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SAFETY AND EFFICACY OF INTRACAMERAL INFUSION OF ADRENALINE DURING PHACOEMULSIFICATION

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ABSTRACT

Cataract surgery is one of the most commonly performed surgical procedures in our ageing world. Cataract surgery is a major surgery as it is an intra-ocular surgery, technically challenging, with abundant scope for devastating complications like loss of sight. Advances in techniques including phacoemulsification and intraocular foldable silicone lens implantation through suture-less mini incisions decrease the surgical recovery period with lower complication rates and improved surgical outcomes. In this present study, an attempt was made to study the safety and efficacy of intra cameral infusion of Adrenaline during phacoemulsification. An observational prospective study was conducted in 150 patients in the ophthalmology department of a tertiary care hospital, Salem. The blood pressure, pulse rate and pupil size parameters were chosen to study the efficacy of adrenaline and the result did not show much fluctuation pre and intraoperatively. Pupillary constriction during phacoemulsification is found to be the major cause of iris damage, incomplete cortex removal, posterior capsular rupture, vitreous loss and even posterior lens material dislocation. So it is necessary to maintain mydriasis. Irrigation fluid containing Adrenaline is thought to be beneficial in this respect. Hence Adrenaline is safe and effective during the cataract surgery.

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INTRODUCTION

A cataract is any opacity of the lens, whether it is a small local opacity or a diffuse general loss of transparency. The cataract may cause significant reduction in visual acuity (VA) or functional impairment. A cataract is a clouding of the lens in the eye that affects vision. A cataract can occur in either or in both eyes. In the United States, cataracts are the most frequently cited self-reported cause of visual impairment and the third leading cause of preventable blindness [1]. Phacoemulsification is a modified version of extra capsular cataract extraction (ECCE) and is the most common surgical procedure for removing cataracts [2].In this, it uses sophisticated machinery to break the nucleus down into a mixture of emulsion and small pieces that can be aspirated through an irrigation-aspiration dual lumen system [3]. In India, according to a recent survey in the Rapid Assessment of Avoidable Blindness (RAAB) study, cataract was responsible for 77.5% of avoidable blindness. Considering current population (121 crore) of India as per census 2011, approximately 62%, that is, 72 lakhs (7.2 million) are blind due to cataract [4]. The objective of the study is to study the safety and efficacy of intra cameral infusion of Adrenaline during phaco emulsification. Inorder to prevent the intra operative complications there should be a good mydriasis which can be achieved by intra cameral infusion of Adrenaline 1:1,00,000. With Adrenaline mydriasis reaches 95% of its final value within10 mins [5].

MATERIALS AND METHODS

The study was conducted prospectively in ophthalmology department of a tertiary care hospital in Salem, Tamilnadu for a period of six months in 150 patients. The patient of both sex above the age of 30, who diagnosed with cataract were included in the study. The patients who have previous intra ocular injury, inflammation or surgery and other iris abnormalities, patients who preferred conventional extra capsular surgery and the patients who is sensitive to adrenaline were excluded in the study [6].

A total of 150 cases of cataract surgery were collected and analyzed from the ophthalmology department of a tertiary care hospital in Salem. The collected cases were classified according to gender wise, age wise, number of surgeries in each month, affected eye, visual acuity and the type of cataract affected. The parameters like blood pressure, pulse rate and pupil size pre and intraoperatively were measured to determine the safety and efficacy of intracameral Adrenaline during phacoemulsification. In order to maintain mydriasis 1ml of Adrenaline (0.00001%) was given intracamerally after corneal incision[7]. The solution were prepared prior to the surgery by the surgeon given intracamerally just after corneal incision and let it to stayed at the anterior chamber for 1min. Pre and intra operative parameters were measured, and the subjective surgical performance was graded after each procedure.

