Research Article

Quality of analgesia on onset and duration of sensory and motor block during early part of labor

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Abstract

Background: Childbirth is a painful event but suffering from it is optional. Since the availability of epidural analgesia during labor, it has become a milestone in obstetric analgesia because millions of parturients all over the world are opting it during childbirth because of effective pain relief.

Objective: This study was conducted to compare onset duration of sensory and motor blockade and quality of analgesia of intrathecal bupivacaine 1.25 mg and fentanyl 25 μg in combined spinal epidural technique in early stage of labor.

Materials and Methods: Sixty primigravid or second gravid belonging to ASA grade I and II with singleton pregnancy, cephalic presentation in active labor were selected. Used bupivacaine 1.25 mg and fentanyl 25 μg made to 2 ml with normal saline for group I and bupivacaine 2.5 mg and fentanyl 25 μg made 2 ml with normal saline for group II.

Result: The onset of analgesia was 204 s in group I and 87 s in group II after initial spinal component of combined spinal–epidural analgesia CSEA. The average dermatomal level of sensory blockade achieved was T9 in group I and T7–T8 in group II. Variation in pulse and blood pressure is minimal in group II.

Conclusion: Needle technique of CSEA has rapid onset of action with 1.25mg of bupivacaine and fentanyl 25μg. It has minimal effect of motor blockade, sensory blockade and Blood pressure with rapid onset of analgesia achieved within 4–10 min.

KEY WORDS: Bupivacaine 2.5 mg, fentanyl 25 μg, bupivacaine 1.25 mg, sensory block, motor block

Introduction

Childbirth is a painful process and pain relief during labor has always been associated with myths and controversies.[1] For labor analgesia, epidural administration of local anesthetic agents and systemic (intravenous or intramuscular) administration of opioids (narcotics) are the two most frequently employed pharmacologic methods in the USA.[2] In the developing countries such as India, national average acceptance of epidural analgesia for labor pain relief is almost negligible though sporadically few centers have a comprehensive labor analgesia program.[3] Epidural analgesia has been used extensively using mixture of low-dose local anesthesia and opioids to provide pain relief I labor, but has the drawbacks of delayed onset and motor blockade. Low-dose combined spinal epidural (CSE) analgesia has gained widespread acceptance as an approach to labor analgesia.[4]

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CSE analgesia is an effective method of analgesia in labour. Intrathecal administration of combination of local anaesthetic and lipophilic opioid provides rapid analgesia. Synergism has been demonstrated when a local anaesthetic is administrated together with an opioid allowing enhanced pain relief with fewer adverse effects.[5,6]

This study compares the efficacy of low dose of bupivacaine 1.25 mg with fentanyl 25 μg intrathecally (single dose) in terms of onset, duration of block, and quality of analgesia during labor, followed by epidural analgesia.

Materials and Methods

This study was conducted in Department of Anesthesiology in association with Department of Obstetrics and Gynaecology at MNR Medical College & Hospital, Sangareddy from 2013 to 2015. A total of 60 patients were included in this study.

Inclusion Criteria: Patients of the following categories were included in this study.

1. Healthy primigravida and gravida,
2. Patients at term,
3. ASA-I and ASA-II,
4. Maternal request of epidural analgesia,
5. Age between 20 and 35 years, and
6. Women in active labor with cervical dilation in primi about,
7. 4–5 cm and gravid 2 with cervical dilation of 3–4 cm.

Exclusion Criteria: Patients with the following complications were excluded from this study.

1. Parturient with gravid 3 or more and with multiple pregnancies,
2. Hypertension,
3. Severe anemia,
4. Cephalo pelvic disproportion,
5. History of ante partum hemorrhage,
6. Allergy to local anesthetic,
7. CVS/RS disease,
8. Bleeding disorders, and
9. Diabetes mellitus.

Sixty patients with ASA I and ASA II in established labor with cervical dilatation less than 5 cm was randomly selected and informed written consent was taken from patients. A detailed history, complete physical examination, and routine investigations were done for all patients. Patients were divided in to two groups of 30 each.

