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Comparison of 0.1 % Bupivacaine and 2 µg/ml Fentanyl with 0.1 % Ropivacaine and 2µg/ml Fentanyl for Labour Analgesia

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ABSTRACT **Objectives:** Bupivacaine combined with opioid was used for labour analgesia. But even with opioids Bupivacaine produces minimal motor blockade. Ropivacaine which is recently used provides less motor block. we compared analgesic efficacy and intensity of motor block of both the drugs in Labour Analgesia.

Materials and methods: 50 parturients were randomly divided in to two groups. The first group (B)received 0.1 % Bupivacaine and 2 µg/ml Fentanyl and the second group (R) received 0.1 % Ropivacaine and 2µg/ml Fentanyl.

Results: The analgesic efficacy between the two groups were similar. The intensity of motor blockade in group B was 0.92+/-0.27 and there was no motor blockade in group R which was significant (p=0.00)

conclusion: Ropivacaine and fentanyl provides minimal motor blockade when compared to bupivacaine and fentanyl.

KEYWORDS : Bupivacaine, Ropivacaine, Labour Analgesia

Introduction

The pain of childbirth is considered as the most painful experience a woman will endure in her lifetime. An array of pharmacological and non-pharmacological techniques has been used for labour analgesia. Epidural labour analgesia is an effective means of providing analgesia during labour and the gold standard technique[1]. Bupivacaine is the routinely used local anaesthetic for labour analgesia due to its excellent sensory blockade. Bupivacaine combined with low dose of opioid is used to reduce the concentration of bupivacaine and hence reduce motor blockade. But even with low concentration it produces minimal motor blockade which prevents patient from ambulation. Ropivacaine which is recently used provides less motor block[2].

The present study was carried out to compare the analgesic efficacy and degree of motor blockade produced by of 0.1% bupivacaine and 2 mcg/ml fentanyl with 0.1% ropivacaine and 2 mcg/ml fentanyl.

Materials and methods:

This study was a randomized, prospective double blinded study. It was done at KAPV Govt medical college hospital from June 2015 to June 2016 after approval from the Medical Ethics Committee. Informed consent was obtained from the patients. Primigravida with term gestation, singleton pregnancy with vertex presentation, ASA physical status 2, uncomplicated pregnancy, normal fetal heart rate and cervical dilatation < 5 cm were included in this study. Multiple gestation and Contraindications to neuraxial analgesia were excluded.

50 parturients were randomly assigned to group B and R (25 patients in each group)

Group B - received 0.1% bupivacaine and 2 mcg/ml fentanyl

Group R -received 0.1% ropivacaine and 2 mcg/ml fentanyl.

All patients were assessed prior to the procedure. General and systemic examinations were carried out. Routine investigations like complete haemogram, blood sugar, blood urea, serum creatinine, and electrocardiogram were performed. Inside the Labour room monitors like ECG, NIBP, Pulse oximetry (SPO_2) and CTG were connected and baseline parameters recorded. Cervical dilation and condition of membranes were recorded by the obstetrics post graduate. An Intravenous access was secured with 18G venflon and all parturients were preloaded with 10 ml/ kg of Ringer lactate solution. The parturient and anaesthesiologist performing the technique and administering the drug were blinded to the drug. Under aseptic precautions patient in lateral position epidural space identified with 18 g Touhey needle in L3-L4 or L4-L5 space in midline approach with loss of resistance to air technique and catheter threaded 6 cm into the epidural space. After negative aspiration for blood and CSF, test dose of 3 ml of 1.5 % Lignocaine with 5 mcg /ml of Adrenaline was administered. Inadvertent intravascular and intrathecal spread of drug were rule out. Parturients with test dose positive are excluded from the study. Five minutes after administering the test dose, loading dose of 15 ml of the study drug 0.1 % of Bupivacaine with 2µg/ml of fentanyl in Group B or 0.1 % Ropivacaine with 2µg/ml of fentanyl in Group R is administered in 5 ml increments at intervals of 5 minutes. Parturients not experiencing adequate analgesia in 20 min are supplemented with additional 5ml of the study drug. Following the loading dose additional supplements of the drug are administered based on the VAS score up to a maximum of 20 ml/hr, whenever VAS score exceeds 4.

