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ORIGINAL RESEARCH

EFFECTS OF RETROPUPILLARY IRIS CLAW LENS IMPLANTATION ON VISUAL OUTCOME, ENDOTHELIAL CELL LOSS, AND COMPLICATIONS IN PATIENTS WITH POSTERIOR CAPSULE DEFICIT

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ABSTRACT

Purpose: To investigate the effects of retropupillary Iris claw lens implantation in patients with inadequate posterior capsule in terms of visual outcome, endothelial cell loss, and complications.

Methods: Sixty-six patients who had retropupillary iris claw lenses implanted in eyes with posterior capsule deficit participated in this prospective study.

Results: The mean PreopLogMAR was 0.5338, and at 3 months postoperatively, it had improved to 0.3149. In 36 patients (54.54 %), macular oedema was noted; in 24 patients (36.36 %), pigment dispersion was noted. Disenclavation was observed in none of the case.

Conclusion: Retropupillary Iris Claw lens implantation is a quick, affordable, predictable, safe, and operation that can produce good visual results with few problems.

Keywords: Iris Claw Lens; Retropupillary; Aphakia; Enclavation

INTRODUCTION

Even though cataract surgery has advanced greatly over the years, there are still some instances where a posterior chamber intraocular lens (PCIOL) cannot be placed after the cataract is removed. There may not be enough posterior capsular support for PCIOL implantation in the capsular bag or sulcus in cases of aphakia, posterior chamber IOL dislocation, large posterior capsular rent or whole bag removal, Marfan syndrome/ectopialentis, large zonular dialysis, and trauma-induced dislocation of the crystalline lens.

An anterior chamber intraocular lens (ACIOL), a scleral fixated intraocular lens (SFIOL), or an iris fixated IOL are the potential treatments. It has frequently been documented that the usage of ACIOLs at the iridocorneal angle results in endothelial cell loss and pseudophakic bullous keratopathy (PBK) [1,2]. Scleral fixation of posterior chamber IOLs has a number of drawbacks, including challenging suture technique, longer surgical time, and complications like hypotony, potential intraoperative bleeding, harm to the ciliary body, choroidal haemorrhage, retinal detachment, vitreous incarceration, and cystoid macular oedema.

Prof. Jan G.F. Worst created the Iris Claw lens in 1978 [3-5]. It had a circular aperture between the optic and haptic and was a plano convex lens [6]. In order to improve the distance between the IOL and the corneal endothelium, a modified convex-concave variant with a vaulted design was created in 1996.

It is possible to fixate iris-claw lenses to the iris in either the anterior or posterior chamber. However, there is a danger of endothelial cell loss with Iris claw lens implantation in the anterior chamber, which might result in pseudophakic bullous keratopathy. The midperipheral iris stroma, which is stationary, is where the haptics of the lens are enclavated, giving the pupil unrestricted capacity to dilate and constrict.

The Andreas Mohr-first published approach of retro pupillary iris fixing of iris claw lenses and has number of benefits [7]. It combines the advantages of posterior chamber IOL implantation with a less invasive, inexpensive, and quick surgical technique [7]. IOL haptics and a few optical components are located behind the iris, making them more aesthetically pleasing than anterior chamber implants. There is improved stability, elimination of lens tilting, and lessglare issue when iris-claw lenses are retropupillary fixed that is typical of anterior chamber IOL implants.

A few more negative effects include disenclavation, pupillary deformity, and iris atrophy. Numerous research has been conducted to examine the visual outcome, problems, benefits, and drawbacks of RPICIOL in comparison to SFIOL and ACIOL. Evaluation of endothelial cell loss following RPICIOL has received more attention recently. In this connection, we have analysed the visual outcome, endothelial cell loss, and complications of retropupillary iris claw lenses, paying particular attention to the documentation of endothelial cell count both before surgery and throughout all subsequent visits.

