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EFFECT OF INTRATHECAL LABOR ANALGESIA USING FENTANYL 25 ÌG AND BUPIVACAINE 2.5 MG ON PROGRESS OF LABOR

Sushil Kumar* MD, PDCC , Senior Resident , Deptt. Of anaesthesiology , JLN Medical College and Hospital , Bhagalpur , Bihar , India *Corresponding Author

Veena Horo M.D. , Associate Professor , Deptt. Of anaesthesiology , JLN Medical College and Hospital , Bhagalpur, Bihar , India

ABSTRACT

The pain of childbirth is the most severe pain any women can endure in their lifetime. The pain of the early first stage of labor arises from dilation of the lower uterine segment and cervix. Pain of the late first stage and second stage of labor arises from the descent of the fetus in the birth canal, resulting in distension and tearing of tissues in the vagina and perineum. Epidurals have long been associated with increased oxytocin use, increased fetal malposition, increased rates of instrumental and caesarean delivery, and longer labors. Spinal block is cheaper as well as less technically challenging when compared to epidural and combined spinal epidural block. Intrathecal analgesia alone is useful when duration of labor can be reasonably estimated. Opioid combined with a small dose of local anesthetic provides rapid analgesia and dissipates when no longer needed.(2) In view of the above, the present study was undertaken to compare the progress of labor as the primary outcome and hemodynamic changes in the mother and fetus as secondary outcome in parturients who received intrathecal labor analgesia using bupivacaine 2.5 mg and fentanyl 25 ìg to a matching group C who did not receive neuraxial analgesia during normal vaginal delivery using a partogram.

OBJECTIVES OF STUDY : To evaluate the effect of intrathecal labor analgesia using fentanyl 25 ìg and bupivacaine 2.5 mg on progress of labor

SETTING: Medical College Hospital

DESIGN: Controlled randomized trial.

STATISTICAL ANALYSIS USED : Student t test , SPSS for windows

RESULTS : We found that single shot intrathecal analgesia using fentanyl 25 ìg and bupivacaine 2.5 mg when given in the active phase of first stage of labor had rapid onset with satisfactory pain relief and minimal motor block, which completely regressed at the time of second stage of labor. It was associated with faster cervical dilation rate and no delay in the progress of labor, without significant maternal and fetal hemodynamic variation

BACKGROUND: The aim of this study was to evaluate the progress of labor and hemodynamic changes in the mother and fetus with intrathecal analgesia using bupivacaine and fentanyl during normal vaginal delivery.

MATERIALS AND METHODS: Sixty nulliparous parturients in the active phase of labor with a cervical dilatation of >3 cm were selected for this prospective study. Group SA (n = 30) received an intrathecal injection of 0.5% hyperbaric bupivacaine 2.5 mg and fentanyl 25 ìg and compared with Group C (n = 30) who refused to give consent for neuraxial analgesia. Visual analog score, progress of labor, maternal hemodynamic variations, and fetal heart rate were recorded. Statistical analysis included an unpaired and paired two-tailed t-tests.

RESULT: Duration of the active phase of first stage of labor was shortened in group SA as compared to group C (115.50 vs. 134.0 min, $P < 0.05$). Duration of second stage of labor was prolonged in group SA as compared to group C (18.03 vs. 10.13 min, $P < 0.05$). Rate of cervical dilation was faster in group SA as compared to group C (3.021 vs. 2.486 cm/h, $P < 0.05$). Mean visual analog score, pulse rate, and mean arterial pressure was significantly decreased as compared to the baseline in group SA. No significant changes were noted in the fetal heart rate as compared to the baseline in both groups.

CONCLUSIONS: Single-shot intrathecal analgesia using fentanyl 25 ìg and bupivacaine 2.5 mg in active phase of first stage of labor associated with fast cervical dilation rate and no delay in the progress of labor.

KEYWORDS :

INTRODUCTION

The pain of childbirth is the most severe pain any women can endure in their lifetime. The pain of the early first stage of labor arises from dilation of the lower uterine segment and cervix. Pain of the late first stage and second stage of labor arises from the descent of the fetus in the birth canal, resulting in distension and tearing of tissues in the vagina and perineum.[1]

Labor pain is excruciating and is a significant contributor to fear, stress, and anxiety. Painful uterine contractions lead to maternal hyperventilation and increased catecholamine concentration resulting in maternal and fetal hypoxemia. Labor pain when unrelieved can have adverse effects on the course of labor as well as on the fetal wellbeing. An effective labor analgesia leads to better maternal and fetal outcome. [2]Relief of pain during labor endeavors to make the journey of labor safe and pleasant for both the mother and baby.

