Original Article

Comparison of Changes in Intraocular Pressure after Subtenon and Peribulbar Local Anaesthesia for Phacoemulsification

Sher Akbar Khan, Mir Ali Shah,Ibrar Hussain, Faisal Nawaz, Mumtaz Alam

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See end of article for authors affiliations

Correspondence to:
Dr. Mir Ali shah
Department of Ophthalmology,
Lady Reading Hospital Peshawar,
Pakistan.
E-mail:drmashahpsh@hotmail.com

Purpose: To compare the changes in intraocular pressure after subtenon and peribulbar local anesthesia in patients undergoing phacoemulsification.

Study Design: Prospective interventional case series.

Place and Duration of Study: The study was conducted at the Department of Ophthalmology, Khyber Teaching Hospital Peshawar. The duration of study was one year i.e. from October 2009 to October 2010.

Materials and Methods: The patients were divided into two groups. Group "A" received subtenon anesthesia and group "B" received peribulbar anesthesia. Intraocular pressure was measured just before, after 1 minute and 10 minutes after the administration of anesthesia. All the data were recorded on a proforma. SPSS-20 was used for data analysis.

Results: There were 152 patients in each group. The 2 groups were similar in terms of age (P value = 0.83) and gender (P value = 0.73). There was no difference in mean intraocular pressure between two groups just before injection (P value = 0.72). There was a greater rise in mean intraocular pressure just after injection in group "B" as compared to group "A" (P value < 0.0001); in both groups the mean intraocular pressure declined to its base level after 10 minutes of injection (P value = 0.52).

Conclusion: Subtenon anesthesia leads to little rise in intraocular pressure as compared to peribulbar anesthesia immediately after the injection. However 10 minutes after injection the intraocular pressure declines to its base level in both groups.

Key Words: subtenon anaesthesia, peribulbar anaesthesia, intraocular pressure.

Cataract is the leading cause of avoidable blindness in the world[1], and accounts for over half of the causes of blindness in Pakistan[2].Cataract surgery can be carried out under general or local anesthesia. Due to unwanted effects of general anesthesia[3] local anesthesia is preferred by most surgeons and patients for cataract surgery; the latter having good analgesia and quick recovery[4].

Local anesthesia includes topical anesthesia and regional anesthesia. Topical anesthesia affects only the nerve endings of the trigeminal nerve in the cornea and conjunctiva so akinesia of the globe will not be achieved. Therefore, surgical training and good patient cooperation is required for safe use of topical anesthesia[5]. One type of regional anesthesia is peribulbar which is performed by injecting the anesthetic solution in the orbit around the equator of the eye ball (outside the muscle cone) using sharp needle[6] and the other is subtenon anesthesia which involves the use of blunt canula[7]. Serious complications such as sight threatening globe perforation and life threatening brainstem depression

have a 2.5 fold greater risk in sharp needle techniques (peribulbar, retrobulbar) as compared with subtenon block[8]. Subtenon block has 2.3 times more risks of minor complications like subconjuctival haemorrhages and conjunctival chemosis[8].

The goal of ideal local anesthesia is to obtain complete anesthesia and akinesia of the eye ball and low intraocular pressure in order to provide optimal surgical conditions[9]. This study was aimed at comparing the changes in intraocular pressure after subtenon and peribular local anaesthesia in patients undergoing cataract surgery.

MATERIAL AND METHODS

This prospective interventional study was conducted in the Department of Ophthalmology Khyber Teaching Hospital Peshawar. The duration of study was one year i.e. from October 2009 to October 2010. Before starting the study, approval was taken from the ethical review board of the hospital.

Patients admitted to Eye unit for cataract surgery in the age group between 50 – 70 years were included in the study.Patients with uncontrolled diabetes mellitus, glaucoma or ocular hypertension, systemic hypertension, carotid stenosis, anterior chamber abnormalities, hypersensitivity to lignocaine, uncooperative patients like mentally retarded, history of convulsions or epilepsy and on topical systemic antihypertensive medicine were excluded from the study. Written informed consent was taken from all the patients.

The cases were randomly divided into two groups as group "A" and group "B". Patients in group "A" received subtenon anesthesia and in group "B" received peribulbar anesthesia. Digital compression was started after anesthesia administration and continued for 10 minutes with interval for 10 seconds after every 2 minutes. All procedures were performed by a single and experienced surgeon. Intraocular pressure (IOP) was measured with Perkins tonometer (Clement Clarke London) just before, one minute after and 10 minutes after the anesthesia administration in lying position. All the data were recorded on a pre-designed proforma.

SPSS 20.0 was used for data analysis. Descriptive statistics like mean and standard deviation were calculated for age and IOP while frequencies and percentages were calculated for gender. P-value was generated using student t-test for comparison of IOP after both types of anesthesia procedures. p-value of <0.05 was considered significant.

RESULTS

There were 152 patients in each group. Mean age for group "A" was 59.74 ± 5.58 years and for group "B" it was 59.88 ± 5.91 years (P value = 0.83). In group "A" there were 79 (52%) females and 73 (48 %) males and in group "B" there were 77 (50.7%) female and 75 (49.3%) male (P value = 0.73).

There was no significant difference in mean IOP in the two groups just before the administration of anesthesia (P value = 0.72). One minute after anesthesia the IOP increased to 14.99 ± 1.25 mmHg in group "A" and 17.37 ± 1.28 mmHg in group "B" (P value < 0.0001). So the difference between the mean IOP of both groups 1 minute after injection was statistically significant. However after 10 minutes of injection the mean IOP returned to its base level in both groups and there was no significant difference in mean IOP in both groups after 10 minutes (P value = 0.52), as shown in Table 1.

Table 1: Comparison of intraocular pressure between two groups.

