

# Intrathecal Block in Caesarean Section – Comparison Between Levobupivacaine-Fentanyl and Levobupivacaine.

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## ABSTRACT

**Background:** Spinal anaesthesia (or intrathecal block), is a form of regional anaesthesia involving the injection of a local anaesthetic into the subarachnoid space. Spinal anaesthesia is the technique of choice for Caesarean section as it avoids a general anaesthetic and the risk of failed intubation. The aim of the study was to compare the effect of intrathecal levobupivacaine-fentanyl and levobupivacaine in caesarean deliveries. **Methods:** This study is the prospective, comparative study done on 80 pregnant women of ASA grade I and II, aged between 20-40 years, scheduled for elective caesarean section. The subjects were divided into two groups, A & B which received levobupivacaine-fentanyl and Levobupivacaine respectively. The spinal block features were evaluated with parameters- Time of onset of sensory blockade, time to achieve complete sensory blockade and time to achieve maximum sensory level up to T6, two segment regressions time, regression time to T12 for the sensory block and time of rescue analgesia. The motor blockade was measured using modified Bromage scale. Onset of motor block (Bromage Score-1), time to achieve maximum motor block (Bromage Score-3) and total duration of motor block were recorded. Heart rate and blood pressure were monitored immediately after subarachnoid injection of drug and when patient is made supine. These observations were also noted at interval of 2, 4, 6, 8, 10, 12, 14, 20, 30 minutes and at the end of surgery. **Results:** The combination of fentanyl and levobupivacaine decreases the time to achieve complete sensory and motor block. The combination of fentanyl and levobupivacaine had significantly protracted the duration of sensory and motor block. Grade of motor block was better with combination of fentanyl and Levobupivacaine. Levobupivacaine-fentanyl reduced the need of post-operative analgesics. The mean intraoperative pulse rate, systolic and diastolic blood pressure were more stable in patients receiving combination of fentanyl and Levobupivacaine. **Conclusion:** The combination of fentanyl and Levobupivacaine is the better for Intrathecal block in Caesarean section.

**Keywords:** Caesarean, fentanyl, Intrathecal block, Levobupivacaine.

## INTRODUCTION

Spinal anaesthesia (or intrathecal block), is a form of regional anaesthesia involving the injection of a local anaesthetic into the subarachnoid space, generally through a fine needle, usually 9 cm (3.5 in) long. Spinal anaesthesia is the technique of choice for Caesarean section as it avoids a general anaesthetic and the risk of failed intubation (which is approximately 1 in 250 in pregnant women). It also means the mother is conscious and the partner is able to be present at the birth of the child. The post-operative analgesia from intrathecal opioids in addition to non-steroidal anti-inflammatory drugs is also good.<sup>[1,2]</sup>

Spinal anaesthetics are typically limited to procedures involving most structures below the upper abdomen. To administer a spinal anaesthetic to higher levels may affect the ability to breathe by paralysing the intercostal respiratory muscles, or even the diaphragm in extreme cases, as well as the body's ability to control the heart rate via the cardiac accelerator fibres. Also, injection of spinal anaesthesia higher than the level of L1 can cause

damage to the spinal cord, and is therefore usually not done.<sup>[3-5]</sup>

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Levobupivacaine is a local anaesthetic drug belonging to the amino amide group. It is the S-enantiomer of bupivacaine. Compared to bupivacaine, levobupivacaine is associated with less vasodilation and has a longer duration of action. It is approximately 13 percent less potent (by molarity) than racemic bupivacaine and has a longer motor block onset time. Levobupivacaine is indicated for local anaesthesia including infiltration, nerve block, ophthalmic, epidural and intrathecal anaesthesia in adults; and infiltration analgesia in children. Levobupivacaine is contraindicated for IV regional anaesthesia.<sup>[1,6-10]</sup>

