Recent Advances in Phakic Intraocular Lens

Essay Submitted for Master Degree in Ophthalmology

Presented by

Bashir Abdel Raof Mohmed

MB BCh

Supervised by

Prof. Dr. osama salem

Professor of Ophthalmology

Faculty of Medicine Ain Shams University

Dr. Mohmed Moghazy

Assistant Professor of Ophthalmology

Faculty of Medicine Ain Shams University

Ain Shams University

Cairo2013

ACKNOWLEDGMENT

My endless and everlasting thanks to ALLAH , the most gracious and the most merciful for completion of this work.

Although no words can express my great gratitude and respect to **Prof. Dr. Osama Salem,** Professor of ophthalmology faculty of medicine, Ain Shams University, I would like to thank him for his encouragement, advice and his great sincere support throughout this study.

I feel greatly indebted to **Dr. Mohmed Moghazy,** Assistant Professor of ophthalmology faculty of medicine, Ain Shams university, for his great care, patience, sincere guidance, tremendous effort. He generously offer me unlimited cooperation and valuable advice throughout this study.

بسم الله الرحمن الرحيم

نَرْفَعُ دَرَجَاتٍ مَنْ نَشَاءُ وَفَوْقَ كُلِّ ذِي عِلْمٍ عَلِيمٌ

صدق الله العظيم

سورة يوسف (آية ٧٦)

List Of Content

List of abbreviations

ALK	*Automated Lamellar Keratoplasty*
AC	*Anterior Chamber*
ACD	*Anterior Chamber Depth*
ATPIOLs	*Artisan toric Phakic intraocular lenses*
BAB	*Blood-Aqueous Barrier*
BCVA	*Best Corrected Visual Acuity*
DSAEK	*Descemet's Stripping Automated Endothelial Keratoplasty*
EPI-LASIK	*Epithelial Laser In-Situ Keratomileusis*
FDA	*Food and Drug Administration*
ICGA	*indocyanine green angiography*
ICL	*Implantable Contact Lens*
IOL	*Intraocular Lens*
IOP	*Intraocular Pressure*
LASEK	*laser assisted sub-epithelium Keratomileusis*
LASIK	*laser in situ Keratomileusis*
Nd:YAG	*Neodymium Yttrium Aluminum Garnet*
No	*Number*
OVD	*Ophthalmic Viscosurgical Device*
PC	*Posterior Chamber*

PI	*Peripheral Iridectomy*
PIOL	*Phakic Intraocular Lens*
PMMA	*Polymethyl Methacrylate*
PRK	*photorefractive keratectomy*
PRL	*Phakic Refractive Lens*
RK	*Radial keratotomy*
RLE	*Refractive Lens Exchange*
TICL	*Toric Implantable Contact Lens*
UCVA	*Uncorrected Visual Acuity*
WTW	*White-To-White*

List of Figures

List of Table

Introduction

The surgical solutions to correct refractive errors include: corneal refractive surgery, clear lens extraction, and phakic. Intraocular lens implantation ***(Lovisolo and Reinstein, 2005)***.

Phakic intraocular lens (PIOL) Is a supplementary IOL Implanted between the cornea and the crystalline lens; fixated in the angle, enclavated to the mid-peripheral Iris with a claw or placed In the posterior chamber (PC) , giving rise to a condition called *duophakia* or *artiphakia* ***(Grabow, 1999)***.

PIOL is apotentialy advantage over competing refractive surgical techniques. Keratorefractive procedures, being based on modification of corneal curvature, face many limitations including aggressive alteration of corneal architecture (aspherrcal corneal curvature), induction of higher order optical aberrations, lack of predictability. In addition, corneal refractive surgery carries risks as ectasia, haze, diffuse lamellar keratitis, or regression. Clear lens extraction with or without intraocular lens implantation differs from PIOL insertion in that the vitreous body is more likely to be disturbed with increased risk of retinal detachment, and the frequent need for YAG capsulotomy. Further more accommodation is lost ***(Comaish and Lawless, 2002)***.

