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A COMPARATIVE STUDY OF INTRATHECAL HYPERBARIC BUPIVACAINE AND LEVOBUPIVCAINE IN PATIENTS UNDERGOING ELECTIVE LOWER SEGMENT CAESAREAN SECTION

Anaesthesiology

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ABSTRACT

Introduction: Hyperbaric levobupivacaine represents a significant advancement in regional anaesthesia, particularly in the realm of spinal anaesthesia. Levobupivacaine is long-acting Amide local anaesthetic, which is a pure S- Enantiomer of bupivacaine, hyperbaric levobupivacaine offers a promising alternative to racemic bupivacaine, known for its potential cardiotoxicity due to the presence of both S and R enantiomers1 **Methods:** After obtaining institutional ethical committee approval, study is commenced, informed consent from the patients is taken, patients undergoing elective lower segment caesarean section (LSCS), aged between 19-35years of ASA grade-2 are included in the study The patients satisfying the inclusion criteria were either given an intrathecal drug of Hyperbaric 0.5 % bupivacaine (10mg) or Hyperbaric Levobupivacaine 0.5% (10 mg). Primary objective of the study is to observe maximum level achieved, time required to achieve the maximum level of sensory blockade, duration of effective sensory blockade and haemodynamic parameters such as heart rate, mean arterial pressure, SpO2, respiratory rate, intraoperative side effects like nausea, vomiting, bradycardia, hypotension and shivering were noted **Results:** Time to achieve sensory blockade till T6 dermatome was prolonged in group B (165.33±70.45 sec) as compared to group L (140.55±39.69 seconds) (p value= 0.085). Prolonged duration of motor blockade was observed in group B (160.55±8.04 minutes) as compared to group L (142.32±12.45 minutes) (p<0.001). Less haemodynamic stability was seen in patients of group B with more incidence of hypotension and bradycardia.as compared to group L **Conclusion:** Hyperbaric Levobupivacaine is nearly equally effective to bupivacaine to produce sensory and motor blockade with comparable onset time and better haemodynamic stability with lesser side effects6

KEYWORDS

INTRODUCTION

Regional anaesthesia, especially spinal anaesthesia (SA) is one of the most sought after technique used for the lower segment caesarean sections(LSCS)[1,2].regional anaesthesia is relatively safe, reliable and easy to perform in the LSCS in contrast to General Anaesthesia(GA), which due to physiological changes that occur during the pregnancy affecting the airway, increased chances of aspiration making it challenging to the anaesthesiologist[3] and also risk of drugs transferring to the foetus via the placenta.

Hyperbaric Bupivacaine is widely used for the LSCS because of its duration of action and faster onset, but cardiotoxicity is a concern which is a limiting factor[8], Levo Bupivacaine a newer Amide local anaesthetic which a pure S- Enantiomer of bupivacaine less cardiotoxic than bupivacaine[9] and gaining popularity in recent times. It has demonstrated less affinity and strength of inhibitory effect on the inactivated state of cardiac sodium channels than the Bupivacaine and faster protein binding rate[2].

METHODS

Ethical approval for the study was provided by the institutional ethics committee,A written informed consent was obtained from all the patient enrolled in the study 100 American society of Anaesthesiologists physical status (ASA-PS) -2 (pregnancy) aged between 19-35 years under going Elective LSCS were chosen for the study.