IV line was secured with 18G cannula to both hands, patient was coloaded with 500ml of ringerlactate solution, basal vital parameter like pulse rate, blood pressure, respiration, O_2 saturation were recorded. The patient was positioned in a left lateral position with the help of an assistant. Under aseptic conditions the back was prepared with 5% povidone iodine solution, spirit and area was draped. In L2-L3/L3-L4 inter space was identified – skin was infiltrated with 2ml of 1% xylocaine, 18G touhy CSE needle introduced by loss of resistance to air. The Group 1 received sub arachnoids block with inj. Bupivacaine 1.25 mg with injection Fentanyl 25 μg by 27G Whitacre needle through 18G epidural needle, Group 2 received inj.2.5mg Bupivacaine with Fentanyl 25 μg respectively. Epidural catheter introduced with 3-4cm free catheter inside the epidural space.

Patients were allocated randomly to receive intrathecal injection of Bupivacaine 1.25mg (0.5% Bupivacaine 0.25ml) with Fentanyl 25μg (Group I n=30) or Bupivacaine 2.5 mg (0.5% Bupivacaine 0.5ml) with fentanyl 25μg (Group II n=30) both made up to total volume of 2ml with saline. Patients VAS pain score was recorded every 5, 10, 15, 30, 45,60,75,90,105, 120 min i.e., (every 5 min for 15 min and then every 15 min for 2 hrs.) until the next request for analgesia.

After positioning the patient in supine position, onset of analgesia and dermatomal level were checked by loss of sensation to pin prick. Time of onset and degree of motor blockade were checked by Bromage classification. VAS score for all patients at the next request for analgesia was recorded and study was terminated. Continuation of epidural analgesia was carried out with 0.125% bupivacaine + 2 μg fentanyl in 10 ml.

Result

Both the group I and group II were similar with respect to age of the parturients. Mean age in group I was 23.43 and standard deviation (SD) of 2.87. In group II, mean age was 22.63 with SD of 2.94. *p*-value of 0.29 and was statistically significant. 50% of group I patients had 5 cm and 33% had 6 cm cervical dilatation. 43% of group II patients had 5 cm and 43% had 6 cm cervical dilatation.

Study showing mean time onset of sensory analgesia in group I patient's value is 204.33 s and SD is 53.06 and in group II mean value is 87 s and SD is 30.16. Mean difference between two groups is 117 s. *p*- value is highly significant (<0.001) [Table 1].

In this study, 87% of patients in group-1, had grade 0 motor blockade and 60% of patients in group II had grade 0 motor blockade. Grade I motor blockade in 13% of patients of group I and 30% in group II. Grade II motor blockade was not there in Group I and in 10% of cases in group II. P-value is statistically significant (<0.04) (Tables 2 and 3).

Discussion

Collis et al.[7] popularized the use of intrathecal bupivacaine 2.5 mg and fentanyl 25 μg. Soresi performed the first international CSE in 1937. Lee et al.[4] compared intrathecal

Table 1: Dermatomal level of sensory blockade after spinal component of CSE

Dermatomal level	Group I	Group II
T6	0	2 (7%)
T7	0	11 (37%)
T8	5 (17%)	11 (37%)
T9	13 (43%)	4 (14%)
T10	10 (33%)	2 (7%)
T11	2 (7%)	0

Table 2: Changes in systolic blood pressure (BP)

Systolic BP	Mean±SD		Mean difference	*p*-value
	Group I	Group II		
0	120 ± 7	121 ± 8	–0.4	0.84
1	111 ± 10	112 ± 9	–1.5	0.52
5	110 ± 10	112 ± 10	–1.8	0.48
15	107 ± 22	106 ± 13	0.5	0.92
30	113 ± 9	106 ± 13	7.0	0.02*
45	117 ± 13	110 ± 13	6.3	0.07
60	115 ± 9	115 ± 8	0.4	0.86
90	117 ± 8	115 ± 7	2.1	0.29
180	119 ± 5	110 ± 13	8.3	0.002*

