Comparative Evaluation of Intrathecal Administration of Isobaric Levobupivcaine (0.5%) and Isobaric Ropivacaine (0.75%) in Patients Undergoing Lower Limb Surgeries

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ABSTRACT

Introduction: Bupivacaine available as a recemic mixture of its enantiomers dextro and levo bupivacaine has been the gold standard for intrathecal use in spinal anesthesia. Levo bupivacaine and Ropivacaine are the two recently introduced alternatives to Bupivacaine in clinical practice. The aim of our study is to evaluate the effect of intrathecal administration of isobaric Levobupivacaine and isobaric Ropivacaine in patients undergoing lower limb surgeries.

Material and methods: Sixty patients were grouped equally in group I and II, who received intrathecal 3 milliliter (0.5%) isobaric Levo Bupivacaine (15 milligram), and 3ml (0.75%) isobaric Ropivacaine (22.5mg) respectively.

Results: The observations were discussed in terms of vital parameters; onset, duration and recovery from sensory and motor blockade and side effects. It was found that isobaric Ropivacaine 0.75% intrathecally provides shorter duration of motor and sensory block compared to Levo bupivacaine 0.5%.

Conclusion: Also there were less episodes of hypotension which indicate that 0.75% isobaric Ropivacaine provides more hemodynamic stability than Bupivacaine 0.5% intrathecally.

Keywords: Levobupivacaine, Ropivacaine, Lower Limb Surgeries, Subarachnoid Block

INTRODUCTION

Subarachnoid block is probably the most widely used regional anesthetic procedure in routine clinical anesthesiology practice. It provides rapid onset, consistent sensory blockade and adequate muscle relaxation for all types of surgery below the level of umbilicus. This procedure is relatively easier, requires less equipment and very cost effective. Main disadvantages of subarachnoid block are hypotension, lack of ability in precisely controlling the level and duration of block and risk of introduction of infection directly into the cerebrospinal fluid. Compared to Intrathecally Isobaric Levo bupivacaine 0.5%, Isobaric Ropivacaine 0.75% provides shorter duration of motor and sensory block and provides more hemodynamic stability and less chances of hypotension than Levobupivacaine 0.5%. The aim of the present study was to evaluate the effect of intrathecal administration of isobaric Levobupivacaine and isobaric Ropivacaine in patients undergoing lower limb surgeries.

MATERIAL AND METHODS

After obtaining informed consent from all the patients, Sixty patients of ASA I and II of age 20 to 50 years of either sex were included in our study. These patients were divided equally into 2 Groups, 30 each. Group I and II who received intrathecal 3 ml 0.5% isobaric Levo Bupivacaine (15 mg) and 3ml 0.75% isobaric Ropivacaine (22.5mg) respectively. Patients who refuse for consent, Infection at site of injection, Coagulopathy or any other bleeding disorder, severe Hypovolemia, severe hypotension, increased intracranial tension, severe stenotic valvular heart disease or ventricular outflow obstruction were excluded from our study.

All patients underwent pre-anaesthetic check up where detailed history was taken, they were physically examined and relevant routine and special investigations were carried out. Informed and written consent for anaesthetic procedure was taken from patient for surgery.

They were kept nil orally for at least 6 hours prior to starting the procedure. Heart Rate, Blood Pressure, Respiratory Rate, Oxygen Saturation and Electrocardiogram were noted. After intravenous cannulation, injection Ondansetron 4milligram, ranitidine 50 milligram and 500 ml ringer lactate solution were given.

Under all aseptic precautions, subarachnoid block was given with patient placed in the lateral position with affected limb uppermost by midline approach between third and fourth lumber space via 25 Gauge Quincke's spinal needle. On confirmation of free flow of Cerebrospinal fluid the calculated drug was injected slowly . After injection patient was immediately turned supine. No tilt was given. All patients received oxygen at 4 litres per minute by oxygen mask.

Continuous monitoring of B.P, HR, RR, SpO2 and ECG was done during intraoperative period at regular intervals. Onset of sensory blockade and motor blockade was noted in all the patients. Determination of onset of sensory block was done by pin prick technique; while assessment of motor blockade was done using Bromage Scale.

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S. No.	Age (in years)	Group I(n=30)		Group II(n=30)	
		No.	%	No.	%
1.	20-25	6	20	5	16.66
2.	25-30	4	13.33	6	20
3.	30-35	4	13.33	4	13.33
4.	35-40	6	20	6	20
5.	40-45	4	13.33	4	13.33
6.	45-50	6	20	6	20

Table–1: Table showing age wise distribution of cases

	Group I (0.5%) Levo Bupivacaine isobaric)	Group II (0.75% Ropivacaine Isobaric)	P value
Onset of Sensory Block (min)	6.40±1.4	6.20±1.10	0.67
Level of Sensory Block	T10	T10	>0.05
Onset of Motor Block (min)	13.90±2.22	12.17±2.00	0.0178
Mean duration of Motor Blockage (min)	224.20±19.17	178.20±31.14	0.0001
Duration of analgesia (min)	235.75±11.16	203.40±12.60	0.0001

Table-2: Effects of both drugs

	Group I (n=30)	Group II (n=30)
Incidence of hypotension	8	4
Pt. required treatment of hypotension	4	2
Incidence of Bradycardia	2	1
Incidence of Respiratory Depression	0	0

Table-3: Table showing haemodynamic stability

Sl. No.	Adverse effects	Group	Number of patients
1.	Nausea/ Vomiting	I	2
		II	2
2.	Rigor	I	1
		II	1
3.	Vasopressor (>1 bolus of inj. ephedrine, 5mg)	I	4
		II	2
4.	Itching	I	0
		II	0
5.	PDPH	I	0
		II	0

Table-4: Comparison of incidence of adverse effects

Grade 0 Able to raise the lower limb straight (straight leg raising test).

