Indian Journal of Clinical and Experimental Ophthalmology 2021;7(2):442–447

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Indian Journal of Clinical and Experimental Ophthalmology

Journal homepage: www.ijceo.org

Original Research Article

Comparison of visual acuity in primary and secondary iris claw implantation in western Maharashtra

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ARTICLE INFO

Article history:
Received 08-12-2020
Accepted 16-12-2020
Available online 30-06-2021

Keywords:
Primary and Secondary Iris claw lens
Visual acuity
Endothelial cell count
Intra ocular pressure

ABSTRACT

Background: A potential complication of cataract surgery is posterior capsular rent, where PCIOL can't be implanted. Primary Iris claw implantation means that the IC-IOL is implanted in the same setting after cataract removal. While secondary Iris claw lens implant is done in an aphakic eye without capsular support and post cataract surgeries when the eye is left aphakic.
Aim: To compare the visual outcome in cases of primary and secondary iris claw lens implantation after cataract surgery.
Materials and Methods: This was a hospital-based Prospective Interventional Longitudinal study, conducted on patients in a tertiary care centre, in Western Maharashtra from September 2018 to August 2020. 31 eyes underwent primary iris claw implant and 19 underwent secondary iris claw implant.
Results: Highly significant difference in visual acuity preoperatively due aphakia among subjects who underwent secondary iris claw implantation (p=0.000) was seen. Highly significant difference in visual acuity post operatively till 15 days was also seen due to less corneal oedema& inflammation in patients who underwent secondary iris claw implantation. No significant difference in visual acuity was seen on day 40 as lens was put in both the groups and the signs of inflammation had reduced (p=0.759).
Conclusion: Overall visual outcome after 40 days is comparable in primary and secondary cases. It is better to do a primary retro fixated iris claw implantation, as in case of a secondary implant the patient will have undue anxiety, to undergo a second surgery along with increased financial burden and patient can develop complications due to aphakia.

1. Introduction

Prevalence of blindness was reported to be 8% in the age group of more than 50 years as per National blindness survey.[1] Cataract accounts for 62.6% of all blindness affecting 9-12 million bilaterally blind people. In India, around 20 lakh new cases of cataract is being added every year, thereby increasing the burden of blindness. The prevalence of un-operated cataract in people ≥60 years of age, in north India was 58% (95% CI, 56–60) and (95% CI, 51–55) in south India was 53% (P = 0.01).[2]

A potential complication of cataract surgery is posterior capsular rent. It was seen to occur in 0.45%–5.2% of cases.[3,4] The outcome of cataract surgery can be adversely affected in case of an improperly managed PCR. Patients who are left aphakic are visually impaired without glasses and therefore it increases the prevalence of blindness. Thus, this does not help in reducing the prevalence of blindness. The most important factor which determines the visual acuity post-surgery is seen to be the loss of vitreous.[5]

Primary Iris claw implantation means that the IC-IOL is implanted in the same setting after cataract removal. While secondary Iris claw lens implant is done in aphakic eyes without capsular support. Implantation of secondary iris

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https://doi.org/10.18231/j.ijceo.2021.088

claw lens can be done post cataract surgeries (in the second sitting) when the eye is left aphakic due to complications like lens drop or nucleus drop or vitreous leakage due to posterior capsular rupture.

Because of its peculiar means of fixation, to the peripheral iris, the IC-IOL can be implanted in any eye with sufficient iris to support it. In addition, the iris claw lenses tend to fare much better than angle-supported phakic lenses in terms of endothelial cell loss. IC-IOL can be either placed anterior to the iris or can be retro fixated. An anterior fixated IC-IOL will have shown to have many complications like those caused by AC-IOL, like endothelial decompensation. Therefore most surgeons prefer retropupillary fixation of IC-IOL to enhance endothelial safety. In our study we have compared the outcomes of primary and secondary retropupillary fixated iris claw lenses.

Secondary IOL implantation is often challenging. This is because there is a history of trauma to the eye or complicated intraocular surgery usually in patients with aphakia. Furthermore, management of aphakia in a vitrectomized eye can pose some problems because of lack of capsular support or changes in anatomy of the AC, angle, or cornea. In these cases, an iris-fixated PC IOL can be implanted.[6]

2. Materials and Methods

This was a hospital-based Prospective Interventional Longitudinal study conducted on patients in a tertiary care centre in Western Maharashtra, from September 2018 to August 2020. Before starting the study the Institutional Ethics Committee clearance was obtained.