	Group "A" Mean ± SD	Group "B" Mean ± SD	P value
IOP just before anesthesia	12.16 ± 1.23 mmHg	12.11 ± 1.22 mmHg	0.72
IOP 1 minute after anesthesia	14.99 ± 1.25 mmHg	17.37 ± 1.28 mmHg	<0.0001
IOP 10 minute after anesthesia	11.97 ± 1.22 mmHg	11.88 ± 1.25 mmHg	0.52

IOP: Intraocular pressure. Group "A" subtenon anesthesia. Group "B" peribulbar anesthesia.

DISCUSSION

Ophthalmic surgery is one of the most frequent surgical procedures requiring anesthesia in developed countries[10]. In the past most of the cataract surgeries used to be performed under general anesthesia.[11] With the passage of time, new advances and developments in the cataract surgeries were made. The time of surgery was reduced and incision became smaller and now most of the surgeries are performed under safe and effective means of local anesthesia[12] and hence the unwanted effects of general anesthesia are obviated with the use of local anesthesia[3].

There are different techniques of local anesthesia available for cataract surgeries. Topical anesthesia[10,13]

is free of serious and life threatening complications and can be used in selected cases[14], however it lacks akinesia and a possible association between topical anesthesia and endophthalmitis has also been noted.[15]Patients undergoing cataract surgery under topical anesthesia experience more postoperative pain and discomfort as compared to those receiving subtenon anaesthesia[16]. Subconjunctival block is pain free[17] provides anesthesia to the anterior segment and is not very popular[18]. Needle blocks like peribulbar and retrobulbar anesthesia provides excellent analgesia and akinesia however serious and life threatening complications can occur with these procedures. Therefore, these techniques require intravenous lines and presence of anesthetist and can be performed under the supervision of senior and experienced ophthalmic surgeon as suggested by joint report of Royal College of Anesthesia and Royal College of Ophthalmologists.[19]Subtenon technique is safe, effective and painless and is perfect block[20,21]. There is a statistically significant increased risk of serious complications with sharp needle anesthesia compared with subtenon technique[8].

An ideal anesthetic technique must be safe from serious complications, effective in terms of providing good akinesia and analgesia and must not elevate intraocular pressure in order to provide optimal surgical conditions.

In this study we compared the changes in IOP after subtenon and peribulbar local anesthesia in patients undergoing cataract surgery. IOP was measured with Perkins tonometer just before, one minute after and 10 minutes after the anesthesia administration in lying position.

IOP measured just before and then 1 minute after administration of anesthesia revealed that there was a greater increase in mean IOP just after anesthesia administration in group "B" as compared to group "A". Mean IOP just before anesthesia in group "A" was 12.16 ± 1.23 mm Hg which increased to 14.99 ± 1.25 mm Hg 1 minute after injection. Mean IOP just before anesthesia in group "B" was 12.11 ± 1.22 mmHg which increased to 17.37 ± 1.28 mmHg 1 minute after injection. So comparing the difference between the mean IOP before and 1 minute after administration of anesthesia there was a significant rise of mean IOP in group "B" as compared to group "A" (P value < 0.0001). This is comparable with the results of other study in which there was a significant rise in IOP following the peribulbar injections (median rise 0.5 mmHg sub-Tenon's method, 3.5 mmHg peribulbar method, p = 0.02) but for both methods, IOP fell to a similar level at 5 min after use of the pressure lowering device[22].

Another study showed that one minute after the injection, IOP increased significantly in the peribulbar group (mean 7.97 mm Hg ± 8.80 [SD]) (P< .05). There was no significant increase in the sub-Tenon's injection group (mean 0.12 ± 3.09 mm Hg). In both groups, IOP returned to pre-injection levels by 10 minutes postoperatively. The mechanism of this increase in IOP may be attributed to the restricted orbital space in which a larger volume of anesthetic solution is injected.[23]

In both groups mean IOP declined to the base level 10 minute after anesthesia administration i.e. in group "A" IOP decreased to 11.97 ± 1.22 mmHg and in group "B" it decreased to 11.88 ± 1.25 mmHg. Thus, 10 minute of anesthesia administration, there was no significant difference in the intraocular pressure in both groups (P value = 0.52), which is comparable with other studies.[22,23] Therefore both groups have equally optimal surgical conditions.

With peribulbar anesthesia the IOP may be elevated to the level, although for a short time, sufficient to cause reduction in pulsatile ocular blood flow which may cause potential problems for the patient with ocular vascular compromise[24].

CONCLUSION

Peribulbar anesthesia leads to significant rise in intraocular pressure as compared to peribulbar anesthesia immediately after the injection. However, 10 minutes after injection the intraocular pressure declines to its base level in both groups.

Author's Affiliation

Dr. Sher Akbar khan
Principal Author FCPS
District Ophthalmologist Saidu Teaching Hospital, Swat.

Dr. Mir Ali Shah (Corresponding Author)
FCPS, ICO (Retina)
Associate professor of Ophthalmology, Lady Reading Hospital Peshawar.

Prof Ibrar Hussain
FCPS, FRCS
Chairman Department of Ophthalmology, Khyber Teaching Hospital Peshawar

Dr. Faisal Nawaz
FCPS, VR Fellow LRH
Lady Reading Hospital Peshawar.

Dr. Mumtaz Alam
FCPS, Consultant ophthalmologist KSA.

Role of Authors

Dr. Sher Akbar khan
Concept and design, Data collection/Assembly.

Dr. Mir Ali Shah (Corresponding Author)
Concept and design, Drafting, Statistical expertise, Critical revision.

Prof Ibrar Hussain
Concept and design, Critical revision.

Dr. Faisal Nawaz
Drafting, Statistical expertise

Dr. Mumtaz Alam
Data collection/Assembly.

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