

Comparative Evaluation of Hyperbaric Spinal Ropivacaine Versus Hyperbaric Bupivacaine in Patients Undergoing Lower Limb Surgeries: An Institutional Based Study

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ABSTRACT

Background: Both ropivacaine and levobupivacaine have been studied to some degree for spinal anaesthesia. The present study was conducted for comparing efficacy of hyperbaric spinal ropivacaine versus hyperbaric bupivacaine in lower limb surgery.

Materials & Methods: The present study was conducted for comparing efficacy of hyperbaric spinal ropivacaine versus hyperbaric bupivacaine in lower limb surgery. A total of 40 patients were enrolled. Complete demographic and clinical details of all the patients were obtained. Only those patients were enrolled which were scheduled to undergo lower limb surgery. All the patients were randomized into two study groups – Ropivacaine group and Bupivacaine group. On the day of surgery, an intravenous line was established on the nondominant hand using 16G size intravenous cannula and preloading was done in every patient. Continuous monitoring of all the patients was done. Motor outcome was compared. Analysis of results was done using SPSS software.

Results: Mean age of the patients of the ropivacaine group and bupivacaine group was 46.8 years and 43.7 years respectively. Mean onset of motor block among patients of the ropivacaine group and bupivacaine group was 13.2 minutes and 9.4 minutes. Mean onset of Sensory block among patients

of the ropivacaine group and bupivacaine group was 6.5 minutes and 3.2 minutes. Motor block variables and sensory block variables were significantly better for bupivacaine group. Hyperbaric bupivacaine had prolonged duration of analgesia compared to hyperbaric ropivacaine.

Conclusion: Hyperbaric bupivacaine used intrathecally has a faster onset of sensory block and prolonged duration of analgesia compared to hyperbaric ropivacaine.

Key words: Spina, Hyperbaric, Bupivacaine.

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INTRODUCTION

Regional block anesthesia is the best option for life-saving operations where both general and central neuraxial anesthesia are risky, since no fasting, special preparation, or preoperative optimization is required.¹ Furthermore, peripheral nerve blocks provide surgical anesthesia with better cardiorespiratory stability² as compared to the central neuraxial blockade which having side effects of hypotension, bradycardia, meningitis, postdural puncture headache, hematoma, neurological deficit, etc.³ With the development of new techniques such as ultrasound and peripheral nerve stimulator, the scope of anesthesia has shifted from general anesthesia (GA) and central neuraxial blockade for isolated limb surgery to peripheral nerve blocks.⁴

Both ropivacaine and levobupivacaine have been studied to some degree for spinal anaesthesia. Ropivacaine is well tolerated after

intrathecal use, and was found to have a shorter duration of action than bupivacaine, making it a possible alternative to lidocaine for ambulatory surgery because of the low incidence of transient neurological symptoms (TNS).⁵⁻⁸ Hence; the present study was conducted for comparing efficacy of hyperbaric spinal ropivacaine versus hyperbaric bupivacaine in lower limb surgery.

MATERIALS & METHODS

The present study was conducted in the Department of Anaesthesiology, Tagore Medical College and Hospital, Chennai, Tamil Nadu (India) for comparing efficacy of hyperbaric spinal ropivacaine versus hyperbaric bupivacaine in lower limb surgery. A total of 40 patients were enrolled. Complete demographic and clinical details of all the patients were obtained. Only those

patients were enrolled which were scheduled to undergo lower limb surgery. All the patients were randomized into two study groups – Ropivacaine group and Bupivacaine group. On the day of surgery, an intravenous line was established on the

nondominant hand using 16G size intravenous cannula and preloading was done in every patient. Continuous monitoring of all the patients was done. Motor outcome was compared. Analysis of results was done using SPSS software.

Table 1: Motor block variables

Variable	Ropivacaine group	Bupivacaine group	p-value
Onset of motor block	13.2 mins	9.4 mins	0.001 (Significant)
Duration of motor block	131.7 mins	176.9 mins	0.000 (Significant)

Table 2: Sensory block variables

Variable	Ropivacaine group	Bupivacaine group	p-value
Onset of sensory block	6.5 mins	3.2 mins	0.000 (Significant)
Duration of sensory block	153.8 mins	212.7 mins	0.003 (Significant)

RESULTS

Mean age of the patients of the ropivacaine group and bupivacaine group was 46.8 years and 43.7 years respectively. Mean onset of motor block among patients of the ropivacaine group and bupivacaine group was 13.2 minutes and 9.4 minutes. Mean onset of Sensory block among patients of the ropivacaine group and bupivacaine group was 6.5 minutes and 3.2 minutes. Motor block variables and sensory block variables were significantly better for bupivacaine group. Hyperbaric bupivacaine had prolonged duration of analgesia compared to hyperbaric ropivacaine.

