



COMPARING THE EFFICACY OF FENTANYL VS. BUTORPHANOL AS ADJUVANTS IN LUMBAR SUBARACHNOID BLOCK WITH BUPIVACAINE FOR PATIENTS UNDERGOING LOWER LIMB SURGERIES

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ABSTRACT Spinal anesthesia is the most commonly used technique for lower abdominal and lower limb surgeries. Intrathecally, administered local anaesthetics and opioids have been shown to have a synergistic analgesic effect, hence requiring relatively lower dosage. Neuraxial opioids also allow prolonged analgesia in the postoperative period and faster recovery from spinal anaesthesia. Adjuvants used include Fentanyl, morphine, buprenorphine, butorphanol, sufentanil. A prospective observational study was conducted in 354 patients of age group (20 – 60yrs) and ASA grade 1 and 2. A total of 177 patients received 25 mcg Fentanyl along with 3ml 0.5% Bupivacaine (H) and remaining 177 received 250 mcg Butorphanol along with 3ml 0.5% Bupivacaine (H). Duration of analgesia (sensory block), onset of sensory and motor blockade, duration of motor blockade, hemodynamic changes and adverse effects were compared. From the study it was found that Butorphanol was significantly better than Fentanyl in providing longer duration of analgesia. Butorphanol as adjuvant to hyperbaric 0.5% Bupivacaine 3ml in intrathecal route for lowerlimb surgeries offered better hemodynamic stability and provided effective and relatively safe anaesthesia.

KEYWORDS : fentanyl, butorphanol, adjuvant, bupivacaine, intrathecal

INTRODUCTION

Neuraxial anaesthesia is commonly performed for all surgical procedures carried on lower abdomen, pelvis and lower limbs to provide adequate surgical anaesthesia and analgesia. Spinal anaesthesia, despite providing a satisfactory surgical exposure, with just a small amount of local anaesthetic, has a drawback due to unpredictable perturbations in the haemodynamic parameters as a result of sympatholysis. These effects are proportional to the level of sympathetic blockade. Intrathecally, administered local anaesthetics and opioids have been shown to have a synergistic analgesic effect, hence requiring relatively lower dosage. Neuraxial opioids also allow prolonged analgesia in the postoperative period and faster recovery from spinal anaesthesia. Adjuvants used include Fentanyl, morphine, buprenorphine, butorphanol, sufentanil etc. Intrathecal opioids have been used in treating intraoperative, post-operative, and chronic cancer pain. This technique of intrathecal opioid administration along with local anaesthetics has been studied extensively. In our institution, Fentanyl and Butorphanol are the commonly used adjuvants, potent narcotic analgesics with rapid onset and short duration of action. The principal actions of therapeutic value are analgesia and sedation. Butorphanol is a proven intravenous analgesic, effective in intra muscular route in labour analgesia, and has also been safely used in epidural anaesthesia. So to enlighten further, we will be comparing the efficacy of Fentanyl Vs Butorphanol as adjuvants in lumbar subarachnoid block with 0.5% bupivacaine for patients undergoing lower limb surgeries.

OBJECTIVES

PRIMARY OBJECTIVE

To compare the duration of analgesia (sensory blockade) between Butorphanol and Fentanyl as adjuvants to intrathecal hyperbaric 0.5% Bupivacaine in patients undergoing lower limb surgeries.

SECONDARY OBJECTIVES

To compare the onset of sensory and motor blockade between Butorphanol and Fentanyl as adjuvants to intrathecal hyperbaric 0.5% Bupivacaine in patients undergoing lower limb surgeries.

To compare the duration of motor blockade between Butorphanol and Fentanyl as adjuvants to intrathecal hyperbaric 0.5% Bupivacaine in patients undergoing lower limb surgeries.

To compare hemodynamic changes and adverse events between Butorphanol and Fentanyl as adjuvants to intrathecal hyperbaric 0.5% Bupivacaine in patients undergoing lower limb surgeries

METHODOLOGY

A prospective observational study conducted in 354 patients of age group (20 – 60yrs) and ASA grade 1 and 2. A total of 177 patients received 25 mcg Fentanyl along with 3ml 0.5% Bupivacaine (H) and

remaining 177 received 250 mcg Butorphanol along with 3ml 0.5% Bupivacaine (H). Duration of analgesia (sensory block), onset of sensory and motor blockade, duration of motor blockade, hemodynamic changes and adverse effects were compared between the two groups. Statistical analysis was done using IBM SPSS Statistics version 20.0 and T-test and Mann Whitney U-test were done. Association analysed with Chi-square test and Fisher's exact test

