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Retropupillary Iris-Claw Intraocular Lens Implantation In Primary Aphakic Patients

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I. Introduction

Inadequate posterior capsular support during cataract surgery makes it impossible to implant posterior chamber intraocular lens. Leaving the eye aphakic affects the quality of life as it causes high hypermetropia and anisometropia. In such conditions, secondary intraocular lens implantation options are sutured scleral fixation, intrascleral fixation, angle-supported anterior chamber, and anterior chamber or retropupillary iris-claw IOLs[(1)]

Scleral sutured PCIOL are anatomically closer to the original IOL resulting in good visual outcome but they are technically difficult to insert and passing scleral needle passes increase the risk of intraocularhemorrhage, suture breakage and endophthalmitis.

One of the major limitations associated with ACIOL is limited availability of its size with respect to the diameter of the anterior chamber which is necessary to maintain the lens in position and to avoid complications. If the lens is too short, it causes dislocation increasing the chance of damage to the corneal endothelium and angle of anterior chamber. If the lens is too large, it would cause an uneven pressure over the anterior chamber angle increasing the chances of glaucoma.[(2,3)]

Iris claw lens can be the procedure of choice if iris support is feasible. Peripupillary iris claw lens has high incidence of postoperative complication. Retropupillary iris claw lens is most commonly used because chances of damage to the anterior chamber angle and iris root are avoided as the lens is fixed to the mid periphery of iris. Iris claw IOL does not interfere with physiological vascularisation.[(2,3)]

Inclusion criteria – Posterior capsular rent without capsular support
Subluxated lens
Zonular dialysis
Exclusion criteria – intraocular inflammation
Post segment pathology
Iris sphinter tear , traumatic mydriasis

Iridodailysis, secondary aphakia
Preoperative assessment

History Detailed ocular and medical history was taken. Special emphasis was given to the history of diminution of vision (gradual or sudden), trauma to the eye, and the trauma occurred. Patients were asked about any other ocular complaints to rule out other ocular pathology and previous ocular surgery. Trauma to the eye, diabetes mellitus, hypertension, and any other medical or surgical history in the past were noted. Hence, the patients with other causes of poor vision could be excluded from the study

Fifty consecutive patients who underwent extracapsular cataract extraction with posterior capsular rent resulting in surgical aphakia. Preoperative uncorrected visual acuity (UCVA), BCVA in logMAR, IOP, slitlamp examination, gonioscopy, and B scan. Operated by same surgeon. Anterior vitrectomy when indicated and irisclaw lens implantation was done. Recording of postoperative BCVA, IOP, and keratometry at 1 week, 4 week, 3 month, and 6 month. Postoperative complication noted. Analysis of result and conclusion.

Ocular examination

1. Visual acuity: Uncorrected, with the pinhole as well as BCVA was recorded preoperatively in each patient in logMAR
2. Anterior segment examination: Detailed anterior segment examination was done including slilampbiomicroscopy and assessment of grades of vitreous herniation into the anterior chamber. Slitlamp examination with previous surgical peripheral iridectomy and pupil was done

3. Distant direct ophthalmoscopy and detailed dilated fundus evaluation were done using +90 D lens or indirect ophthalmoscopy
4. Bscan ultrasonography was done when media opacities precluded adequate visualization of the fundus
5. IOP was taken with Goldmann'sapplanation tonometer
6. Syringing of both eyes to rule out any focus of infection of the sac
7. Keratometry and Ascan were done. IOL power was calculated using SRK II formula. $P = A - 2.5\ L - 0.9\ K$. Where P: power of IOL in Diopter, A: constant, L: axial length of the eyeball in millimeter, and K: average corneal curvature.

After the examination, the following investigations were done in all the patients preoperatively:

1. Conjunctival swab for culture and sensitivity
2. Electrocardiography
3. Blood sugar random and if necessary fasting and postprandial
4. Chest Xray if advised by the physician
5. The operative fitness of each patient was obtained from the physician.

