EFFICACY OF PERIBULBAR ANAESTHESIA VERSUS TOPICAL WITH INTRACAMERAL LIGNOCAINE ANAESTHESIA IN MANUAL SMALL INCISION CATARACT SURGERY: A 1-YEAR RANDOMISED CONTROLLED TRIAL

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ABSTRACT

AIMS

To study the efficacy of peribulbar anaesthesia versus topical with intracameral anaesthesia in manual small incision cataract surgery and to compare surgeon's experience as well as surgical outcome under both techniques.

METHODS

In a randomised controlled trial conducted at KLES Dr. Prabhakar Kore Hospital and MRC Belgaum from January 2012 to December 2012; 120 patients who met inclusion criteria were randomised into peribulbar group or topical with intracameral group (60 in each). Parameters studied in both the groups were akinesia, analgesia and complications occurring during administration of anaesthesia; surgeon's experience was evaluated in terms of patient's cooperation, difficulty while doing surgery due to ocular movements, anterior chamber stability, time taken to complete surgery; surgical outcome was studied with regards to any complications during surgery, best corrected visual acuity at 6 weeks.

RESULTS

Lid akinesia (96.66%) and globe akinesia (100%) was seen only in peribulbar anaesthesia which obviously lacked in topical anaesthesia which was both statistically and clinically significant. Patients in topical group mainly had pain during scleral incision (18.33%), sclera-corneal tunnelling (10%), cortical wash (13.33%) which were statistically and clinically significant compared to peribulbar group. Button holing (3.33%) and posterior capsular rent (3.33%) occurred in topical group due to unexpected eye movement which was clinically significant. Pain scale between both the groups showed no difference during surgery. Most of patients had mild pain 61.66% in peribulbar group and 51.66% patients in topical group. Pain scale was significant in peribulbar group after 4 hrs. of surgery ($p<0.001$).

Patient cooperation and lesser ocular movements during surgery was better in peribulbar group and also clinically significant. Anterior chamber stability was similar in both the groups. Unwanted ocular movements and lid squeezing were common difficulties faced by surgeon in topical group. Time taken to complete surgery was longer under topical anaesthesia. Best corrected visual acuity 6 weeks postoperatively showed no statistical significant difference in both the groups.

CONCLUSION

Topical with intracameral anaesthesia can be an alternative to peribulbar anaesthesia for MSICS provided the patient is very cooperative.

KEYWORDS

Peribulbar, Topical, Intracameral, Manual Small Incision Cataract Surgery.

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INTRODUCTION: Cataract is a most common treatable cause of blindness in elderly population. There is a backlog of 3.8 million people who develop blinding cataract every year in India as against 2.7 million cataract surgeries done every year.[1,2] The only treatment of cataract is its surgical removal which is the commonest ophthalmic surgical procedure.[2]

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Anaesthesia being an integral part of the cataract surgery which may be performed under topical, local or general anaesthesia. Patient comfort, safety and low complication rates are the essentials of anaesthesia.[3] Anaesthesia for cataract surgery today aims at creating a comfortable environment for the patient and surgeon during surgery and quick recovery of function without added risks.

Topical and intracameral anaesthesia are new options for pain control in modern cataract surgery. Though topical anaesthesia is widely used in phacoemulsification technique it has been rarely used in MSICS which is very suitable procedure for high volume surgeries in developing country. Many parts of our country still do not have access to phacoemulsification due to cost consideration of the procedure.[2,4]

Therefore, the purpose of this study was to compare efficacy of peribulbar anaesthesia versus topical with intracameral anaesthesia in MSICS and surgeon's experience.

PATIENTS AND METHODS: One hundred and twenty patients who met inclusion criteria during one year were assigned randomly into two groups (sixty each) by computer generated table of two. Group 1-Peribulbar group (n = 60) and Group 2-Topical with intracameral group (n = 60). Inclusion criteria were patients with cataract and age more than 50 years. Exclusion criteria were uncooperative patients (mentally challenged, involuntary movement disorders, high anxiety), patients who were unable to understand and comply with verbal commands (deafness, dementia, aphasia), patients who were unable to understand modified visual analogue pain scale, sensitivity to Xylocaine, corneal dystrophies/degenerations, corneal opacifications, corneal thinning, one eyed patient. Ethical clearance was obtained by Institutional Review Board.

Tropicamide 0.8% and phenylephrine 5% eye drops were instilled for mydriasis every 15 min. starting one hour prior to surgery. No sedation was given to any patients.

