Intrathecal 0.75% Isobaric Ropivacaine Versus 0.5% Heavy Bupivacaine For Elective Caesarean Delivery: A Randomized Comparative Study In Hundred Patient's

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Abstract: Background And Aim: Ropivacaine being comparatively less cardiotoxic and neurotoxic than bupivacaine, it also produces minimal motor blockade of shorter duration when used in spinal anaesthesia. This study was aimed to compare the intrathecal 0.75% isobaric ropivacaine for caesarean delivery with 0.5% bupivacaine heavy in pregnant patients. **Method:** 100 parturient belonging to ASA grade I & II scheduled for elective caesarean section were randomly selected for the study and are divided into two groups of 50 each. Group B patients received 2ml of 0.5% hyperbaric Bupivacaine intrathecally. Group R patients received 2ml of 0.75% isobaric Ropivacaine intrathecally. Onset and duration of sensory block, onset and duration of motor block, highest level of sensory block, quality of anaesthesia, and time of request for analgesia, hemodynamic parameters and adverse effects if any were studied. **Results:** Baseline demographic variables were similar in two groups. Neonatal outcome were also similar in two groups. Onset of sensory block at T8, time to request for analgesia, total duration of analgesia was comparable in both groups. Mean highest level of sensory block in both groups was T5 but in group R having slightly higher range (T3-T6) as compare to group B (T4-T6). Regression of sensory block at L1, duration of motor block was shorter but having longer onset of motor block in Group R as compare to group B. **Conclusion:** Ropivacaine 15 mg (2 ml of 0.75% isobaric Ropivacaine) provides comparable quality of sensory block but has slower onset and significantly shorter duration of motor block compared to bupivacaine. [Tudu L NJIRM 2014; 5(6) :44-48]

Key Words: Ropivacaine, Bupivacaine, intrathecal, caesarean section.

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Introduction: Subarachnoid block is the anaesthesia technique of choice and is gold standard for caesarean section compared to general and epidural anaesthesia, as there is chance of acid aspiration syndrome with the former and lack of reliability of block with epidural anesthesia1.

Lignocaine previously used for caesarean section was associated with very high incidence of transient neurological symptom[2]. Bupivacaine, an amide compound, a most widely used drug for spinal anaesthesia presently, having longer duration of action and associated with few adverse cardiac effects[3,4], like arrhythmias and prolonged duration of sensory and motor blockade hence there is a need to overcome these problems. The newer drug Ropivacaine being comparatively less cardiotoxic and neurotoxic[5], it also produces minimal motor blockade of shorter duration which relieves the psychological distress of being immobile for a longer period of time after Caesarean section. Hence the purpose of this study was to assess and compare the duration of sensory and motor blockade of intrathecal Ropivacaine with intrathecal Bupivacaine during caesarean section [6,7,8].

Methods: After approval from institutional ethical committee, written informed consent in Hindi and English was obtained from 100 patients of ASA grade I and II divided in two groups undergoing spinal anaesthesia for Elective Caesarean Section. Groups allocation was achieved by a computer generated randomization list.

IV access of patients was obtained on the forearm with 18 Gauge IV cannula and premedicated with ranitidine 150mg, metaclopramide 10 mg and glycopyrolate 200µg i.v. one hour prior to the surgery. Patient was preloaded with an i.v. infusion of one litre of ringer lactate solution in preoperative area. Patients were monitored for basal heart rate (HR), non invasive blood pressure (NIBP), mean arterial pressure (MAP) peripheral oxygen saturation (SpO2).

On arrival in operating room each patient was identified and then placed on a tilting operation table. Intrathecal block was performed with the

patient in sitting position using a 25-gauge Quincke's needle at the L3–4 or L4–5 intervertebral spaces using midline approach after aseptic and antiseptic precaution. The study solution (2ml) was administered over 30sec. Patient was turned gently and placed supine with left uterine displacement and supplementary oxygen at the rate of 3ltr/min was given through a Hudson facemask. After intrathecal block, HR, NIBP, MAP and SpO2 were measured every 5 min until delivery and then every 15 min in post operative period. Hypotension was defined as 20% decrease in blood pressure from baseline values, and was treated with incremental i.v. of ephedrine 5–10 mg. Bradycardia was defined as heart rate less than 60 bpm and treated with i.v. atropine 0.5mg. After giving spinal aneasthesia sensory and motor block characteristic was noted. Patient's pain was assessed immediate postoperatively, 1, 2,6,12 and 24 hours by visual analogue Scale (VAS).

