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RESEARCH ARTICLE

COMPARISON OF HYPERBARIC LEVOBUPIVACAINE/ BUPIVACAINE FOR CESEREAN SECTION

Dr. Manisha Kapdi[1], Dr. Vandana Shah[2], Dr. Ekta Soni[3], Dr. Dharmeshkumar Bhagwani[4] and Dr. Kinjal Vaghamshi[5]

1. Professor H.G in Anaesthesia, Narendra Modi Medical Collage, Ahmedabad.
2. Associate Professor H.G in Anaesthesia, Narendra Modi Medical Collage, Ahmedabad.
3. Associate Professor H.G in Anaesthesia, Narendra Modi Medical Collage, Ahmedabad.
4. Tutor in Anaesthesia, Narendra Modi Medical Collage, Ahmedabad.
5. Ex Resident in Anaesthesia, Narendra Modi Medical Collage, Ahmedabad.

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Abstract

Background : Bupivacaine is the most popular local anesthetic agent in obstetric practice Levobupivacaine showed a lower risk of cardiovascular and central nervous system (CNS) toxicity compared to Bupivacaine The **aim** of this study was to investigate the clinical efficacy of levobupivacaine compared with hyperbaric bupivacaine for spinal anesthesia for cesarean section.

Methods: 60 pregnant women in ASA I - II group scheduled to have elective cesarean operation were allocated into the study. Patients were randomly divided into two groups. 10 mg levobupivacaine (0.5%) for Group L (n = 30) patients, 10 mg hyperbaric bupivacaine (0.5%) for B (n = 30) patients were intrathecally administrated a total of 2.0cc. Sensory and motor block characteristics of the groups were assessed with pinprick and Bromage scale; observed hemodynamic changes and side effects were recorded.

Results: The time to reach maximum dermatome for the sensory block, time to regression by two dermatomes and time to regress to T12 dermatome was found to be significantly long in Group B. It was observed that in Group B, the motor block was faster and lasted longer. Where as hypotension, bradycardia and nausea were less in Group L, the need for ephedrine was higher in Group B ($p < 0.05$). Conclusion: Since motor block time is shorter, and side effects like hypotension, bradycardia and nausea are less, levobupivacaine can be a good alternative in cesarean sections.

Introduction:-

Hyperbaric Bupivacaine is favored in obstetric anesthesia. Although hyperbaric local anesthetic solutions have a remarkable record of safety, their use is not totally without risk [7-9]. To prevent unilateral or saddle blocks, patients should move from the lateral or sitting position rapidly and after mobilization of the patients, extension or early return of the block may be seen. Hyperbaric solutions may cause sudden cardiac arrest after spinal anesthesia because of the extension of the sympathetic block [10,11]. Hyperbaric solutions may cause hypotension or

Corresponding Author:- Dr. Kinjal Vaghamshi
Address:- Ex Resident in Anaesthesia, Narendra Modi Medical Collage, Ahmedabad.

bradycardia after mobilization,12].Levobupivacaine is the pure S (-) enantiomer of racemic bupivacaine but is less toxic to the heart and CNS [13,14].

In this randomized, double-blind observational study, we evaluated the quality of the block and the incidence of side effects, particularly hypotension and compared with clinical effect of hyperbaric bupivacaine in spinal anesthesia for cesarean sections.

After institutional ethical approval and written informed consent were obtained, 60 women enrolled for elective Caesarean delivery, at more than 37 weeks' gestation, ASA physical status class I or II, were enrolled into this randomized, double-blind observational study.

Exclusion criteria

Patients refusing regional anesthesia, having contraindications to spinal anesthesia, those with a body weight over 100 kg, shorter than 1.50 cm and taller than 1.75, those who received medications other than perinatal vitamin and iron preparations, having systemic diseases, expectant mothers with fetal anomaly,twins babies, placenta previa, abruptio placenta were excluded from the study.

