

Original Article

A Comparative Study of Post-Operative Side Effects between Spinal Bupivacaine Plus Buprenorphine and Combined Femoral and Sciatic Nerve Block Used For Analgesia

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Background: The study aims to compare postoperative side effects produced by spinal bupivacaine plus buprenorphine with femoral and sciatic nerve blocks. **Methods:** Randomly patients were divided in to 2 groups by using computer generated randomization, 25 patients were taken in each group they are Group - A (spinal bupivacaine plus buprenorphine) and Group - B (Combined femoral and Sciatic Nerve Block). Postoperative side effects like nausea and vomiting, itching, drowsiness, sedation and prolonged sensory & motor block produced and hemodynamic variability was documented and compared between both groups (A and B). **Results:** The Nausea and vomiting, itching, drowsiness and sedation was high with Group A and prolonged sensory & motor block was high with Group B (p value < 0.01 highly significant). Hemodynamic variability was not significant between both groups. **Conclusion:** Nerve blocks (femoral & sciatic) compared to intrathecal buprenorphine are very useful, with fewer side effects for post-operative pain relief.

Key words: Analgesia, Buprenorphine, Bupivacaine.

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bupivacaine plus buprenorphine with combined femoral and sciatic nerve blocks in patients scheduled for lower limb surgeries.

Materials and Methods

The study was conducted on 50 patients (25 patients in each group because 25 sample size in both group was showed to have a 80% power and significance level indicated by alpha=0.05). With inclusion criteria of American Society of Anesthesiology (ASA) 1 and 2, with 20 to 50 years of age of both sex (male and female) scheduled for lower limb operations. Institutional Ethical committee approval was taken for the study. Patients were subjected to preoperative anaesthesia work up and those who were not consenting for regional anaesthesia, local anaesthetics anaphylaxis history, having local infection, pregnancy, lactation, psychiatric illness, coagulation disorder, neurological disorder, were not included in the study. Informed written consent taken from all patients included in our study.

This study was planned with an aim to compare and estimate incidence of side effects produced by spinal bupivacaine and buprenorphine with combined femoral and sciatic nerve blocks without buprenorphine. Randomization Technique was done by using computer generated randomization. Group allocation was made according to the sequentially numbered sealed non transparent envelope. Selection of the patients and analysis was done as per the consort guidelines.

The following monitors were connected Pulse oximeter, Non-invasive blood pressure (NIBP) and Electrocardiogram (ECG), and were instituted on arrival in perioperative room. Proper aseptic precautions were taken for both groups. Anaesthesiology consultant with minimum of 3 years of experience did both nerve block and spinal anaesthesia.

Group - A: The study conducted on 25 adult patients of both (male and female) sex in ASA 1 and

Introduction

Buprenorphine is an agonist-antagonist opioid with a long-acting property, that has been used commonly for analgesia. Buprenorphine is also administered via intrathecal route. Buprenorphine dissociates slowly from μ -opioid receptor, its duration of action is prolonged and has comparatively less addiction potential.^[1] Because of the nausea and purities in these patients ondansetron has to be used for premedication for minimum of 24 hours postoperatively till the effect of opioids decreases.^[2] Nerve blocks have been used for postoperative pain relief with less side effects. Nerve blocks, as part of postoperative analgesic, have decreased postoperative side effects like nausea, vomiting and drowsiness.^[3] Haematoma and neuropraxia are the most common complication and side effect of peripheral nerve blocks. Therefore this study was aimed to compare postoperative side effects produced by spinal

2, all patients scheduled for lower limb operations. All the patients received 2 microgram (µg) per kg (kilogram) of Buprenorphine intrathecally with 0.5% bupivacaine (heavy) for the spinal anaesthesia at L3–L4 or L4–L5 level by spinal whitacre needle. The incidence of side effects at 1, 2, 4, 6, 8, 12 till 24 hours after surgery [Table 1]. Postoperative vital values pulse rate, blood pressure, respiratory rate, oxygen saturation were observed and recorded for Group A patients [Table 2].

Group – B: The study conducted on 25 patients of both (male and female) sex in ASA 1 and 2, posted for lower limb operations. All patients were given combined femoral and sciatic nerve blocks using peripheral nerve stimulator with 0.5 mA and stimuplex needle. Femoral nerve located by observing patella movement 10 ml of 0.5% bupivacaine injected by using the needle. Sciatic nerve detected by observing the dorsiflexion in the foot of the same side, 15 ml of 0.5% bupivacaine was injected. The incidence of side effects evaluated at 1, 4, 6, 8, 12 till 24 hours after surgery [Table 3]. Postoperative vital values pulse rate, blood pressure, respiratory rate, oxygen saturation were observed and recorded for Group B patients [Table 4].

Results

The study conducted with an aim to compare and estimate incidence of postoperatively side effects produced between Group A and Group B. Among all the 50 patients in both groups, none of the patients were to be converted to general anesthesia due to failure of adequate motor or sensory block probably because both the groups received spinal bupivacaine to facilitate surgery.

Group – A

The side effects recorded are nausea and vomiting (48%), itching (8 %), retention of urine (4%), drowsiness and sedation (32%) and prolonged sensory & motor block (4%). No respiratory depression was observed [Table 1].

Postoperative values (mean) are as follows: Pulse rate (mean) 72.36 ± 5.31 per min., Systolic blood pressure (mean) measured in mm of Hg 100.64 ± 11.91 , Respiratory rate (mean) 13.52 ± 1.19 per min., Oxygen saturation (mean) 95.08 ± 1.3 [Table 2].