Fentanyl is a potent, synthetic opioid pain medication with a rapid onset and short duration of action. It is a potent agonist of  $\mu$ -opioid receptors in

the brain. Fentanyl is 50 to 100 times more potent than morphine, but some fentanyl analogues, which are designed to mimic the pharmacological effects of the original drug, may be as much as 10,000 times more potent than morphine. Intravenous fentanyl is often used for anesthesia and analgesia. During anaesthesia it is often used along with a hypnotic agent like propofol. It is also administered in combination with a benzodiazepine, such as midazolam, to produce sedation for procedures such as endoscopy, cardiac catheterization, and oral surgery, or in emergency rooms. It is often used in the management of chronic pain including cancer pain. Fentanyl is sometimes given intrathecally as part of spinal anesthesia or epidurally for epidural anesthesia and analgesia. Because of fentanyl's high lipid solubility, its effects are more localized than morphine, and some clinicians prefer to use morphine to get a wider spread of analgesia.<sup>[8,11]</sup>

In caesarean section, surgeries performed under spinal anaesthesia, it has been reported that the administration of local anaesthetics alone has a short duration of effect. Also, it is insufficient for preventing visceral pain and nausea especially during uterus manipulation and peritoneum closure. This leads to postoperative analgesic requirement at an earlier stage. A number of adjuvants have been studied to prolong the effect of spinal anaesthesia. The present study is done to compare the effects of intrathecal levobupivacaine-fentanyl and levobupivacaine in caesarean deliveries.<sup>[4,8,12-15]</sup>

## MATERIALS AND METHODS

This study is the prospective, comparative study done in the department of anaesthesia for the period of eight months. The aim of the study was to compare the effect of intrathecal levobupivacaine-fentanyl and levobupivacaine in caesarean deliveries. This study was conducted on 80 pregnant women of ASA grade I and II, aged between 20-40 years, scheduled for elective caesarean section which were randomly selected. The subjects were divided into two groups, A & B which received levobupivacaine-fentanyl and Levobupivacaine respectively.

### Inclusion criteria

- Age 20-40 years
- Pregnant female posted for elective Caesarean surgery
- Normal cardiovascular parameters in pre-anaesthetic check-up.

### Exclusion criteria

- Age <20 and >40 years
- Contraindication to spinal anaesthesia.
- Bad obstetric history and obstetric complications in present pregnancy.
- Evidence of foetal compromise and anomalies.
- Patients with valvular heart disease.

- Nephritis and renal failure.
- Patients with psychiatric diseases.
- Not giving consent for participation in study.

A detailed pre-anaesthetic evaluation and all relevant investigations were done. In operation theatre, the standard monitoring devices SpO<sub>2</sub>, ECG, non-invasive blood pressure, temperature probe was attached to the patient and baseline parameters pulse rate, blood pressure, respiratory rate and SpO<sub>2</sub> were recorded. Intravenous access was setup with a wide bore 18G intravenous cannula over forearm. Each patient was preloaded with 10 mL/kg Ringer lactated solution over a period of 20 minutes prior to spinal anaesthesia. All patients were pre-medicated intravenously with Inj. Ranitidine 50 mg and Inj. Ondansetron 4 mg.

The Group A received levobupivacaine 10 mg (2 mL) and fentanyl 20 mcg (0.4 mL). The Group B received levobupivacaine 10 mg (2 mL) plus normal saline (0.4 mL). Under all aseptic precautions, through midline approach, the lumbar puncture was done at L2-L3 or L3-L4 intervertebral space with 23G disposable Quincke's spinal needle. The time of injection of spinal drug was recorded as '0' minutes. Oxygen was supplemented to each patient at a rate of 5 lit./min. via oxygen mask.

The spinal block features were evaluated with parameters- Time of onset of sensory blockade, time to achieve complete sensory blockade and time to achieve maximum sensory level up to T6, two segment regressions time, regression time to T12 for the sensory block and time of rescue analgesia.

The motor blockade was measured using modified Bromage scale. Onset of motor block (Bromage Score-1), time to achieve maximum motor block (Bromage Score-3) and total duration of motor block were recorded. Heart rate and blood pressure were monitored immediately after subarachnoid injection of drug and when patient is made supine. These observations were also noted at interval of 2, 4, 6, 8, 10, 12, 14, 20, 30 minutes and at the end of surgery.