Preoperative preparation: Every patient who was included in the study was admitted 1 day before operation.

- Xylocaine sensitivity test was done
- Preoperative antibiotic eyedrop was instilled 6 hourly.

Instrument and material required during surgery are as follows:

- Wire speculum
- Roundbodied needle with thread to take superior rectus stay suture
- Conjunctival forceps
- Section enlarging scissors
- BardParker handle
- #15 blade
- Lance tip blade
- Crescent blade
- 2.8mm keratome blade
- 5.5mm keratome blade
- Irisclaw lens holding forceps
- Injection pilocarpine
- Enclavation rod
- Vannas scissors
- Iris repository
- Syringe with fine cannula
- Bipolar wet cautery
- 100 nylon suture
- Automated vitrectomy probe
- 26 G needle
- Mcpherson forceps
- Injection dexamethasone and gentamicin for subconjunctival injection
- 0.05 mL intracameral injection of moxifloxacin.

Surgical procedure Anesthesia Topical surface anesthesia was given with 4% lignocaine. Then, peribulbar block was given using 2% lignocaine + adrenaline + hyaluronidase injection(3ml) and injection 0.5% bupivacaine (2 ml).

Surgical technique temporal scleral incision

1. Surgeon was required to sit laterally toward the patient's shoulder and perform surgery
2. For the right eye, incision was need to be placed at 7 to 11 o'clock and for the left eye at 2 to 5 o'clock position
3. Temporal conjunctival flap was prepared to expose the limbus
4. Hemostasis was achieved using a wetfield bipolar cautery
5. Paracentesis was created at 11 o'clock and 6 o'clock position using a 15° lance tip knife
6. Partialthickness groove was made through about two thirds depth of anterior limbal area with the help of a razor (#11 surgical blade) knife
7. A self sealing sclerocorneal tunnel incision was made
8. Anterior vitrectomy was performed with the help of an automated vitrectomy probe if there is a vitreous loss (vitrectomy probe setting: vacuum 150 mmHg, aspiration flow rate of 22 ml/min, and power of 420 Hz)

9. Injection pilocarpine 0.5% was injected through the side port
10. Viscoelastic material was introduced in the anterior chamber to help protect the cornea and facilitate the positioning of the irisclaw IOL implantation
11. The irisclaw lens was inserted posterior to the iris (lens has 5 mm optic and a total diameter of 8.5 mm) in the anterior chamber with the help of a irisclaw lens holding forceps
12. The IOL was rotated and centered over the pupil
13. The IOL was enclavated into the iris using enclavation rod
14. Thereafter, a peripheral iridectomy was performed at 12 o'clock position using the scissors to avoid a pupillary block
15. Viscoelastic material was removed through irrigation and aspiration cannula
16. The anterior chamber was formed with normal saline and air
17. 10.0 nyloninterrupted suturing was done
18. The conjunctival flap was cauterized
19. Subconjunctival injection of gentamicin and dexamethasone was given (0.5 ml)
20. Dexamethasone (Ocupol) ointment was applied in the eye
21. Pad and Bandage were given.

Postoperative treatment

- Tablet ofloxacin 200 mg twice a day for 3 days
- Tablet pantoprazole 40 mg once a day for 3 days
- Tablet aceclofenac 100 mg twice a day for 3 days
- Tablet acetazolamide as and when required.

Local treatmentSteroid eyedrop (dexamethasone 0.1%) was given 6 times/day for 6 weeks in tapering dose and antibiotic eyedrop (moxifloxacineyedrop 0.5 mg %) 6 times/day for 6 weeks in tapering dose. Antiglaucoma drug was given if required. Postoperatively, visual acuity, IOP, slitlamp finding, and complication, if any, were noted on the 1st postoperative day.

