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INFLUENCE OF ADDITION OF SMALL DOSE OF LIGNOCAINE TO BUPIVACAINE INDUCED SUBARACHNOID BLOCK IN CAESAREAN SECTION

Anaesthesiology

Raghuwanshi Apurva Consultant Anesthesiologist, Villoo Poonawalla Memorial Hospital Hadapsar, Pune, Maharashtra.

Naitam Jyoti* Associate professor, Department of Anaesthesiology, Government medical college Gondia, Maharashtra, India. *Corresponding Author

ABSTRACT

Background: Low dose intrathecal lidocaine has vasodilatory effects and increases the local anesthetic clearance from the intrathecal space. Hence the present study was undertaken to study the effect of addition of lidocaine to bupivacaine on the duration of spinal block. **Method:** A total of 80 patients posted for caesarean section planned under spinal anesthesia requiring sensory level up to T6 and duration from 1 to 1.5 hours were divided into two equal groups. Patients received either 1.8 ml hyperbaric bupivacaine + 0.3 ml Inj. Lignocaine 2% (preservative free) [Group BL, n=40] or 1.8 ml hyperbaric bupivacaine + 0.3 ml normal saline [Group BS, n=40].The sensory motor characteristics were measured and compared between two groups. **Results:** Spinal block resolved faster in group BL than group BS; 299.75± 27.02 min versus 335.62± 50.29 min (p=0.002). There was no significant difference found between groups with respect to the incidence of adverse events and treatments. **Conclusion:** The addition of small dose (6 mg) of lidocaine to hyperbaric bupivacaine in caesarean section can shorten the duration of bupivacaine spinal block and thereby providing more rapid recovery.

KEYWORDS

Lidocaine, Hyperbaric Bupivacaine, Spinal anesthesia, Intrathecal, Sensory, Motor

INTRODUCTION

Obstetric anaesthetists are faced with the unique situation of providing anaesthesia for caesarean sections, where anaesthetists have to provide care for both the mother and the unborn baby. A team approach is vital to ensure optimal outcome while ensuring that the labour process is a safe and pleasant experience for the parturient. There has been an increasing trend in the caesarean section rate in the last two decades, at the same time; there has been a move towards more caesarean sections being performed under regional anaesthesia compared to general anaesthesia [1].However, the type of anaesthesia chosen for caesarean section is dependent on numerous factors such as the urgency and indication of the operation, maternal preference as well as coexisting medical problems [2].

In addition, the duration of the spinal block in short or medium duration procedures is a concern for anaesthetists. Till now this problem could be easily managed by selecting 5% hyperbaric lignocaine for subarachnoid block. But now the availability of this drug is erratic. Needless to say that anaesthetists in this part of the country has no option but to use 0.5% hyperbaric bupivacaine for subarachnoid block of various surgeries irrespective of their short duration. Also, lower doses of long acting local anaesthtics compromise the efficacy of anaesthesia. When using spinal anaesthesia for ambulatory surgery, recovery of the sensory and motor functions should be fast and predictable after completion of the surgical procedure [3].

Moreover, the most commonly used local anaesthetic agent for spinal anaesthesiais hyperbaric lignocaine and bupivacaine. Bupivacaine is widely accepted as a safe and reliable drug but may have duration of action too long for short surgical procedures such as caesarean deliveries and inguinal herniorraphy. It has been shown in animal studies that low dose lidocaine has vasodilatory effects and increases the local anesthetic clearance from the intrathecal space [4, 5]. Thus there emerged the need to evaluate above fact through a study on human beings. Therefore, in the present study, we have investigated whether intrathecallidocaine added to bupivacaine could shorten the duration of motor as well as sensory blockade of bupivacaine spinal anaesthesia, thereby providing more rapid recovery from the spinal anaesthesia.

MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval and written informed consent from all the patients, this prospective, randomized & double blinded study was conducted in the Department of Anaesthesiology at Tertiary Care Hospital during a period of two years from November 2015 to November 2017. Total 80 patients of ASA grade I & II, age between 20 to 40 years, height 140 to 160 cms, primi& multi-gravida, full term/near term in labour and who posted for caesarean section under spinal anesthesia requiring sensory level up to T6 and duration from 1 to 1.5 hours were included in the study. Patients with no consent, ASA grade III & IV, age <20 and >40 years, high risk pregnancy & precious pregnancy, fetal distress, pregnancy with co morbid conditions (Diabetes mellitus, Hypertension, Heart disease, PIH etc) and contraindications to spinal technique (Local infection, Bleeding diathesis/Coagulation disorder, Vertebral column deformities, etc) were excluded from the study.

