



A STUDY OF EFFICACY OF INTRATHECAL ROPIVACAINE VERSUS BUPIVACAINE

Anaesthesiology

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ABSTRACT

Bupivacaine is the most commonly used drug for spinal anesthesia. Ropivacaine is a relatively new enantiomerically pure isomer of bupivacaine with a low pKa and low lipid solubility as well as less cardiotoxicity with a possibility of shorter duration of sensory as well as motor block compared to bupivacaine. The shorter duration of block could be helpful in early ambulation and early discharge particularly in day care settings.

KEYWORDS

Intrathecal Isobaric Bupivacaine, Isobaric Ropivacaine, Sensory Block, Motor Block.

Introduction:

Spinal anesthesia, defined, as 'the regional anesthesia obtained by blocking nerves in the subarachnoid space' is a popular and common technique used worldwide. The advantages of an awake patient, simplicity of the procedure, rapid onset of action, minimal drug cost, relatively less side effects and rapid patient turnover has made this the technique of choice for many a surgical procedure.¹ Subarachnoid block is the anesthetic technique of choice for surgical procedures involving lower limbs, pelvis, and lower abdomen, as the technique is simple and provides for all the requirements of surgery like analgesia and motor block with a single drug. 2 Various drugs have been used to produce spinal anesthesia. Lidocaine was the widely used drug to produce anesthesia. It was associated with a very rapid onset and a shorter duration of action and also a high incidence of transient neurological symptoms. 3 Presently, Bupivacaine is the widely used drug, but has a prolonged duration of action, prolonged motor blockade and also cardiotoxicity. Ropivacaine is a relatively new amino amide local anesthetic agent which is long acting and an enantiomerically pure isomer of Bupivacaine(s isomer). It has a low pKa and low lipid solubility, and is considered to block sensory nerves to a greater extent than motor nerves⁴ and having similar local anaesthetic properties and chemical structure to that of bupivacaine. 5 Because of sensorimotor dissociation, ropivacaine should be a favourable local anesthetic for day care surgery and could be associated with earlier post-operative mobilization than Bupivacaine. 6 Ropivacaine was first approved for intrathecal use in the European Union in 2004⁷ and there are limited studies comparing plain bupivacaine solutions with plain ropivacaine. Hence the present study was undertaken to assess the duration of sensory and motor blockade of intrathecal ropivacaine and side effects if any compared to intrathecal bupivacaine.

Materials and Methods:

This study was done in the Department of Anesthesia, Azeezia Institute of Medical Sciences, Kerala.

This study was done from June 2017 to May 2018.

After obtaining institutional ethical committee clearance and informed written consent 80 adult patients of ASA Physical status I & II in the age group of 18-60 years of either sex, posted for elective lower limb, lower abdominal, gynecology and urology surgeries were enrolled for the study. Patients were randomly divided into two groups of 40 each. Group "B" Bupivacaine group - Receiving Intrathecal isobaric 0.5% Bupivacaine 3ml (15 mg) and Group „R" Ropivacaine group- Receiving Intrathecal isobaric 0.5% Ropivacaine 3ml (15mg)

After the spinal block, pulse rate, respiratory rate and blood pressure were measured at 0, 1, 2, 3, 5, 10, 15, 20, 25, 30, 45, 60, 90, 120, 180 min Hypotension was defined as 20% decrease in blood pressure from baseline values, and was treated with incremental intra venous boluses of ephedrine. Bradycardia was defined as pulse rate less than 60bpm and treated with intravenous atropine 0.6mg. O2 4l/min via face mask and intravenous fluids at the rate of 10ml/kg/hr were administered throughout the period of surgery.

Then the sensory block, motor block and complications were assessed.

Results:

Sensory block: Time of Onset of Sensory Block: The mean time for onset of sensory block in Group R was 7.49 ±3.05 minutes and in Group B was 6.75± 2.01 minutes, with p value 0.2, which was statistically not significant. Highest level of sensory block: In Group R, 3(7.5%) of the patients achieved a level of T4 while in Group B, 8(20%) of the patients achieved a level of T4. 42.5%(17) of patients achieved a level of T6 in group R while 62.5% (25) of patients achieved a level of T6 in group B. There was a statistically significant difference in the number of patients achieving T6 sensory block. (p 0.017). Duration of sensory block: The mean duration of sensory block(regression of sensory block to S1) was 181.93±46.87 minutes for group R and 247±51.77 minutes for group B which was clinically and statistically significant (p value <0.01)

Motor block: Onset time of motor blockade: The mean time for onset of motor blockade was 2.23±1.63 minutes for group R and 2.27±1.34 minutes for group B (P value 0.9) and was statistically not significant. Degree of motor block: Complete motor block was seen in all patients in both groups without any statistically significant difference. Duration of motor block: Duration of motor blockade ranged from 125 min to 218 min in group R while it was between 180 min to 298 min in group B. The mean duration of motor block in group R was 158.49±42.76 min, while in group B it was 222±48.53min (p <0.01)

Haemodynamic changes: Both groups noted a fall in systolic blood pressure after the administration of spinal anaesthesia. Maximum fall was seen between 5th and 25th minute. The magnitude of fall was greater in group B compared to group R and was statistically significant. Comparison of systolic blood pressure between two groups: There was fall in diastolic blood pressure in both the groups but was statistically not significant. There was no significant difference in the pulse rate between the two groups.

Side Effects: 2 patients in group R had hypotension while 4 patients in group B had hypotension. Bradycardia was seen in 2 patients in group B. No cases of nausea, vomiting and respiratory depression were reported in either of the groups.

Discussion:

Subarachnoid block is a commonly employed anaesthetic technique for surgeries of the lower abdomen and lower limb. It is a safe, inexpensive and easy to administer technique which produces anaesthesia, analgesia and relaxation with a single drug thus avoiding poly pharmacy, and also provides post-operative pain relief. The risks of general anaesthesia are avoided. Bupivacaine is the local anaesthetic widely used for spinal anaesthesia because of its high potency and minimal neurological toxicity. Though cardiotoxicity is not a concern in subarachnoid block, the quality of sensory and motor blockade, hemodynamic changes and side effect profile are some considerations in selecting a drug for spinal anaesthesia. Ropivacaine, a s-enantiomer of bupivacaine is being increasingly used for spinal anaesthesia in lower abdominal, perineal surgeries as well as lower

limb surgeries. Advantages claimed are shorter duration of motor block with similar sensory block properties compared to bupivacaine, thus minimising the psychological discomfort of being immobile for long time. Low cardiotoxicity is also a major advantage. Hence this study was undertaken to assess the sensory and motor block characteristics of ropivacaine for spinal anaesthesia in patients coming for surgeries of lower abdomen and lower limbs. Bupivacaine 0.5%(H) 15mg is the commonly used drug in our institute. Hence an equivolume dose of 15mg (3ml of 0.5%) Ropivacaine was selected for the study. Since hyperbaric ropivacaine is not available commercially, we chose isobaric solutions of Ropivacaine and Bupivacaine. Both the groups were similar with respect to demographic profile in order to avoid variations in intraoperative and post-operative outcomes.

Conclusion:

Intrathecal isobaric ropivacaine 15mg is similar to isobaric bupivacaine 15mg with respect to onset of sensory and motor block as well as degree of motor block. However a shorter duration of both sensory and motor block was seen in ropivacaine group compared to bupivacaine group.

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