RESULTS

354 patients satisfying inclusion criteria were enrolled into the study. After taking written informed consent for participation in the study, the patients were allocated to either 'Group 1' or 'Group 2' with equal allocation of 177 cases each. There was no patient lost to follow up and outcome was analysed for all the participants. Results on continuous measurements are presented on Mean \pm SD. Results on categorical measurements are presented in number and percentage. Significance is assessed at 5% level of significance. The collected data were coded and entered into the IBM SPSS Statistics, Version 20.0, a statistical package software program. The results are presented under the following headings: Section A: Socio demographic and clinical characteristics of study participants Section B: Outcome analysis: Comparison of Level of sensory blockade, Time to maximum sensory and motor blockade, Duration of motor blockade, Hemodynamic parameters at different time points between the groups

TABLE – 1 COMPARISON OF AGE

| AGE | GROUP - I | GROUP – II |
|---------|-----------------------|------------|
| < 30 | 12 | 18 |
| 31 – 40 | 18 | 24 |
| 41 – 50 | 42 | 41 |
| 51 – 60 | 59 | 54 |
| > 60 | 46 | 40 |
| Total | 177 | 177 |
| Mean | 52.531 | 50.356 |
| SD | 11.392 | 12.346 |
| p value | 0.086 Not Significant | |

Mean age of the group A is 52.53 and group B mean age is 50.36. There is no significant difference between both group regarding age. P value 0.086 not significant.

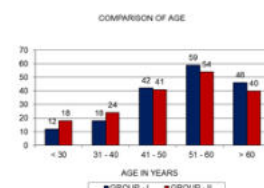


TABLE – 2 COMPARISON OF GENDER

| GENDER | GROUP - I | GROUP - II |
|---------|-----------------------|------------|
| Male | 119 | 128 |
| Female | 58 | 49 |
| Total | 177 | 177 |
| p'value | 0.355 Not significant | |

There is no significant difference between both groups regarding gender. P value is 0.355 Not significant.

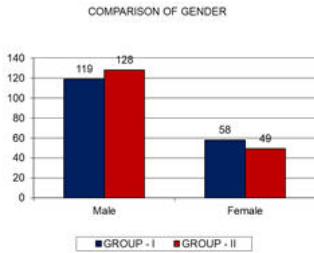


TABLE – 3 COMPARISON OF WEIGHT

| WEIGHT | GROUP - I | GROUP - II |
|---------|-----------------------|------------|
| Mean | 70.19 | 68.70 |
| SD | 8.008 | 7.477 |
| p'value | 0.072 Not significant | |

There is no significant difference between both groups regarding weight of the patients. P value is 0.072 Not significant

COMPARISON OF WEIGHT

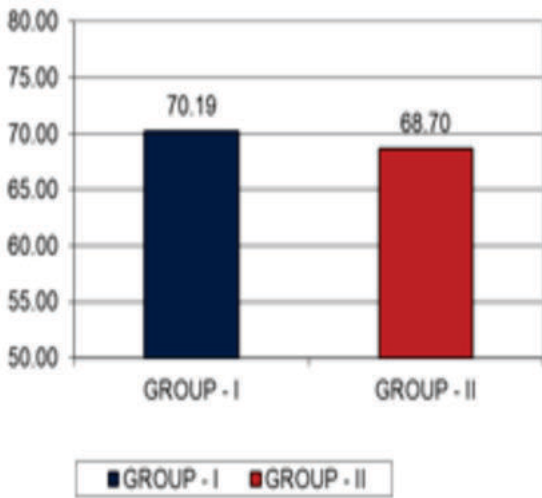


TABLE – 4 COMPARISON OF HEIGHT

| HEIGHT | GROUP - I | GROUP - II |
|---------|--------------------|------------|
| Mean | 163.41 | 160.29 |
| SD | 6.374 | 6.739 |
| p'value | <0.001 Significant | |

There is significant difference between both groups regarding height of the patients. P value is <0.001 Significant

