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Iris Sync: A Novel Device For Iris Positioning

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ABSTRACT

Background : Anophthalmia due to orbital evisceration, enucleation, or exenteration can cause significant psychological stress due to functional disability and societal response to the facial disfigurement. Custom-made prosthesis is the preferred treatment modality to restore the loss. Iris positioning pays a major role in the aesthetics of prosthesis, to achieve better psychological impact among patients.

Technique: Iris Sync device - a simple device that can be used for recording the measurement and position of the iris of the unaffected natural eye and precisely transferring it to the prosthetic eye of the patient.

Conclusion: The device is straightforward, inexpensive fast and accurate with fewer subjective and objective errors.

Keywords: Eye prosthesis, Prosthetic eye, Iris positioning, Iris sync.

Introduction

As it is rightly said "Eyes are the window to the soul", they speak louder than words. One cannot emphasize enough on the importance of it, be it vision, facial expressions or appearance of an individual.[1] The absence of eye known as Anophthalmia, can be caused due to various reasons: congenital defects, trauma, carcinoma, sympathetic ophthalmic or painful blind eye. This requires surgical treatments like orbital evisceration, enucleation, or exenteration, attempted to remove affected part or complete eye.

Often this causes social, functional, and emotional anguish.[1] Here, the role of a maxillofacial prosthodontist in restoring the organ and patient's confidence becomes important. [2]

Iris is the most important aspect of fabricating an ocular prosthesis. Its positioning and colour resemblance to another eye play a crucial role. An inaccurate position can give the appearance of squint eye which is unappealing and creates a poor psychological impact on patients. The right selection of shape, size, contour, and colour of the iris is crucial for determining its positioning.[3]

For rehabilitation, custom-made prosthesis similar to the patient's natural eye is made. There are various methods in the literature by which iris positioning has been done. It can be done by simple visual assessment and measurement between various landmarks, with the use of devices like pupilometer, Vernier callipers, rulers, tongue blades, laser pointers, ocular locators, profile gauze, graph grids, spectacle grids, occlusal plane with grid, editing software like photoshop etc.[4]

The purpose of this article is to report a novel device " Iris sync" used for the orientation and positioning of iris during the fabrication of an ocular prosthesis. It is a simple and innovative device that objectively positions the iris for better accuracy.

Iris sync apparatus

This is a novel calliper device use to accurately mark the position of iris of the missing eye. It measures the distance of the iris of normal eye to the glabella (anatomic landmark)

It comprises of a head strap, bite fork, vertical rod, horizontal rod and pointers to mark iris.

Head strap – to hold the device from above and stabilize it

Bite fork – stabilize the apparatus from beneath

Horizontal rod – contains a ruler parallel to the interpupillary line. It can be moved vertically on the vertical rod and secured at patient's interpupillary line level. It carries a platform on which pointers on both sides of midline are attached with screws.

Vertical rod- Vertical platform for the horizontal rod and bite fork, which is movable in the vertical direction and can be secured with screws for support.

Various pointers to be placed on horizontal rod. They are of various lengths and contains a tip.

Figure 1 : Components of Iris sync device

The Figure 1 shows the Components of Iris sync device

Procedure

1. Fabrication of Wax conformer: Impression of the missing ocular area was made; subsequently master cast was poured. From this the wax conformer was made, shaped and contoured similar to the normal eye. This wax conformer was then adjusted in patient's eye.
2. Attachment of the device: The device was worn from the head, carried in front of the face. Bite fork was fitted in accordance with the midline and the patient was asked to bite on it for stabilization, head strap was fitted on to patient's head. Such that the centre of head strap rests on glabella and the vertical rod aligns and coincides with the midline. The horizontal rod was adjusted to coincide with the interpupillary line.

3. Iris positioning : after the device was secured in place, patient is asked to look straight in forward direction. The pointer of appropriate size was selected on the basis of space between the horizontal rod and the conformer. It was then adjusted on to the centre of iris of the normal eye, the distance from this to centre of the rod is measured and noted. The pointer at the affected eye with conformer is adjusted with the measured distance. The tip is dipped in eosin stain and marking was done on wax conformer.
   The centre of iris for the prosthesis was achieved in the form of a point. Wax trial prosthesis was verified and after patient confirmation, cured in conventional manner.

Figure 2 : Device in position on patient (a) Front view (b) Lateral view

The Figure 2 shows Device in position on patient (a) Front view (b) Lateral view

Discussion

The iris is the pigmented, muscular curtain that covers the space in front of the eye between the cornea and the lens. The pupil punctures this curtain. It is located in front of the lens and ciliary body, behind the cornea. Fabricating a custom prosthetic eye presents with many complexities and challenges. A few variables that impact iris location are the proper choice of iris shape, size, contour, and colour. [5]The major challenge is to precisely orient the iris. It definitely depends on the skill of the operator to inculcate and achieve characteristic and aesthetic results. This can only be achieved once the measurements of the proposed iris are precise on the prosthetic eye.

Various techniques have been proposed. Subjective techniques include Facial measurements using anatomic landmarks,[6] Window light method,[7] Visual assessment ,[8] Inverted anatomic tracings method.[9] Objective methods include instruments such as Pupillometer,[10] Ocular locator,[11] Graph grid method,[12] Boley's gauge, [13] Customized scale for iris positioning,[14] Modified Hanau wide-view spring bow,[15] Customized frame spring bow assembly,[16] PD ruler,[17] Digital photograph,[18] Laser pointer apparatus,[19] Photoshop software,[20] Nae's ruler.[21]

Nimonkar SV et al,[4] concluded that objective techniques that make use of simple apparatus without the need for patient participation and cooperation should be opted to achieve best aesthetics. Shetty et al. in 2018 [15] used Hanau wide-view spring bow with modifications but cannot be used in patients without ears. Laser pointer apparatus by Belkhode et al.,in 2020 [19] was introduced in which a laser pointer helped to measure the distances of the iris mathematically. On the contrary, iris sync apparatus is straightforward and less time-consuming than other devices in the same category. The horizontal rod provides several readings like that of iris and pupil size on a single ruler while being user-friendly.

It can be used in complicated cases with facial asymmetry. As the vertical rod marks the nasion, glabella, tip of the nose and midpoint of the chin as its landmarks on the midline. Any gross asymmetry can be noted and proceeded. It is a versatile device which can be used in multiple patients, in small setups, and allows verification of the iris positioning multiple times.

It eliminates the need of arbitrary measurements with rulers and callipers, reducing chairside time and number of appointments, it is simple yet innovative in its design. The achieved result is an accurate iris position. Its limitation is the requirement of specific instrument. Also, well-structured and long-term prospective studies are recommended to comment on the longevity of this device.

Conclusion

Iris sync device technique is a straightforward, fast and cost-effective method for iris positioning. It is a handy device and technique friendly to the clinician, with which aesthetically pleasing and accurate prosthesis can be fabricated.

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