



Anesthesiology

OBSERVATIONAL STUDY TO COMPARE THE EFFECT OF INTRATHECAL 0.5% ISOBARIC BUPIVACAINE AND 0.75% ISOBARIC ROPIVACAINE FOR LOWER ABDOMINAL AND LOWER LIMB SURGERIES

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ABSTRACT **Background and Objectives:** Effect of intrathecal 0.5% isobaric bupivacaine & 0.75% isobaric ropivacaine in intrathecal anesthesia for lower abdominal & lower limb surgeries. The objective was to evaluate the effect of isobaric bupivacaine and isobaric ropivacaine in spinal anesthesia.

Materials and Methods: Sixty selected patients were randomized to receive intrathecal isobaric bupivacaine 3.5ml & isobaric ropivacaine 3.5ml in spinal anesthesia for lower limb & lower abdominal surgeries. Sensory and motor block characteristics, hemodynamic changes, intraoperative analgesia, intraoperative and postoperative adverse effects were compared.

Conclusion: Isobaric ropivacaine has comparable quality of sensory block but has slower onset and significantly shorter duration of motor block and better hemodynamic stability compared to bupivacaine.

KEYWORDS : Intrathecal, Isobaric, Bupivacaine, Ropivacaine.

INTRODUCTION

Spinal anaesthesia is a popular modality for lower abdominal and lower limb surgery. It has the benefit of simple procedure, quicker onset of action and dependability in generating generalized sensory and motor blockade.

Subarachnoid block is the anaesthesia technique of choice and is gold standard for lower abdominal/ lower limb surgery compared to general and epidural anesthesia, as there is chance of aspiration syndrome with the former and lack of reliability of block with epidural anesthesia.

Ropivacaine was synthesized simultaneously with bupivacaine almost 50 years ago, and it was first launched in 1996, being the first pure S-enantiomeric local anaesthetic to be clinically introduced. Several experimental and clinical studies confirm ropivacaine has lower and different toxicity profile compared to bupivacaine.^[1]

Although systemic toxicity of local anaesthetics is not a problem for intrathecal administration, block characteristics such as onset and duration of analgesia, the quality of muscle relaxation, haemodynamic stability, and side effects are important considerations during spinal anaesthesia. The potential advantages of using ropivacaine compared with bupivacaine remain to be determined.^[2]

Ropivacaine came on the market in 1996. Because of sensorimotor dissociation, ropivacaine should be a favorable local anesthetic for day-case surgery and could be associated with earlier postoperative mobilization than bupivacaine.^[3]

Extensive clinical data have shown that ropivacaine is effective and safe for regional anaesthetic techniques such as epidural and brachial plexus block. However, experience of intrathecal anaesthesia with ropivacaine is not as well documented.^[4]

AIMS OF THE STUDY

To compare the effect of intrathecal 0.5% isobaric bupivacaine & 0.75% isobaric Ropivacaine in intrathecal anesthesia for lower abdominal & lower limb surgeries.

OBJECTIVES THE STUDY

The following parameters were observed.

1. Onset of sensory block.
2. Duration of sensory and motor block.
3. Time for two segment regression.
4. Haemodynamic changes (Heart rate, Systolic blood pressure, Diastolic blood pressure, Spo2) Side effects and complications (if any)

Materials and Methods

After obtaining approval from hospital Ethical Committee, details of the procedure was explained to the patients and a written informed consent was taken. 60 patients aged 18-60 years of either sex, height,

weight, ASA status I and II scheduled for elective lower abdominal and lower limb surgeries were enrolled in this study. Exclusion criteria were; Patient refusal with poor cardiovascular and respiratory reserve, Patients with ASA III or more, Patients with known allergy, sensitivity to study drug, They were randomly divided into two groups after obtaining informed consent.

Group B (n=30) received 0.5% Isobaric Inj. Bupivacaine 3.5ml intrathecally.

Group R (n=30) received 0.75% Isobaric Inj. Ropivacaine 3.5ml intrathecally.

The following parameters were observed & compared.

- Onset of sensory and motor block.
- Duration of sensory and motor block.
- Time for two segment regression.
- Side effects and complications (if any)

OBSERVATION AND RESULTS

Sixty patients, thirty in each group were included in the study and analyzed. The groups were comparable with respect to demographic characteristics like age, weight, physical status and duration of surgery and difference was statistically not significant.

ONSET OF SENSORY BLOCK

Onset time for sensory block in seconds	Group B	Group R
Min-Max	20-40	156-180
Mean ± SD	31.17±6.11	168.90±7.61
Inference	Onset time for sensory block is significantly More with Group R with P<0.001**	

COMPARISON OF DURATION OF SENSORY AND MOTOR BLOCK (MEAN±SD)

Sensory Block	Group B	Group R	P Value
Duration of Sensory Block in minutes	182.67±20.29	190.33±9.37	0.065+
Duration of motor block (in min)	218.50±19.1	149.00±3.81	<0.001**

DURATION OF REGRESSION OF SENSORY LEVEL IN TWO GROUP OF PATIENTS

Spinal level	Group B	Group R	P value
T8	206.00±34.28	310.33±9.37	0.031*
T10	208.67±19.07	209.00±10.37	0.933

In our study 3 patients in group B required treatment for intra-operative

hypotension, 7 patients required treatment for bradycardia and 1 patient required treatment for both hypotension and bradycardia but there was no incidence of intra-operative hypotension or bradycardia requiring treatment in group R.