The values of the two groups were compared and expressed as mean  $\pm$  SD. Statistical analysis was done by using Student's paired t-test for quantitative and Chi-square test for qualitative parameters. The p value of <0.05 was considered as statistically significant.

## RESULTS

This study was conducted on eighty patients in the age group of 20-40 years, which were divided into two groups (40 each). The Group A received levobupivacaine + fentanyl and the Group B received levobupivacaine + normal saline. The demographic profile of these patients was compared. The difference in parameters of the patients (Age, weight, height, BMI) were found to be statistically insignificant ( $p>0.05$ ) [Figure 1].

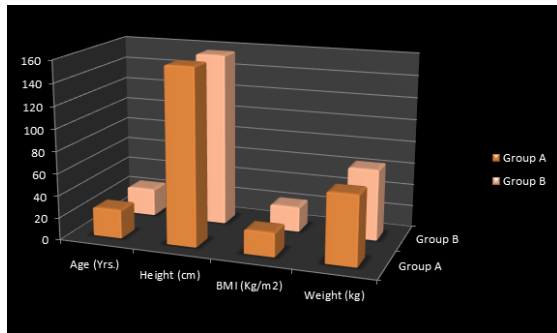


Figure 1: Comparison of demographic characteristics in two groups.

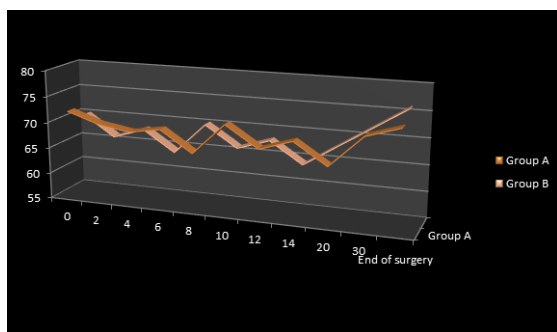


Figure 2: Intraoperative deviations in Mean Heart Rate at different time interval.

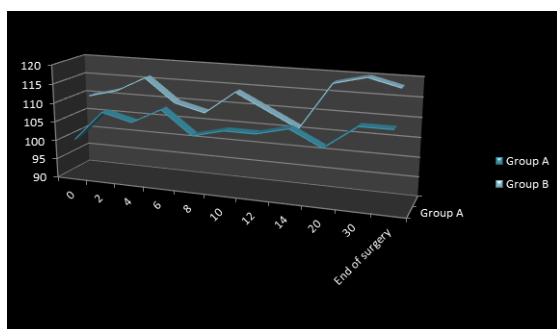


Figure 3: Intraoperative deviations in systolic blood pressure at different time interval.

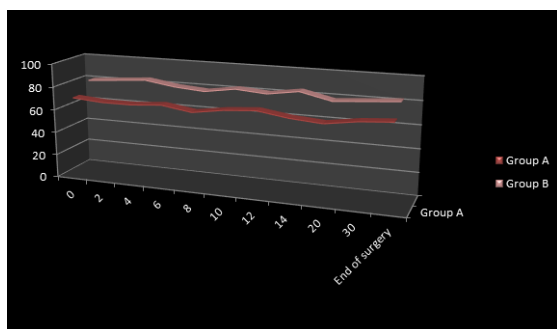


Figure 4: Intraoperative deviations in diastolic blood pressure at different time interval.

Table 1: Comparison of sensory parameters of Subarachnoid (Spinal) Blockade in two groups.

Parameters	Group A	Group B	P value
Mean onset time of sensory block (min.)	2.5 ± 0.2	5.82 ± 2.7	<0.05
Time to achieve complete sensory block	6.8 ± 2.3	9.2 ± 1.8	<0.05
Time to achieve highest level of sensory block T6	3.7 ± 0.6	4.9 ± 0.29	<0.05
Two segment regression time for sensory block	96.61 ± 20.8	92.7 ± 18.5	>0.05
Time to regress to T12 dermatome for sensory block	109.16 ± 15.3	99.56 ± 14.9	<0.05
Mean duration of effective analgesia	179.6 ± 31.1	152.79 ± 31.6	<0.05

Parameters	Group A	Group B	P value
Time of onset of motor block - Grade I (min.)	3.88 ± 0.56	6.41 ± 1.08	<0.05
Time of completion of motor block	9.72 ± 2.11	11.55 ± 3.9	<0.05
Duration of motor block	132.15 ± 19.2	127.23 ± 17.53	<0.05

Table 2: Comparison of motor parameters of Subarachnoid (Spinal) Blockade in two groups.

