

# Comparison of ropivacaine 0.75% and bupivacaine 0.5% on intraocular pressure after peribulbar block in cataract surgery.

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## Abstract

The low cardiovascular and neurological toxicity of ropivacaine has led to its application as a local anaesthetic in a wide variety of specialist application including peribulbar block for cataract surgery. The aim of the study was to compare the effect of ropivacaine 0.75% with hyaluronidase 50 IU/ml and bupivacaine 0.5% with hyaluronidase 50 IU/ml on intraocular pressure in peribulbar block for cataract surgery. Method: We examined 60 patients subjected to small incision cataract surgery who were randomly divided into two groups according to the local anaesthetic used, namely ropivacaine 0.75% or bupivacaine 0.5% with addition of hyaluronidase and assess changes of intraocular pressure. Result: with respect to bupivacaine ropivacaine showed greater reduction in IOP. ( $P < 0.05$ ). Conclusion: Ropivacaine 0.75% has greater reduction in IOP as compared to bupivacaine.

## INTRODUCTION

Ropivacaine is an amino amide local anaesthetic agent with greater margin of safety than bupivacaine for cardio toxicity and neurotoxicity.<sup>1,2</sup> The efficacy and safety of ropivacaine for anaesthesia during cataract surgery is well studied abroad<sup>3-8</sup> with most of the studies using peribulbar technique and hyaluronidase to facilitate the onset of anaesthesia and akinesia. Topical anaesthesia is much more preferred technique than regional anaesthesia as revealed by survey.<sup>9</sup> However, topical anaesthesia may not be appropriate for all and regional anaesthesia would be required for certain cases.<sup>10</sup>

There is reduced risk for globe perforation and optic nerve damage with peribulbar (extraconal) than Retrobulbar (intraconal) block. However greater volume of anaesthetic solution must be used and peribulbar anaesthesia may be associated with post operative diplopia, transient intra ocular pressure (IOP) elevation and shorter duration of anaesthesia.<sup>11, 12, 13</sup> Retrobulbar is still a common technique at many institutions especially when hyaluronidase is not available and fast and reliable akinesia is needed.

Ropivacaine is recently being introduced in Indian market and needs to be evaluated in Indian perspective. Hence, we

decided to evaluate effect of ropivacaine as local anaesthetic with hyaluronidase in peribulbar block for cataract surgery and its effect on IOP and its comparison with bupivacaine with hyaluronidase.

## METHODS

After having obtained research ethics committee approval, we selected 60 ASA physical status I & II patients undergoing small incision cataract surgery in a randomized double blind study. After thorough preanaesthetic evaluation patients refusing consent, taking anticoagulants, allergic to amide local anaesthetic or hyaluronidase, patients with psychiatric illness, with major systemic diseases, on medication affecting IOP and with a single eye were excluded from the study.

After written informed consent from the patients they were randomized to receive peribulbar anaesthesia using 0.75% ropivacaine with hyaluronidase 50 IU/ml in group R (n=30) or 0.5% bupivacaine with hyaluronidase 50 IU/ml in group B (n=30). One drop of 0.5% proparacaine was administered topically on the day of operation at 8:00 am to measure baseline IOP with Schiotz tonometer. The anaesthetic solution was prepared individually immediately before block. The investigators performing the injections and

assessment were blinded to the solution used. Peribulbar injection of local anaesthetic was given by using 25 G, 1 inch needle at the junction of lateral one-third and medial two-third directed deliberately toward the orbital floor and drug was injected until peribulbar fullness was observed or to a maximum volume of 7 ml. Light massage over the globe was applied for the spread of solution for a minute. IOP was recorded at 1, 3, 5, 10 and 15 min. interval after the block. IOP was recorded using Schiotz tonometer

Data collected were subjected to statistical analysis using Jindal sigma statistical software version 2.0. Mean with standard deviation (S.D.) for all the parameters were calculated and comparison between the groups was made using student's T test for quantitative data and chi square test for qualitative data. Value of  $p < 0.05$  was considered statistically significant.

## RESULTS

Patient's characteristics were similar and comparable between the two study groups.