Any patient with VAS score of more than 3 was administered diclofenac 1mg/kg intramuscularly. Time since spinal anaesthesia to first complaint of pain and request for rescue analgesia was recorded. The quality of anaesthesia, the quality of muscle relaxation (judged by the surgeon) and the degree of intraoperative patient comfort (judged by the patient) was recorded excellent, good, fair or poor. The condition of neonate was evaluated by APGAR scores at 1 and 5 minutes after delivery. The significance of differences in parameter between two groups were analyzed by calculating the standard error of difference between two means and by unpaired 't' test. For comparison of incidence of side effect in two group's Chi- square test was done. Mean were assessed by one-way analysis of variance (ANOVA). Statistical significance was defined as <0.05 [9,10] .

Results: Demographic parameters in both groups were comparable. There was no significant difference between the two groups in mean time to onset of sensory block at T8, (157.720±39.90sec) with Bupivacaine and (172.80±40.12sec) with ropivacaine, (P 0.0628). Maximum level of sensory block attained in group B ranged between T4 and T6, where as in group R, it ranged between T3 and T6 which was clinically and statistically highly significant (P < 0.001), Total duration of sensory block was 192.90 ± 17.750 min in group B and 199.00±19.19min in group R, which is not significant (P 0.1017).

Mean time of onset of motor block was 274.50±69.00 sec in group B and 485.20±104.18sec group R (p<0.001). Duration of motor block was 154.70±14.51 min in group B and 94.100±8.31 min in group R which is clinically and statistically significant (P<0.001).Time to request for analgesia, haemodynamic parameters and side effects were comparable in both groups.
Baby's general condition was assessed by APGAR Score in 1 minute and 5 minute, which was comparable in both the groups.

Table 1: Patient's Demographics Profile

Variables	Group B	Group R	P value
Age	24.92 ± 3.01	24.44 ± 3.55	0.4676
Weight	62.30 ± 4.38	60.80 ± 4.55	0.0963
Height	156.26 ± 3.41	155.99 ± 3.24	0.6857
ASA Grade	1.02 ± 0.14	1.06 ± 0.23	0.2961
Duration of surgery	59.80 ± 5.24	61.76 ± 8.16	0.1520

Table 2: Summary of Results

Sensory and motor block characteristic	Group B	Group R	P value
Onset of sensory block T8(sec)	157.72 ± 39.90	172.80 ± 40.15	0.0628
Highest level of sensory block(thoracic dermatomes)	5.17 ± 0.88 T5 (T4-T6)	4.55 ± 0.83 T5 (T3-T6)	P< 0.001
Regression of sensory block at L1(min)	172.42 ± 13.40	164.26 ± 17.10	0.0092
Time to request for analgesia(min)	158.50 ± 15.02	157.50 ± 12.86	0.6430
Onset of motor block(sec)	274.50 ± 69	485.20 ± 104.18	P<0.001
Duration of motor block(min)	154.70 ± 14.51	94.00 ± 8.31	P<0.001
Total duration of analgesia(min)	192.90 ± 17.70	199.00 ± 19.19	0.1017

Figure 1: Comparison of Haemodynamic Responses Detected In Study Groups.

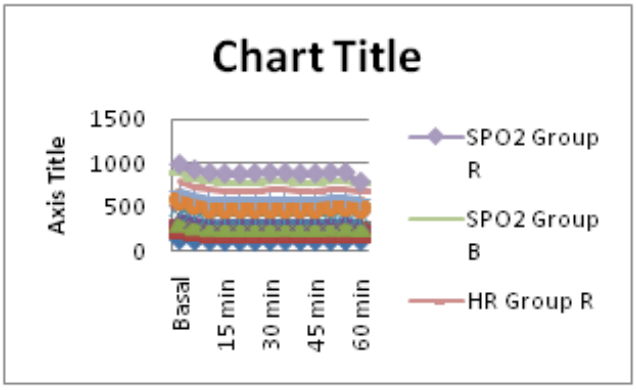

Table 3: Side Effects and Complications

Events	Group B, n=50	Group R, n=50
	n= no. of pt.	n= no of pt.
Hypotension	38	36
Bradycardia	3	0
Nausea/ Vomiting	7	5
Shivering	0	0
Respiratory depression	0	0
Headache	0	0
Urinary retention	0	0
Neurological complication	0	0

Discussion: All patients receiving either drug achieved adequate level of anaesthesia except one patient in each group who required intraoperative opoids supplementation. Various authors have considered a block upto T10 for onset of sensory blockade; however we considered T8 for onset as it was more appropriate for caesarean section. Chan-Jong Chung and colleagues[11] used 18mg of hyperbaric ropivacaine for Caesarean Delivery and found that onset time of block to T10 was 192 sec. In our study, we noted that mean time for onset at T8 was 158 sec (2.5 min) with 15 mg ropivacaine. This difference in onset time could be because of isobaric solution used in our study.

