Original Article

Comparison of Secondary Anterior and Posterior Intraocular Lens Implantation for Aphakia

Syed Shahid Asad, Arshad Sheikh, Uzma Fasih

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See end of article for authors affiliations

Correspondence to:
Dr. Syed Shahid Asad
Assistant Professor
Department of Ophthalmology
Karachi Medical and Dental College, and Abbasi Shaheed Hospital, Karachi
E.mail:
drshahidasad@hotmail.com

Purpose: To study the visual outcomes and complications after secondary anterior and posterior intraocular lens implantation surgery in aphakic patients.

Study Design: Quasi experimental Study**.**

Place and Duration of Study: Ophthalmology Dept. Abbasi Shaheed Hospital, Karachi from 30-7-2002 to 30-6-2003.

Material and Methods: We selected 40 aphakic patient for secondary intraocular lens (IOL) implantation from the outpatient department. A proforma was filled pre and postoperatively. Patients were followed up for at least two months. The statistical data analysis was done on SPSS version 13. All Aphakic patients came to eye outpatient department were asked to participate in the study. Secondary intraocular lens implantation was done along with peripheral iridectomy, broad iridectomy, vitrectomy and corneal repair according to the requirement.

Results: Eighteen (45%) patients were male and 22 (55%) patients were female. Patients were between 20 to 60 years of age. Thirty three (82.5%) patients had senile cataract while 7 (17.5%) patients had traumatic cataract. Most of traumatic cataract patient were below 30 years of age. Twenty seven (67.5%) patients had secondary Anterior chamber intraocular lens (AC IOL) and 13 (32.5%) patients had secondary posterior chamber intraocular lens (PC IOL) implantation done. Visual status after PC IOL implantation was better in 69.2%, remained same in 15.3% and decreased in 15.3% of patient while visual status after AC IOL improved in 62.9%, remained same in 25.9% and decreased in 11.11%. Vitrectomy was done in 15% of the patients who had AC IOL. There was increase in intraocular pressure which was controlled by medication. Three (7.5%) patients had vitritis while 2 (5%) patients had iris prolapse that was adequately managed.

Conclusion: Secondary PC and AC IOL implantation produces similar results and should be the procedure of choice and for the visual rehabilitation in aphakic patients.

Key Words: Aphakia, Secondary intraocular lens implantation, Visual rehabilitation.

The leading cause of treatable blindness in Pakistan is age related cataract. The United Nations population division has labeled cataract as the most prevalent ophthalmic disease and aphakia is considered to be the first complication of cataract surgery[1,2].

Spectacle lenses were acceptable 30 years ago because of two reasons. First, no other method of aphakic correction was available and secondly, the cataract was fully mature or nearly so in one eye and the vision was greatly reduced in the second eye, so that vision improvement was dramatic for the patient,

when spectacles were provided. The visual acuity may be good, but the patient faced the problems like, enlarged images, about 1/3 of normal size, prismatic effect, aberrational effects, decreased visual fields, ring scotoma, jack-in-box phenomenon and misjudgment of the distance leading to difficulty in daily routine life. There is no binocular vision if the other eye is phakic with good vision[3].

Although contact lenses overcomes many of these problems, but most aphakic patients are old and slow to adopt and learn. Contact lenses are unsuitable for use in dusty environment and most unilateral aphakic patients stop wearing a contact lens within two years[4].

With contact lens there is also binocularity problem, which can be improved with an intraocular lens.[5] Graham et al demonstrated a low success rate with the use of daily wear and extended wear contact lens for aphakia in over 70 years of age and suggested that this group of patients should be given full consideration for secondary intraocular lens implant procedures[6]. This practice of secondary intra-ocular lens implantation in management of aphakia has gained wide-spread acceptance in USA[7-11].

The implantation of an intra-ocular lens in an already aphakic eye is termed as "the secondary intra-ocular lens implantation". These lenses can be implanted in anterior or posterior chamber of an eye. Extracapsular cataract extraction provides support for posterior chamber implants. It has less complication than anterior chamber implants, so considered to be a preferred procedure. Posterior chamber lens can be fixed without the capsular support due to new techniques[12-13].

In case of posterior capsular rupture, vitreous loss or intracapsular cataract extraction, anterior chamber lens implantation should be considered as the most suitable procedure, although it may lead to complications like cystoid macular edema, retinal detachment, uveitis and bullous keratopathy, increase IOP. Modified techniques, use of viscoelastics and improved quality of lenses have make less chance of complications than earlier.

The rationale of our study is to compare the results of secondary anterior and posterior chamber intraocular lens implantation in patients with aphakia due to various reasons.

