FABRICATION OF A SPECTACLE RETAINED HOLLOW ORBITAL PROSTHESIS - A CASE REPORT

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Abstract

Malignant lesions involving orbit often necessitates radical surgical excision resulting in orbital defects followed by radiation therapy and chemotherapy. A conservative, economical technique for rehabilitation of a patient with orbital defect following orbital exenteration and radiation therapy using spectacle retained hollow orbital prosthesis with heat-polymerizing acrylic resin is presented.

Key words: Orbital prosthesis, ocular prosthesis, orbital exenteration, acrylic prosthesis

Introduction

Loss of an eye, the most vital sense organ, causes the afflicted to feel disgraced emotionally and communally[1,2]. Restoring these defects with a prosthesis is a very challenging task[3,4]. Irreversible injury, malignant orbital tumors, severe blindness and sympathetic ophthalmia can cause eye loss[3,6,7,8] The functional and esthetic restoration of the defect depends on the collaborated efforts of the oncologist, prosthodontist and plastic surgeon[9,10,11]. This clinical report describes rehabilitation of an orbital defect using spectacle retained hollow orbital prosthesis.

Clinical report

A thirty-six year old female who underwent radiotherapy post orbital exenteration for soft tissue sarcoma of the left lower eyelid was referred to department of Prosthodontics for rehabilitation of the orbital defect. History revealed that patient was unaware of the prosthetic options available after the initial surgery and was living with the

defect for ten years. On examination, a well healed orbital defect lined with split skin graft was observed on the left side (Figure 1). Various prosthetic options were discussed and she opted for a spectacle retained acrylic orbital prosthesis.

A facial moulage (Figure 2) was made using irreversible hydrocolloid impression material (Algitex, DPI, Rudrapur, Uttarakhand). Defect area was boxed with impression compound (Y-Dents, MDM Corporation, Lalkuan, Delhi). Irreversible hydrocolloid was mixed and the entire area to be recorded was covered and wet gauze pieces were placed over it. A thermoplastic sheet was adapted to form a framework for the impression material and a layer of type II dental plaster (White Gold, Asian Chemicals, Rajkot, Gujarat) was applied. The facial moulage was poured with type III dental stone (Goldstone, Asian Chemicals, Rajkot, Gujarat) to obtain a working model.

A single layer of modeling wax (Surana modeling wax, Surana industries, Mangalore, India) was adapted over the defect region on the working model and was tried in the defect region for proper margin adaptation. This formed the intaglio surface of the hollow orbital prosthesis. Using the wax pattern, an acrylic stent was prepared by using tooth colored (DPI, Rudrapur, Uttarakhand) and clear acrylic heat polymerizing resin (DPI, Fort, Mumbai) along with acrylic paints for characterization and tried in the defect area for adaptation.

The wax pattern for the ocular prosthesis was made to simulate the natural eye and was oriented to the center of the acrylic stent using the facial measurements. It was held in place on acrylic stent with modeling wax which was adapted to mimic the anatomy of the orbit around the ocular prosthesis including eyelids (Figure 3). Once the contours were confirmed, a putty-light body index of finished pattern was made (Figure 4).

The iris button was oriented in the ocular wax pattern by using the distance from the center of the pupil of the contralateral eye to the midline as a guide to centre the pupil. The vertical position of the pupil was determined by the distance between the eyebrow and the pupil of the contralateral eye. The margin was made to flush with the pupil and a layer of white mock-up wax (Maarc Mock-Up Wax, India) was applied on top of the modeling wax to make the pattern simulate natural eye.

The wax pattern of the ocular prosthesis was removed from the stent and clear acrylic struts were attached to the iris button to maintain its position after dewaxing. Polymerization was done using tooth colored heat polymerizing acrylic resin to obtain the custom ocular prosthesis. Further scleral characterization was done by incorporating red color threads and stains. To achieve a layer of clear acrylic resin on top of the ocular prosthesis, a thin layer of modelling wax was added.

The ocular prosthesis was positioned in the putty index and molten modeling wax was poured in the remaining area to obtain the orbital portion of the eye. Further detailed modifications in the carving of the eyelids was carried out and tried in the defect area along with artificial eyelashes. The orbital prosthesis was polymerized with equal proportions of heat polymerizing pink and clear acrylic resins with intrinsic acrylic stains. Characterization was done using extrinsic acrylic paints and the prosthesis was tried in the defect area. The completed hollow orbital prosthesis was attached to the nasal buds of the spectacle frames using autopolymerising clear acrylic resin (Figure 5). Home care and maintenance instructions were given and a follow up after 1 week was done.

Discussio

Superior esthetics and function can be achieved by choosing the best maxillofacial prosthetic material and retentive aid. For the success of maxillofacial prosthesis, retention plays a key factor and a variety of retentive modes are employed to keep the prostheses in place.[1,5,6,12,13,14] Spectacle frame and tissue undercut was used in the present case as modes of retention to enable precise and reproducible positioning of the prosthesis. However, due to the weight of the prosthesis, eyeglass frames with prosthesis might slide down when the wearer leans forward[11]. Also, it becomes mandatory to wear them every time the patient wants to use the prosthesis.[10]

Though implants provide greater retention, orbital defects have much lower implant success rates[10]. They are also costly, susceptible to peri-implant tissue reactions and difficult to maintain.