Epidurals have long been associated with increased oxytocin use, increased fetal malposition, increased rates of instrumental and caesarean delivery, and longer labors. Spinal block is cheaper as well as less technically challenging when compared to epidural and combined spinal epidural block. Intrathecal analgesia alone is useful when duration of labor can be reasonably estimated. Opioid combined with a small dose of local anesthetic provides rapid analgesia and dissipates when no longer needed[(2)]

Bupivacaine because of its least placental transfer, due to high protein binding and minimal motor block compared to sensory block in lower doses, has become the popular choice for labor analgesia. Addition of neuraxial lipid soluble opioids permitted reduction in the dose and concentration of bupivacaine from 0.5% to as low as 0.065% while maintaining effective analgesia and minimizing potential adverse effects on the progress of labor and lower extremity motor block[(5)]

In view of the above, the present study was undertaken to compare the progress of labor as the primary outcome and hemodynamic changes in the mother and fetus as secondary outcome in parturients who received intrathecal labor analgesia using bupivacaine 2.5 mg and fentanyl 25 µg to a matching group C who did not receive neuraxial analgesia during normal vaginal delivery using a partogram.

MATERIAL AND METHODS

60 nulliparous parturients at term pregnancy (American society of

anaesthesiologist physical status grade I) were recruited for this prospective study. Only patients with singleton pregnancies and vertex presentation who were in the active phase of labor with a cervical dilatation of >3 cm and normal fetal heart rate (FHR) tracings were enrolled.

Patients in the group SA (n = 30) received an intrathecal injection of 0.5% hyperbaric bupivacaine 2.5 mg (0.5 mL) and fentanyl 25 µg (0.5 mL), volume made to 1.5 mL with normal saline, and compared with the matching group C (n = 30) who refused to give consent for neuraxial analgesia. The two groups were evaluated with regards to the progress of labor, maternal hemodynamic variations, fetal heart rate, and neonatal outcome during labor in parturient undergoing normal vaginal delivery.

Parturients were positioned supine with left-uterine displacement. An intravenous line was secured with an 18 G cannula on the nondominant hand and the parturients were preloaded with 500 mL of ringer's lactate solution; oxygen was administered by facemask at 3 L/min. To perform the block, parturients were placed in a sitting position as anatomical landmarks are easy to identify in the sitting position and performing the block technically easier in this position. The L3-L4 interspace was identified and 25 G spinal needle was used to enter the subarachnoid space. After return of clear cerebrospinal fluid, patients were given a single intrathecal injection of solutions mentioned previously. Then, patients were repositioned in a supine position with left-uterine displacement. No patients were allowed to walk during the study period due to the need for continuous maternal and fetal monitoring for safety reasons. The frequency and intensity of uterine contractions, dilation, and effacement of the cervix, descent of the presenting part, and requirement of oxytocin (when cervical dilation rate was <1 cm/h) were assessed using the standard partogram chart to plot the progress of cervical dilation hourly and uterine contraction per 10 min by the obstetrician. FHR was monitored using an electronic fetal monitor. The requirement for instrumental deliveries or caesarean section and the indications for the same were also noted and such parturients were excluded from the study.

Statistical analysis

Statistical analysis was performed using software Statistical Package for the Social Sciences (SPSS) version 21 (Armonk, NY: IBM Corp). Unpaired and paired student t-test was used to analyze the data; P value of 0.05 was considered to be significant.

RESULTS

Both groups were similar in terms of age, weight, and height of parturients. Both groups were comparable in terms of mean cervical dilation and VAS score at the time of study initiation [Table 1].

Table 1: Parturients characteristics

	Group SA (n=30) (Mean±SD)	Group C (n=30) (Mean±SD)
Age (years)	23.27±3.629	21.87±2.285
Weight (kg)	57.37±3.39	58.17±4.11
Height (cm)	154.83±3.62	155.27±3.10
Cervical dilation (cm)	4.17±0.65	4.13±0.63
Use of oxytocin	6 (20%)	7 (23.33%)
Baseline vas score	7.60±0.62	7.27±0.69

The mean onset of sensory block and motor block was 2.97 ± 0.615 and 4.00 min, respectively, and mean duration of motor block was 24.0 ± 1.826 min in group SA. The highest level of sensory block attained was T8 in 30%, T9 in 66.7%, and T10 in 3.3% of group SA. The duration of analgesia was 147 ± 22.11 min.

The VAS score was significantly lower in group that was provided intrathecal analgesia at all time intervals as compared to group C (P < 0.001) [Table 2].