COMPARISON OF HEIGHT

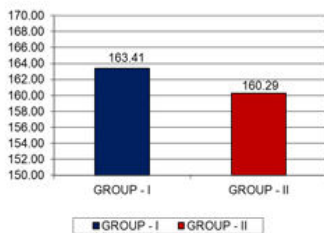


TABLE – 5 COMPARISON OF ASA

| ASA | GROUP - I | GROUP - II |
|---------|-----------------------|------------|
| I | 82 | 92 |
| II | 95 | 85 |
| Total | 177 | 177 |
| Mean | 1.54 | 1.48 |
| SD | 0.5 | 0.501 |
| p'value | 0.289 Not significant | |

There is no significant difference between both groups regarding ASA. P value is 0.289 Not significant

COMPARISON OF ASA

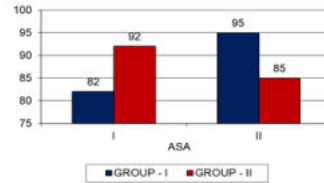


TABLE – 6 COMPARISON OF MOTOR BLOCKADE TIME IN MINUTES

| MOTOR BLOCKADE TIME in mins | GROUP - I | GROUP - II |
|-----------------------------|--------------------|------------|
| Mean | 120.48 | 128.26 |
| SD | 7.426 | 4.753 |
| p'value | <0.001 Significant | |

Motor blockade time is significantly higher in group II. P value is <0.001 significant.

COMPARISON OF MOTOR BLOCKADE TIME

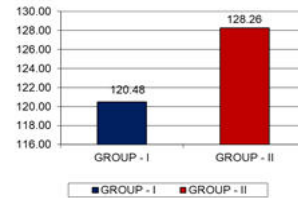


TABLE – 7 COMPARISON OF ONSET OF MOTOR BLOCK IN MINUTES

| Onset of Motor Block in minutes | GROUP - I | GROUP - II |
|---------------------------------|--------------------|------------|
| Mean | 3.06 | 3.15 |
| SD | 0.124 | 0.142 |
| p'value | <0.001 Significant | |

Onset of Motor block is significantly higher in group II than group I. p value is <0.001 significant.

COMPARISON OF MOTOR BLOCK IN MINUTES

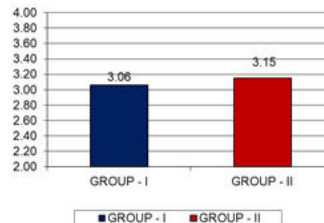


TABLE – 8 COMPARISON OF ONSET OF SENSORY BLOCK IN MINUTES

| Onset of Sensory Block in minutes | GROUP - I | GROUP - II |
|-----------------------------------|-----------------------|------------|
| Mean | 1.19 | 1.195 |
| SD | 0.15 | 0.153 |
| p'value | 0.895 Not Significant | |

There is no significant difference between both groups regarding Onset of sensory block p value is 0.895 Not significant.

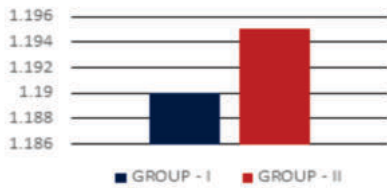


TABLE – 9 COMPARISON OF DURATION OF ANALGESIA IN HOURS

| DURATION OF ANALGESIA (hrs) | GROUP - I | GROUP - II |
|-----------------------------|--------------------|------------|
| Mean | 6.59 | 7.49 |
| SD | 1.084 | 1.394 |
| p'value | <0.001 Significant | |

Mean duration of analgesia is 6.59 hrs for group I and 7.49 for Group II. This difference is statistically significant. p value is < 0.001 significant.