Anaesthesia Technique: Group one patients received peribulbar anaesthesia (26 gauge needle) 4-5 mL, lignocaine 2% with adrenaline 1 in 2,00,000 (30 mL) solution was used. Group two patients received topical 2% sterile Xylocaine jelly into superior and inferior fornices two applications one at 20 min. before surgery and second at 5 min. before surgery and 1% preservative-free Xylocaine was injected into anterior chamber after making entry into anterior chamber during surgery.

Surgical Technique: All patients underwent MSICS by single surgeon. Under all aseptic precautions, part was prepared. A wire speculum was placed and no superior rectus bridle suture taken. A fornix based conjunctival flap was raised superiorly and haemostasis was achieved by minimal cauterisation. Scleral incision was made. Sclerocorneal tunnel was made using crescent knife. In group one, viscoelastic was injected into the anterior chamber (AC) after entry. In group two, 1% preservative-free Xylocaine 0.5 mL was injected into AC and waited for 1 min. after which viscoelastic was injected into AC. Anterior capsulotomy and hydrodissection was done. Nucleus was prolapsed into AC and delivered out using a sandwich technique. Polymethylmethacrylate posterior chamber intraocular lens was implanted. No subconjunctival injection was given. Antibiotic drops put and eye padded. Eye patch was removed after 4 hrs. and topical antibiotic steroids started every 2 hourly and tapered for next 6 weeks.

Parameters: The following parameters were studied: 1) Akinesia: effectiveness of the block was assessed for onset of akinesia of lids and globe after giving anaesthesia. Complications were noted as either being present or absent. a) local- burning sensation, chemosis, subconjunctival haemorrhage, retrobulbar haemorrhage, globe perforation, optic nerve injury. b) systemic-convulsions, loss of consciousness, respiratory arrest, cardiac arrest. 2) Analgesia: At the start of the surgery, the patients were instructed to hold the hand of paramedical staff and to squeeze the hand whenever they felt pain, which was recorded together with the surgical step during which they felt pain. Pain during surgery was assessed immediately after surgery and pain 4 hrs. after surgery was assessed and graded by visual analogue pain scale (modified): Grade 0 (no pain), Grade 1(mild), Grade 2(moderate), Grade 3(severe) Grade 4(maximum). 3) Surgeon's experience**:** Surgeon was interviewed regarding the surgical experience under both groups and was asked to grade the experience regarding a) Patient co-operation: Grade 1 – excellent**,** Grade 2 – good**,** Grade 3 – poor. b) Difficulty due to ocular movement: Grade 1 – none, Grade 2 – Some, Grade 3 – great difficulty. c) Anterior chamber stability: Grade 1 – excellent, Grade 2 – good, Grade 3 – poor. d) Any surgical complications were also noted. Time taken to complete surgery was also recorded. Best corrected visual acuity was done at six weeks. Statistical analysis was done using chi-square test. Statistical correlations were done by SPSS statistical data package editor, version 12.0.

RESULTS:

Most of the patients belonged to age group of 60 to 69 years (45%) in both the groups with mean age of 64.5 years. The descriptive data of both the groups are given in table 1.

	Peribulbar group (n=60)	**Topical group (n=60)**
Gender		
Male	29	36
Female	31	24
Cataract		
Senile Mature Cataract	9	8
Senile Immature Cataract	14	15
Nuclear Sclerosis	33	31
Posterior Subcapsular Cataract	4	6
Operating time	12±1.98 min	15±2.7 min (p=0.001)

Table 1: Descriptive Data

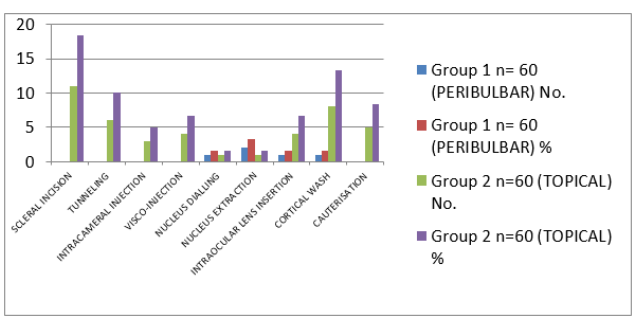
During administration of anaesthesia, pain was obvious in group one due to needle prick. In group two, 3(5%) had burning sensation (p=0.242) which was statistically not significant. Lid akinesia and globe akinesia present in group one which lacked in all patients of group two which was statistically significant (p<0.001). In group one, 27 (45%) had chemosis and 13 (21.66%) had subconjunctival haemorrhage which was statistically significant (p<0.001), 3(5%) had giddiness which was statistically not significant

(p=0.242). No cases of retrobulbar haemorrhage, globe perforation, optic nerve injury, loss of consciousness, respiratory arrest, cardiac arrest occurred.