Following application of routine monitors (noninvasive BPmeasurement,electrocardiography, and pulse oximetry) and insertion of a peripheral 20 G i.v cannula, a rapid infusion of lactated Ringer's solution 10 ml/kg was administered. Baseline systolic BP and heard rate were calculated as the mean of the three recordings. Patients were placed in the sitting position. After disinfecting the skin and infiltrating with 2% lidocaine, lumbar puncture was performed at the L3-4 interspace using a 25-gauge Quincke point needle. Patients were randomly divided into two groups lateral supine position. In Group B inj bupivacaine heavy 0.5%10 mg 2 cc & in Group L inj Levobupivacaine heavy 0.5%heavy 2 cc given intrathecaly after free flow of CSF .Oxygen 4 L/min was administered via a facial mask. The sensory level of spinal anesthesia was assessed bilaterally in the anterior axillary line by pinprick, using a short beveled 25 G needle, and was recorded at baseline prior to spinal injection, then every minute for the first 15 min after injection, and every five minutes for the next 30 min, and at 45 min. Blood pressure, heart rate, and the extent of motor block were recorded at the same measurement intervals. Permission to perform operation was given once a T4-T6 level had been achieved. Considering the time of intrathecal injection as time zero, the time to onset of sensory block, the time taken to reach maximum sensory block level, the time to regression of two dermatomes of the sensory block, the duration of the regression of the sensory block level to T12 from the maximum level were recorded. The level of motor block was
assessed with modified Bromage scale (0 = no paralysis,
able to flex hips/knees/ankles; 1 = able to move knees, unable to raise extended legs; 2 = able to flex ankles, unable to flex knees; 3 = unable to move any part of the
lower limp). The time to onset of motor block, the time to reach Bromage 3 and the time of complete disappearance were recorded. Bradycardia was defined as pulse rate < 50 bpm, and it was treated with 0.5 mg IV atropine. IV boluses of 6 - 12 mg mephentermine and additional IV fluids were administered to treat hypotension, which was defined as systolic blood pressure below 100 mm Hg or a decrease systolic pressure of >25% from baseline value.

The amount of mephentermine used for each patient was recorded. Whether there was a need for intraoperative analgesia and time to first analgesic requirement in the postoperative period were recorded and the planned treatment included incremental 25 µg boluses of IV fentanyl, or general anesthesia. Intraoperative and postoperative nausea and vomiting, and other side-effects were recorded. Patients were inquired for transient neuronal sequale (TNS) was inquired & treated with standered anaesthesia care.The calculation of the required sample size was based on mean and standard deviation of complete regression of spinal block after anesthesia with bupivacaine and levobupivacaine reported in previous investigation (3,4),30 patients per group were required to detect a 20- min difference in time for complete regression of spinal anesthesia with an expected effect size to standard deviation ratio of 0.9 accepting a two-tailed error of 5% and alpha error of 20%. Statistical assessment of the data was carried out using the statistical SPSS software. p value < 0.05 was considered to be statistically significant.

Results:-

Table 1:- Demographic parameters.

Parameters	Group B(n=30)	Group L(n=30)	P value	Inference
Age(yrs)	27.09 ± 1.22	26.88 ± 2.21	>0.05	NS

Height(m)	1.62 ± 1.4	1.61 ± 1.6	>0.05	NS
Weight(kg)	56.2 ± 3.4	57.5 ± 2.3	>0.05	NS
Gestation weeks(n)	37.5 ± 0.7	36.9 ± 0.5	>0.05	NS
Duration of surgery	35.4 ± 5.6	36.2 ± 4.3	>0.05	NS

There has been no statistical difference between groups in terms of their demographic characteristics and the duration of the operation .

Table2:- Sensori - motor Charisteristics.

Parameter	Group B(n=30)	Group L(n=30)	P value	Inference
Onset of sensory block(mins)	2.05±0.5	2.26±0.2	>0.05	NS
Time to T10 level(mins)	3.45±0.4	3.50±0.6	>0.05	NS
Time to 2 segment regression(mins)	58.7±4.2	45.6±3.6	<0.05	NS
Time to regression to T12(mins)	100.5±10.8	91.2±4.5	<0.05	S

Time to regression to T12 The time to onset of motor block in Group B was shorter than Group L ($p < 0.05$).Highest level achieved in Group B was T3-4 & Group L was T4-5.

Table 3:-

Parameter (mins)	Group B(n=30)	Group L(n=30)	P value	Inference
Onset of motor block	2.56±0.4	3.45±1.2	<0.05	S
Time to Bromage 3	4.2±1.0	5.3±1.4	<0.05	S
Time to Bromage 1	122.4±2.6	94.5±3.2	<0.05	S

Motor block developed faster and lasted longer with bupivacaine group($p < 0.05$) .

Table 4:- Adverse reactions.

Adverse effects	Group B(n=30)	Group L(n=30)	P value	Inference
Hypotension	10	4	<0.05	S
Bradycardia	8	1	<0.05	S
Nausea-vomiting	10	3	<0.05	S
TNS	1	1	>0.05	NS

Hypotension and bradycardia were more common in the B group. In addition, nausea was noticed more frequently in the B group ($p < 0.05$) .Transient neurological sequale incidence was same in both group.($P>0.05$)

Table 5:- Total Mephentermine & Time to first rescue analgesia.

Parameter	Group B(n=30)	Group L(n=30)	P value	Inference
Total mephentermine required(mg)	15.0±2.3	6.2±2.4	<0.001	HS
Time to first rescue analgesia(mins)	132.6±2.3	85.4±4.3	<0.001	HS

It was observed that the requirement of intraoperative mephentermine was higher in Group B and the time to first analgesic requirement was longer in Group B ($p <0.001$) ..In both groups neonates of all partueient cry imidiately so foetomaternal outcome was good.

