CASE REPORT

Prosthetic Rehabilitation Technique with an Economical Customized Orbital Prosthesis

Hazira M Yusof[1], Fadzlina Abd. Karim[2]

[1] Department of Prosthodontics, Faculty of Dentistry, Level 15 Tower B, Persiaran MPAJ, Jalan Pandan Utama, Pandan Indah, 55100, Universiti Sains Islam Malaysia, Malaysia
[2] Oral & Maxillofacial Surgery Unit, Department of Surgery, Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia Medical Centre, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia

ABSTRACT

Post-surgical orbital defects pose a severe effect on patient, psychologically and physically, especially in the eventual return to the society and daily routine. In cases where reconstructive surgery is not possible, prosthetic rehabilitation is crucial in addressing this issue. Implant-supported orbital prosthesis provides superior retention, however, it is not economically acceptable for some cases. Various modes of retention are available to cater to each patient's diagnosis, treatment need and economical status. This article describes the procedures in the construction of a customized silicone orbital prosthesis using adhesive and spectacles for retention. This technique is cost-effective and simple while providing comfort and satisfaction for the patient.

Keywords: Orbital defect, Orbital exenteration, Silicone prosthesis, Orbital prosthesis, Case Report

Corresponding Author:
Hazira binti M Yusof, MSc
Email: hazirayusof@usim.edu.my
Tel: +60129916605

INTRODUCTION

Cancer survivors are faced with psychological and physical challenges that need to be addressed in their eventual return to society. The loss of an eye, a crucial sensory organ with the added loss of aesthetic can negatively affect a person socially and emotionally (1). Oral maxillofacial rehabilitation addressed the problem by providing a customized prosthesis for a patient where reconstructive surgery is not feasible. This custom prosthesis helps in concealing and disillusionment of the disfigurement to increase patient's personal aesthetic and self-confidence. The success of a prosthesis depends on the retention of a prosthesis in the defect area (2). Osseointegrated implant, magnets, adhesive, precision attachments, studs and spectacles are methods used in retaining orbital prosthesis (3,4). However, there are cases where the osseointegrated implant is not suitable. An adhesive retained prosthesis is a simple and effective method. Although there have been concerns about allergies to the materials used and effects of adhesive especially on older and more fragile skin, the materials are changing with the introduction of remover and adhesive remains as the most commonly used mode of retention (2). This clinical report describes the technique in the construction of a customized silicone orbital prosthesis with an acrylic base.

CASE REPORT

The patient was referred to Oral Maxillofacial Clinic at Hospital Canselor Tuanku Muhriz UKM Medical Centre with a request for a right orbital prosthesis. The patient had a history of right orbital mass with intracranial extension diagnosed as right canal lymphoepithelial carcinoma. Histopathological examination results came back as metastasis of nasopharyngeal carcinoma. Patient had a right eye exenteration, right craniotomy, excision of the tumour and middle maxillary antrostomy. The operation was done by oculoplastic surgeon in Hospital Serdang with joint team from neurosurgery and otolaryngology surgeon from Hospital Sultanah Bahiyah. The patient expressed concern with regards to aesthetic and was continuously wearing black sunglasses. Examination of the surgical site revealed a healthy area with no inflammation and no sign of infection. The defect extended laterally from the inner canthus of the eye to the outer canthus of the eye with bone depression at the temple area (Fig. 1). A four-visit treatment for a customized orbital prosthesis was planned for an economical prosthesis as requested by the patient. Informed consent was taken from the patient for teaching purposes.

The impression of the defect was taken using irreversible hydrocolloid (Kromopan Chromatic Alginate, Lascod, Florence Italy) and the cast was poured using dental