Grade I Able to perform knee joint movement but not at hip joint movement.

Grade II Able to perform movement at ankle joint but neither at hip joint nor at knee joint.

Grade III Able to perform toe movement, but unable to perform ankle, knee and hip joint movement.

Grade IV No movement at lower limb.

Postoperative Observation: H.R, B.P., R/R, SpO_2 and ECG was observed till the requirement of 1st rescue analgesic dose. Duration of sensory and motor blockade was observed postoperatively and duration of 1st rescue analgesia was noted in all the patients. Patients were observed for side effects like hypotension, bradycardia, respiratory depression, nausea/vomiting, tightness in chest, respiratory difficulty, convulsions.

STATISTICAL ANALYSIS

Observations were duly recorded, tabulated and then statistically analyzed by unpaired t-test between the groups. P value < 0.05 was considered clinically significant.

RESULTS

In our study p-value was found to be insignificant regarding age and duration of surgery among both groups.

The mean age of the patients in Group I was 35±5 years and in the Group II was 36.3± 5.0 years and p value was found to be insignificant (table-1). Mean duration of surgery in Group I was 86.8±25 and in Group II was 84.0±23 and it was found to be insignificant.

Pulse rate (per minute)

The mean onset of sensory block for Levo bupivacaine (0.5%) isobaric was 6.40 ± 1.40 mins and for Ropivacaine (0.75%) isobaric was 6.20 ± 1.10 mins which was statistically insignificant (table-2).

The level of sensory block in Group I is Thoracic level 10, in Group II it is Thoracic level 10. P value is > 0.05, so there is no significant difference in level of sensory block between the two groups.

The mean onset of motor block for Group I was 13.90 ± 2.22 and Group II it was 12.17± 2.00 mins. P-value was statistically significant between the two groups.

The mean duration of motor blockade in Group I was 224.20 ± 19.17 mins and in Group II it was 178.20 ± 31.14 mins. P-value was statistically significant between the two groups.

The duration of complete analgesia for group I was 235.75 ± 11.16 mins while it was 203.40 ± 12.60 mins for group II. P-value was statistically significant between the two groups.

It is evident from the above table that larger no. of patients in Group I have developed incidence of hypotension and required treatment.

There no significant difference in incidence of bradycardia and no incidence of respiratory depression occurred in both

groups.

From table-4 it is evident that there was no significant incidence of adverse effects reported in any of the groups.

DISCUSSION

The mean age in group I (35±5) and group II (36.3±5.0) which clearly showed that they were comparable among themselves and hence statistically insignificant ($p > 0.05$). Studies conducted among the patients of ASA grade I and II. Halena kallio et al (2004) conducted their studies on patients between age group 18 – 65 years and ASA physical status I and II (where n = 30 in each groups) for Ropivacaine 0.75% and Bupivacaine 0.5% via subarachnoid block for lower limb surgeries.[1]

Ying Y. Lee et al compared 3 drugs with 25 patients in each group. Thus our current study groups were comparable in age and number of patients to studies done previously.[2]

In our current study dose of Ropivacaine 0.75% 3ml was selected with Levo bupivacaine 0.5% 3ml (15mg). J.F.Luck et al also took the same concentration and dose in their study.[3]

In our present study onset of sensory block took 6.4 ± 1.4 for 0.5% Levo Bupivacaine, 6.20± 1.10 for 0.75% Ropivacaine and there was no intergroup significance. Maximum dermatomal level achieved was T10 in Levo bupivacaine and T10 in ropivacaine. Van Kleef et al (1994) also got same level of T_{10} - T_{11} with 0.75% ropivacaine.[4]

The time to achieve complete motor blockade (Modified Bromage Scale 1) was longer in the Levo Bupivacaine group (13.90±2.22) than Ropivacaine group (12.17±2.00) and the difference was statistically insignificant ($p<0.05$) which is shown in table . Same observation was made by Mantouvalou et al.[5]

In Our study motor block regression started at 95 min in Ropivacaine and 181 min in Levo bupivacaine group and observed sensory block time of 223 and 238 min in Ropivacaine, and Levo bupivacaine groups respectively. McNamee and colleagues compared Ropivacaine and Levo bupivacaine at a dose of 17.5 mg and they also found faster recovery from sensory and motor block in Ropivacaine group.[6]

In our study there was slight reduction in mean arterial pressure after the spinal block in both the groups, however it was significant only in Levo bupivacaine group .There were no significant inter group differences. Shesky et al (1983) also reported an average maximum decrease in MAP of 9 – 17% with isobaric Bupivacaine within 30 minutes after the induction of spinal anaesthesia, a maximum decrease in heart rate of approx 8 – 17% was also observed by them.[7] Previous studies have linked intrathecal Ropivacaine with an increased incidence of PDPH. This similar with the findings of Gautier PE (1999).[8]

CONCLUSION

No significant changes was reported in pulse rate, respiratory rate and SpO_2 in present study. Adverse events like nausea/ vomiting, rigor, and itching were equally distributed in all the groups and statistically insignificant. In no case was urinary retention reported.

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