A detailed medical and surgical history, clinical examination and all necessary investigations were done for all the patients. After pre-anaesthetic assessment and obtaining consent, patients were randomly divided into two equal groups. The randomization of the patients was done alternatively on the basis of intrathecal drug administered. Group BL (40 patients) received 1.8 ml hyperbaric bupivacaine + 0.3 ml Inj. Lignocaine 2% (preservative free) while group BS (40 patients) received 1.8 ml hyperbaric bupivacaine + 0.3 ml normal saline.

Patients were kept overnight nil by mouth prior to the procedure. 18-gauge venous cannula access was secured and patients were premedicated with injection ondansetron 0.08 mg/kg intravenous (IV) and Ranitidine 1 mg/kg IV, also, pre-loaded with 15 ml/kg of lactated Ringers solution 15-20 mins before spinal block. Under all aseptic precautions subarachnoid block was administered with 23 gauge Quincke spinal needle in L3-L4 interspace. Midline approach in left lateral or sitting position was taken. After free clear adequate cerebrospinal fluid flow was observed and intrathecal space confirmed drug was administered. Fluid therapy was maintained with lactated Ringer s solution 10 mL/kg/h. Time of injection of local anaesthetic was counted as zero hour.The person who was injecting the spinal drug was different from the observer who noting the parameters.

Hemodynamic parameters such as pulse rate (PR), systolic blood pressure (SBP), meanarterial blood pressure (MBP) were monitored every 3 min for the first 30 mins and then subsequently every 10 min until 60 min or completion of surgery which ever was later.ECG and SPO2 were continuously monitored till completion of the procedure. Any episode of bradycardia or hypotension within 24 hours was noted. Hypotension was defined as decrease in systolic arterial pressure below 90 mmHg or a fall in BP by >20% of baseline and it was treated with a rapid infusion of crystalloid (200ml) and a bolus of Injection Mephentramine 6 mg IV if it persisted.Bradycardia (HR<50per minute) was treated with injection Atropine 10 mcg/kg IV.

Onset of sensory block was assessed by pinprick sensation tested every 30 seconds from "0" hour at one fixed dermatome level i.e. L1. Maximum sensory level (MSL) achieved by each patient within initial 30 minutes and also time required to achieve MSL was recorded. Duration of sensory block was the time to regression of block till S2

i.e.dull sensation felt. Time from intrathecal injection to highest sensory level (maximum block height) was also noted. Motor block was assessed by modified Bromage scale. Onset of motor block was the time required to reach modified Bromage 3.Time needed for motor action to regress to grade 1 was taken as the duration of motor block. Intraoperative or post-operative incidence of bradycardia, hypotension, nausea/vomiting, prolonged sedation were noted and managed accordingly.New born outcome was assessed by Apgar score by the pediatrician, not otherwise involved in the study at 1, 5 and 10 minutes.Patients following surgery were transferred to the post anesthesia care unit (PACU).

STATISTICALANALYSIS

Data analysis was done by using SPSS (Statistical package for social sciences) version 20:0 and Microsoft excels software.Qualitative data variables were expressed by using frequency and percentage (%). Quantitative data variables were expressed by using mean, SD, Median and Range. Two independent sample t-test/ Mann-Whitney U test were used to find the significant difference between two independent groups for quantitative data variables. Chi-square test / Fisher's exact test was used to find the significance between two independent groups with qualitative data variables.P-value < 0.05 was considered as significant and p value < 0.01 was considered as highly significant.

RESULTS

A total of 80 patients were enrolled in the study and divided into two groups of 40 patients in each group. The majority of the patients were in the age group of 21-25 years (22 patients in each group). However, both the groups were comparable and found no significant difference among the groups (P> 0.05) in regards to demographic profile and duration of surgery as shown in table 1.

Table 1: Demographic data of the patients and duration of surgery

Parameters	Group BL	Group BS
Age (years)	25 ± 2.2	25 ± 2.5
Weight (kg)	54 ± 8.6	55± 8.5
Height (cm)	150± 2.1	150± 2.5
Duration of surgery (min)	60.18 ± 7	61.63± 6

In the present study even though there was decrease in the pulse rate in both the groups, it was clinically insignificant and no patient developed significant bradycardia intra-operatively therefore none of the patient required treatment with atropine. A falling trend of both mean systolic and mean arterial pressure was observed in both the groups after giving spinal block. But the fall was seen to be more in group BS. Thus it indicated mere stable hemodynamics in patients of group BL, (Figure 1).

