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ORIGINAL ARTICLE

Comparison of Effects of Levobupivacaine vs Ropivacaine vs Bupivacaine in Phacoemulsion Surgeries of Oncology Cases: A Randomised Controlled Trial

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ABSTRACT

Objective: To evaluate the efficacy and to compare the quality of peribulbar block anaesthesia of 0.5% Levobupivacaine, 0.5% Ropivacaine and 0.5% Bupivacaine for cataract surgery in post surgical/ post chemotheraphy/ post radiotheraphy oncology cases.

Place and Duration of Study: Chengalpattu Medical College, Chengalpattu. 2023 - 24.

Study Design: Randomized Controlled Clinical Trial.

Methodology: After obtaining approval from institutional ethics committee and written informed consent from all patients, a randomized controlled double blinded clinical trial was conducted on 30 ASA 3 oncology patients undergoing cataract surgery. Patients were randomly allocated into three groups. Group L, Group R and Group B of 10 each. Patients in Group L were to receive Levobupivacaine 0.5%, Group R 0.5% Ropivacaine and Group B 0.5% Bupivacaine. Haemodynamic variables (heart rate, systolic and diastolic BP) and the onset and duration of sensory and motor block, sensory regression time, Intraocular Pressure values were recorded and compared using ANOVA test.

Conclusion: Levobupivacaine is better suited for phacoemulsion surgeries of Post Surgical/ post chemotheraphy/ post radiotheraphy oncology cases.

KEYWORDS

• ANOVA test • Levobupivacaine • Bupivacaine • Ropivacaine

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INTRODUCTION

The search of newer and safer anaesthetic drugs for peribulbar block has been there for many years. The introduction of levobupivacaine and ropivacaine has satisfied the need of drugs with low toxicity and long duration of blockade[1] and with greater degree of motor sensory differentiation, which has led to their wide application, as local anaesthetic.[2]

METHODOLOGY

The study population was randomly divided into three groups of 10 each. The study was carried out as a randomized double blinded study. A thorough preanaesthetic evaluation was done and these ASA 3 patients were posted for surgery only after their systemic diseases like diabetes, hypertension, CAD were brought under control. The 30 ASA 3 patients subjected to cataract surgery by phacoemulsion were randomized into 3 groups L, R and B. Each group were to receive a mixture of 5ml of local anaesthetic (Levobupivacaine 5ml-L group/ Ropivacaine 5ml- R group/ Bupivacaine 5ml- B group) and 5ml of hyaluronidase is injected using 23G needle through the skin near lower orbital rim of the respective eye at the junction of medial 2/3rd and lateral 1/3rd[(10)]. An observer new to the group assignments recorded the onset and duration of sensory and motor block, sensory regression time, pre block, post block, post operative IOP values, and total duration of analgesia.[5,6] Ocular movement scores were evaluated at 2, 4, 6, 8 and 10 mins after injection. Intraoperative and postoperative analgesia were evaluated by verbal pain scores. Duration of surgery and the need for supplementary anaesthesia, haemodynamic parameters and incidence of post-operative complications were recorded[(4)].

The observer recorded the evaluation of sensory block by the abolition of corneal reflex and the motor block by the scores on the verbal pain scale (VPS) Ghai *et al*[11]. The VPS pain score ranges from 0 to 4 with 0 = no pain, 1 = mild pain, 2 = moderate pain, 3 = severe pain, 4 = unbearable pain. Adequacy of analgesia was assessed by holding the bulbar conjunctiva with toothed forceps while adequacy of akinesia was assessed using the scoring system of Brahma and colleagues[(12)] as 3 - full movement, 2 - moderate movement, 1 - flicker and 0 - no movement.

It was planned to treat bradycardia (HR < 50/ min) with inj. Atropine 0.01mg/kg and hypotension (decrease in systolic arterial BP 30%<baseline) with inj. Mephentramine (6-12mg). Patients were not sedated during surgery. Inj. Tramadol 100mg IV(infusion) or inj. paracetamol 1g IV(infusion) was given for post operative analgesia.