Acrylic resin and medical-grade silicones are commonly used materials for the fabrication of maxillofacial prosthesis. Although silicone offers prostheses a lifelike appearance and a knife edge margin that blends seamlessly with natural skin[2,7], it

has drawbacks such as difficulty cleaning, poor margin strength and color fading over time.[3,10] Additionally, they are incapable of forming a chemical or mechanical bond with the optical frame.[10] Acrylic resin is cost effective, readily stainable, biocompatible, color-stable, adheres to optical frames and requires less maintenance.[5,6,10]

Handling and maintenance of the prosthesis are a key to successful prosthesis. [5,8] Follow up was scheduled at regular intervals to evaluate health of the tissue bed, to relieve pressure points, and emphasize maintenance.

Conclusion

This case report describes a cost effective, non-invasive technique for prosthetic rehabilitation of an orbital defect following exenteration with a spectacle retained hollow orbital prosthesis. The prosthesis was tissue tolerant, esthetic, comfortable, and easy to maintain.

References

1. Hatamleh MM, Watson J, Srinivasan D. Closed-eye orbital prosthesis: A clinical report. J Prosthet Dent 2015; 113:246-9.

2. Vincent A, Kohlert S, Kadakia S, Sawhney R, Ducic Y. Prosthetic Reconstruction of Orbital Defects. Semin Plast Surg. 2019; 33:132–7.

3. Lincoln KP, Albert YT, Prihoda TJ, Sutton AJ. Comparative Accuracy of Facial Models Fabricated Using Traditional and 3D Imaging Techniques Journal of Prosthodontics.2016; 25:207-15.

4. Dings JP, Merkx MA, Manon T.P, de Pol PV, Maal TJ, Meijer GJ. Maxillofacial prosthetic rehabilitation: A survey on the quality of life. The Journal of Prosthetic Dentistry.2018;120:780-6.

5. Babu AS, Manju V, Nair VP, Thomas CT. Prosthetic rehabilitation of surgically treated orbital defects - evisceration, enucleation, and exenteration: A case series. J Indian Prosthodont Soc. 2016; 16:216-20.

6. Jain S, Jain P. Rehabilitation of orbital cavity after orbital exenteration using polymethyl methacrylate orbital prosthesis. J Indian Prosthodont Soc. 2016; 16:100-4.

7. Lanzara R, Thakur A, Viswambaram M, Khattak A. Fabrication of ocular prosthesis with a digital customization technique – A case report. J Family Med Prim Care. 2019; 8:1239–42.

8. Sathe S, Pisulkar S, Nimonkar SV, Belkhode V, Borle A. Positioning of iris in an ocular prosthesis: A systematic review. J Indian Prosthodont Soc. 2020; 20:345-52.

9. Kusum CK, Indrajeet, Wankhade BG. Simple Technique to fabricate a facial moulage with a prefabricated acrylic stock tray: A clinical innovation. J Indian Prosthodont Soc. 2014;14:341–4.

10. Pruthi G, Jain V, Rajendiran S, Jha R. Prosthetic rehabilitation after orbital exenteration: A case series. Indian Journal of Ophthalmology. 2014; 62:629-32.

11. Shetty S, Mohammad F, Shetty R, Shenoy K. Prosthetic rehabilitation of an orbital defect for a patient with hemifacial atrophy. J Indian Prosthodont Soc. 2016; 16:91-5.

12. Kusugal P, Chourasiya RS, Ruttonji Z, Astagi P, Nayak AK, Patil A. Surface detail reproduction and dimensional stability of contemporary irreversible hydrocolloid alternatives after immediate and delayed pouring. Contemp Clin Dent. 2018; 9:20-5.

13. Kharade P, Verma M, Sharma S. Anterior indexing technique for orbital prostheses. J Prosthet Dent. 2017; 118:561-3.

14. Jain RA, Verma M, Gupta R, Gill S, Ghosh M. Fabrication of a bicomponent hybrid orbital prosthesis. J Prosthet Dent. 2019; 122:568-72.

Figure 1. Orbital defect lined with split skin graft

Figure 2: Facial moulage

Figure 3: Wax trial of the ocular and the orbital prosthesis

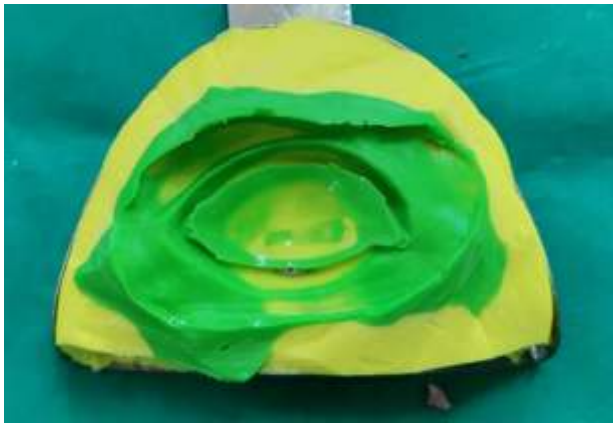

Figure 4: Putty index of the ocular and orbital contours

Figure 5: Spectacle retained orbital prosthesis in situ