Figure 1: Comparison of hemodynamic parameters between two groups

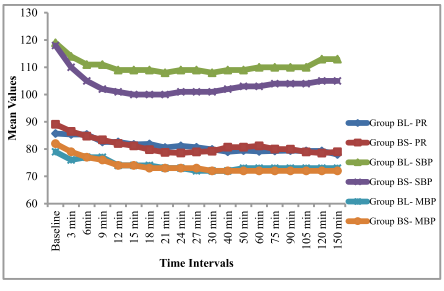


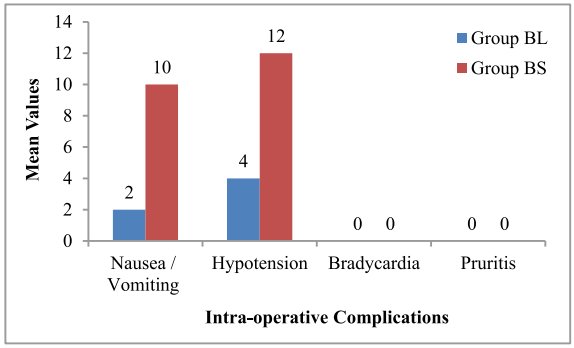
Table 2 summarizes the time course of spinal anesthesia in the two groups. The onset of sensory block was found to be faster in group BL than group BS and it was statistically significant (p<0.05). Time needed to reach highest sensory level was significantly (p=0.088) less in group BL as compared to group BS. Majority of patients had developed T6 levels; however lower level of T8 was found in only 4 patients of group BL as against 7 in group BS.

Table 2: Onset and Recovery Profile of Sensory and Motor Block

Sensory motor characteristics	Group BL	Group BS	P Value
Max sensory block level	T4-T8	T4-T8	NS
Onset of sensory block(sec)	51± 10	80.25± 35	<0.0001
Time to L1 block(min)	2.88 ± 1.47	3.91± 1.29	<0.0014
Time to T10 block(min)	5.02 ± 1.71	6.00± 1.75	0.0141
Time for maximum height of block (min)	6.57 ± 2.02	7.68 ± 1.63	0.0088
Motor block(min) (Bromage grade 3)	3.8 ± 1.55	4.8± 1.52	0.0048
Onset of motor block	72 ± 15	168± 66	<0.0001
Duration of motor block	155.62 ± 23.61	183.25± 18.09	<0.0001
Recovery Profile (in min)	**Group BL**	**Group BS**	**P Value**
Time to 2-level regression	43.75 ± 10.30	67± 13.34	<0.0001
Time to T10 regression	73± 7.9	92± 15.33	<0.0001
Time to L1 regression	133.62 ± 23.83	156.12± 17.23	<0.0001
Time to S2 regression	299.75± 27.02	335.62± 50.29	0.002

There was nosignificant difference between intraoperative complications in group BL andgroup BS as depicted in figure 2.

Figure 2: Complications or side effects



DISCUSSION

In the present study, group BL received mixture of hyperbaric bupivacaine 0.5% (9 mg= 1.8ml) and 2% Inj. lidocaine 6mg (0.3 ml); total volume=2.1 ml intrathecally while group BS received mixture of hyperbaric bupivacaine 0.5% (9 mg= 1.8ml) and Normal saline (0.3 ml); total volume=2.1 ml intrathecally.Lee et al [6], assigned patients presenting for transurethral resection ofbladder tumor or prostate to one of three groups to receive intrathecal 1.5 mL ofhyperbaric 0.5% bupivacaine, plus 0.6 mL of one of three solutions: saline(Group I, n = 30, control), 1% lidocaine (Group II, n = 30, 6mg), and 2%lidocaine (Group III, n = 30, 12mg).El-Adawy et al [7] assessed the effectof intrathecal Bupivacaine–Lidocaine combination at different doses ofLidocaine (6 and 12 mg) on the onset and recovery of anesthesiafor electivelower abdominal surgery.For present study, we tried to search 1% lidocaine preservative free but since it was not available we used 0.3 ml 2% lidocaine preservative free (6mg) solution marketed for use in cardiology.

As regard the characteristics of sensory and motor block, the onset was found to be faster in group BL,also the time to reach sensory blockade at L1 level and T10 level was found to be faster in group BL than group BS. Similar results were recorded by Yazicioglu et al [8] and Yazicioglu et al [9].Time needed to reach highest sensory level was significantly(p<0.05) less in group BL as compared to patients of group BS which is comparable with the study done by El-Adawy et al [7]. Regarding the recovery profile, time for two segment regression, regression to T10 level, L1 level, and S2 level was significantly shorter in patients receiving low dose lidocaine, these findings corresponding with previous studies [6, 7, and 9].The additional lidocaine might have induced vasodilation of spinal blood vessels, increasing the clearance of bupivacaine from the intrathecal space.