MATERIAL AND METHODS

After receiving approval from ethics council of the Medical College, the study was conducted at the Tertiary Eye Care Centre in India. Before every surgical treatment that every patient had, written informed permission was obtained from them in accordance with hospital protocol. 66 eyes of66 patients who had retropupillary iris claw lens implantation made up this prospective cohort research. Table 1 displays the Iris claw lens implantation indications in our investigation.

Table 1: Indications

Indication	No.	%
Aphakia	42	63.63
DislocatedIOL	12	18.18
PCIOLinAnteriorchamber	12	18.18

Patients with posterior defective capsule, endothelial cell count greater than 1000 cells, and BCVA of 6/60 or better on Snellen chart met the inclusion criteria. Patients with decompensated cornea, insufficient iris tissue, and diseases in the posterior segment met the exclusion criteria. All patients had their preoperative uncorrected and best corrected visual acuities (UCVA and BCVA) measured, and the following tests were done:

a. Slit-lamp examination.
b. Keratometry and an A scan; computation of the IOL's power using the SRK/T formula and A constant of 115.
c. 90 D and indirect ophthalmoscopy retinal examination.
d. using specular microscopy to count endothelial cells (TopconSP- 1P).
e. Non-contact Tonometry (Nidek NT 510 NCT).
f. Carl Zeiss Meditech's optical coherence tomographyDublin, Calif., USA).

The same surgeon (SPS) implanted a retropupillary iris claw lens under local anaesthetic while following all aseptic procedures. A superior 5.5 mm incision is created either clear corneal or sclero-corneal. Two paracentesis are made 180 degree apart at 90 degree to main incision. Pilocarpine is injected intracamerally to constrict the pupil. Under air, the main incision is used to insert the iris claw IOL into the anterior chamber.

At each stage, viscoelastic (2 percent HPMC) is injected to maintain the anterior chamber. One haptic is angled down and inserted beneath the iris while holding the optic using specialised lens-holding forceps with flat and broad tips. On the same side,an Iris repositor or asinsky hook is passed through the paracentesis. Iris is now enclaved in the lens haptic claw with the simultaneous upward movement of the lens haptic and downward movement of the sinsky hook. Similar enclavation is carried out on the opposite side. The majority of the cases required anterior vitrectomy. Simcoe's canula is used to aspirate viscoelastic from the anterior chamber (figure 1, 2).