Patients were then discharged on the 3rd postoperative day and were called for followup weekly for 4 weeks and then at 3rd and 6th months postoperatively. On every followup visit, the eye was examined on the slit lamp, and BCVA, IOP, and keratometry reading were recorded. The patients pro forma was duly filled and records were kept.The statistical analysis of the main outcome variables was done by the application of appropriate statistical methods.

Statistical analysis

All data were analyzed with the assistance of biostatistician, Department of Community Medicine, Jawaharlal Nehru Medical College, Sawangi, Wardha. Using descriptive and inferential statistics by Chi square test, Student's paired t test, and one way ANOVA, statistical analysis was done. SPSS 22.0 version (Chicago, Illinois, USA) and GraphPad Prism 6.0 version software were used.$P < 0.05$ was considered the level of significance.All numerical patient data were entered into a Microsoft Excel spreadsheet.$\eta = 16\ \sigma 2/\Delta 2$.Where Δ represents expected mean and σ standard deviation (SD) of variable based on paired sample.The minimum sample size was 44 and hence we choose 50 eyes of 50 patients.

II. RESULTS

AGE AT PRESENTATION

TABLE NO 1: AGE DUSTRIBUTION OF PATIENTS

SL. NO	AGE OF THE PATIENTS	NO OF PATIENTS
1	20-30	2
2	30-40	6
3	40-50	11
4	50-60	21
5	60-70	10

SEX DISTRIBUTION

TABLE NO 2: SEX DISTRIBUTION

SEX	NO. OF PATIENTS
MALE	36
FEMALE	14

LATERALITY

TABLE NO: 3 LATERALITY

S.NO	EYE	NO. OF PATIENTS
1	Right	26
2	Left	24

B Scan FINDINGS

TABLE 11: PRE OPERATIVE B SCAN FINDINGS

S.NO	B SCAN FINDINGS	NO OF PATIENTS
1	NORMAL	42
2	PVD	4
3	DISCLOCATED NUCLEUS	1
4	DISLOCATED IOL	3
5	RETINAL DETACHMENT	0
6	VITRITIS	0

Preoperative B Scan findings was normal in 42 Patients had PVD, 1 Patient had dislocated nucleus and 3 Patients had dislocated IOL.

TABLE 12: POST OPERATIVE B SCAN FINDINGS

SL NO	B SCAN FINDINGS	NO OF PATIENTS
1	NORMAL	43
2	PVD	4
3	RETINAL DETACHMENT	0
4	VITRITIS	3

POSTOPERATIVE COMPLICATIONS

TABLE NO: 13 POST OPERATIVE COMPLICATIONS

SNO	POST OF COMPLICATIONS	NO OF PATIENS	PERCENTAGE
1	NO COMPLICATIONS	35	70
2	STRIATE KERATOPATHY	7	14
3	IRITS	14	28
4	COMEAL DECOMPENSATION	0	0
5	IOL DECENTRATION	2	4
6	IOL DISCENTRATION	2	4
7	CYSTOLD MECULAR EDEMA	3	6
8	RETINAL DETACHMENT	0	0
9	ENDOPHTHALMITIS	0	0
10	VITRITIS	3	6
11	RAISE IN IOP	2	4
12	ALTERATION IN PUPIL SHAPE	5	10
13	IOL DISLOCATION	0	0

PRE- OPERATIVE AND POSTOPERATIVE VISUAL ACUTTY COMPARISON

TABLE NO: 14 COMPARISION OF VISUAL ACUTTY IN PRE-OP AND POST –OP PERIOED

SNO	VISUAL ACUTTY	PRE-OP	POST-OP 1ST WEEK	POST-OP 4TH WEEK	POST-OP 6TH WEEK
1	6/6-6/12	0	19	32	41
2	6/18-6/36	0	19	10	6
3	6/60-4/60	9	10	7	3
4	≤3/60	41	2	1	0

