

# Matching the Iris Color of Ocular Prosthesis Using an Eye Contact Lens: New Technique

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## ABSTRACT

The prosthodontist can give a cosmetically acceptable ocular prosthesis for those patients undergoing surgical resection of the eye ball. This artificial replacement being either stock or custom made. A favourable esthetics results could be achieved by selecting tinted contact lenses to match the iris color of the ocular prosthesis with natural eye color. The design, size, contour, technique and multi-color contact eye lenses facilitate the production of a satisfactory prosthesis.

## KEYWORDS

Contact eye lenses, Color matching, Ocular prosthesis, Maxillofacial prosthodontics.

## المستخلص

يتم صناعة العيون الصناعية التجميلية لغرض تعويض العين البشرية بعد ازالة كرة العين ورفعها تماما من جحر العين لاسباب معينة مثل السرطان او نتيجة حوادث معينة. في هذه التقنية الجديدة تم استعمال العدسات العينية اللاصقة بثلاثة الوان الاخضر, الازرق والبنّي والتي تعتبر الالوان الاساسية للعيون الطبيعية حيث تم ادخال هذه العدسات داخل التركيب لتأخذ حيز العدسة للعين الصناعية لغرض مطابقة الوان العين الطبيعية بعد استعمال الزوج الثاني من العدسة اللاصقة ووضعها على العين الطبيعية الاخرى.

## INTRODUCTION

The eyes are the most attractive features of the human face. It is the merciful God who created human beings and gave him eyes with different colors <sup>(1)</sup>. Unfortunately, surgical removal of human eye ball is inevitable especially those with traumatic car traffic accident, war injuries or congenital deficiency <sup>(2)</sup>. In the Egyptians era, the first eye artificial prosthesis was discovered. The ancient Iraqi civilisation of the Babylonian and Sumerian had most likely used gold, silver and precious stones for making "art-eyes" for monuments and mummies <sup>(3-5)</sup>. The color of the eye iris is graduated from light blue shade to dark black or brown shade and frequently, a scale of a three degrees ranging from blue, green to brown were utilized for classification of the eye color. The iris composed of five layers, the anterior border layer, stroma, the contractor and dilator muscles fibres, and the posterior pigment epithelium. The anterior layer with stroma underneath are mostly responsible for characterization of the eye color. Genetics are among large factors that determine the color of the iris. The blue-brown gene allele frequencies using a dominant recessive model for human eye by gave dominant-recessive allele at a single gene by 21% for brown and 79% for blue. The green eye color was assigned to chromosome <sup>(6)</sup>. An ocular prosthesis is an artificial substitute for an enucleated eye ball; and ocular prosthesis may be available as a stock ocular prosthesis or can be custom made. The disadvantages exist in a stock ocular prosthesis, such as ill-fitting and inequitable shade matching; whereas a custom-

made ocular prosthesis increases the adaptation, movement of the eye ball and exactly matches the iris position of the neighbouring eye<sup>(7,8)</sup>. The maxillofacial prosthodontist play a major role in restoring a missing eye with artificial prosthesis with satisfactory appearance, thereby retrieving patient face harmony and natural look <sup>(9)</sup>. The aim of this study is to apply a new laboratory technique to match the iris color of ocular prosthesis by using different colors of eye contact lenses.

## TECHNIQUE

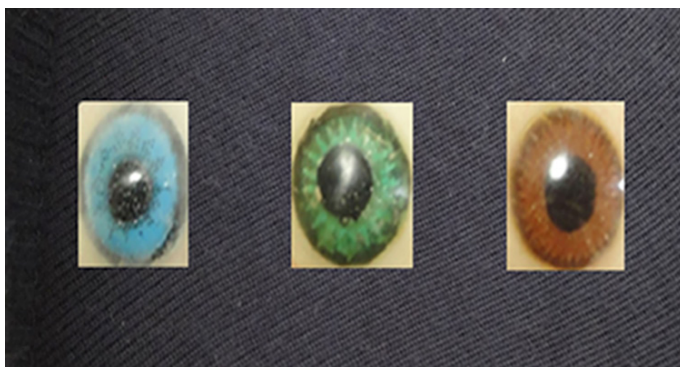
The iris matching of ocular prosthesis began by selecting contact lenses with different colors (blue, green, and brown) (Air Optix, USA), as these colours are the most commonly used in eye colour classification <sup>(6)</sup>. According to the manufacturer's information regarding the diameter and the contour of the contact lenses; three wax patterns were carved similar to dome shape and contoured to produce and simulate the details of the corneal prominence and iris. This was followed by investing the wax patterns in metal dental flask using a dental die stone type IV (Vel-Mix Classic® 31008, Kerr, USA). A vacuum mixing device was used for mixing die stone at room temperature. The water /powder ratio was 23ml/100ml according to manufacturer's instructions, followed by using lost wax technique to remove the wax pattern. To produce a suitable and matching iris color, three oil colours (blue, green, and brown) were selected before packing the acrylic. The oil color was mixed with clear heat-polymerising acrylic resin (Triplex,