COMPARISON OF DURATION OF ANALGESIA IN HOURS

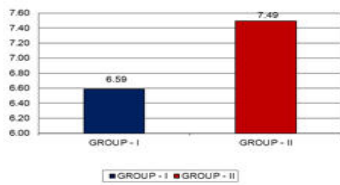


TABLE – 10 COMPARISON OF VERBAL NPRS SCORE

| | GROUP - I | | GROUP - II | | p'value | Significance |
|------------------------------|-----------|-------|------------|-------|---------|--------------|
| | Mean | SD | Mean | SD | | |
| Verbal NPRS Score in minutes | | | | | | |
| 0 mins | 0.412 | 1.025 | 0.232 | 0.497 | 0.035 | Significant |
| 30 mins | 0 | 0 | 0 | 0 | 1 | Not sig |
| 60 mins | 0 | 0 | 0 | 0 | 1 | Not sig |
| 90 mins | 0 | 0 | 0 | 0 | 1 | Not sig |
| 120 mins | 0.458 | 1.055 | 0.226 | 0.644 | 0.013 | Significant |
| 150 mins | 0.927 | 1.327 | 0.898 | 1.061 | 0.825 | Not sig |
| 180 mins | 3.412 | 0.719 | 3.548 | 0.91 | 0.121 | Not sig |
| 210 mins | 3.333 | 0.54 | 3.379 | 0.562 | 0.441 | Not sig |
| 240 mins | 4 | 0.707 | 4.023 | 0.639 | 0.753 | Not sig |
| 270 mins | 4.864 | 1.13 | 3.808 | 1.577 | < 0.001 | significant |
| 300 mins | 6.588 | 0.678 | 6.554 | 0.698 | 0.643 | Not sig |

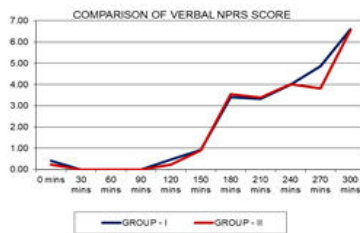


TABLE 11- COMPARISON OF MODIFIED BROMAGE SCALE

| | GROUP - I | | GROUP - II | | p'value | Significance |
|-----------------------------------|-----------|-------|------------|-------|---------|-----------------|
| | Mean | SD | Mean | SD | | |
| Modified Bromage scale in minutes | | | | | | |
| 0 mins | 2.864 | 0.343 | 2.842 | 0.366 | 0.549 | Not Significant |
| 30 mins | 4 | 0 | 4 | 0 | 1 | Not Significant |
| 60 mins | 4 | 0 | 4 | 0 | 1 | Not Significant |

| | | | | | | |
|----------|-------|-------|-------|-------|--------|-----------------|
| 90 mins | 4 | 0 | 4 | 0 | 1 | Not Significant |
| 120 mins | 4 | 0 | 4 | 0 | 1 | Not Significant |
| 150 mins | 2.571 | 0.519 | 2.333 | 0.496 | <0.001 | Significant |
| 180 mins | 2.045 | 0.298 | 1.797 | 0.492 | <0.001 | Significant |
| 210 mins | 1.949 | 0.307 | 1.684 | 0.49 | <0.001 | Significant |
| 240 mins | 1.638 | 0.558 | 1.26 | 0.522 | <0.001 | Significant |
| 270 mins | 2.051 | 1.174 | 0.944 | 0.796 | <0.001 | Significant |
| 300 mins | 0.672 | 0.626 | 0.379 | 0.52 | <0.001 | Significant |

No significant difference between both groups regarding Bromage scale up to 120 minutes. After 120 minutes, upto 300 minutes there is significant difference between both groups. P value is < 0.001 significant.

COMPARISON OF MODIFIED BROMAGE SCALE

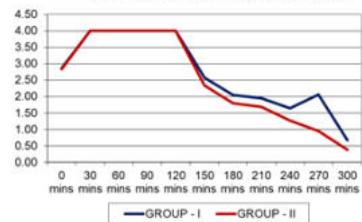


TABLE – 12 COMPARISON OF HEART RATE

| | GROUP - I | | GROUP - II | | p'value | Significance |
|------------|-----------|-------|------------|-------|---------|--------------|
| | Mean | SD | Mean | SD | | |
| Heart Rate | | | | | | |
| 0 mins | 85.254 | 3.818 | 85.633 | 3.375 | 0.324 | Not sig |
| 30 mins | 86.508 | 3.03 | 86.311 | 2.72 | 0.519 | Not sig |
| 60 mins | 86.441 | 2.929 | 86.322 | 3.161 | 0.714 | Not sig |
| 90 mins | 86.35 | 3.307 | 86.96 | 3.274 | 0.082 | Not sig |
| 120 mins | 85.701 | 3.402 | 85.915 | 2.862 | 0.521 | Not sig |
| 150 mins | 86.768 | 3.68 | 87.136 | 3.517 | 0.338 | Not sig |
| 180 mins | 86.915 | 3.586 | 86.797 | 3.372 | 0.749 | Not sig |
| 210 mins | 86.797 | 3.334 | 87.073 | 3.416 | 0.441 | Not sig |
| 240 mins | 86.593 | 3.229 | 86.198 | 3.097 | 0.24 | Not sig |
| 270 mins | 87.836 | 2.882 | 88.164 | 2.831 | 0.281 | Not sig |
| 300 mins | 86.412 | 2.92 | 86.243 | 2.224 | 0.539 | Not sig |

No significant difference between both groups regarding heart rate from 0 minutes to 300 minutes P value is not significant.