Exclusion criteria: Patients with short stature (height < 150 cms), history of pre-eclampsia and eclampsia, uncontrolled diabetes mellitus, history of cardiac diseases, morbid obesity and coagulopathies are excluded from the study 100 patients Are divided into two groups, 50 in each group, (group b and group L)
Group B received 10mg (2cc) of hyperbaric bupivacaine
Group L received 10mg (2cc) of hyperbaric levobupivacaine

Primary objective of the study is to observe maximum level achieved, time required to achieve the maximum level of sensory blockade, duration of effective sensory blockade and haemodynamic parameters such as heart rate, and vital parameters like pulse rate, mean arterial pressure, SpO2 respiratory rate, intraoperative side effects like nausea, vomiting, bradycardia, hypotension and shivering were recorded

Patients were examined pre-operatively and detailed pre anaesthetic examination was done. All routine investigations were carried out. The patients were Nil per oral (NPO) for 6 hours prior to the scheduled time of surgery. They were premedicated with tablet pantoprazole 40 mg orally a night before. In the operating room, monitoring comprising of electrocardiography (ECG), pulse oximetry (Spo2) and Non-Invasive Blood Pressure (NIBP) were established. Baseline readings of vital parameters were recorded. Intravenous line was secured with 18G or 20G. with patient in left lateral position, under all aseptic precautions, spinal anaesthesia was administered at the L3-L4 interspace using 25G Quincke Babcock's spinal needle and the study drug injected. The patient was made in to supine. Sensory block was assessed using Pin prick test and patients asked about the sensation every one minute till 5 minutes and reassessed every 5 minutes for 15 minutes and every 20 minutes post operatively until sensory block was back to L2 dermatome level. Loss of sensation to pinprick till T6 dermatome level was considered adequate for commencement of surgery. Time taken to achieve sensory blockade till T6 dermatome level was recorded (time between intrathecal administration of drug and spread of sensory block till T6 level).

Maximum level of sensory block achieved, time taken to attain maximum height of the block and duration of sensory block (interval from intrathecal drug administration to the point of L2 regression) was recorded. Modified bromage scale is used to assess motor blockade[9], assessed at the same interval as sensory block[3]. Onset time of motor blockade was recorded and taken as interval between intrathecal administration of drug till Bromage score of 3 was achieved.

Duration of block was noted (interval from intrathecal drug administration to the point at which Bromage score was back to zero). Haemodynamic parameters of the patient before the block (basal), every one minute till 5 minutes then after every 5 minutes till the end of surgery were recorded. Any episode of hypotension, bradycardia, nausea and vomiting were recorded.

Mephentermine 6mg IV stat was administered to treat hypotension and, whenever needed, glycopyrrolate 0.2 mg IV was administered when the HR dropped to 50beats/min or <20% of the basal value. Episode of nausea and vomiting was treated by injection ondansetron 4mg IV. The comparison of normally distributed continuous variables between the groups was performed students T test. nominal categorical data between groups were compared using chi-square test, p value 0f < 0.05 was considered statistically significant.

RESULTS

Data of all 100 patients enrolled in the study were included in the analysis The age, weight, height and duration of the surgery of the

patients were comparable in both the groups in (table1), mean time to achieve sensory blockade till T6 level is higher in group B (165.33±70.45) when compared to group L is (140.55±39.69 sec) and time to achieve maximum height of sensory block was also higher in group B (260.08±98.55) when compared to group L (225.03±86.34) time of regression of sensory block till L2 level was faster in group L, maximum height of sensory blockade achieved in both the groups was T4, 39 pt in group b and 37 in group L, significant difference in P <0.001 was found in time to achieve motor blockade till Bromage-3 group B (320.23±80.78 sec), group L (420.33±144.55 sec) and time to regression of motor blockade group B (160.55±8.04 mins) vs group L (142.32±12.45 mins), (table-2)

The haemodynamic measurements revealed consistent mean heart rates in both groups. However, Group B exhibited a slight decrease in mean arterial pressure compared to Group L (figure 1 and figure 2) though this decrease did not reach statistical significance.

