



STUDY OF POSTOPERATIVE INTRAOCULAR PRESSURE CHANGES IMMEDIATELY FOLLOWING CATARACT SURGERY AND ITS ASSOCIATED RISK FACTORS.

Ophthalmology

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ABSTRACT

Aim: To study the changes in intraocular pressure in postoperative patients immediately following cataract surgery and its associated risk factors.

Methodology: This prospective longitudinal study was conducted on 60 patients undergoing cataract surgery either by small incision cataract surgery or phacoemulsification for a period of 1 year. Intraocular pressure readings were estimated pre-operatively followed by on post-operative day 1, 3 and 7 with non-contact tonometer Change in intraocular pressure was observed.

Results: total of 60 patients consisting of 63.3% males and 36.6% females were included in this study. The mean age of males and females who underwent cataract surgery were 61.52 ± 14.72 years and 59.72 ± 13.92 years respectively.

Out of 60 patients 45.00% underwent Manual small incision cataract surgery and 55.00% underwent phacoemulsification with mean preoperative IOP 16.15 ± 2.31 were considered in this study. The mean decline in IOP was found to be 15.62 ± 3.17 at post op week 1 from baseline which was statistically significant. The comparison of all parameters from preoperative to postoperative was done by applying Student's Paired 't' test at 5% (p, 0.05) and 1% (p, 0.01) level of significance. The mean transient rise of IOP found on post op day 1 was 17.55 ± 3.96 . Risk factors associated with transient rise in postoperative IOP day 1 were found to be residual viscoelastic material 35.00%, presence of pseudoexfoliation syndrome 11.67%, postoperative corneal edema 16.66%, longer surgical time and more tissue handling by surgeons undergoing training 50.00%, remnant cortex 3.3%.

Conclusion: our study infers that cataract surgery induces a transient rise in IOP in first 24 hours followed by a gradual decline in IOP, 7 days following cataract surgery. The transient rise in IOP is multifactorial and single or a combination of factors may be responsible for the same in each patient.

KEYWORDS

Intraocular pressure, phacoemulsification, MSICS, risk factors.

INTRODUCTION

Cataract is one of the leading cause of preventable blindness in the world. Blindness due to cataract presents an enormous problem in India not only in terms of human morbidity but also in terms of economic loss and social burden.¹

Cataract is defined as any opacity in the crystalline lens. Cataract is very common and easily treatable condition. As for today there is no medical treatment for cataract. Surgery is recognized to be the only treatment option. Cataract surgery is not only vision restoring surgery but it is considered as refractive surgery.

Modern cataract surgeries have many benefits and comparatively low post op complication rate. Complications related to cataract surgery may be intra-operative and postoperative complications. Postoperative complications can be either early post operative (within first few hours to few days) or late postoperative (after 1 month to years). According to the cataract national Dataset of the UK, the most common postoperative complications were 'corneal edema, striae and Descemet's membrane folds 5.18% followed by postoperative uveitis 3.29%, IOP rise above 21 mmHg 2.57%, cystoid macular edema 1.62%, posterior capsular opacification 1.22%'.²

Out of which transient rise in IOP elevation within 24 hours is well known complication. The incidence of early postoperative IOP increase is reported to be 2.3- 8.9% in all cataract extractions³. In most cases, the IOP returns to normal within few days without harmful effects, however in certain patients the IOP elevation can lead to significant vision loss^{4,6}.

Several studies suggest that there is significant IOP reduction in normal population after cataract extraction with or without posterior chamber intraocular lens implantation. It attributes for long term control of IOP, widening of anterior chamber angle causing its deepening after removal of cataract^{7,8}.

However, long term elevations in IOP have also been reported and if they occur may require additional topical or surgical therapy. Though usually transient, the risk of postoperative IOP elevation cannot be ignored, especially in patients with severe disease in whom an IOP spike may be devastating.

The present study was aimed to assess measure the effect of uncomplicated cataract surgery on intraocular pressure using applanation tonometer and various factors associated with it.

