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ORIGINAL ARTICLE

# A comparative study of Sufentanil and fentanyl with low concentration bupivacaine for combined spinal epidural labour analgesia

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***ABSTRACT:***
**Background:** An increase in instrumental deliveries and potentially even cesarean sections has been linked to dystocia caused by epidural anesthesia. The present study was conducted to compare sufentanil and fentanyl with low concentration bupivacaine for combined spinal epidural labour analgesia. **Materials & Methods:** 70 parturients were split up into two groups of 35. Bupivacaine heavy (2.5 mg), sufentanil (5 mcg) and 10 mL intermittent bolus of sufentanil 0.30 mcg/mL in bupivacaine 0.125% were administered as spinal top-ups to Group I. Group II got fentanyl (25 mcg) and bupivacaine heavy (2.5 mg) intrathecally, as well as an epidural top-up of 10 mL intermittent boluses of fentanyl 2.5 mcg/mL in bupivacaine 0.125%. Total analgesic requirements, mean interval between epidural top-ups, and duration of intrathecal and epidural analgesia were recorded. **Results:** The mean age in group I was 26.2 years and in group II was 26.1 years. The mean weight was 57.4 kgs in group I and 58.2 kgs in group II. The mean height was 160.2 cm in group I and 161.4 cm in group II. The difference was non- significant (P> 0.05). Duration of intrathecal analgesia was 102.4minutes in group I and 78.2minutes in group II. Time of onset of intrathecal analgesia was 2.05minutes in group Iand 2.09 minutes in group II and mean duration between epidural top-ups was 94.1minutes in group Iand 85.4 minutes in group II respectively. The difference was significant (P< 0.05). Mode of delivery was full-term normal delivery in 23 and 25 and lower segment caesarean section in 12 and 10 in group I and II respectively. VAS score 0-1 was seen in 29 and 31, score 1-4 in 6 and 4 in group I and II respectively. The difference was non- significant (P> 0.05). **Conclusion:** Sufentanil and fentanyl combined in a spinal epidural produced good labor analgesia and high patient satisfaction.
**Key words:** labour analgesia, spinal epidural, sufentanil

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## INTRODUCTION

An increase in instrumental deliveries and potentially even cesarean sections has been linked to dystocia caused by epidural anesthesia.[1] The proposed mechanism by which epidural analgesia may influence the rate of forceps and caesarean deliveries is the motor blockage of the pelvic diaphragm muscles by local anesthetics. Strong opioids may be added to reduce the concentration of local anesthetics, which may lessen motor blockage and, thus, the impact of epidural analgesia on dystocia.[2] The most noticeable indicator of the start of labor is pain. The agonizing pain of labor is a major source of worry and anxiety. Maternal hyperventilation and elevated catecholamine levels brought on by painful uterine contractions result in hypoxemia in both the mother and the fetus.[3]

An efficient analgesia eliminates the drawbacks and improves the outcomes for both the mother and the fetus. Therefore, pain management ought to be a key component of labor management at all levels.The use of combined spinal epidural (CSE) analgesia to relieve labor pain is growing.[4] It combines the flexibility of the epidural catheter with the benefit of a quick onset of spinal analgesia. The epidural route can be used to modify the drug's dosage and frequency of administration in accordance with parturients' needs. If necessary, it can also be expanded to provide anesthesia for cesarean birth.[5]The present study was conducted to assess efficacy of sufentanil and fentanyl with lowconcentration bupivacaine for combined spinal epidural labour analgesia.

## MATERIALS & METHODS

The present study comprised of 70 parturients belonging to ASA grade I and IIwith singleton, term pregnancy in spontaneous labour. All gave their written consent for participation in the study.

Data such as name, age etc. was recorded. Everyone was split up into two groups of 35. Bupivacaine heavy (2.5 mg), sufentanil (5 mcg) and 10 mL intermittent bolus of sufentanil 0.30 mcg/mL in bupivacaine 0.125% were administered as spinal top-ups to Group I. Group II got fentanyl (25 mcg) and bupivacaine heavy (2.5 mg) intrathecally, as well as an epidural top-up of 10 mL intermittent boluses of fentanyl 2.5 mcg/mL in bupivacaine 0.125%. Total analgesic requirements, mean interval between epidural top-ups, and duration of intrathecal and epidural analgesia were recorded. A 10-point visual scale was used to

measure pain and overall satisfaction. The delivery method was noted. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

## RESULTS

**Table I Baseline parameters**

| Parameters | Group I (35) | Group II(35) | P value |
|---|---|---|---|
| Age (years) | 26.2 | 26.1 | 0.96 |
| Weight (kg) | 57.4 | 58.2 | 0.82 |
| Height (cm) | 160.2 | 161.4 | 0.73 |

Table I shows that mean age in group I was 26.2 years and in group II was 26.1 years. The mean weight was 57.4 kgs in group I and 58.2 kgs in group II. The mean height was 160.2 cm in group I and 161.4 cm in group II. The difference was non- significant (P> 0.05).

