The journal of
PROSTHETIC AND IMPLANT DENTISTRY
Official Publication of Indian Prosthodontic Society
Kerala State Branch

A SIMPLIFIED APPROACH TO ENHANCE THE RETENTION OF AN ORBITAL PROSTHESIS

* Abhay Kumar Dixit, **Neeti Solanki, ***Saumyendra Vikram Singh, ***Raghuwar Dayal Singh

*Ex-Junior Resident, **, Senior Resident, ***Professor, Department of Prosthodontics, Faculty of Dental Sciences, King George's Medical University, Lucknow, Uttar Pradesh, India. | Corresponding Author: Dr. Neeti Solanki, Email: neetisolanki90@gmail.com

https://doi.org/10.55231/jpid.2023.v06.i02.06

Abstract

Aim: *Esthetic rehabilitation of an orbital defect with an orbital prosthesis using modified anatomic mode of retention.*

Background: *Orbital deficits can result from neoplasms, infections or trauma. These defects lead to functional as well as esthetic disablement. Prosthetic rehabilitation plays a vital role as an alternative to surgical reconstruction in such cases, as an orbital prosthesis provides a non-invasive, cost friendly and esthetically predictable approach. Retaining an orbital prosthesis within the defect can be accomplished by various means such as use of implants, adhesives or anatomic undercuts. Engaging anatomic undercuts in the defect ensures a practical, trouble-free, cost-effective, and successful approach.*

Case Description: *In this clinical report we have discussed a simplified approach to improve the retention of an orbital prosthesis through incorporation of an "acrylic plug" within the prosthesis.*

Conclusion: *Conventional methods of retention of an orbital prosthesis can be improved and modified depending upon the anatomic and structural attributes of the defect.*

Clinical Significance: *Conventional retention of an orbital prosthesis can be enhanced in a cost effective and time efficient manner as compared to implant supported prosthesis.*

Keywords: Orbital defects, Orbital prosthesis, Retention in maxillofacial prosthesis.

Background

Loss of a part of a body can have adverse psychological and functional consequences. 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.[1,2] The resultant defects can lead to esthetic as well as functional impairment. For the reconstruction of

orbit and the mid face, anterolateral thigh flaps, fibular flaps and radial forearm flaps have been utilized. An attempt at eyelid reconstruction is also attempted many a times to increase the retention of the prosthesis. Owing to the complexity and lack of predictable outcomes, surgical management is limited to coverage using microvascular free flaps.[3,4] Hence, prosthetic rehabilitation plays a pivotal role as an alternative to surgical reconstruction in restoring the optimum esthetics and to improve the psychological balance and social acceptance of the patient. These prostheses also allow for hygiene maintenance around the defect along with observation for recurrence, if any. Retention of these prosthesis is a major factor directly related to the overall success of the prosthesis as well as its acceptability by the patient. Various modes of retention have been used to retain the orbital prosthesis, such as implant supported prosthesis, use of adhesives, spectacles, magnets and anatomic undercuts. Anatomic undercuts are mostly utilized for obtaining retention in an orbital prosthesis owing to the technique sensitivity, unpredictability, additional cost and comorbidities associated with an implant supported prosthesis.[5] An implant placement should be well planned with an interdisciplinary approach, utilizing a team effort of the maxillofacial prosthodontist and the surgeon.[6] Although implant-retained ocular prostheses play an important role in the success of treatment, conventionally retained orbital prostheses are practical, trouble-free, cost-effective, and successful.[7] Adhesives when used, can provide satisfactory retention in cases where anatomic undercuts are not present in the defect.[8] Repeated application and removal of the adhesive may result in tearing of the margins compromising marginal adaptability as well as the esthetics making the prosthesis more conspicuous. In this case report we have described a simple approach to improve the retention of a silicone orbital prosthesis with the use of an "acrylic plug", in turn increasing the acceptability and esthetic outcome.