Figure 1: Surgical Steps

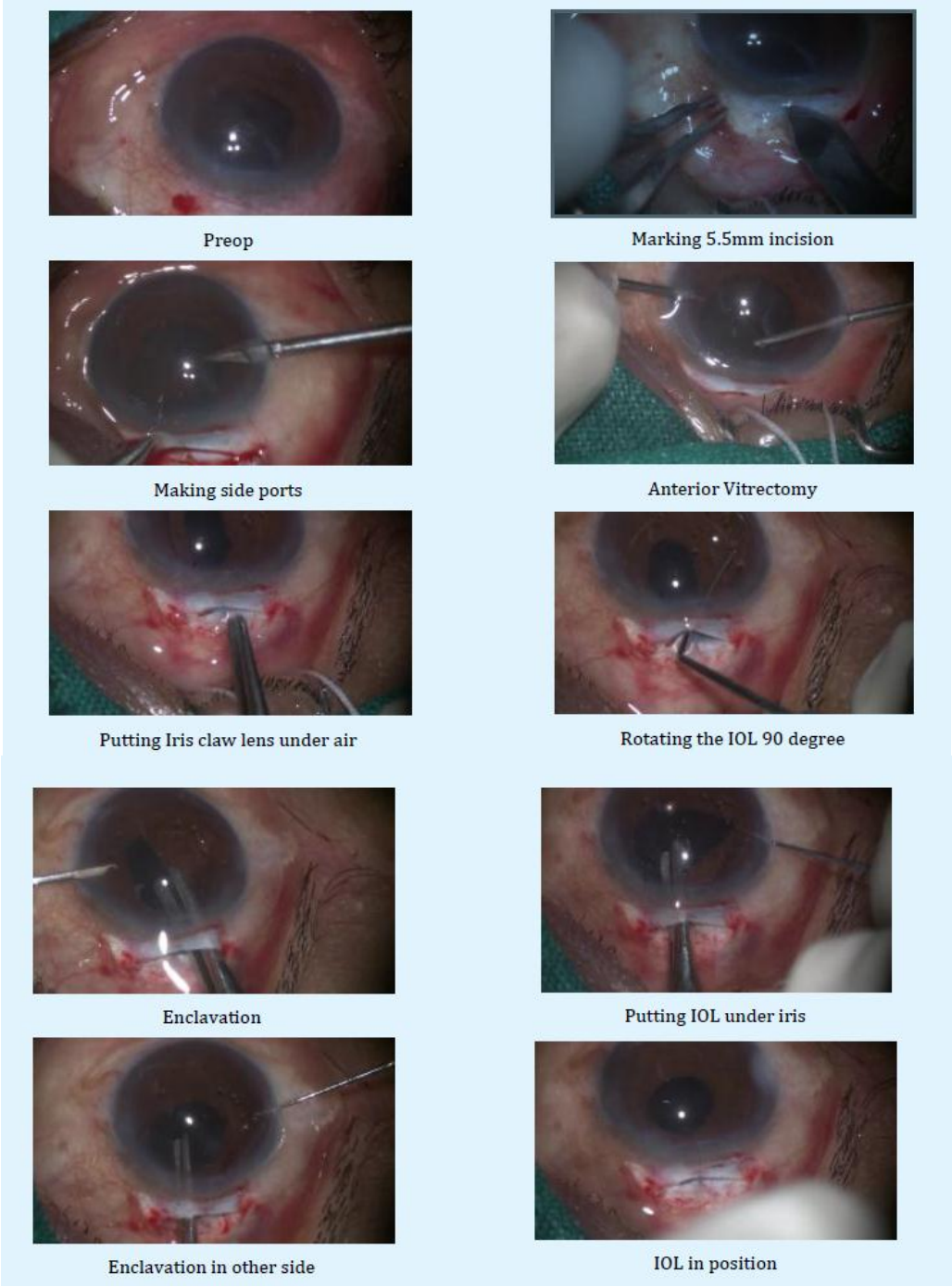
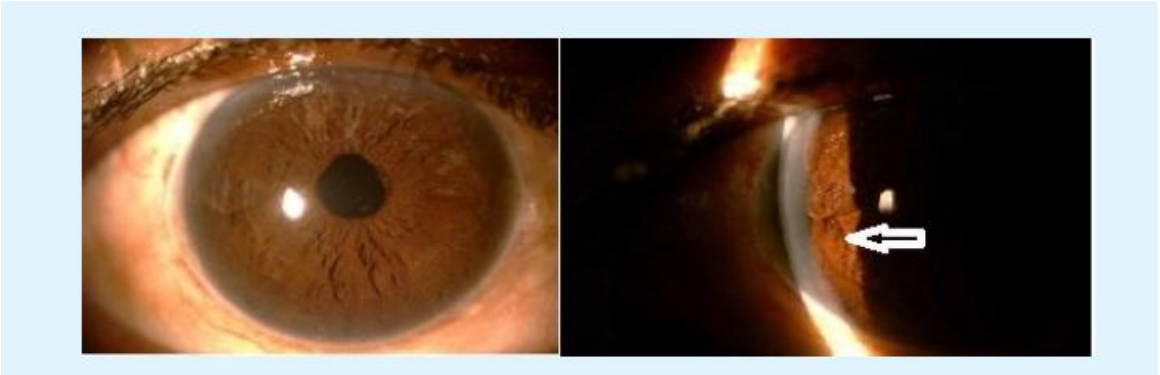


Figure 2: Postoperative photo with site of Enclavation



The patient was specially checked on the first postoperative day to determine the IOL centration, endothelial cell loss using specular microscopy, and macular oedema using an optical coherence tomogram (OCT). These were reiterated at each subsequent appointment. Topical antibiotics (moxifloxacin 0.5 percent eye drops and tobramycin 0.3 percent eye drops) and tapering doses of topical steroids (prednisolone acetate 1 percent)were given for 4 weeks as part of the normal postoperative care.

