Comparison of 0.125% ropivacaine-dexmedetomidine versus 0.125% levobupivacaine-dexmedetomidine for epidural labour analgesia

ABSTRACT

Background: Levobupivacine and Ropivacaine are two new local anaesthetics with effects similar to bupivacaine. The aim of this prospective study was to compare ropivacaine and levobupivacaine with dexmedetomidine as adjuvant for epidural analgesia in labour regarding onset, quality and duration of analgesia, motor blockade, labour outcome and any adverse effect on foetus.

Methods: The patients were randomly allocated into two groups comprising of 25 partuirents each. The patients of group I were given 10 ml of 0.125% ropivacaine with dexmedetomidine (0.5µg/kg body wt) as initial dose and 8 ml of 0.125% ropivacaine along with 0.5µg/kg body wt of dexmedetomidine as subsequent top up doses as and when required. Patients of group II were given 10 ml of 0.125% levobupivacaine with dexmedetomidine (0.5µg/kg body wt) as initial dose and 8 ml of 0.125% levobupivacaine with dexmedetomidine(0.5µg/kg body wt) as subsequent top up doses as and when required.

Results: The addition of dexmedetomidine to low dose of ropivacaine and levobupivacaine greatly improves the quality of labour analgesia, with no prolongation of first or second stage of labour. Also, the side effects on the mother were rare. Fetal outcome was not affected with the low dose of drugs. The onset of analgesia was earlier and the duration of analgesia was prolonged in group II (Levobupivacaine 0.125%+ dexmedetomidine 0.5%µg/kg body wt) as compared to group I (ropivacaine 0.125% + dexmedetomidine 0.5%µg/kg body wt).

Conclusion: Though both levobupivacaine and ropivacaine provide effective labour analgesia without any adverse effects but levobupivacaine with dexmedetomidine as adjuvant is better of two drugs in terms of onset and duration of analge

Keywords: ropivacaine,levobupivacaine,dexmedetomidine,epidural labour analge

INTRODUCTION

Central neuraxial analgesia is the most versatile method of labour analgesia and is currently the gold standard technique for pain control in obstetrics.[1] Levobupivacaine and ropivacaine are newer local anesthetics that have effects similar to bupivacaine. They are believed to be less toxic to the central nervous system and cardiovascular system with reduced motor blockade.[2-4] Dilute solutions of local anaesthetic with various adjuvants are commonly used to lower incidence of motor blockade and instrumental delivery .

The present study was conducted to evaluate and compare the quality and duration of analgesia of ropivacaine and levobupivacaine along with dexmedetomidine as adjuvant for epidural analgesia in labour. The primary outcome of the study was onset and duration of analgesia whiles the secondary outcome being motor blockade, labour outcome and any adverse effect on foetus.

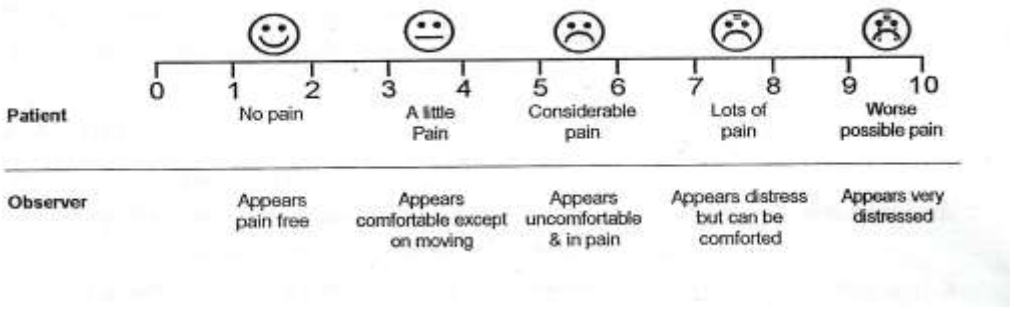
Material and Methods

After obtaining approval from institutional ethics committee and written informed consent from all patients, study was conducted on 50 women in labour, of ASA grade I and II. Procedure was explained to the patient before administration of epidural block. All women were carrying singleton pregnancies of atleast 35 weeks with cephalic presentation. Each participant was in active stage of labour with cervical dilatation of 3-5 cm. Patients having -breech presentations , ante partum hemorrhage, severe pre-eclampsia, aortic stenosis, cephalopelvic disproportions, coagulation defects or on anti-coagulant therapy, vertebral deformity, local sepsis, sensitivity to the drug to be administered and fetal distress were not included in the study.