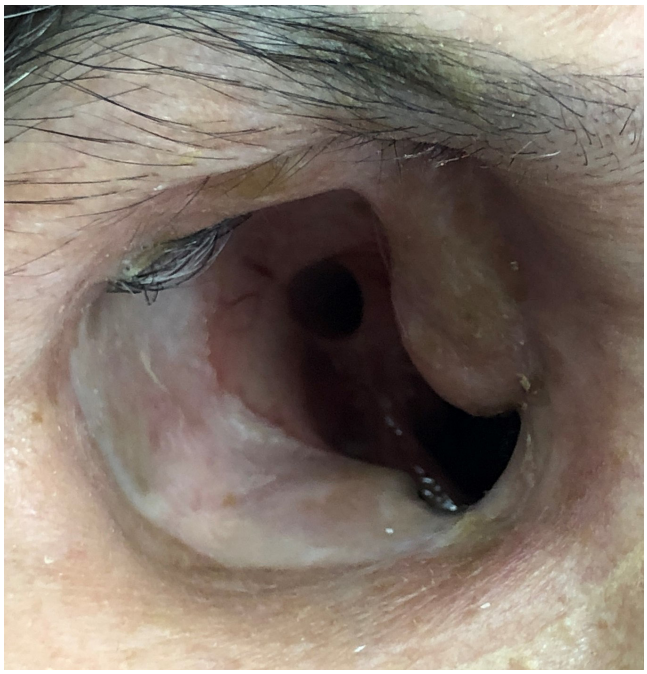

Figure 1: Exenterated orbital covered by skin lining and communication to the sinus with an undercut at the base for retention of the prosthesis

stone (Dentona, type 3 stone, Germany). The base of the orbital was covered with gauze to prevent the flow of impression material into the depth of orbital fissure. A sheet of wax was soften adapted on the surrounding lateral wall in the orbital area to form a ring that will be used to form an acrylic ring that conforms to the shape of the orbital defect.

The construction of cornea was done with printing a pre-designed cornea that matches the patient's eye and it was inserted into the pre-formed ocular wax pattern and invested (Fig. 2). Clear polymethylmethacrylate powder and liquid were mixed and white acrylic paint were mixed together and processed to form the sclerae. A sheet of wax that was adapted to the lateral wall was invested and processed to form an acrylic ring with holes for retention of silicone. The processed sclera was positioned at the centre of acrylic ring that form the base of the prosthesis (Fig. 3) and brown wax was added to form the rest of the initial waxed up prosthesis.

First try-in was done to ensure the undercut was engaged and the patient was comfortable with the base and the positioning of cornea and iris location in relation to the left eye was correct. This was done by measuring an equidistant position from the bridge of nose crest to the centre of irises. An imaginary horizontal line of the irises should be parallel to the corners of the mouth. The second try in was an aesthetic try-in where special characteristics such as wrinkle, eyelid and eyebags on the left side were carved. Patient's opinion was taken into consideration and adjustment made until patient was satisfied before prostheses was processed.

The material used for the prosthesis was silicone

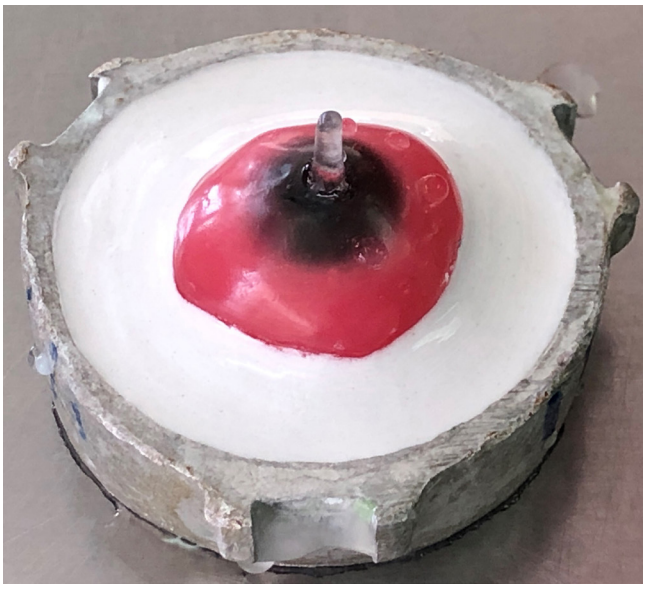

Figure 2: Investment of cornea and wax pattern before dewaxing to form sclerae

Figure 3: Posterior view of the acrylic ring with holes created for retention of silicone. The ring form reduces the weight of the prosthesis

elastomer (Platinum VST Silicone, Factor II, Arizona, USA) with intrinsic coloring (Functional Intrinsic II, Factor II, Arizona, USA) that were incorporated until homogenous skin color paste was produced. The prosthesis was packed and put under pressure of 100 Pa and polymerized at the temperature of 75oC for 45 minutes in waterbath.