Discussion:-

Regional anaesthesia is common for LSCS for better foetomaternal outcome.Bupivacaine is commonly used for same.Bupivacaine is commonly used Local anaesthetic for same.we have also used hyperbaric levobupivacaine as it is haemodynamic safe.

In our study, sensory block levels required for cesarean sections were achieved in both groups, and it was observed that the hemodynamic stability with levobupivacaine was better maintained. In most of the studies where the same doses of levobupivacaine and bupivacaine were investigated, sensory and motor block characteristics were found to be similar. Glaser et al. compared 3.5 ml [8] and Fattorini et al. compared 3 ml [9] 0.5% isobaric bupivacaine with levobupivacaine, and both reported that there was no significant difference in terms of maximum distribution, and

durations of sensory and motor block. In a study on urological surgery, it has been reported that 2.5 ml 0.5% isobaric levobupivacaine and 2.5 ml 0.5% hyperbaric bupivacaine had equal effects in spinal anesthesia and that the time to onset of sensory block and duration of sensory blockage were similar [10]. In a dose-effect study comparing racemic bupivacaine and levobupivacaine in patients undergoing urological surgery, Lee et al. [11] reported that 2.6 ml 0.5% racemic bupivacaine and levobupivacaine have a nearly equivalent clinic profile and hemodynamic effects. In another study conducted in volunteers, spinal anesthesia was administered in doses of 4, 8, 12 mg by using hyperbaric spinal levobupivacaine and racemic bupivacaine, sensory and motor block characteristics in different doses were compared. It has been reported that in the same doses hyperbaric levobupivacaine and racemic bupivacaine had the same effects [12].

We observed in our study that maximum sensory block the level in the bupivacaine group was higher and the development the motor block was faster and lasted longer.

Gautier et al. [13] during spinal anesthesia for caesarean delivery ,compared the same doses of levobupivacaine and bupivacaine, and reported that while adequate anesthesia was maintained in the 97% of the patients in the bupivacaine group, this rate was 80% in the levobupivacaine group, and duration of motor block and analgesia was shorter in the levobupivacaine. In our study also, sensory and motor block durations were found to be shorter in the levobupivacaine group.

The effects of baricity on the block characteristics have been contradictory in literature: while some studies that report the difference in baricity does not affect block characteristics [13] on the one hand, there are also studies reporting that the motor block develops and disappears faster when hyperbaric solutions are used [14] on the other hand. Prior to our research, we undertook a pilot study using the different dosages given in the literature, to determine the dosages to be used in our study. Hypotension is the most common complication in the spinal anesthesia [17]. It is known that besides its effects on the mother, it causes acidosis by altering uteroplacental perfusion. Administering hydration using crystalloid or colloid before the spinal anesthesia has proved insufficient [18]. Titti et al. [19] reported that the rate of occurrence of hypotension was 62% in elective cesarean operations in which they administrated spinal anesthesia with 2.5 ml 0.5% bupivacaine. In our study, the incidence of hypotension with bupivacaine was found to be 36.6% as we have taken 2 cc of hyperbaric bupivacaine. The incidence of hypotension was significantly reduced to 16.6% in the doses we used in the levobupivacaine group.Fattorini et al. [9] reported that although they did not observe a significant difference in the sensory and motor block characteristics of levobupivacaine and bupivacaine among 60 patients who undergo major orthopedic surgery, they did not find severe hypotension and better cardiovascular stability was provided in the levobupivacaine group, Parpaglioni et al. [20] investigated minimum local anesthetic dose in caesarean sections, and they reported that in the levobupivacaine group, in which they administered similar doses with our study, the incidence of hypotension decreased significantly. Glasser et al. [4] same as our study, reported that levobupivacaine, compared with bupivacaine, causes less bradycardia, and that reduces arterial pressure less. In regional anesthesia for cesarean sections, nausea and vomiting can occur due to a few factors. The most important reason is that cerebral blood flow decreases in consequence of hypotension. It may as well occur because of an increase in the block level, or because of the fact that structures related to peritoneal stretch during the operation due to an inadequate block level. We can explain the reduced incidence of nausea occurred in the levobupivacaine group with the fact that the doses we administered developed adequate blocks, and caused less hypotension.

Conclusion:-

In nutshell We conclude that spinal anesthesia with both local anesthetic drugs provides fast and effective induction of surgical anesthesia for elective cesarean section. Since motor block time is shorter, and side effects like hypotension, bradycardia and nausea are less, levobupivacaine can be a good alternative in cesarean sections.

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