OBSERVATION

The mean heart rate in Group L is 76.69, Group R is 79.76, Group B is 75.24.

The preoperative mean systolic BP in Group L is 128.3, Group R is 131.7, Group B is 132.7 and the mean diastolic BP in Group L is 84.7, Group R is 87.2, Group B is 81.2.

The intraoperative mean systolic BP in Group L is 131, Group R is 131.4, Group B is 129.7 and the mean diastolic BP in Group L is 81.2, Group R is 88.6, Group B is 83.7.

The onset of sensory block is between 2 - 3.15 mins in Group L, 3 - 5.30 mins Group R, 2 - 3 mins in Group B.

The mean duration of sensory block is 140.20 mins in Group L, 110.10 mins in Group R, 138.40 mins in Group B.

The onset of motor block is between 2 - 3 mins in Group L, 5 - 6 mins Group R, 2 - 3.2 mins in Group B.

The mean duration of motor block is 160.60 mins in Group L, 120.02 mins in Group R, 156.40 mins in Group B.

There is no significant change in the heart rate and blood pressure(preoperative and intraoperative - systolic and diastolic) between the Groups L, R and B.

The mean total duration of analgesia is 163.3 in Group L, 120.2 in Group R, 161.4 in Group B.

The mean intraocular pressures after 5 mins is 18.1 in Group L, 14.8 in Group R, 17.6 in Group B and after 15 mins is 17.3 in Group L, 16.4 in Group R, 16.9 in Group B.

There is no significant change in the VPS scores and ocular movement scores between the groups L, R and B with R group having slower onset and short duration of action.

Side effects like hypotension, nausea, vomiting and other adverse effects were not

encountered in any of the Groups. None of the cases in each group need supplemental anaesthesia or analgesia.

Ocular movement scores												
After	**4 mins**			**6 mins**			**8 mins**			**10 mins**		
Groups	L	R	B	L	R	B	L	R	B	L	R	B
Score	0	2	1	0	2	0	0	1	0	0	0	0

VPS Scores in post-op hours											
1st hour			**2nd hour**			**3rd hour**			**4th hour**		
L	R	B	L	R	B	L	R	B	L	R	B
0	1	0	0	2	0	0	2	0	0	2	1

Table 1: Pre OP Blood Pressure

Pre OP	Systolic BP	Diastolic BP
Group L	128.3	84.7
Group R	131.7	85.2
Group B	132.7	81.2
P Value	0.016*	0.117
F Value	7.76	2.32

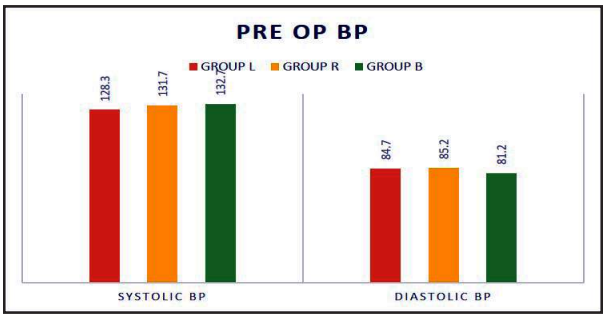
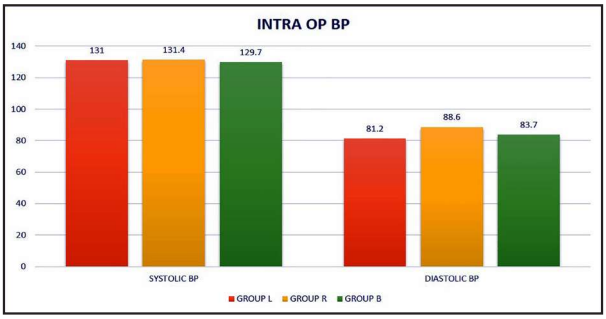