Maternal age, height and weight were recorded along with baseline pulse rate, blood pressure and fetal heart rate as pre labor characteristics.All the patients were preloaded with intravenous infusion of Ringer lactate 500ml prior to block. Patients were made to lie on the operation table in the left lateral position. Under strict aseptic precautions, local anaesthetic, 1-2ml of 2% xylocaine was injected subcutaneously at L_{2-3} or L_{3-4} interspace. After piercing the skin with Sise introducer, epidural space was sought with the help of Tuohy's needle. Epidural space was identified by loss of resistance to saline technique. An 18G

epidural catheter was inserted into the space through the Tuohy's needle so that 3-4cm of catheter remains in the space. Tuohy's needle was withdrawn slowly and catheter fixed to the parturient back with micropore. The patients were divided into two groups of 25 each. Group I patients were given 10ml of Ropivacaine 0.125% with Dexmedetomidine (0.5µg/kg body wt) and group II patients were given 10ml of Levobupivacaine 0.125% with Dexmedetomidine (0.5µg/kg body wt) epidurally.

Pulse, blood pressure and VAS were checked every 5 minutes for the first 30 minutes and thereafter every 15minutes for the first hour and every half hourly thereafter till delivery. Onset of analgesia was defined as time taken from drug administration to VAS <3. Top up dose of 8 ml was given when VAS score was ≥ 4.Study was completed when spontaneous vertex or assisted vaginal delivery occurred.



The following were recorded as labor characteristics: onset of analgesia, level of analgesia, duration of the epidural analgesia, duration of the first and second stage, total amount of local anesthetic used as top-up bolus doses and their frequency of administration, degree of motor blockade and the parturient' complaints after epidural anesthesia (including nausea, vomiting, backache and fever). Fetal heart rate, Mode of delivery, Agar scores of the newborn, body weight of the newborn and the presence of postpartum hemorrhage were also noted in both groups

Results

Pre labour characteristics of both groups were comparable (Table 1).

Table 1. Pre labour characteristics

	Group I	Group II
Age, years	24.56±3.47	24.36±3.78
Weight,kg	65.6±7	64.5±6
Height,cm	156±5	156±5
Parity,%		
Primigravida	56	68
Multigravida	44	32

The time of onset of analgesia was less in group II (levobupivacaine + dexmedetomidine) as compared to group I (ropivacaine + dexmedetomidine). The mean time of onset of analgesia was 12.24±1.30 minutes with a range of 10-15 minutes in group I (ropivacaine + dexmedetomidine) and the mean time of onset of analgesia was 11.16±1.86 minutes with a range of 8-16 minutes in group II (levobupivacaine +dexmedetomidine). The difference in the time of onset of analgesia was statistically significant ($p<0.05$).

The total duration of analgesia after first injection into the epidural space was significantly more in group II as compared to group I. In group II, the mean duration of analgesia was 172.16±21.25 minutes whereas in group I, the mean duration of analgesia was 158.52±25.58 minutes. The difference in duration was statistically significant.

Table 2. Labour characteristics

	Group I (n=25)	Group II (n=25)
Time of onset of analgesia,min	12.24±1.30	11.16±1.86
Duration of analgesia,min	158.52±25.58	172.16±21.25
Duration of first stage of labour,min	170.68±148.17	205.12±201.86
Duration of second stage of labour,min	35.72±14.72	39.84±15.81
Total duration of labour,min	212.36±154.54	250.36±210.19

Table 3. Labour characteristics

	Group I (n=25)	Group II (n=25)
No. of top-up doses	0.60±0.91	0.60±1.04
Vaginal delivery (%)	92	92
Instrumental delivery	8	8
Newborn weight (kg)	2.80±0.30	2.75±0.21
Motor blockade	nil	Nil

The change in pulse rate and mean blood pressure before and after epidural block in both the groups was statistically insignificant.

There was no significant change in fetal heart rate before and after the epidural block in both the groups. The difference in Apgar score at both 1 and 5 minute was also insignificant in both the groups.

There was no significant difference between the two groups in duration of first stage, second stage, third stage and total duration of labour when compared statistically. The total duration of labour was not prolonged in any of the two groups, being 212.36±154.54 minutes in group I and 250.36±210.19 minutes in group II.

