Research Article

INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

EVALUATION OF CHANGES IN IOP FOLLOWING PHACOEMULSIFICATION WITH PCIOL IMPLANTATION AND ITS CORRELATION WITH OCULAR BIOMETRIC PARAMETERS

Dr. Ruchika Pawan Kedia,[1] Dr. Sunil Kumar Singh[2*]

[1]Assistant Professor, Department of Ophthalmology, I care Institute of Medical Sciences and research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal

[2*]Associate Professor, Department of Ophthalmology, Ananta Institute Of Medical Sciences And Research Centre, Siyol, Rajasthan

Address for correspondence

Dr. Sunil Kumar Singh

Email id: Sunileyewala@gmail.com

How to cite: Kedia RP, Singh SK. effects of phacoemulsification with PCIOL implantation on intraocular pressure after cataract surgery. It also aimed to evaluate the correlation between preoperative ocular parameters, such as AL ACD, AL, and CCT, and changes in intraocular pressure after surgery. International Research Journal of Pharmacy, 2019,10:7:163-166.

DOI: 10.7897/2230-8407.1007238

==========

ABSTRACT

Background: The intraocular pressure is reduced by phacoemulsification with PCIOL in accordance to the intraocular pressure observed prior to surgery. The postoperative decrease in intraoperative pressure is linked to a number of preoperative conditions.

Aim: The purpose of this study was to evaluate the effects of phacoemulsification with PCIOL implantation on intraocular pressure after cataract surgery. It also aimed to evaluate the correlation between preoperative ocular parameters, such as AL ACD, AL, and CCT, and changes in intraocular pressure after surgery.

Methods: 262 patients with cataracts, of both sexes, had phacoemulsification and PCIOL implantation as surgical treatments. After surgery, ocular biometric parameters and IOP reduction were assessed in all individuals on the first postoperative day and one month later.

Results: BCVA using a LogMAR chart was 1-0.76 for study individuals prior to surgery and 0.16-0 thereafter. Preoperative BCVA using the Snellen chart was 72%, while postoperative BCVA was 67%. Preoperatively, the ACD was 3.25±0.26, but it raised to 3.64±0.29 ($p<0.001$) considerably. Following surgery, the mean intraocular pressure (IOP) of the operated eyes dropped dramatically ($p<0.001$) to 11.50±1.68 mm Hg. Preoperative mean IOP was observed to be 13.46±1.96 mmHg, and it dropped to 11.56±1.64 mmHg postoperatively. After a month, there was a 1.92±0.59 mmHg change in the mean IOP. 14.11% was the percentage change in IOP at one month. It was statistically significant ($p<0.001$) that the mean intraocular pressure changed.

Conclusion: The current study suggests that normal eyes with cataracts, especially those related with age, have a considerable reduction in intraocular pressure following phacoemulsification with PCIOL implantation. Furthermore, in patients with cataracts, ACD is substantially linked to the postoperative drop in intraocular pressure as compared to preoperative intraocular pressure.

Keywords: phacoemulsification, intraocular pressure, cataract, ocular parameters, PCIOL

INTRODUCTION

Cataract surgery is one of the most ancient surgical procedures in ophthalmology, having been done and documented in literature since the fifteenth century B.C. Before undergoing its final step, this procedure underwent couching, phacoemulsification, intracapsular cataract extraction (ICCE), and extracapsular cataract extraction (ECCE). Dr. Charles Kelmen introduced phacoemulsification to ophthalmology in 1967. Phacoemulsification and cataract surgery have been shown in several prior studies to be beneficial in lowering intraocular pressure (IOP) in both glaucomatous and normotensive eyes. This lowers the need for antiglaucoma medications and helps to regulate IOP.1.

Numerous studies in the literature have indicated that phacoemulsification combined with cataract surgery can lower intraocular pressure (IOP) over time. It is unclear what mechanism causes the intraocular pressure to drop after phacoemulsification and cataract surgery. Nonetheless, a number of theories are put forth to explain this, such as enhanced trabecular outflow brought about by the anterior chamber's deepening, hyposecretion of aqueous humour brought on by irritation or the generation of free radicals, and/or phacoemulsification-induced stress remodelling brought on by the ultrasonic vibrations—an effect that is also observed in laser trabeculoplasty. The inclusion of certain subjects in the operation can be impacted by a precise evaluation of the patients to determine where a drop in IOP will occur after cataract surgery. It is recommended to determine if cataract surgery by alone will be sufficient to lower IOP or if a related glaucoma operation will also be required. Long-term surgical reductions in intraocular pressure are often observed in persons with high preoperative IOP.3.

Recent research in the literature has demonstrated that phacoemulsification with PCIOL reduces intraocular pressure in a manner that is proportionate to the intraocular pressure observed prior to surgery. The postoperative decrease in intraoperative pressure is linked to a number of preoperative conditions. With the use of contemporary and cutting-edge technologies such as Pachymeter, Goldmann Applanation Tonometer (GAT), and Optical Coherence Biometer (IOL Master), variable ocular parameters are efficiently measured both preoperatively and postoperatively.4

The impact of biometric ocular factors on intraocular pressure reduction during phacoemulsification surgery has been evaluated in a number of literature publications. Studies evaluating long-term IOP decrease are extremely rare.5. Thus, the goal of the current study was to evaluate the effects of phacoemulsification with PCIOL implantation following cataract surgery on intraocular pressure (IOP). It also aimed to evaluate the correlation between preoperative ocular parameters such as axial length (AL), anterior chamber depth (ACD), and central corneal thickness (CCT) and postoperative IOP changes.

