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Case Report

Prosthetic rehabilitation of a patient with orbital defect- A clinical report

Komal Dhillon[1], Shokhi Bansal[1], Manjunath TR[2], Deepesh Saxena[3], Roma Goswami[3], Chandan Rathod[4], Noopur Rathi[5]

[1]Department of Prosthodontics, Shaheed Kartar Singh Sarabha Dental College, Ludhiana, Punjab, India;
[2]Columbia Dental Care, Fraser Town, Bangalore, India;
[3]Department of Prosthodontics, Subharti Dental College, SVSU, Meerut, Uttar Pradesh, India;
[4]Rathod Dental Hospital and Advance Implant Center, Bhilai, India;
[5]Department of Prosthodontics, Divya Jyoti College of Dental Sciences, ABVMU, Uttar Pradesh, India

ABSTRACT:
Repairing deformities in the face is no simple feat; each patient needs a tailor-made plan for their treatment. Significant psychological and physiological issues might arise as a result of the disfigurement that accompanies an eye loss. Implants are just one of several therapeutic options available. Despite the improved outcomes, implanted orbital prostheses may not be financially feasible for everyone. This article presents a basic method for creating an orbital prosthesis (silicone) that incorporates and adjusts a prefabricated ocular prosthesis to meet specific aesthetic and functional requirements. Rehabilitation that was both accurate and effective required a multidisciplinary management and team approach with the aid of a clinical psychologist.

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Corresponding author: Noopur Rathi, Department of Prosthodontics, Divya Jyoti College of Dental Sciences, ABVMU, Uttar Pradesh, India

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INTRODUCTION

The human face holds not only vital sense organs but also contributes to maximum expressions in a human being. Having beautiful, natural teeth plays a significant role in maintaining an attractive face, which is crucial for social acceptance in today's modern, civilised society.[1] Even with reconstructive surgery, it is impossible to restore the appearance of a severed body part.[2] The issue is more complicated when the deformation is apparent on the face and influences and changes the social reaction.[3] For some individuals who have suffered from facial disfigurement, the possibility of "social death" is real.[4] Various factors can lead to the unfortunate deprivation of vision, including birth defects, permanent injuries, severe blindness, sympathetic ophthalmia, or the necessity of histological confirmation for a probable diagnosis.[5] The complications of COVID-19 disease after the beginning of the pandemic saw a rise in mucormycosis (rhino-orbital-cerebral), with the fungus claiming more lives (n = 4300) among the affected people in the Indian subcontinent alone.[6] Facial bone necrosis, infection of the orbits and skull, and eventual death resulted from the disease's localised spread throughout the entire face.[7] Of those who survived had faces disfigured with loss of nose, maxilla, extended eyes, and orbits. Disfigurement from losing an eye can lead to serious mental and physical health issues. In most cases, surgeons will either enucleate the eyeball or perform evisceration, which involves removing the globe's contents while leaving the sclera and, in rare cases, the cornea intact.[8] Archaeologists in Egypt uncovered evidence of eye replacements using various materials (stones, clay, and metals like gold, bronze, and copper) in the shrinking socket, which dates back to the fourth dynasty.[9] A significant improvement was made when eye prostheses were made of glass and porcelain.[10] A methyl methacrylate prosthesis's adaptability in terms of dimensions (size/shape) and strength contributed to its meteoric rise in popularity.[10] When the defect goes beyond the orbital area and comes into contact with movable tissue beds, it becomes preferable to use a flexible substance like silicone. If a patient wants to

speed up their physical and mental recovery after having an eye removed, as well as increase their chances of social acceptability, they need to get a new prosthetic eye as soon as feasible. Correct and effective patient rehabilitation and follow-up care require a multidisciplinary management and team approach.[1] Analogue methods are usually used to build orbital and ocular prostheses, which necessitate highly trained prosthetists to craft devices that are accurate, lifelike, and pleasant for each individual patient.[11] multiple factors determine the ocular/orbital prosthesis success and patient satisfaction, with location and defect extension being major challenges and determinants.[12] If the defect is extensive, the means to retain and obscure the prosthesis becomes very difficult.

This case report presents a very unique and rare case of a similar defect in which the magnitude of the orbit was extensive and therefore difficult to rehabilitate.

