ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)
IJDSIR : Dental Publication Service
Available Online at: www.ijdsir.com
Volume – 3, Issue – 4, August - 2020, Page No. : 74 - 79

Ocularistry- The Art of Crafting Prosthetic Eye: A Case Report

[1]Harmanpreet Atwal, BDS, Department of Prosthodontics and Crown & Bridge, Army Dental Centre Research & Referral, Delhi, India

[2]Tanuj Mendiratta, BDS, Post Graduate Resident, Department of Prosthodontics and Crown & Bridge, Army Dental Centre Research & Referral, Delhi, India

[3]M Viswambaran, BDS, MDS, Professor& Head of Department, Department of Prosthodontics and Crown & Bridge, Army Dental Centre Research & Referral, Delhi, India

[4]Anup Gopi, BDS, MDS, Classified specialist, Department, Department of Prosthodontics and Crown & Bridge, Army Dental Centre Research & Referral, Delhi, India

Corresponding Author: Harmanpreet Atwal, BDS, Department of Prosthodontics and Crown & Bridge, Army Dental Centre Research & Referral, Delhi, India

Citation of this Article: Harmanpreet Atwal, Tanuj Mendiratta, M Viswambaran, Anup Gopi, "Ocularistry- The Art of Crafting Prosthetic Eye: A Case Report", IJDSIR- August - 2020, Vol. – 3, Issue -4, P. No. 74 – 79.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Eye is a vital organ for expression and serves a window to the soul. Facial deformity of any kind especially loss of an eye due to trauma, disease or congenital defects impacts the psychology and psychosocial behaviour of the patient. Customised prosthetic rehabilitation of the lost eye is a craft work involving multiple steps. There are multiple techniques for fabrication of an ocular prosthesis. This case report highlights the clinical management of a 03 year old female patient with an exenterated right eye due to Mucormycosis secondary to a complication of Acute Lymphocytic Leukaemia.

Keywords Enucleation; Evisceration; Exenteration; Custom orbital prosthesis

Introduction

Eye is not only a vital sense organ but also one of the most expressive part of the human body. The defect or loss of an eye due to pathology, trauma or any congenital reason damages the communication skill and psychosocial behaviour of an individual. The surgical procedures for the removal of an eye are classified into three general categories: enucleation, evisceration and exenteration by Peyman, Saunders and Goldberg (1987). According to Scoll (1982) enucleation is a surgical procedure in which globe along with the attached portion of the optic nerve are excised from the orbit. Evisceration is the removal of eye contents while leaving the sclera and extraocular muscles intact. Exenteration is the most radical of the

three procedures and involves the removal of eye, adnexa and part of the bony orbit [1].

The rehabilitation of the lost eye is important for aesthetics and protecting the orbital socket thereby preventing any infection. It can be done using prefabricated stock eyes, custom made ocular prosthesis or orbital prosthesis. The fabrication of the custom-made prosthesis can vary from a simple to complicated procedures with multiple steps using different techniques. However, it offers improved internal fit, comfort, even distribution of pressure during eye movements and enhanced aesthetics due to characterisation [2].

This article describes a case of prosthetic rehabilitation of a 03 year old girl with an exenterated right eye by fabrication of a custom made orbital prosthesis in which the impression of the defect site was made using the putty wash impression technique under General Anaesthesia to fabricate a characterised orbital prosthesis. The challenge in this case was the age of the patient as the child was lacking co-operative ability according to Wrights classification of child's behaviour, for fabrication of an orbital prosthesis [3].

Case report

A 03 year old daughter of a serving soldier reported to the Department of Prosthodontics for prosthetic rehabilitation of an enucleated right eye. On eliciting the patient's history it was revealed that the patient developed Mucormycosis of right eye as a complication of Acute Lymphocytic Leukaemia detected last year which led to exenteration of right eye.

Extra oral examination revealed a large orbital defect of the right eye with a healed tissue bed and there was no sign of inflammation (Fig-1). It was planned to rehabilitate the patient with custom made orbital prosthesis. The treatment procedures were explained and the consent of the parents was taken prior to the treatment.

