

Original Article

Study to Evaluate the Change in the Intraocular Pressure after Clear Corneal Phacoemulsification in Normal Patients

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ABSTRACT:

Background: Nowadays, phacoemulsification represents the gold standard for cataract surgery. The surgical technique assumes small clear corneal incisions and foldable intraocular lenses, which greatly reduce the operating time.³ Several studies report that cataract surgery lowers intraocular pressure (IOP) in normal and glaucomatous eyes and some authors consider it a part of glaucoma management as well. **Aim:** To evaluate the change in the intraocular pressure after clear corneal phacoemulsification in normal patients. **Materials and methods:** The present study was conducted in the Department of Ophthalmology, M.G.M. Hospital, Kamothe, Mumbai. For the study, we selected 52 normal patients for cataract extraction by phacoemulsification using a 3.2 mm clear corneal incision. For the measurement of IOP, Goldmann applanation tonometer was used. The measurement was done by the same operator preoperatively and afterwards 15 days, one month, three months, six months and 12 months postoperatively. The mean change in the IOP preoperatively and postoperatively was calculated and further evaluation done. **Results:** A total of 102 patients were included in the study. 62 patients were male and 40 patients were female. The mean age of the patients was 69.21 ± 12.23 years. The mean preoperative IOP was 14.56 ± 2.98 mmHg. The reduction in IOP after 15 days was 2.23 mmHg; after 1 month was 2.84 mmHg; after 3 months was 3.2 mmHg; after 6 months was 3.34 mmHg; and after 1 year was 3.38 mmHg. The difference was statistically significant. **Conclusion:** From the results of current study, this can be concluded that significant reduction in IOP can be seen in normal patients after cataract surgery by CCP.

Keywords: Cataract, cornea, intraocular pressure.

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INTRODUCTION:

With the increase in the age of people in a population, the prevalence of Glaucoma and cataract also increases.¹ An increasing number of patients who present to the ophthalmologist with symptoms of cataract or glaucoma are diagnosed with both conditions.² Although it is an increasingly common situation, the management of combined cataract and glaucoma is still a subject of debate. Primary open angle glaucoma (POAG) is one of the most common forms of glaucoma in adults. Nowadays, phacoemulsification represents the gold standard for cataract surgery. The surgical technique assumes small clear corneal incisions and foldable intraocular lenses, which greatly reduce the operating time.³ Several studies report that cataract surgery lowers

intraocular pressure (IOP) in normal and glaucomatous eyes and some authors consider it a part of glaucoma management as well.^{4,6} Friedman et al in their 2002 article; "Surgical strategies for coexisting glaucoma and cataract. An evidence based update," examined the long-term intraocular pressure (IOP) lowering effect of cataract extraction alone in glaucoma patients. They concluded that cataract extraction by phacoemulsification alone decreased the IOP in glaucoma patients.⁷ They graded the evidence as weak and detailed studies that addressed this question. The average patient follow up was less than 2 years in these reports. The present study was planned to evaluate the change in the intraocular pressure after clear corneal phacoemulsification in normal patients.

MATERIALS AND METHODS:

The present study was conducted in the Department of Ophthalmology, M.G.M. Hospital, Kamothe, Mumbai. For the study, we selected 52 normal patients for cataract extraction by phacoemulsification using a 3.2 mm clear corneal incision. The ethical approval for the protocol of the study was obtained from the ethical committee of the M.G.M. Hospital. An informed signed consent was obtained from the participants after explaining them the procedure of the study. The exclusion criteria of the patients were: patients having history of ocular surgery, ocular trauma, on ocular medication, preoperative IOP more than 21 mmHg.

A prospective analysis was done on the patients using clinical records paying attention to patient age and sex, size of capsulorhexis, and pre and postoperative IOP. Three weeks prior to surgery, patients were called to the facility to measure axial length, lens thickness and anterior chamber depth (ACD) using ultrasound. A scan by contact technique. For the measurement of IOP, Goldmann applanation tonometer was used. The measurement was done by the same operator preoperatively and afterwards 15 days, one month, three months, six months and 12 months postoperatively. The surgeries were performed by the same surgeon to avoid any clinical bias. Surgeries were performed under peribulbar anesthesia using Lidocaine. The surgical procedure included involving a 3.2 mm superior corneal tunnel incision, viscoelastic material injected into the anterior chamber, capsulorhexis of 5 mm, hydrodissection, in the bag phacoemulsification using phaco-chop technique, cortex aspiration, additional injection of viscoelastic material and insertion of foldable hydrophobic intraocular lens (IOL) in the capsular bag. The

viscoelastic material was then removed. The corneal incision was closed by stromal hydration. Postoperatively, patients were prescribed topical dexamthasone and neomycin eye drops for four weeks, and topical non-steroidal anti-inflammatory eye drops five times daily for 6 weeks. The mean change in the IOP preoperatively and postoperatively was calculated and further evaluation done. The statistical analysis of the data was done using SPSS software (version 20.0) for windows. Chi-square test and Student’s t-test were used for the determination of statistical significance of the data. A p-value <0.05 was predefined to be statistically significant.