Table 3: Changes in diastolic blood pressure (BP)

Diastolic BP	Mean SD		Mean difference	*p*-value
	Group I	Group II		
0	78 ± 7	81 ± 5	–2.6	0.10
1	75 ± 10	78 ± 8	–2.9	0.21
5	74 ± 10	74 ± 9	–0.1	0.98
15	75 ± 11	72 ± 11	2.6	0.36
30	77 ± 9	74 ± 11	3.0	0.25
45	75 ± 10	75 ± 10	–0.6	0.81
60	78 ± 10	77 ± 8	1.4	0.56
90	74 ± 10	74 ± 10	0.0	–
180	76 ± 9	76 ± 9	0.0	–

bupivacaine 1.25 mg and fentanyl 25 μg and bupivacaine 2.5 mg and fentanyl 25 μg for CSE analgesia.

Collis et al. did comparison of CSE analgesia bupivacaine (2.5 mg) and fentanyl (25 μg) followed by epidural top ups of 15 ml, 0.1% bupivacaine with 2 μg/ml fentanyl in to epidural space. Overall satisfaction was greater in CSE group. Comparison of maternal satisfaction with low-dose CSE (group A) and high-dose standard bupivacaine (group B) epidural analgesia was carried out. They concluded onset of analgesia was more rapid in CSE group 20 min VAS score 92/98 group A versus 68/99 group B ($p < 0.0001$).

Cousine et al.[8] concluded that onset of analgesia and duration was almost similar addition of clonidine had increased incidence of hypotension. In fentanyl and bupivacaine groups, thoracic sensory dermatomal level was T5. Onset was 5 min and duration was more than 90 min with small incidence of motor blockade. In this study, the onset of analgesia was equally rapid with both doses of bupivacaine. Sensory onset of analgesia with mean of 204 s in group I, 87 s in group II and mean difference of 117 s between both groups. Dermatomal level achieved at the end of 10 min was T9 in group I and T7–T8 in group II with *p*-value of <0.001. Motor blockade grade 0 in 87% of cases and grade I in 13% cases in group I. In group II, grade 0 60% patients and 30% patients with grade I blockade. Duration of analgesia for spinal component, mean of 82 min in group I and 104 min in group II with grade I blockade.

Lee et al.[4] concluded that VAS pain scores in the first 30 min were similar in both groups. Median time to first request for additional analgesia was longer in group B (120 min) compared to group A (75 min) $p < 0.0013$. Collis et al.[7] concluded that overall satisfaction was greater in CSE group than in stand epidural group. In this study, degree of pain relief was assessed using visual analog score. There was no significant difference in pain relief between the groups. 67% of patient in group I had score of 1–2 and 33% of patient in group II had score of 3–4.

In this study, hypotension was present in 10% in group I and 43% in group II, which was easily treated with fluids. Buvanendran et al.[9] studied that intrathecal bupivacaine reduces pruritus and prolongs duration of fentanyl analgesia during labor.

Complications following CSE are reported in numerous studies, the most greaded are cardiorespiratory catastrophes and inadvertent total spinal block. Norris et al.[10] quotes inadvertent dural puncture in epidural leading to total spinal in his series as 6.3% and PDPH in CSE is 1.2%. In this study, we did not come across cardiorespiratory catastrophes total spinal inadvertent puncture of dura or kinking of catheter.

Conclusion

The onset of analgesia was equally rapid with both doses of bupivacaine and the groups achieved excellent in major proportion within 5 min. Duration of analgesia was longer in patients who received the larger dose of bupivacaine. Study found low incidence of motor block with bupivacaine 1.25 mg compared with bupivacaine 2.5 mg and also showed a significant low decrease in arterial pressure with bupivacaine 1.25 mg. Study also suggests that bupivacaine 1.25 mg was as effective as bupivacaine 2.5 mg when added to fentanyl 25 μg for CSE analgesia in the first stage of labor with less motor, sensory block, and hypotension.

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