MATERIAL AND METHODS

The study design was Quasi interventional/ comparative. done at Ophthalmology Department Abbasi Shaheed Hospital, Karachi, from 30-7-2002 to 30-6-2003. We selected 40 aphakic patient for secondary I.O.L implantation from the outpatient department. The study design was Quasi interventional/comparative.

Patients after selection, were admitted in ophthalmology department of Abbasi Shaheed Hospital from 30-7-2002 to 30-6-2003. A proforma was filled pre and postoperatively. There was a system of follow up for at least two months. which was extended to six months in few patients.

The indication of secondary IOL implantation were Intolerance to aphakic glasses and traumatic cataract with monocular aphakia. All surgeries were done under local anaesthesia. Inclusion Criteria were contra-lateral pseudophakia, age between 20 – 60 years of any gender, monocular aphakia, Spectacles intolerance because of the weight of the spectacle, prismatic effect, spherical aberration[14,15], Contact lens intolerance e.g. parkinsonism, cerebrovascular accident, rheumatoid arthritis in very old age patient[16], Occupational limitation e.g. athletes, labour working in dusty environment and Posterior capsular rupture.

Exclusion Criteria were central corneal opacity, optic atrophy, uncontrolled glaucoma, retinal detachment, diabetic retinopathy and hypertensive retinopathy.

Comprehensive history of the patient regarding the cause of aphakia and questions related with general physical health were taken. A personal data of name, age, gender, address, occupation were noted. Ocular History included indications for previous surgery including senile cataract, traumatic cataract and congenital cataract.. Time after the previous surgery , problems faced related with the aphakia, problems faced related with aphakia glasses and contact lenses, any coexisting ocular disease like glaucoma and ocular disease for which one had took treatment in past were documented.

Complete examination of the eye included any deviation of eye ball, visual acuity for distance and near with and without glasses was recorded. Slit lamp examination included lids and adnexa, conjunctiva, cornea and fornice. Any corneal opacity in traumatic cataract was of interest regarding visual prognosis. Types of previous surgery i.e. ICCE or ECCE or any iridectomy or any conjoint surgery, iris, pupil and posterior capsule were examined and noted. Fundi were examined with both direct and indirect ophthalmoscope, 78D and biomicroscopy. Intraocular

pressure was noted.

All the patient had preoperative biometry and IOL power calculation using SRK – formula. Systemic investigations included Full blood count, urine complete and blood glucose random. Valium 5mg and Diamox 250mg were given orally. All surgeries were done under local anaesthesia using injection Xylocaine 2% with adrenaline.

After 24 hours, eye pad was removed and noted for any discharge or bleeding. Visual acuity was recorded. Slit lamp examination was done to examined for wound, flare, keratic precipitates and hyphema. Patients were discharge. Usual protocol for follow up was 2nd day, 1st week, 2nd week, 1st month and 2 months post-operatively. On each follow up patients were examined for visual acuity, biomicroscopy, refraction, IOP and fundus examination. Refraction between 1.5 to 2 months special attention was given to post-operative astigmatism. All post-operative surgical complications were noted.

Antibiotics with steroid combination were given 6 hourly for 6 – 8 weeks, oral antibiotic and analgesic for 5 days. In case of any complication drugs were adjusted accordingly.

RESULTS

In these 40 cases 18 (45%) patients were male and 22 (55%) were female (Table 1). The patients aged between 20 – 30 years were 5 (12.5%), mostly of traumatic cataract, between 31 – 40 years were 4 (10%) patients, while from 41 – 60 years of age the number of patients were 31 (77.5%), mostly of senile type. The mean age was 40 years, so there was a significant relationship found between age and the cause of cataract below 30 years (Table 2).

Among 40 patients, 33 (82.5%) patients were of senile cataract and 7 (17.5%) patients were of traumatic cataract as seen in Table 2.

Out of 33 patients in which aphakia was due to senile cataract extraction, 11 (33.3%) patients had intracapsular cataract extraction (ICCE), while 22 (66.6%) patients had extra-capsular cataract extraction (ECCE). Seven patients who had aphakia due to traumatic cataract, all had ECCE as mentioned in table 3.

Anterior chamber lens implantation was done in 27 (67.5%) cases and 13 (32.5%) patients had PC IOL implantation (Table 4). The pre-operative visual status of the patients is mention in table 5.

After PC IOL implantation, 2 (15%) patients had no improvement in vision, while 2 (15%) patients had decrease in the visual activity postoperatively, while 9 (69%) patients had improvement in their vision on Snellen's chart as indicated on table 6.

Visual improvement after AC IOL implantation can be seen on the table 7, which indicates that the vision of secondary AC IOL was same in 7 (25%) patients, decreased in 3 (11%) patients, while improvement was seen in 17 (62.9%) patients.

