EVALUATION OF THE VISUAL OUTCOME AND COMPLICATION OF SECONDARY IMPLANTATION OF OPEN-LOOP ANTERIOR CHAMBER, SULCUS FIXATED POSTERIOR CHAMBER AND SCLERAL FIXATED POSTERIOR CHAMBER INTRAOCULAR LENSES.

Dr. Charu Mithal, Dr. S. Sivranjini, Dr. Gaurav Kumar, Dr. Sandeep Mithal
Upgraded Dept. of Ophthalmology, LLRM Medical College Meerut.

Secondary intraocular lens implantation (IOL) is defined as insertion of an IOL into an eye, which is rendered aphakic by prior cataract extraction by any method or by an exchange IOL that is a special case of secondary intraocular lens implantation. Commonly used lens for secondary implantation is anterior chamber or a posterior chamber lens.

The subject of secondary implantation will remain extremely important in the third world countries for many decades to come. The reason is a great number of cataract surgeries in the past were performed without intraocular lens implantation. A large number of patients still seek remedy for their aphakic disability. After ages of relocative procedures like couching and lens extractive procedures like aphakic resighting came the real breakthrough “a new lens for the old”.

For many centuries sight has been restored by cataract surgery but the improvement has been limited. Aphakic spectacles only became available about 250 years ago. They gave generally improved vision but many, problems remain to which some patients can never adapt.

The continued popularity of secondary intraocular lens implantation especially in 3rd world countries is due to disadvantages of aphakic spectacles including image enlargement, prismatic and peripheral aberrational effects leading to spectacle intolerance, limited field of vision with a roving ring scotoma. Distance judgment is impaired with aphakic spectacles leading to clumsiness in performance of simple tasks. Unilateral aphakia in younger patients after traumatic cataract do not have good patient compliance with respect to contact lens wear. Unioocular aphakic has no possibility of binocular vision with aphakic spectacles and contact lens wear.

For more than 2 decades, anterior chamber IOLs (AC IOLs) and for more than a decade scleral-fixated posterior chamber (PC) IOLs has been predominant type of lens used in secondary IOL implantation in the absence of capsule support. For the past decade surgeons around the globe have also tried sulcus fixation of a standard PC IOL as a treatment modality in cases with nucleus or IOL drop with intact capsulorrhexis margin. Secondary sulcus fixated lenses have been used in children with unilateral aphakia with intact capsular support. Scleral-fixated PC IOL implantation is successful even in aphakic children with no capsular support. All these techniques have advantages and pitfalls, and the indications, lens style, techniques, and incidence of complications with each IOL type remains controversial. Implantation of modern, open-loop, AC IOLs has regained popularity and is a valuable alternative to scleral-fixated PC IOLs and scleral fixated lenses are most preferred over the other two.

Although these 3 major approaches are available for secondary IOL implantation in aphakic eyes with inadequate capsule support, no consensus exists on the indications and relative efficacy and safety of these. The purpose of this study is to evaluate the visual outcomes and complication profiles of secondary implantation of open-loop anterior chamber, sulcus fixated posterior chamber and scleral fixated posterior chamber intraocular lens.

Materials and method:
The current prospective study included 45 eyes of 45 patients with aphakia, healthy retina with good visual potential and age less than 75 years were included. Patients were randomly allocated into three groups of 15 eyes each who consecutively underwent surgery from Nov 2010 to Sep 2012. Surgeries were performed at LLRM Medical College, Meerut. Group I patients underwent secondary implantation with AC IOL (Kelman Z type AC IOL). Group II patients underwent secondary implantation with scleral fixated IOL (Hanita lens with two eyelets). Group III received...
secondary implantation of posterior chamber lens in ciliary sulcus. Preoperative gonioscopy was performed in all eyes. Eyes with peripheral anterior synechia or glaucoma received either PC IOL or scleral fixated PC IOL on the basis of presence or absence of capsular support respectively. Patients with normal angle anatomy and within normal IOP received open-loop AC IOL.

Patients were followed post-operatively for a minimum period of 1 year. Patients were examined on post op day day 1, 1st week, 2nd week, fortnightly for 2 months and then monthly. Post op follow up included Snellen visual acuity, Intra ocular pressure evaluation by applanation, Slit lamp biomicroscopy, Fundus examination and Retinoscopy. OCT was done in Cystoid Macular edema (CME) suspects. Postoperative complications were recorded.