TABLE NO:15 PREOPERATIVE FACTORS ANALYZED FOR IMPROVEMENT IN VISUAL OUTCOME ≥6/12

SNO	PRE-OP FACTORS	NO OF PATIENTS	P VALUE	SIGNIFICANCE <0.05
1	No Pre-op factors	22	0.003	Significant
2	Corneal Opacity	3	0.544	Not Significant
3	Type of Cataract Surgery	31	0.505	Not Significant
4	History of Injury	14	0.057	Not Significant
5	Duration of Trauma /Cataract Surgery and Iris Claw Lens Implantation < 4 Months	34	0.140	Not Significant
6	Diabetes Mellitus	5	0.646	Not Significant
7	Hypertension	4	0.560	Not Significant

Visual outcome significantly improved in patients with no preoperative factors (p value of 0.003 by Pearson Chi-square Test). All other factors were not significantly associated with improved vision in this study.

TABLE NO : 16 NPOSTOPERATIVE FACTORS ANALYZED FOR IMPROVEMENT IN VISUAL ACUTTY ≥6/12

Sl No	Post of Factors	No of Patients	P Value	Significance <0.05
1.	No Post Op Complications	35	0.001	Significant
2	Strtate Keratopathy	7	0.518	Not Significant
3	Iritis	14	0.187	Not Significant
4	Corneal Decompensation	0	1.000	Not Significant
5	IOL Decentration	2	0.999	Not Significant
6	IOL Disenclavation	0	1.000	Not Significant
7	Cystold Macular Edema	3	0.999	Not Significant
8	Retinal Detachment	0	1.000	Not Significant
9	Endophthaimitis	0	1.000	Not Significant
10	Viritis	3	0.999	Not Significant
11	Raise in IOP	2	1.000	Not Significant
12	Alteration in Pupil Shape	5	0.300	Not Significant
13	IOL Dislocation	0	1.000	Not Significant

<

In patients with no postop complications (p value of 0.001 by Pearson Chi-square Test) there was significant improvement in visual outcome after 6 weeks. Presence of other post op complications were not significantly associated with improvement in visual outcome in this study. Prolonged duration of surgery >60 minutes (p value of 0.020 by Pearson Chi-square Test) was associated with poor visual outcome in this study.

TABLE NO: 17 PRE-OP FACTORS ANALYSED FOR DECREASE IN VISUAL OUTCOME <6/12

SL No	PRE-OP FACTORS	NO. OF PATIENTS	P VALUE	SIGNIFICANCE
1	No Pre-Op Factors	22	0.297	Not Significant
2	Corneal Opaclty	3	0.999	Not Significant
3	Chromic Uvettls	15	**0.001**	**Significant**
4	History of Traums	14	**0.000**	**Significant**
5	Duration of Trauma/cataract Surgery and Iris Claw Lens Implantation < 4 months	34	0.236	Not Significant

Significant factors associated with poor visual outcome with p value of 0.001, 0.009 by Pearson Chi-square Test are chronic uveltls and history of trauma respectively after 6 weeks of Iris claw lens Implantation. All other factors were not significantly associated with poor visual outcome in this study.

TABLE NO: 18 POST OP FACTORS ANALYZED FOR DECREASE IN VISULAL OUTCOME <6/12

SNO	POST –OP FACTORS	NO. OF PATIENTS	P VALUE	SIGNIFICANCE <0.05
1	No Post of Complications	35	0.140	Not Significant
2	Striate Keratopathy	7	0.015	Significant
3	Iritis	14	0.001	Significant
4	Cystoid Macular Edema	3	0.456	Not Significant
5	Corneal Decompensation	0	0.429	Not Significant
6	IOL Decantation	0	0.331	Not Significant
7	IOL Disenclavation	0	0.429	Not Significant
8	Alteration in Pupil Shape	5	0.975	Not Significant
10	Vitritis	3	0.004	Signiifcant
11	Endophthalimitis	0	0.429	Not Significant

III. DISCUSSION

Retro pupillary fixation of iris claw intraocular lens is a safe and effective option for visual rehabilitation of patients with aphakia with inadequate capsular support following cataract surgery, large zonular dialysis, post traumatic cataract, subluxation and dislocation of lens. A similar study by Baykaraet al[4] found that this technique is safe and effective.

