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# OVERVIEW AND CLINICAL OUTCOMES OF IRIS-CLAW ANTERIOR CHAMBER FIXATION FOR APHAKIA

Ophthalmology

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## ABSTRACT

**Background: Objective:** This prospective observational study aimed to evaluate the outcomes and complications of the iris-claw anterior chamber fixation technique for the management of aphakia. **Methods:** Fifteen patients with aphakia and insufficient capsular support were enrolled in the study. Preoperative examinations were performed, and the surgical technique involved iris-claw anterior chamber fixation of the Artisan intraocular lens. Postoperative follow-up examinations were conducted at 1 week, 1 month, and 6 months. Visual acuity, intraocular pressure, and complications were assessed. Statistical analysis was performed using appropriate tests. **Results:** The study population had a mean age of 49.5 ± 17.41 years, with a male predominance (73.3%). The most common indications for IOL implantation were posterior capsular rent (46.7%) and dislocated IOLs (26.7%). Significant improvements in uncorrected visual acuity (UCVA) and best-corrected visual acuity (BCVA) were observed at all follow-up intervals ($p < 0.001$). Intraocular pressure decreased postoperatively ($p < 0.001$). Pigment precipitates were the most common complication (73.3%), but no severe complications were reported. **Conclusion:** The iris-claw anterior chamber fixation technique demonstrated favorable outcomes for aphakic patients. The procedure resulted in significant improvements in visual acuity and stable intraocular pressure. Although pigment precipitates were common, severe complications were not observed. Further studies with long-term follow-up are necessary to validate these findings and optimize patient outcomes.

## KEYWORDS

## INTRODUCTION:

Aphakia, defined as the absence of the crystalline lens from the pupillary area, results in high hypermetropia and a loss of accommodation.[1] Patients with aphakia often experience visual distortions such as erythroplasia (objects appearing reddish) and cyanopsia (a blue tint). The optical condition of the aphakic eye involves a curved corneal surface separating air and aqueous plus vitreous, leading to increased retinal image size and astigmatism. Surgical techniques and the development of intraocular lenses (IOLs) have significantly improved the correction of aphakia.[2]

Surgical techniques have progressed in parallel with the development of IOLs with the result that the high degrees of astigmatism historically brought about by cataract surgery are less frequently seen.Among the options available for correcting aphakia, the insertion of an intraocular lens has proven effective, overcoming the optical disadvantages of aphakic spectacles and the challenges associated with contact lenses.[3] In particular, the iris-claw Artisan/Verisyse lens has emerged as a noteworthy solution. Made of Perspex CQ-UV, a UV light-filtering PMMA material, this single-piece non-foldable IOL offers correction for myopia, hyperopia, astigmatism, and aphakia. Positioned anterior to the iris, the Artisan/Verisyse lens provides sufficient clearance from the anterior lens capsule and corneal endothelium.[4] It has a fixed overall length, eliminating the need for sizing measurements, and is available in various refractive powers. Another variant, the Artiflex, is a foldable iris-claw lens made of hydrophobic polysiloxane.[5,6] There are several surgical techniques for intraocular lens implantation in eyes with inadequate capsular or zonular support such as anterior and posterior chamber IOLS which are further divided as Angle-supported Anterior Chamber Intraocular Lens, Iris – Supported Anterior Chamber Intraocular Lens, Trans Scleral Fixated Posterior Chamber Intraocular Lens (PCIOL).The iris-claw technique for IOL implantation, known as enclavation, offers advantages such as easier and quicker procedures.[7]

The lens is fixed to the mid-peripheral iris using unique flexible haptic claws, ensuring a safe distance from angled structures. The mid-peripheral iris, with its low vascularity and immobility, allows for undisturbed mydriasis (pupil dilation).[8] By positioning the optic vaults away from the iris, risks of pupillary block and pigment dispersion are reduced. Importantly, sutures are not required, and the lens is implanted at a safe distance from the corneal endothelium, minimizing the risk of endothelial damage.[9] This study aims to provide an overview of the iris-claw anterior chamber fixation technique.

## MATERIALS AND METHODS:

Ethical clearance was obtained from the Institutional Ethical Committee to conduct this prospective observational study at the Postgraduate Department of Ophthalmology, SMHS Hospital, Govt. Medical College, Srinagar, over a period of one and a half years. Patients meeting the selection criteria and providing informed consent were enrolled in the study.

### Inclusion Criteria:

- Patients with aphakia and insufficient capsular support.
- Patients with post-traumatic dislocation or subluxation.
- Patients with dropped IOL/nucleus or its fragments.
- Anterior chamber depth greater than 3.2 mm.
- Endothelial celcountsnt greater than 1500 mm2.

### Exclusion Criteria:

- Patients with dense corneal opacity.
- Patients with optic atrophy.
- Patients with macular scar.

Patients who met the inclusion criteria were informed about the study and invited to participate after obtaining their informed consent. Preoperative examinations were conducted, including assessment of visual acuity (both uncorrected and corrected) using Snellen chart, direct and indirect ophthalmoscopic examinations, intraocular pressure (IOP) measurement, specular microscopy, optical biometry for axial length measurement, B-scan for posterior segment evaluation, and HD-OCT for macular edema diagnosis.

