



Original Article

Influence of Phacoemulsification on Pre-Operative and Post-Operative Intraocular Pressure

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ABSTRACT

Various geographic regions have different ocular disease spectrums. It relies on the area's geographic position, economic situation, cultural diversity, and ethnic integrity. Visual impairment (VI) affects 624 million people worldwide, including 19 million children. Due to decreased productivity, blindness has a major financial impact on the individual, family, and society. **Objectives:** To compare the effect of phacoemulsification surgery and to determine the mean decrease in pupil size after instilling nepafenac 0.1% (preoperative IOP vs postoperative IOP). **Methods:** This study was conducted on 120 patients from period 2016-2017, who have given nepafenac 3 drops per day (steroid anti-inflammatory drops) one day prior to surgery. The pupil size was measured with a caliper; immediately before (preoperative) and at the end of surgery (postoperative). The difference between pupillary diameters was noted and the decrease in pupil size was calculated. **Results:** The mean age was 52.53 ± 7.20 years in the given population. There were 42 (35%) males and females were 78 (65%). The preoperative measurement of the pupil size was 7.13 ± 1.06 mm which was reduced to 6.27 ± 1.34 mm at end of surgery. The mean decrease in pupil size was 0.86 ± 0.46 mm. There was significant decrease in pupil size from baseline (preoperative) measurements than after the surgery ($p < 0.05$). **Conclusion:** It is concluded that nepafenac 0.1% during phacoemulsification surgery can be beneficial in maintaining mydriasis in eyes of patients.

INTRODUCTION

Visual impairment (VI) affects 624 million people worldwide, including 19 million children. Due to decreased productivity, blindness has a major financial impact on the individual, family, and society [1]. Since almost 20 years ago, the World Health Organization (WHO) has prioritized the prevention of blindness through its programme, which it runs in conjunction with the International Agency Blindness Prevention (IAPB). The fundamental idea behind this policy is that if the services are made available, up to 80% of blindness can be avoided [2]. Cataract is a clouding

of the lens that results in a decrease in vision [3]. Cataracts commonly present gradually and damage one or both eye [4]. Blurred vision, dullness or diplopia, inability to open eyes in light, difficulties with strong light, and difficulty seeing in the dark are all symptoms [5]. In the vast majority of patients, cataract removal with intraocular lens (IOL) implantation is a common approach of recovering eyesight [6]. While extracapsular cataract extraction is still one of the most often utilized procedures in Pakistan, it is gradually being superseded by phacoemulsification [7], a

minimally invasive, suture-free approach for removing cataracts and implanting IOL [8]. The cornea's endothelium is a layer of cells in the posterior (inner) section of the cornea [9]. Nuclear sclerosis includes malnutrition, low socioeconomic status, and poor education regarding progression [10]. The combination of nuclear sclerosis type of cataract and aging was demonstrated in the Age-Related Eye Disease Study (AREDS) [11]. Studies prove that cases taking vitamin C supplements have advanced situations of eyelid development [12]. In this study researchers compared the effect of phacoemulsification surgery to determine the mean decrease in pupil size after instilling nepafenac 0.1% (preoperative IOP vs postoperative IOP).

METHODS

It was a quasi-experimental study conducted on 150 eyes. The patients with cataract between age of 40-65 years were selected for the study. The patients with previous intraocular surgery including YAG iridotomy, filtration surgery, dystrophy, opacity (seen by slit lamp examination), synechial angle closure more than 180 degrees and inflammatory eye disease (seen by slit lamp examination) were excluded from this study. After approval from Ethical Research Board, Services Institute of Medical Sciences/ Services Hospital, total 150 patients fulfilling inclusion criteria were enrolled by obtaining the medical record of patients admitted in Eye ward. Written informed consent was taken from each participant. Sociodemographic information like name, age, and gender were recorded. Preoperative complete ophthalmic examination was performed by measuring intraocular pressure (IOP) with Goldmann Applanation Tonometer. Proper sterile precautions were taken to prepare the area for surgery, including use of antiseptics like povidone-iodine. Sterile drapes, gowns and gloves were employed. A plastic sheet with a receptacle helped to collect the fluids during phacoemulsification. An eye speculum was inserted to keep the eyelids open. The surgeries were performed by using retro-bulbar anesthesia. An incision with 2.75-mm keratome blade was made on cornea by clearing temporal lobe and the viscoelastic material (USA) was filled in the anterior chamber was filled. Then, continuous phacoemulsification using an Infiniti Vision System (Alcon, USA) was performed consecutively by inserting a foldable intraocular lens (RayOne Cflex, Rayner) into the capsular bag. After the viscoelastic material removal, the stromal hydration was used for incision closure. Then, 0.3% Tobramycin eye drops and 0.1% Dexamethasone eye drops were instilled four times a day and gradually decreased over one month after the surgery. The data was entered and analysis was carried out by using the software SPSS

version 26.0. The variables analyzed were age, gender and intraocular pressure. The quantitative data like age was presented with simple descriptive statistics like mean and standard deviation. The descriptive data like gender was presented as frequency and percentage. The changes in intraocular pressure and pupil size were presented as mean and standard deviation and paired sample test was performed to compare continuous variable like IOP and pupil size changes in preoperative and postoperative measurements. The comparison for reduction in pupil size with age was analyzed by independent sample t test p-value ≤ 0.05 was considered statistically significant.