In our study 50 eyes of 50 patients were selected according to inclusion criteria. The mean age of the patients was 50.6 years. In Rao and Sasidharan et al[5] study the mean age of presentation was 57±10 years. In Gonner man et al[6] study iris claw lens implantation was done in 137 eyes.

The pre-operative visual acuity in majority of patients [82%] was ≤ 3/60 and between 4/60-6/60 in 18% of cases. The mean duration of iris claw lens implantation was 30 minutes.

The postoperative period was uneventful in 70 % of patients. Iritis [28%]is the most common postoperative complication followed by striate keratopathy [14%].Iritis and striate keratopathy were statistically significant in terms of poor visual outcome with p value of 0.001 and 0.015 respectively. The other complications were IOL decentration [4%], alteration in pupil shape [10%], cystoid macular edema [6%] and raise in IOP [4%].

Gonnerman et al[6] reported pupil ovalisation in13.9% of cases and ViphulBhandhari et al[7] study pupil ovalisation was noted in 10 % of cases. Fixation of haptic asymmetrically and very tightly is probably reason for alteration in pupil shape. In Hsing ye et al[8] study IOL decentration was noted in 2 cases. De silva et al[9] in his study reported wound leak in 6% and iris claw dislocation in 6% of cases. In our study no such complications were noted.

The post-operative visual acuity at 1 week was between 6/6-6/12 in [19]38% of cases,6/18-6/36 in 38% of cases,6/60-4/60 in 20% of cases and ≤ 3/60 in 4%of cases. At 6 weeks, 82% of patients had visual acuity of 6/6-6/12,12% had 6/18-6/36,and 6% had 6/60-4/60.The improvement in visual acuity after 6 weeks was due to the treatment of complications. In de silva et al[9] study 60% had visual acuity 6/12 or better and in Gonnerman et al[6] study 63.6% had visual acuity 6/12 or better.

The success of surgery was defined as visual acuity ≥6/12. In our study 82% have visual acuity of ≥ 6/12. In Gonnerman et al[6] study the success rate was 60%and in De silva et al (9) study, the success rate was 63.5%. In Rao et al[5] study 80% had final visual acuity of ≥6/12 comparable to our study.Postoperative refraction was more towards myopic side in our study In Gonnerman et al[6] and Viphul Bhandhari et al[7] study the postop refraction was more towards myopic side.

Limitation One of the limitations of the study is short follow up period and less sample size. Further studies can be planned with longer follow up period using LOG Mar visual acuity for better quantification of visual acuity. Late complications can also be documented in previous studies.

IV. CONCLUSION

The retropupillary iris claw implantation provided a good outcome in patients with inadequate posterior capsular support. Visual acuity in both primary and secondary implantation were similar concluding that iris claw lens implantation can be done in the primary setting rather than planning for secondary implantation at a later date. Most common immediate complications observed did not compromise the visual acuity after 2 months concluding that the complications are tolerable. One of the limitations of the current study is short follow up period (2 months). Further studies can be planned with documentation of late complications of iris claw lens implantation.

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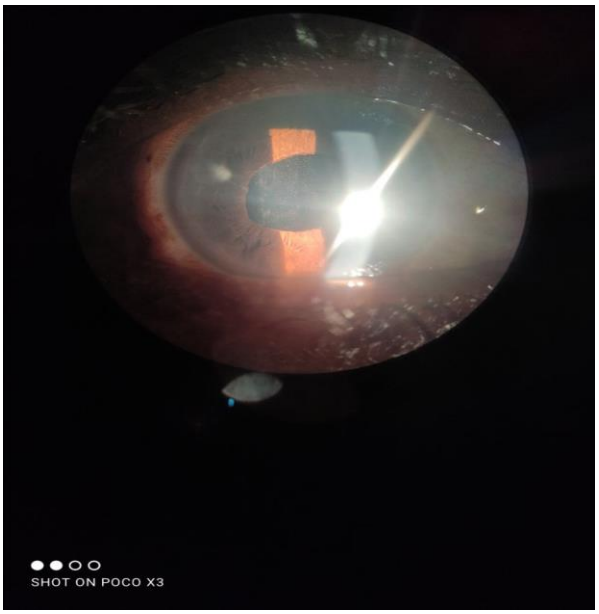