A total of 50 patients were evaluated and divided according to the procedure done. 31 underwent primary iris claw implant and 19 underwent secondary iris claw implant. Patients who have undergone complications during cataract surgery and patients with surgical aphakia with no capsular support with endothelial counts more than 1000 cells were included in the study.

Patients of surgical aphakia with decompensated corneas, aphakic patients with cystoid macular oedema or choroidal neovascular membrane, traumatic aphakia and aphakic patients with insufficient iris tissue, were excluded from the study.

After taking detailed history, all patients underwent complete ophthalmologic evaluation -Visual acuity – UCVA and BCVA, slit-lamp examination was done with emphasis on condition of iris and pupil, keratometry was done with autokeratometer, A-scan Biometry was done to calculate the iris claw power in case of secondary cases. In case of primary iris claw implantation the iris claw power was calculated by subtracting 1.00D from the power calculated for a routine posterior chamber IOL. Retinal evaluation was done with 90 D lens and indirect ophthalmoscopy, endothelial cell density was calculated by specular microscopy and Goldmann's applanation tonometry was used to measure the intra ocular pressure (IOP).

Primary retropupillary Iris Claw Implantation was done in patients in whom posterior capsular rent occurred and routine posterior chamber intra ocular lens could not be implanted.

The PC iris claw lens was implanted as a secondary procedure 4 weeks after the first surgery in cases where primary iris claw implantation could not be done. In case of complications like nucleus or lens fragment drop due to posterior capsule rupture or where surgeons were not trained adequately to implant the claw lens or when there was an unavailability of lens, the claw lens implantation was taken up as a secondary procedure.

Postoperative evaluation in both the groups was done. UCVA and BCVA was taken. Slit lamp examination to check the corneo-scleral incision integrity, assessment of cornea for corneal clarity, AC depth and inflammatory reaction, iris pattern, pupillary reaction and shape and lens stability. IOP was measured with the help of Goldmann's applanation tonometer. Corneal endothelial cell density was measured with the help of specular microscopy. Fundus examination was done with the help of 90 D lens and indirect ophthalmoscope. Postoperative satisfaction on day 1 was also noted. The patients were asked if they were happy with the post-operative visual outcome on day 1 and they were asked if they had any discomfort or pain.

These were assessed on day 1, 7, 15 and 40 post operatively.

2.1. Statistical analysis

Data was entered in EXCEL and analysed using WinPepi software and was summarised using mean and SD. Appropriate tests of statistical significance such as chi-square, t test, and paired t test were used.

3. Results

A total of 50 cases were analysed in this study. Out of which 31 were operated as primary iris claw cases and 19 were secondary iris claw cases. Mean age of study sample was 66.62 years (SD - 8.09), with the highest 82 years and lowest 53 years. There were 29 (58%) males and 21 (42%) females in the study. 19 (38%) samples were from 61-70 years age group followed by 16 (32%) subjects in 71-80 years age group.

21 (42%) out of 31 cases of primary iris claw surgery underwent small incision cataract surgery (SICS) & 10 (20%) underwent phacoemulsification. Whereas 10 (20%) out of 19 patients of secondary iris claw surgery had undergone SICS & 9 (18%) had undergone phacoemulsification previously.

Posterior capsular rupture (34, 68%) was most common cause for iris claw implant (for both primary and secondary iris claw), out of which 27 (79.4%) were plain PCR, 4 out of 34 (11.8%) were PCR with IOL drop and 3 out of 34 (8.8%) were PCR with nucleus drop. This was followed by weak bag zonular dialysis (7 out of 50, 14%). Other conditions like subluxated PCIOL (3, 6%), extension of CCC etc. were also the causes of retropupillary iris claw implant among study subjects.

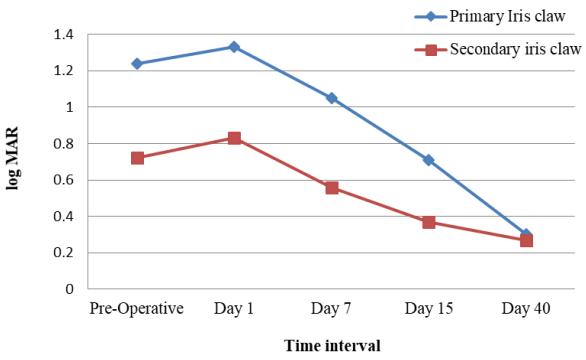

Fig. 1: Line diagram showing BCVA pre operatively and postoperatively till day 40

Figure 1 shows that in comparison with pre-operative logMAR value there was significant ($p<0.05$) decrease in logMAR value following day 15 post-operatively, among study samples operated either by primary or secondary iris claw cataract surgery. Visual acuity significantly improved after 15 days of cataract surgery due to reduction in corneal edema and anterior chamber reaction.