Nineteen (47.5%) patients had no complication in our study. While 3 (7.5%) patients developed transient rise in intraocular pressure. Three (7.5%) patients of

Table 1: Gender Distribution (n = 40).

Gender	No. of Patients	Percentage
Male	18	45%
Female	22	55%
Total:	**40**	**100%**

P value = 0.336

There was no correlation between gender and cause of cataract.

Table 2: Distribution of Age Group (n = 40).

Age	Senile	Traumatic
20 – 30 years	0	5 (71.4%)
31 – 40 years	3 (9.1%)	1 (14.3%)
41 – 60 years	30 (90.9%)	1 (14.3%)
Total:	**33 (100.0%)**	**7 (100.0%)**

P value = 0.000

Table 3: Surgery for Aphakia (n = 40).

Cause of Cataract	I.C.C.E	E.C.C.E
Senile (n = 33)	11 (33.3%)	22 (66.6%)
Traumatic (n=7)	0	7 (100%)

P value = 0.315

Table 4: Procedure Done for Secondary IOL (n = 40).

Procedure	No. of patients	Percentage
Secondary AC IOL + PI	15	37.5%
Secondary AC IOL	3	7.5%
Secondary AC IOL + Broad iridectomy	2	5%
Secondary AC IOL + Vitrectomy + PI	5	12.5%
Secondary AC IOL + Vitrectomy	1	2.5%
Secondary AC IOL + Corneal repair	1	2.5%
Secondary PC IOL	12	30%
Secondary PC IOL + PI	1	2.5%
Total secondary AC IOL	27	67.5%
Total secondary PC IOL	13	32.5%

P value = 0.592

Table 5: Pre-Operative Vision (n = 40).

Pre-op Vision	No. of Patients	Percentage
6/6	5	12.5%
6/9	12	30.0%
6/12	4	10.0%
6/18	4	10.0%
6/24	6	15.0%
6/36	4	10.0%
6/60	3	7.5%
C/F N-I with PH	1	2.5%
PL PR	1	2.5%
Total:	**40**	**100%**

Table 6: Visual Outcome after PC IOL implantation (by Snellen's Chart) (n = 13).

Visual Outcome	No. of Patients	Percentage
Decrease of vision	2	15.3%
Remain same	2	15.3%
Partial improvement of line	2	15.3%
One line improvement	5	38.4%
Two lines improvement	1	7.6%
Three lines improvement	1	7.6%
Total:	**13**	**100%**

Improvement in vision 69.2%

Table 7: Visual Outcome after AC IOL Implantation (by Snellen's Chart) (n = 27).

Visual Outcome	No. of Patients	Percentage
Decrease of vision	3	11.11%
Remain same	7	25.9%
Partial improvement of line	3	11.11%
One line improvement	8	29.6%
Two lines improvement	4	14.8%
Three lines improvement	1	3.7%
Four lines improvement	1	3.7%
Total:	**27**	**100%**

Improvement in vision 62.9%

traumatic cataract had scar but not in the pupillary region. Three (7.5%) patients had vitritis. Two (5%) patients had iris prolapse. Four (10%) patients had striate kerotopathy. Post-operative astigmatism against the rule found in 3 (7.5%) patients as mentioned on table 8.

There was a significant relationship between age and cause of cataract. Below 30 years of age, trauma was more likely the cause of cataract.

Table 8: Post-Operative Complications.

Complications	No. of Patients	Percentage
No complications	19	47.5%
Transient increase in IOP	3	7.5%
Corneal opacity not in the pupillary region	3	7.5%
Vitiritis	3	7.5%
Hyphema formed on iridectomy, vitreous floaters	2	5.0%
Iris prolapse	2	5.0%
Striate Keratopathy + iris atrophy	2	5.0%
Striate Keratopathy	2	5.0%
Difficult in setting haptics	1	2.5%
Astigmatism	3	7.5%
Total:	**40**	**100%**

DISCUSSION

Cataract is one of the leading cause of reversible blindness in our region. For the last two to three decades intracapsular cataract extraction was the only way to treat such blindness. All post cataract aphakic eyes were rehabilitated by the aphakic glasses or contact lenses.

Although, the results were better in comparison with cataract or aphakia, but these treatments had certain problems and limitations.

The major problems with aphakic glasses were their weight, magnification, distortion and aberration[17].

While a much better alternative for the aphakic patient were contact lenses. But such lenses also had their own limitations such as difficulty to be used by elderly patient as they were unable to maintain proper hygienic conditions, allergy, infections and restriction of their use in dusty environment[18].