The surgical technique employed was iris-claw anterior chamber fixation. Peribulbar anesthesia was administered, and a 5.2 mm sclera-corneal tunnel incision was made at the 12 o'clock position. Additional paracentesis incisions were made at 3 o'clock or 9 o'clock. Anterior vitrectomy was performed, and if necessary, a complete pars plana vitrectomy was conducted. Pilocarpine was injected for miosis, and viscoelastic material was used.

The Artisan intraocular lens was implanted with the convex side up and fixed to the iris using a claw mechanism. Viscoelastic material was removed, and the corneoscleral tunnel was sutured. Postoperatively, topical medication including Nepafenac, moxifloxacin, and prednisolone eye drops was administered.Follow-up examinations were conducted at 1 week, 1 month, and 6 months post-surgery to assess visual outcomes and detect any complications. Data was recorded and analyzed using SPSS software. Continuous variables were expressed as Mean±SD, while categorical variables were presented as frequencies and percentages.

Statistical tests such as Student's t-test, Mann-Whitney U-test, chi-square test, or Fisher's exact test were employed as appropriate. A significance level of $p<0.05$ was considered statistically significant

## RESULTS

**Table 1: Distribution Of Age In Patients**

| Age (Years) | Iris Claw Anterior Chamber IOL | | P-value |
|---|---|---|---|
| | No. | %age | |
| ≤ 40 | 3 | 20.0 | 0.697 |
| 41-50 | 3 | 20.0 | |
| 51-60 | 4 | 26.7 | |
| 61-70 | 5 | 33.3 | |
| Total | 15 | 100 | |
| Mean±SD (Range) | 49.5±17.41 (19-70) | | |

In this study, a total of 15 patients were included, with ages ranging from 19 to 70 years and a mean age of 49.5 ± 17.41 years. The study population was predominantly male, with males comprising 73.3% of the participants.

**Table 2: Causes Of Aphakia**

| Cause of aphakia | Iris Claw Anterior Chamber IOL | | P-value |
|---|---|---|---|
| | No. | %age | |
| PCR | 7 | 46.7 | 0.945 |
| Dislocated IOL | 4 | 26.7 | |
| Nucleus drop | 2 | 13.3 | |
| Crystalline lens drop | 1 | 6.7 | |
| Decentered IOL | 1 | 6.7 | |
| Total | 15 | 100 | |

Indications for IOL implantation the most common indication was posterior capsular rent (PCR), accounting for 46.7% of patients. Following PCR, dislocated IOL was the second most frequent indication, observed in 26.7% of patients. Additionally, nucleus drop was identified as the indication for IOL implantation in 13.3% of the patients.

**Table 3: Ucva And Bcva Before And After Implantation**

| Time interval | UCVA (logMAR) before and after IOL implantation | | |
|---|---|---|---|
| | Mean | SD | P-value |
| Preoperative | 1.38 | 0.652 | - |
| 1 Week | 1.07 | 0.531 | <0.032* |
| 1 Month | 0.61 | 0.492 | <0.001* |
| 6 Months | 0.38 | 0.419 | <0.001* |
| Time interval | BCVA (logMAR) before and after IOL implantation | | |
| | Mean | SD | P-value |
| Preoperative | 0.78 | 0.251 | - |
| 1 Week | 0.74 | 0.341 | <0.043* |
| 1 Month | 0.41 | 0.345 | <0.001* |
| 6 Months | 0.23 | 0.206 | <0.001* |

Here the mean preoperative LogMAR (UCVA) was determined to be 1.38 ± 0.652. Postoperatively, at 1 week, 1 month, and 6 months, the mean LogMAR UCVA values were 1.42 ± 0.543, indicating an improvement in visual acuity. These changes in UCVA were found to be statistically significant.

Furthermore, the mean preoperative LogMAR best-corrected visual acuity (BCVA) in the iris claw anterior chamber IOL group was 0.78 ± 0.251. Similar to UCVA, there were statistically significant improvements in BCVA at 1 week, 1 month, and 6 months postoperatively.

These results demonstrate the positive impact of secondary IOL implantation on visual acuity in patients undergoing the procedure. The statistically significant improvements in both UCVA and BCVA highlight the effectiveness of the Iris claw anterior chamber IOL in addressing visual impairment and restoring visual function.

**Table 4: Intra Ocular Pressure Before And After Implantation**

| Time interval | INTRA OCULAR PRESSURE (mmHg) Before and After | | |
|---|---|---|---|
| | Mean | SD | P-value |
| Preoperative | 15.71 | 2.89 | - |
| 1 Week | 15.42 | 3.35 | 0.854 |
| 1 Month | 14.83 | 2.58 | 0.419 |
| 6 Months | 12.97 | 3.72 | <0.001* |

In our present study, the mean preoperative intraocular pressure (IOP) was measured at 15.71 ± 2.89 mmHg. At the 1-week follow-up, the mean IOP slightly decreased to 15.42 ± 3.35 mmHg. By the 6-month follow-up, the mean IOP further decreased to 12.97 ± 3.72 mmHg.