MATERIALS AND METHODS:

A total of 60 eyes from 60 patients were enrolled in a prospective longitudinal study at Pravara Rural Hospital, Loni. This study includes patients undergoing small incision cataract surgery and phacoemulsification surgery for senile cataract, patients of age above 40 and both genders and those willing to give written informed consent for study between December 2019 to December 2020 (period of 1 year). Patients with history of glaucoma or IOP more than 21 mm Hg, patients with traumatic cataract and patients with previous intraocular surgery and paediatric patients were excluded. Study was initiated after ethical approval and data was collected from all selected patients using a structured proforma meeting the objectives of the study.

All surgeries were performed under Peribulbar anaesthesia. For the MSICS, a 7.5mm self-sealing sclero-corneal tunnel was made, a side port entry at 9 o'clock is made with lancetip. Anterior capsulotomy using can opener or CCC was done. A stab incision is made at 12 o'clock position and viscoelastic substance was injected in to AC. Hydro dissection, delivery of lens nucleus, and aspiration of the cortex was done. A single piece rigid polymethyl methacrylate intraocular lens (IOL) with a 6.0-mm optic was implanted in the capsular bag after injection of a dispersive viscoelastics. Wound was closed using 10-0 nylon sutures, followed by a meticulous aspiration of viscoelastic substance out of the AC and conjunctival flap was then repositioned.

While performing phacoemulsification, a 3mm self-sealing sclero-corneal incision was made. A continuous curvilinear capsulorhexis was done and lens nucleus was emulsified using crack and-flip technique and aspirated by a phacoemulsifier. A foldable hydrophilic acrylic PCIOL was implanted in the capsular bag. In all the patients dispersive viscoelastic material was used. Post operatively, all eyes received topical antibiotics, mydriatics and steroids for 6 weeks.

Post-operative intraocular pressure was measured using non-contact tonometer. Patients were scheduled for follow up examination on post op day 1, 3 and at 1 week to observe for change in intraocular pressure. Outcome parameters were evaluated by descriptive statistics as mean, SD, percentage etc. The comparison of all parameters from

preoperative to postoperative was done by applying Student's Paired 't' test at 5% (p,0.05) and 1% (p, 0.01) level of significance.

RESULTS:

Total number of 60 patients with 63.3% males and 36.6% females were considered in this study. The mean age of males and females who underwent cataract surgery were 61.52±14.72 years and 59.72±13.92 years respectively.

Table No 1: Age and sex wise distribution

Age in years	SICS (n=27)		PHACO (n=33)		TOTAL CASES (n=60)	
	Males	Females	Males	Females	Males	Females
40-50 yrs.	4	2	2	2	6	4
50-60 yrs.	10	2	4	7	14	9
60-70 yrs.	3	2	8	5	11	7
70-80 yrs.	2	1	5	0	7	1
> 80 yrs.	0	1	0	0	0	1
Total	19	8	19	14	38	22
Mean ± SD	58.31±12.01	61.37±13.26	64.73±12.87	50.07±13.64	61.52±14.72	59.72±13.92

Table No 2: Comparison of IOP from preoperative, postoperative day 1, postoperative day 3, postoperative day 7 (n=60):

IOP (n=60)			
Preoperative	Postoperative Day1	Postoperative Day3	Postoperative Day7
Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
16.15±2.31	17.55±3.96	16.33±3.48	15.62±3.17

Student's Paired 't' test results:

Preoperative v/s Postoperative Day1: value of $t = 2.863$, $p = 0.0058$, significant

Postoperative Day1 v/s Postoperative Day7 : value of $t = 6.781$, $p = 0.0001$, significant

By applying student's paired 't' test there is a significant increase seen in the mean values of IOP from preoperative to postoperative day 1.

Also, by applying Student's Paired 't' test there is a significant decrease seen in the mean values of IOP from postoperative Day 1 to postoperative Day 7.

