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COMPARATIVE STUDY OF 0.125%BUPIVACAINE VERSUS 0.125% LEVOBUPIVACAINE FOR LABOR ANALGESIA

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ABSTRACT

Background: A clinical study was undertaken in 60 parturients in labor. All parturients were of ASA1 without any associated systemic disease who are in active labor with 0.125% bupivacaine and 0.125% Levobupivacaine to compare onset of analgesia, maximum level of sensory blockade, duration of analgesia.

Methodology: They are allocated randomly into the two groups: Group-I and Group-II, 30 members each, to compare the effectiveness of Bupivacaine and Levobupivacaine. In Group I total number of paturients 30 received 0.125% bupivacaine 10 ml alone as initial bolus dose and 0.125% bupivacaine 5ml as top up doses. In Group II total number of parturients 30 received 0.125% levobupivacaine 10 ml alone as initial bolus doses and 0.125% levobupivacaine 5 ml as top up doses.

Results: From our study: 1. The onset of analgesia with 0.125% levobupivacaine (6.53) which was similar to the onset time for the same concentration of bupivacaine (6.8 min) 2. 10 ml of 0.125% bupivacaine or 10 ml of 0.125% levobupivacaine produces a maximum level of sensory blockade up to T6 3. The duration of analgesia with 0.125% bupivacaine (80 min) is similar to the duration of analgesia 0.125% levobupivacaine (81 min).

Conclusion: Based on the data bupivacaine and levobupivacaine have produced equivalent onset, sensory block, and duration with good maternal and fetal outcome. The analgesic efficacy mainly depends on the concentration rather than the type of anesthetic drug. We conclude that both 0.125% bupivacaine and 0.125% levobupivacaine confer adequate and safe labor analgesia with no significant influence on the mode of delivery, hemodynamic changes, duration of labor or neonatal outcome.

KEYWORDS : Labor analgesia, Bupivacaine, Levobupivacaine.

INTRODUCTION

Pain is an extremely agonising experience for most women. Various methods have been tried since time immemorial to alleviate this pain. Attempts had been made even in ancient times to alleviate pain.

The modern concept of obstetric analgesia can be said to have begun with James Young Simpson. He used ether in obstetric practice in 1847, barely months after its first public demonstration by Morton in 1846. or the birth of her child in 1853. Various methods like use of inhalational agents, parenteral drugs, psychological therapies came into effect but, could not last longer.

The use of lumbar epidural analgesia was made possible by the description of pain pathways by Aburel in 1930. Among all the techniques available, the epidural method comes closest to the ideal in being effective in alleviating pain and in being safe for both the mother and the fetus.[1] The concentrations of local anesthetics initially used was high enough to cause motor blockade.[2] Concerns about this motor blockade and its effect in delaying the progress of has led to the use of low concentrations of local anesthetic[3] which produce selective sensory blockade[4], thereby sparing the motor fibers. Levobupivacaine have been introduced into obstetric analgesic practice with the proposed advantages of causing less motor block and toxicity compared with bupivacaine[5]. This study aims to compare onset, maximum level and duration of bupivacaine, and levobupivacaine at lower concentrations for analgesia.

METHOD

Our clinical study on "Epidural Analgesia for Child Birth" is to compare effectiveness of Bupivacaine and Levobupivacaine in relieving pain during labor. A total number of 60 parturients were studied. These patients were divided into two groups randomly.

Group-I Total number of parturients 30. This group received Bupivacaine initial bolus dose 10ml of 0.125% and top up doses 5ml of 0.125% Bupivacaine Hydrochloride. Group-II Total number of parturients 30. This group received Levobupivacaine initial bolus dose 10ml of 0.125% and top up doses 5ml of 0.125%.

Preoperative assessment of all patients was done such that the patients having associated diseases like pregnancy induced hypertension, heart disease, diabetes mellitus were excluded from the study. Hematological parameters including hemoglobin level, clotting time, bleeding time and biochemical parameters like blood sugar, blood urea, serum creatinine were noted and were within the normal limits. Neonatal evaluation was done in all the cases with APGAR score.

Procedure:

All the patients were explained the procedure of the technique and written informed consent was obtained. The patients were thoroughly evaluated and examined. Pulse rate, BP, fetal heart rate recorded before providing epidural analgesia. 18 G intravenous cannula was started and all the patients were preloaded with 500 ml of Ringer Lactate. After proper scrubbing and draping, 18 G epidural needle was inserted in L3-L4 space, epidural space was confirmed with gentle aspiration and catheter was fixed with its tip at T12 from skin.

Timing of Induction of Epidural Analgesia:

Epidural analgesia for child birth is administered in two stages. Identification of stage of labor was done with the help of an obstetrician. Segmental sensory block T10 - L1 is required in relation to stretching of uterine tissues and simultaneous dilatation of cervix and stretching of lower segment. Moderate to severe bearing down pains. Completed fetal flexion and internal rotation. Segmental

sensory block T10 - S4 in relation to stretching of pelvic structure and perineum added to pain of uterine contractions.

Parameters observed:

1. Onset of Analgesia
2. Maximum level of Sensory Blockade
3. Duration of Analgesia

RESULTS

The demographic data with respect to age, gender and statistical data with respect to hemodynamics, side effects, motor blockade neonatal depression according to APGAR score were similar in both the groups.