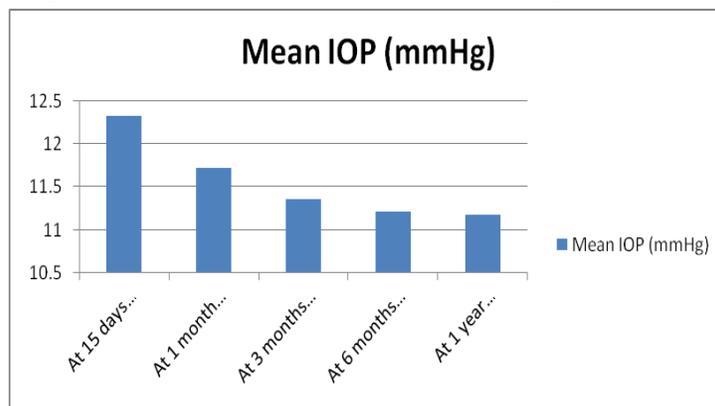
RESULTS:

A total of 102 patients were included in the study. Out of 102 patients, 62 patients were male and 40 patients were female. The mean age of the patients was 69.21 ± 12.23 years. The mean preoperative IOP was 14.56 ± 2.98 mmHg. Table 1 shows the change in IOP postoperatively, after 15 days, 1 month, 3 months, 6 months and 12 months. At 15 days postoperatively, the mean IOP was 12.33 ± 3.1 mmHg. At 1 month postoperatively, mean IOP was 11.72 ± 2.4 mmHg. At 3 months postoperatively, the mean IOP was 11.36 ± 3.5 mmHg. At 6 months postoperatively, the mean IOP was 11.22 ± 2.2 mmHg. At 1 year postoperatively, the mean IOP was 11.18 ± 1.6 mmHg. The reduction in IOP after 15 days was 2.23 mmHg; after 1 month was 2.84 mmHg; after 3 months was 3.2 mmHg; after 6 months was 3.34 mmHg; and after 1 year was 3.38 mmHg. From Table 1, this can be inferred that there is significant reduction in the mean IOP postoperatively. The difference was statistically significant with p value <0.05.

Table 1: Mean IOP after phacoemulsification at different intervals postoperatively

Time of examination	Mean IOP (mmHg)	p-value
At 15 days postoperatively	12.33 ± 3.1	0.002
At 1 month postoperatively	11.72 ± 2.4	
At 3 months postoperatively	11.36 ± 3.5	
At 6 months postoperatively	11.22 ± 2.2	
At 1 year postoperatively	11.18 ± 1.6	

Fig 1: Showing mean IOP after phacoemulsification at different intervals postoperatively



DISCUSSION:

Numerous studies have shown that cataract surgery by phacoemulsification with posterior chamber IOL induces a mid- and long-term lowering of IOP. Although elevations in IOP may occur in the immediate postoperative period due to retained viscoelastic material, the IOP is known to normalize within two to four hours. In our study, we observed a decrease of 3.38 mmHg in the IOP from preoperative to 1 year postoperatively. The difference observed was statistically significant. Shingleton BJ et al compared the effects of clear corneal phacoemulsification on intraocular pressure (IOP) in patients without glaucoma, glaucoma suspects, and patients with glaucoma. A retrospective analysis of patients who had clear corneal phacoemulsification with a minimum of 12 months follow-up was performed. The patients were divided into 3 groups: no glaucoma (NG), glaucoma suspects (GS), and glaucoma (GG). None had a history of prior surgery. Glaucoma suspects included patients with elevated IOPs, abnormal discs, pseudoexfoliation syndrome, or pigment dispersion syndrome on no medications and with no field defects. Glaucoma patients had received only medical treatment. Two-tailed, homoscedastic t tests were used for statistical analysis. There were 143 patients (164 eyes) in the NG group, 65 (75) in the GS group, and 61 (71) in the GG group. The mean preoperative IOP was 16.42 mm Hg \pm 2.77 (SD), 17.59 \pm 4.15 mm Hg, and 16.97 \pm 4.86 mm Hg in the 3 groups, respectively. At 1 year, the mean IOP was lower in all groups: 14.37 \pm 2.97 mm Hg, 15.68 \pm 3.38 mm Hg, and 15.86 \pm 4.00 mm Hg, respectively. The change was statistically significant in the NG and GS groups. Glaucoma patients showed a statistically significant reduction in the number of glaucoma medications postoperatively. It was concluded that clear corneal phacoemulsification was associated with a statistically significant long-term reduction in IOP. Iancu R et al assessed intraocular pressure dynamics after phacoemulsification in patients with uncontrolled primary open angle glaucoma (POAG). The study was designed as a prospective, non-randomized, cohort study. The study population comprised of 38 patients with medically uncontrolled POAG who underwent cataract surgery by phacoemulsification between 2011 and 2012. Most of the patients needed glaucoma surgery after a variable time. Mean preoperative IOP decreased with 2.1 \pm 3.7 mmHg at 6 months and with 1.9 \pm 3.9 mmHg at 12 months compared with the baseline IOP. Postoperative IOP was statistically significant lower compared with its preoperative value at 6 months and at one year. The difference between mean IOP at 6 months and 1 year after cataract surgery was not statistically significant ($p > 0.05$). Preoperatively, all the patients received topical antiglaucoma therapy. After phacoemulsification, their number did not change statistically significant, but it showed a slight increase. Average number of topical glaucoma medications used