COMPARISON OF HEART RATE

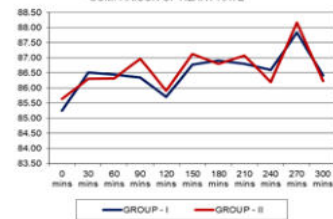


TABLE – 13 COMPARISON OF NIBP SYSTOLIC

| | GROUP - I | | GROUP - II | | p'value | Significance |
|------------------------|-----------|-------|------------|-------|---------|--------------|
| | Mean | SD | Mean | SD | | |
| NIBP[Systolic] in mins | | | | | | |
| 0 mins | 129.576 | 3.273 | 128.96 | 3.072 | 0.069 | Not Sig |
| 30 mins | 128.797 | 3.314 | 128.124 | 3.449 | 0.062 | Not Sig |
| 60 mins | 126.836 | 3.265 | 126.271 | 3.43 | 0.113 | Not Sig |
| 90 mins | 125.785 | 3.209 | 125.407 | 3.507 | 0.29 | Not Sig |
| 120 mins | 123.814 | 3.481 | 123.424 | 3.576 | 0.299 | Not Sig |
| 150 mins | 119.186 | 6.179 | 118.966 | 6.455 | 0.743 | Not Sig |
| 180 mins | 116.096 | 5.114 | 116.243 | 5.15 | 0.788 | Not Sig |
| 210 mins | 117.407 | 5.924 | 117.379 | 5.958 | 0.964 | Not Sig |
| 240 mins | 115.977 | 6.239 | 115.927 | 6.249 | 0.939 | Not Sig |
| 270 mins | 120.345 | 7.786 | 120.011 | 7.054 | 0.673 | Not Sig |
| 300 mins | 119.469 | 6.904 | 118.797 | 5.572 | 0.314 | Not Sig |

No significant difference between both groups regarding Systolic BP from 0 minutes to 300 minutes P value is not significant.

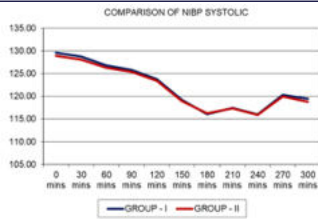


TABLE – 13 COMPARISON OF NIBP SYSTOLIC

| NIBP[Systolic] in mins | GROUP - I | | GROUP - II | | p'value | Significance |
|------------------------|-----------|-------|------------|-------|---------|--------------|
| | Mean | SD | Mean | SD | | |
| 0 mins | 129.576 | 3.273 | 128.96 | 3.072 | 0.069 | Not Sig |
| 30 mins | 128.797 | 3.314 | 128.124 | 3.449 | 0.062 | Not Sig |
| 60 mins | 126.836 | 3.265 | 126.271 | 3.43 | 0.113 | Not Sig |
| 90 mins | 125.785 | 3.209 | 125.407 | 3.507 | 0.29 | Not Sig |
| 120 mins | 123.814 | 3.481 | 123.424 | 3.576 | 0.299 | Not Sig |
| 150 mins | 119.186 | 6.179 | 118.966 | 6.455 | 0.743 | Not Sig |
| 180 mins | 116.096 | 5.114 | 116.243 | 5.15 | 0.788 | Not Sig |
| 210 mins | 117.407 | 5.924 | 117.379 | 5.958 | 0.964 | Not Sig |
| 240 mins | 115.977 | 6.239 | 115.927 | 6.249 | 0.939 | Not Sig |
| 270 mins | 120.345 | 7.786 | 120.011 | 7.054 | 0.673 | Not Sig |
| 300 mins | 119.469 | 6.904 | 118.797 | 5.572 | 0.314 | Not Sig |

No significant difference between both groups regarding regarding Systolic BP from 0 minutes to 300 minutes P value is not significant.