Comparison of analgesia during the surgery between both the groups are shown in table 2. During surgery, group one had severe pain in none(0%) of the patients, and 3(5%) patients had severe pain in group two which were statistically not significant (p=0.226). Step of surgery at which pain occurred is shown in graph 1. Analgesia at 4 hrs. after surgery, group one had mild pain in 41(68.33%) patients and 22(36.66%) patients in group two. Group one had no pain in 13(21.66%) patients and 36(60%) patients in group two. Group one had moderate pain in 6(10%) patients and 2(3.33%) patients in group two which were statistically significant (p<0.001).

	Group 1		Group 2	
	No.	%	No.	%
Grade 0 (no pain)	19	31.66	19	31.66
Grade 1 (mild)	37	61.66	31	51.66
Grade 2 (moderate)	4	6.66	7	11.66
Grade 3 (severe)	0	0	3	5

Table 2: Analgesia During the Surgery



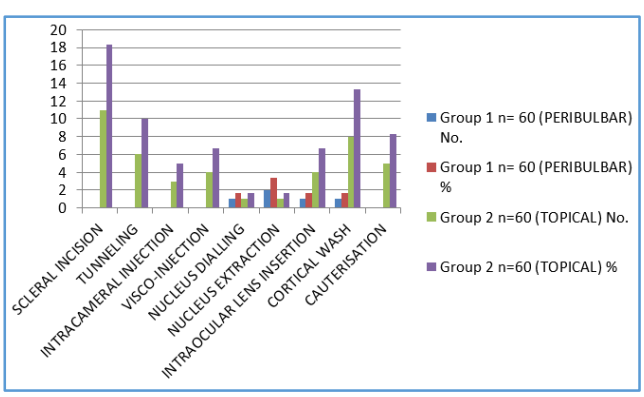
Graph 1: Step of Surgery at which Pain Occurred

Results of surgeon's experience are shown in tables 3. Poor cooperation was seen in group two in 2 (3.33%) patients which were statistically significant (p<0.001). Surgeon had some difficulty in 2(3.33%) patients in group one and 15(25%) patients in group two which were statistically significant (p<0.001). Anterior chamber stability during surgery was statistically not significant (p=0.266).

Surgical complications included button holing which was none in group one whereas it was seen in 2 (3.33%) patients in group two which was statistically not significant(p=0.476). Premature entry occurred in 2 (3.33%) patients in both the groups. Descemet stripping occurred in 1(1.66%) patient in group one and none (0%) of the patients in group two which was statistically not significant (p=1.000). Anterior chamber was shallow in none (0%) of the patients in group one and 1(1.66%) patient in group two which was statistically not significant (p=1.000). Posterior capsular rent with vitreous loss was seen in none in group one and 2(3.33%) in group two which was statistically not significant (p=0.476). Posterior capsular rent without vitreous loss occurred in 2 (3.33%) patients in group one and 1(1.66%) in group two which was statistically not significant (p=1.000). Blepharospasm was seen in 1 (1.66%) patient in group one and in 5(8.33%) patients in group two which was statistically not significant (p=0.209). Intraoperative complications are depicted in graph 2. Best corrected visual acuity at 6 weeks was statistically not significant. [Chi-3.47,3-degree p=0.324].

	Group 1 No.	%	Group 2 No.	%
Patient's Cooperation During Surgery				
1(excellent)	58	96.66	44	73.33
2 (good)	2	3.33	14	23.33
3(poor)	0	0	2	3.33
Difficulty Due to Ocular Movement				
1(none)	58	96.66	45	75
2(some)	2	3.33	15	25
3(great difficulty)	0	0	0	0
Anterior Chamber Stability				
1(excellent)	57	95	53	88.33
2(good)	3	5	5	8.33
3(poor)	0	0	2	3.33

Table 3: Surgeon's Experience



Graph 2: Intra-Operative Complications

DISCUSSION: General anaesthesia offers almost motionless optimal surgical conditions and possesses no major complications risk related to the injection. However, it needs anaesthetic staff, equipment during administration, require a longer recovery time and is increasingly expensive. Later, retrobulbar block was one of the most frequently followed techniques. Its advantages include obtaining ocular akinesia and sufficient analgesia but there is a risk of damage to surrounding structures including globe perforation or penetration, entry into the cerebrospinal fluid and vascular structures behind the eye, causing respiratory depression and cardiovascular collapse. Due to the relatively higher risks of retrobulbar blocks this technique is gradually becoming obsolete. Later, Retrobulbar block was modified

into peribulbar block.[5] The occurrence of rare but sight-threatening complications have led to the adoption of the technique of subtenon's block, which avoids the use of sharp needles. Advantages are reduction of complication rates mainly in myopic eyes and the option of re-injections to top up the anaesthesia during surgery. Anaesthetic leakage, need for dissection and sutures are its limitations.[5]

