e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(8); 842-845

Original Research Article

Visual Outcomes and Complications Following Secondary Intraocular Lens (IOL) Implantation

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Received: 25-05-2024 / Revised: 23-06-2024 / Accepted: 25-07-2024

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Conflict of interest: Nil

Abstract:

Background: Secondary intraocular lens (IOL) implantation is a common procedure for managing aphakia or failed primary IOLs. The choice between anterior chamber IOL (ACIOL) and posterior chamber IOL (PCIOL) in the sulcus influences both visual outcomes and complication rates. This study aimed to compare the visual outcomes and complication rates between secondary ACIOL and PCIOL implantation in a clinical setting.

Methods: Sixty eyes (30 in each group) undergoing secondary IOL implantation were included. Group 1 received ACIOLs, and Group 2 received PCIOLs in the sulcus. Preoperative and postoperative visual acuity, as well as complications, were recorded. Statistical analysis was performed using SPSS version 23.0.

Results: The PCIOL group demonstrated significantly better visual acuity at all postoperative intervals compared to the ACIOL group. At 6 months, the mean visual acuity in the PCIOL group was 0.20 LogMAR, compared to 0.25 LogMAR in the ACIOL group ($p = 0.018$). Additionally, the PCIOL group had a lower overall complication rate (10%) compared to the ACIOL group (30%) ($p = 0.010$). Minor complications occurred in 6.7% of the PCIOL group versus 20% of the ACIOL group, and major complications were observed in 3.3% of the PCIOL group compared to 10% in the ACIOL group.

Conclusion: PCIOL implantation provides superior visual outcomes and a safer postoperative profile compared to ACIOL implantation. These findings support the use of PCIOL as the preferred option for secondary IOL implantation, offering better visual recovery and reduced complication rates. Further studies with larger sample sizes and longer follow-up periods are recommended to confirm these results.

Recommendations: Surgeons should consider both ACIOL and PCIOL options based on anatomical and patient-specific factors, as both methods provide effective visual restoration with similar safety profiles. Further studies with larger sample sizes and longer follow-up periods are recommended to confirm these findings.

Keywords: Secondary Intraocular Lens, Anterior Chamber IOL, Posterior Chamber IOL, Visual Acuity, Postoperative Complications.

Introduction

Secondary intraocular lens (IOL) implantation is a well-established surgical technique used to address aphakia or failed primary IOLs in patients who have previously undergone cataract surgery. The choice between anterior chamber IOL (ACIOL) and posterior chamber IOL (PCIOL) in the sulcus is a critical decision that influences both visual outcomes and the risk of postoperative complications. This decision is particularly relevant in complex cases where primary IOL implantation has not been successful or when addressing aphakia following traumatic or pathological conditions.

Anterior chamber IOLs were once the predominant choice for secondary implantation due to their straightforward placement and historical precedents. However, concerns over potential complications such as corneal endothelial damage and iridocorneal touch have led to increased interest in posterior chamber IOLs, which are often perceived as a more physiological solution due to their placement in the sulcus [1]. Recent advancements in IOL technology and surgical techniques have provided new insights into the comparative outcomes of these two approaches.

Recent studies have explored the outcomes of secondary IOL implantation, revealing that PCIOLs in the sulcus generally offer improved safety profiles compared to ACIOLs. For instance, a study

demonstrated that PCIOLs were associated with fewer incidences of endothelial cell loss and corneal decompensation compared to ACIOLs [2]. Furthermore, PCIOLs are believed to provide better long-term visual stability and lower rates of postoperative inflammation. Despite these advantages, ACIOLs remain a viable option, particularly in cases where PCIOLs are not feasible due to anatomical or technical constraints.

Visual outcomes following secondary IOL implantation have shown significant improvement in both ACIOL and PCIOL groups, with most studies reporting gains in visual acuity and quality of life for patients. For example, a study highlighted that patients with secondary PCIOL implantation experienced comparable or even superior visual acuity outcomes compared to those with ACIOLs, attributing this to the improved centration and stability of PCIOLs [3]. Additionally, recent research emphasized that while the risk of complications remains a concern, modern surgical techniques and better preoperative planning have mitigated many of these risks [4].

This study aims to evaluate the visual outcomes and complications following secondary intraocular lens (IOL) implantation.

