

Comparison of Topical Versus Peribulbar Anaesthesia during Phacoemulsification for Cataract

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ABSTRACT

Objective: To determine the outcome of topical versus peri-bulbar anesthesia in cataract surgery.

Study Design: Randomized control trial.

Place and Duration of Study: This study was conducted at the Department of Ophthalmology Unit 1, Jinnah Hospital, /Allama Iqbal Medical College Lahore from January 2013 to January 2014.

Materials and Methods: Total 200 patients were divided randomly in two groups by the help of random number table; Group A patients were given topical anaesthesia and group B peribulbar anaesthesia. Pain assessment was done 10 minutes after the anaesthesia by Visual Analogue Scale. All the patients were operated by phacoemulsification technique. On 1st post operated day patient satisfaction was assessed by asking that whether he/she like same anaesthesia in future in terms of yes or no.

Results: Out of 100 cases with topical anaesthesia, 51% of the patients experience no pain while 49% were with mild pain but in case of peri-bulbar anaesthesia, 66 % of the patient felt no pain to mild pain. Similarly, in comparison to topical anaesthesia where all of the patients were satisfied with the anaesthesia, up to 72% of patients were satisfied with peri-bulbar anaesthesia.

Conclusion: Good level of anaesthesia and more patients' satisfaction could be achieved by topical anaesthesia as compared to peribulbar anaesthesia.

Key Words: Topical anaesthesia, Peribulbar anaesthesia, Phacoemulsification.

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INTRODUCTION

Based on WHO's study over the global population in 2002 (updated in 2004), results showed that thirty seven million people are blind globally. The number of new cases of blindness in Pakistan is 1.0%.¹ Most of the factors responsible for this blindness are related with eye problems. Out of these, cataract causes loss of vision in 17.6 million people which is approximately thirty percent of all global blindness.^{2,3} In a survey conducted by Dineen et al⁴ in 2007, the most common cause of loss of vision in Pakistan is cataract (51.5%; defined as <3/60 in the better eye on presentation) with corneal opacity, uncorrected aphakia and glaucoma to follow by 11.8%, 8.6% and 7.1% respectively.

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Surgery is the mainstay of treatment for cataract and comprises of removal of opacified lens material along with placement of intraocular lens. After surgery nearly 90% of cataract patients can have a corrected vision of 20/40 or more.⁵ Anesthesia for cataract surgery varies from eye drops (topical) to peri-bulbar (next to eyeball) or retro-bulbar (behind the eye). The associated patient anxiety can be reduced by additional oral or intravenous sedation or rarely general anesthesia. General anesthesia is mostly required in children and adults having psychiatric or medical problems. Retro-bulbar block provides akinesia of extra-ocular muscles. The mechanism of retro-bulbar anesthesia involves blocking of cranial nerve II, III and VI (the nerves responsible for globe movements). This block remained popular for ages but had been replaced by peri-bulbar anesthesia since 1986 due to its higher complication rate (hematoma, optic nerve damage, globe perforation and blindness).^{6,7}

Peri-bulbar anesthesia is a safe replacement of retro-bulbar anesthesia for cataract surgery. In peri-bulbar anesthesia the anesthetic agent is injected outside the muscle cone, resulting in less complications as caused by retro-bulbar anesthesia. The direct injury to optic nerve or hemorrhage in intra-conal area is avoided in peri-bulbar anesthesia.⁸ Although it provides excellent anesthesia but there are risks of injection related complications like chemosis (10 %), sub-conjunctival hemorrhage (8 %), bleeding in the orbit (4 %),

perforation in the eye, direct trauma to the optic nerve, intravascular injection of anesthetic agent and dysfunction of extra ocular muscle have been reported. These complications can be avoided using topical anaesthesia.^{7,8}

Fichman was the first who described topical anesthesia in 1927 and since then this technique has improved tremendously.⁶ In different studies, the experienced surgeons found topical anesthesia to be safe and satisfactory as compared to peri-bulbar and retro-bulbar anesthesia for phacoemulsification and intraocular lens implantation in selected cataract patients.⁹ As a result the usage of topical anesthesia has progressively risen from 8% in 1995 to 63% in 1998.⁶

Studies conducted in the past to compare the outcome of peri-bulbar and topical anaesthesia showed variable results. Siad k at al¹¹ observed effective pain control (mild or no pain) up to 90 % by topical anaesthesia while Ahmad S⁶ found lower efficacy of topical anaesthesia to 78% and 22% of the patient need addition subconjunctival local anaesthesia supplement along with topical anaesthesia. Similarly, peri-bulbar anaesthesia outcomes were also different in different studies. Peri-bulbar anaesthesia is effective in controlling pain (no pain to mild pain) to 75% in Siad K¹¹ studies while its efficacy increase to 100 % in Said TME⁷ study. Similarly, patient's satisfaction was also assessed by Said K. In his study 90% of the patients were satisfied with topical anaesthesia and 72 % were satisfied with peribulbar anaesthesia. Although in Pakistan, the topical anaesthesia is not very popular but due to increase in frequency of phacoemulsification surgery, it is the time to switch to topical anaesthesia which is cost effective, saves time and satisfactory for both surgeon and the patient. The only published study to compare peri-bulbar versus topical anaesthesia in Pakistan was done only in 2007 by Naeem et al.¹² They measured the variables in term of pain and akinesia. But results of their study were given in terms of mean value instead of percentages.