DISCUSSION

Subarachnoid block is a commonly used block for lower abdominal and lower limb surgeries. It is a safe, cheaper and easy-to-administer technique. It offers a high level of post-anesthesia satisfaction for patients. Its post anesthetic satisfaction is very high. It is a simple and very reliable technique which has a rapid onset. Accidents due to airway management, aspiration and polypharmacy, which are risks of general anesthesia are avoided. Bupivacaine has high potency and minimal neurological symptoms, which is why bupivacaine is the choice of local anesthesia used routinely for limb and lower abdomen surgeries. The main factors taken into consideration while selecting a drug for spinal anaesthesia are the quality of sensory blockade, motor blockade, hemodynamic changes and side effects. Ropivacaine, a *s*-enantiomer of bupivacaine is now commonly used for spinal anaesthesia in caesarean section, lower abdominal and perineal surgeries including lower limb surgeries. Its advantages are claimed to be shorter duration of motor block with similar sensory block properties when compared to bupivacaine. Thereby mini missing the psychological discomfort of being immobile for a long duration. Also the most major advantage is its lesser cardiotoxic property compared to bupivacaine and therefore this study was conducted to assess the sensory and motor characteristics of ropivacaine for spinal anaesthesia in abdominal surgeries or lower limbs.

An observational study was conducted at S.B.K.S M.I R.C which included 60 ASA I and II patients who underwent abdominal surgeries/ lower limb under intrathecal block.

In our study we have used a ratio of 1:1 by volume in order to know the minimum possible dosage of both the drugs to obtain adequate Anaesthesia. Isobaric Ropivacaine 0.75 and Isobaric Bupivacaine 0.5 was used.

1. Onset of sensory block :

All patients receiving either drug achieved adequate level of anaesthesia. We considered a block up to T8 for onset of sensory block. M.Mantouvalou et¹ al did a comparative study of plain Ropivacaine, Bupivacaine and Levobupivacaine for Lower abdominal surgeries and found that the time to achieve surgical analgesia up to T8 dermatome was 13±8 for Bupivacaine group, 12±7 mins for the Ropivacaine group. In our study we noted that mean time for onset at T8 was noted 156-180s in R group and 20-40s in B group. The reason for the observed difference between our result and other studies is not apparent, but it could be attributed to methodological differences such as difference in the dosage or population studied. M.Mantouvalou et⁵ al noted that the cephalic spread of sensory block was similar in all groups. McNamee et al⁴ compared 17.5mg of plain Ropivacaine with 17.5mg of plain Bupivacaine in patients undergoing total hip arthroplasty under spinal anaesthesia. There were no significant differences in the upper extent of sensory block. In agreement to the above studies a level of T8 was attained in both the groups in our study.

2. Duration of motor block

A. McNamee et al⁴ found that the median duration of complete motor block (Modified bromage scale) was significantly shorter in the Ropivacaine group compared with Bupivacaine group. M.Mantouvalou et⁵ al observe a shorter duration of motor block among the Ropivacaine group when compared with Bupivacaine group. The duration of motor block was 269± 20mins and 278± 70mins respectively for Ropivacaine and Bupivacaine. All patients in our study receiving either Ropivacaine or Bupivacaine developed complete motor block and is in agreement with above mentioned studies.

3. Regression of sensory block to T10

In our study the time taken for the regression of post-operative spinal level to T10 was 232.00±16.59 mins and 224.00±10.37 mins respectively in group B and R.

4. Request for rescue analgesia

No patients required supplemental analgesia intra operatively.

5. Quality of anaesthesia

The anaesthesia was well accepted by all patients belonging to both groups. Majority of patients opined that the quality of anaesthesia is good to excellent with both the drugs.

6. Haemodynamic parameter

Neval Boztug and his colleagues⁶ observed that 8.8% of patients in Bupivacaine group received inj. Ephedrine for treatment of hypotension, whereas only 2 patients received in Ropivacaine group. One in group B received i.v Atropine for bradycardia but none in group R. D.A. McNamee¹ observed in their study that intra-operative hypotension requiring treatment with inj. Ephedrine occurred in 12% of patients in R group and in 26% of patients in B group. M.Mantouvalou et al⁵

Al6 found in their study that intra-operative hypotension requiring treatment with inj. Ephedrine occurred more often in the B group than in R group. Bradycardia was also more common in group B than in group R.

In our study 3 patients in group B required treatment for intra-operative hypotension, 7 patients required treatment for bradycardia and 1 patient required treatment for both hypotension and bradycardia but there was no incidence of intra- operative hypotension or bradycardia requiring treatment in group R.

CONCLUSION

Our study reveals that of isobaric ropivacaine 0.75% when administered intrathecally provides adequate anesthesia for lower limb/ abdominal surgeries. Onset of sensory block is slow compared to that of Bupivacaine, with same level of maximum sensory block. The duration of analgesia at T8 (two segment regression) was significantly same with Ropivacaine. But there is delayed onset of motor block and shorter duration of motor block with Ropivacaine compared to Bupivacaine. Cardiovascular stability is better than Bupivacaine. Hence Ropivacaine can be used successfully for lower limb/ abdominal surgeries where early recovery is well appreciated by the patients.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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