

## ORIGINAL ARTICLE

### To compare the effect of intrathecal Fentanyl with hyperbaric Bupivacaine on the quality of subarachnoid blockade in cesarean section

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#### ABSTRACT:

**Background:** In cesarean section (CS), subarachnoid blockade (SAB) is mostly preferred than general anesthesia. SAB is a simple technique, has rapid onset, dense neural blockade and also associated with negligible maternal and fetal risk. This study was conducted to compare the effect of intrathecal Fentanyl with hyperbaric Bupivacaine on the quality of SAB in CS. **Materials & Methods:** This was conducted in the department of Anaesthesia, Patan hospital. The patients were randomly divided into two study groups by lottery method. Group 1 (n= 80): was given 2ml (10 mg) of 0.5% hyperbaric Bupivacaine plus 0.5 ml (25 µg) of fentanyl intrathecally, total volume=2.5 ml. Group 2 (n=80): was given 2ml (10mg) of 0.5% hyperbaric Bupivacaine plus 0.5ml NS intrathecally, total volume =2.5ml. **Results:** The mean age in group I was 38.54 ± 3.22 years and in group II was 36.14 ± 3.22 years. Mean height in group I was 162.4 ± 6.00 m and in group II was 160.1 ± 3.22 m. Duration of surgery in group I was 122.2 ± 24 minutes and in group II was 120.2 ± 22 minutes. The difference was non- significant (P= 1). The onset of sensory analgesia was 2.26 ± 0.312 minutes in group I and 2.2 ± 0.30 minutes in group II. Time for maximum cephalic spread was 12.48 ± 3.25 minutes in group I and 11.40 ± 3.45 minutes in group II. Maximum analgesic block was T5-7 in group I and group II. Onset of motor block was 3.48 ± 0.99 minutes in group I and 3.51 ± 0.84 minutes in group II. Time for complete motor block was 6 ± 2.39 minutes in group I and 7.27 ± 2.30 minutes in group II. The difference was non- significant (P> 0.05). Time for two segment regression was 86.82 ± 10.80 minutes in group I and 128.11 ± 10.81 minutes in group II. Mean duration of analgesia was 198.12 ± 23.54 minutes in group I and 206 ± 18.23 minutes in group II. The difference was significant (P< 0.05). **Conclusion:** We found that addition of fentanyl to 0.5% hyperbaric bupivacaine for sub arachnoid blockage markedly improves the quality of intraoperative analgesia with minimal side effects. It also improved the quality of SAB in Cesarean section

**Key words:** Bupivacaine, Cesarean, fentanyl.

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#### Introduction

In cesarean section (CS), subarachnoid blockade (SAB) is mostly preferred than general anesthesia. SAB is a simple technique, has rapid onset, dense neural blockade and also associated with negligible maternal and fetal risk. As CS requires traction of peritoneum and handling of intraperitoneal organs, which causes intraoperative visceral pain which can be overcome by achieving the higher block upto thoracic level 4 by using higher dose of bupivacaine. The use of higher dose of bupivacaine may cause higher incidence of maternal arterial hypotension resulting in maternal and neonatal morbidity. Therefore, several additives like opioids are given intrathecally with local anesthetic mainly to improve

the quality and duration of SAB and to minimize the dose of local anesthetic, to reduce the extent and effects of sympathetic blockade.<sup>1</sup>

The unmatched reliability and simplicity of subarachnoid block has made spinal anesthesia a very useful and successful technique in managing all surgical cases undergoing infraumbilical procedures. Currently it has become more popular because of addition of opioids to local anesthetics in centroneuroaxial blockade which provides better intraoperative analgesia and early postoperative analgesia.<sup>2</sup>

Bupivacaine was introduced by Eckenstam in 1957 and used clinically by Telivno in 1963. Currently hyperbaric bupivacaine is being used with opioids for almost all

surgical cases. Bupivacaine an amide type of local anesthetic has high potency, slow onset and long duration of action. Although intrathecal bupivacaine alone offers good sensory blockade, a substantial number of patients experiences some pain and discomfort and may require analgesic supplements intraoperatively. Addition of fentanyl not only improves quality of intraoperative analgesia but it also extends to early postoperative period.<sup>3</sup> This study was conducted to compare the effect of intrathecal Fentanyl with hyperbaric Bupivacaine on the quality of SAB in CS.

### Materials & methods

This was a prospective, randomized, double-blind, comparative study. This was conducted in the department of Anaesthesia, Patan hospital. Following inclusion and exclusion criteria was used:

**Inclusion Criteria:** ASA physical status grade I, scheduled for elective cesarean section under spinal anesthesia.

**Exclusion criteria:** Patient refusal, contraindication for spinal anaesthesia and hypersensitive to bupivacaine and fentanyl. It included 160 patients undergoing elective caesarean section.