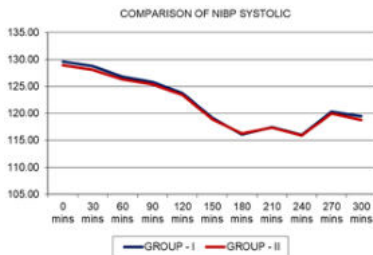


TABLE – 14 COMPARISON OF RESPIRATORY RATE

| Respiratory Rate | GROUP - I | | GROUP - II | | p'value | Significance |
|------------------|-----------|-------|------------|-------|---------|--------------|
| | Mean | SD | Mean | SD | | |
| 0 mins | 12.282 | 0.612 | 12.226 | 0.644 | 0.398 | Not sig |
| 30 mins | 11.475 | 0.666 | 11.452 | 0.648 | 0.746 | Not sig |
| 60 mins | 11.486 | 0.595 | 11.514 | 0.7 | 0.683 | Not sig |
| 90 mins | 12.282 | 0.612 | 12.254 | 0.61 | 0.664 | Not sig |
| 120 mins | 11.475 | 0.666 | 11.463 | 0.666 | 0.873 | Not sig |
| 150 mins | 11.486 | 0.595 | 11.441 | 0.509 | 0.443 | Not sig |
| 180 mins | 12.282 | 0.612 | 12.249 | 0.608 | 0.601 | Not sig |
| 210 mins | 11.475 | 0.666 | 11.469 | 0.691 | 0.938 | Not sig |
| 240 mins | 11.486 | 0.595 | 11.486 | 0.623 | 1 | Not sig |
| 270 mins | 12.282 | 0.612 | 12.243 | 0.606 | 0.541 | Not sig |
| 300 mins | 11.475 | 0.666 | 11.446 | 0.629 | 0.682 | Not sig |

No significant difference between both groups regarding regarding respiratory rate from 0 minutes to 300 minutes. P value is not significant.

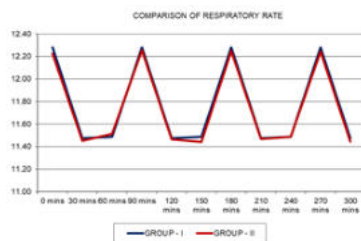
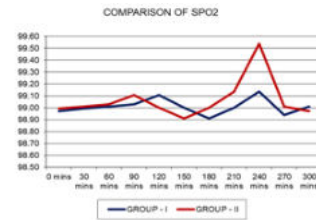


TABLE – 15 COMPARISON OF SPO2

| Spo2 | GROUP - I | | GROUP - II | | p'value | Significance |
|----------|-----------|-------|------------|-------|---------|--------------|
| | Mean | SD | Mean | SD | | |
| 0 mins | 98.972 | 0.842 | 98.994 | 0.829 | 0.799 | Not Sig |
| 30 mins | 98.994 | 0.829 | 99.011 | 0.798 | 0.845 | Not Sig |
| 60 mins | 99.011 | 0.798 | 99.028 | 0.808 | 0.843 | Not Sig |
| 90 mins | 99.028 | 0.808 | 99.107 | 0.801 | 0.356 | Not Sig |
| 120 mins | 99.107 | 0.801 | 99 | 0.819 | 0.213 | Not Sig |
| 150 mins | 99 | 0.819 | 98.91 | 0.8 | 0.294 | Not Sig |
| 180 mins | 98.91 | 0.8 | 99 | 0.833 | 0.298 | Not Sig |
| 210 mins | 99 | 0.833 | 99.136 | 0.793 | 0.118 | Not Sig |
| 240 mins | 99.136 | 0.793 | 99.537 | 0.594 | 0.561 | Not Sig |
| 270 mins | 98.938 | 0.799 | 99.011 | 0.819 | 0.394 | Not Sig |
| 300 mins | 99.011 | 0.819 | 98.972 | 0.842 | 0.654 | Not Sig |

| Spo2 | GROUP - I | | GROUP - II | | p'value | Significance |
|----------|-----------|-------|------------|-------|---------|--------------|
| | Mean | SD | Mean | SD | | |
| 0 mins | 98.972 | 0.842 | 98.994 | 0.829 | 0.799 | Not Sig |
| 30 mins | 98.994 | 0.829 | 99.011 | 0.798 | 0.845 | Not Sig |
| 60 mins | 99.011 | 0.798 | 99.028 | 0.808 | 0.843 | Not Sig |
| 90 mins | 99.028 | 0.808 | 99.107 | 0.801 | 0.356 | Not Sig |
| 120 mins | 99.107 | 0.801 | 99 | 0.819 | 0.213 | Not Sig |
| 150 mins | 99 | 0.819 | 98.91 | 0.8 | 0.294 | Not Sig |
| 180 mins | 98.91 | 0.8 | 99 | 0.833 | 0.298 | Not Sig |
| 210 mins | 99 | 0.833 | 99.136 | 0.793 | 0.118 | Not Sig |
| 240 mins | 99.136 | 0.793 | 99.537 | 0.594 | 0.561 | Not Sig |
| 270 mins | 98.938 | 0.799 | 99.011 | 0.819 | 0.394 | Not Sig |
| 300 mins | 99.011 | 0.819 | 98.972 | 0.842 | 0.654 | Not Sig |

No significant difference between both groups regarding regarding SPO2 from 0 minutes to 300 minutes. P value is not significant.