All the vitals are monitored and recorded continuously at 5,10, 20,30,45,60 min and every 30 min after that until delivery. Adverse effects like hypotension, bradycardia and oxygen desaturation are recorded and managed accordingly

Pain score assessed by visual analogue score (VAS) 0 to 10 (0-no pain to 10 -worst pain) and degree of motor blockade is assessed by modified Bromage scale. After delivery Patients satisfaction score assessed as excellent, good, fair or poor, the mode of delivery spontaneous, vaginal, instrumental vaginal and caesarean section and total dose of local anaesthetics required were recorded.

Data are expressed as mean ± standard deviation. All outcomes were assessed using Chi-squared test and independent t-test, $P < 0.05$ was considered statistically significant. statistical analyses were done using SPSS version 16.0 statistical software.

Results:

There was no difference between the groups with respect to demographic and labour characteristics and statistically not significant (p>0.05). (**Table 1**).

Table 1 Demographic and Obstetric characteristics

characteristics	bupivacaine (n=25)	ropivacaine (n=25)	P value
Age (years)	22.80+/-1.80	23.84+/-2.09	>0.05
Weight (kg)	51.20+/-6.75	50.32+/-5.77	>0.05
Height (cm)	154.08+/-5.08	152.92+/-3.39	>0.05
Cervical dilation before injection	3+/-1	3+/-1	>0.05

The patient satisfaction score for epidural labour analgesia between the two groups were similar and statistically not significant (p>0.05). The intensity of motor blockade in group B was 0.92+/-0.27 and there was no motor blockade in group R which was statistically significant (p<0.0001). (Table 2).

Table 2. Analgesia and Motor blockade

Characteristics	Bupivacaine	Ropivacaine	P value
Intensity of motor blockade	0.92+/-0.27	0	<0.0001

Patient satisfaction score % - Excellent	16% (4)	28% (7)	>0.05
Good	84% (21)	72%(18)	>0.05

The differences in the mean blood pressure, mean heart rate, fetal heart rate and cervical dilatation between the two groups were found to be statistically insignificant.

Discussion:

In this study, 0.1 % bupivacaine and 2 mcg fentanyl with 0.1 % ropivacaine and 2mcg/ml fentanyl were compared for labour analgesia with regard to analgesic efficacy and intensity of motor blockade The patient satisfaction score recorded in Group B was 84 % with good analgesia and 16 % with excellent analgesia when compared to group R wherein it was 78 % with good analgesia and 22 % with excellent analgesia. This correlated with the study by Steinstra [3] et al with results of Group B and R recorded with 58% and 64.5 % for excellent analgesia respectively, 42 % and 35.5 % for good analgesia in group B and R respectively. This also correlated with the study by Muir[4] et al (52.94% excellent analgesia for bupivacaine and excellent analgesia in 82.353% cases of ropivacaine)

Patients administered ropivacaine/fentanyl had no motor block compared to patients administered bupivacaine/fentanyl, the differences in motor block observed in this study may be related to the physiochemical properties of the two drugs. Ropivacaine is prepared as an almost pure (>99%) L-isomer, whereas bupivacaine is prepared as a racemic (50–50) mixture of the D- and L-isomers. Other than these racemic differences, ropivacaine contains a 3-carbon side chain, whereas bupivacaine contains a 4-carbon side chain. It is possible the D-isomer or the extra carbon in the side chain of bupivacaine somehow alters receptor binding so that more motor block is produced. This correlated with the study by Meister [5] et al, Pinder [6] et al and campbell[7] et al.

The differences in the mean heart rate, mean arterial pressure, oxygen saturation and fetal heart rate were comparable between both the groups. The hemodynamic parameters correlated with the previous study by Pirbudak [8] et al and Fernandez[9] et al.

Conclusion:

This study concluded that ropivacaine with fentanyl 2 µg/ml produces excellent labor analgesia clinically indistinguishable from a similar concentration of bupivacaine/fentanyl, except that patients developed significantly less motor block with ropivacaine/fentanyl.

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