Table 2: Intra OP Blood Pressure

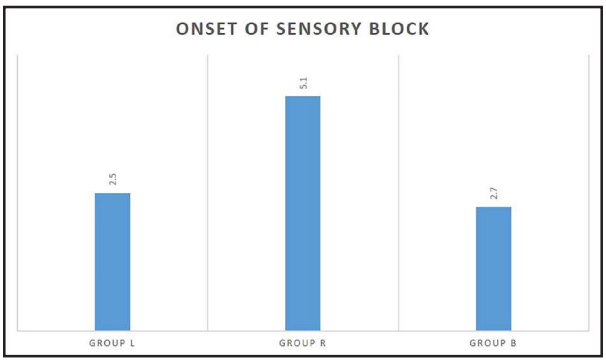
Intra OP	Systolic BP	Diastolic BP
Group L	131	81.2
Group R	131.4	88.6
Group B	129.7	83.7
P Value	0.683	0.003*
F Value	0.386	6.92



There is no significant change in blood pressure (preoperative and intraoperative, systolic and diastolic) between the groups L, R and B as shown in the graph and 'P' values of 0.683and 0.003 for systolic and diastolic bp's which is insignificant.

Table 3: Onset of Sensory Block

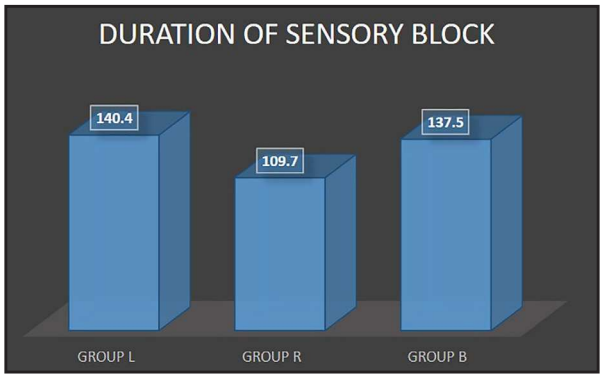
Group	Mean	SD
Group L	2.5	0.16
Group R	5.1	0.22
Group B	2.7	0.29
	P Value -0.001	
	F Value - 32.4	



Group L has quicker onset of sensory block compared to group R and group B as depicted in the graph and proved by 'P' value of 0.001 which is significant.

Table 4: Duration of Sensory Block

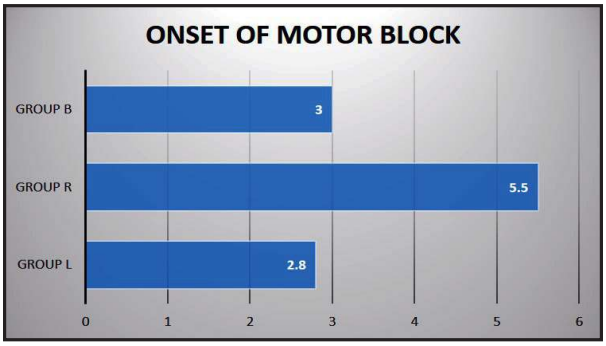
Group	Mean	SD
Group L	140.4	0.62
Group R	109.7	0.85
Group B	137.5	1.85
	P Value - 0.001	
	F Value - 190.2	



Group L has relatively longer duration of sensory block compared to group R and group B as shown in graph and 'P' value of 0.001 which is significant.

Table 5: Onset of Motor Block

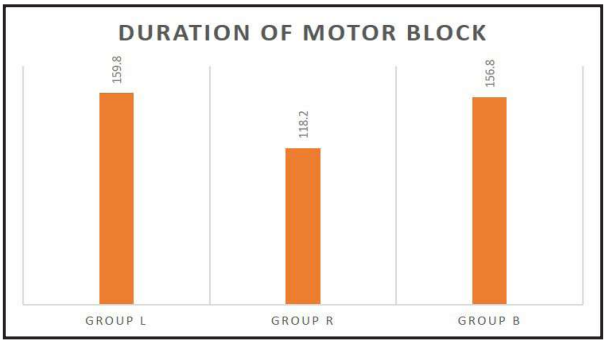
Group	Mean	Sd
Group L	2.8	0.16
Group R	5.5	0.4
Group B	3	0.18
P Value -0.001		
F Value - 111.65		



Group L has relatively quicker onset of motor block compared to group R and group B, as depicted in graph and 'P' value of 0.001 which is significant.