During the issue stage, external staining and colouring (Functional Extrinsic Six Color Kit, Factor II, Arizona, USA) were then done with medical-grade colouring to match with patient's skin. Retention and stability of the orbital prosthesis came from medical grade adhesive and the engagement of the undercut and rigidity of the acrylic base ring. The patient was advised on wearing rimmed glasses for retention and masking of the prosthesis (Fig.4). Prosthesis care and hygiene instructions were given to the patient along with adhesive for the patient's

Figure 4: Before and after photographs. Patient is advised to wear rimmed spectacles following the shape of the margin to camouflage the prosthesis

daily usage. The outcome of the prosthesis was excellent with good fit and retention. Two-month follow up visit showed a well-functioning orbital prosthesis and vast improvement in patient's perceived mood in comparison to the pretreatment state.

DISCUSSION

A silicone-based prosthesis was the material of choice for the natural skin-like appearance and flexibility of the material to engage surrounding undercut. Silicone is known to turn rigid over time with tearing of the edges due to thin layer of silicone at the margin (4). The longevity of the prosthesis can be increased by maintaining an overall thick margin. Alternative material such as three-dimensional printed acrylic resin is more durable and easier to clean, however, it has unnatural glossy finishing and rigidity which does not blend well with the mobile surrounding tissue.

The orbital prosthesis is worn over the surgical site to replace both missing tissues and exenterated eye. The prosthesis needs to be exactly precise to the surgical site as this will aid the localization of the prosthesis. This close adaptation along with a rigid acrylic ring to the surrounding wall and silicone prosthesis to the skin help with the stabilisation and retention. Retention by an adhesive along with the use of spectacles provides good retention for the prosthesis. Implant retained prosthesis has been considered as the ideal mode of retention, however, it was not the treatment of choice in this case due to high implant cost and the risk of lower success rate in implant retention for cases of a highly irradiated orbital bone (5). The cost for alternative treatment options such as three-dimensional printed prosthesis or an implant-retained prosthesis, excluding the cost of implant surgery, is significantly higher and can reach up to six times more than conventional prosthesis in a public hospital setting in Malaysia.

CONCLUSION

Construction of an orbital prosthesis using the present undercut, adhesive and spectacles as retaining tools is economical and simple while addressing the main concern. The follow-up review showed that the patient's condition and demeanour have greatly improved with the result of the treatment.

ACKNOWLEDGEMENTS

The authors thank the universities and hospital involved, Universiti Sains Islam Malaysia and Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia Medical Centre, Malaysia for the assistance and encouragement in the treatment and manuscript preparation.

REFERENCES

1. Lekay-Adams M, Sykes LM, Du Plessis F. Prosthetic challenges in a patient with ocular evisceration and global preservation: A case report. S Afr Dent J. 2014;69(1):15-7.
2. Kiat-amnuay S, Gettleman L, Khan Z, Goldsmith LJ. Effect of adhesive retention on maxillofacial prostheses. Part I: Skin dressings and solvent removers. J Prosthet Dent. 2000;84(3): 335-40. https://doi.org/10.1067/mpr.2000.109507.
3. Aalaei S, Abolhassani A, Nematollahi F, Beyabanaki E, Mangoli AA. Fabrication of an implant-supported orbital prosthesis with bar-magnetic attachment: A clinical report. J Dent (Tehran). 2015;12(12):932-5.
4. Shrestha B, Thaworanunta S. Orbital prosthesis fabrication: Current challenges and future aspects. Open Access Surgery. 2016;9:21-8. https://doi.org/10.2147/OAS.S81435.
5. ElKhashab MA, Radi IAW, Elkhadem AH. Implant prognosis in irradiated versus non-irradiated nasal, orbital and auricular sites. Int J Oral Maxillofac Surg. 2020;49(5)636-48. https://doi.org/10.1016/j.ijom.2019.09.010.