

# Study of progress of labor with intrathecal labor analgesia using fentanyl 25µg alone versus fentanyl 20µg plus bupivacaine 2.5mg

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## Abstract

**Background:** Labour analgesia techniques, are widely practised procedures performed by an anaesthesiologist on request by the obstetrician or parturient. Single shot spinal analgesia is an alternative to epidural analgesia during labour, easier to administer and with faster onset of pain relief. In present study we compared intrathecal labor analgesia using fentanyl 25µg alone and fentanyl 20µg plus bupivacaine 2.5mg on the progress of labor at a tertiary hospital. **Material and Methods:** Present study was conducted in 20-30 years age, primigravida, full-term, singleton pregnancies, vertex presentation, in active phase of labor with a cervical dilatation of more than 4 cm with normal fetal heart rate (FHR) tracings, ASA grade I/II, parturients were randomly allocated in 2 groups. **Results:** In present study total 60 parturients were equally divided in two groups (Group F and Group BF). General characteristics of participants such as maternal age, height, weight, cervical dilatation at entry in study and Baseline VAS score were comparable in both groups. In BF group early onset of labor analgesia, more duration of labor analgesia, better rate of cervical dilatation, APFAR scores and less duration of second stage was noted as compared to group F, difference was not significant. While short duration of active first stage was noted in group F than group BF, difference was not significant. No side effects/ adverse effects were noted in present study. **Conclusion:** Intrathecal fentanyl with bupivacaine group had early onset of labor analgesia, more duration of labor analgesia, better rate of cervical dilatation, APFAR scores and less duration of second stage. Though no significant difference was noted for duration of active phase of first stage, duration of second stage and progress of labour in both groups.

**Keywords:** progress of labour, intrathecal labor analgesia, fentanyl, bupivacaine

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## INTRODUCTION

Pain relief is an important issue for labouring women. The level of pain experienced and the effectiveness of pain relief may influence a woman's satisfaction with labour and the birth and may have immediate and long-term emotional and psychological effects.<sup>1</sup> Labour analgesia techniques, are widely practised procedures performed by an anaesthesiologist on request by the obstetrician or parturients. During vaginal birth, neuroaxial analgesia is proven to give the most effective pain relief. Single shot spinal analgesia is an alternative to epidural analgesia

during labour, easier to administer and with faster onset of pain relief but with a restricted duration as limitation.<sup>2</sup> Systemic opioids are shown to have limited effect on pain during labour but in neuraxial route opioids are proven effective. Opioids are widely used in conjunction with local anesthetics as they permit the use of a lower dose of local anesthetics while providing adequate anesthesia and analgesia. It both provides adequate anesthesia as well as lower drug toxicity.<sup>3</sup> Spinal anaesthesia with local anaesthetic agents, especially bupivacaine, has side effects such as hypotension, respiratory depression, vomiting and shivering in a dose dependent fashion.<sup>4</sup> In present study we compared intrathecal labor analgesia using fentanyl 25µg alone and fentanyl 20µg plus bupivacaine 2.5mg on the progress of labor at a tertiary hospital.

### MATERIAL AND METHODS

Present study was conducted in department of anaesthesiology with help from obstetrics and gynaecology department during February 2020 to September 2020. Study design was interventional, comparative study. Institutional ethical committee approval was taken. 20-30 years, primigravida, full-term, singleton pregnancies, vertex presentation, in active phase of labor with a cervical dilatation of more than 4 cm with normal fetal heart rate (FHR) tracings, ASA (American society of Anaesthesiologists) status grade I and II were considered for this study. Parturients delivered vaginally were included and women required LSCS were excluded.

60 parturients were enrolled in present study, randomly allocated in 2 groups.

- 1) Group F - received an intrathecal injection of fentanyl 25 µg
- 2) Group BF - received intrathecal injection of fentanyl 20 µg plus 0.5% hyperbaric bupivacaine 2.5 mg (0.5 ml)

After preloading with 500 ml RL solution, under all aseptic precautions spinal block was given in left lateral position, in L3-L4 interspace with a 25 G spinal needle. Single intrathecal injection was given as per group distribution. Maternal parameters such as maternal vitals, duration of sensory block, pain scores were recorded by anaesthetist. Labour was monitored partographically by obstetrician. Partograph helps to record frequency and intensity of uterine contractions, dilation of the cervix, descent of the presenting part, oxytocin used and fetal heart rate recordings. Every neonate was examined by neonatologist immediately after birth and APGAR scores were recorded. All findings were recorded in Microsoft excel sheet and analysed with help of SPSS version 22. Unpaired and paired student t-test was used to analyze the data, p value less than 0.05 was considered as significant.

### RESULTS

In present study total 60 parturients were equally divided in two groups (Group F and Group BF). General characteristics of participants such as maternal age, height, weight, cervical dilatation at entry in study and Baseline VAS score were comparable in both groups.

**Table 1: General characteristics**

| Characteristics                                | Group F (n=30) | Group BF (n=30) |
|--|----------------|-----------------|
| Age (in years)                                 | 23.11 ± 2.34   | 22.92 ± 2.87    |
| Height (in cms)                                | 155.1 ± 5.21   | 154.2 ± 6.25    |
| Weight (in kgs)                                | 64.17 ± 7.21   | 66.24 ± 6.72    |
| Cervical Dilatation at entry in study (in cms) | 4.56 ± 0.38    | 4.42 ± 0.29     |
| Baseline VAS score                             | 5.32 ± 1.17    | 5.57 ± 1.06     |

In BF group early onset of labor analgesia, more duration of labor analgesia, better rate of cervical dilatation, APGAR scores and less duration of second stage was noted as compared to group F, difference was not significant. While short duration of active first stage was noted in group F than group BF, difference was not significant. No side effects/ adverse effects were noted in present study.