Following surgery, patients had follow-up appointments 24 hours, 1 week, 4 weeks, and 3 months later. The following examinations were performed at each subsequent visit:

- Best Corrected Visual Acuity (BCVA).
- Non-contactTonometry
- Indirect ophthalmoscopy and 90 D examination.
- Optical coherence tomography;
- Specular microscopy.

For statistical analysis, the chi square test and student paired T tests were performed.A p-value of 0.05 or above was deemed statistically significant.

RESULTS

66 patients having 66 eyes withretropupillary Iris claw lens implantation were recruited in the study. The patient's age ranged from 45 to 80 years with mean age of 62.5 years. There were 18 (27.27%) males and 48 (72.72%) females (table 1).

According to Table 2, the mean best corrected LogMAR preoperatively was0.5338 ± 0.2188 (range from 0.176 to 0.778), while the mean post-operative best corrected LogMAR was 0.3149 ± 0.1729 at the conclusion of the follow-up period (range from 0 to 0.602).Only 12 patients (18.18%) had visual acuity better than 6/12 before to surgery, while 42 patients (63.63%) did so at the end of three months. Table 2's p value for the Chi-Square test, was 0.000033which is highly significant (table 3).

The mean preoperative endothelial cell count was 2207.18 ± 615.29 cells/mm2, and after three months of follow-up, it had fallen to 1877.91 ± 569.55 cells/mm^2(Table 4).The complications were divided into 3 parts:Intraoperative, Perioperative (<1week) and Postoperative (>1 week) which are summarised in Table 6.

Table 2: Distribution of subjects according to age and gender

Variable	N	%
Mean age (range) in years	62.5(45-80)	
Gender		
Male	18	27.27
Female	48	72.72

Table 3: Preop vs Postop mean best corrected LogMAR

Variable	Mean ± SD	Range
Preop	0.5338 ± 0.2188	0.176 to 0.778
Postop 3 months	0.3149 ± 0.1729	0 to 0.602

Table 4: BCVA preop vs. 3 months postop

BCVA	Preop	3 Months Postop	P value
≥6/12	12	42	0.000033
6/12- 6/24	30	24	
<6/24	24	0	

Table 5: Endothelial cell count (cells/mm2)

Variables	Mean ± SD (cells/mm2)
Preop	2207.18 ± 615.29
1 week	2118.25 ± 550.32
1 month	1987.56 ± 551.53
3 months	1877.91 ± 569.55

Table 6: Complications

Intraoperative			Perioperative<1wk			Postoperative1wk -1month			perative1month-3months		
Complication	No.	%	Complication	No.	%	Complication	No.	%	Complication	No.	%
Bleeding	6	9.09	Macularoedema	36	54.54	Macularoedema	18	27.27	Macularoedema	6	9.09
			Uveitis	18	27.27	Uveitis	6	9.09	PupilOvalisation	12	18.18
			PupilOvalisation	30	45.45	PupilOvalisation	12	18.18			
			IOLdecentration	6	9.09	IOLdecentration	6	9.09	IOLdecentration	6	9.09
			t elavation inIOP	22	33.33	t elavation inIOP	24	36.36	Pigmentdispersion	24	36.36

DISCUSSION

ACIOL, SFIOL, and iris fixed lenses are the IOL choices available in situations with a defective posterior capsule. ACIOL implantation is simple and quick, however it should be avoided since it frequently results in pseudophakic bullous keratopathy from postoperative endothelial cell loss. SFIOL implantation respects the architecture of the eye, but it is technically difficult and associated with many complications [8]. The advantages of both ACIOL and SFIOL are combined with the use of retropupillary iris claw lenses. For the purposes of examination and treatment of the posterior segment, the retropupillary fixed IOL does not prevent pupil dilation. It benefits from posterior chamber implantation, which is quick to learn, takes less time, and is associated with less problems [9,10].

