Evaluation of Artisan Lens Implantation for Correction of Pediatric Aphakia with Inadequate Capsular Support

Thesis submitted

By

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Abstract

PURPOSE: To evaluate the postoperative visual efficacy, and complication rate after intraocular implantation of an iris-claw aphakic intraocular lens (IOL).

SETTING: Research Institute of Ophthalmology and Abo El Reesh children hospital, Cairo University.

DESIGN: Case series.

METHODS: This chart review comprised 25eyes with no capsule support that had anterior iris-fixation IOL implantation for aphakia between 2011 and 2012.

RESULTS: The study comprised 25 eyes (18 patients). Iris-claw IOLs were inserted during primary lens surgery in 18 eyes and as a secondary procedure in 7 eyes. The mean post operative best corrected visual acuity (BCVA) was (0.51 ± 0.19).There was a highly significant increase in BCVA in comparison with the pre operative value (0.17 ± 0.11) .There was a highly significant decrease in endothelial cell count (ECC) 1 month post operative (3081.64 ± 495.3) in comparison with the pre operative ECC (3573.36 ± 468.9). There was a non significant decrease in cell count 1 year post operative (2894.24 ± 444.6) in comparison with cell count 1 month post operative (3081.64 ± 495.3).

CONCLUSIONS: Iris-claw IOL implantation for aphakia gave a good visual outcome and can be used for a wide range of indications. Postoperative complication rates were better than, those with conventional anterior chamber IOLs and sulcus scleral fixation IOLs.

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Key words: Pediatric -aphakia- capsular support-artisan-claw lens.

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LIIST OF ABBREVIATIONS

AC	Anterior Chamber
BCVA	Best corrected visual acuity
CME	cystoid macular edema
CECD	Central endothelial cell density
D	Diopter
ECC	Endothelial cell count
IOL	intra ocular lens
IOP	Intraocular pressure
PC	Posterior Chamber
PMMA	Poly methyl metacrylate
PI	Peripheral iridectomy
RGP	Rigid gas permeable
S-IOLS	Scleral-fixated intra ocular lenses
SF	Scleral fixation
VA	Visual acuity

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Aim of work

To evaluate the post-operative outcome of artisan lens implantation in aphakic pediatric eyes lacking proper capsular support regarding visual acuity, intraocular pressure and endothelial cell count and ocular complications.

Introduction

INTRODUCTION

The increasing use of intra ocular lens (IOL) implants in children has created a new set of challenges for surgeons treating pediatric cataracts, which remain a significant cause of childhood blindness in all regions of the world [1].

Pediatric IOL insertion eliminated the need for contact lens wear and did not lead to a significantly different corrected visual acuity 6 months after surgery compared with lensectomy with contact lens correction. This allows pediatric IOL insertion to be a safe alternative for the correction of pediatric aphakia[2].

Unfortunately, Pediatric aphakia without proper capsular support is not uncommon. In absence of adequate capsule support, an angle or iris supported anterior chamber intraocular lens (ACIOL), and a trans-sclerally sutured posterior chamber intraocular lens (PCIOL) offer different choices for correction of aphakia. [3].

Several reports on groups of patients with angle supported angle- supported anterior chamber IOLs in pediatric aphakia have been published. Due to high incidence of secondery glaucoma, progressive pupil distortion, corneal endothelial cell loss, and the limited experience of these IOLs in children, angle-supported IOLs have not gained widespread acceptance. [4].

Scleral-fixated IOLs are considered a more acceptable alternative for in the bag or ciliary sulcus implantation of posterior chamber IOLs, in the absence of

capsular support in children. However in scleral-fixated IOLs concerns have been raised about the risk of conjunctival and scleral erosion of scleral sutures leading to infection or endophthalmitis, IOL tilt, dislocation of the lens in the vitreous cavity, vitreous or ciliary body hemorrhage , and secondary glaucoma . [5].

The Artisan IOL is one of the latest versions of the iris fixated anterior chamber IOLs with a substantially different lens design than the previous generations of iris fixated IOLs. Artisan aphakia lens is a PMMA anterior chamber iris fixated lens originally designed in 1978 by J G .Worst, Groningen. It is associated with fewer complications. [6]. Artisan IOLs are easy to place and are associated with a good visual outcome and low incidence of intra-operative and post operative complications [7].