Table 1 shows that on application of unpaired t test there was highly significant difference in the preoperative visual acuity between subjects who underwent primary and secondary iris claw implantation ($p=0.000$). Highly significant difference in thepost-operative visual acuity, till 15 days was also seen (between primary and secondary iris claw group) due to less corneal oedema & inflammation in patients who underwent secondary iris claw implantation. No significant difference in post-operative visual acuity, between both the groups, was seen on day 40 as lens was put in both group and the signs of inflammation had reduced by then ($p=0.759$).

Those operated by primary and secondary iris claw cataract surgery didn't have intraocular pressure difference either pre or post operatively. ($p>0.05$)

Table 2 shows that those operated by primary or secondary iris claw implant surgery didn't show significant difference in endothelial cell count either pre or post operatively between both the groups. ($p>0.05$)

5 subjects were having unstable lens following primary iris claw surgery while there was one subject with unstable lens following secondary iris claw surgery.

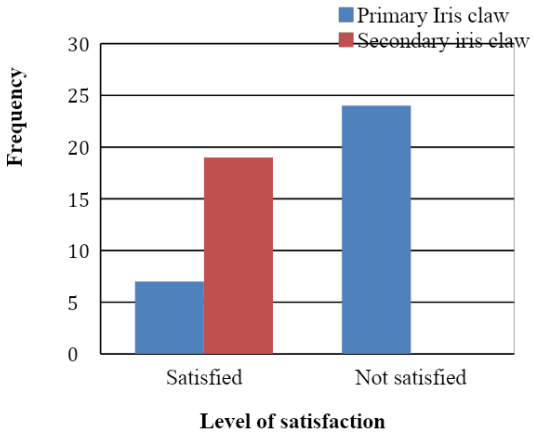

Fig. 2: Bar diagram showing patient satisfaction in both the study groups

Figure 2 shows that all the 19 patients who underwent secondary iris claw surgery and 7 out of 31 from primary iris claw surgery were satisfied by the procedure. A yes or no question was asked pertaining to their satisfaction about postoperative vision on day 1 post surgery and if any discomfort or pain was present.

There was no major complication following surgery in any group.

4. Discussion

In our study we enrolled a series of 50 patients with varied age groups ranging between 53 years to 82 years out of which 58% were males and 42% females. In this prospective interventional study we compared the visual outcome of patients who underwent iris claw implantation primarily after cataract surgery to the visual outcome of aphakic patients who underwent secondary iris claw implantation. 62% patients underwent primary iris claw implantation out of which 42% underwent SICS surgery and 20% underwent phacoemulsification, while 38% patients underwent secondary iris claw implantation out of which 20% had undergone SICS and 18% had undergone phacoemulsification previously.

In our study we observed that posterior capsular rupture was the most common cause for primary and secondary iris claw implantation. Weak zonules were the second most common cause for primary iris claw implantation. PC rent with IOL drop during surgery was the second most common cause for secondary iris claw implantation.

Gonnermann J et al. conducted a study, showed that the most common aetiology requiring primary lens exchange was Marfan's syndrome and ectopialentis and the most common etiology requiring secondary implantation was pseudoexfoliation syndrome in addition to penetrating eye

Table 1: BCVA preoperatively and postoperatively on follow up

BCVA (logMAR) Time	Group	Number of cases (N)	Mean	Std. Deviation	Std. Error Mean	p value
Pre-Operative	Primary iris claw	31.00	1.24	0.36	0.06	**0.000**
	Secondary iris claw	19.00	0.72	0.12	0.03	
Day 1	Primary iris claw	31.00	1.33	0.39	0.07	**0.000**
	Secondary iris claw	19.00	0.83	0.40	0.09	
Day 7	Primary iris claw	31.00	1.05	0.43	0.08	**0.000**
	Secondary iris claw	19.00	0.56	0.33	0.08	
Day 15	Primary iris claw	31.00	0.71	0.33	0.06	**0.001**
	Secondary iris claw	19.00	0.37	0.31	0.07	
Day 40	Primary iris claw	31.00	0.30	0.24	0.04	0.759
	Secondary iris claw	19.00	0.27	0.28	0.06	

Table 2: Endothelial cell count pre operatively and post operatively

Endothelial cell count Time	Group	N	Mean	Std. Deviation	Std. Error Mean	p value
Pre-Operative	Primary iris claw	31.00	2430.00	195.44	35.10	0.577
	Secondary iris claw	19.00	2459.70	154.61	35.47	
Post-Operative	Primary iris claw	31.00	2288.00	187.34	33.65	0.853
	Secondary iris claw	19.00	2298.00	203.53	46.69	

injury and trauma.[7]

We observed in our study that there was statistically significant difference between pre-operative visual acuity and post-operative visual acuity. This was due to aphakia in secondary cases and cataractous lens in primary cases, pre-operatively. Visual acuity is better after the implantation of an intra-ocular lens therefore the patients were satisfied post-surgery.