In our series, 48 (72.72%) individuals saw an improvement in BCVA while the remaining patients' visual acuity remained unchanged [11–13]. According to other studies, the visual acuity improved with the implantation of a retropupillary Iris claw lens. BSCVA better than 20/40 was present in 24 (18.18%) eyes preoperatively, and in 42 (63.63%) eyes 3 months following surgery [12]. According to De Silva et alseries' 68 % of all eyes had a final BSCVA of 6/12 (20/40) or better, and 88.7 % of eyes without any additional pathology that restricted vision had this degree of vision.According to Mohr et al., 27 patients (56.2%) had improved vision, 18 patients (37.5%) had their visual acuity remain the same, and 3 patients had decreased visual acuity (6.2 %) [13]. These findings are comparable to those of other studies on iris-claw IOLs, secondary open-loop anterior chamber IOLs(60–77% of eyes with a BSCVA ≥20/40), secondary scleral sutured posterior chamber IOLs, (53.8–77.8% of eyes

with a BSCVA ≥20/40) or secondary iris-claw PC IOLs(60% to 67%with BSCVAs of 20/40 or better) [7].

It is a well-known fact that endothelial cell loss occurs with all cataract operations. The increasing loss of corneal endothelial cells, which is followed by corneal decompensation, is the main issue when implanting anterior chamber IOLs [14]. This approach is safer because the irisclaw IOL is placed posteriorly and is farther away from the endothelium [8]. In this study, we discovered a drop in endothelial cell count that was statistically significant (14.51%) [12].Corneal decompensation was reported in1.7% of eyesby De Silva, et al. but not seen in any case in our study[13].Raghvendra Rao, et al. reported endothelial cell loss of 8.96% postoperatively, at the end of 6 months, [15]

Overall, the incidence of complications in our study is similar to other studies, and are generally related to a pre-existing eye disease or predisposing factor rather than to the IOL implantation itself. We saw elevated IOP in some cases and all were managed medically which is in accordance with previous studies.According to Gonnerman incidence of postoperative macular edema was 8.7% after 6 to 7 months of Iris claw lens implantation.[9] In a study done by De Silva on Iris Claw IOL two patients had CME of which one had chronic CME [13]. We didn't find any case of CME. But slight macular oedema in 9 cases (27.27 %) was seen in our series, which subsided during the follow up period.No dislocation was seen in our study. Gonnerman found dislocation rate upto 8.7% in his study.Pigment dispersion was seen as a complication in two studies, but this was not seen in several studies. [11,12] We detected pigment dispersion in 24 cases (36.36%of our patients)

CONCLUSION

In situations when there is a weak posterior capsule or insufficient capsular support, the retropupillary iris claw intraocular lens implantation is a clinically safe, less time-consuming, predictable, and efficient primary or secondary surgery. At the three-month follow-up, it can provide good visual outcomes for up to 64% of patients with BCVA 6/12. When compared to Scleral fixed intraocular lenses (SFIOL) and anterior chamber intraocular lenses(ACIOL), problems following the implantation of retropupillary Iris claw lenses were limited and had a number of advantages. There were no instances of corneal decompensation, and the endothelial cell loss was comparable to SFIOL and better than ACIOL. After a month of follow-up, there had been relatively little cell loss compared to the intraoperative endothelial cell loss.Therefore, implantation of a retropupillary iris claw lens is preferable to scleral-fixed or angle-supported IOL implantation.

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