After, obtaining approval from the Institutional Review Committee, PAHS, written informed consent was taken from the patients included in study group. Preoperative evaluation with detailed history, physical examination and relevant laboratory investigations was done one day before surgery and all the procedures were explain to the patients. The patients were randomly divided into two study groups by lottery method. Group 1 (n= 80): was given 2ml (10 mg) of 0.5% hyperbaric Bupivacaine plus 0.5 ml (25 µg ) of fentanyl intrathecally, total volume=2.5 ml. Group 2 (n=80): was given 2ml (10mg) of 0.5% hyperbaric Bupivacaine plus 0.5ml NS intrathecally, total volume =2.5ml.

Bupivacaine 2 ml was drawn by the primary investigator and rest of the drugs was prepared and added to sterile syringe by anesthesia assistant. The final volume for intrathecal was adjusted to 2.5 ml. Assessment of the patient during and after the procedure and operation was done by the blinded primary investigator.

Standard monitoring included pulse oximetry, non-invasive blood pressure (NIBP) and electrocardiography (ECG) were attached to the patient in the operation theatre. Pulse, heart rate, systolic blood pressure, diastolic blood pressure and mean arterial blood pressure were noted and regarded at baseline. Intravenous access was established with 18G cannula.

Inj. Ranitidine 50 mg and Inj. Metoclopramide 10 mg was given iv half an hour before operation. Preloading with 20

ml/kg of Ringer's Lactate solution was done within half an hour before performing subarachnoid block. A subarachnoid block was performed with the study drug in the sitting position with a 25 G Quincke needle at the L3-4 intervertebral space.

The study drug was injected over 10-15 seconds after obtaining free flow of CSF, following which the patient was immediately placed in supine position with 15 degrees leftward tilt of the operating table. Pulse and NIBP was recorded every 5 minutes till 30 minutes and every 10 minutes thereafter till the end of surgery.

The level of sensory block was defined as the loss of sharp sensation by using a pinprick test bilateral at the mid clavicular line every minute till 20 minutes after intrathecal injection to determine the maximum level of sensory block. Sensory blockade up to T4-T6 was taken as time of onset of sensory block. Time at which the sensory block regress to T10 level will also be noted. Degree of motor block was assessed bilaterally using a 4-point Bromage scale which is as follows: 0 = no motor block, 1 = just able to flex knees but not the hips, 2 = unable to flex knees, free ankle movements, 3 = no movement possible in any lower extremity.

Time at which the maximum degree of motor block was also be noted and also the time at which the Bromage scale becomes to zero was also be noted. Degree of motor blockade was assessed in 5, 10 and 15 minutes.

The quality of intra-operative analgesia was evaluated by the patient at 15 minute intervals using Visual Analogue Scale VAS-100 mm point scale as follows: 1: VAS from 0-4mm (no pain) 2: VAS from 5-44mm (mild pain), 3: VAS from 45-74mm (moderate pain), 4: VAS from 75-100mm (severe pain)

The duration of complete analgesia (time from intrathecal injection to the first complain of pain) was noted. The duration of effective analgesia (time taken from intrathecal injection to the first dose of rescue drug) was also noted.

Postoperative analgesia was assessed at the time of first rescue analgesia by using a visual analogue scale. The time of rescue analgesic medication and duration of effective analgesia (from the time of intrathecal drug administration to the first supplementation with a rescue analgesic) noted. Intramuscular Diclofenac sodium 75 mg was given for postoperative analgesia, and if pain persisted, intramuscular Inj. Pethidine 50 mg (with inj. Promethazine 25 mg) was supplemented.

Postoperative analgesia was assessed first at the time of rescue analgesia using a simplified visual analogue scale rating. 1: VAS from 0-4mm (no pain), 2: VAS from 5-44mm (mild pain), 3: VAS from 45-74mm (moderate pain), 4: VAS from 75-100mm (severe pain)

## Results

**Table I** Distribution of patients

Total- 160			
Group	Group I	Group II	P value
Number	80	80	1
Drug	2ml (10 mg) of 0.5% hyperbaric Bupivacaine plus 0.5 ml (25 µg ) of fentanyl intrathecally	2ml (10mg) of 0.5% hyperbaric Bupivacaine plus 0.5ml NS intrathecally	

**Table II** Demographic profile

Parameter	Mean±S.D		P value
	Group I	Group II	
Age	38.54 ± 3.22	36.14 ± 3.22	1
Height	162. 4± 6.00	160.1± 3.22	0.4
Duration of surgery	122.2± 24	120.2± 22	0.2