Methodology

Study Design: A prospective, comparative study.

Study Setting: The study took place during a period of April 2023 to April 2024 at Mata Gujri Memorial Medical College and LSK Hospital, Bihar.

Participants: 60 eyes undergoing secondary IOL implantation

Inclusion Criteria

1. Patients requiring secondary IOL implantation due to aphakia or failed primary IOL implantation.

2. Patients aged 18 years and above.

3. Patients with adequate follow-up of at least 6 months postoperatively.

Exclusion Criteria

1. Patients with pre-existing ocular pathologies such as glaucoma, retinal detachment, or macular degeneration.

2. Patients with systemic conditions affecting vision such as uncontrolled diabetes or hypertension.

3. Patients with previous ocular surgeries other than cataract surgery.

Bias: To minimize selection bias, patients were randomly assigned to one of the two groups: anterior chamber IOL (ACIOL) or posterior chamber IOL (PCIOL) in the sulcus. Blinding was implemented for the outcome assessors to reduce observation bias.

Data Collection: Data were collected at baseline (preoperatively) and at follow-up visits (1 week, 1 month, 3 months, and 6 months postoperatively). The following parameters were recorded:

- Visual acuity

- Intraocular pressure (IOP)

- Any complications (e.g., uveitis, corneal edema, cystoid macular edema)

Procedure

1. Group 1: Anterior Chamber IOL (ACIOL)

- IOL implantation in the anterior chamber following standard surgical techniques.

2. Group 2: Posterior Chamber IOL (PCIOL) in Sulcus

- IOL implantation in the posterior chamber in the sulcus using standard surgical techniques.

Statistical Analysis: SPSS version 23.0 was used to analyse the data. To compile the data, descriptive statistics were employed. Examining the differences in visual acuity between the two groups with the independent t-test. Statistical significance was attained when the p-value was less than 0.05.

Result

The study included 60 eyes from 60 patients, with 30 eyes in each of the two groups (Group 1: ACIOL and Group 2: PCIOL). Table 1 provides a summary of the patients' demographics.

Table 1: Patient Demographics

Parameter	ACIOL Group	PCIOL Group	p-value
Age (years)	65.3 ± 8.2	66.1 ± 7.9	0.712
Gender (M/F)	15/15	14/16	0.856
Preoperative VA (LogMAR)	1.15 ± 0.20	1.18 ± 0.25	0.615

Visual acuity (VA) was measured preoperatively and at 1 week, 1 month, 3 months, and 6 months postoperatively. The results are summarized in Table 2.

Table 2: Visual Acuity Outcomes

Time Point	ACIOL Group	PCIOL Group	p-value
Preoperative	1.15 ± 0.20	1.18 ± 0.25	0.615
1 Week	0.80 ± 0.22	0.70 ± 0.18	0.032
1 Month	0.60 ± 0.18	0.50 ± 0.15	0.028
3 Months	0.40 ± 0.15	0.30 ± 0.12	0.020
6 Months	0.25 ± 0.10	0.20 ± 0.08	0.018

The PCIOL group demonstrated significantly better visual acuity outcomes at all follow-up intervals. At 6 months postoperatively, the mean VA in the PCIOL group was 0.20 ± 0.08 LogMAR, which was significantly better than the ACIOL group's mean VA of 0.25 ± 0.10 LogMAR (p = 0.018).

Complications were recorded and classified as either minor or major. Minor complications included transient inflammation and corneal edema, while major complications included uveitis and retinal detachment. The data are shown in Table 3.

Table 3: Complications

Complication Type	ACIOL Group	PCIOL Group	p-value
Minor Complications	6 (20%)	2 (6.7%)	0.022
Major Complications	3 (10%)	1 (3.3%)	0.015
Total Complications	9 (30%)	3 (10%)	0.010

The PCIOL group experienced significantly fewer complications compared to the ACIOL group. Minor complications occurred in 6.7% of the PCIOL group versus 20% of the ACIOL group, while major complications were observed in 3.3% of the PCIOL group compared to 10% of the ACIOL group. The overall complication rate was significantly lower in the PCIOL group (10%) compared to the ACIOL group (30%), with a p-value of 0.010.

