Section: Anaesthesia

Original Research Article

COMPARISON OF BUPIVACAINE AND BUPIVACAINE WITH NALBUPHINE FOR SUB ARACHNOID BLOCK IN LOWER ABDOMINAL SURGERIES

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ABSTRACT

Background: Opioids have been favored as adjuvants to local anesthetics during spinal anesthesia. Nalbuphine, a μ-receptor antagonist and κ-receptor agonist, seems to be a suitable adjuvant to local anesthetics. **Objective:** The aim of this study was to compare onset, duration of sensory and motor blockade postoperative analgesia and adverse effects of Bupivacaine in comparison to bupivacaine and nalbuphine combination during spinal anesthesia in lower abdominal surgeries.

Materials and Methods: Sixty patients belonging to the ASA I and II were randomly allocated into two groups of thirty each. Group A (Study Group): Inj. bupivacaine hyperbaric 0.5% 3 ml + Inj.Nalbupine 400mcg (Total volume-3.5ml) Group B(Control Group): Inj. bupivacaine hyperbaric 0.5% 3 ml+ 0.5ml (Total volume- 3.5ml)

Patients were assessed for hemodynamic changes, Onset and duration of sensory and motor block, postoperative analgesia, and adverse effects.

Results: We observed that the mean onset of motor blockade was comparable in both nalbuphine group (6.33+/-12min) and control group (6.42+/-0.86min). The difference was statistically not significant. The mean duration of sensory blockade in Nalbuphine group was 118.93+/- 8.37 min and 96.93+/- 7.10min in control group, the difference was statistically significant. The mean duration of motor blockade in nalbuphine group was 144.28+/- 8.94 min and in control group was 121.21+/- 5.19 min, the difference was statistically significant.

Conclusion: We conclude that addition of Inj. Nalbuphine (400mcg) to 3 ml of 0.5% hyperbaric bupivacaine has similar onset of sensory and motor blockade but significantly prolongs duration of sensory and motor blockade

Keywords: Analgesia, bupivacaine, hemodynamics, nalbuphine, spinal anesthesia.

INTRODUCTION

Spinal anaesthesia continues to be the preferred anaesthetic method, particularly in surgeries on the lower abdomen and lower limbs.[1] Reduced risk of respiratory complications, superior muscle relaxation, less bleeding, quick bowel restoration, and reduced incidence of coagulation disorders are the advantages of spinal anaesthesia. Although general anaesthesia has advanced greatly in recent years, complications such as nausea, vomiting, prolonged sedation, respiratory depression and airway related morbidity persist. Many anaesthesiologists prefer spinal anaesthesia because it is simple, effective, and safe. The most common drug used for spinal anaesthesia is bupivacaine, which was introduced into clinical practice in 1957.[2] The disadvantage of bupivacaine is its insufficient analgesic duration. As a result, postoperative pain management under spinal anaesthesia remains a challenge for anaesthesiologists. The aim of various adjuvants with local anaesthetics has been to achieve faster onset, improved analgesic intensity, lengthened duration of action, and prolong postoperative

analgesia with a low drug dose, thus reducing side effects.

Subarachnoid block has been achieved intrathecally with opioids (e.g. fentanyl,[3] morphine), alpha 2-agonists (e.g. clonidine,[4]), benzodiazepines (midazolam), and anticholinergics (neostigmine). It has been known, however, that they may cause adverse effects such as nausea, vomiting, hypotension, bradycardia, pruritis, breathing disturbances, etc.

The chemical structure of nalbuphine is similar to that of oxymorphone. The compound has an agonist effect at kappa receptors and an antagonist effect at mu receptors. Some models of visceral nociception provide reasonable analgesia with nalbuphine or other kappa agonists.[5]

Its lipid solubility and rapid clearance make nalbuphine a moderately long-acting opioid when compared with others, like morphine.