RESULTS

The present study demonstrates that Adrenaline 1:10,0000 in the intra ocular infusion is of significant benefit in maintaining mydriasis during cataract surgery. It also reduces the number of eyes in which the pupil size less than 7mm preoperatively and 8mm intraoperatively. One advantage of giving Adrenaline in the irrigation fluid, as opposed to a bolus, is that it continues to enter the eye while the stimulus to miosis persists. As Adrenaline is administered over a longer time period by infusion than by injection, a more dilute concentration can be used. Adrenaline maintains mydriasis by a direct action on the dilator pupillae of the iris [8]. The 150 cases were classified according to gender wise and from these 87 (58%) were female patients and 63 (42%) were male patients. According to age wise the maximum number of patients was under the age group of 51-60. Patients were also categorized according to the eye affected. 76 were with right eye cataract and 74 with left eye cataract. Visual acuity was measured preoperatively and postoperatively. For 128 patients the preoperative visual acuity improved to 6/12 and 6/9 for the rest 22 patients. Patients were again categorized according to the type of cataract and more number of patients was found with immature cataract, in that 36% were females and 24% were males. Comparing with topical mydriatics, Adrenaline produces mydriatic effect within 10 mins, whereas onset of action of topical one is 30mins. The pupil size was measured pre and intraoperatively in order to determine the efficacy of Adrenaline in maintaining mydriasis during the cataract surgery. From the observation it was evident that the Adrenaline was helpful in maintaining an adequate mydriatic effect throughout the surgery. The average pupil size pre and intraoperatively were found to be 7.62 ±0.87mm and 8.18 ±0.59mm. Pupillary constriction during phacoemulsification is found to be the major cause of iris damage, incomplete cortex removal, posterior capsular rupture, vitreous loss and even posterior lens material dislocation. So it is necessary to maintain mydriasis. Irrigation fluid containing Adrenaline is thought to be of beneficial in this respect. The pulse rate was measured as it is an important parameter in determining the safety of Adrenaline. Here, the average pre operative and intra operative pulse rate was found to be 84.38 ± 8.44/ min and 83.6 ±7.97/min. There were no significant changes in pulse rate.

Blood pressure is the most important parameter which determines the safety of Adrenaline during cataract surgery, as the systemic absorption of Adrenaline increases the risk of cardiovascular side effects. These effects are particularly perilous in high risk groups such as patients with hypertension or cardiovascular diseases. From the study group it proved that the blood pressure does not show much fluctuations preoperatively and intraoperatively even in those patients with hypertension. The data of the effect of Adrenaline on pre and intra operative diastolic blood pressure and pre and intra operative systolic blood pressure were shown in figure no3. Adrenaline does not show much fluctuation in the systolic and diastolic blood pressure. Since it does not enter into the systemic circulation. Hence, Adrenaline is safe during phacoemulsification.

Determination of the safety and efficacy of Adrenaline

Table 1: Effect of Adrenaline on pre and intra operative pupil size.

Average pre-operative pupil size in mm (±SD)	Average intra operative pupil size in mm (±SD)
7.62 ±0.871	8.18 ±0.596

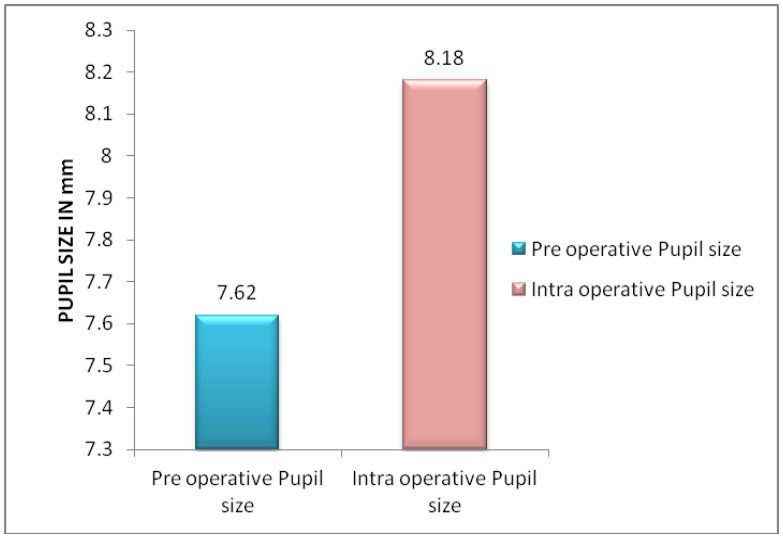

Figure1:Effect ofAdrenaline on pre and intra operative pupil size.