MATERIALS AND METHODS

This randomized control trial was conducted at Ophthalmology Unit 1, Jinnah Hospital, Lahore. The duration of study was from 1st January 2013 to 31st January 2014. Two cases of patients undergoing cataract surgery were included. Outcome were measured in terms of pain (score 0-1) and patient satisfaction. Pain assessment was subjective and categorized according to visual analogue scale (VAS) into no pain = 0, mild pain = 1 (tolerated pain), moderate pain (needs help or interference like more anesthesia) and severe pain = 3 (not tolerated need to stop the surgery). Frequency of patients was recorded with pain (score 0-10) Patients were asked whether he/ she like same anesthesia in future in terms of yes or no, on first post-operative day. Yes was considered positive for patients satisfaction. All the patients with senile cataract (diagnosed on slit lamp examination) and age more than 30 years were included in the study. Patient who

refused informed consent, was difficult to communicate, suffering from dementia, nystagmus, unable to understand pain scale and hazy cornea were excluded from the study. After Ethical committee approval from our hospital, 200 patients for cataract surgery fulfilling the selection criteria were included in the study. An informed consent was obtained from them. Patients were divided randomly in two groups by the help of random number table; Group A was the patients of topical anesthesia and group B of peribulbar anesthesia. 100 patients were given peribulbar anesthesia with 3 ml of mixed bupivacain 50mg/10ml (1.5 ml) and lidocain 2 % (1.5 ml). Single injection was injected in lower temporal area. 100 patients were given topical drops of proparacaine hydrochloride 0.5%. Pain assessment was done 10 minutes after the anesthesia by touching the needle to conjunctiva and limbus and asking the patient whether he feel no pain (0), mild pain (1), moderate pain (2) or severe pain. All the patients were operated by phacoemulsification technique. Both anesthesia infiltration and surgery was done by the same surgeon. On 1st post operated day patient satisfaction was assessed by asking that whether he / she like same anesthesia in future in terms of yes or no. All the collected data was analyzed with SPSS 20.

RESULTS

In group A, patients having topical anaesthesia, mean age was 66.67±6.39 years. In comparison, peribulbar group mean age of patients was 66.36±6.26 and gender distribution in both groups were shown in Table 1. Table 2 is a pain score comparison between patients of peribulbar and topical anaesthesia. In case of topical anaesthesia, 59% of the patients were having no pain. However, in peribulbar group patients and 34% patients felt moderate to severe pain. Patient satisfaction comparison is shown in table 3. At one end, all the patients were satisfied with topical anaesthesia. On the other hand, only 28% of the patients were not satisfied with peribulbar anaesthesia.

Table No.1: Age & gender distribution among groups

Variable	Topical anaesthesia		Peri-bulbar anaesthesia	
	No.	%	No.	%
Age (years)				
50-65	57	57.0	58	58.0
66-80	43	43.0	42	42.0
Gender				
Male	67	67.0	62	62.0
Female	33	33.0	38	38.0

Table 4 shows p value in individual pain groups in case of peribulbar and topical anaesthesia. In no pain group, 59 % of patients felt no pain in topical anaesthesia and 11% in peribulbar anaesthesia and p value was highly significant (P=.000). P value was also significant in mild, moderate and severe pain group as shown in the table. Table 5 shows p value in individual level of

patient satisfaction in each group. In both groups the p value was highly significant.

Table No.2: Pain score among groups

Pain score	Topical anaesthesia		Peri-bulbaranaesthesia	
	No.	%	No.	%
No pain	59	59.0	11	11.0
Mild pain	41	41.0	55	55.0
Moderate pain	-	-	30	30.0
Severe pain	-	-	4	1.0

Table No.3: Patient satisfactions among groups

Patient satisfaction	Topical anaesthesia		Peri-bulbaranaesthesia	
	No.	%	No.	%
Yes	110	110.0	72	72.0
No	-	-	28	28.0

Table No.4: Cross tabulation in pain groups

Pain Score	Topical anaesthesia		Peri-bulbaranaesthesia		P value
	No.	%	No.	%	
No pain	59	59.0	11	11.0	P=0.000
Mild pain	41	41.0	55	55.0	P=0.033
Moderate pain	-	-	30	30.0	P=0.000
Severe pain	-	-	4	4.0	P=0.061

Table No.5: Cross tabulation among patient satisfaction groups

Patients satisfaction	Topical anaesthesia		Peri-bulbaranaesthesia		P value
	No.	%	No.	%	
Yes	100	100.0	72	72.0	P=0.000
No	-	-	28	28.0	P=0.000