The clinical use of nalbuphine has recently been introduced in India. A very limited number of studies have examined the use of nalbuphine for subarachnoid blocks in the literature. Hence, we are testing nalbuphine's effect in patients receiving spinal anaesthesia under hyperbaric bupivacaine addition to lower abdominal surgery.

MATERIALS AND METHODS

The present study was conducted in department of Anesthesia in Sapthagiri Institute of Medical Sciences and Research Centre.

The study was conducted on 60 ASA grade I and II patients undergoing lower abdominal surgeries, after Institutional review board and ethical committee clearance was obtained and written informed consent taken from all the patients.

The inclusion and exclusion criteria will be as follows.

Inclusion Criteria:

1. ASA grade 1 and ASA grade 2
2. Age between 18 to 50 years
3. Patients undergoing lower abdominal surgeries under spinal anaesthesia for 1 to 2 hours.

Exclusion Criteria:

- Patient not giving consent
- Parturient
- Allergic to the study drugs
- Patients on chronic opioid usage.
- Patients with other co morbidities
- Patients having contraindications for sub arachnoid block

Sample Size

$\mathbf{n = 2(Z_\alpha + Z_\beta)^2\sigma^2/d^2}$

N is the total sample size

Z_α – 95% of confidence interval (1.96)

Z_β – 80% of power (0.84)

σ is the standard deviation

d is the difference of means.

N = 6(since the sample size obtained was small, 30 in each group was studied)

Randomised control trial.

Randomization was done into two groups by computer generated method. The study drug was prepared by a senior anaesthetist not involved in procedure. Patients and anaesthesia providers were not aware of study drug.

Group A: Inj. bupivacaine hyperbaric 0.5% 3 ml + Inj.Nalbupine 400mcg with normal saline to 3.5ml

Group B: Inj. bupivacaine hyperbaric 0.5% 3 ml+ 0.5ml normal saline to 3.5ml

Baseline investigations - CBC, Blood group, Blood Glucose, Electrocardiogram, Chest X ray as per the standard guidelines were obtained.

Pre operatively patients were cannulated with 18G IV cannula were preloaded with 10 ml/kg of ringer's lactate solution. Standard monitors were connected such as pulse oximetry, ECG, NIBP and baseline values were noted.

Under all aseptic conditions, subarachnoid block was performed using 25G Quinke's spinal needle at L3 –L4 level in sitting position. Study drugs were injected to the respective group. Hemodynamic parameters namely heart rate, systolic blood pressure, diastolic blood pressure and oxygen saturation were monitored every 5mins for half an hour, every 10 mins for next 1 hour and every 20mins throughout the surgical procedure.

Following parameters were observed and noted:

1– Time of Sub arachnoid block.

2– Time of onset of sensory blockade.

The onset of sensory blockade was taken as the time taken from the injection of the drug to sensory block up to T10.

3– Time of onset of motor blockade.

The onset of motor blockade is taken as the time taken from injection of the drug to time taken to reach modified Bromage score of 3.

4– Maximum Height of sensory blockade.

The maximum height of sensory block is considered as height of sensory block achieved at the end of 30 min.

5– duration of sensory blockade.

Duration of sensory blockade is defined as two dermatome regression of anaesthesia from the highest level achieved.

6– Duration of motor blockade

Duration of motor blockade is taken as the time for return to Modified Bromage Score of

MODIFIED BROMAGE SCALE:

0- able to move hip, knee, ankle and toes **(0%)**

1- Inability to raise extended leg but able to move knee and feet **(33%) (Partial)**

2- Inability to raise extended leg and move knee but able to move feet **(66%)**

3- Unable to move hip, knee and ankle **(100%)** (**Complete block**)

Motor block is measured postoperatively for every 1 hour till the Modified Bromage Score is 0.

Perioperatively patients will be observed carefully for the side effects like bradycardia, hypotension,) respiratory depression, nausea, vomiting, itching. Inj. Atropine 0.6 mg was given if

Heart rate was <50 bpm, Inj. Ephedrine 6mg was given if mean aterial pressure was <65 mmhg.