These findings indicate a trend of decreasing intraocular pressure following secondary IOL implantation.

**Table 5: Immediate And Late Complications After Iol**

| Immediate complications | Iris Claw Anterior Chamber IOL | |
|---|---|---|
| | No. | %age |
| Corneal edema | 0 | 0.0 |
| Transient hypotony | 0 | 0.0 |
| Anterior uveitis | 2 | 13.3 |
| Haptic breakage | 0 | 0.0 |
| Complications | Iris Claw Anterior Chamber IOL | |
| | No. | %age |
| Pigment precipitates | 11 | 73.3 |
| IOP elevation | 0 | 0.0 |
| Pupil ovalization | 4 | 26.7 |
| Vitreous hemorrhage | 0 | 0.0 |
| IOL decentration | 1 | 6.7 |

Our study results show that pigment precipitates were observed in 11 out of 15 patients (73.3%) following the surgical procedure. These pigment precipitates were successfully managed with the administration of topical steroid treatment.

Importantly, none of the patients in this group experienced complications such as UGH syndrome, retinal detachment, endophthalmitis, cystoid macular edema, or choroidal effusion. Additionally, no reports of glare or halos were noted, indicating a favorable postoperative outcome in terms of visual symptoms.

## DISCUSSION

The present study investigated the outcomes and complications of secondary intraocular lens (IOL) implantation in patients with various indications. The results of our study are consistent with previous research, highlighting the effectiveness and safety of this procedure.[10]

In our study, the majority of patients undergoing secondary IOL implantation were males, which is in line with previous studies by Mora et al. (2019) and Yamane et al. (2014). This gender distribution may be attributed to various factors such as differences in healthcare-seeking behavior or susceptibility to the underlying conditions requiring IOL implantation. Further research is needed to explore the underlying causes of this gender disparity.[12,13]

The most common indications for secondary IOL implantation in our study were posterior capsular rent (PCR) and dislocated IOLs. These findings are consistent with the studies conducted by Kelkar et al. (2019) and Yamane et al. (2014), which also identified PCR and subluxated/dislocated IOLs as primary indications for the procedure. The similarity in findings across studies underscores the clinical significance of these indications and the need for effective management strategies for these complications.[13,14]

Regarding visual outcomes, our study demonstrated a significant improvement in both uncorrected visual acuity (UCVA) and best-corrected visual acuity (BCVA) following secondary IOL implantation. These results align with previous research by Kelkar et al (2017), Riazi et al. (2008), and Negretti et al. (2020), which reported similar improvements in visual acuity after secondary IOL implantation. These findings suggest that this procedure is an effective intervention for improving visual function in patients with compromised vision due to various etiologies.[15,16]

Intraocular pressure (IOP) is an important parameter to monitor after IOL implantation. Our study showed a slight decrease in mean IOP from preoperative values to 6 months postoperatively. This trend is consistent with the findings of Negretti et al. (2020), where a similar pattern of IOP reduction was observed after Artisan IOL insertion. The maintenance of stable IOP levels postoperatively indicates the absence of significant complications such as glaucoma or elevated IOP.[17,18]

Complications associated with secondary IOL implantation were generally minimal in our study. Pigment precipitates were the most common complication observed, followed by pupillary ovulization. These findings are in agreement with Agarwal et al. (2016), who

reported no major intraoperative complications in their study. The absence of severe complications such as UGH syndrome, retinal detachment, endophthalmitis, cystoid macular edema, or choroidal effusion further supports the safety of secondary IOL implantation.[19]

Comparing our results to Teng and Zhang (2014), who studied the complications of Artisan iris claw IOL implantation, we observed a different complication profile. In their study, anterior uveitis, iris depigmentation, and pupillary distortion were reported.[20] The variation in complications may be attributed to differences in patient characteristics, surgical techniques, or follow-up duration. Further investigation is warranted to determine the factors contributing to these differences and develop strategies for minimizing complications. They were generally minimal, with pigment precipitates being the most common. Further research and long-term follow-up studies are necessary to validate these findings and optimize patient outcomes.

## CONCLUSION

The iris-claw anterior chamber IOL fixation technique proves to be a successful surgical approach for the management of aphakia. The visual outcomes achieved at one-month post-surgery are excellent and continue to be maintained at the six-month follow-up. Although the procedure demonstrates low complication rates, it is worth noting that pigment precipitates may occur in a significant proportion of eyes implanted with iris-claw IOLs. Despite this, the overall benefits and positive outcomes of the procedure make it a viable option for patients with aphakia. Further studies and long-term follow-up are warranted to assess the long-term efficacy and safety of iris-claw anterior chamber IOL fixation.

### Limitations Of The Study

Limitations of this study include its single-center design, potentially limiting the generalizability of the findings to other populations or settings. The study primarily focused on objective clinical and visual outcomes, with a lack of inclusion of patient-reported outcomes, such as satisfaction and quality of life. The follow-up period of six months may not fully capture the long-term durability and stability of iris-claw anterior chamber fixation. Multicentre studies with diverse populations, longer follow-up periods, and incorporation of patient-reported outcomes are needed to validate and enhance our understanding of this technique.

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