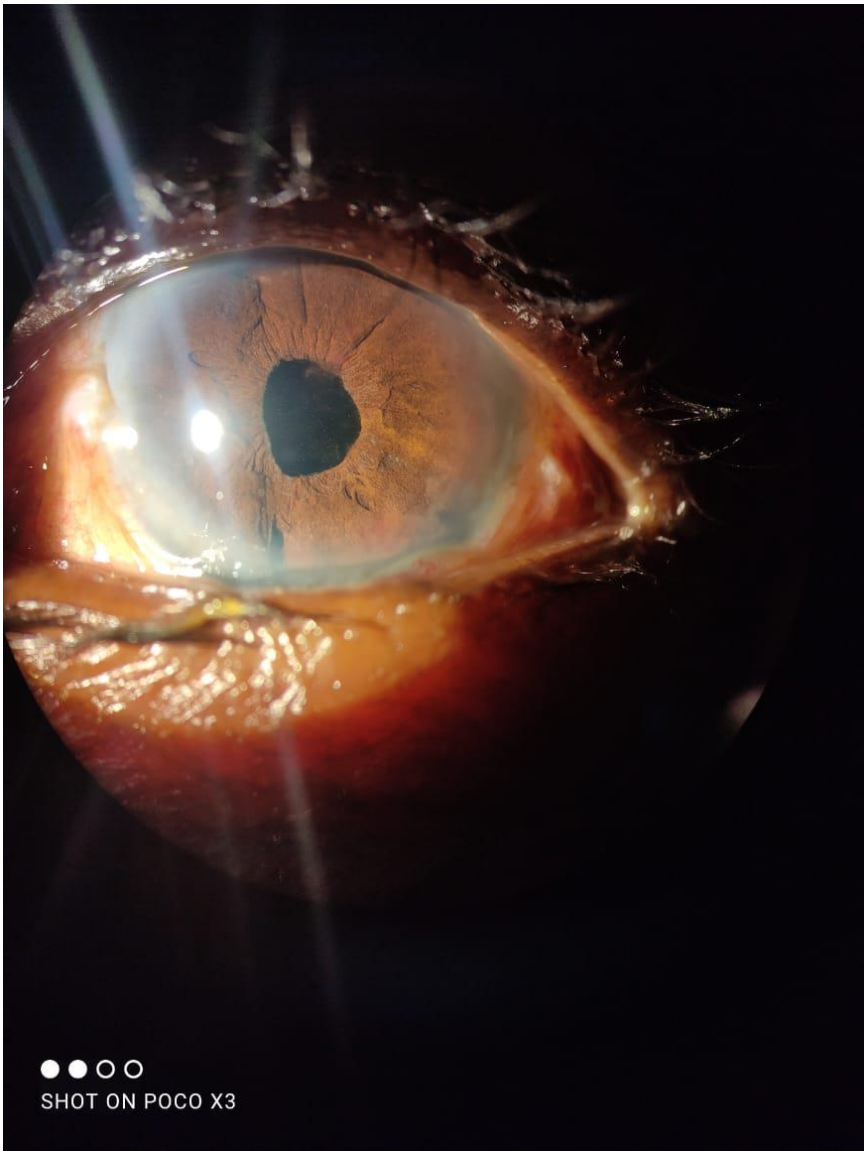
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