Astigmatic Correction with Toric Intraocular Lens During Cataract Surgery

Thesis

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List of Abbreviations

Abb.	Full term
AA	Ahmed Assaf.
AK	Astigmatic keratotomy.
BCVA	Best corrected visual acuity.
HOAs	High order aberrations.
I/A	Irrigation /aspiration.
IOL	Intraocular Lens.
LOAs	Low order aberrations.
LRIs	Limbal relaxing incisions.
OCCI	Opposite clear corneal incisions.
PCRIs	Peripheral corneal relaxing incisions.
RMS	Root mean square
UDVA	Uncorrected distant visual acuity

ABSTRACT

We found that No significant decrease in the UDVA and the refractive cylinder was observed between 1 week and 3 months postoperatively, no significant correlation was found between the level of rotation and magnitude of refractive cylinder at 3 months postoperatively, no significant decrease in the total, coma and spherical aberration was observed between 1 week and 3 months postoperatively, but there was a significant decrease in the high and trefoil aberrations was observed between 1 week and 3 months postoperatively.

In conclusion, the aspheric toric IOL is able to provide a highly predictable correction of the ocular astigmatism due to its stability within the capsular bag, with minimal rotation, it also provide excellent visual and refractive outcomes.

Keywords: Best corrected visual acuity - Astigmatic keratotomy- Irrigation /aspiration- Intraocular Lens

INTRODUCTION

Astigmatism is a refractive error in which no point focus is formed because of unequal refraction of light rays in different meridia by the diopteric system of the eye ***(Ghanem and Azar, 2010).*** It may be either regular astigmatism, oblique astigmatism or irregular astigmatism ***(Elkington et al., 1999).***

Cataract surgery is one of the most commonly performed surgeries ***(Reidy et al., 1998),*** Among patients having cataract about 13% of patients do not have corneal astigmatism, 65% have corneal astigmatism between 0.25 D to 1.25 D, 15% have astigmatism between 1.50 D and 2.25 D, 4% have corneal astigmatism between 2.50 D and 3.00 D, and 3% have astigmatism equal to or higher than 3.25 D ***(Ferrer-Blasco et al., 2009).***

Because as little as 0.75 D of Astigmatism may cause ghosting and halos, correcting Astigmatism in cataract surgery is desirable ***(Hoffer, 1980).***

When replacing a lens during cataract surgery pre-existing astigmatism can either be corrected by glasses or contact lenses ***(Savage et al., 2003).***

Delivering a high quality of vision and spectacle independence whenever possible are important in today's era of refractive cataract surgery ***(Holland, 2013).***

Many alternative surgical procedures to reduce or eliminate astigmatism are now available such as corneal relaxing incisions, astigmatic keratotomies, limbal relaxing incisions and excimer laser ablation ***(Savage et al., 2003).***

All these methods have limitations such as the amount of cylinder that can be corrected which is limited and postoperative outcomes which are subject to many variables such as age, incision number, depth, and length. Also it is dependent on variable healing responses and the skill of the surgeon. The risks for overcorrection, perforation, and wound gape also need to be considered ***(Grabow, 1994).***

In ***1994, Shimizu et al*** described Toric intraocular lens (IOL) implantation as another option for the correction of corneal astigmatism in cataract patients.

The use of a toric IOL is designed to replace the cataractous lens of an eye and to correct the corneal astigmatism in a single procedure, Thus if toric IOLs are safe and efficient, an increase in quality of life should be observed in cataract patients with astigmatism ***(Agresta et al., 2012).***

Rotation of the toric IOL after implantation is the main problem associated ***(Weinand et al., 2007),*** it has been estimated that approximately 1 degree of off-axis rotation results in a loss of up to 3.3% of the lens cylinder power. When the toric IOL rotates 30 degrees, the cylinder power is completely lost ***(Novis, 2000).***

AIM OF THE WORK

The purpose of this study is to assess the astigmatic reduction, rotational Stability and the aberrometric changes of the Toric IOL ***(Acrysof Toric IQ)*** in a series of cataract surgery patients with corneal astigmatism greater than 1.00 D.

ASTIGMATISM

Astigmatism is a refractive error in which no point focus is formed because of unequal refraction of light rays in different meridia by the diopteric system of the eye ***(Ghanem and Azar, 2010).***

Instead of a single focal point in spherical errors, there are two focal lines, separated from each other by a focal interval called Sturm of conoid ***(Fig. 1)***. At the diopteric mean of the focal lines, there is a cross section of the conoid of sturm that is circular this circular patch of light rays is called the circle of least confusion: it represents the best overall focus of the sphero-cylinderical lens ***(Kohnen et al., 2008).***

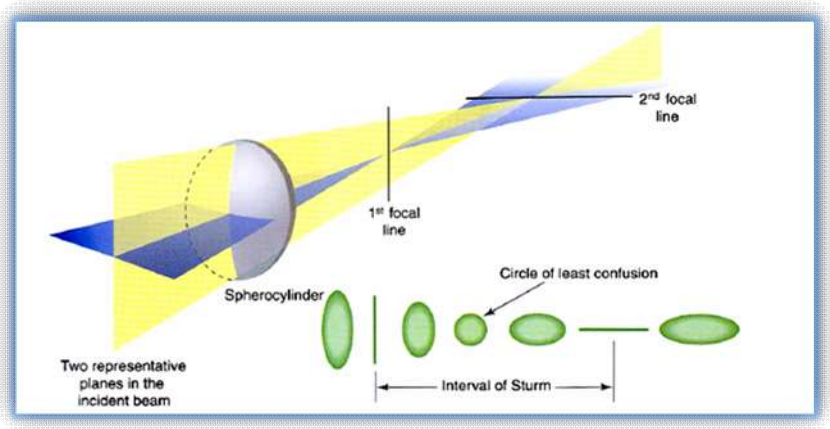

Fig. (1): Conoid of Sturum ***(Skuta et al., 2011).***

It may be either regular astigmatism, oblique astigmatism or irregular astigmatism ***(Elkington et al., 1999),*** Regular astigmatism can be classified According to location of principle meridians into With-the-rule astigmatism and Against-the-rule astigmatism ***(Michaels, 1980).***

Astigmatism of >1.00 diopter is expected to be visually significant with affection of the quality of uncorrected visual acuity ***(Boyd, 2000)***.

Assessment of corneal Astigmatism:

Placido disc: *(Fig. 2)*

The general shape of the cornea can be studied using Placido's disc. This is a flat disc bearing concentric black and white rings. A convex lens is mounted in an aperture in the centre of the disc in order to magnify the image and relieve the need for accommodation ***(Elkington et al., 1999).***