Thus, the results of present study showed that the addition of 0.3 ml of 2% lidocaine (6mg) to 1.8 mL of 0.5% hyperbaric bupivacaine for intrathecal injection for caesarean section can shorten the duration of bupivacaine spinal block and thereby providing more rapid recovery. This is an important finding because decreasing the PACU time by at least 10% makes it possible to decrease the number of patients in PACU by 20% this enables PACU's to lower the costs, increase the number of patients admitted, increase the quality of care delivered and reduce the risks after anesthesia [11]. The factors that influence the height of spinal anesthetic block include volume, concentration, baricity, site of injection, and patient position. [10] The specific

gravities of 1% and 2% lidocaine are almost equivalent to saline, [12] minimizing the effects of baricity.On the contrary to our study, Husum et al [13] concluded that the addition 0.6ml of lidocaine 1% to 2.0 ml of intrathecal hyperbaric bupivacaine 0.5% did not shorten the duration of sensory or motoric blockade or the time to discharge of the patient from the PACU. This difference in outcome can be related to differences in methodology, since in his study, the bupivacaine dose was higher and the patients stayed in the lateral decubitus position after the intrathecal injection.

The intra-operative, postoperative hemodynamic and oxygen saturation were foundbe non-significant between two groups. Stable hemodynamic response with the intrathecal mini-dose lidocaine added to bupivacaine may be due to the fact that a smaller dose of anaesthetic allows for activation of homeostatic vasoconstrictive compensatory mechanisms [10]. The Apgar scores of neonate at 1,5 and 10 minutes were comparable inboth the groups. Only 2 patient in group BL and10 patients in group BS were complained of nausea/vomiting.10% of the parturientsdeveloped hypotension in group BL while 30% in group BS had hypotension.The hypotension was treatable by giving 200 ml IV ringer lactate fast. Out ofthose who developed hypotension, only 5% required vasopressor in the form of6 mg Mephentramineiv bolus in group BL, while in group BS 22.5% neededvasopressor. These findings are correlated with the previous studies [6-9].

CONCLUSION

From the results of present study, it can be concluded that the addition of small dose (6 mg) of lidocaine to hyperbaric bupivacaine in caesarean section can shorten the duration ofbupivacaine spinal block, thereby providing more rapid recovery andit is safe and effective without any adverse effect on maternal andneonatal outcome.

REFERENCES

1. Yeoh SB, Leong SB, Heng AS. Anaesthesia for lower-segment caesarean section: Changing perspectives. Indian J Anaesth. 2010;54(5):409-414.
2. Banerjee A, Sarkar D, Bhadra B. Evaluation of anaesthetic techniques for caesarean. Int J Res Med Sci 2018;6:1742-6.
3. https://www.openanesthesia.org/spinal_anesthesia/ and https://www.nysora.com/techniques/neuraxial-and-perineuraxial-techniques/spinal-anesthesia/
4. Clement R, Malinovsky JM, Corre P, et al. Spinal biopharmaceutics of bupivacaine and lidocaine by microdialysis after their simultaneous administration in rabbits. Int J Pharm.2000;203:227---34.
5. Clement R, Malinovsky JM, Le Corre P, Dollo G, Chevanne F, Le Verge R. Cerebrospinal fluid bioavailability and pharmacokinetics of bupivacaine and lidocaine after intrathecal and epidural administration in rabbits using microdialysis. J PharmacolExpTher 1999;289:1015–21.
6. Lee SJ, Bai SJ, Lee JS, Kim WO, Shin YS & Lee KY. The duration of intrathecal bupivacaine mixed with lidocaine. Anesthesia and Analgesia 2008; 107(3), 824–827.
7. El-Adaway S, AzzaAbd-El Alim, Manal El-Hamamsy.Effect of intrathecal Bupivacaine-Lidocaine combination on motor block and analgesia period. Bulletin of Faculty of Pharmacy, Cairo University 2012;50:61-65.
8. Yazicioglu D, Akkaya T and Kulacoglu H. Addition of lidocaine to bupivacaine for spinal anaesthesia compared with bupivacaine spinal anaesthesia and local infiltration anaesthesia. ActaAnaesthesiolScand 2013;57:1313-1320.
9. Yazicioglu D, Akkaya T, Sonmez E, Gumus H. Addition of lidocaine to levobupivacaine reduces intrathecal block duration: randomized controlled trial. RevistaBrasileira De Anesthesiologia 2014;64(3):159-163.
10. Brown DL. Spinal, epidural, and caudal anesthesia. In: Miller RD, eds. Anesthesia. New York: Churchill Livingstone, 2005: 1668.
11. Dexter F, Tinker JH. Analysis of strategies to decrease post anesthesia care unit costs. Anesthesiology. 1995;82:94-101.
12. Richardson MG, Wissler RN. Densities of dextrose-free intrathecal local anesthetics, opioids, and combinations measured at 37oC. AnesthAnalg 1997;84:95–9.
13. Husum B, Jacobsen J, Jensen PE, Kledal, S et al. The addition of lidocaine to bupivacaine does not shorten the duration of spinal anesthesia: a randomized, double-blinded study of patients undergoing knee arthroscopy. Anesthesia and analgesia 2011;113(5):1272-5.