DISCUSSION

Couching was the first treatment documented for cataract surgery in India during fifth century BC. This was the procedure in which lens was displaced into the vitreous cavity from its normal pupillary position. Jacques Daviel devised the first method of cataract extraction (removal of lens outside the iris) after failure to perform couching procedure in 1947. After its success, the cataract extraction surgery has gone through major revolution from intra-capsular to extra-capsular lens extraction and now a day’s phacoemulsification technique, throughout the history.¹³

At the same time anaesthesia for cataract surgery has also gone through many stages of evolution. General anaesthesia was used by many surgeons as it is convenient to perform surgery with it, without any patient discomfort. Although general anaesthesia is still

being practiced in children and non-cooperative patients but there are risks associated with it. The retro-bulbar (RB) anaesthesia supplemented by facial nerve block has remained the gold standard for many years and recommended by many surgeons (Atkinson, Van Lint, O’Brien, etc)¹³. In RB anaesthesia 3-4 ml of local anaesthetic agent is injected into the muscle cone of eye. Since it is a blind injection, there are potential chances of causing perforation of eye globe hematoma formation, intrathecal/ central nervous system spread or intravascular spread.^{14, 15}

Due to high chances of complications in retro-bulbar anaesthesia, ophthalmologist and anaesthetist switched onto another method of anaesthesia known as per-bulbar anaesthesia. In this method the anaesthetic agent is injected in extra-conal space instead of intra-conal injection as in retro-bulbar anaesthesia. The peri-bulbar anaesthesia was first described in 1986 and is based on “tissue compartment principle”. According to this principle, the local anaesthetic agent spreads by virtue of its volume and pressure throughout the compartment once injected in the intra-compartmental space so that large volume of local anaesthesia (8-12ml) can be injected into the extra-conal space from which it must spread to the intra-conal space resulting in adequate akinesia and analgesia of the globe.¹⁶ The technique of peri-bulbar anaesthesia has also evolved during the last few years. The classic technique of two injections was described by Bloomberg et al¹⁷ in 1986. They described that the first injection should be injected at inferior and temporal area of the orbit which is the same site as for retro-bulbar injection but with a smaller up-and-in angle. The second injection site should be superior and nasal part of orbit between the medial third and the lateral two third of the orbital roof edge. Different comparative studies have shown that if the sufficient amount of anaesthetic agent is injected at the single site it will be equally effective and there is no need for second injection. So, it is recommended that a single injection technique should be opted and second injection should be preserved as a supplement option provided the first injection has failed.¹⁸

Recently topical anaesthesia has been introduced to overcome the complications of peri-bulbar anaesthesia, like chemosis (10%), subconjunctival haemorrhage (8%), orbital bleeding (4%), ocular perforation, optic nerve trauma, intravascular injection of anaesthetic agent and extra ocular muscle dysfunction have been reported. The technique of topical anaesthesia is based on method to block sensory nerves supplying the conjunctiva and the cornea (nasociliary nerve, lacrimal nerve, long and short ciliary nerves).^{6,7}

Although peribulbar anaesthesia is considered a good anaesthesia for eye surgery but, different studies conducted claims different outcomes. In a study conducted by Said TME ⁷, the efficacy of peribulbar anaesthesia was 100 % as an anesthetic agent. On the other hand, Siad k et al ¹⁶ found that the efficacy of peribulbar anaesthesia was 25 % less as claimed Said TME. If we compare our results we found that the results regarding efficacy of peribulbar anaesthesia was similar to that of Siad TME et al. we found 66 % of the

patients felt no to mild pain and remaining 34 % moderate to severe pain.

In case of topical anesthesia for phacoemulsification surgery, Ahmad¹¹ found that there was no pain to mild pain in 78 % of patients. In the remaining patients, surgeon has to give a sub-conjunctival local anesthesia in order to achieve complete analgesia. However, Said et al¹¹ reported the incidence of addition anaesthesia much lower and 90 % of the patients felt good analgesia with topical anaesthesia. In our study, the results were much better and we found no pain in 59% of the patient and mild pain in 49 % of the patient. So, our study supports the results of Said et al¹¹ study that no addition sedation is required after topical anaesthesia in cataract surgery.

Our results regarding patient satisfaction were very much similar to Said K et al findings. They found 90% patient satisfaction level for topical anaesthesia and 72% for peribulbar anaesthesia.¹¹ All our patients were satisfied with topical anaesthesia and 72% patient were satisfied with peribulbar anaesthesia. One of the study comparing result of peribulbar versus topical anaesthesia for cataract surgery was conducted by Naeem et al¹² in 2005. They found topical anaesthesia a good replacement for peribulbar anaesthesia but the study was statistically weak as values were measured in terms of mean instead of percentages. In our study we found significant p values for pain control and patient satisfaction while comparing topical anaesthesia with peribulbar anaesthesia.

CONCLUSION

Good level of anaesthesia and more patients' satisfaction could be achieved by topical anaesthesia as compared to peribulbar anaesthesia. Patients may have more eye movements in topical anaesthesia than in peribulbar, but if the surgeon is more experienced and patient is cooperative, topical is more safe and effective anaesthesia.

Author's Contribution:

Concept & Design of Study: Qasim Latif Chaudry
 Drafting: Sidra Naseem
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