**Table 2: Labor characteristics**

| Characteristics                                   | Group F (n=30) | Group BF (n=30) | P value |
|---|----------------|-----------------|---------|
| Onset time of Labor Analgesia (min)               | 4.32 ± 1.42    | 2.92 ± 1.07     | 0.52    |
| Duration of Labor Analgesia (min)                 | 214.46 ± 34.75 | 203.25 ± 26.12  | 0.60    |
| Duration of active 1 <sup>st</sup> stage (in min) | 177.35 ± 21.24 | 179.97 ± 18.49  | 0.75    |
| Duration Of 2 <sup>nd</sup> Stage in min          | 34.6 ± 13.16   | 32.07 ± 11.15   | 0.53    |
| Rate of cervical dilatation (cm/h)                | 1.59 ± 0.45    | 1.71 ± 0.32     | 0.84    |
| Oxytocin used (units)                             | 5.56 ± 2.14    | 5.91 ± 1.94     | 0.85    |
| APGAR score 1 min after birth                     | 6.97 ± 0.57    | 7.12 ± 0.72     | 0.61    |
| APGAR score 5 min after birth                     | 8.57 ± 0.77    | 8.68 ± 0.65     | 0.73    |

## DISCUSSION

Painful uterine contractions cause maternal hyperventilation and increased catecholamine concentration resulting in maternal and fetal hypoxaemia.<sup>5</sup> An ideal labour analgesic technique should provide adequate and satisfactory analgesia without any motor blockade or adverse maternal and fetal effects. Among the variety of labour analgesia techniques ranging from parenteral and inhalational agents, regional analgesia has an edge over other methods in achieving the above goals.<sup>2</sup> Fentanyl has been studied extensively and is added during induction of anesthesia to provide analgesia during surgical procedures and to decrease the hypertensive response to intubation.<sup>6</sup> Often, intrathecal opioids, such as fentanyl or sufentanil, are combined with local anesthetics, thereby markedly enhancing the quality and duration of postoperative analgesia after cesarean delivery as well as providing better parturient comfort without affecting neonatal outcome significantly.<sup>7</sup> Bupivacaine is the most commonly used drug for subarachnoid block due to its lesser side effects. Various studies have shown that low-dose diluted bupivacaine with fentanyl can provide sufficient anesthesia with rapid recovery in patients undergoing ambulatory surgery or minor urological surgeries.<sup>8</sup> In study by Gowrisree K,<sup>9</sup> duration of the active phase of first stage of labor was slightly shortened in group A (intrathecal labor analgesia with fentanyl 25 µg) as compared to group B (fentanyl 20 µg plus bupivacaine 2.5 mg). Duration of the second stage of labor was slightly prolonged in group-B as compared to group A (22.2 vs 25.07min.) and significant. Rate of cervical dilation was faster in group A as compared to group B (1.93 vs. 1.94 cm/h). They concluded that, rapid onset with satisfactory pain relief, VAS scores <4 and good maternal and fetal hemodynamics in both the groups and minimal motor block in group-B. Similar findings were noted in present study. Mathur P *et al.*,<sup>10</sup> noted that, mean duration of second stage of labor was significantly prolonged in labour analgesia group (18.03 ± 8.27 min) as compared to control group (10.13 ± 5.89 min) and difference was statistically significant (P < 0.001). Possible reason for a prolonged second stage could be relaxation of the abdominal wall musculature secondary to neuraxial local anesthetic resulting in decreased effectiveness of maternal expulsive efforts. Mathur P *et al.* concluded 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, associated with faster cervical dilation rate and no delay in the progress of labor, without significant maternal and fetal hemodynamic variation. Fentanyl has been used along with bupivacaine for labor analgesia extensively to decrease motor block, however the addition

of opioids to local anesthetics has disadvantages of pruritus and respiratory depression.<sup>11</sup> No side effects/ adverse effects were noted in present study. Traditional epidural techniques, employing high concentrations of local anaesthetic (at least 0.25% bupivacaine), have been associated with prolonged labour, use of oxytocin augmentation and an increased incidence of instrumental vaginal delivery.<sup>2</sup> Higher doses of bupivacaine, increasing the level of blockade are likely to enhance hypotension and induce breathing difficulties but reducing the dose of bupivacaine does not prevent hypotension.<sup>12</sup> Also coadministration of small doses of intrathecal opioids with bupivacaine for spinal anaesthesia is advisable and advantageous in order to decrease the intensity as well as severity of spinal complications associated with spinal anaesthesia.<sup>13</sup> Combined Spinal Epidural technique provides effective and timely labour analgesia particularly for women in active labour. CSE technique consists of a spinal injection of a small dose of local anaesthetics and/or lipophilic opioids (usually Fentanyl or Sufentanil), followed by introduction of catheter into epidural space for maintaining of analgesia by extradural drug administration.<sup>14</sup>

## CONCLUSION

Intrathecal fentanyl with bupivacaine group had early onset of labor analgesia, more duration of labor analgesia, better rate of cervical dilatation, APGAR scores and less duration of second stage. Though no significant difference was noted for duration of active phase of first stage, duration of second stage and progress of labour in both groups.

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