61 aphakic eyes were enrolled for a study by Jayamadhury G et al. it was noted that the mean preoperative UCVA was 1.66 ± 0.3 LogMAR and postoperatively after 1 year it was 0.53 ± 0.5 LogMAR (P = 0.00001).[8]

In our study we also observed statistically significant difference between visual acuities post operatively after primary and secondary IC-IOL implantation up to day 15. This could be due to more amount of postoperative inflammation and corneal oedema in case of primary cases as compared to secondary cases. It was also observed that there was no significant difference (P > 0.05) in the visual acuity on the 40^{th} day of follow up in both the groups. Though there is a difference in visual acuity in initial days, long term result were not significant as the patient ultimately had good visual acuity by 40^{th} day post operatively.

A study conducted by Güell et al. showed similar results like ours with no major complications. It was concluded that IC-IOL implantation in aphakic eyes was a predictable, effective and a safe procedure in the first 5 years of follow-up.[9]

In our study no significant complications were noted. Complications can be avoided with delicate handling of tissues and by learning the skill of iris claw implantation. But the follow up period in our study is of 40 days thus long term complications could not be assessed. Loss of endothelial cell count was noted but there was no corneal decompensation seen in our period of study.

We observed a statistically significant difference in pre-operative and post-operative IOP but no significant difference in IOP was seen between primary and secondary iris claw implantation. Iop remains same as there is inflammation but no inflammatory glaucoma induced. Thus it is safe to implant a retropupillary iris claw lens, without the fear of glaucoma, unlike that in case of ACIOL implant

In a study by Choragiewicz T et al., where the authors did not observe any statistically significant rise in the intra

ocular pressure pre operatively and post operatively. [10]

In our study we noted statistically significant difference between pre-operative and post-operative endothelial cell count, former being higher. However we did not find any statistically significant difference between primary and secondary iris claw implantation surgeries. We would require a follow up for at least a year to see if any endothelial call loss occurs over time.

Güell et al. concluded that Artisan IOL implantation caused approximately 10.9% endothelial cell loss over the period of 3 years. Anbari and Lake reported preoperative manual endothelial cell density mean of 2269 ± 611 cells/mm^2. It decreased postoperatively to 2002 ± 532 cells/mm^2 at 2 years (P = 0.0005) which was statistically significant. [11]

Furthermore, we did not find any statistically significant difference in IOL power calculation in primary and secondary iris claw implantation. Thus we can go ahead with the use of iris claw in case of complication in the primary sitting itself and the power of the lens can be calculated with the help of the power of regular PCIOL lenses.

It was seen that on post-operative day one patient satisfaction was seen to be better in case of the group of patients who underwent secondary iris claw implant as they had better visual outcome in the immediate post op period, due to less corneal oedema and inflammation. While in case of primary iris claw implant 24 out of 31 patients were unsatisfied. This is because in case of primary iris claw implantation there is increased amount of inflammation which leads to pain and reduced vision in the first few days post operatively. Moreover the patient has a psychological impact of a different type of IOL being implanted post-surgery.

5. Conclusion

Retropupillary iris claw implantation can be consider particularly in all aphakic subjects having contraindication for AC implant because of glaucoma or endothelial abnormality.

A 40 days follow up result of this prospective study, with adequate sample size and the objective of comparing the visual outcome, endothelial cell count, iop, stability of IOL, and patient satisfaction validates the role of posterior fixation of iris claw lens in patients with inadequate capsular support. It shows that there is better visual outcome in the early post op period in case of secondary iris claw cases but the overall outcome after 40 days is comparable in primary and secondary cases.

We feel that it is better to do a primary retro fixated iris claw implantation as in case of a secondary implant the patient will have more anxiety as the patient has to undergo a second surgery. Thus primary fixation is preferred not just to satisfy the surgeon's ego, but as it reduces the financial burden and the psychological impact of a second surgery as well.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare that there is no conflict of interest.

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Cite this article: Motwani D, Maheshgauri R, Bakare P, Bhavsar D, Kaul S, Singh C. Comparison of visual acuity in primary and secondary iris claw implantation in western Maharashtra. *Indian J Clin Exp Ophthalmol* 2021;7(2):442-447.