

## **A Comparison between Intrathecal Nalbuphine versus Fentanyl as an Adjuvant With 0.5% Hyperbaric Bupivacaine for Postoperative Analgesia in Patients Undergoing Lower Segment Cesarean Section**

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### **Abstract**

**Background:** Opioids have been used as an adjunct to bupivacaine in spinal blockade to enhance the onset of action, to improve the quality of intraoperative and postoperative analgesia, and to increase the duration of block. Fentanyl is a synthetic opioid agonist and nalbuphine is a synthetic opioid agonist-antagonist. This study aims to compare the postoperative analgesia of intrathecal nalbuphine and fentanyl as adjuvants to bupivacaine in cesarean section.

**Methods:** A prospective, randomized, double-blind and comparative study was conducted on 90 patients. These patients were randomized into three groups with fifty patients in each group. Group I received 2 ml of 0.5% hyperbaric bupivacaine (10 mg) plus 0.4 ml nalbuphine (0.8 mg), Group II received 2 ml of 0.5% hyperbaric bupivacaine (10 mg) plus 0.4 ml fentanyl (20 µg), and

Group III received 2 ml of 0.5% hyperbaric bupivacaine (10 mg) plus 0.4 ml of normal saline.

**Results:** The mean duration of motor block (time required for motor block to return to Bromage’s Grade 1 from the time of onset of motor block) was  $153.21 \pm 3.12$  min in Group I,  $152.36 \pm 2.24$  min in Group II, and  $123.24 \pm 2.09$  min in Group III.

**Conclusion:** As an adjunct to hyperbaric bupivacaine in subarachnoid block anesthesia, fentanyl is better than nalbuphine in enhancing the onset of both sensory and motor block.

**Keywords:** CS, Nalbuphine, Bupivacaine, Fentanyl.

### **Introduction**

Most anesthetists prefer spinal anesthesia over general anesthesia (GA) in cases of cesarean section (CS) delivery, as it avoids the risk of aspiration that may occur with GA, avoids the neonatal depressant effect of GA, and provides postoperative analgesia. However, it

also has disadvantages, as it provides a relatively fixed short duration of anesthesia, causes sympathetic block with subsequent hypotension and bradycardia, lesser control on the level of blockade, may give insufficient visceral block with visceral pain, and the possible occurrence of nausea and vomiting especially during uterine manipulation and peritoneal closure.<sup>1</sup>

Fentanyl is a lipophilic opioid with a rapid onset following intrathecal injection and does not migrate to the 4th ventricle to cause respiratory depression. Various studies have shown that it improves duration of sensory anesthesia and postoperative analgesia without producing significant side effects.<sup>2</sup>

Nalbuphine when used as adjuvant to hyperbaric bupivacaine has also improved the quality of perioperative analgesia with fewer side effects. It is a mixed synthetic agonist antagonist which attenuates the  $\mu$ -opioid effects and enhances the  $\kappa$ -opioid effects.<sup>3</sup> There is no documented report of neurotoxicity with nalbuphine. Morphine, fentanyl, and other  $\mu$ -opioids come under Narcotic Act, thus their availability is a major concern while nalbuphine is easily available and with fewer side effects<sup>4</sup>

The aim of this study was to compare fentanyl with nalbuphine as intrathecal adjuvant to 0.5% hyperbaric bupivacaine in terms of sensory and motor blockade

characteristics and duration of postoperative analgesia as the primary end points and intraoperative hemodynamic changes, sedation, pruritus, and respiratory depression as the secondary end points in patients undergoing cesarean section.

#### Material and methods

90 patients with ASA physical status Class I or II, aged 18–45 years, posted for cesarean section in our institution were included in this study. This was a prospective randomized double-blind comparative study. Patients with contraindication for spinal anesthesia were excluded from this study.

Intravenous access was secured with 18G cannula, and all patients were preloaded with 10 ml/kg of Ringer's lactate solution. The study medication (2.4 ml of the drug solution) was prepared by the anesthesiologist who did not take part in the study. Group I patients received 2 ml of 0.5% hyperbaric bupivacaine plus 0.4 ml nalbuphine (0.8 mg), Group II patients received 2 ml of 0.5% hyperbaric bupivacaine plus 0.4 ml fentanyl (20  $\mu$ g), and Group III patients received 2 ml of 0.5% hyperbaric bupivacaine plus 0.4 ml of normal saline.

## Results

Table 1: Demographic Variables

Parameters	Group I (n=30)	Group II (n=30)	Group III (n=30)	P value
Age (years)	22.65±4.21	23.61±2.16	23.41± 2.31	0.25
ASA I/II	23/7	24/6	25/5	0.31

All groups were comparable.

Table 2: Characteristics of sensory and motor block

Parameters	Group I (n=30)	Group II (n=30)	Group III (n=30)	P value
Onset Sensory block (Mint.)	4.12±1.16	4.36±1.36	5.14± 1.21	0.12
Onset motor block (Mint.)	6.36±1.26	6.63±1.53	7.12± 1.63	0.32
Duration of Sensory block (Mint.)	108.12±5.06	111.32±4.32	85.65± 2.12	0.01
Duration of motor block (Mint.)	153.21±3.12	152.36±2.24	123.24± 2.09	0.01

The difference in the time of onset of sensory and motor block was statistically nonsignificant (NS) among the groups ( $P > 0.05$ ). The mean duration of sensory block was  $108.23 \pm 5.24$  min in Group I,  $112.54 \pm 4.65$  min in Group II, and  $86.32 \pm 2.34$  min in Group III. The mean duration of motor block (time required for motor block to return to Bromage's Grade 1 from the time of onset of motor block) was  $153.21 \pm 3.12$  min in Group I,  $152.36 \pm 2.24$  min in Group II, and  $123.24 \pm 2.09$  min in Group III.

### Discussion

We conducted a randomized double-blind study to compare intrathecal nalbuphine and fentanyl as adjuvants to 0.5% hyperbaric bupivacaine with bupivacaine alone in patients undergoing cesarean section.

Nalbuphine exhibits a ceiling effect to analgesia, i.e. increase in dose increases analgesic effect only up to a certain point beyond which there is no further enhancement of analgesia with the increase in dose.<sup>5</sup> We chose 0.8 mg of nalbuphine to compare with 20 µg of fentanyl as Culebras et al.<sup>6</sup> and Jyothi et al.<sup>7</sup> had previously observed that increasing nalbuphine dose from 0.8 to 1.6 mg and 2.4 mg did not increase analgesic efficacy.

We found that onset of sensory block was comparable in the three groups. Gomaa et al. compared intrathecal nalbuphine 0.8 mg and fentanyl 25 µg and found that

there was no statistically significant difference in onset of sensory block between fentanyl (1.64 min) and nalbuphine (1.60 min) group<sup>8</sup> Similar results were observed by Gupta et al.,<sup>9</sup> Ahmed et al.,<sup>10</sup>

### Conclusion

As an adjunct to hyperbaric bupivacaine in subarachnoid block anesthesia, fentanyl is better than nalbuphine in enhancing the onset of both sensory and motor block.

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