DISCUSSION

Arthroplasty in younger and older population is challenging and remains a topic of debate amongst Orthopaedic surgeons. Halawi et al.¹ reported a large series of 426 cases of less than 55 years with a minimum of five years follow up. The overall 5-year implant survival rate was 90.8%, and the aseptic survival rate was 92.6%. They also noted that the bearing type was the only risk factor for revision surgery, particularly with metal-on-polyethylene bearings. Considering the old age of patients, uncertainty about their life expectancy, associated co morbidities and fear of potential postoperative complications, elderly patients often hesitate to undergo simultaneous bilateral total knee arthroplasty (SBTKA). There have been very few reported series of SBTKA in octogenarian and nonagenarian population.⁶⁻⁹ Hence; the present study was conducted for comparing efficacy of hyperbaric spinal ropivacaine versus hyperbaric bupivacaine in lower limb surgery. Mean age of the patients of the ropivacaine group and bupivacaine group was 46.8 years and 43.7 years respectively. Mean onset of motor block among patients of the ropivacaine group and bupivacaine group was 13.2 minutes and 9.4 minutes. Mean onset of Sensory block among patients of the ropivacaine group and bupivacaine group was 6.5 minutes and 3.2 minutes. Motor block variables and sensory block variables were significantly better for bupivacaine group. Hyperbaric bupivacaine had prolonged duration of analgesia compared to hyperbaric ropivacaine. Luck et al compared the clinical effects of 'hyperbaric' bupivacaine for spinal anaesthesia with those of similar

preparations of levobupivacaine and ropivacaine. Sixty ASA grade I-II patients undergoing elective surgery under spinal anaesthesia were randomized to receive 3 ml of bupivacaine, levobupivacaine, or ropivacaine, each at 5 mg ml⁻¹ and made hyperbaric by the addition of glucose 30 mg ml⁻¹. A standard protocol was followed after which a blinded observer assessed the sensory and motor blocks. The level and duration of sensory (pinprick) block, intensity and duration of motor block, and time to mobilize and to micturate were also recorded. One patient (ropivacaine group) required general anaesthesia because of technical failure, but all the other blocks were adequate. There were no significant differences between the groups with regard to the mean time to onset of sensory block at T10, the extent of spread, or mean time to maximum spread. Regression of sensory block in the ropivacaine group was more rapid as demonstrated by duration at T10 ($P < 0.0167$) and total duration of sensory block ($P < 0.0167$). Patients in the ropivacaine group had more rapid recovery from motor block ($P < 0.0167$) and shorter times to independent mobilization ($P < 0.0167$). There were no significant differences between the bupivacaine and the levobupivacaine groups. 'Hyperbaric' ropivacaine provides reliable spinal anaesthesia of shorter duration than bupivacaine or levobupivacaine, both of which are clinically indistinguishable.¹⁰ Kulkarni KR et al compared the clinical efficacy of equal doses of hyperbaric 0.5% ropivacaine with 0.5% bupivacaine for SA. Eighty American Society of Anesthesiologists grade I-II patients undergoing elective infraumbilical surgeries under SA were recruited and randomized to receive 3ml of hyperbaric ropivacaine 5mg/ml containing dextrose 83 mg/ml (by the addition of desired dose of 25% dextrose) in Group R or 3ml of hyperbaric bupivacaine 5mg/ml containing dextrose 80 mg/ml in Group B. Ropivacaine produced a slower onset of sensory block (ropivacaine 4.5 min; bupivacaine 3.2 min; $P < 0.05$) and the mean total duration of sensory block was significantly lesser (ropivacaine 155 min; bupivacaine 190.5 min; $P < 0.05$). Patients in the ropivacaine Group R had significantly more rapid recovery from the motor blockade (ropivacaine 120 min; bupivacaine 190 min; $P < 0.05$) and passed urine sooner than the patients in bupivacaine Group B (ropivacaine 257 min; bupivacaine 358 min; $P < 0.05$).

Ropivacaine 15 mg in dextrose 8.3% provides reliable SA of shorter duration than bupivacaine 15 mg in 8% dextrose.¹¹

CONCLUSION

Hyperbaric bupivacaine used intrathecally has a faster onset of sensory block and prolonged duration of analgesia compared to hyperbaric ropivacaine.

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