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ORIGINAL ARTICLE

Effect of General Anesthesia on Intra-ocular Pressure during Ophthalmic Procedures in Our Population

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ABSTRACT

Aim: To determine changes in intraocular pressures (IOP) associated with drugs used for general anesthesia (GA) induction in eye surgery.
Study design: Observational prospective study
Place and duration of study: Department of Ophthalmology, CMH Rawalpindi from 1st March 2015 to 31st May 2016.
Methodology: Eighty subjects that were advised to undergone various ophthalmic surgical procedures under GA were included in the study. Visual acuity, intraocular pressure (IOP), extra ocular motility, anterior and dilated posterior segment examination were carried out to determine the ophthalmic status. Mixed anesthetics were used in all patients. IOP was recorded at T1 (10 min before induction of anesthesia), T2 (10 min after intubation), and T3 (at the conclusion of surgery before extudation) using Perkins tonometers. Changes in IOP before induction of GA, after intubation, and just before extubation were recorded.
Results: Mean pre-anesthesia IOP for patients of age was 42.3 years with a range of 9-70 years and mean IOP was 16.4 with a range of 10-23 mmHg. There was a significant decrease in the mean IOP at T2 (Perkins: 4-6 mmHg) and T3 (Perkins: 5-8mmHg) as compared to the IOP at T1 (10-18mmHg. The decreases in IOPs at T2 and T3 were similar in both anesthetic groups (T2: P=4-6mmHg; T3: P = 5-8 mmHg).
Conclusion: Significant decrease in IOP after GA was observed with mixed anesthetic agents. For management decisions this aspect of general anaesthesia drugs on IOP as noted with currently used anesthetic agents has to be accounted for and decisions are taken accordingly.
Keywords: General anesthesia, inhalation anesthetics, intraocular pressure, Perkins tonometers.

INTRODUCTION

General anesthetic agents are a necessity in many fields of ophthalmic surgeries except cataract. Major retinal, oculoplastic, traumatic, strabismus and lacrimal procedures require GA as a prerequisite. Literature shows that the various anesthetic agents used in ophthalmic surgeries have a measureable effect on intra ocular pressure dynamics. Intraocular pressure is an important diagnostic and prognostic indicator in glaucoma patients either children or adults. Several agents used during general anesthesia (GA) such as preanesthetic medications, inducing agents, and groups used for maintenance and reversal of anesthesia had shown to affect /alter IOP measurements[1-6].

Many classes of drugs available in market used during induction and maintenance of GA, several of them have shown to affect IOP; it seems difficult to assess the effect of each of these drugs on IOP. However, in the past studies have been carried out in some areas which used fixed anesthetic drug regimes in order to address the effects of individual anesthetic agents on IOP.[7-9] While fixed anesthetic drug preparations cannot be practically applied in current daytoday practices they provide reasonable good baseline for research. One of the used halogenated inhalational anesthetic in ophthalmic surgery is sevoflurane. It causes early induction, little systemic complications, less airway disturbance, and has shown early recovery rate[7-11]. It is use as a GA agent for small procedures in children. As less attention has been paid on studies to quantified the effects of anesthetic agents on IOP measurements in our population an attempt has been made In this study and we tried to evaluate the changes in IOPs associated with anesthetics used for GA during ophthalmic surgery.

PATIENTS AND METHODS

This descriptive study was carried out in the Department of Ophthalmology, CMH Rawalpindi after permission from IRB from 1st March 2015 to 31st May 2016. An observational prospective study was conducted at Eye Department between March 2015 and July 2016. Eighty cases from outpatient department who were advised ophthalmic surgery (cases of lacrimal surgery, squint surgery, and retinal surgery and oculoplastic procedures) under general anesthesia were selected to be included. There were 44 males and 36 female patients. Age ranges between 10-60 years. Informed consent documented in all patients; in the children, parental consent was taken in written. Patients attending the eye OPD were examined on slit lamp after taking their visual acuity by snellen acuity charts and ocular motility assessment. Complete ocular anterior and posterior segment examination was done with help of slit lamp along with tonometry for baseline record. Normal healthy individual without any serious systemic illness, allergic to anesthetic agents and those with liver or kidney diseases, uncontrolled diabetes hypertension, past history of ocular surgeries history of trauma, patients above 70 years of age and eyes with corneal pathology that can influence IOP were excluded.

At the time of surgery, Propofol 1% was used for induction of general anesthesia and isoflurane 1% with oxygen was used for maintenance. Adequate Oxygen saturation (SpO2) >98%, carbon dioxide partial pressures (35-45mmHg) were maintained throughout all surgeries IOP was measured using Perkin tonometer in all patients. Initially IOP was taken before induction (T1), then after induction of anesthesia second recording of IOP was documented (T2) and lastly after extubation third reading was taken (T3).Any drop or rise of IOP at these 03 stages was recorded and documented. In the results, a value of $P<0.05$ was considered statistically significant. Statistical analyses were performed using SPSS. Muscle relaxant atracurium basylate 30 mg stat.and was reversed with inj neopyrolate.