PATIENT PARAMETERS	GROUP B (n-50) Mean±SD	GROUP L (n-50) Mean±SD
Age (year)	23.55±4.17	23.48±5.16
Height (cm)	155.34±4.31	155.40±5.55
Weight (kg)	58.02±8.13	59.26±7.32
Duration of surgery (min)	58.50±10.55	59.50±9.60

blockade evaluation	Group-B Mean ±SD	Group-L Mean±SD	P value
Time to achieve sensory blockade till T6 level	165.33±70.45	140.55±39.69	0.085
Time taken to achieve maximum height sensory block (sec)	260.08±98.55	225.03±86.34	0.08
Time of regression of sensory block till L2 level(min)	200.34±8.54	178.55±28	<0.001
Maximum height of sensory blockade	T4(39) T6(11)	T4(37) T6(13)	0.34
Time to achieve motor blockade till bromage score 3 (sec)	320.23±80.78	420.33±144.55	<0.001
duration of the Motor block (bromage 0) (mins)	160.55±8.04	142.32±12.45	<0.001

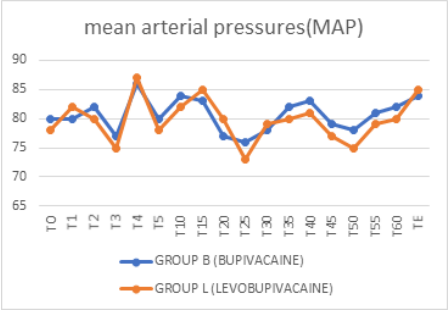

Figure 1 comparison of MAP between two groups

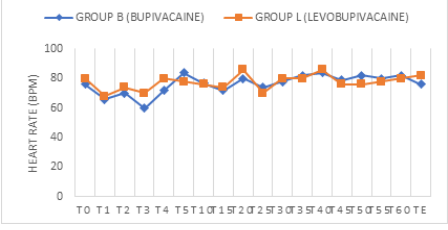

Figure 2 comparison of HR between two groups

DISCUSSION

In this study, both groups showed comparable demographic characteristics including age, weight, and height, with no statistically significant differences observed. Additionally, both groups achieved the required sensory block level for caesarean section adequately. However, group L demonstrated a shorter time to achieve the T6 sensory level compared to group B. (group L 140.55±39.69 sec, group B 165.33±70.45 Sec) indicating early onset with Levobupivacaine. Kaur K et al compared hyperbaric bupivacaine 0.5% and isobaric Levobupivacaine 0.5% in patients undergoing caesarean section showed similar duration in their studies. Kumar S et al reported similar timings in the onset of sensory blockade, whereas total duration of motor blockade is prolonged the variations may be because of the difference in the volume of drug used (2.5ml). Sudeep, N Gopal Reddy et al[5] compared isobaric levobupivacaine 0.5% with clonidine in group -1 and 0.5% hyperbaric bupivacaine in group-2 in lower limb surgeries, their showed similar duration in onset of sensory blockade (2.25±0.19 mins and 2.48±0.18 mins in group-1 and group -2 respectively) whereas onset of motor blockade time was significantly higher than recorded. Majority studies and our present study observed that bupivacaine took longer time to achieve the maximum height as compared to levobupivacaine[3,4]. Bupivacaine still proven to provide longer duration of analgesia as compared to levobupivacaine[7]. Present study illustrated that, time to achieve motor blockade till modified bromage score-3 was faster and duration was longer in group B as compared to group L. time of the motor blockade recovery was more variable in levobupivacaine group range from 90 mins to 180 mins in few patients. Our results were nearly comparable with results of kaur k et al [3]

Incidence of nausea and vomiting higher in bupivacaine group when compared to levobupivacine group but not statistically significant[4,7]. Levobupivacaine has a reduced affinity for Aα fibers (somatic motor fibers) compared to bupivacaine, potentially leading to a milder motor blockade[1]. These characteristics collectively contribute to shorter durations of both motor and sensory blocks in patients administered with levobupivacaine[6]

CONCLUSION:

We found that using single-shot spinal anaesthesia with both types of local anaesthetics drugs achieves rapid and effective onset of surgical anaesthesia for elective caesarean sections. Levobupivacaine, which offers shorter motor block duration and better haemodynamic stability, represents a preferable alternative for caesarean sections.

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