**Figure 1**

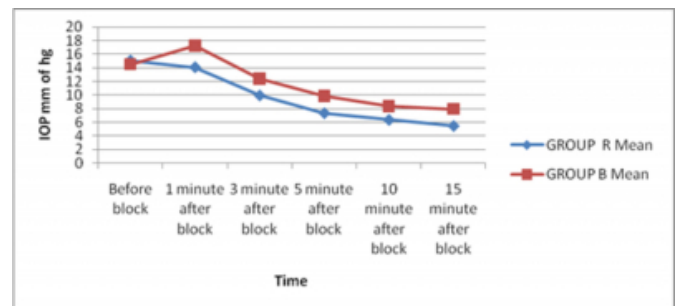
Table 1: Demographic data of patients

	<b>GROUP R</b> <b>Mean <math>\pm</math> SD</b>	<b>GROUP B</b> <b>Mean <math>\pm</math> SD</b>	<b>P Value</b>
<b>Age (yrs)</b>	58.80 $\pm$ 9.65	62.60 $\pm$ 10.81	> 0.05
<b>Sex : M</b>	14	13	> 0.05
<b>F</b>	16	17	
<b>Height (cm)</b>	144.17 $\pm$ 11.41	147.07 $\pm$ 7.37	> 0.05
<b>Weight (kg)</b>	47.97 $\pm$ 10.15	47.70 $\pm$ 15.62	> 0.05

There was no statistical significant difference between study groups in terms of base line IOP before injection. In both the groups, IOP reduced significantly from the base line at 15 min after block. ( $P < 0.002$ ) On comparison between the two groups, there was significant reduction in IOP at 1, 3, 5, 10 and 15 min after injection in group R than in group B.

**Figure 2**

Figure 1: changes in intra ocular pressure



## Discussion

With the recent availability of ropivacaine in the Indian market and its better safety profile as compared to other established local anaesthetics,<sup>1-7</sup> there is wide area of research open and desirable with ropivacaine.

Going through the literature, our impression with 1 % ropivacaine was that onset of akinesia was delayed. Addition of high concentration of hyaluronidase (300 IU/ ml) in peribulbar local anaesthesia promotes speed of onset and quality of block.<sup>14</sup>

However, a number of other studies of peribulbar ropivacaine combined with hyaluronidase 0-75 IU/ml were published and they found this to be as effective as higher doses of hyaluronidase.<sup>4, 15, 16</sup> Hence we wished to determine whether 0.75% ropivacaine with lower dose of hyaluronidase (50 IU/ml) as a sole anaesthetic could be a better anaesthetic for intraocular pressure control for ocular surgery as compared to 0.5% bupivacaine, particularly as other clinical applications have demonstrated motor sparing properties of ropivacaine.<sup>1</sup>

Differences in the methods used in different studies make direct comparison difficult. This includes site of injection, definition of successful block, indication for and methods of supplementation and type of surgery. We used a technique of a single injection at the junction of medial 2/3 and lateral 1/3 of lower orbital margin, needle directed deliberately towards the orbital floor according to our established practice in ophthalmology department. With this technique, we were able to achieve adequate anaesthesia for cataract surgery in 15 mins after the injection in all patients in both the groups and comparison between the two groups we found statistically significant difference in reduction in IOP between the two groups. Though, both the drugs 0.75% ropivacaine and 0.5% bupivacaine reduced intra ocular

pressure significantly from the base line value but ropivacaine decreased the IOP to a greater extent than bupivacaine. This finding is similar to reduction in IOP when used in peribulbar block.<sup>4, 6, 8</sup>

## CONCLUSION

We found that ropivacaine 0.75% with hyaluronidase 50 IU/ml is a suitable mixture for peribulbar block. Ropivacaine 0.75% was found to be better than bupivacaine 0.5% under the same standard conditions for lowering IOP in intra ocular surgery. Reduction in IOP is probably due to relaxation of extra ocular muscles with both local anaesthetics and in addition smaller intra ocular blood volume due to vasoconstriction in case of ropivacaine.<sup>6</sup>

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