Currently primary IOL is a routine procedure, therefore all the patients formerly operated by older method should be considered for placement of IOL as a secondary procedure, so as to get the privilege of optimum correction of their aphakia[19].

Secondary IOL implantations were the most appropriate alternative to aphakic glasses and contact lenses. In those patient who had ECCE with intact posterior capsules provides support for the post chamber IOL[2,13]. While anterior chamber IOL implantation in those patient who had ruptured posterior capsule or had ICCE.

In our study, the major indication for secondary IOL implantation was intolerance to aphakic glasses, 50% of our patient had this problem, this is quite in accordance with other studies. In a study by Hahn TW et al[20] 56.2% of patients under went secondary IOL implantation because of the discomfort. In other studies also, the major indication for such surgery was intolerance to aphakic glasses (Biglan AW et al[21] and Ali et al)[14].

As mentioned earlier the site of IOL implantation largely depends upon the state of the posterior capsule. In our study 13 (32.5%) patients had PC IOL, and 27 (67.5%) patients had AC IOL, when we compare our study with other studies we found similar result as Ali et al, 37.93% had PC IOL implantation and 62.07% had AC IOL implantation, same results found in another study by Synder et al,[11] 78.5% case were implanted in AC IOL and 21.5% were PC IOL.

A study regarding comparison of pre and post-operative vision was conducted by Shammas and Milkie,[22] in which a decrease in visual acuity was seen in 3% of patients, increase in 55% of cases and no improvement in 42% of patients. Similarly in our study the vision remained same in 9 (22.5%) patients. Improvement of vision from 1 line to 4 lines were in 20 (50%) patients and 5 (12.5%) patients had partial improvement of vision on Snellen's chart, so overall improvement in vision was 62.5%. Decrease in post-operative patient vision was noticed in 6 (15%) patients on Snellen's chart.

Hykin et al (1991)[23] suggest that correct AC IOL positioning is more likely with a secondary procedure, but the complications such as chronic angle closure glaucoma, bullous keratopathy and hyphema may be directly related to the position of AC IOL. We observed no such complication in our study.

According to the Stark et al[24] (1989) "Because of high incidence and great variety of complications associated with AC lens, we have developed a technique for the implantation of PC IOL in the absence of posterior capsular support. Many other authors supported this statement (Colvard et al 1983

and Stark et al[25] 1988). But our results of AC IOLs and PC IOLs were near about the same regarding improvement of vision and there were no significant early complication caused by AC lens implantation.

Open sky vitrectomy (anterior vitrectomy) was done in 6 (15%) cases due to vitreous loss, all patients had AC IOL implantation done. According to the Hykin et al (1991) vitreous loss is a serious complications of cataract surgery. Final visual acuity is less than in uncomplicated cases and the incidence of long term complication is higher, complication like retinal detachment and cystoid macular oedema are related more to the vitreous loss rather than to the position of implant.

We observed iris prolapse in 2 (5%) patients, which was surgically managed. While Striate keratopathy was observed in 4 (10%) patients, hyphema with iridectomy in 2 (5%) patients.

At the last of our discussion we come to end that there was a risk of reduced vision after secondary intraocular lens implantation due to the possibility of complications that follows this procedure. However, functional vision was better with intraocular lens in the comparison with the aphakic eye,[23] especially the peripheral vision.[9]

The procedure of secondary intraocular lens implantation is being done all over the world, with secondary IOL patient have the benefit of "**good binocular single vision**" and also "**improvement in peripheral vision"** with the **"liberation from heavy aphakic spectacles".** So it considered to be quite effective procedure.

Now, with more expertise, better techniques, latest equipment, good material used during operation and excellent sterilization procedures have "**declined the graph of complications"** over the past few years.

CONCLUSION

Secondary PC and AC IOL implantation produces similar results and should be the procedure of choice for visual rehabilitation in aphakic patients.

Author's Affiliation

Dr. Syed Shahid Asad
Assistant Professor
Department of Ophthalmology
Karachi Medical and Dental College
and Abbasi Shaheed Hospital, Karachi

Dr. Arshad Sheikh
Professor of Ophthalmology
Department of Ophthalmology
Karachi Medical and Dental College
and Abbasi Shaheed Hospital, Karachi

Dr. Uzma Fasih
Associate Professor
Department of Ophthalmology
Karachi Medical and Dental College
and Abbasi Shaheed Hospital, Karachi

Role of Authors:

Dr. Syed Shahid Asad
Study concept, Data collection, Data Analysis

Dr. Arshad Sheikh
Critical Review & overall Supervision

Dr. Uzma Fasih
Patient selection, Statistics, Data Analysis

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