Case

A 70-year old female reported to the Department of Prosthodontics, with the complaint of unaesthetic appearance due to deformity in relation to left eye. The patient had a history of squamous cell carcinoma followed by exenteration of the orbit one year back. Careful examination revealed a defect where the left eye once was, measuring 55mm medio-laterally, 48mm supero-inferiorly and 15mm antero-posteriorly (Fig.1). Physical examination of the defect revealed the presence of an undercut in the inferolateral margin of the defect. Hence, a silicone prosthesis engaging this

Fig.1: Orbital defect on the left side.

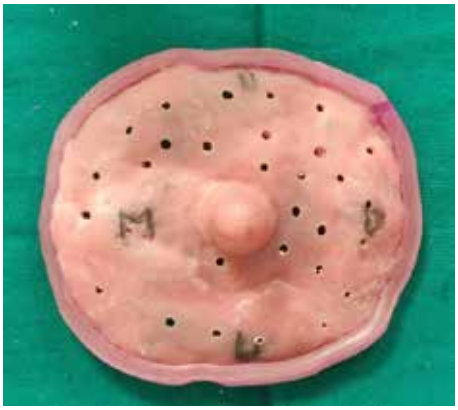

Fig. 2a: Autopolymerizing resin customized tray for recording the orbital impression

Fig.2b: Irreversible hydrocolloid impression of the defect

anatomic undercut for retention was planned for this patient. Firstly, an impression of the defect was planned for the patient. An auto-polymerizing acrylic (Rapid Repair, Pyrax Polymars, India) customized tray (Fig.2a.) was fabricated for making the impression with irreversible hydrocolloid impression material (Tropicalgin, Zhermack, Italy) (Fig.2b). This method improved the accuracy and ease of impression making. The impression was poured in type 3 dental stone (Kalabhai Kalstone, Karson Pvt. Ltd., Mumbai) to obtain the model. A PVC sheet (Easy-Vac Gasket, 3A MEDES, Korea) of 1mm thickness was adapted to the defect with the help of a vacuum former. This served as a skeleton for the wax pattern improving the adaptability as well as ease of try-in of the pattern. Following the adaptation of PVC sheet, a stock scleral shell was used for iris positioning within the defect. The iris positioning was done in relation to the contralateral eye using the grid method of positioning. After trial in the patient, wax pattern was fabricated around this correctly positioned iris (Fig.3a). The first structures to be carved were the upper and lower eye lids. The wax model was repeatedly tried on the patients face and contoured keeping the adaptability, fit, margins, and majorly, the esthetics in relation to the contralateral eye (Fig.3b). Once, the wax pattern try in was satisfactory, a master mold was made after investing the wax pattern. Following de-waxing, color matching for the silicone was done using a spectrophotometer. The color matched medical grade silicone (Technovent Ltd., UK) was manipulated and packed in the master mold and cured (Fig.4). The final prosthesis was retrieved and finished with silicone trimming discs and polished. The final prosthesis was tried on the patient to evaluate the fit followed by extrinsic staining to accentuate the esthetics of the final outcome. After the final trial, an acrylic plug was fabricated by adapting the autopolymerizing acrylic engaging the inferolateral anatomic undercut (Fig.5). This plug was adapted throughout the length of the undercut increasing the surface area for enhanced retention. This plug was attached to the undersurface of the scleral shell through a tunnel created in the tissue surface of the silicone prosthesis. This plug was then finished and final try-in of the prosthesis was done in the patient with and without glasses (Fig.6a & 6b). Marked improvement in mechanical retention was observed and the final esthetic outcome was pleasing to the patient.

Fig. 3a: Wax pattern fabricated post iris positioning

Fig. 3b: Wax pattern trial on the patient

Fig. 4: Packing of medical grade silicone (Technovent) in the prepared mould

The journal of
PROSTHETIC AND IMPLANT DENTISTRY
Official Publication of Indian Prosthodontic Society
Kerala State Branch