MATERIALS AND METHODS

This prospective observational study was carried out to evaluate the effects of phacoemulsification with PCIOL implantation on intraocular pressure after cataract surgery. Additionally, it aimed to evaluate the correlation between preoperative ocular parameters such as AL ACD, AL, and CCT and the change in intraocular pressure after surgery. The patients with cataracts who visited the institute's Department of Ophthalmology made up the study population.

A total of 262 participants of all genders were enrolled in the research. All subjects gave their informed permission after being fully briefed about the study design. Subjects with traumatic cataracts and post-operative problems, retinal diseases, systemic diseases, severe cataracts, glaucomatous eyes, and paediatric cataracts were excluded from the research. All the subjects had a thorough medical history, family history, surgical history, medication history, and ophthalmic history documented when they were finally included. The thorough fundal examination with a slit light examination came next. The BCVA (Best Corrected Visual Activity) was recorded using the Snellen chart and the LogMAR chart one month after surgery and the day before.

Preoperative and postoperative IOP was assessed with GAT between 10 and 12 a.m. after proper sterilisation and upkeep. While the axial length and ACD were measured with an optical coherence biometer, the CCT was measured with a pachymeter. Before the procedure, patients were not allowed to use any topical medications other than the dilating drop. After the operation, the individuals had six weeks of treatment with eye drops containing 0.1% Diclofenac sodium, 1% Prednisolone acetate, and 0.5% Moxifloxacin. The untreated eye's IOP was monitored concurrently.

Following final inclusion, topical drops containing 1% Tropicamide and 2.5% Phenylephrine were used every 15 minutes for 45 minutes to achieve pupillary dilatation in the operated eye. This was done before to surgery. A side-port incision was made and a peribulbar block using a mixture of 2% lidocaine and 0.5% bupivacaine was administered under aseptic and sterile circumstances. A single, skilled surgeon in the field carried out every surgery with a conventional method and a micro-coaxial device. Incisions were left unstitched.

All individuals had follow-up on the first postoperative day and one month after surgery. In order to fabricate the findings, the gathered data were statistically evaluated using SPSS software 18.0 and one-way ANOVA. Statistical significance was attained when the p-value was less than 0.05.

RESULTS

The goal of the current study was to evaluate the effects of phacoemulsification with PCIOL installation on intraocular pressure after surgery. It also aimed to evaluate the correlation between preoperative ocular parameters, such as AL ACD, AL, and CCT, and postoperative changes in intraocular pressure. A total of 262 participants of all genders were enrolled in the investigation. Table 1 provides a summary of the ocular parameters measured both preoperatively and postoperatively during the trial. The average age of the research participants was observed to be 63.86±4.03 both before and after surgery.

In the current study, there were 38% female participants and 62% male participants. Using a LogMAR chart, the study patients' BCVA was 1-0.76 prior to surgery and 0.16-0 following it. In terms of statistics, this difference was not significant. Using a Snellen chart, the BCVA was 72% preoperatively and decreased to 67% postoperatively. In terms of statistics, this was not important. Prior to surgery, the CCT in µm was 549.59±25, and it remained unchanged afterward. AL was 23.55±0.75 mm preoperatively, and it changed very slightly to 23.56±0.75 mm after surgery. Prior to surgery, ACD was 3.25±0.26, but it dramatically rose to 3.64±0.29 ($p<0.001$). The mean intraocular pressure (IOP) in the surgically repaired eyes was 13.42±1.98 mm Hg, and it dramatically ($p<0.001$) dropped to 11.50±1.68 postoperatively. In contrast, the IOP decline in the untreated eyes was not statistically significant.

The goal of the current study was to evaluate how the mean IOP changed after PCIOL implantation and phacoemulsification. The study found that the mean intraoperative pressure in 262 eyes was 13.46±1.96 mmHg before surgery, and it dropped to 11.56±1.64 mmHg after surgery. At a one-month recall, the mean IOP changed by 1.92±0.59 mmHg. At one month, the percentage change in IOP was 14.11 percent. Table 2 illustrates that this change in mean intraocular pressure was statistically significant with $p<0.001$.

DISCUSSION

The goal of the current study was to evaluate the effects of phacoemulsification with PCIOL installation on intraocular pressure after surgery. It also aimed to evaluate the correlation between preoperative ocular parameters, such as AL ACD, AL, and CCT, and postoperative changes in intraocular pressure. All individuals had follow-up on the first postoperative day and one month after surgery. A total of 262 participants of all genders were enrolled in the investigation. The average age of the research participants was observed to be 63.86±4.03 both before and after surgery.

