferro I, Mora MJ, Santana U. A double-impression technique for craniofacial defects. *J Prosthet Dent* 2005;9:398-9.

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