**Table II Assessment of parameters**

| Variables | Group I | Group II | P value |
|---|---|---|---|
| Duration of intrathecalanalgesia (min) | 102.4 | 78.2 | 0.02 |
| Time of onset ofintrathecal analgesia (min) | 2.05 | 2.09 | 0.58 |
| Mean duration betweenepidural top-ups (min) | 94.1 | 85.4 | 0.03 |

Table II, graph I shows thatduration of intrathecal analgesia was 102.4minutes in group I and 78.2minutesin group II. Time of onset of intrathecal analgesia was 2.05minutes in group Iand 2.09minutes in group II and mean duration between epidural top-ups was 94.1minutes in group Iand 85.4 minutes in group II respectively. The difference was significant (P< 0.05).

**Graph I Assessment of parameters**

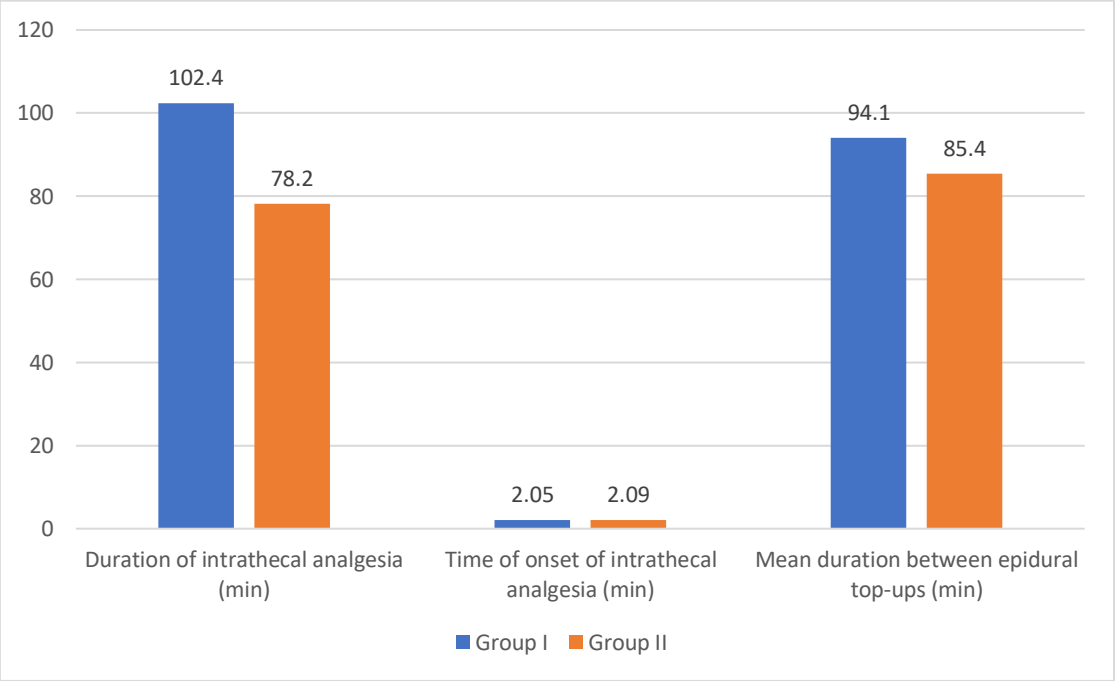


**Table III Mode of delivery and Pain**

| Parameters | Variables | Group I | Group II | P value |
|---|---|---|---|---|
| Mode of delivery | Full-term normal deliver | 23 | 25 | 0.63 |
| | Lower segment caesarean section | 12 | 10 | |
| VAS | Score 0-1 | 29 | 31 | 0.75 |
| | Score1-4 | 6 | 4 | |
| | Score4-7 | 0 | 0 | |
| | Score7-10 | 0 | 0 | |

Table II shows that mode of delivery was full-term normal delivery in 23 and 25 and lower segment caesarean sectionin 12 and 10 in group I and II respectively. VAS score 0-1 was seen in 29 and 31, score 1-4 in 6 and 4in group I and II respectively. The difference was non- significant (P> 0.05).

## DISCUSSION

An increase in instrumental deliveries and potentially even cesarean sections has been linked to epidural anesthesia as a cause of dystocia. The proposed mechanism by which epidural analgesia may influence the rate of forceps and caesarean deliveries is the motor blockage of the pelvic diaphragm muscles by local anesthetics.[6,7] Strong opioids may be added to reduce the concentration of local anesthetics, which may lessen motor blockage and, thus, the impact of epidural analgesia on dystocia. While several research have compared the effectiveness of epidural bupivacaine 0.125% with fentanyl and sufentanil, many studies have employed different dosages of opioid added to bupivacaine 0.125% as a bolus dose.[8] The present study was conducted to compare sufentanil and fentanyl with low concentration bupivacaine for combined spinal epidural labour analgesia.

