ROPIVACAINE VERSUS BUPIVACAINE-LIGNOCAIN MIXTURE IN PERIBULBAR BLOCK - A COMPARATIVE STUDY

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ABSTRACT

BACKGROUND
Ropivacaine is a newer local anaesthetic agent with low systemic side effects. It has the potential advantage of reduced cardiovascular and neurological toxicity compared with other available local anaesthetics that are commonly used for peribulbar anaesthesia. In this study, we intend to compare the efficacy of Ropivacaine as against Bupivacaine-Lignocaine mixture in peribulbar anaesthesia.

MATERIALS AND METHODS
A prospective, randomised study was conducted on 100 patients undergoing elective cataract surgery by phacoemulsification under peribulbar block at Dr. Sushila Tiwari Memorial Hospital, Haldwani. Patients were randomly allocated to two groups of 50 patients each, Group 1 (Bupivacaine + Lignocaine) and Group 2 (Ropivacaine). In all cases peribulbar block was achieved by injecting 7 - 10 mL of the drug. Both groups were compared with respect to intraocular pressure change, onset of akinesia, postoperative pain and haemodynamic status after application of peribulbar block and surgeon’s satisfaction at the end of surgery.

RESULTS
The demographic data of the patient and surgical duration were similar in both groups. Ropivacaine showed statistical significance in reduction of intraocular pressure and onset of akinesia 10 mins after the block. No significant difference was observed in haemodynamic status after the block. Both groups showed similarity in post-operative pain assessment and surgeon’s satisfaction at the end of surgery.

CONCLUSION
It is inferred from our study that Ropivacaine is a good alternative for peribulbar anaesthesia compared to bupivacaine/lignocaine as it has a better safety margin, faster onset and lesser toxic effects than other comparable local anaesthetic agents.

KEYWORDS
Anaesthetics, Local; Anaesthetics, Conduction; Intraocular Pressure; Phacoemulsification.


BACKGROUND
Anaesthesia for ophthalmic surgery presents many unique challenges. It is essential to appreciate that ophthalmic drugs may significantly alter the effect to anaesthesia and that concomitantly anaesthetic drugs and manoeuvres may dramatically influence intraocular dynamics. Also, patients undergoing cataract surgery are usually represented by extremes of age and notable coexisting medical diseases (e.g. diabetes mellitus, coronary artery disease, essential hypertension, chronic lung disease).

As general anaesthesia can be precarious in the elderly population and not advisable in view of short procedure (10 - 15 mins), needle blocks are the most preferred for anaesthesia in ocular surgeries.

Peribulbar injection of a local anaesthetic agent is an effective technique for cataract surgery and the most frequently used local anaesthetic agents for this procedure are lidocaine, bupivacaine or a combination.[1] These agents are known for their striking side-effects on cardiovascular and nervous systems. Newer agents like ropivacaine and carticaicaine with low systemic side effects have been introduced and found to be safe and effective for peribulbar anaesthesia in cataract surgery.

Ropivacaine is a monoamide local anaesthetic agent with a long-acting effect and a great margin of safety. The cardiac and central nervous system toxicity is less than bupivacaine.[2] The lower potential for systemic toxicity of ropivacaine compared with bupivacaine enables it to be used for surgical anaesthesia in higher concentration, which may facilitate diffusion of local anaesthetic molecules into peripheral nervous tissue, improving the onset of nerve blockade.[3]

MATERIALS AND METHODS
After proper Ethical clearance was obtained from Chairman and Members of Ethical Committee, Government Medical College, Haldwani, data was collected from patients scheduled to undergo elective cataract surgery by phacoemulsification under peribulbar block at Dr. Sushila Tiwari Memorial Hospital, Haldwani.

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Surgical satisfaction was assessed by the surgeons as being poor, adequate or good.

Statistical Analysis
The data was entered in MS Excel spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 24.0. Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ± SD and median. Statistical tests were applied as follows:

1. Quantitative variables were compared using unpaired t-test/Mann-Whitney test (when the data sets were not normally distributed) between the two groups.
2. Qualitative variables were correlated using Chi-Square test/Fisher’s exact test.

A p value of < 0.05 was considered statistically significant.

RESULTS
The study took place over a period of two months and proper record was maintained regarding demographic data and measured parameters at various steps. Patient’s demographic characteristics and duration of surgery were similar in the two groups. There were no differences in the surgical procedures between two groups (Table 1).

The IOP data was comparable in both the groups before giving block. There was no statistical difference at 1 min and 5 mins after the block. Significant difference in intraocular pressure was observed between both groups at 10 and 15 mins (Table 2).

In our study, motor blockade onset was achieved early in ropivacaine group than the group with combination of Lignocaine and Bupivacaine, but was significant only at and after 10 minutes. (Table 3) During the early period of block, the akiinesia score was comparable between both the groups (Figure 1).
block in both groups, the degree of akinesia achieved was faster with ropivacaine and the difference was statistically significant. It has been suggested that in peribulbar anaesthesia, the differences in the potency of the motor blockade between both anaesthetics could be concentration-dependent.\cite{10} Comparison of different concentrations of ropivacaine in 68 patients showed that the concentration of 0.75% is preferable to 0.5% and 1.0%, which produce respectively lower akinesia and prolonged anaesthetic recovery.\cite{11} In a study that compared peribulbar ropivacaine, racemic bupivacaine and levobupivacaine, all in concentrations of 0.75%. No significant difference in quality of motor blockade was noted.\cite{11} Equimolar concentrations of ropivacaine and bupivacaine in peribulbar anaesthesia seem to have the same anaesthetic potency.\cite{12}

Peribulbar anaesthesia causes a temporary increase in the intraocular pressure due to the compressive effect of anaesthetic solution on the eye and increase in intraorbital pressure. However, after the onset of akinesia, due to relaxation of ocular musculature, a reduction in intraocular pressure is observed.\cite{13}

Notable reduction in intraocular dynamics was observed between the two groups 10 mins after peribulbar block. Though, both the drugs 0.75% ropivacaine and 0.5% bupivacaine reduced intraocular pressure significantly from the baseline 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.\cite{10,13,14} In a study by Nociti JR, despite similar blockade with analgesia and akinesia 1% ropivacaine decreased the intraocular pressure immediately after its administration, unlike 0.75% bupivacaine which promoted an initial elevation in intraocular pressure followed by a reduction. The authors suggested that the difference could be due to the vasoconstrictive action of ropivacaine. Similar reduction in IOP was also seen in many studies evaluating ropivacaine in peribulbar block.\cite{13}

The minor elevation in IOP with lignocaine/bupivacaine group, though statistically significant in comparison to ropivacaine was insignificant clinically and never did it reach abnormally high levels. Our finding regarding onset of peribulbar block and post-operative pain is consistent with study done by Gioia et al who compared 0.75% ropivacaine with 1:1 mixture of 2% lignocaine and 0.5% bupivacaine for peribulbar anaesthesia in vitreoretinal surgery.\cite{14}

\section*{CONCLUSION}
Due to the similar characteristics in motor and sensitive blockade, intraocular dynamics and its lower systemic toxicity, ropivacaine represents an effective alternative to mixture of bupivacaine/lignocaine in peribulbar anaesthesia. Therefore, 0.75% ropivacaine alone is a suitable option for performing peribulbar block in cataract surgery.

\section*{REFERENCES}
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