preoperatively was 2.66 \pm 0.66, while at 6 months after surgery it was 2.71 \pm 0.75 and at 12 months postoperatively, 2.9 \pm 0.53. IOP decreased statistically significant after phacoemulsification in patients with uncontrolled POAG, but the decrease was not sufficient for optimal glaucoma management; therefore, many patients needed subsequent glaucoma surgery.^{8,9}

Leelachaikul Y et al evaluated long-term intraocular pressure (IOP) changes after sutureless clear corneal phacoemulsification in eyes with preoperatively controlled glaucoma. The study was a retrospective study conducted in Eye Clinic, Ramathibodi Hospital, Faculty of Medicine, Mahidol University. The medical records of 218 patients who had uneventful sutureless clear corneal phacoemulsification with acrylic foldable lens (IOL) implantation were retrospectively reviewed. Included were 58 patients with medically controlled open-angle glaucoma and 160 normal controls. Follow-up was 12 to 18 months. Outcome measures were postoperative IOP and number of glaucoma medications. Postoperatively, there was an insignificant decrease in IOP in the glaucoma group; the mean decrease was 1.4 mm Hg \pm 3.8 (SD) at 12 months and 1.6 \pm 4.2 mm Hg at 18 months. The mean number of medications decreased significantly at 12 months (0.51 \pm 0.75) and at 18 months (0.41 \pm 0.83). The control group also had a significant decrease in IOP, with a mean decrease of 0.83 \pm 2.8 mm Hg at 12 months ($P = .01$) and 1.26 \pm 2.9 mm Hg at 18 months. The decrease in IOP was more pronounced in eyes with a higher preoperative IOP in both the glaucoma and control groups. These findings suggested that sutureless clear corneal phacoemulsification with foldable acrylic IOL implantation is a relatively safe and simple surgical option in patients with cataract and well-controlled glaucoma. The approach provided favorable long-term IOP change and led to rapid visual rehabilitation in both the glaucoma and control group. MATHALONE N et al evaluated long-term IOP control after sutureless clear corneal phacoemulsification in eyes with preoperatively controlled glaucoma. The charts of 345 patients who had uneventful sutureless clear corneal phacoemulsification with acrylic foldable lens (IOL) implantation were retrospectively reviewed. Included were 58 patients with medically controlled open-angle glaucoma and 287 normal controls. Follow-up was 1 to 2 years. Outcome measures were postoperative IOP and number of glaucoma medications. Postoperatively, there was an insignificant decrease in IOP in the glaucoma group; the mean decrease was 1.5 mm Hg \pm 4.4 (SD) at 12 months and 1.9 \pm 4.9 mm Hg at 24 months. The mean number of medications decreased significantly at 12 months (0.53 \pm 0.86) and at 24 months (0.38 \pm 0.9) ($P = .04$). The control group also had a significant decrease in IOP, with a mean decrease of 0.72 \pm 3.7 mm Hg at 12 months ($P = .01$) and 1.33 \pm 3.2 mm Hg at 24 months ($P < .0001$). The decrease in IOP was more pronounced in eyes with a higher preoperative IOP in

both the glaucoma and control groups. These findings suggested that sutureless clear corneal phacoemulsification with foldable acrylic IOL implantation is a relatively simple and efficient surgical option in patients with cataract and well-controlled glaucoma. The approach combines long-term IOP control with fewer medications and leads to rapid visual rehabilitation.^{10, 11}

CONCLUSION:

From the results of current study, this can be concluded that significant reduction in IOP can be seen in normal patients after cataract surgery by CCP.

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