Table 2: Mean visual analog scale score

Time (min)	Group SA (Mean±SD)	Group C (Mean±SD)	P value	Significance
0	7.60±0.62	7.27±0.69	0.054	NS
4	1.17±1.15	7.27±0.69	<0.001	S
10	0.00±0.00	7.27±0.69	<0.001	S
20	0.00±0.00	7.43±0.50	<0.001	S
30	0.00±0.00	7.70±0.47	<0.001	S
60	0.00±0.00	8.23±0.50	<0.001	S
90	0.13±0.04	8.73±0.64	<0.001	S
120	1.33±0.67	9.43±0.57	<0.001	S
150	2.36±1.08	9.84±0.37	<0.001	S
180	3.53±0.58	10.00±0.00	<0.001	S

Thus, parturients in group SA received excellent pain relief throughout labor and VAS score remained less than 4 till delivery as compared to group C, in which VAS score was more than 7 at all time. Rate of cervical dilation was significantly faster and duration of active phase of first stage of labour was observed to be significantly shorter in parturients who received intrathecal analgesia when compared to control group [Table 3].

Table 3: Comparison of progress of labor

	Group SA (Mean±SD)	Group C (Mean±SD)	P value	95% CI
Duration of active phase of first stage (min)	115.50±27.33	134.0±21.19	0.005	5.9–31.14
Duration of second stage (min)	18.03±8.27	10.13±5.89	<0.001	4.19–11.61
Total Duration of labor (min)	133.53±29.93	144.13±23.35	0.132	3.27–24.47
Rate of cervical dilation (cm/h)	3.021±0.584	2.486±0.402	<0.001	0.28–0.79

Mean pulse rate, mean arterial pressure are shown in the [Figure 1] and [Figure 2], respectively. No intervention was required in any of the parturients with regards to hemodynamic changes in either of the groups.

Figure 1: Pulse rate

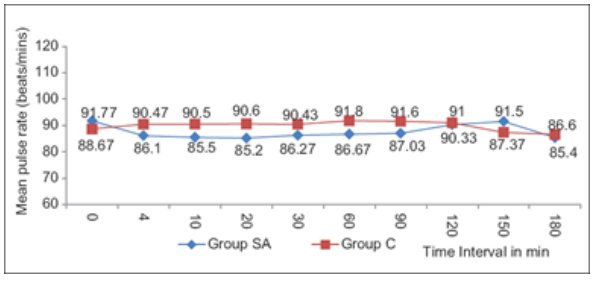
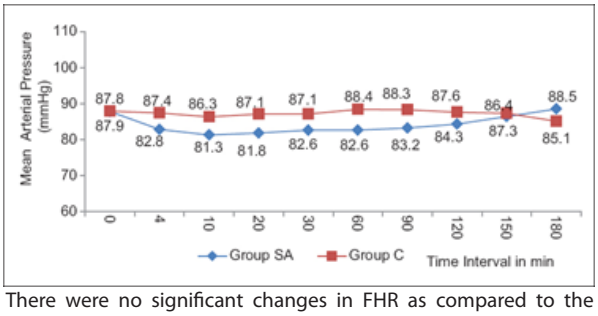


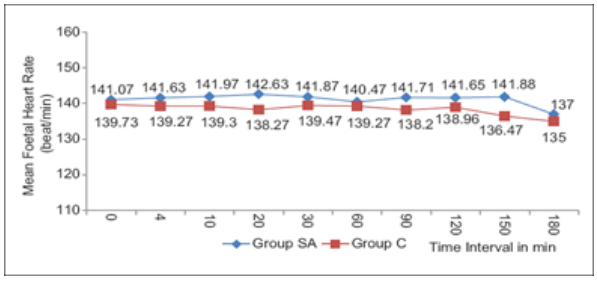
Figure 2: Mean arterial pressure



There were no significant changes in FHR as compared to the baseline in both the groups, and none resulted in intervention for fetal compromise. All FHR decelerations prior to and after intrathecal analgesia administration were transient [Figure 3]. The mode of delivery in all parturients was vaginal delivery without any instrumental delivery. The parturients who required caesarean section due to other indication were excluded from the study.

APGAR score at 1 minute remained between 6 or 7 and at 5 minute remained between 7 and 9 in all neonates of both the groups. No neonatal respiratory depression was noted.

Figure 3: Fetal heart rate



Nausea was reported in 7% parturients in group SA and 10% parturients in group C; 10% parturients in group SA complained of pruritus. Hypotension, bradycardia, vomiting, and fetal distress were not found in either group.

CONCLUSION

In conclusion we found that single shot intrathecal analgesia using fentanyl 25 µg and bupivacaine 2.5 mg when given in the active phase of first stage of labor had rapid onset with satisfactory pain relief and minimal motor block, which completely regressed at the time of second stage of labor. It was associated with faster cervical dilation rate and no delay in the progress of labor, without significant maternal and fetal hemodynamic variation.

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