**Table III** Sub- arachnoid block in groups

Parameters	Mean ± S.D		P value
	Group I	Group II	
Onset of sensory analgesia (min)	2.26 ± 0.312	2.2 ± 0.30	0.1
Time for maximum cephalic spread (min)	12.48 ± 3.25	11.40 ± 3.45	0.1
Maximum analgesic block (segment)	T5-7	T5-7	0.2
Onset of motor block (min)	3.48 ± 0.99	3.51 ± 0.84	0.2
Time for complete motor block (min)	6 ± 2.39	7.27 ± 2.30	0.5
Time for two segment regression (min)	86.82 ± 10.80	128.11 ± 10.81	0.01
Mean duration of analgesia (min)	198.12 ± 23.54	206 ± 18.23	0.02

Table I shows that group 1 (n= 80) was given 2ml (10 mg) of 0.5% hyperbaric Bupivacaine plus 0.5 ml (25 µg) of fentanyl intrathecally. Group 2 (n=80) was given 2ml (10mg) of 0.5% hyperbaric Bupivacaine plus 0.5ml NS intrathecally. The difference was non- significant (P- 1). Table II shows that mean age in group I was 38.54 ± 3.22 years and in group II was 36.14 ± 3.22 years. Mean height in group I was 162. 4± 6.00 m and in group II was 160.1± 3.22 m. Duration of surgery in group I was 122.2± 24 minutes and in group II was 120.2± 22 minutes. The difference was non- significant (P- 1).

Table III shows that onset of sensory analgesia was 2.26 ± 0.312 minutes in group I and 2.2 ± 0.30 minutes in group II. Time for maximum cephalic spread was 12.48 ± 3.25 minutes in group I and 11.40 ± 3.45 minutes in group II. Maximum analgesic block was T5-7 in group I and group II. Onset of motor block was 3.48 ± 0.99 minutes in group I and 3.51 ± 0.84 minutes in group II. Time for complete motor block was 6 ± 2.39 minutes in group I and 7.27 ± 2.30 minutes in group II. The difference was non-significant (P> 0.05). Time for two segment regression was 86.82 ± 10.80 minutes in group I and 128.11 ± 10.81 minutes in group II. Mean duration of analgesia was 198.12 ± 23.54 minutes in group I and 206 ± 18.23 minutes in group II. The difference was significant (P< 0.05).

## Discussion

The subarachnoid block (SAB) is popularly known as a spinal block. There can be confusion when the term “spinal anaesthesia” is used as some anaesthetists include

subarachnoid block and epidural block under the classification of spinal anaesthesia.

Subarachnoid block is most versatile regional block commonly employed for infraumbilical surgeries. The use of neuroaxial opioids has gained widespread popularity as they potentiate the analgesia produced by local anesthetics.<sup>4</sup> This study was conducted to compare the effect of intrathecal Fentanyl with hyperbaric Bupivacaine on the quality of SAB in CS.

In our study, we divided 160 patients into 2 groups. group 1 (n= 80) was given 2ml (10 mg) of 0.5% hyperbaric Bupivacaine plus 0.5 ml (25 µg) of fentanyl intrathecally. Group 2 (n=80) was given 2ml (10mg) of 0.5% hyperbaric Bupivacaine plus 0.5ml NS intrathecally. Similar study was done by Arawal et al.<sup>5</sup>

The mean age in group I was 38.54 ± 3.22 years and in group II was 36.14 ± 3.22 years. Mean height in group I was 162. 4± 6.00 m and in group II was 160.1± 3.22 m. Duration of surgery in group I was 122.2± 24 minutes and in group II was 120.2± 22 minutes. Similar results were seen in study by Hunt CO et al.<sup>6</sup>

We found that onset of sensory analgesia was less in group II as compared to group I. This is in accordance to Catherine et al.<sup>7</sup> Similarly time for maximum cephalic spread was less in group II as compared to group I.

We found that onset of motor block was 3.48 ± 0.99 minutes in group I and 3.51 ± 0.84 minutes in group II. This is in accordance to Harbhej S.<sup>8</sup> We compared Time for complete motor block in both group. Time for complete motor block was 6 ± 2.39 minutes in group I and 7.27 ±

2.30 minutes in group II. Similar results were seen in study by Dahlgren et al.<sup>9</sup>

Time for two segment regression was more in group II as compared to group I. Similarly mean duration of analgesia was  $198.12 \pm 23.54$  minutes in group I and  $206 \pm 18.23$  minutes in group II. This is in accordance to Wang C et al.<sup>10</sup>

### Conclusion

We found that addition of fentanyl to 0.5% hyperbaric bupivacaine for sub arachnoid blockage markedly improves the quality of intraoperative analgesia with minimal side effects. It also improved the quality of SAB in Cesarean section.

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