CASE REPORT

A 55-year-old adult male patient was referred to the department of prosthodontics and maxillofacial prosthetics for the replacement of the missing left eye. The patient gave the history of exenteration of the left eye due to carcinoma. Medical records, when evaluated, disclosed that the patient had developed an abnormal growth on the left eye, which later was disclosed as squamous cell carcinoma upon histopathological findings. The patient underwent exenteration of the eye that included the left eyeball and some part of the orbit. Healing was uneventful, which took around 3 to 6 months, following which the patient sought replacement through the use of an artificial prosthesis. On examination, the orbital socket presented a layer of healed skin graft over the orbital ground tissue *(Figure 1A).* The patient was asymptomatic with no signs of sensitive mucosa, tender tissue, or other discomfort in the periorbital tissue. An anatomical undercut was observed just below the eyebrow; therefore, a treatment plan comprising the fabrication of a custom silicone orbital prosthesis utilising the undercut, along with the support from the spectacles, was formulated. The artificial eye shell (AjantaExports, India) selected was resin-based, which could be modified and adjusted to fit the orbital prosthesis. A psychologist evaluated the patient's quality of life and any associated anxiety or depression before starting the treatment.[6,13] Psychological evaluation disclosed the patient has a level 2 depression (DSM-5-TR) and underwent psychological counselling before, during, and after prosthesis fabrication.[14]

The clinical and laboratory procedures for fabricating the ocular/orbital prosthesis were performed under strict infection control procedures as directed by various international and national guidelines.[15] Fabrications of prostheses were devised in different stages that included facial impression making, laboratory fabrication of prostheses, and finally trial and prosthesis insertion.

Facial impression: A supine position was assumed by the patient, and the patient was then draped in preparation for the impression operation. Petroleum jelly was applied all over the eyebrows and the face. The hair was clipped and protected by using a swimming cap. The initial step involved the acquisition of a face mould, which was accomplished by utilising an irreversible hydrocolloid (CA 37; Cavex, Haarlem, Holland)impression material. The ocular globe can be precisely realigned in three dimensions with regard to the other eye using this technique. When registering the orbital deficiency, it is important to use caution because it is frequently concealed by a delicate reconstructive graft or sensitive granulation tissue. Layers of surgical cotton and bandage were used within the impression material to act as layers of reinforcement. Paper clips were also utilised as an alternative source of reinforcement. Once impression material was spread on the face, a second layer of quick-setting dental plaster (Pankaj Industries, Mumbai, India)was layered over the spread alginate that contained means of retention. The reinforced impression was then carefully removed and inspected for any faults that may be present *(Figure 1B)*. The process of pouring the impression and obtaining the model was carried out in type III dental stone (Pankaj Industries, Mumbai, India)*(Figure 1C).*

Fabrication of Prosthesis: We used a stock ocular eye that mimics the other eye as precisely as possible in terms of size, shape, colour, and iris and sclera. To obtain a feel for where to start making changes, the cast was put on top of the stock ocular prosthesis. Following this, the patient's right eye was positioned to mimic the ocular prosthesis, and he was instructed to fixate on a distant object. The mediolateral positioning was confirmed using a measuring scale after a reference mark was set at the midline. When assessing the prosthetic eye, the pupil served as a point of reference. Accurate mediolateral, anteroposterior, and superioinferior positioning of the prosthesis was performed to exactly mimic the positioning of the normal eye. Base plate wax was then supplemented in layers on the tissue side of the prosthesis in order to orient the prosthesis to the desired visual axis as described in a previous technique where impression compound was used directly in the clinical case for a palatal lift prosthesis.[16]

The periorbital tissues were then sculpted in modelling wax *(Figure 1D)*. To the best of our ability, we replicated the right eye's lid and periorbital tissues. During the clinical trial of the trial ocular prosthesis, the lines of the juncture were feathered and adjusted to end beneath the eyeglasses or the shadows cast by them. Without the use of the eyeglass, the lines of juncture were quite apparent *(Figure 2A)*. This

waxed-up orbital prosthesis was situated to replicate the position of the remaining eye, with the patient focused on a distant fixed point *(Figure 2A)*. The silicone mould was then fabricated following investing and dewaxing. The shade was matched using natural daylight. The appropriate colours were then obtained by mixing different intrinsic shades with a high temperature vulcanising (HTV) silicone material, following which it was packed. It was left overnight to bench cure and then placed in hot water for 1 hour at 45ºC. The prosthesis was then retrieved, trimmed, and the final finishing completed and adjusted according to the patient requirement. Artificial cosmetic eyelashes were then connected to the superior prosthetic eyelid *(Figure 2 B)*. Due to the sparseness of the lower eyelashes, they were artificially enhanced with a few vertical lines of externally painted lower lids. The retention was achieved by engaging the orbital undercut, and it was found that no extra support was required from the glass frame. The prosthetic assembly was then delivered to the patient, who was educated about the use and maintenance of the overall prosthesis. At subsequent follow-up, the patient was extremely happy and satisfied with the social outcome of the prosthesis.

Instructions to the patient: The patient was instructed to remove the prosthesis during sleep. The method of insertion and removing the prosthesis and its care were demonstrated to the patient. The soft tissues of the socket were required to be rinsed with an ophthalmic irrigation solution after specific use. The patient was advised that the prosthesis should not come in contact with alcohol or solvents of any kind, as this could cause crazing. The patient was also directed to avoid the use of the cosmetics on the prosthesis because the oil base used in their compounding is deleterious to the resiliency of the resin and silicone material. Any time the ocular prosthesis gets a scratch, the patient is advised to return to the clinic and avoid polishing on his own.