DISCUSSION

In our study, 354 patients undergoing elective lower limb surgeries were observed. The patients who received Fentanyl were included under Group 1 – 177 cases and those patients who received Butorphanol were included under Group 2 – 177 cases. Sociodemographic data of Group 1 and Group 2 were comparable. The age of the patients ranged from 26 years to 68 years. The mean age for Group 1 was 52.53 ± 11.39 years and that of Group 2 was 50.35 ± 12.34 years. Of the total study population in each group, 70% were males and 30% were females. The demographic characteristics of two groups (Fentanyl and Butorphanol) showed no statistically significant associations as p values are >0.05, except for height. Similar observations were made by Bhandari et al, Sandip Roy Basunia et al regarding the demographic data (5,3). In our study population, 46% patients of group 1 and 52% patients of group 2 belonged to ASA class 1 and rest belonged to ASA class 2. Distribution of ASA class 1 and 2 between Group 1 and 2 were tested using Chi-square test and P value was calculated which was not statistically significant. The time of onset of sensory block was 1.19 ± 0.15 minutes in group 1 and was 1.195 ± 0.15 minutes in Group 2 and showed no statistical significance. A faster onset of sensory blockade was demonstrated by studies done by Bhandari et al and Binay kumar et al (5,1).

Motor blockade characteristics were also compared between the two groups in our study. Time to maximum motor block in Group 1 was 3.06 ± 0.12 minutes and 3.15 ± 0.14 minutes in Group 2. Duration of motor blockade was 120.5 ± 7.43 minutes in group 1 and 128.3 ± 4.75 minutes in group 2. Independent t' test was conducted to find out the statistically significant differences in the time of maximum motor blockade and duration of motor blockade between two groups (Fentanyl and Butorphanol) and they showed that there is a statistically significant differences between the groups as p <0.001. According to studies done by Binay kumar et al in 77 parturients epidural volume expansion (EVE) is better than epidural or spinal in terms of level of motor blockade, time taken for motor recovery and with comparable incidence of side effects(1). This is supported by studies done by Kaur et al with similar results (13). The studies done by Binay kumar et al and Kishnani et al also observed faster motor recovery in patient undergoing epidural volume extension (1,2). The hemodynamic parameters including the HR, RR and SPO2 were recorded in both groups from the time of administration of anaesthesia every 30 minutes to till 300 minutes. The mean baseline HR in group 1 was 85.25 ± 3.82 and group 2 was 85.63 ± 3.37. and at 300 minutes 86.4 in group 1 and 86.24 in group 2, both P values obtained on comparing between two groups were statistically insignificant. The mean baseline SPO2 group 1 was 98.97 ± 0.84 and of group 2 was 98.97 ± 0.83. Independent t' test was conducted to find out the no statistically significant differences during and after the surgery with two groups (Fentanyl and Butorphanol) and they showed that there were no statistically significant differences from 0 minutes to 300 minutes as P values are >0.05. Comparative studies between butorphanol and fentanyl or other pure mu receptor agonists, or even

butorphanol vs plain bupivacaine heavy, as adjuvants to spinal anaesthesia are relatively fewer in number. The study by Upasna B et al., was the only contemporary study on comparison of intrathecal Fentanyl and Butorphanol as adjuvants to spinal anaesthesia in different varieties of infraumbilical surgeries comparable to this study [4]. Hence, this study was undertaken to compare these two drugs in a variety of infraumbilical surgeries to get a better idea regarding their perioperative analgesic and anaesthetic efficiency as opposed to only one variety of surgery. There was also a controversy on the optimal intrathecal dose of butorphanol with variations in the range of 25 µgm - 200 µgm in the above referred studies. The studies conducted by Gupta K et al., and Reddy NG et al., both of them being based on lower limb orthopaedic surgery [7,9], used a dose of 200 µgm intrathecal butorphanol along with bupivacaine heavy. Similar dose was also used by Singh SN et al., in abdominal and vaginal hysterectomies under spinal anaesthesia without any significant side effects [12]. Thus, a dose of 25 µgm Fentanyl and 250 µgm of Butorphanol as adjuvants with Bupivacaine heavy 3 mL, in subarachnoid block was used in this study with an intention of testing the perioperative efficacy, especially that of butorphanol as against a relatively fixed and already established dose of fentanyl. The other major concern was whether this dose of butorphanol was associated with an increase in adverse effects in comparison with other studies.