Topical procedures do not cause akinesia which is the main disadvantage. This can make operating conditions difficult specially in MSICS. However, absence of akinesia can be helpful to the surgeon by asking the patient to look in a particular direction to expose a desired area, optimising red reflex and wound access.[6,7] Its advantages over injected local anaesthesia include its ease of application, economical, minimal to absent discomfort on administration, rapid onset of anaesthesia, faster postoperative functional recovery. More important topical anaesthesia eliminates the risk of complications caused due to needle injection in peribulbar anaesthesia such as subconjunctival haemorrhage, chemosis, retrobulbar haemorrhage, globe perforation, optic nerve injury, respiratory arrest, cardiac arrest.[4,8]

Minor complications such as burning sensation was experienced by 5% of the patients in the present study while application of lignocaine jelly in topical group which was statistically not significant (p=0.242). In other study, 2% in the topical anaesthesia group felt burning sensation.[4] One study showed that advantage of gel preparation is that the number of application required is less compared to topical drops as it maximises the time of contact and lidocaine is slowly released from the gel.[8] Our study correlates well with the study. Chemosis in peribulbar group was seen in 45% patients in our study which was clinically and statistically significant (p<0.001). In a study done by Parkar T et al, 34% of patients had chemosis.[9] Our results are consistent with other studies. Chemosis occurs due to anterior spread of drug and use of large volume of anaesthetic agent.[10] Subconjunctival haemorrhage in peribulbar group was seen in 21.66% patients which was statistically significant (p<0.001) compared to topical group. In other study, the incidence of subconjunctival haemorrhage amounted to 18%. While Wasee and colleagues reported subconjunctival hemorrhage in 23% of patients.[11] Our results are comparable with other studies. Subconjunctival haemorrhage is the main complication of peribulbar anaesthesia, which subsided within 3 days to few weeks after surgery.[12] Corneal abrasion in two patients in peribulbar was due to incomplete closure of the lids while giving digital pressure, this did not interfere during the surgery; however, this is not seen in topical group which but obvious does not require digital pressure, this was not significant (p=0.476). Corneal abrasion can occur from a compression device or postoperatively as the motor effects of the local anaesthetic wear off, allowing the eyelid to open, thus exposing an anaesthetic cornea. 5% patients had giddiness in peribulbar group in whom vitals were stable which were statistically not significant (p=0.242).

Major complications such as retrobulbar haemorrhage, globe perforation, optic nerve injury loss of consciousness, respiratory arrest, cardiac arrest was not seen our study. The incidence of serious retrobulbar bleeding is reported to be in the range of 1%–3% by Morgan et al and as 0.44% in a series of 12,500 cases in another study. Brainstem anaesthesia is reported to occur in 1 in 350–500 intraconal local anaesthesia injections.[10]

During intracameral injection of lignocaine, pain occurred in 5% patients in topical group. Visco-injection caused no pain in peribulbar group and 6.66% patients had pain in topical group which was statistically not significant (p=0.127). In study by Gupta S K et al, 3.1% had pain during viscoelastic injection.[2] Pain occurred because of increase in volume of anterior chamber caused stretching of structures leading to pain during injection. Topical agents only block superficial structures like cornea and conjunctiva and do not anaesthetise deep structures thus handling of iris and stretching of ciliary body and zonules causes pain. Therefore, use of intracameral lignocaine decreases pain from anaesthetised intraocular anterior segment structures and during inflation and deflation of the globe called uveal anaesthesia. It also helps to dilate the pupil due to its relaxing effect on iris muscle and decreases sensitivity to light of operating microscope due to anaesthetic effect on retina-ganglion cell-optic nerve complex.[13,14] A study by N Smitha et al showed that most of patients felt pain during Nucleus dialing and extraction.[1] Wang et al study also showed that patients had pain during nucleus dialing and prolapse.[14] Nucleus delivered through the section in MSICS causes more pain. Therefore, increase in wound length, use of untoothed forceps and fish hook technique would cause less pain which was seen in study by Gupta S K et al.[2] Intraocular lens insertion caused pain in 1.66% patients in peribulbar group and 4.66% patients in topical group which was statistically not significant (p=0.361) and was similarly seen in study by S Ahmed.[7] Cortical wash caused pain in 1.66% patients in peribulbar group and 13.33% patients in topical group which was statistically significant (p=0.038) while 4 % of patients had pain under topical in a study by Gupta S K et al.[2] Cauterisation causing pain was not seen in peribulbar group but was seen in 8.33% patients in topical group which was statistically not significant(p=0.068).