**OBSERVATIONS AND RESULTS**

**Table 1. Visual acuity in three study groups**

<table>
<thead>
<tr>
<th>Visual acuity</th>
<th>Group 1 (AC IOL) n=15</th>
<th>Group 2 (SF IOL) n=15</th>
<th>Group 3 (PC IOL) n=15</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/6-6/18</td>
<td>2 (13.3%)</td>
<td>7 (46.7%)</td>
<td>9 (60%)</td>
</tr>
<tr>
<td>6/24-6/60</td>
<td>7 (46.7%)</td>
<td>7 (46.7%)</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>&lt;6/60</td>
<td>6 (40%)</td>
<td>1 (6.7%)</td>
<td>1 (6.7%)</td>
</tr>
</tbody>
</table>

By applying Z test of proportions at confidence interval 95% for independent group's statistical difference in the final visual acuity attained between the three groups was calculated.

The number of patients attaining BCVA 6/6-6/18 was maximum with PC IOL and SF IOL compared to AC IOL and this difference was statistically significant by applying Z test of proportions for independent groups at confidence interval of 95%. There was no statistical difference between SF IOL and PC IOL.

**Table 2. Statistical analysis of three groups with BCVA 6/6-6/18**

<table>
<thead>
<tr>
<th>Visual acuity</th>
<th>Group 1 (AC IOL)</th>
<th>Group 2 (SF IOL)</th>
<th>Group 3 (PC IOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=18</td>
<td>2</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Observed Sample Proportion</td>
<td>0.11</td>
<td>0.39</td>
<td>0.59</td>
</tr>
<tr>
<td>AC IOL</td>
<td>-</td>
<td>YES z=3.01</td>
<td>YES z=2.72</td>
</tr>
<tr>
<td>SF IOL</td>
<td>YES z=3.01</td>
<td>-</td>
<td>NO z=0.65</td>
</tr>
<tr>
<td>PC IOL</td>
<td>YES z=2.72</td>
<td>NO z=0.65</td>
<td>-</td>
</tr>
</tbody>
</table>

The difference in number of patients attaining BCVA 6/24-6/60 in the three groups was not statistically significant by applying Z test of proportions for independent groups at confidence interval of 95% (Table 3).

**Table 3. Statistical analysis of three groups with BCVA 6/24-6/60**

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (AC IOL)</th>
<th>Group 2 (SF IOL)</th>
<th>Group 3 (PC IOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed Sample Proportion</td>
<td>0.36</td>
<td>0.36</td>
<td>0.26</td>
</tr>
<tr>
<td>AC IOL</td>
<td>-</td>
<td>NO z=0</td>
<td>NO z=0.65</td>
</tr>
<tr>
<td>SF IOL</td>
<td>NO z=0</td>
<td>-</td>
<td>NO z=0.65</td>
</tr>
<tr>
<td>PC IOL</td>
<td>NO z=0.65</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

By applying Z test of proportions at confidence interval 95 % for independent group's statistical difference in the final visual acuity attained between the three groups was calculated.

The number of patients attaining BCVA <6/60 was maximum with AC IOL compared to the other two groups and this difference was statistically significant by applying Z test of proportions for independent groups at confidence interval of 95%. There was no statistical difference between SF IOL and PC IOL.

**Table 4. Statistical analysis of three groups with BCVA<6/60**

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (AC IOL)</th>
<th>Group 2 (SF IOL)</th>
<th>Group 3 (PC IOL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed Sample Proportion</td>
<td>0.75</td>
<td>0.125</td>
<td>0.125</td>
</tr>
<tr>
<td>AC IOL</td>
<td>-</td>
<td>YES z=3.03</td>
<td>YES z=3.03</td>
</tr>
<tr>
<td>SF IOL</td>
<td>YES z=3.03</td>
<td>-</td>
<td>NO z=0</td>
</tr>
<tr>
<td>PC IOL</td>
<td>YES z=3.03</td>
<td>NO z=0</td>
<td>-</td>
</tr>
</tbody>
</table>

**POST OPERATIVE COMPLICATION PROFILE**

The frequency of early complications was maximum with AC IOL compared to the other two groups but this difference was NOT statistically significant by applying Z test of proportions for independent groups at confidence interval of 95%. Also, there was no statistical difference between the early complications of SF IOL and PC IOL (Table 5 and 6).
### DISCUSSION

A large number of patients still seek remedy for their aphakic disability in a developing country like India. Hence, a study regarding intraocular lens implantation as a viable option for correction of aphakia remains important even today.