Group – B

The side effects were nausea and vomiting (4%) itching (0%), retention of urine (4%), drowsiness and sedation (0%), prolonged sensory & motor block (16%). Haematoma formation and neuropraxia incidence was not observed [Table 3].

Post-operative mean values are as follows: Pulse rate (mean) 83.2 ± 8.59 , Systolic blood pressure (mean) 114.4 ± 14.4 , Respiratory rate (mean) 15.50 ± 0.99 , Oxygen saturation (mean) 98.20 ± 1.04 (Table 4).

Chi-square test was used for statistical analysis to compare the significance of side effects of intrathecal

buprenorphine with combined femoral and sciatic nerve blocks both group patients received spinal bupivacaine. Nausea and vomiting, itching, drowsiness and sedation was high with Group A and prolonged sensory & motor block was high with Group B (The chi-square statistic is 16.1058, the p-value =0.00288 which is highly significant). There was no statistically significant difference between the two groups post-operative vital mean values ($p=0.85253$).

Table 1: Side effects observed with Group A patients.

| Side Effects | Number of Patients | Percentage |
|-----------------------------------|--------------------|------------|
| Nausea and Vomiting | 12 | 48% |
| Itching | 2 | 8% |
| Drowsiness & Sedation | 8 | 32% |
| Retention of Urine | 1 | 4% |
| Prolonged Block (Motor & Sensory) | 1 | 4% |

Table 2: Group A Postoperative values (Mean ± SD).

| Pulse Rate (per min) | Blood Pressure (mm of Hg) | Respiratory Rate (per min) | O2 Saturation (%) |
|----------------------|---------------------------|----------------------------|-------------------|
| 72.36 ± 5.31 | 100.64 ± 11.91 | 13.52 ± 1.19 | 95.08 ± 1.30 |

Table 3: Side effects observed with Group B patients.

| Side Effects | Number of Patients | Percentage |
|-----------------------------------|--------------------|------------|
| Nausea and Vomiting | 1 | 4% |
| Itching | 0 | 0% |
| Drowsiness & Sedation | 0 | 0% |
| Retention of Urine | 1 | 4% |
| Prolonged Block (Motor & Sensory) | 4 | 16% |

Table 4: Group B Postoperative values (Mean ± SD).

| Pulse Rate (per min) | Blood Pressure (mm of Hg) | Respiratory Rate (per min) | O2 Saturation (%) |
|----------------------|---------------------------|----------------------------|-------------------|
| 83.20 ± 8.59 | 114.40 ± 14.40 | 15.56 ± 0.99 | 98.20 ± 1.04 |

Discussion

The discovery of opioid receptors in the spinal cord has changed postoperative pain management. Pert and Snyder in their study on opiate receptor demonstration in nervous tissue showed the existence of opioid receptor in nervous tissue as confirmed by autoradiography.^[4] Buprenorphine, an opium alkaloid similar to morphine, which is highly lipophilic, has a high opiate receptor activity and produces a longer and more prolonged analgesia with a very few side effects when compared to morphine.

Nausea and vomiting were reported with intrathecal buprenorphine by Capogna G et al.^[5] Sedation and drowsiness with buprenorphine was observed by Freedman M.^[6] Cahill et al, have reported that respiratory depression was minimal with buprenorphine.^[7]

In the present study incidence of nausea and vomiting was 48 %. The vomiting may be due to the buprenorphine action on chemoreceptor trigger zone (CTZ) in medulla. These patients responded well to antiemetics. 8 % of patients had itching, 32% of patients had sedation and drowsiness and 4% of patients had retention of urine. There was no incidence of respiratory depression.

Usage of buprenorphine slightly decreased pulse rate, systolic blood pressure and respiratory rate. Similar findings were reported by Kamal and Gaddes study.^[8] Peripheral nerve blocks are the alternative method of postoperative analgesia which gives excellent pain relief in majority of orthopaedic and lower limb procedures. It is always emphasised that administration of nerve blocks can provide adequate and good postoperative analgesia.^[9] Peri operative need for opioids are majorly reduced by peripheral nerve blocks.^[10] Nerve blocks give good analgesia without the side effects of opioids. In our study, nausea and vomiting was seen in 4 %, partial effect in 8 % and prolonged motor block in 16 % of the patients. There was no incidence of neuropraxia or haematoma formation. The incidence of side effects like vomiting, itching and drowsiness are less with nerve blocks compared to intrathecal buprenorphine.

Limitations:

1. Cross sectional study, and a direct causal relation between intrathecal buprenorphine and nerve blocks (femoral & sciatic) is difficult to establish.
2. Follow up of the patients after 24hours to assess the degree of side effects later was not done. Further studies would increase the strength of our above said findings.

Conclusion

Nerve blocks (Group B) had less postoperative side effects which did not cause much problem for patient. Haematoma formation and neuropraxia was not observed during and after the procedure. Intrathecal buprenorphine produced post-operative analgesia with significant side effects like nausea, vomiting, itching, sedation and urinary retention. No respiratory depression and haemodynamic variation was observed between the two groups. Thus we found that nerve blocks (femoral & sciatic) are more beneficial, reliable, safer and efficient method than buprenorphine for post-operative analgesia, there by many of the side effects can be avoided in post-operative ward. As the anaesthesiologists interest beyond the operation theatre in postoperative wards and postoperative care is increasing day by day this study is important in the current trend of anaesthetic practice. We recommend to preferably use nerve

blocks for post-operative analgesia over intrathecal buprenorphine and spinal anaesthesia for lower limb surgeries.

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