Surgical complications like button holing of scleral tunnel was not seen in peribulbar whereas it was seen in 3.33% patients in topical group which was similarly seen in study by N Smitha et al.[1] Posterior capsular rent with vitreous loss was not seen in peribulbar group and was seen in two (3.33%) patients in topical group which was statistically not significant (p=0.476). Posterior capsular rent without vitreous loss occurred in two (3.33%) patients in peribulbar group and one (1.66%) patient in topical group which was statistically not significant (p=1.000). Smitha et al study showed posterior capsular rent in 2.7% patients in topical group and 1.3% in peribulbar group.[1] Rent occurred due to sudden movement of the patient's eye while operating due to lack of akinesia in topical group. Blepharospasm was seen in 1.66% patients in peribulbar group due to ineffective block and in 8.33% patients in topical group which is commonly encountered in topical

anaesthesia. However, it was statistically not significant (p=0.209). Our study compares well with study done by Gupta S K et al study who had blepharospasm as an integral difficulty faced by the surgeons under topical anaesthesia.[2]

Pain immediately after surgery was evaluated by visual analogue scale, on comparing both the groups pain scale difference was not significant (p=0.226). This in agreement with study by Naeem et al and another study where there was no statistical difference in pain score between topical and peribulbar groups.[15,16] The results of the present study was similar to various studies done for topical group except that none of the patients in this study needed subtenon lignocaine injection as it was required by few patients in other studies.[2] A study by Collin and colleagues, showed that females experience more pain than males during surgery.[17]

Analgesia after 4 hrs. of surgery, no pain was seen in 21.66% patients in peribulbar group and 60% patients in topical group in our study. Mild pain was seen in 68.33% patients in peribulbar group and 36.66% patients had in topical group. Moderate pain was seen in 10% patients in peribulbar group and 3.33% in topical group. Statistical analysis showed that peribulbar group had more pain compared to topical group after 4 hours (p<0.001). This seems to contradict the finding by N Smitha et al where there was no difference in pain scale between the two groups after 4 hours of surgery due to the fact that pain scale is very subjective causing this difference.[1]

Surgeon experienced better co-operation of patients in peribulbar group compared to topical group (p<0.001). In N Smitha et al study, patient cooperation was very good in 96.5%.[1] Study by Gupta S K et al demonstrated good patient's cooperation in 87.5%.[2] This emphasises sticking to selection criteria. Patient cooperation can be improved by surgeon-patient communication, talking or assuring the patient which lessens patient's anxiety (vocal anaesthesia) at any time during surgery, by warning the patient before each important step of surgery.[6] Surgeon had no difficulty during surgery due to ocular movements in 96.66% in peribulbar group and 75% in topical group. Surgeon had some difficulty in 3.33% in peribulbar group and 25% in topical group which were statistically significant (p<0.001) indicating that surgeon was more comfortable to operate in peribulbar group compared to topical group. Our study compares well with study by Naeem et al and S K Gupta and colleagues.[2,15] It is seen that lack of akinesia do not cause difficulty in surgery for an experienced surgeon and if the patients are cooperative. Uncontrolled eye movements can be minimised by lowering the brightness of operating microscope to low intensity and constant communication with the patient.[7,15]

Surgeon graded anterior chamber stability as excellent in 95% patients in peribulbar group and 88.33% in topical group, good in 5% in group one and 8.33% in topical group, poor in 0 % in peribulbar group and 3.33% in topical group which was statistically not significant (p=0.266). Gupta S K et al states that under topical anaesthesia, there is no rise in intraocular pressure when compared to peribulbar anaesthesia.[2]

Time taken in topical was longer due to difficulty in ocular movements, constant communication with patient and being cautious before each important step during surgery. However, study by N Smitha et al had average time of 7 minutes.[1] There was no significant difference in both the groups with regards to visual acuity which correlates well with study by N Smitha et al.[1]

CONCLUSION: Peribulbar anaesthesia provides excellent akinesia under operative condition, but has needle related complications during its administration. Topical with intracameral anaesthesia eliminates the risk but does not provide akinesia. Analgesia provided between both the groups showed no significant difference.

Patient's cooperation and difficulty due to ocular movement was better in peribulbar group as experienced by surgeon. Both the techniques were free from vision or life threatening complications and had no difference in best corrected visual acuity.

Therefore, topical with intracameral anaesthesia can be an alternative to peribulbar anaesthesia for manual small incision cataract surgery provided the patient is very cooperative.

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