Ivoclar vivdent, Germany) until matching the contact lens color. Then it was polymerized at 99°C for 120 min by using a polymerizing machine (Wassermann, Germany). After polymerization has completed, the acrylic domes were gently removed from the mold, flash was cut and the domes were gently trimmed, rounded and polished. The final shape of domes is considered as a back ground or based surface to adapt, fit and adjust the contact lens, the pupil piece was centred and fixed on the top of the background (dome) using superglue (Fig. 1).



**Fig. (1)** Blue, green, and brown color domes with pupil of iris.

To fabricate the corneal prominence, the contact lens was gently loaded from the container by the fine tip of the tweezer to adapt, fit and adjust on the background (dome) surface and further acrylised and fixed using self-cure clear acrylic resin (GC, Unifast, Japan) (Fig. 2).



**Fig. (2)** Blue, green, and brown corneal prominence (dome with contact lens).

After the self-cure has completely polymerized, the excess of acrylic was trimmed and polished. To fabricate the sclera part of ocular prosthesis, scleral wax pattern was contoured. Followed by investing the wax patterns in metal dental flask using a dental die stone, packed in the customary manner, and processed using heat cured tooth coloured acrylic resin (Ivoclar vivadent, Germany) with the aid of a polymerizing machine at 99°C for 120min. After the acrylic resin has completely polymerized the excess of acrylic was trimmed by acrylic bur and polished. In order to centralise the corneal prominence (dome with contact lens) on the central portion of the sclera surface;

engineering compass - centre wheel with pencil was used to mark the central portion of the sclera surface. The corneal prominence was glued over the sclera surface. The simulation of sclera vessels was achieved by spreading artificial veins over the sclera surface. Later on, a fine layer of clear heat-cured acrylic resin was applied upon the corneal prominence and sclera, thereby creating depth and exaggerate the details of the contact lens. Subsequent to curing of acrylic resin, finishing and polishing was accomplished (Fig. 3).



**Fig. (3)** The final ocular prosthesis with different color.

## DISCUSSION

Ocular defect is considered as a remarkable facial deficiency that necessitates artificial replacement<sup>(10)</sup>. The psychological and esthetics impacts as a result of traumatic or surgical removal of eye ball led to a significant advancement and research in the material and technique of prosthetic substitutions. An acceptable prosthesis by the patient results in self-confidence and improved social communication. Most authors are in a line of close matching or harmony between artificial eye prosthesis and natural eye to gain maximum esthetics benefits<sup>(11)</sup>. Many methods were suggested for making artificial eye prosthesis in the literature. Stock eye prosthesis was supported by Laney<sup>(12)</sup>. Although, many colored and painted irises were commercially manufactured, little success was encountered. The prosthodontist among the other teamwork believe that the color of the iris is the most successful parameter to satisfy the patient esthetics demand of the ocular prosthesis. One of the major problem of commercial ocular prosthesis is mismatching between synthetic and natural iris color<sup>(13)</sup>. The most frequently used methods for individual made ocular prosthesis are black iris disk and paper iris disk. Nevertheless, iris painting considered as one of the major procedure when making a custom made artificial prosthesis, this will increase patient confidence and improve esthetics requirements. Yet, this procedure requires a combination of art and color skills<sup>(14)</sup>. Artopoulou *et al.*<sup>(15)</sup> innovated a method of

reproducing the patient's iris using digital camera. A special photographs software were used aided by a laser printer for printing the picture on white paper. Although, this technique is considered reliable but it is a sensitive one since it requires patient cooperation, beside that setting computer software and digital photography devices are needed. Moreover, precise image adjustment is required by special computer software<sup>(15)</sup>. In this technique, the contact lens provides acceptable and adequate esthetics demands since it resemble the natural iris with less modification. This technique needs time and experimental with error tactic, yet the final esthetics and functional outcomes are encouraged. The color of contact lens may consort and important for younger patients especially the female but may not for older patients. Hence, using of the contact lens within corneal part of the iris of ocular prosthesis should be recommended.

## CONCLUSION

A simplified technique has been suggested by using of contact lens for reproduction of iris color, to accomplish the esthetics demands of the patients with defective eye. This procedure regarded as an additional step for individual esthetics.

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