

A Spectacle with Magnet Retained Eye Prosthesis for Rehabilitation of Orbital Defect

Dr K Vinayagavel¹, Dr C Sabarigirinathan², Dr K Hema³, Dr M Rajakumar⁴,
Dr V Harishnath⁵, Dr M Kanmani⁶

^{1,2}(Professor, Dept of Prosthodontics, Tamilnadu Govt Dental College & Hospital Chennai, India)

⁴(Associate Professor, Dept of Prosthodontics, Tamilnadu Govt Dental College & Hospital Chennai, India)

^{5,6} (Senior Assistant Professor, Dept of Prosthodontics, Tamilnadu Govt Dental College & Hospital Chennai, India)

³(Post Graduate Student, Dept of Prosthodontics, Tamilnadu Govt Dental College & Hospital Chennai, India)

Abstract: The defect which is associated with loss of eye can lead to major physical, mental and emotional disturbance. Treatment of facial deformity is a difficult task in which procedure for each patient is very skilled and précised. Visual judgment alone will not be perfect. Here we report a case of 45-year-old female patient with meningiosarcoma of the right eye, undergone surgical enucleation and was rehabilitated by spectacle with magnet retained silicon orbital prosthesis in order to accomplish perfect fit and aesthetics.

Keywords: artificial eye, magnet, orbital prosthesis

I. Introduction

Acquired facial defects are frequently imparted with extensive mutilation, disability, social response to the functional impairment and psychological stress. Rehabilitation of maxillofacial defects play an essential part in treatment success, so it will promote the patient comfort, happy and also to become a part of society by minimizing their psychological stress. The loss or absence of an eye may result from a congenital defect, irreparable trauma, a painful blind eye, sympathetic ophthalmia, or the need for histologic confirmation of a suspected diagnosis.^{1,2} The fabrication of an orbital prosthesis is generally tricky because that the ocular prosthesis is enclosed within a orbital prosthesis, so it is necessary to be accurately harmonized to the other side of natural eye in size, contour and position precisely to make it fit in three dimension so it will reproduce the exact gaze as well as accurate inter-lid opening.

Different methods and materials for fabrication of the orbital prosthesis are available and also many varieties of way in retaining the prosthesis. Acrylic resin can be used as it is durable, colour stable and easily coloured extrinsically or intrinsically but its disadvantages include rigidity and water sorption property³. Medical grade silicone is another material frequently used for extraoral prostheses as it is biologically inert and colour stable but their disadvantages include the need of sophisticated equipments, poor edge strength as well as colour deterioration on exposure to sunlight⁴. Retention of orbital prosthesis can be achieved by tissue undercuts, attaching it to different parts of a spectacle, use of magnets, use of adhesives or use of osseointegrated implants^{5,6}. Bearing all these things in our mind the difficulty in prosthesis fabrication and increased cost, retention for orbital prosthesis is done by fixing it to different portion of spectacle, it can be preferred for majority of cases.

Here we are reporting a patient with an orbital defect and rehabilitated by using easily accessible material and simple procedure.

II. Case Report

A 45 year old woman reported to the Department of Prosthodontics, TAMILNADU GOVERNMENT DENTAL COLLEGE AND HOSPITAL for the replacement of her exenterated right eye. From the history of the patient, it reveals that he has undergone surgery with exenteration of orbit which had been carried out 1 year back to eradicate tumour. On extra oral examination of the patient showed a large orbital defect on the right side, no bony or soft tissue undercut exists, so there is some difficulty in retention of prosthesis. Therefore spectacle with magnet retained orbital prosthesis was planned for the patient to make him socially presentable.



Fig 1: Right orbital defect area

III. Procedure

- 1) In order to examine the case detail full facial impression from forehead region to nose was made with the patient in a semi supine position and the other right eye was passively closed. First the region was boxed with modelling wax and then irreversible hydrocolloid (Alginate-dentsply) was mixed and painted smoothly into the defect part and also above the closed left eye. Further, alginate mixes were made and the complete boxed area was filled with alginate. Next wet gauze was kept over the alginate. Dental plaster was mixed and poured over the gauze to make the impression stable.