We found that mean age in group I was 26.2 years and in group II was 26.1 years. The mean weight was 57.4 kgs in group I and 58.2 kgs in group II. The mean height was 160.2 cm in group I and 161.4 cm in group II. Vertommen JD et al[9], in a double-blind, randomised, prospective study 150 women in labour received intermittent epidural injections of 10 ml 0.125% bupivacaine with adrenaline (1:800,000) with 5, 7.5 or 10 micrograms of sufentanil added. The onset, duration, and quality of analgesia were compared. Motor block, type of delivery and neonatal Apgar scores were noted. The onset, duration, and quality of analgesia were generally similar in the three groups, except following the second injection when the quality of analgesia was significantly superior in the sufentanil 7.5 and 10 micrograms groups. Motor blockade and type of delivery did not differ between the groups and there were no differences in neonatal Apgar scores. No patient required more than three injections. Theyconcluded that 7.5 micrograms sufentanil is the optimal dose to add to intermittent epidural injections of 10 ml 0.125% bupivacaine with adrenaline (1:800,000) for pain relief in labour.

We found duration of intrathecal analgesia was 102.4minutes in group I and 78.2minutes in group II. Time of onset of intrathecal analgesia was 2.05minutes in group Iand 2.09 minutes in group II and mean duration between epidural top-ups was 94.1minutes in group Iand 85.4 minutes in group II respectively. Loftus et al[10]studied the placental transfer and neonatal effects of epidural sufentanil and fentanyl infused with bupivacaine for labor analgesia.Healthy parturient women (n = 36) received epidural bupivacaine alone (group B) or with fentanyl (group B-F) or sufentanil (group B-S). Group B received a 12-ml bolus of 0.25% bupivacaine followed by a 10 ml/h infusion of 0.125% bupivacaine. Groups B-F and B-S received a 12-ml bolus of 0.125% bupivacaine with 75 micrograms fentanyl or 15 micrograms sufentanil, respectively, followed by 10 ml/h of 0.125% bupivacaine with fentanyl 1.5 micrograms/ml or sufentanil 0.25 micrograms/ml. Maternal venous (MV) and umbilical arterial (UA) and umbilical venous (UV) bupivacaine and opioid plasma concentrations were determined. Neonatal assessment included Apgar scores, umbilical cord blood gas analyses, and neurobehavioral testing at delivery and at 2 and 24 h of life using the Neurologic and Adaptive Capacity Score (NACS).The mean total dose of fentanyl was 136.6 +/- 13.1 micrograms (SEM), and of sufentanil, 23.8 +/- 1.8 micrograms. Although administered in a ratio of 5.7:1, fentanyl and sufentanil MV plasma concentrations were in the ratio of 27:1. UV/MV ratios were 0.37 for fentanyl and 0.81 for sufentanil. Fentanyl was detected in most UA samples, whereas sufentanil was present in only one sample. Neonatal condition was good and generally similar in all groups, with the exception of a lower NACS at 24 h in group B-F.

We found mode of delivery was full-term normal delivery in 23 and 25 and lower segment caesarean section in 12 and 10 in group I and II respectively. VAS score 0-1 was seen in 29 and 31, score 1-4 in 6 and 4 in group I and II respectively. For 95% of parturients (ED95) receiving either epidural fentanyl or sufentanil with bupivacaine 0.125% for labor analgesia, Herman et al[11] determined the analgesic effective dosages as indicated by a visual analog pain scale (VAS) of at least 10. One hundred women who are at full term and in active early labor (cervical dilatation of.5 cm) are seeking obstetric anesthetic services for labor pain relief. Following a 3-ml test dose of bupivacaine 0.25%, patients were randomly assigned and equally distributed to receive one of ten epidural dosage regimens of bupivacaine 0.125% alone or in combination with either fentanyl 25, 50, 75, or 100 mg or sufentanil 5, 10, 15, 20, or 25 mg in a 10-ml bolus. Using a 10-cm plastic VAS slide rule, VAS scores were taken from each parturient at 0, 1, 5, 10, 15, 20, 25, and 30 minutes, as well as again when the patient asked for more analgesia. Analgesic success, defined as a VAS of at least 10 with each opioid dose, was plotted using a log-probit dose-response analysis. In bupivacaine 0.125%, an ED95 value of 8 mg and 50 mg was determined for sufentanil and fentanyl, respectively. The duration of analgesics and the frequency of adverse effects did not differ statistically across groups.

The limitation the study is small sample size.

## CONCLUSION

Authors found that sufentanil and fentanyl combined in a spinal epidural produced good labor analgesia and high patient satisfaction.

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