In the current study, 38% of participants were female and 62% were male. Using the LogMAR chart, the study patients' BCVA was 1-0.76 prior to surgery and 0.16-0 following it. According to statistics, this difference was not substantial. Using a Snellen chart, the BCVA was 72% preoperatively and 67% after surgery. The results were not statistically significant. Prior to surgery, the CCT in µm was 549.59±25, and it remained unchanged after surgery. Prior to surgery, AL measured 23.55±0.75 mm, however after surgery, it changed very slightly to 23.56±0.75. Prior to surgery, the ACD was 3.25±0.26, but it dramatically rose to 3.64±0.29 ($p<0.001$). The average intraocular pressure (IOP) in the surgically repaired eyes was 13.42±1.98 mm Hg, and it dramatically ($p<0.001$) dropped to 11.50±1.68 after the procedure. In contrast, the IOP in the untreated eyes did not change.

These findings aligned with research by Mensberger SL6 (2012) and Majstruk L et al. (2019), who found similar ocular parameters to those in the current investigation. The goal of the current study was to evaluate how the mean IOP changed after PCIOL implantation and phacoemulsification. The study found that the mean intraoperative pressure in 262 eyes was 13.46±1.96 mmHg before surgery, and it dropped to 11.56±1.64 mmHg after surgery. At a one-month recall, the mean IOP changed by 1.92±0.59 mmHg. At one month, the percentage change in IOP was 14.11 percent. With $p<0.001$, the mean intraocular pressure change was statistically significant.

These results were consistent with those of Guan H et al. (2013) and Tham CCY et al. (2013), whose authors demonstrated a similar decrease in mean intraocular pressure to that of the current investigation.

CONCLUSION

Within its limitations, the present study concludes that following phacoemulsification with PCIOL implantation results in reduced intraocular pressure significantly in normal eyes with cataract especially associated with age. Additively, compared to preoperative intraocular pressure, ACD is associated significantly with the postoperative reduction in the intraocular pressure in subjects with Cataract. Also, postoperative IOP reduction was significantly

proportional to IOP preoperatively. However, the present study had a few limitations including small sample size, short study duration, and geographical area biases. Hence, more longitudinal studies with a larger sample size and longer monitoring period will help reach a definitive conclusion.

REFERENCES

1. Davis G. The evolution of cataract surgery. *Mo Med*. 2016.
2. Ling JD, Bell NP. Role of cataract surgery in the Management of Glaucoma. Int Ophthalmol Clin. 2018;58:87–100.
3. Kung JS, Choi DY, Cheema AS, Singh K. Cataract surgery in the glaucoma patient. Middle East Afr J Ophthalmol. 2015;22:10–7.
4. E. DeVience, S. Chaudhry, and O. J. Saeedi, "Effect of intraoperative factors on IOP reduction after phacoemulsification," International Ophthalmology. 2017;37:63–70.
5. Melancia D, Abegão Pinto L, Marques-Neves C. Cataract surgery and intraocular pressure. Ophthalmic Res. 2015;53:141–8.
6. Mansberger SL. Reduction in intraocular pressure after cataract extraction: the Ocular Hypertension Treatment Study. *Ophthalmology*. 2012;119:1826–31.
7. Majstruk L, Leray B, Bouillot A, Michée S, Sultan G, Baudouin C, et al. Long term effect of Phacoemulsification on intraocular pressure in patients with medically controlled primary open-angle glaucoma. *BMC Ophthalmol*. 2019;19:149.
8. Guan H, Mick A, Porco T, Dolan BJ. Preoperative factors associated with IOP reduction after cataract surgery. *Optom Vis Sci.* 2013;90:179–84.
9. Tham CCY, Kwong YYY, Baig N, Leung DYL, Li FCH, Lam DSC, et al. Phacoemulsification versus trabeculectomy in medically uncontrolled chronic angle-closure glaucoma without cataract. *Ophthalmology*. 2013;120:62–7.

TABLES

S. No	Parameter	Preoperative	Postoperative	p-value
1.	**Mean Age (years)**	63.86±4.03	63.86±4.03	-
2.	**Gender**			Not significant
a)	Males	62%	62%	Not significant
b)	Females	38%	38%	Not significant
3.	**BCVA (LogMAR Chart)**	1-0.76	0.16-0	Not significant
4.	**BCVA (Snellen chart)**	72%	67%	Not significant
5.	**CCT µm**	549.59±25	549.59±25	Not significant
6.	**AL mm**	23.55±0.75	23.56±0.75	Not significant
7.	**ACD mm**	3.25±0.26	3.64±0.29	<0.001
8.	**IOP mmHg (Eye treated)**	13.42±1.98	11.50±1.68	<0.001
9.	**IOP mmHg (Eye not treated)**	13.4±2.8	13.3±2.6	Not significant

Table 1: Ocular parameters in the study subjects preoperatively and postoperatively (BCVA: Best-corrected visual activity)

S. No	Eyes (n)	Mean IOP (preoperative)	Mean IOP (postoperative)	IOP change at 1 month	IOP change at 1 month (%)	p-value
1.	262	13.46±1.96	11.56±1.64	1.92±0.59	14.11	<0.001

Table 2: Change in IOP following phacoemulsification with PCIOL implantation in the study subjects