Table 6: Duration of Motor Block

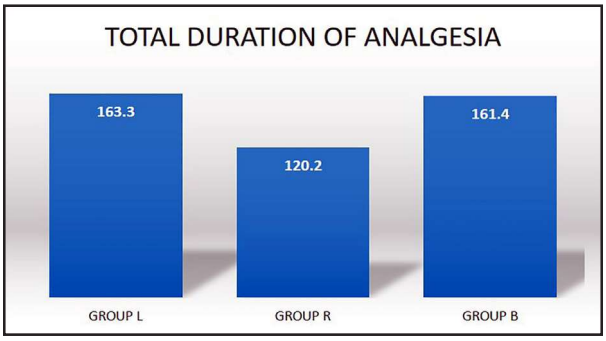
Group	Mean	Sd
Group L	159.8	0.63
Group R	118.2	1.19
Group B	156.8	1.05
P Value -0.001		
F Value - 553.8		



Group L has relatively longer duration of motor block compared to group R and group B, as shown in graph and 0.001'P' value which is significant.

Table 7: Total Duration of Analgesia

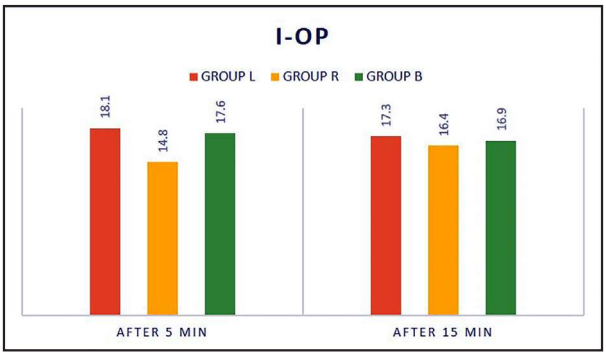
Group	Mean	Sd
Group L	163.3	0.96
Group R	120.2	0.98
Group B	161.4	0.98
P Value -0.001		
F Value - 680.3		



Group L has relatively longer duration 0f analgesia compared to group R and group B as proved by significant 'P' value of 0.001 and as shown in graph.

Table 8: I-OP

I-Op	After 5 Min	After 15 Min
Group L	18.1	17.3
Group R	14.8	16.4
Group B	17.6	16.9
P Value	0.001*	0.015*
F Value	123.8	4.88



Group R has significant reduction in IOP after 5min and 15min compared to group L and group B as seen in graph.

DISCUSSION

Though levobupivacaine and ropivacaine are pure left isomers, they have less cardiac

and neurotoxic potential due to the three dimentional structure[13]. Ropivacaine and levobupivacaine have been developed as alternative to bupivacaine due to the long acting local anesthetic action with greater margin of safety, which has lead to the wide application.

The quality of sensory and motor blockade, haemodynamic changes and side effects profile are some considerations in selecting a drug best suited for peribulbar block.

Levobupivacaine has long duration of action as Bupivacaine, but with minimal cardiovascular and neurological toxicity as studied by Bajwa SJ Kaur[7]. It is safe and offers high level of post-anaesthesia satisfaction of patients.

As studied by Agarwal A. Varma RK. Srivatsava[2] Ropivacaine is better suited in phacoemulsion surgeries of patients with raised intraocular pressures but has short duration of motor and sensory blockade, minimizing the psychological discomfort of immobile lids for long time[9].

CONCLUSION

Haemodynamically all the drug groups showed comparable and stable results[8] and we conclude that Levobupivacaine has better anaesthetic properties with respect to Ropivacaine and Bupivacaine and is well suited for peribulbar block of phacoemulsion in post surgical/ post chemo-radiation oncology cataract cases.

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