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Iris replication techniques from conventional to digital - A case series

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Abstract

Loss on an eye leads to both physical and psychological disturbances to patient. Although there are many techniques and materials used for the prosthetic rehabilitation of such ocular defects, the choice depends on the feasibility and skill of the maxillo facial Prosthodontist. This article highlights three different techniques through which iris can be replicated. In first case iris from stock eye was used after selecting the closest matching colour and diameter of the iris. In second case iris was replicated using paint on technique. Acrylic colours were painted on iris discs and processed. In third case iris was replicated by using the printed image of patient's normal eye. Although stock eye gives acceptable results, not everytime it will match the iris shade. Thus, different custom-made techniques using paint on and digital photography should be brought into practise for more natural and life like appearance.

Keywords: Ocular Prosthesis, Iris Replication, Iris Paint On Technique, Iris Photographic Duplication.

Introduction

The eye is the jewel of the body and Iris is as unique as a fingerprint in adding beauty to one's face. Amidst the beauty of this vital sense organ, one cannot overlook the pressing matter of ocular imperfections. There are a multitude of ocular disorders that can lead to loss of

orbital contents like cataracts, glaucoma, refractive errors, amblyopia, Strabismus, and age-related macular degeneration [1].

In India, a recent study conducted among older adults revealed a prevalence rate of vision problems 2.9% which was lower than the rate reported in RAAB study 3.6% [2]. The incidence of eye cancer is estimated to be less than 0.5% [3]. Ocular defects can have various etiologies, like congenital defects, age-related changes, nutritional deficiencies, traumatic injuries and environmental factors. Patients with ocular defects will undergo different treatments like enucleation, evisceration and exenteration [4].

Creation of lifelike prosthetic restorations is a paramount objective in the field of maxillofacial Prosthodontics, particularly when it comes to ocular prostheses. The iris, with its intricate color patterns and uniqueness is essential to mimic the natural appearance of the eye. This case report describes the various techniques used to replicate the natural appearance of the iris for the successful rehabilitation of patients with ocular prosthesis.

Case Report

Case 1: A 35-year-old male was referred from Department of Ophthalmology to our department following enucleation of his right eye. Impression was made using light body addition silicone (fig 1). Scleral try-in was done using modeling wax, followed by iris centering. The most suitable iris, matching both diameter and colour of the patient's normal eye was selected and removed from stock eye. Iris was then embedded in the scleral wax and processed (fig 2). Extrinsic staining of sclera was done using acrylic paint and blood vessels were mimicked using red nylon fibres and was delivered to the patient (fig 3).

Fig. 1: Ocular impression

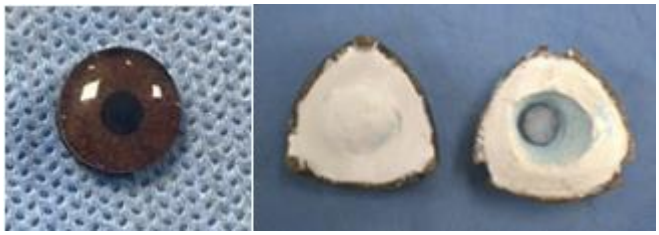

Fig. 2: Iris from stock eyes and processing

Fig. 3: Pre and post op

Case 2: A 58-year-old male reported post enucleation of his left eye due to trauma while working on a field. Impression of affected eye was made using light body addition silicone, scleral try in was done to achieve the desired contour. Centering of iris was done and aluminium disc placed in position of future iris. Iris disc was chosen and trimmed to the diameter of patient's normal iris. Iris painting was done using acrylic colours and paint brushes of size 0,00 and 000 (fig 4). Painted iris disc was let to dry and stuck on iris button using monopoly syrup. This iris button along with the painted iris disc was replaced in place of aluminium disc after dewaxing. Scleral acrylic was packed and heat cured (fig 5). The sclera was characterized using acrylic paint, finished, polished and delivered to the patient (fig 6).

Fig. 4: Painted iris disc

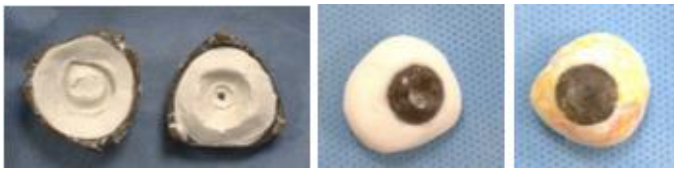

Fig. 5: processing and characterization

Fig. 6: Pre and post op

Case 3: A 65-year-old male who underwent evisceration post trauma of his left eye reported for fabrication of prosthetic eye. Impression was made using light body addition silicone, scleral try in was done using modeling wax followed by iris centering. Photograph of the patient's normal eye was captured using DSLR camera (Canon 1300D) using an ISO of 100, aperture size of F22, Focal length of 1.5 feet and using white balance. Digital print of the same was made on polished vinyl sticker sheets after editing the diameter of the iris using appropriate computer software (fig 7). The iris was removed from the printed sheet and stuck on iris disc, upon which iris button was placed using monopoly syrup. The aluminium disc used for iris centering was removed post dewaxing and replaced by the corneal button before packing. The processed prosthesis was characterized, finished, polished and delivered to the patient (fig 8).

Fig. 7: Printed iris after digital photography

Fig. 8: Pre-op and post op

Discussion

The iris, with its intricate structure and precise functionality, is truly a remarkable feature of the human eye [5]. Replication of the iris holds significance in the process of fabricating an ocular prosthesis that must contribute both emotional and physical motivation to the patient. In this case series, to achieve precise iris replication three distinct techniques were employed like the utilization of stock eyes, the meticulous art of hand painting, and the employment of digital photography.

Removal of iris from stock eyes is dependent on the availability of specific colour and diameter of the iris. The drawback of stock iris is, not all shades are available. Hence, for certain patient's paint-on and photographic techniques are used to replicate the iris as close as possible to natural eye [6].

Skilled artisans meticulously painted each iris, paying close attention to the patterns and color variations that make each iris unique. This labor-intensive process allowed for a level of customization that catered to the specific needs and preferences of each individual. This technique has better colour stability on exposure to external environment. Fernandes et al. observed better

esthetic results with painted iris on glass in comparison to other techniques. [7]

In recent years, digital photography has emerged as a valuable tool in the fabrication process. This innovative approach involves capturing highly detailed images of the normal eye, enabling practitioners to achieve a remarkably close match to the natural eye. Consequently, this method effectively overcomes several limitations that are commonly associated with conventional techniques. However, the successful implementation of this approach necessitates the utilization of specialized digital photography equipment and settings, as well as the employment of computer software that facilitates precise image adjustments. A benefit of this approach is its minimal demand for artistic proficiency, as it is less laborious and complex than manual painting. [8]

Conclusion

The replication of the iris is a multifaceted process involving a combination of techniques. Each method has its advantages and limitations. Stock eyes provide quick and affordable solution, but may lack customization. Hand painting offers closer match to the patient's natural iris, but requires artistic skill and regular maintenance. Digital photography ensures accurate color matching and pattern replication, but requires advanced equipment and expertise. Ultimately, the choice of method depends on the patient's specific needs, available resources, and level of realism.

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