In comparison to lamellar refractive corneal surgery, which requires technically complex and expensive lasers and microkeratomes, PIOL require minimal investment for the surgeon. Concerning the patient, PIOL implantation has the advantage of preserving the architecture of the cornea (which is arguably the healthiest part of a highly myopic eye), and no interface is formed in the optical axis of the corneal stroma. In addition," it may provide more predictable and potentially reversible refractive results than surgical technique that manipulate the corneal curvature ***(Waring, 1999)***.

Compared with clear lens extraction, myopic implantation is reversible, preserves accommodation, and reduces the risk of retinal complications ***(Baikoff, 1997)***.

Contrary to an PIOL which can fit in the space created by the removed cataract, PIOL must fit within the space available in the anatomically normal anterior ocular segment. This increases the challenge for PIOL design to avoid damage to the corneal endothelium, anterior chamber angle, iris and crystalline lens ***(Waring, 1999).***

A report from the American Academy of Ophthalmology concluded that in cases of myopia levels equal to or higher -8D, PIOL may provide abetter visual outcome than Keratorefractive surgery, they also added that is Up until now, no reports have been

available in the literature considering PIOLs in patients with nystagmus, they not expected that rapid ocular movement due to the nystagmus will affect the stability of the PIOL **(Huang et al, 2009).**

PIOL implantation can be safe therapeutic option to correct high refractive errors in patients with nystagmus. Some of these patients may greatly benefit from the surgery, which may improve their visual acuity and quality of life **(Gonzalo et al, 2011).**

The use of anterior or posterior PIOL, including toric lenses, either alone or after implantation of Intracorneal Rings (ICRS) can be done **(Espander L, Meyer J. 2010).**

Aim of the work

The aim of this work is to look at the most recent data regarding the types, indications, techniques, complications and management of implantation of phakic intraocular lenses. It also displays the efficacy, predictability, stability, and safety of these implants. It stresses the need for careful preoperative evaluation, patient selection and long-term follow up in order to avoid unnecessary complicatios.

Anatomy of the anterior segment of the eye

General shape and dimensions of the eyeball

The eyeballis made up of segments of two spheres of different sizes placed one in front of the other, the anterior smaller segment, the cornea, is transparent and forms about one-sixth of the eyeball; it has a radius of curvature of about 8 mm. The posterior larger segment, the sclera, is opaque and has a radius of curvature of 12 mm ***(Snell and Lemp, 1998).***

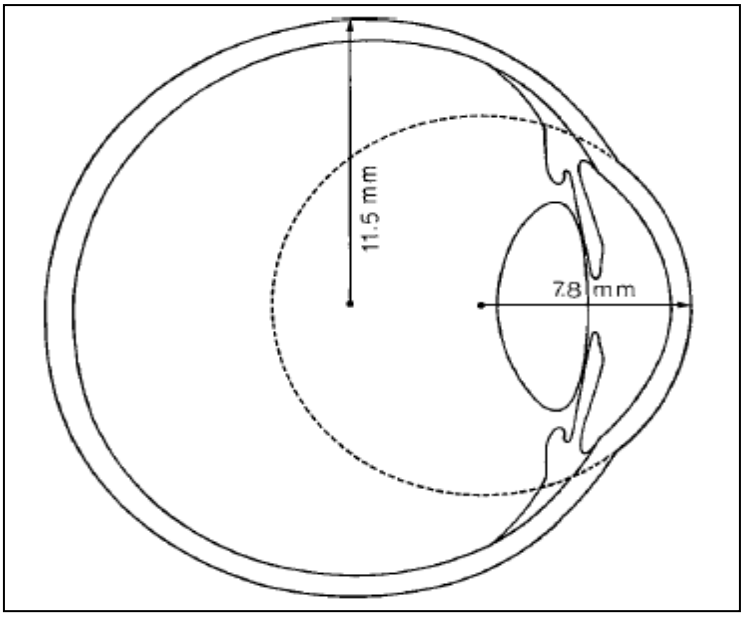

Fig. 1 Diagram of the eyeball. ***(Liebovitch, 2006).***

Anteriorly, the center of the external surface of the cornea is called the anterior pole. Because the vertical dimension of the