Discussion

Amongst the facial prosthetic rehabilitation, rehabilitating an orbital defect is considered amongst the most difficult as the rehabilitation aims at restoring a movable organ with a static prosthesis. This is one of those esthetically complex situations where obtaining adaptability, optimum fit and retention along with esthetically pleasing outcome becomes challenging. Various modes of retention can be used for orbital prosthesis such as adhesives, spectacles, magnets, and maxillofacial implants. In terms of retention and esthetic appeal, advanced treatment modalities such as implant-supported orbital prosthesis have a superior outcome but the cost is a major constraint and hence not affordable for all patients.[7] Along with the financial limitations, the second surgical exposure is another factor that concerns the patients. Using anatomical undercuts to obtain retention is one of the most economical modes along with ease of fabrication.[5] In this case report, we have tried to increase the retention by engaging the bony undercuts in the defect. Acrylic plug improved the adaptability of the prosthesis to the defect by improving the retention. This plug can be modified and relined time and again based on the retention requirements. Hence, there is an ease of fabrication and possibility for modification according to the need and is an economic mode of retention compared to the adhesives. Also, the problems associated with cleaning the prosthesis after use of adhesive leading to tearing and inadaptability of margins is avoided.

Conclusion

Restoring orbital defects poses a challenge for the maxillofacial prosthodontist in terms of esthetic acceptance and retention of final prosthesis. Amongst the various modes of retention, utilizing anatomic bony undercuts of the defect provides pleasing results with ease of the fabrication procedure. In this technique, we have laid out a simplified and economic approach by incorporating an additional "acrylic plug" attachment to enhance the retention and to provide a possibility of modification depending on the future needs. This prosthesis ensures adequate retention affecting the psychological status of the patient more positively.

Clinical Significance

Conventional retention of an orbital prosthesis, using anatomic undercuts in the defect, can be

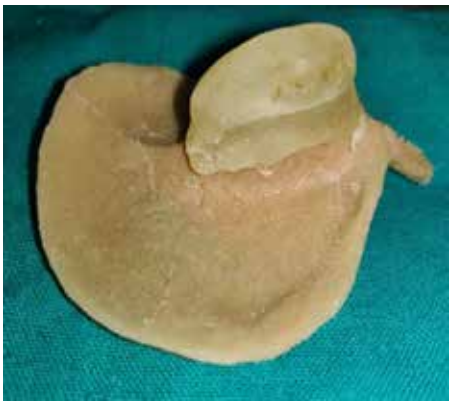

Fig.5: Autopolymerizing resin "acrylic plug" attached to the underside of the prosthesis to engage the inferolateral anatomic undercut for retention.

Fig. 6a: Final prosthesis on the patient

Fig. 6b: Final prosthesis on the patient with glasses.

enhanced in a cost effective and time efficient manner as compared to implant supported prosthesis. This saves patient the trouble of undergoing another surgical exposure and the additional cost and time associated with implant placement.

References

1. Rahman I, Cook AE, Leatherbarrow B. Orbital exenteration: A 13 year Manchester experience. Br J Ophthalmol 2005; 89:1335-40.
2. Aerts I, Rouic LL, Gauthier-Villars M, Brisse H, Doz F, Desjardins L. Retinoblastoma. Orphanet Journal of Rare Diseases 2006; 1: 1-11.
3. Mueller S, Hohlweg-Majert B, Buergers R, et al. The functional and aesthetic reconstruction of midfacial and orbital defects by combining free flap transfer and craniofacial prosthesis. Clin Oral Investig. 2015;19(2):413–419.
4. Archontaki M, Stavrianos SD, Rapidis AD. Free microvascular tissue transfer for the reconstruction of midfacial defects in oncological patients. Med Oral Patol Oral Cir Bucal. 2010;15(5):746–751.
5. Parel SM. Diminishing dependence on adhesives for retention of facial prosthesis. The Journal of Prosthetic Dentistry. 1980; 43: 552-560.
6. Eckert SE, Desjardins RP. Prosthetic considerations. In: Branemark PI, Tolman DE, editors. Osseointegration in Craniofacial Reconstruction. Illinois: Quintessence Publishing Co. Ltd; 1998. p. 87-94.
7. Anderson RL, Thiese SM, Nerad JA. The universal orbital implant: indications and methods. Adv Ophthalmic Plast Reconstr Surg . 1990;8:88–99.
8. Wolfaardt JF, Tam V, Faulkner MG, Prasad N. Mechanical behavior of three maxillofacial prosthetic adhesive systems: A pilot project. J Prosthet Dent 1992;68:943-9.