Method of Fabrication of Orbital Prosthesis

Recording the defect site with facial impression and fabrication of facial moulage

After a pre-anaesthetic checkup the patient was taken up under General Anaesthesia. The patient's eyebrow and surrounding areas were lubricated in order to facilitate the removal of impression material without distortion. Orientation lines were made on the patient's face with an indelible pencil for symmetrical orientation of the orbital prosthesis. After block out of the lower undercut with a gauge, the defect was recorded with polyvinyl siloxane putty consistency impression material (Aquasil Putty; Dentsply Cualk, USA). A special tray was then fabricated, using two layers of wax sheet each of 1mm thickness which was adapted on the patient's face to act as a spacer on which impression compound was adapted to act as a tray. Holes were made in the impression compound and an impression was made with irreversible hydrocolloid impression material after removal of the spacer (Fig-2). The retrieved impression was then poured with type III dental stone to obtain a facial moulage.

Stock acrylic eye shell selection and orientation

A paediatric stock acrylic eye shell was selected after matching the iris & scleral size and colour of the patient's non defective side. The most challenging part of the treatment was to correctly orient the stock eye shell in the defect area with respect to adjacent eye to make it inconspicuous to the observer, as the patient was uncooperative in terms of age but with repeated efforts and perseverance the desired result could be achieved. Facial measurements were made to orient the eye shell wherein vertical lines were marked on the face. Line A was marked through the midline of the face, line B passing through the pupil of left eye when patient was kept in normal straight gaze and line B' was drawn equidistant from line A as was from line A to B. A

horizontal line C was drawn passing through the centre of the pupil of left eye and extended through the defect of the right side as C'. The line B-B' helped in correctly orienting the shell in mediolateral direction and line C-C' in correct vertical plane (Fig-3). These measurements were then transferred to the facial moulage for fabricating the wax pattern.

Wax pattern Fabrication and Try-in

After transferring the measurements to the facial moulage the defect was covered with a wax strip over which the stock eye shell was oriented as per the recorded measurements and stabilized with wax. The peri- orbital tissues were then reconstructed with wax replicating the adjoining soft tissues ina detailed manner. After sculpting, the wax pattern try in was done to check the correct medio-lateral, supero-inferior and antero-posterior orientation of the prosthesis on the patient's face (Fig-4). Ceroplastic is the most challenging and a critical step as it is during this step all the details should be perceived as similar as possible to the contra- lateral side to obtain silicone duplicate of very good characteristics. Since it determines the final outcome of the prosthesis, with the application of appropriate behavioural management technique the same was done successfully.

Processing of the pattern with silicone

To maintain the position of the eye shell without any discrepancy an acrylic stopper was placed on the pattern during processing. Flasking of the pattern was followed by de-waxing. The patient's skin colour was matched with medical grade high temperature vulcanising (HTV) silicone (Technovent, United Kingdom) using intrinsic stains. After shade matching the silicone was packed into the mould and cured according to the manufacturer's specifications (Fig-5). After curing, deflasking was done and the prosthesis was retrieved. The silicone flashes were trimmed and trial of the processed prosthesis was done for the parents' approval. Once the parents were satisfied, the characterisation of the prosthesis was done by placement of eye lashes and then the sealant was applied allover (Fig-6).

Insertion with medical adhesive

The insertion of the finished prosthesis was done using a medical adhesive (Probond adhesive, Technovent, United Kingdom (Fig-7&8) considering the remaining growth left of the patient. The parents were taught to insert and remove the prosthesis, along with instructions for maintenance of the prosthesis. The parents were also given the option of using spectacles by the child to further camouflage the margins of the prosthesis.

Discussion

Prosthetic rehabilitation of an orbital defect is a complex procedure with multidisciplinary approach which not only improves aesthetics but also boosts confidence in the patient and near ones. This case had a multidisciplinary approach of Paediatric ophthalmologist, Paediatric anaesthetist, Paediatric Oncologist and Prosthodontist for a successful outcome. Dental fear, non-cooperation, compromising medical conditions and the need for extensive dental treatment are the most common reasons for out-patient Dental General Anaesthesia [4]. In this case non- cooperation and need for extensive treatment were the factors because of which it was decided to make the impression under General Anaesthesia after a pre-anaesthetic evaluation.

