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Original Research Article

Comparison of Ropivacaine (0.5%) with Bupivacaine (0.5%) for major lower limb orthopedic surgery

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Abstract: Bupivacaine is commonly used in spinal anesthesia and is associated with cardio toxicity; a safer option is required as ropivacaine which is less cardio toxic. The Aims and objective was to compare the effect of ropivacaine (0.5%) with bupivacaine (0.5%) for major lower limb orthopedic surgery. The Materials and methods were in this study was conducted at Dept. of Anesthesia, GMC, Bhopal, MP between July 2015 to Dec 2016.Sixty patients who were posted for lower limb orthopaedic surgeries were enrolled and randomly divided into two groups: Group R (received plain 0.5% ropivacaine) and Group B (received plain 0.5% bupivacaine). The onset and duration of sensory and motor block was recorded. In Results the Demographic parameters were comparable between both the groups ($p>0.05$). Onset of sensory block at T10 dermatome was comparable ($p>0.05$), duration of sensory block was longer in Group B compared to Group R ($p<0.001$) and duration of complete motor block was shorter in Group R compared to in Group B ($p<0.001$.) The Conclusion in this study was Ropivacaine 0.5% may be a possible alternative to 0.5% bupivacaine for giving spinal anesthesia in lower limb orthopedic surgeries.
Keywords: ropivacaine, bupivacaine, orthopedic surgeries.

INTRODUCTION

Bupivacaine is being used since 40 years as a local anaesthetic. Commercially it is available as a racemic mixture of both isomers. In spite of being commonly used in spinal anesthesia, bupivacaine is associated with undesirable motor blockage and cardiotoxicity which may even lead to death due to accidental injection [1].

Ropivacaine is an S‑enantiomer amide local anaesthetic which is long acting and fewer lipids soluble. It effectively blocks the nerves to greater extent which are involved in pain transmission as compared to fibers which control motor functions [2]. Ropivacaine being fewer lipids soluble is associated with lower central nervous system related and cardiotoxicity. Hence ropivacaine seems to be an effective alternate for major lower limb orthopedic surgery [3]. The present study was done to compare the effect of ropivacaine (0.5%) with bupivacaine (0.5%) for major lower limb orthopedic surgery.

MATERIALS AND METHODS

A prospective randomized double blind study was done in the Deptt. Of Anesthesia, GMC, Bhopal, MP between July 2015 to Dec 2016. The study included 60 adult patients of age between 18-60 years of either sex. Patients with body weight between 60-80 kgs, belonging to ASA Grade I and II, scheduled for elective lower limb orthopaedic surgery were included in the study.

A written informed consent from all the patients and Ethical Committee approval was obtained before starting the study. Patients who had contraindications to spinal anaesthesia, allergy to amide local anaesthetics, patients with a significant history of substance abuse, who had participated in clinical trials in the preceding 3 months, had been enrolled previously in this study or had significant derangement of laboratory values were excluded from the study.

Following arrival in the anaesthetic room, i.v. access was established. Premedication in the form of ondensetron (4mg) and ranitidine (50mg) were given. Full non-invasive monitoring including partial pressure of oxygen (SPO2), non invasive blood pressure (NIBP) and electrocardiogram (ECG) were undertaken.

Subarachnoid block was given by 23G quinckes needle. Correct needle placement was identified by free flow of cerebrospinal fluid and 3.5 ml (17.5 mg) of study drug was injected. Patients were

divided into Group R (who received plain 0.5% ropivacaine) and Group B (who received plain 0.5% bupivacaine).

The spinal needle was removed and the patient placed supine to carry out the initial assessments. The upper and lower spread of sensory block was determined bilaterally using loss of pin prick sensation. Sensory block was assessed at 2 and 5 min post-injection and at 5 min intervals for 20 mins. Assessments were continued at 30-min intervals following the completion of surgery until normal sensation returned.

The degree of motor block in the non-operative leg was assessed at the same time points as sensory block using a Bromage scale (0=no motor block, 1=inability to raise extended legs, 2=inability to flex knees, and 3=inability to flex ankle joints). Assessment of motor block ceased once normal motor function returned.

Heart rate and arterial pressure were recorded using standard non-invasive monitors before intrathecal injection and thereafter 1, 5, 10, 15, 20, 25, 30, 45 and 60 min, then hourly until 8 h post-injection. The quantitative data was analyzed using IBM SPSS- ver.20 software and expressed as mean± standard deviation (SD) and difference compared using one-factor analysis of variance. The qualitative data was compared with chi-square analysis. $P<0.05$ was considered significant.

RESULTS

In present study mean age in Group R and Group B was 35.7±12.3 and 38.2± 13.4 years respectively. Mean body weight in Group R and Group B was 60.62±7.86 and 59.12±6.4 kgs respectively. There were equal number of males and females in both the groups.