Fig 2 : Facial impression with alginate



Fig3 : Plaster backing for the impression

- 2) The facial moulage was prepared by boxing the impression and poured with type III gypsum .



Fig 4: Working cast model

- 3) Master cast was duplicated. Modelling wax was placed on it to construct permanent base and it was processed by using transparent heat cure acrylic polymerising resin. It was then tried in patients face for fit. The base helped to join the silicone prosthesis to the spectacle of the eye wear.



Fig 5: Wax pattern for fabrication of Acrylic base



Fig 6 : Heat polymerising acrylic base tried in patient

- 4) Measurements were made from the patient's facial midline to the center of the pupil to the facial midline and from the inner canthus of the eye to the nasal bridge³. Both the measurements were made when the patient was asked to look and fix the contralateral eye at distant gaze³. An appropriate stock ocular prosthesis was selected in order to match closely to the color, size and shape of iris and sclera of the left eye. The ocular part required some minute alterations to make in shape, so that it fit into the socket, as the deformity was relatively large. The acrylic base was uncovered at the bridge of the nose for magnetic attachment to the spectacle. The eye was then

held in the exact position gained by using some measurements of the contralateral eye on a base of modelling wax. Once that position was established remaining portion was sculpted in wax and tried in the patient. Approval from the patient about the look of the orbital prosthesis was achieved. The wax sculpted orbital prosthesis was flaked and dewaxed



Fig7 : Wax tryin of orbital prosthesis



Fig 8:Sculpted orbital prosthesis processing

5) Over the acrylic base, primer was applied for bonding, over that Room temperature vulcanizing (RTV) medical-graded silicone material was mixed according to instructions given by the manufacturer. Pigment stains were added to the silicone for intrinsic staining at the time of mix, to achieve the approximate skin shade of the patient. After matching with the patient, RTV silicone was packed into the mould and was left to cure. Once polymerization was over the prosthesis was deflasked, retrieved and finished. Readymade eye lashes were available and we used it by attaching to the prosthesis using cyanoacrylate adhesive. The frame was selected and trialed on the patient. In the exposed portion of acrylic magnet is attached and similarly in the spectacle over the nose pad region another magnet is placed. Finally to the patient home care instructions were specified; follow-up was carried out. The patient was pleased with the prosthesis, as it made her socially pleasing.



Fig 9 : Silicone orbital prosthesis with Magnet attachment



Fig 10: Magnet attached to the spectacle



Fig 11 : Spectacle with silicone orbital prosthesis



Fig 12: Silicone orbital prosthesis insertion

IV. Discussion

Implants and plastic surgery are used nowadays for rehabilitation of the patient with an orbital defect. Custom-made silicon orbital prosthesis is always a good choice when patient does not need any surgery and also for the patient who cannot afford for sophisticated methods. Following surgical enucleation of the orbit and its contents, most concern of the patient is about their aesthetic appearance, so rehabilitation should be designed subsequently to make the patient mentally healthy. So orbital prosthesis are represented as easy, good-looking and feasible option where aesthetic and functional desires are met with local reconstructive procedures. In this case we are able to achieve aesthetic and comfort by treating with silicone orbital prosthesis.

The choice of using acceptable maxillofacial prosthetic material and sensible retentive aid should be the aim of rehabilitating these patients. Silicone has improved marginal adaptation and realistic appearance, so it

has been used for the fabrication of orbital prosthesis. Silicones have been used for over 50 years in the field of maxillofacial prosthetics, with desirable material properties including flexibility, biocompatibility, ability to accept intrinsic and extrinsic colorants, chemical and physical inertness and mouldability⁷. The most commonly used conventional method to retain orbital prostheses is the eyeglass frames and anatomic retentive undercuts⁸. In this case report patient did not have any anatomical undercuts in the defect region; hence, spectacle was only alternative choice to keep hold of the silicone orbital prosthesis. Silicone prosthesis will not bond to the spectacle, so, an acrylic base was made, which created a stable base for the orbital prosthesis and also help in the attachment by magnet to the spectacle.