Figure 1: (A) Extra oral view showing left orbit surface details (B) Facial impression supported by plaster (C) Working cast of the face (D) Wax up orbital prosthesis with prefabricated ocular prosthesis

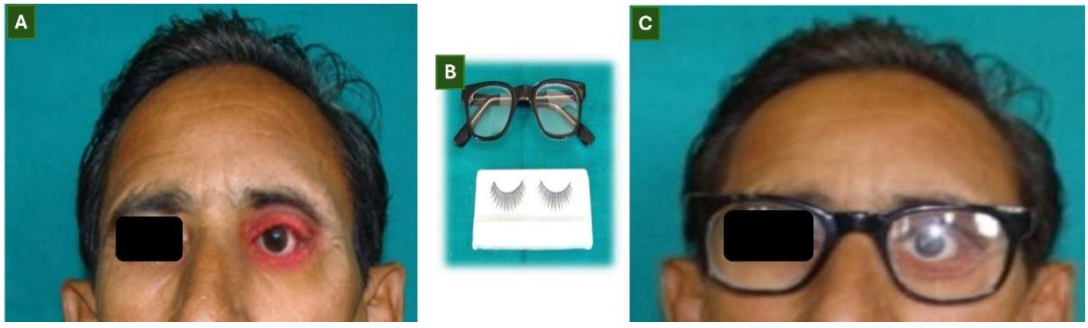

Figure 2: (A) Extra oral view of the trial orbital prosthesis containing ocular prosthesis (B) Selected eye frame and artifical eyelashes (C) Final prosthesis in place

DISCUSSION

A clinical case of rehabilitation of an adult male patient who had undergone exanteration of the left eye and was successfully rehabilitated with a combination of ocular and orbital prostheses has been presented. Squamous cell cancer had spread to this area, causing the patient to lose sight in his left eye. Basal cell carcinoma is the most common malignant eyelid tumour in the Caucasian race, accounting for nearly 85% of cases. Its etiopathogenesis varies, with UV radiation being a significant risk factor.[17] Squamous cell carcinoma (SCC) has also been found to be in the majority in other races and studies.[18] rarely the absence of eye may be associated with congenital or

part of syndromes.[19] Treatment focuses on radical excision for local control, with advanced malignant eyelid tumours requiring orbital exenteration and postoperative radiotherapy.[20] Risk factors for orbital invasion include elderly male patients, advanced tumour stage, local recurrences, localisation in the medial canthal area, aggressive histological subtypes, and perineural invasion.[17-20] Significant cosmetic abnormalities, functional impairments, and potential psychological consequences can arise from defects that are either congenital or acquired by trauma and ablative tumour excision surgery.[21] There are three angles from which to examine facial aesthetics from a clinical perspective: biological, biomechanical, and psychological.[22] Just because a defect remains after surgery to remove the lesion doesn't mean anyone can understand the emotional toll that it might take on a patient.[23]

For a long time, people with anophthalmia have understood the significance of an attractive and functional orbital prosthesis in helping them regain their natural look. An ocular prosthesis from a stock company that comes in a variety of sizes, forms, and colours can occasionally suffice when an artificial eye is required.[11] On the other hand, a tailor-made eye prosthetic is often necessary.[24] Benefits include better osseointegration with the underlying tissues, more prosthetic mobility, more natural facial shapes, and more aesthetic control over iris and sclera size.[10] However, there are a number of procedures involved in the production of a custom prosthesis, which drives up the price compared to a stock prosthesis. Because of its low cost and ease of fabrication, a modified stock ocular prosthesis is a great substitute. One of the most important things for the orbital prosthesis to look good is for the prosthetic eye to be properly aligned.[18] A number of methods, including facial measurements, have been suggested for guiding the orbital prosthesis's eyepiece into proper alignment.[25] Rehabilitating an orbital deformity is no easy feat, but an orbital prosthesis can help when plastic surgery is out of the question or the patient simply does not want the procedure. A variety of methods exist for securing an orbital prosthesis in place, including adhesives, eyeglass attachments, or penetration of hard or soft tissue undercuts.[26] Implants are a popular choice since they provide better retention than other methods. Osseointegrated implants are only used in a small number of patients due to a number of reasons, such as systemic diseases and budgetary limitations. Whatever the case, the patient follow-up is essential for the surgeon as well as the prosthetist. Improper follow-up of surgeons has been reported to increase the complexities of rehabilitation in such cases since overgrowth of fibrous tissue within the defect is associated with poor clinical outcomes.[27]

CONCLUSION

Specialised individuals with the proper training to build acceptable substitutes have a unique problem when it comes to replacing anatomical elements. Patients without substantial financial resources have found the stock ocular prosthesis to be a practical and cost-effective alternative to more costly treatment choices. Both ocular prostheses made of silicone and eye prostheses made of resin, however, are not compatible, and issues continue to remain till better replacements are found.

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Conflict of interest: None

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