

# A PROSPECTIVE, COMPARATIVE STUDY OF EFFECT OF BUPIVACAINE-FENTANYL AND BUPIVACAINE-TRAMADOL IN PATIENT UNDERGOING LOWER ABDOMINAL SURGERY IN SPINAL ANAESTHESIA

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## ABSTRACT

### BACKGROUND

Various local anaesthetic agents are used with good pharmacokinetic profile. Bupivacaine is a potent amide local anaesthetic producing prolonged anaesthesia along with that it produces more sensory than motor block. Only limitation with the use of bupivacaine is its cardio toxicity in high dose, it has been found that a mixture of local anaesthetic and opioids has supra additive effects in the spinal cord posterior horn pain transmission. The requirement of local anaesthetic will be submaximal, which improves and maintains the overall analgesic effect over the time, and with fewer side effects.

### MATERIALS AND METHODS

It is a prospective study conducted in the department of anaesthesia and critical care at Konaseema institute of medical science, Amalapuram, Andhra Pradesh. This study was conducted between 2012-2013 and during this period 140 patients were included in to this study as per the exclusion and inclusion criteria.

### RESULTS

Regarding onset of sensory block time to reach T10 level was 4.22 and 4.2 min respectively in group BF and group BT, which is statistically significant with P value <0.05. Peak sensory level achieved in group BF was T4 but in group BT it was T5. Time required to reach peak sensory level was 10.6 min in group BF and 10.8 in group BT which is statistically significant. Onset of motor block in group BF was 3.6 min and in group BT it was 4.2 mins. Total duration of motor block was more in BF group that is 280.4 min than group BT that is 260.4 min. Mean duration of 1<sup>st</sup> dose of rescue analgesia was 432.66 min in group BF and 400.20 min in group BT.

### CONCLUSION

In our study we have found that there is no difference between the mean change in blood pressure, heart rate and respiratory rate, between two groups, which is supported by the study of various authors. Time to reach peak T10 level was 4.22 min and 4.39 min in group BF and BT respectively which is similar to the work of other authors and peak sensory level achieved by BF was higher than BT that is T4. Mean duration of sensory block was little higher in Group BT than the group BF which is similar to the work of Ravishankar et al., A. M. kaki et al.

### KEYWORDS

Fentanyl, Tramadol, Bupivacaine, Spinal Anaesthesia.

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### BACKGROUND

The stress response to surgery is presented as derangement of metabolic and physiological process which is expressed in the form of hormonal, inflammatory and acute phase responses. The response has a compensatory mechanism

and provides a chance of survival because of increased cardiovascular functions, fluid retention, and increased metabolic activity. If the stress response is prolonged then it leads to delayed ambulation, increased morbidity and mortality, healing process delayed, change of postoperative infection increases.<sup>1,2</sup>

In modern practice of anaesthesia and critical care various procedures are followed and drugs are used to reduce the post-operative morbidity and decrease the duration of stay in the hospital.

Spinal anaesthesia is one of the anaesthesia techniques that reduces the stress response and improves the operative pain relief.

Various local anaesthetic agents are used with good pharmacokinetic profile. Bupivacaine is a potent amide local anaesthetic producing prolonged anaesthesia along with

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that it produces more sensory than motor block. Only limitation with the use of bupivacaine is its cardio toxicity in high dose, it has been found that a mixture of local anaesthetic and opioids has supra additive effects in the spinal cord posterior horn pain transmission. The requirement of local anaesthetic will be submaximal, which improves and maintains the overall analgesic effect over the time, and with fewer side effects.<sup>3,4,5</sup>

Fentanyl is a lipophilic opioids most widely used in context of post-operative pain. It has been found in many studies that bupivacaine with fentanyl produces a faster blockade intra operative and postoperative analgesia without higher degree of motor bloc.<sup>6</sup>

Tramadol is an atypical opioid which relieves pain by opioid as well as additional mechanism. Its affinity for  $\mu$  receptor is low and  $\kappa$  and  $\delta$  is very low. It inhibits uptake of noradrenaline and serotonin and  $\uparrow$ 5HT so activate monoaminergic spinal inhibition of pain. It produces less respiratory depression.<sup>7</sup>

Present study is designed to study of comparison of effect of bupivacaine with fentanyl verses bupivacaine with tramadol in patient under going lower abdominal surgery in spinal anaesthetic.