Haemodynamic parameters like mean HR, SBP and SPO2 were within acceptable limits. Both mean SBP and DBP were lower in the butorphanol group as compared to the fentanyl group, although it was not statistically significant, whereas there was no such trend on comparison of mean HRs between the groups, just like the study of Reddy NG et al., [9]. This was unlike the findings of Sandip Roy Basunia et al where both mean HRs and blood pressure were significantly lower in the butorphanol group between 45-90 minutes of intraoperative period [3]. Haemodynamic parameters were within acceptable limits in line with the study of Reddy IR et al., [6]. Time for onset of sensory block of the fentanyl group (1.19±0.15 min) was less than that of butorphanol group (1.195±0.15 min) but results were comparable (p>0.05). This was similar to the findings of Kumar A et al., where time to onset of sensory block in fentanyl group was 8±1.4 minutes, while it was 8±3.2 minutes in the butorphanol group [8]. The longer period in the latter study may be due to their much lower dosage of spinal drugs. The maximum sensory level achieved was T6 in both groups in this study much like Reddy NG et al., where they had used 200 µgm of intrathecal butorphanol and bupivacaine heavy 3 mL [9]

Both these adjuvant opioids did not cause any significant increase in onset of motor blockade which was consistent with the findings of Binay kumar et al and Kishnani et al.[1,2]. However in Group B, the mean duration of motor block was 120.45±7.43 minutes, which was significantly more than Group A at 128.3±4.75 minutes. These findings were quite consistent with Reddy IR et al., (butorphanol group 178.99±13.32 min as opposed to 168.8±9.18 min in fentanyl group) and Upasna B et al., (246±42.6 min in butorphanol group as opposed to 180±16.8 min in fentanyl group [6,4]. This was contrary to the findings of Kumar B et al., who found no statistically significant difference between duration of motor block between these groups [10]. One explanation may be, they had used 2.5 mL of 0.5% Bupivacaine and 25 µgm of butorphanol, while in this study 3 mL of 0.5% Bupivacaine and 250 µgm of Butorphanol was used instead. However, if mean duration of surgery in these groups are compared (73.27±14.69 min for Group A and 75.36±13.53 min for Group B), the motor block was not that inconvenient. Most significant finding of this study was that time for first request of rescue analgesia was prolonged in Butorphanol group (7.49 ± 1.39 hrs) compared to Fentanyl group (6.59±1.39hrs). Both fentanyl and butorphanol along with bupivacaine provided adequate analgesia and anaesthesia, but butorphanol was superior in delaying time of rescue analgesic which supports the result obtained from studies of Kumar B et al., time of consumption of rescue analgesia in fentanyl group was 308±14.9 minutes which was significantly less than in butorphanol group at 365.9±12.3 minutes [10]. Similar statistically significant findings were also observed in studies of Binay kumar et al and Kishnani et al [1,2].

Addition of fentanyl (20-25 µg) to low-dose bupivacaine (4 mg) has been reported to increase the perioperative quality of spinal blocks with fewer cardiovascular changes in elderly patients. None of the groups had episodes of hypotension which means that butorphanol much like fentanyl has a scope of use as an adjuvant in spinal anaesthesia in elderly patients with cardiovascular morbidities.

Delayed respiratory depression is more commonly associated with poorly lipid-soluble narcotic drugs, like morphine. The patients were continuously observed for respiratory depression and sedation in this study and no significant respiratory depression was noted much like Binay kumar et al and Kishnani et al., thus again pointing out that both these drugs in this route may have fewer side effects[1,2].

CONCLUSION

The conclusion of the study was that the Butorphanol was significantly better than Fentanyl in providing longer duration of analgesia. Butorphanol as adjuvant to hyperbaric 0.5% Bupivacaine 3ml in intrathecal route for lowerlimb surgeries offered better hemodynamic stability and provided effective and relatively safe anaesthesia.

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