RESULTS

There were 44(55%) males and 36(45%) females (Table 1). Correctable visual acuity ranges from 6/6 to 6/60. Intraocular pressure ranges between 10-19mmHg. Cup disc ratio varied from 0.3 to 0.5. Patient age ranges from 9 to 70 years with mean value of 42.3 years.

Table 1: Socio demographic profile of subjects

Gender	No.	%age
Male	44	55
Female	36	45

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Table 2: Distribution of cases according to type of procedures

Adverse effects	No.	%age
Strabismus	24	30.0
Oculoplastic	30	37.5
Lacrimal	15	18.75
Retinal	11	13.75
Others	-	-

Table 3: Intra ocular pressure decrease at various stages of GA (n=80)

T1 Pre anaesthesia pressure baseline	T2 after induction mean drop	T3 at extubation mean drop
10-19 mm of Hg	4-6 mm of Hg	5-7 mm of Hg

Table 4: Average drop in pressure in various surgeries

Squint	4-7 mm of Hg
Retina	5-8 mm of Hg
Lacrimal	5-6 mm of Hg
Oculoplastic	4-8 mm of Hg

DISCUSSION

The ophthalmic surgeon should be well versed with effect of any anesthetic agent on intraocular pressure before the drug recommended for routine use in ophthalmic anesthesia. Most anesthetic including inhalation anesthetics decrease IOP in proportion to the used anesthesia. Jantzen showed the importance of anesthetic drugs when general anesthesia was advised for eye surgery[12].

Using Tonopen Park et al[8] showed that there is a drop of 5-6 mm Hg in intra ocular pressure in patients anesthetized with either sevoflurane. In another study with combination of anesthetics propofol with remifentanil and sevoflurane with remifentanil Schäferet al. [7] compared IOP measurements using Draeger's tonometer. The study reported greater IOP reductions in the group treated with propofol and remifentanil than the one treated with sevoflurane and remifentanil. However, the study did not come up with details on the degree of IOP reduction in the two settings. Gofman et al[11] compared IOP values in patients anesthetized with propofol administered by targeted control infusion, with those anesthetized with sevoflurane in the increasing vs. decreasing concentration (0.5%, 2%, and 5%). This study showed that there were no significant changes in IOPs before and after induction of anesthesia, and that there were no differences in IOP values between the two groups of patients treated with the different anesthetics. The results of this study, however, are contradictory to those of other studies that have shown that both propofol and sevoflurane decrease IOP[7,8,12].

Eltzschig et al[9] reported mean IOPs decreased by 3-4mmHg in endotracheal intubation and laryngeal mask airway groups with no differences noted between the two groups.Our study support the above two studies since a measureable reduction of intra ocular pressure was recorded in majority of cases under going strabismus, oculoplastic, lacrimal and vitreo retinal procedures in our setup as shown in above results.

CONCLUSION

Significant decrease in IOP after GA was observed with mixed anesthetic agents. For management decisions this aspect of general anaesthesia drugs on IOP as noted with currently used anesthetic agents has to be accounted for and decisions are taken accordingly.

Conflict of interest: Nil

REFERENCES

1. Self WG, Ellis PP. The effect of general anesthetic agents on intraocular pressure. Surv Ophthalmol 1977;21:494500.
2. Cunningham AJ, Barry P. Intraocular pressurephysiology and implications for anaesthetic management. Can Anaesth Soc J 1986; 33:195208.
3. Murphy DF. Anesthesia and intraocular pressure. Anesth Analg 1985;64:52030.
4. Holloway KB. Control of the eye during general anaesthesia for intraocular surgery. Br J Anaesth 1980;52:6719.
5. Peuler M, Glass DD, Arens JF. Ketamine and intraocular pressure. Anesthesiology 1975;43: 5758.
6. Jaafar MS, Kazi GA. Effect of oral chloral hydrate sedation on the intraocular pressure measurement. J Pediatr Ophthalmol Strabismus 1993;30:3726.
7. Schäfer R, Klett J, Auffarth G, Polarz H, Völcker HE, Martin E, et al. Intraocular pressure more reduced during anesthesia with propofol than with sevoflurane: both combined with remifentanil. Acta Anaesthesiol Scand 2002; 46:7036.
8. Park JT, Lim HK, Jang KY, Um DJ. The effects of desflurane and sevoflurane on the intraocular pressure associated with endotracheal intubation in pediatric ophthalmic surgery. Korean J Anesthesiol 2013;64:11721.
9. Eltzschig HK, Darsow R, Schroeder TH, Hettesheimer H, Guggenberger H. Effect of tracheal intubation or laryngeal mask airwayTM insertion on intraocular pressure using balanced anesthesia with sevoflurane and remifentanil. J Clin Anesth 2001;13:2647
10. Abouleish AE, Leib ML, Cohen NH. ASA provides examples to each ASA Physical Status Class. ASA Newsletter 2015;79:3849.
11. Gofman N, Cohen B, Matot I, CattanA, Dotan G, Stolovitch C,et al. Do intraocular pressure measurements under anesthesia reflect the awake condition? J Glaucoma 2017;26:299302.
12. Jantzen JPAH. Anaesthesia and intraocular pressure. Anaesthesist 1988; 37: 458±69.