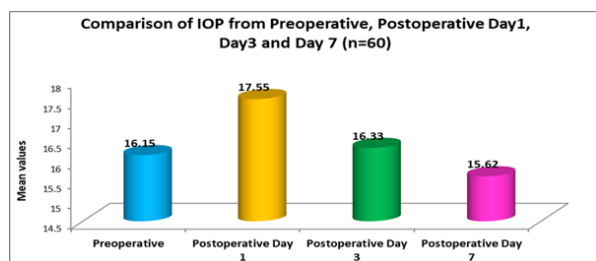


Table No.3: Distribution of various risk factors causing transient rise in IOP (n=60):

	Number	Percentage (%)
Longer surgical time and more tissue handling by surgeons undergoing training	30	50.00%
Residual viscoelastic	21	35.00%
Corneal edema	10	16.66%
Pseudoexfoliation syndrome	7	11.67%
Remnant cortex	2	3.3%

STATISTICAL ANALYSIS:

Statistical analysis was done by descriptive statistics as mean, SD, percentage etc.

The comparison of all parameters from preoperative to postoperative was done by applying Student's Paired 't' test at 5% (p,0.05) and 1% (p, 0.01) level of significance.

The statistical analysis software namely SYSTAT Version 12 (made by Crane's software, Bangalore) was used for analysis of data.

DISCUSSION:

In this study, we found that there was no significant difference between the pre-operative IOP and in the mean age of the patients.

In this study we observed significant transient rise in IOP on postoperative day 1 after cataract surgery. **Average rise of 17.55±3.96 IOP was observed from the baseline.** This increase peaks at 3-7 hour after surgery up till first 24 hour. Similar results were shown by Sengupta et al.⁷ and Rainer et al.¹⁰. Some studies also denote a rise in IOP at the 1st day post-operative in patients with phacoemulsification^{11,12,13}.

35% patients showed obvious retained viscoelastic material on post operative day 1. Retained ophthalmic viscoelastic devices, obstruct the trabecular meshwork causing a rise in the postoperative IOP as also shown by Arshinoff et al.¹⁴. Dispersive OVD retain more because they adhere to intraocular structures of the eye.

Out of 60 patients, 50% had a history of excessive tissue handling and longer surgical time by trainee surgeons. Bomer et al. in his study, reported postoperative IOP elevation was higher for inexperienced surgeons due to surgical trauma, inducing release of iris pigments and serum proteins thereby obstructing trabecular meshwork¹⁵.

11.67% patients had a pre-existing pseudoexfoliative syndrome. A study by Pohjalainen et al reported IOP spikes associated with PXF¹⁶. This is due to release of inflammatory mediators, reducing anterior chamber outflow. In this study, 16.66% immediate rise in IOP occurred due to postoperative corneal edema 3.3% patients had cortical remnants, post surgery. Similar results were reported by Romero Aroca¹⁷. Remnant lens fragments induce severe autoimmune inflammatory reaction causing the trabecular meshwork to get clogged.

Several studies have reported that cataract extraction with PCIOIOL implantation lowers IOP in eyes¹⁸. **In this study, average decline of (15.62±3.17) IOP was observed postoperatively after 7 days from the baseline.** This declining trend was corroborated with Shingleton et al¹¹. This could be due to posterior shift of anterior capsule, which causes zonules to exert posterior traction on ciliary body and scleral spur. As a result, trabecular meshwork and Schlemm's canal expands. This ultimately increases outflow facility and IOP consequently decreases.

Therefore, comparatively lower mean IOP at 1 week was observed in this study following MSICS and phacoemulsification surgery. We also observed transient rise in IOP in first 24 hours after cataract surgery and risk factors causing this transient rise were also observed.

CONCLUSION:

Cataract surgery induces a transient rise in IOP in first 24 hours followed by a gradual decline in IOP, 7 days following cataract surgery. The transient rise in the IOP is multifactorial and single or a combination of factors may be responsible for the same in each patient such as residual viscoelastic material, resident performed surgery, pre-existing pseudoexfoliation syndrome, postoperative corneal edema.

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