Original Article

Comparison of Outcomes between Scleral Fixated Versus Anterior Chamber Intraocular Lens Implantation in Aphakic Patients

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ABSTRACT

Purpose: To compare the visual outcomes and early postoperative complications of Scleral fixated intra-ocular lens (SFIOL) implantation versus anterior chamber intra-ocular lens (ACIOL) in aphakic patients.

Study Design: Quasi-experimental study.

Place and Duration of Study: Al Shifa Trust Eye Hospital, Kohat, from February to July 2025.

Methods: This study included 59 aphakic patients, aged 18-70 years. Patients with pre-existing retinal disorders such as macular degeneration or retinal detachment, those with severe corneal opacities or glaucoma, individuals with uncontrolled systemic illnesses (such as poorly managed diabetes or hypertension), and anyone with a recent history (within the last six months) of ocular trauma or infection were excluded. The study patients were recruited and divided into either the SFIOL or ACIOL groups through convenient sampling. Complete ocular examination included Best-corrected visual acuity (BCVA converted to LogMAR), intraocular pressure, slit lamp examination, fundoscopy and post-operative complications. Data was analysed using SPSS-27. The Mann-Whitney U test and chi-square or Fisher's exact test, (considering $p \leq 0.05$ as statistically significant), were applied.

Results: The median age was 62 years (IQR: 54–70), and 66.1% were male. Postoperative BCVA improved in both groups, with no statistically significant difference ($p = 0.086$). ACIOL was associated with higher rates of Hyphema ($p = 0.011$) and vitreous incarceration ($p = 0.024$). Severe uveitis, IOL capture, and retinal detachment showed no significant intergroup differences.

Conclusion: Both SFIOL and ACIOL are effective in restoring vision in aphakic patients. However, ACIOLs are related to a higher rate of early postoperative complications.

Keywords: Aphakia, Intraocular lens implantation, Anterior Chamber, Visual Acuity, Postoperative Complications, Secondary Intraocular Lens Implantation.

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INTRODUCTION

Aphakia whatever the cause, results in lack of accommodation, severe hyperopia, and anisometropia. It is managed by spectacles or contact lenses or surgical implantation of lens.[1] Different surgical techniques are reported in literature to correct aphakia in children as well as in adults.[2,3] Two commonly performed intra ocular lens (IOL) implantation techniques for aphakia are scleral-fixated (SF) and anterior chamber (AC) IOL.[4] SFIOL is traditionally

classified as sutured or suture-less. The haptic fixation in the sutured SFIOLs can either be two-point or four-point fixation. Two-point fixation increases the risk of IOL tilt and decentring. The restrictions in sutured SFIOL include surgeon experience, longer surgical time, suture-related irritation, suture erosion, and late IOL subluxation or dislocation due to broken sutures.[5] Khan et al, reported that the frequency of corneal edema was significantly higher in ACIOL as compared to sutured SFIOL (SSFIOL).[6] On the other hand the absolute postoperative spherical equivalent was significantly higher in SSFIOL implantation when compared with ACIOL. The main advantage of SFIOL over other IOLs is that it may be placed in damaged corneas, as well as in cases of concurrent iris injuries or iridodialysis.[8] SFIOLs are superior to ACIOLs in several aspects, including preserving the integrity of corneal endothelium, being appropriate for use in eyes with peripheral anterior synechiae or large sector iridectomy.[9]

Whether SFIOL or ACIOL, each technique has its advantages and disadvantages. ACIOLs are easier to implant but risk corneal endothelial damage and glaucoma while SFIOLs have better anatomic positioning but carry suture-related risks. Since the evidence regarding their comparative outcomes is still limited and inconsistent, this study will compare the visual outcome and early postoperative complications between SFIOL and ACIOL implantation in aphakic patients in a tertiary care center of a low resource country.

METHODS

This quasi-experimental study was conducted from February 2025 to June 2025 after obtaining ethical approval from the IRB (**Reference No. AST/EC/25/04, dated: 12/02/25**) at Department of Ophthalmology, Al Shifa Trust Eye Hospital, Kohat. The sample size was calculated using OpenEpi software, assuming an approximate prevalence of aphakia of 8.0% among adult patients who had undergone cataract surgery, confidence level of 95% and 7% margin of error.[10] The sample size was calculated as 60 aphakia patients, divided into two groups based on surgeon's judgment and the results of the clinical evaluation. The SFIOL implanted patients were included in Group A (n=30), and ACIOL implanted patients were in Group B (n=30).

