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A Technique to Achieve Predictable Iris Positioning and Symmetry in Ocular and Orbital Prostheses

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Abstract

An alternative technique for achieving predictable iris positioning and symmetry for ocular and orbital prostheses using a mounted graph grid is proposed.

The eye is a vital organ, providing vision, and also an important component of facial expression. Loss of an eye may have a crippling effect on the psychology of the patient. The loss of an eye due to congenital reasons, trauma, or tumor necessitates replacement by an artificial substitute, such as an ocular or orbital prosthesis. The procedure of prosthetic replacement presents many challenges, and one of the foremost is the precise alignment of the pupil in the artificial eye, to achieve correct interpupillary distance and positioning with respect to the contralateral eye. The objective of the proposed technique is to achieve predictable positioning of the iris to enhance the final esthetic effect of the prosthetic eye and to achieve a conversational gaze that can form a reliable source of nonverbal expression on the patient's face.

Various methods regarding accurate positioning of the iris and ocular portion of the orbital prosthesis have been described. Roberts[1] and Bulbulian[2] proposed the use of the pupillometer. Joneja et al[3] described the use of window light, or light reflection viewed symmetrically in both eyes. Brown[4] used caliper measurements made from the patient's face. McArthur[5] described the use of the ocular locator and fixed caliper for positioning the artificial eye in the orbital prosthesis. Benson[6] suggested fabrication of a custom-made acrylic resin ocular prosthesis in which the size and position of the iris was determined by visual judgment. Jooste[7] described the use of dividers for transfer of measurements for orienting the ocular portion of the orbital prosthesis. Nusinov et al[8] mentioned the technique of inverted anatomic tracings for establishing the orbital tissue contours of the oculofacial prosthesis.[8] Guttal et al[9] described the method of positioning the iris disk on a custom-made ocular prosthesis using a transparent graph grid.

Depending on the type of defect, an impression is made with either alginate[10] or polyvinyl siloxane (PVS)[11] impression material. Either of these impression materials can be used, as both of them record the tissues accurately. Care is to be exercised when using alginate to ensure a free-flowing mix. Alginate also has the advantage of being nonirritating, cost effective, easily available, and dispensable. PVS can be used in cases requiring a reline impression of the ocular defect, if the patient is already using an existing prosthesis. A cast is poured using dental stone (Kalstone, Kalabhai Dental Corp., Mumbai, India), and a wax pattern is then fabricated using modeling wax, Type II (Elite, Elite Dental Corp., Nanded, India). The pattern is then evaluated in the patient's socket, and the iris is positioned. The iris should closely approximate the color of the contralateral iris. The size of the iris should be such that the upper eyelid should cover the upper portion of the iris and the lower eyelid rests at, or slightly above, the lower portion of the iris.[12]

Technique

(1) A suitable stock eye or prefabricated iris button (Technovent, Leeds, United Kingdom) is selected with the iris circumference matching the contralateral eye. Care is taken to ensure the stock eye prosthesis or the wax pattern over which the iris disk is to be placed is well finished and gives a pleasing contour to the eyelids and the inner canthus of the affected eye.

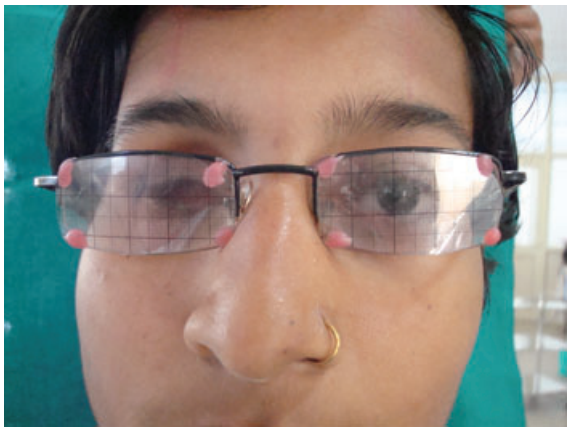

Figure 1 Grid cutouts placed on spectacle frame.

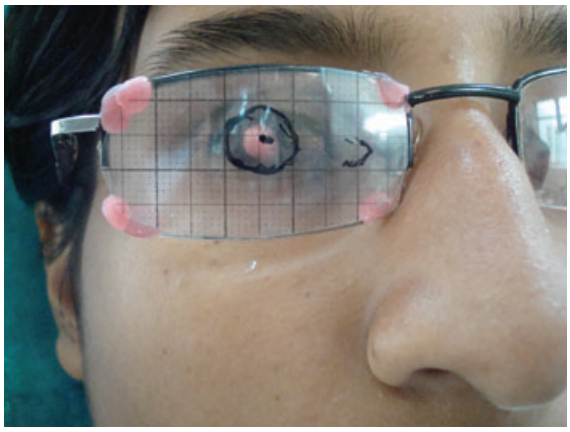

Figure 3 Traced cutout placed in the internal aspect of spectacle frame on the affected side.