Whiteside and colleagues[12], in their study, noted that the maximum level of sensory block attained was T7 with ropivacaine and T5 with bupivacaine when 15mg of hyperbaric ropivacaine and bupivacaine were used for lower abdominal and lower limb surgeries. However, higher level of sensory blockade was noticed in ropivacaine group (T3 – T6) compared to bupivacaine group (T4 – T6) in our study. This may be attributed to use of isobaric solution of ropivacaine in our study.

Boztug and others noted that time of regression of block to L1 was faster with ropivacaine (116 ±31) min group v/s (152.2 ±64.5) min in bupivacaine group, when used for outpatient arthroscopic surgeries[13]. We also observed that regression to L1 with ropivacaine was faster compared to bupivacaine and these corroborates well with results of above mentioned study.

Chan-Jong Chung and others noted that time of regression of block to S1 was longer (188.56±28.2min) in bupivacaine group when compared to ropivacaine group (162.56 ± 20.2 min)[12]. However, we observed that regression of nerve block to S1 was comparable in both the groups in our study and concurs with observations of Kim S. Khaw; et al[14] who also noted of regression to S1 was comparable when either intrathecal isobaric bupivacaine or ropivacaine was used for caesarean delivery.

Mean duration for request of analgesia was comparable in both groups in our study and concurs with study of P. Gautier[15] colleagues who compared the effects of intrathecal ropivacaine, levobupivacaine, and bupivacaine for caesarean section

P. Gautier et al[15] compared the effects of intrathecal bupivacaine (8mg) levobupivacaine (8mg), ropivacaine (12mg), for Caesarean section and found that the mean time for onset of Gr3 bromage motor block was 9 min and 14 min for bupivacaine and ropivacaine respectively. We noticed that the mean time for onset of motor blockade was 4.9 min with bupivacaine and8.08 min with ropivacaine. Rapid onset of block in our study can be attributed to higher doses of local anaesthetics used. In our study, patients receiving ropivacaine had delayed onset of G3 motor blockade compared to bupivacaine, this is in agreement with the above mentioned study and also study conducted by Ogun and others[9].

We observed a shorter duration of motor blockade with ropivacaine compared to bupivacaine. Our findings are in affirmation with that of Chan Jong Chung and colleagues[12] who also found shorter duration (120min) of motor blockade with ropivacaine when compared to bupivacaine. Kim S. Khaw and colleagues[14] also noted shorter duration of motor block with 15mg of ropivacaine for caesarean section.

Chan Jong Chung and colleagues[12] observed complete motor block in all patients receiving either bupivacaine or ropivacaine for caesarean section. N Boztug and others[15] observed complete motor blockade in 88% of patients receiving ropivacaine and 100% patients receiving bupivacaine when administered for knee arthroscopy. All patients in our study receiving either ropivacaine or bupivacaine developed complete motor block and was in agreement with above mentioned studies.

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

In our study hypotension occurred in 38% of patients in group B and 37% of patients in group R. Bradycardia was noticed in 8% of bupivacaine group and no bradycardia in ropivacaine group. Median fall in mean arterial pressure was 24 mm of Hg with ropivacaine compared to 31 mm of Hg in bupivacaine. Incidence of hypotension was comparable in both groups, which was easily managed by ephedrine bolus. These are in affirmation well with results of Ogun and others[8] also observed comparable hemodynamic in their study.

Mean APGAR score at 1st minute was 8.78 ±0.84 and 8.78 ± 0.60 and at 5th minute was 9.02 ± 0.76 and 8.76 ± 0.77 for Group B and Group R respectively which was statistically comparable P>0.05.

Incidence of nausea and vomiting were comparable between groups in our study. Urinary retention could not be observed as all the patients were catheterized for 24 hrs. Other complication like shivering, respiratory depression, pruritus, headache, and neurological complications were not observed in any patients of both the groups.

Conclusion: Our study reveals that onset of sensory blockade was similar to that of Bupivacaine, with level of sensory block was slightly higher and regression of sensory block to L1 was significantly shorter with Ropivacaine.

But there was delayed onset of motor block and shorter duration of motor block with ropivacaine compared to bupivacaine. Hence ropivacaine can be used successfully for caesarean section where early recovery and early maternal infant bonding as well as successful breast feeding is well appreciated by mother. No depressant effect on the neonate was seen with intrathecal Bupivacaine and intrathecal Ropivacaine.

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