Modeling clay and waxes are generally used material for forming the pattern for prosthesis. However, many individuals who once preferred sculpting clay have turned to use wax because of the possibility of residual oils from the clay contaminating the mold surfaces, which can interfere with the platinum catalyst employed in modern silicon prosthesis material⁹. So, modelling wax and medical grade silicone was used in the fabrication of orbital prosthesis. Compare to the acrylic prosthesis, silicone orbital prosthesis have some advantages like light weight, better aesthetics. As the prosthesis was attached to the spectacle adhesive was not used. So, allergic reaction due to adhesives or silicone were reduced, because in this present case more of tissue contact was with acrylic base.

Magnet was used so that it enables the patient to remove prosthesis and clean the spectacle.

Orbital prosthesis presents an attractive and viable alternative when esthetic and functional demands are beyond the capacity of local reconstructive efforts¹⁰. Surgical procedure is a major financial burden for the patient, so they look for the treatment which is economical. The choice of using acceptable maxillofacial prosthetic material and sensible retentive aid should be the aim of rehabilitating these patients. Silicone has improved marginal adaptation and realistic appearance, so it has been used for the fabrication of orbital prosthesis.

V. Conclusion

The goal of any prosthetic treatment is to return the patient to society with a normal appearance of the prosthetic eye. This paper elaborates the technique of fabrication of spectacle with magnet retained orbital prosthesis for a patient whose eye was exenterated as a result of meningiosarcoma of the right eye. The disfigurement resulting from loss of eye can cause significant psychological, as well as social consequences. However with the advancement in ophthalmic surgery and ocular prosthesis, patient can be rehabilitated very effectively. The maxillofacial Prosthodontist should provide prosthetic treatment to the best of his ability and should also consider psychological aspects and if necessary the help of other specialist should be taken into consideration

References

- [1]. PERMAN KI, BAYLIS HI. EVISCERATION, ENUCLEATION, AND EXENTERATION. OTOLARYNGOL CLIN NORTH AM 1988; 21:171-82.
- [2]. Artopoulou LL, Montgomery PC, Wesley PJ. Digital imaging in the fabrication of ocular prostheses. J Prosthet Dent 2006; 95:327-30.
- [3]. Parajuli PK et al A spectacle retained acrylic orbital prosthesis for rehabilitation of an exenterated eye Acrylic orbital prosthesis 2012; Vol 10 (No.2);144-146
- [4]. Chalian V A and Philips R W: Materials in maxillofacial prosthetics. J Biomed Mater Res 1974; 8: 349-363
- [5]. Glantz P O: On retention of maxillofacial prosthesis. Odontol Revy 1972; 22: 317-325.
- [6]. Ronse J A, Chalian V A.: Fabrication of hollow extraoral prosthesis to enhance retention. JProsthet Dent 1985; 53: 557-564.
- [7]. Jani RM, Schaaf NG. An evaluation of facial prostheses. J Prosthet Dent 1978;39:546-50.
- [8]. Parel SM. Diminishing dependence on adhesives for retention of facial prosthesis. JProsthetDent 1980;43:552-60.
- [9]. Taylor DT. Clinical Maxillofacial Prosthetics. Quintessence Publishing Co, Inc 2000: pg 99.
- [10]. Konstantinidis L, Scolozzi P, Hamedani M. Rehabilitation of orbital cavity after total orbital exenteration using oculofacial prostheses anchored by osseointegrated dental implants posed as a one step surgical procedure. Klin Monbl Augenheilkd 2006;223:400-04.