Table-1: Comparative study of ropivacaine and bupivacaine groups

Parameters	**Group R (0.5% ropivacaine)**	**Group (0.5% bupivacaine)**
Age in Yrs (mean±SD)	35.7±12.3	38.2± 13.4
Body weight in Kgs (mean±SD)	60.62±7.86	59.12±6.4
Onset of Sensory Block at T10 dermatome	2 minutes (range 2-9)	3.5 hrs (range 2.8 - 5.0 hrs)
Duration of complete motor block	2.1 hrs (range 1.8-3.2 hrs)	3.8 hrs (range 3- 4.5 hrs)

There was no significant difference in the median time of onset of sensory block at T10 dermatome, which was 2 minutes (range 2-5 min) in the Group R and 2 minutes (range 2-9) in Group B. Median duration of sensory block at T10 dermatome was significantly longer in Group B [3.5 hrs (range 2.8 - 5.0 hrs)] compared to 3 hrs in Group R ($p<0.001$).

Median duration of complete motor block (as per modified Bromage scale 3) was significantly shorter in Group R [2.1hrs (range 1.8-3.2 hrs)] compared to 3.8 hrs (range 3- 4.5hrs) in Group B ($p<0.001$.)

DISCUSSION

Spinal anesthesia is a very old technique which is used for several lower limb related surgeries. Hyperbaric bupivacaine was being used for long as a drug of choice. But due to lower neuro and cardio toxic profile of ropivacaine, as stated by different studies, is now coming out as a useful alternative [4].

Effectiveness of intrathecal ropivacaine has been confirmed in different surgeries like trans-urethral resection of prostate, total hip replacement and lower abdominal by different studies [5]. The present study had found no difference in the median time of onset of sensory block at T10 dermatome in both the groups but study done by Chatterjee *et al.;* found a significant result [4].

Chatterjee *et al.;* did a study on 100 patients with mean age of 37.7±12.3 and 41.3±15.8 years in ropivacaine and bupivacaine treated group respectively, reported longer mean onset time of sensory block in ropivacaine treated group as compared to bupivacaine treated group ($p<0.05$) [4].

A study done by Chung et al reported shorter duration of sensory block in Ropivacaine group compared to bupivacaine group ($P<0.05$). Similar findings were found in the presents study. The median duration of sensory block at T10 dermatome was significantly longer in Group B compared to Group R ($p<0.001$).

In present study, median duration of complete motor block was significantly shorter in Group R compared to Group B ($p<0.001$.) Studies done by Chatterjee *et al.;* and Chung *et al.;* reported the similar findings [4, 6].

The possible reason for shorter motor block may be due to the fact that Ropivacaine being less lipophilic in nature as compared to bupivacaine has less penetration in big myelinated motor fibers, hence leading to decreased motor blockage [1].

Jagtap *et al.;* did a similar study involving 60 patients who were undergoing major lower limb surgeries, and recommended the optimal dose of spinal ropivacaine in different situations. They observed 7.6 mg and 11.4 mg as ED50 and ED95 respectively for spinal ropivacaine in lower limb surgery of 50 min or less [2].

Shaikh *et al.;* compared the effect of Ropivacaine (15 ml of 0.75%) and Bupivacaine (15 ml of 0.5%) in orthopedic surgeries and reported comparable onset of sensory block at T10 (P>0.05), findings are almost similar to present study [1].

CONCLUSION

There was no difference in the onset of sensory block at T10 dermatome in two groups but the duration of sensory block was significantly shorter in ropivacaine (0.5%) treated group along with motor blockage. In conclusion, ropivacaine 0.5% can be used as a possible alternative to 0.5% bupivacaine for orthopedic surgeries of lower limb. However larger studies are required to confirm these findings.

REFERENCES

1. Shaikh S, Rohini K; Comparison of Epidural Bupivacaine 0.5% with Epidural Ropivacaine 0.75% for Lower Limb orthopedic Procedures. The Internet Journal of Anesthesiology 2012; 30 (2):1-6.
2. Jagtap S, Chhabra A, Dawoodi S, Jain A; Comparison of intrathecal ropivacaine-fentanyl and bupivacaine-fentanyl for major lower limb orthopaedic surgery: A randomised double-blind study. Indian J Anaesth 2014; 58:442-6.
3. Simpson D, Curran MP, Oldfield V, Keating GM; Ropivacaine- A review of its use in Regional Anaesthesia and acute pain management. Drugs 2005;65(18):2675-717
4. Chatterjee S, Bisui B, Mandal A, Sheet J, Sengupta S, Majumdar S *et al.;* Effects of intrathecal hyperbaric ropivacaine versus hyperbaric bupivacaine for lower limb orthopedic surgery. Anesthesia: Essays and Researches 2014; 8(3): 349-53.
5. McNamee DA, McClelland AM, Scott S, Milligan KR, Westman L, Gustafsson U; Spinal anaesthesia: Comparison of plain ropivacaine 5 mg ml(-1) with bupivacaine 5 mg ml(-1) for major orthopaedic surgery. Br J Anaesth 2002; 89:702-6.
6. Chung CJ, Choi SR, Yeo KH, Park HS, Lee SI, Chin YJ; Hyperbaric spinal ropivacaine for Cesarean delivery: A comparison to hyperbaric bupivacaine. Anesthesia & Analgesia 2001; 93:157-61.