In the past, secondary implantation of AC IOL has been widely compared with scleral fixated PC IOL with different results. But there have been very few studies to compare the results of these two types of lens placement with placement of a standard PC IOL in the ciliary sulcus in presence of capsular support. So there is lack of credible comparable data in this regard. There are claims and counterclaims about the superiority of one type of implantation over the other. More studies have been conducted to compare the efficacy of secondary implantation of AC IOL with sclerally fixated IOL.

### Comparison of BCVA

In present study, visual acuity analysis showed 11.0% of ACIOL group, 39.3% of SFIOL group and 59.0% of PCIOL group had a visual acuity of 6/18 or better. This correlates well with other studies.

In a study done by Cem Everekilioglu et al. patients of scleral fixated PCIOL implantation had BCVA of 6/9 in 88.2% and BCVA of 6/6 in 64.7% while patients of flexible ACIOL implantation had a BCVA of 6/9 in 94.9% and BCVA of 6/6 in 54.8%.

Jaais F, conducted a study in which vision of 6/9 or better were seen in 9 of 13 eyes (70%) with PCIOL implants and 16 of 24 eyes (67%) with ACIOL.

Hahn T Wet al, retrospectively studied secondary IOL implantation in aphakic eyes. The final postoperative visual acuity of 20/40 or better was achieved in 92.0% of the eyes with posterior chamber lenses, in 71.4% of the eyes with anterior chamber lenses, and in 57.1% of the eyes with scleral-fixated posterior chamber lenses.

Although it must be mentioned that in another study conducted by Dadeya et al, best corrected visual acuity of 6/18 or better was achieved in 36.6% (11/30) of patients in ACIOL group and 30% (9/30) of patients in SFIOL group after a mean follow-up of 3 years.

This study observes that visual acuity of 6/18 or better is achieved in maximum number of patients receiving PCIOL in ciliary sulcus. However there is lack of adequate data in the literature for sulcus fixation of posterior chamber lens, hence our findings cannot be compared.

In present study early complications encountered in
ACIOL group were corneal oedema, increased IOP, shallow anterior chamber and anterior chamber reaction. Late complications associated with ACIOL were, persistent raise in IOP, pseudophakic bullous keratopathy, pupil capture, and cystoid macular edema. The overall complication rates were 33.3% (n=5).

In the SFIOL group, the early complications encountered were anterior chamber reaction and increased. The late complications in SFIOL were persistent elevated IOP and uveitis. The overall complication rate was 20% (n=3).

The early complications in PCIOL group were corneal oedema, increased IOP and anterior chamber reaction. The overall complication rate in PCIOL was 20.0% (n=3).

Our complication profiles were similar to those reported by some other authors with respect to the type and incidence of complications, but different from others. The most frequently reported complication of the scleral fixated group included IOL tilt or decentration and erosion of the overlying scleral flap by Prolene sutures, but we did not encounter similar complications. This might be because of proper centration of IOL was achieved. Complications like suture erosion were not encountered because of proper formation and deposition of the scleral flap and also since a longer follow-up period of around 3 years is required to assess the incidence. Cystoid macular edema has been found to be the most common complication following any type of secondary IOL implantation. We also encountered this complication but it was uncommon.

On analyzing the factors responsible for the final visual outcome it was observed that better visual rehabilitation in aphakic patients depends on good case selection allowing surgeon to individualize the approach, better pre-op and post-op medications, meticulous surgery, proper centration of IOL.

CONCLUSION

Three decades ago intracapsular cataract extraction was a preferred surgery for cataract, so a considerable number of patients in the older age group still seek remedy for aphakia. Also, with the volume of cataract extractions performed today, the complications like nucleus drop and IOL subluxations are common. Moreover with the prevalence of leaving children aphakic after cataract extraction by many ophthalmologists add up to the number of patients suffering uniocular or binocular aphakia. These patients usually have a good visual potential and show improvement in best-corrected visual acuity of more than two lines on Snellen vision.

SFIOL and PCIOL implantation have comparable results as per post op. visual acuity is concerned. ACIOL are less successful as far as better visual rehabilitation is concerned. Although with surgical expertise and modern surgical tools at our disposal, the complication rates of the three surgeries are minimal and equivalent to each other. Hence, secondary intraocular lens implantation is a good surgical option for patients with aphakia seeking to rid themselves of cumbersome aphakic spectacles or the difficult to use contact lenses to overcome their aphakic disability.

REFERENCES