The inclusion criteria were aphakic patients of aged 18 to 70 years, who had never undergone an IOL implant and were ready to give informed consent. Patients with preexisting retinal disorders such as macular degeneration or retinal detachment, those with severe corneal opacities or glaucoma, individuals with uncontrolled systemic illnesses (such as un-controlled diabetes or hypertension), and anyone with a recent history (within the last six months) of ocular trauma or infection were excluded. Each patient underwent complete preoperative assessment. Patients' demographic and clinical information were recorded, such as age, gender, and comorbidities. The Snellen chart was used to determine best-corrected visual acuity (BCVA), which was then converted to LogMAR values for statistical analysis. The IOP was measured using Goldmann applanation tonometry. The anterior segment was evaluated with slit-lamp examination, and any underlying retinal pathology was ruled out using ophthalmoscopy. One patient in group B missed the post-op follow-up visit so in final analysis 29 patients were included in group B. Skilled ophthalmologists carried out all surgical procedures. Under standard sterile settings. Patients were followed one-month post-surgery to assess the IOP, visual acuity and complication if any. A structured questionnaire was used to collect the patient's information. Data were analysed using SPSS-27. Normality was assessed with the Shapiro-Wilk test, followed by Mann-Whitney U test for continuous variables, and chi-square or Fisher's exact test for categorical outcomes. A p-value <0.05 was considered statistically significant. To control for confounding factors such as age, gender, preoperative visual acuity, and surgical type were stratified, with post-stratification analyses performed using appropriate tests.

RESULTS

A total of 59 patients were included, predominantly male 39 (66.1%). Regarding place of residence, 30 (50.8%) patients were from urban areas, while 29 (49.2%) resided in rural settings. Comorbid conditions such as diabetes mellitus and hypertension were present in 40 (67.8%) patients, whereas 19 (32.2%) had no documented comorbidities (Table 1). In the comparison of postoperative BCVA between the SFIOL and ACIOL groups, the Mann-Whitney U test revealed no statistically significant difference ($p = 0.086$). The SFIOL group ($n = 30$) had a lower mean rank (26.33) compared to the ACIOL group ($n = 29$) with a mean rank of 33.79, suggesting a trend toward

Table 1: *Clinical Characteristics (n = 59).*

Variable	Median	25th Percentile	75th Percentile
Age (years)	62	54	70
Preoperative BCVA	1.78	1.78	2.00
Postoperative BCVA	1.00	0.80	1.78
Preoperative IOP (mmHg)	22	20	27
Postoperative IOP (mmHg)	20	18	25

Table 2: *Comparison of Postoperative BCVA Between SFIOL and ACIOL Groups (Mann-Whitney U Test).*

Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	p-value
SFIOL	30	26.33	790.00	325.000	-1.718	0.086
ACIOL	29	33.79	980.00			

Table 3: *Comparison of Postoperative Complications Between SFIOL and ACIOL Groups.*

Complication	Status	SFIOL (n=30)	ACIOL (n=29)	Total (n=59)	p-value (Exact)
Transient corneal edema	Present	19 (63.3%)	14 (48.3%)	33 (55.9%)	0.299
	Not Present	11 (36.7%)	15 (51.7%)	26 (44.1%)	
Vitreous haemorrhage	Present	0 (0.0%)	0 (0.0%)	0 (0.0%)	—
	Not Present	30 (100.0%)	29 (100.0%)	59 (100.0%)	
Intraocular pressure ≥ 30 mmHg	Present	2 (6.7%)	7 (24.1%)	9 (15.3%)	0.080
	Not Present	28 (93.3%)	22 (75.9%)	50 (84.7%)	
Residual lens matter	Present	0 (0.0%)	2 (6.9%)	2 (3.4%)	0.237
	Not Present	30 (100.0%)	27 (93.1%)	57 (96.6%)	
Severe uveitis (AC cells ≥ 3)	Present	1 (3.3%)	6 (20.7%)	7 (11.9%)	0.052
	Not Present	29 (96.7%)	23 (79.3%)	52 (88.1%)	
Fibrin	Present	0 (0.0%)	1 (3.4%)	1 (1.7%)	0.492
	Not Present	30 (100.0%)	28 (96.6%)	58 (98.3%)	
Hyphema	Present	0 (0.0%)	6 (20.7%)	6 (10.2%)	0.011
	Not Present	30 (100.0%)	23 (79.3%)	53 (89.8%)	
Vitreous incarceration	Present	0 (0.0%)	5 (17.2%)	5 (8.5%)	0.024
	Not Present	30 (100.0%)	24 (82.8%)	54 (91.5%)	
IOL capture	Present	1 (3.3%)	4 (13.8%)	5 (8.5%)	0.195
	Not Present	29 (96.7%)	25 (86.2%)	54 (91.5%)	
Retinal detachment	Present	0 (0.0%)	1 (3.4%)	1 (1.7%)	0.492
	Not Present	30 (100.0%)	28 (96.6%)	58 (98.3%)	