Many reported cases of Artisan IOL implantation had good clinical outcomes; however, despite more than 10 years of favorable clinical experience with this IOL, experience in the literature with implantation of this lens in pediatric aphakic eyes is scarce[8].

Review of literature

Pediatric Aphakia

Pediatric cataract is the most common cause of treatable childhood blindness, accounting for 5–20% of blindness in children worldwide [9–11]. Managing cataracts in children remains a challenge. Treatment is often difficult and tedious and requires a dedicated team effort, the most important members being parents [11]. The timing of treatment is crucial for the visual development and successful rehabilitation of children.

Managing pediatric cataract poses important problems related to technical aspects of surgery, changing refraction and functional outcome. However, with refinements in surgical techniques, improvement in quality and designs of intraocular lenses (IOLs) and amblyopia regimes, both technical and functional outcomes of pediatric cataract surgery are improving [10].

Many optical problems exist with post-operative aphakia such as hypermetroia of marked degree , astigmatism against the rule , anisometropia and aniseikonia (in unilateral cases) and abolished accommodation [12] .

The optical correction of pediatric aphakia can be achieved with glasses, contact lenses, or intraocular lenses. Each of these methods has associated problems that make them less than ideal, and there's no uniform consensus on their use [13].

Optical principles of aphakia

The optical system of the aphakic eye consists of the cornea, air in front of the cornea, aqueous and vitreous behind the cornea.

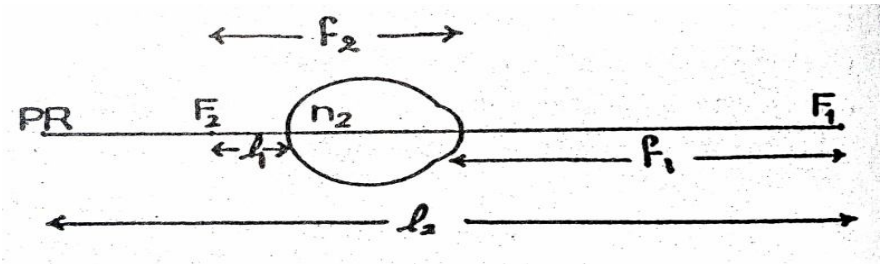

Fig. 1 showing Optical principles of the aphakic eye [12]

The anterior and posterior principal foci of the cornea can be calculated as follows (**Fig.1**).

$$f1 = \frac{n1r}{n2-n1} \quad \text{and} \quad f2 = \frac{n2r}{n2-n1}$$

r=7.7 mm , n1=1 and n2 =1.336

Therefore f1 = 22.91 mm in front of the cornea and f2 = 30.61 behind the cornea

The cornea is the only refracting system remaining in the aphakic eye and the anterior focal principal focus of the aphakic eye is 22.91 mm. Thus the dioptric power of the aphakic eye is $\frac{1000}{22.91}$ = about 43.64 D

The refractive state of the aphakic eye depends on its previous refractive state i.e.: the previously emmetropic eye becomes highly hypermetropic with the far point behind the aphakic eye while the previously highly myopic eye of about -18.00 to –20.00 D is rendered emmetrope after extraction of the crystalline lens [12].

Methods of correction of Aphakia:

1. Glasses

Spectacles are usually worn 12-15 mm in front of the cornea. The aphakic relative spectacle magnification is approximately 1.33 at this point. A correcting lens at the anterior focal point of the aphakic eye produces a relative spectacle magnification of 1.36. The problems of correcting aphakia with high power spectacles lenses are well known and have been described by ***Alan C. Woods*** (1952) .They include [12]:

- Magnification of approximately 20-35 %.
- Altered depth perception resulting from magnification.
- Pincushion distortion; for example, doors appear to bow forward.
- Difficult hand- eye coordination.
- Extreme sensitivity of the lenses to minor maladjustment in vertex distance, pantoscopic tilt, and height.
- Loss of useful binocular vision, in monocular aphakia, due to differential magnification.
- Cosmetic problems as the patient's eyes appear magnified and, if viewed obliquely, may seem strangely displaced because of prismatic effects.