Table I - Average duration of time for onset of analgesia (in minutes)

	Min. Duration	Max. Duration	Average	SD
Group –I	2	13	6.86	2.88
Group –II	2	4	6.5	3.20

Table I shows the average time of onset of analgesia. The minimum time for onset was two minutes in both groups. The maximum time for onset was 13 minutes in both groups. The mean time of onset of analgesia was calculated to be 6.8±2.88 minutes in group I and 6.5±3.2minutes in group II. This difference in the mean time of onset of analgesia was found to be statistically insignificant (p=0.67) by t-test.

Table II - Maximum level of Sensory Blockade

Max. level of Analgesia	Group – I		Group – II		P
	Cases	%	Cases	%	
T_8	12	40.0	13	43.3	>0.05
T_9	7	23.3	8	26.7	>0.05
T_{10}	11	36.7	9	30	>0.05
T_{11}	-	-	-	-	-
T_{12}	-	-	-	-	-
Total	30	100	30	100	

Table II shows the maximum level of analgesia reached in both the groups. The maximum level of analgesia reached was T8 in both groups. Majority of the parturients in both groups achieved a level of T8 i.e. 40% in group I and 43.3% in group II. This difference between the two groups was statistically in significant (p>0.05) by t-test. The minimum level achieved was T10 by 36.7% of parturients in group I and 20% of parturients in group II. This difference was also statistically insignificant (0.05).

Table III - Average duration of analgesia (in minutes)

	Minimum	Maximum	Average	SD
Group –I	52	122	80.0	18.25
Group –II	54	115	81.0	16.52

Table III shows the average duration of analgesia. The minimum duration of analgesia was 52 minutes in group I and 54 minutes in group II. The maximum duration was 122 minutes and 115 minutes in groups I and II respectively. The average duration was 80±18.25 minutes in group I and 81±16.52 minutes in group II. This difference between the two groups was statistically in significant (p>0.05) by t-test.

CONCLUSION

From our study, it can be concluded that:

The onset of analgesia with 0.125% levobupivacaine is (6.53 minutes) which was similar to the onset time for the same concentration of bupivacaine (6.8 minutes). 10ml of 0.125% bupivacaine or 10 ml of 0.125% levobupivacaine produces a maximum level of sensory blockade up to T8. The duration of analgesia with 0.125% bupivacaine is (80 minutes) is similar to the duration of analgesia with 0.125% levobupivacaine which is (81 minutes).

Based on the data both bupivacaine and levobupivacaine confer adequate and safe labor analgesia with no significant influence on the mode of delivery, hemodynamic changes, duration of labor, or neonatal outcome.

DISCUSSION

The ideal labor analgesic technique should be effective, easy to administer, provide consistent, predictable and rapid in onset in all stages of labor, devoid of motor blockade, safe for the mother and the fetus and preserve the stimulus for expulsive efforts during the second stage of labor.[2] It is now well recognized that the only consistently effective method of pain relief in labor is lumbar epidural analgesia. Previously, the local anesthetics bupivacaine, lidocaine and [1] chloroprocaine were used to provide epidural labor analgesia. Bupivacaine still remains the most often used local anesthetic in labor analgesia.[6] Various workers have used varying concentrations of bupivacaine. However, it caused dense motor blockade and interference with maternal awareness of contractions.[2] Despite providing excellent pain relief in labor, epidural analgesia using local anesthetics alone produces motor block in up to 85% of patients, reduces maternal satisfaction with analgesia and is associated with a prolonged second stage and an increased incidence of instrumental delivery. Workers using 0.125% bupivacaine have noticed;

a. Avoidance of significant motor blockade (Bleyaert).[6]
b. Duration of second stage of labor was not prolonged (Bleyaert).[6]
c. No difference in the mode of delivery (Bleyart, Soetens).[8]

However, severe central nervous system (CNS) and cardiovascular adverse reactions reported in the literature after inadvertent intravascular injection or intravenous regional anesthesia have been linked to the R (+) isomer of bupivacaine. The levorotatory isomers were shown to have a safer pharmacological profile[7,8] with less cardiac and neurotoxic adverse effects. Mc leod etal[7], in 2001 stated that levo rotatory isomers were shown to have a safer pharmacological profile Casati et al, in 2006 [9] concluded that levobupivacaine was associated with less cardiotoxic and neurotoxic effects. Most workers have commenced epidural analgesia when the cervical dilation was 3 cm or more. In our study, the epidural analgesia was instituted with cervical dilation between 4-6 cm.

Onset of analgesia

In our study, time of onset of analgesia was taken as the time interval from time of epidural injection till the time when a sensory level of T12 was achieved. In our study, the mean onset of analgesia time was 6.8 minutes (2-13 minutes) in group I. This is similar to the average onset time of 6 minutes noticed by Mc Morland et al.[10] The average onset of analgesia time in group II in our study was 6.5 minutes (2-14 minutes). This concurs with the study of El Moutaz et al, who observed that the onset time was approximately 13 minutes.

Level of sensory block

In our study, the upper level of sensory block in most of the parturients was T8 in groups I and II. This finding was comparable to study done by Wang LZ et al[11], in 2010 who concluded that using PCEA, same concentration of Bupivacaine, Ropivacaine and LevoBupivacaine with Sufentanil produce similar sensory blockade.

Duration of analgesia

The total duration of analgesia was defined as the time interval from the onset of analgesia till the return of painful contractions or till the regression of the sensory level below T10. In our study, the mean duration of analgesia in group I was 80 minutes (53-122 minutes). This is similar to the observations of Bleyaert et al.[6] who found the mean duration of analgesia after the first dose to be 58±15 minutes. In group II, the average duration was 81 minutes (54-115 minutes).

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