Table 2: Effect of Adrenaline on pre and intra operative pulse rate.

Average pre-operative pulse rate per min (±SD)	Average intraoperative pulse rate per min (±SD)
84.38 ±8.44	83.6 ±7.97

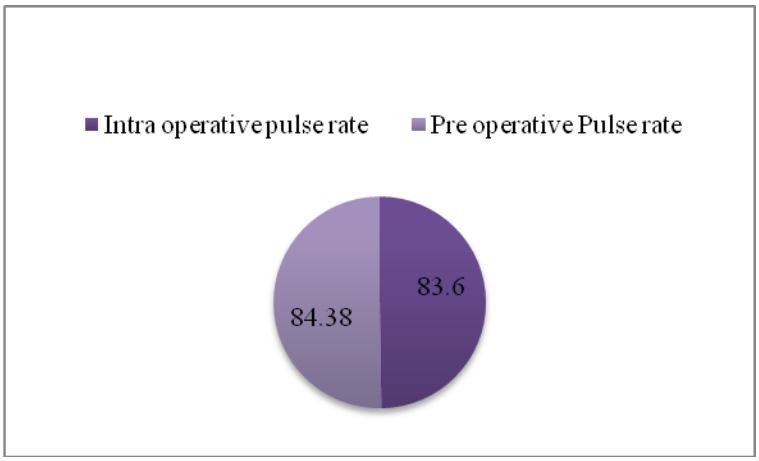

Figure 2: Effect of Adrenaline on pre and intraoperative pulse rate.

Effect of Adrenaline in pre and intra operative blood pressure

Table3: Effect of Adrenaline on pre and intraoperative systolic and diastolic blood pressure.

Average pre-operative diastolic BP in mm Hg (±SD)	Average intra-operative diastolic BP in mm Hg (±SD	Average pre-operative systolic BP in mm Hg (±SD)	Average intra-operative systolic BP in mm Hg (±SD)
82.08 ±6.43	83.32 ±6.45	123.83 ±9.21	124.26 ±8.77

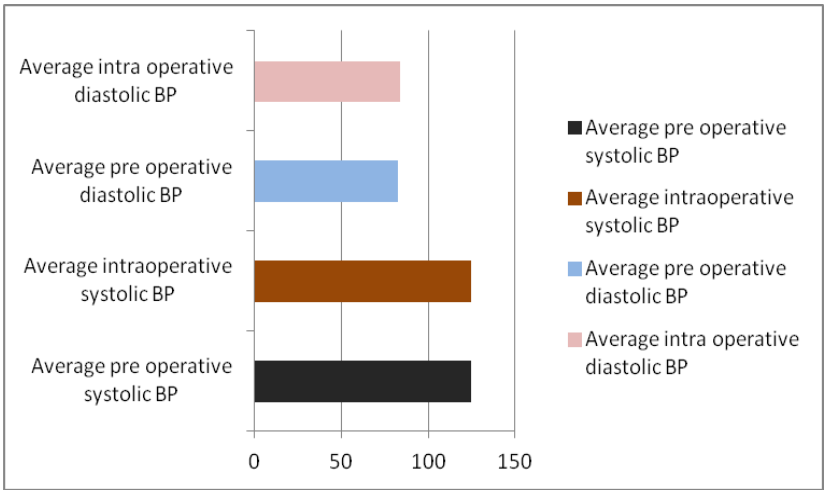

Figure 3: Effect of Adrenaline on pre and intraoperative systolic and diastolic blood pressure.

CONCLUSION

The systemic absorption of Adrenaline will leads to cardiovascular effects. From the above results it can be concluded that the intracameral infusion with 1:100,000 Adrenaline is safe. Thus Adrenaline helps in maintaining an adequate mydriatic effect throughout the surgery. Pupillary constriction during phacoemulsification is found to be the major cause of iris damage, incomplete cortex removal, posterior capsular rupture, vitreous loss and even posterior lens material dislocation. So it is necessary to maintain mydriasis. Irrigation fluid containing Adrenaline is thought to be of beneficial in this respect.

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