better visual outcomes in the ACIOL group; however, the difference did not reach statistical significance (Table 2).

Postoperative complications were compared between the two groups. Severe anterior chamber (AC) inflammation (AC cells ≥ 3) was more common in the ACIOL group [6 (20.7%)] versus 1 (3.3%) in the SFIOL group (p = 0.052), indicating a near-significant trend. Statistically significant differences were found for Hyphema (p = 0.011), observed in 6 (20.7%) ACIOL patients and none in the SFIOL group, and for vitreous incarceration at the wound site (p = 0.024), which occurred in 5 (17.2%) ACIOL cases versus none in the SFIOL group. Other complications, such as fibrin formation, IOL capture, and retinal detachment, showed no significant intergroup differences (Table 3).

DISCUSSION

In this study the median postoperative BCVA increased significantly compared to preoperative values across the entire cohort, showing the overall success of secondary IOL in visual rehabilitation. The ACIOL group had better BCVA than the SFIOL group, but the difference was not statistically significant (p = 0.086). This finding aligns with results reported in literature, where there was comparable visual acuity between ACIOL and SFIOL groups.[11] However, our findings contrast with those of Kwong YY et al, who reported significantly superior visual outcomes in the SFIOL group, attributing the difference to better centration and reduced optical aberrations.[12]

Regarding postoperative complications, ACIOL implantation was related with a higher rate of adverse

events, particularly Hyphema and vitreous incarceration, both of which were statistically significant. These observations align with previous study by Kaur M et al, who noted a greater frequency of postoperative inflammation and anterior segment complications with ACIOL use.[13] In contrast, there are other studies which reported no significant difference in complication rates between ACIOL and SFIOL groups, suggesting that variations in surgical expertise, patient selection, or implant design may account for the differing outcomes.[11,14]

The ACIOL group showed a near-significant increase in severe anterior chamber inflammation ($p = 0.052$) and increased IOP ($p = 0.080$). These findings are also reported by McGhee CNJ.[15]On the other hand, some studies have shown no statistical difference in IOP between the ACIOL and SFIOL groups.[16,17]

This study provides local evidence to the debate about a better IOL for aphakic patients, implying that while both procedures provide satisfactory visual outcomes, SFIOL may have a better complication profile.[18-20] Multi-center, randomized trials with larger sample sizes and longer follow-up are needed to corroborate these findings and inform surgical decision-making.

The limitations of the study include a small sample size, which may limit the findings' generalizability and statistical power to detect modest variations across the groups. The quasi-experimental approach without randomization raises the prospect of selection bias, as patients were assigned to SFIOL or ACIOL based on clinical judgment rather than precise allocation criteria. Follow-up period was only one month, which may have been insufficient to detect late-onset problems or long-term visual results. Finally, the study was conducted at a single tertiary care centre, therefore the results may not be indicative of larger patient populations or diverse clinical contexts.

CONCLUSION

Both SFIOL and ACIOL can restore vision in aphakic patients. However, ACIOL was linked to an increased risk of early postoperative complications. SFIOL may be desirable in patients where reducing complication risk is a focus.

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Patient's Consent: Researchers followed the guidelines set forth in the Declaration of Helsinki.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval: The study was approved by the Institutional review board/Ethical review board **(AST/EC/25/04).**

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