## MATERIALS AND METHODS

It is a prospective study conducted in the department of anaesthesia and critical care at Konaseema institute of medical science, Amalapuram, Andhra Pradesh. This study was conducted between Dec 2012 to March 2015 and during this period 140 patients were included in to this study as per the exclusion and inclusion criteria.

### Exclusion Criteria

- Any contraindication for spinal anaesthesia.
- Cardio vascular conduction abnormality
- Hyper sensitivity to drug.
- Pregnant women.
- Renal disorder.

### Inclusion Criteria

Age 20 to 60 yrs.  
Both sex.  
Belong to ASA I and ASAI.

This study was approved by institutional ethics committee and a written consent was obtained from the patient.

Total one hundred and forty patients, were divided into two groups. First group was BF (bupivacaine with fentanyl) (n=70) group given bupivacaine with fentanyl. Second group was BT (bupivacaine with tramadol) (n=70) group given bupivacaine with tramadol.

All patients were given same pre-anaesthetic medication and advice. Visual pain scale was explained to all the patients. All the vital parameters that is HR, SBP, DBP and respiratory rate was measured preoperatively, a good peripheral access was secured with 18G cannula, and patients were preloaded with, ringer lactate 10 ml/kg over

20 min prior to spinal anaesthesia. Multipara monitor was attached and baseline HR, SBP, DBP, oxygen saturation, respiratory rate and ECG was recorded.

Continuous monitoring of all the parameters were done and a decrease of SBP by 25% from base line and heart rate below 50/min was considered hypotension and bradycardia, and treated appropriately.

Group BF (n=70) were given 25 micro gram fentanyl plus 3 ml of 0.5% hyperbaric bupivacaine and group BT (n=70) were given 25 milligram tramadol with 3 ml of 0.5% hyperbaric bupivacaine.

### Sensory Block

It was assessed by loss of sensation to pin prick by 22 G blunt needle, at every 2 min interval until T<sub>10</sub> dermatome was reached, and then 5 min interval till no change level reached. Time to achieve highest sensory level, maximum level of sensory block, duration of sensory block was recorded in both the group.<sup>7,8</sup>

### Motor Block

It was assessed by modified Bromage scale.

Total duration of motor block time required to reach maximum block reached was noted. The time was calculated from the time of intrathecal injection.

All the hemodynamic parameter was calculated every 5 min for first 45 min after that every 15 min till the end of surgery.

### Analgesia

Postoperative VAS was recorded, for study every 30 min for first 3 hours then 1 hourly for 12 hrs, then 3 hrs for next 24 hrs. When VAS score was more than 3 rescue analgesia given time required to first rescue analgesia and then number patient required rescue analgesia was also noted.<sup>9</sup>

## RESULTS

	Gr.BF (n=70)	Gr. BT (n=70)	P value
<b>Sex</b>	<b>Male 32 Female 38</b>	<b>Male=36 Female=34</b>	
Age (Mean)	37.50	39.8	P<0.05
Mean (Weight)	72.1	70.5	P<0.05
Mean (Height)	162.2	160.2	P<0.05
ASA Grade (%)			
I	58(82)	48(68.5)	
II	12(18)	22(31.5)	
Mean Duration of surgery (in min)	116.42	118.68	

**Table 1. Demographic Profile of Patients**

Time in Min	Group BF Mean	Group BT Mean
5 min	17.4	17.6
10 min	16.4	17.0
15 min	16.2	16.8
20 min	16.6	16.2
25 min	15.8	16.6

30 min	15.8	17.0
45 min	16.4	17.2
60 min	16.8	17.0
90 min	17.0	

**Table 2. Mean Respiratory Rate in Two Groups**

Two groups BF and BT are comparable with respect to demographic profile, as per Table 1. In group BF mean lowest respiratory rate was 15.8 per min, after 30 min from the start of surgery. Similarly in group B min respiratory rate was 16.6 per min at 25 min from the start of surgery.