Parameters	Group A	Group B	P value
Time of onset of motor block - Grade I (min.)	3.88 ± 0.56	6.41 ± 1.08	<0.05
Time of completion of motor block	9.72 ± 2.11	11.55 ± 3.9	<0.05
Duration of motor block	132.15 ± 19.2	127.23 ± 17.53	<0.05

[Table 1 & 2] shows the results regarding characteristics of subarachnoid blockade, i.e. sensory and motor blockade. The onset of sensory and motor block was found to be faster in group A. Mean time to achieve complete sensory and motor blockade was also significantly (<0.05) faster in group A as compared to group B. The addition of fentanyl to levobupivacaine significantly prolonged the duration of sensory and motor block and also the postoperative analgesia as compared to levobupivacaine alone. The difference in grade of motor block at one minute was statistically significant (p<0.05).

In Group A, nausea was the major complication (34%) followed by hypotension (19%). In Group B, nausea was the major complication (38%) followed by vomiting (21%).

The mean intraoperative pulse rate, systolic and diastolic blood pressure of patients from Group A was more stable as compared to Group B at different time intervals with no statistical significance (P >0.05) [Figure 2-4].

## DISCUSSION

The current study confirmed that addition of fentanyl to intrathecal levobupivacaine during caesarean section was more actual for intrathecal block than of levobupivacaine alone. The addition of fentanyl to levobupivacaine had hasty onset of both sensory and motor block. It also extended the duration of sensory block, motor block and postoperative analgesia and also diminutions postoperative analgesic necessity. Period to achieve comprehensive sensory and motor

block was quicker with levobupivacaine-fentanyl group than levobupivacaine alone.

Gautier et al reported that the mean time to achieve highest level of sensory block was 17 minutes.<sup>[16]</sup> The shorter times in our study might be associated with the dose and volume of levobupivacaine (10 mg). The group A had earlier highest level T6 of sensory blockade as compared to group B and the difference was statistically significant, ( $P < 0.05$ ). The cause of earlier spread and earlier highest sensory blockade could be because of affinity of opioid and alpha agonist to dorsal horn.

Khezri et al compared 2.6 mL levobupivacaine vs. 2.3 mL levobupivacaine with 15 µg fentanyl (2.6 mL) in spinal anaesthesia for TURP.<sup>[17]</sup> There were no significant differences between the two groups regarding haemodynamic changes. They determined that supplementary researches might be directed to find the finest combination of levobupivacaine with an opioid sustaining maximal haemodynamic stability.

Erdil et al showed that in spinal anaesthesia superior haemodynamic stability was related with low-dose levobupivacaine-fentanyl when compared with low-dose bupivacaine-fentanyl.<sup>[18]</sup> In a study completed by Padma T et al,<sup>[19]</sup> there was statistically significant difference in haemodynamic parameters like heart rate, mean, systolic and diastolic BP, but clinically these parameters were within normal limits and did not require any intervention.

The limitations of our study are that sample size was very small and outcomes of present study necessity to be established by similar studies on large sample size.

## CONCLUSION

Intrathecal levobupivacaine-fentanyl had faster onset of sensory and motor blockade as compared to intrathecal levobupivacaine alone.

- The combination of fentanyl and levobupivacaine decreases the time to achieve complete sensory and motor block.
- The combination of fentanyl and levobupivacaine had significantly protracted the duration of sensory and motor block.
- Grade of motor block was better with combination of fentanyl and Levobupivacaine.
- Levobupivacaine-fentanyl reduced the need of post-operative analgesics.
- The mean intraoperative pulse rate, systolic and diastolic blood pressure were more stable in patients receiving combination of fentanyl and Levobupivacaine.

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