An orbital prosthesis with intimate tissue contact, merging margins and maintaining its correct orientation are the features of a well made prosthesis. Mc Arthur suggested the orientation of the prosthetic eye in the orbital prosthesis in mediolateral and supero-inferior direction using ocular locator and fixed calliper [5]. Benson suggested the visual method for size determination and orientation of iris on the prosthesis [6]. For correct

orientation of eye shell in the defect area of this case facial measurements were used to get the desired result.

There are various methods of retention for orbital prosthesis including eyeglasses, magnets, adhesives, combination of those and osseointegrated implants [7-10]. Though implants provide the best retention aid to the prosthesis but in this case considering the age and remaining growth of the child this option was ruled out and a medical adhesive based retentive prosthesis was considered.

Silicone elastomers have excellent properties of lifelike appearance, flexibility and marginal adaptation. However, in this case it is expected for the child will have to replace the prosthesis every two to three years due to the growth. Hence, the Prosthodontist by choosing appropriate material and retentive aid determines the aesthetic and successful functional outcome of the prosthesis.

Conclusion

Loss of an eye is definitely a traumatic experience for the patient but in this case the trauma was more for the parents to see their child undergoing this. Rehabilitation was challenging as the patient was in an uncooperative stage of age and frightened by the very sight of a doctor due to numerous visits to the hospital for the treatment of Acute Lymphocytic Leukaemia. The technique employed was suitable considering the age and remaining growth of the patient. Care and attention at every step was mandatory to achieve the desired result both emotionally and prosthetically.

References

1. Stanley RB Jr, Beumer J. Orbital rehabilitation: Surgical and prosthetic. Otolaryngol Clin North Am 1988:21:189-198.
2. Ow KKR, Amrith S. Ocular prosthetics: use of a tissue conditioner material to modify a stock ocular prosthesis. J Prosthet Dent 1997;78:218-222.
3. Dean JA, Avery DR, McDonald RE. Dentistry for the child and adolescent. St. Louis, Mo: Mosby:2010.
4. Legault JV, Diner MH, Auger R. Dental treatment of children in a general anaesthesia clinic: a review. J Can Dent Assoc (Tor) 1972;38:221–224
5. McArthur RD. Aids for positioning prosthetic eyes in orbital prosthesis. J Prosthet Dent 1977;37:320-326.
6. Benson P: The fitting and fabrication of a custom resin artificial eye. J Prosthet Dent 1977;38:532-539.
7. Taylor TD. Clinical maxillofacial prosthetics. Quintessence Publishing Illinois: 233–276;2000.
8. Beumer J, Curtis TA, Marunick MT. Maxillofacial rehabilitation: prosthodontic and surgical considerations. Ishiyaku EuroAmerica, St. Louis: 377–453;1996.
9. Dumbrigue HB, Fyler A. Minimizing prosthesis movement in a midfacial defect: a clinical report. J Prosthet Dent 1997;8:341– 345.
10. Arcuri MR, LaVelle WE, Fyler E, Jons R. Prosthetic complications of extraoral implants. J Prosthet Dent 1993;69:289–292.

Legends Figure

Fig. 1: Pre-Operative Evaluation

Fig. 2 : Patient Anaesthetised After PAC, Impression Made Using Compound Fabricated Special Tray And Pick Up Impression With Alginate

Fig. 3: Facial Measurements for Orientation of Eye Shel

Fig. 4: Wax Pattern Wax Trail for Correct Orientation &Forward Gaze

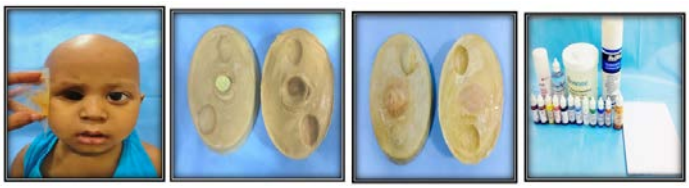

Fig. 5: Shade Matching of Silicone Dewaxing of The Wax Pattern and Placement of Acrylic Stopper & Packing of Shade Matched Silicone

Figure 6 : Sealant Application Placement of Eyelashes

Fig.7: Finished Prosthesis

Fig.8: Pre Vs Post-Operative Photographs