Time in Min	Group BF Mean	Group BT Mean
5 min	82.2	80.4
10 min	80.2	80.0
15 min	70.4	76.0
20 min	70.6	74.2
25 min	74.8	72.2
30 min	72.6	74.2
45 min	74.4	76.0
60 min	74.0	78.0
90 min	76.0	76.0

**Table 3. Mean Heart rate in two groups**

Time	Group BF	Group BT
05 min	126.4	128.2
10 min	120.2	124.2
15 min	116.2	120.4
20 min	110.4	118.2
25 min	112.4	116.2
30 min	120.4	120.0
45 min	124.4	122.0
60 min	125.0	124.0
90 min	126	126.00

**Table 4. Mean change in systolic BP**

In group BF lowest heart rate was 70.2/min, in group BT was 72.0/min. Similarly systolic blood pressure was reduced to minimum level in group BT was 110.4 mm of Hg at 20 min from the start of surgery but in group BT it was 116.2 mm of Hg.

Onset of Block	Group A (Mean)	Group B (mean)	P value
Time to reach T10 level (min)	4.22	43.9	P<0.05
Peak sensory level achieved	T4	T5	
Time to reach peak sensory.	10.6	10.8	P<0.05
Time to reach to L5 (min)	330.4	320.6	P<0.05

**Table 5. Sensory Block Characteristic in Two Groups**

Parameters	Group BF	Group BT
Onset (min)	3.6	4.2
Duration (min)	280.4	260.4

**Table 6. Motor Block Characteristic in Two Groups**

Parameters	Group BF	Group BT
1 <sup>st</sup> rescue analgesic	432.66 min	360.2 min

**Table 7. Time for First Dose of Analgesic**

Regarding onset of sensory block time to reach T10 level was 4.22 and 4.2 min respectively in group BF and group BT, which is statistically significant with P value <0.05. Peak sensory level achieved in group BF was T4 but in group BT it was T5. Time required to reach peak sensory level was 10.6 min in group BF and 10.8 in group BT which is statistically significant.

Onset of motor block in group BF was 3.6 min and in group BT it was 4.2 mins. Total duration of motor block was more in BF group that is 280.4 min than group BT that is 260.4 min.

Mean duration of 1<sup>st</sup> dose of rescue analgesia was 432.66 min in group BF and 400.20 min in group BT.

**DISCUSSION**

It has been observed in many studies that opioid as adjuvant to spinal anaesthesia used to reduce the secretion of various hormones and acute phase substances that is secreted as a response to surgical stress produces post-operative analgesia and helps in speed recovery of patient.<sup>10</sup>

Fentanyl and tramadol are two opioid analgesics which are used as adjuvant to spinal anaesthesia. Fentanyl by acting on μ receptor in substantia gelatinosa of dorsal horn modulates pain sensation, tramadol acts by stimulating the descending inhibitory pathway by inhibiting the uptake of noradrenalin and serotonin.<sup>11,12</sup>

Various studies has been conducted on the intrathecal adjuvant use of fentanyl and tramadol along with various local anaesthetics, but present study is a prospective study to compare the effect combination of tramadol and fentanyl when they are used separately along with bupivacaine on spinal anaesthesia.

In our study we have found that there is no difference between the mean change in blood pressure, heart rate and respiratory rate, between two groups, which is supported by the study of various authors, Sheetal et al., Tarkkila P et al., and Shweta Jain et al.<sup>13-15</sup>

Time to reach peak T10 level was 4.22 min and 4.39 min in group BF and BT respectively which is similar to the work of other authors and peak sensory level achieved by BF was higher than BT that is T4. Mean duration of sensory block was little higher in Group BT than the group BF which is similar to the work of Ravishankar et al., A.M. kaki et al<sup>16,17</sup>

We have found in our study that mean duration of onset of motor block and duration of motor block was almost same in both the groups, which is similar to the study of other authors but the requirement of analgesia in fentanyl group was much prolonged than BT group.<sup>18,19</sup>

**CONCLUSION**

In our study we have found that 25 milligram of tramadol is equally potent than 25 microgram when it is used as adjuvant to bupivacaine for lower abdominal surgery. There is no difference in haemodynamic parameter, analgesia and motor and sensory block.

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