When the VAS of group I and group II was compared, it came out insignificant at 5, 10 and 15 minutes.About the labour outcome characteristics, no differences were observed in the mode of delivery, Apgar score of the newborn and weight of the newborn

Discussion

Epidural anesthesia during labor provides pain relief and confers other advantages on both the mother and fetus.It has the advantage of allowing the mother to remain awake, minimizes the risk of maternal aspiration and reduces drug effects on the newborn.[5]Epidural bupivacaine has been used for many years for labor analgesia. Although this drug produces excellent sensory analgesia, some parturient experienced unacceptable motor block when larger concentrations were used.[6]Ropivacaine and levobupivacaine are suitable for labor analgesia because they produce less motor blockade and were developed to reduce the cardiac and CNS side effects of bupivacaine.[7]In comparison of levobupivacaine versus ropivacaine, it has been found that levobupivacaine was approximately 20% more potent than ropivacaine when comparable doses were used for pain relief during labor.[8]

Dexmedetomidine, a selective alpha 2 adrenoreceptor agonist has been used in spinal and epidural anaesthesia as an adjuvant and has several advantages of increased duration of analgesia compared to local anaesthetics alone with no adverse neurological effects.[9,10] Recent review of literature has shown that dexmedetomidine has been used very sparingly for labor analgesia but however has potential uses. Studies show that dexmedetomidine has high placental retention and increases the frequency and amplitude of uterine contractions directly and in a dose-dependent fashion suggesting advantages for use as an analgesic adjunct during labor.[11, 12] Dexmedetomidine acts on the receptors of the substantia gelatinosa of the dorsal horn of the spinal cord which inhibit the firing of nociceptive neurons stimulated by peripheral Aδ and C fibers. It also inhibits the release of the nociceptive neurotransmitter substance P.[13] We have used dexmedetomidine as adjuvant in our study and overall experience was very good with no adverse effects on mother as well as baby.

In our study, the mean time taken for onset of analgesia was significantly shorter in patients receiving levobupivacaine. Peduto et al in 2003 compared epidural levobupivacaine 0.5% and ropivacaine 0.75% and the time taken for sensory blockade was comparable in both the groups.[14] Sah N et al in 2007 compared ropivacaine (0.2%), bupivacaine (0.125%), and levobupivacaine (0.125%) for labour epidural analgesia. Time to onset of sensory analgesia was shorter in the ropivacaine (9.35±4.96) and levobupivacaine (9.56±4.96) groups than bupivacaine (11.89±7.76) group.[15] Possible difference in results can be explained by the higher concentration of ropivacaine as compared to levobupivacaine used in these studies.

The mean duration of analgesia was longer i.e. 172.16±21.25 minutes. In group II as compared to group I (158.52±25.58). Mantauvalou M et al in 2008 compared 0.5 % isobaric bupivacaine, ropivacaine and levobupivacaine for lower abdominal surgery and found that duration of sensory block was significantly shorter in ropivacaine group(220±30min) compared with bupivacaine (237±88min)and levobupivacaine(230±74 min).[16] Senard et al in 2004 compared 0.1% ropivacaine and levobupivacaine with morphine for post-operative analgesia .duration of analgesia was longer in levobupivacaine(328±157) as compared to ropivacaine(302±84).[17]Our study is consistent with all the above studies.

The change in pulse rate and mean blood pressure before and after epidural block in both the groups was statistically insignificant. These findings were comparable with that of Hughes *et al*.[18]

None of our patients experienced nausea, vomiting and urinary retention in the peripartum period. There was no motor block in both the groups as per the modified Bromage scale. All the patients were ambulatory during labor without any difficulty in bearing down. The neonatal outcomes were comparable with Apgar scores being at least 9/10 at the first minute in both the groups.

When the VAS score of group I and group II was compared, it was insignificant at 5, 10 and 15 minutes. Quality of analgesia was comparable in both the groups during the first and second stage of labour. About the labour outcome characteristics, no differences were observed in the mode of delivery and total duration of labour between the two drugs when used as above mentioned regimens.

In conclusion, both levobupivacaine and ropivacaine combined with dexmedetomidine as adjuvant provide equally effective labour analgesia without jeopardizing the safety of mother and fetus. However, levobupivacaine is better in terms of onset and duration of analgesia.

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