RESULTS

A total 150 patients were included in this study. About 30 cases were excluded from the study due to non-compliance and follow-up issues. Baseline characteristics are shown in (Table 1).

| Parameters | Minimum (n=120) | Maximum (n=120) | Mean \pm SD |
|-----------------|-----------------|-----------------|------------------|
| Age (years) | 40 | 65 | 52.53 \pm 7.20 |
| Pupil Size (mm) | 0.1 | 2.0 | 0.86 \pm 0.46 |

Table 1: Descriptive parameters in cataract patients

The mean follow-up for pupil size was 7.13 \pm 1.06 mm before the surgery and was 6.27 \pm 1.34 after the surgery which was statistically significant and comparison of decreased pupil size (Mean \pm SD 0.952 \pm 0.47 in age group of 40-50 and Mean \pm SD 0.796 \pm 0.44 in age group of 51-65 years) was insignificantly reduced between two age groups (40-50 and 51-65 years) with p-value 0.064 (Table 2).

| Parameters | Pupil Size (mm) N=120 | | |
|--|-----------------------|------------------|---------|
| | | Mean \pm SD | p-value |
| Age groups (years) | 40-50 years | 0.952 \pm 0.47 | 0.064 |
| | 51-65 years | 0.796 \pm 0.44 | |
| Measurement of Pupil Size During Surgery | Preoperative | 7.13 \pm 1.06 | 0.000 |
| | Postoperative | 6.27 \pm 1.34 | |
| Gender | Male | 0.92 \pm 0.45 | 0.306 |
| | Female | 0.83 \pm 0.46 | |

Table 2: Comparison of decrease in pupil size in different parameters.

On the other hand, pupil size reduction was insignificantly associated with gender distribution ($p > 0.05$). The mean preoperative intraocular pressure (IOP) was 18.63 \pm 1.80 mmHg and after 24 hours of surgery; the postoperative IOP was 15.21 \pm 1.98 mmHg. There was statistically significant reduction in IOP after surgery (P 0.000) (Table 3).

| IOP (mmHg) Score | Preoperative IOP | Postoperative IOP | Mean Reduction in IOP | P-value |
|-------------------------------|------------------|-------------------|-----------------------|---------|
| Mean \pm Standard Deviation | 18.63 \pm 1.80 | 15.21 \pm 1.98 | 3.42 \pm 2.87 | 0.000* |

Table 3: Measurement of intraocular pressure (IOP) during the phacoemulsification surgery in cataract patients.

*P-value < 0.05 considered statistically significant

DISCUSSION

Nearly half (47.8 or 17.7 million) of all cases of blindness are due to cataracts, which continue to be the major cause of blindness widely [13]. Cataracts are treated surgically, which is a largely provident surgery with a good chance of restoring vision [14]. To diminish the "backlog" of cataract surgeries, there has been a global action (VISION 2020 the Right to Sight) to increase the number of cataract surgical procedures [11, 15]. Globally, it's projected that 15 million cataract surgeries are carried out annually, an increase in 5 million from just five times ago [16]. According to study conducted by Memon between 1987 and 1990, cataracts regard for 66 of blindness cases in Pakistan [13, 17]. The plan emphasized the demand for a significant expansion of cataract surgery services. Dick et al., showed that cataract is still the most common cause of age related eye conditions [18]. Jacobi et al., found that ciliary body was moved forward by the enlarging lens, which caused the tendons to relax and the space between trabecular plates to constrict. As the lens enlarges, the anterior lens capsule is displaced forward, causing the zonules to apply antecedently directed traction on the ciliary body and uveal tract [19]. In the first many days after surgery, phacoemulsification constantly causes low grade inflammation. This could reduce IOP by either reducing ciliary body waterless product, as in uveitis, or by adding exodus, like in picky ray trabeculoplasty or with prostaglandin analogues. Shingleton et al., found that following cataract surgery, there has been substantiation of lower intraocular pressure (IOP) in eyes without glaucoma. In discrepancy to our disquisition, that the mean IOP 24 hours after study was advanced than pre-op. [20]. The average IOP was 14.53.4 mm Hg before surgery, and it was 17.06.0 mm Hg 24 hours latterly.

CONCLUSIONS

Our study has concluded that intraocular Pressure was reduced after twenty-four hour of surgery than preoperative IOP in patients after phacoemulsification. It has been concluded that nepafenac 0.1% during phacoemulsification surgery can be beneficial in maintaining mydriasis in eyes of patients.

Conflicts of Interest

The authors declare no conflict of interest

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