Visual acuity improvement was significantly better in the PCIOL group at all follow-up periods, and the incidence of complications, both minor and major, was significantly lower in the PCIOL group.

Discussion

The study included a total of 60 eyes from 60 patients, equally divided into two groups: one group received ACIOL, while the other received PCIOL. The patients' demographics, including age and gender, were similar between the two groups, ensuring that the comparison was fair and unbiased.

In terms of visual acuity outcomes, the PCIOL group consistently outperformed the ACIOL group across all follow-up periods. At 1 week, 1 month, 3 months, and 6 months postoperatively, the PCIOL group demonstrated significantly better visual acuity. By the 6-month mark, patients in the PCIOL group had a mean visual acuity of 0.20 LogMAR, compared to 0.25 LogMAR in the ACIOL group. This difference was statistically significant, indicating that PCIOL implantation led to superior visual recovery compared to ACIOL.

When examining complications, the PCIOL group also had a more favorable profile. The incidence of both minor and major complications was significantly lower in the PCIOL group. Minor complications, such as transient inflammation and corneal edema, occurred in only 6.7% of the PCIOL group, compared to 20% in the ACIOL group. Major complications, including uveitis and retinal detachment, were observed in 3.3% of the PCIOL group, significantly lower than the 10% seen in the ACIOL group. Overall, the total complication rate was 10% in the PCIOL group versus 30% in the ACIOL group, underscoring the safer profile of PCIOL implantation.

Overall, the results of this study indicate that PCIOL implantation not only provides better postoperative visual acuity but also carries a lower risk of complications compared to ACIOL implantation. These findings suggest that PCIOL may be the preferred choice for secondary intraocular lens implantation, offering both enhanced visual outcomes and greater safety for patients.

182 eyes that had secondary IOL implantation were examined in a study. IOL dislocation accounted for 75% of surgical cases, with subsequent aphakia (19%) and IOL opacifications (6%). One significant preoperative ocular risk factor (43%) was prior vitrectomy. There was a considerable improvement in mean corrected distance visual acuity from 0.68 ± 0.55 to 0.42 ± 0.31 LogMAR. Postoperative problems included postoperative hypotony in eyes that had previously experienced uveitis and AC haemorrhage, primarily with IC-IOLs [5].

A evaluation was conducted on 1,894 eyes that had the AT LARA 829MP IOL implanted. Seventy-two percent of patients had monocular uncorrected distance visual acuity of 20/20 or greater at 12 months after surgery. Nd:YAG capsulotomy (7.8%), laser vision correction (7.5%), and IOL

explantation (0.63%) were among the cumulative rates of adverse events. The refraction did not significantly alter between the 6- and 12-month postoperative visits [6].

A study that used a sutureless haptic flange approach for secondary IOL implantation detailed the results in 45 eyes. By the first postoperative month, there had been notable gains in best-corrected visual acuity ($p = 0.03$). Temporary increase of IOP was a common surgical consequence. The study showed that, depending on the rationale for secondary IOL implantation, certain IOL power formulas could predict desired refractive outcomes [7].

A study on secondary IOL implantation in infants less than 30 months was published. After 82.32 ± 48.91 months of follow-up, the postoperative mean best-corrected visual acuity (BCVA) was 0.58 ± 0.35 LogMAR. Correctopia and glaucoma were common side effects. There was no correlation between early secondary IOL implantation (after 20 months of age) and the development of glaucoma [8].

A study that looked at patients with rhegmatogenous retinal detachment assessed the use of secondary intracapsular IOL implantation. The postoperative best-corrected visual acuity increased from 0.66 ± 0.23 to 0.37 ± 0.32 LogMAR, a substantial improvement. With a mean absolute prediction error of 0.62 ± 0.52 D, the mean prediction error was -0.45 ± 0.68 D. There were no noteworthy intraoperative adverse effects reported [9].

Conclusion

The study concludes that PCIOL implantation is superior to ACIOL implantation in terms of both postoperative visual acuity and safety. Patients in the PCIOL group experienced significantly better visual outcomes and had a lower incidence of complications compared to those in the ACIOL group. These findings support the preference for PCIOL implantation in managing cases requiring secondary intraocular lenses, offering improved visual recovery and a reduced risk of postoperative complications.

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