(2) Suitable eyewear (Recom, Chandan Optical Company, Ahmedabad, India) is chosen, covering the patient's eye on all sides. A paper graph grid is then photocopied on a transparent projector sheet (Navneet OHP, Navneet Stationery Ltd, Mumbai, India) to fabricate a transparent graph grid.
(3) The transparent graph grid is then folded along the midline, and a second fold is given that would divide the grid into four parts. One part of this is cut into two equal sizes. The two grid cutouts of equal sizes are then positioned on the front surface of the eyewear glass lens (Fig 1).
(4) The patient is positioned to look forward and is asked to hold the position of the eye in a normal conversational gaze. An outline of the iris is then traced, with a mark corresponding to the inner canthus on the side of the normal eye using an indelible ink marker (OHP marker, Camlin, Mumbai, India) (Fig 2).
(5) This grid cutout is removed from the side of the normal eye, and is then attached onto the inner surface of the eyewear lens on the affected side by rotating it to create a mirror image, in such a manner that the horizontal and vertical lines on both transparent grid cutouts are coincident to each other. The position of the inner canthus mark can also serve as a reference point for the level of symmetry needed for the final prosthesis (Fig 3).
(6) An image is traced on the grid cutout of the affected side using the mirror image of the grid cutout of the contralateral eye, which is now placed on the posterior surface of the eyewear lens of the affected side (Fig 4).
(7) The iris disk is positioned in the wax pattern, or the stock eye prosthesis is adjusted in such a way that the position of the iris disk corresponds to the outline traced on the grid on the affected side (Fig 5).
(8) The grids are removed, and the position of the iris is checked for symmetry with the patient engaged in a conversational gaze.
(9) The prosthesis is flasked, cured, finished, polished, and inserted (Fig 6).

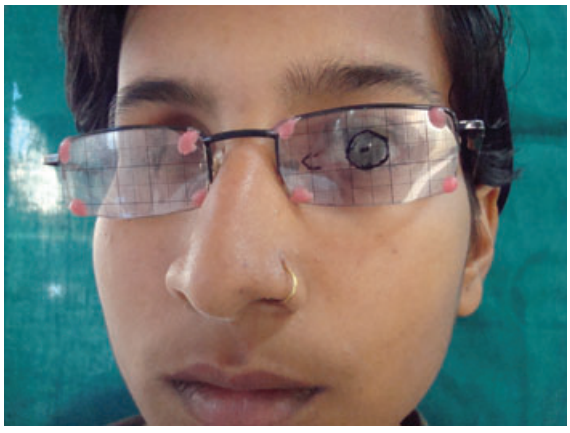

Figure 2 Tracing of the iris and inner canthus on normal side.

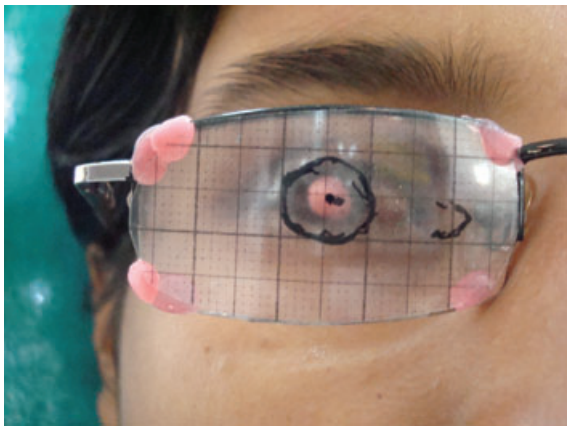

Figure 4 Tracing completed on the affected side.

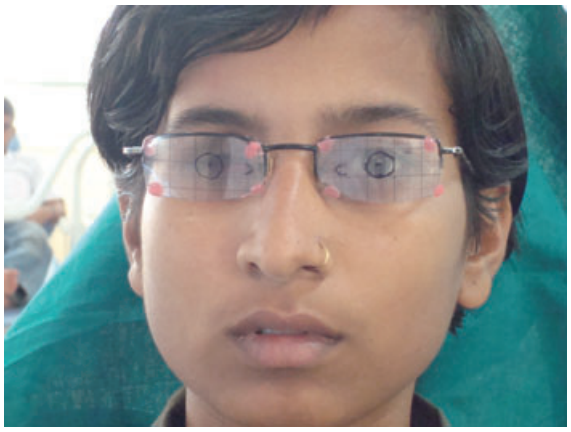

Figure 5 Grid cutouts with both tracings completed.

Figure 6 Finished prosthesis.

Advantages

(1) Simplified technique requiring decreased armamentarium and chairtime as compared to visual assessment by the operator.[6]
(2) The graph grid mounted on eyewear is relatively more stable compared to the graph grid mounted on the nose.[9]
(3) The guideline used for adjustment of iris positioning in the patient is the normal conversational gaze, since this would be the most commonly used position of the eye during interaction with people.

Conclusion

Symmetry is important to the esthetic appearance of maxillofacial prostheses, and the ocular and orbital prostheses are no exception. Numerous techniques have been developed to create ocular and orbital prostheses that serve the purpose of restoring esthetics and improve patient confidence. The described technique allows for the predictable and easy fabrication of an esthetically appropriate ocular and orbital prosthesis.

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