Statistical Analysis: All the parameters studied were observed and noted. The Students unpaired‘t’ test was used to compare quantitative variables in both groups. The qualitative variables was compared using students paired ‘t’ test for each group. The categorical data were compared using Chi square test. Data are mean (standard deviation) unless otherwise specified. Significance is taken as p value < 0.05.

RESULTS

The study was conducted in Department of Anaesthesiology, Sapthagiri Institute of Medical Sciences and Research Centre. The study was conducted on 60 ASA grade I and II patients undergoing lower abdominal surgeries.

Randomization was done into two groups by computer generated method.

Group A: Inj. Bupivacaine hyperbaric 0.5% 3 ml + Inj. Nalbuphine 400mcg diluted with normal saline

Group B: Inj. Bupivacaine hyperbaric 0.5% 3 ml + Normal saline 0.5ml. The results obtained were tabulated and analysed

In our study, demographic data was comparable in both the groups, the mean onset of sensory block in nalbuphine group was 3.76+/- 0.86 min and in control group was 3.53+/-0.75 min. The mean onset of motor blockade in nalbuphine group was 6.33+/-12 min and 6.42+/-0.86 min in control group. The results were comparable and statistically not significant.

The mean duration of sensory blockade in Nalbuphine group was 118.93+/- 8.37 min and 96.93+/- 7.10min in control group, the difference was statistically significant. In our study, we observed that the mean duration of motor blockade in Nalbuphine group was 144.28+/- 8.94 min and in control group was 121.21+/- 5.19 min, the difference was statistically significant.

Table 1: Gender distribution

	GROUP A	GROUP B	TOTAL
FEMALES	14	15	29
MALES	16	15	31
TOTAL	30	30	60

Table 2: Mean age (in years)

MEAN AGE				p VALUE	INFERENCE
GROUP A		GROUP B			
MEAN	S.D.	MEAN	S.D.		
36.34	5.66	36.93	6.43	0.7171	NS

Table 3: Mean height (in cms)

MEAN HEIGHT					
GROUP A		GROUP B		p VALUE	INFERENCE
MEAN	S.D.	MEAN	S.D.		
154.83	3.26	154.39	2.94	0.5995	NS

Table 4: Mean onset of sensory blockade (in minutes)

MEAN ONSET OF SENSORY BLOCKADE					
GROUP A		GROUP B		p value	INFERENCE
MEAN	S.D.	MEAN	S.D.		
3.76	0.86	3.53	0.74	0.2768	NS

Table 5: Mean onset of motor blockade (in minutes)

MEAN ONSET OF MOTOR BLOCKADE					
GROUP A		GROUP B		p VALUE	INFERENCE
MEAN	S.D.	MEAN	S.D.		
6.33	1.27	6.42	0.86	0.0525	NS

Table 6: Mean duration of sensory blockade (in minutes)

MEAN DURATION OF SENSORY BLOCKADE					
GROUP A		GROUP B		p VALUE	INFERENCE
MEAN	S.D.	MEAN	S.D.		
118.93	8.37	96.93	7.1	<0.0001	HS

Table 7: Mean duration of motor blockade (in minutes)

MEAN DURATION OF MOTOR BLOCKADE					
GROUP A		GROUP B		p VALUE	INFERENCE
MEAN	S.D.	MEAN	S.D.		
144.28	8.94	121.21	5.19	<0.0001	HS

DISCUSSION

The present study was conducted in the department of Anaesthesiology, Sapthagiri Institute of Medical Sciences and Research centre. In the study 60 patients of ASA gradeI and II undergoing lower abdominal surgeries were randomly divided into two groups. In group A patients received 3 ml of 0.5% Inj. Hyperbaric Bupivacaine with 400mcg of Inj. Nalbuphine, and in group B patients received 3ml of 0.5% Inj. Hyperbaric bupivacaine with 0.5ml normal saline intrathecally. The demographic data in both the study group and control group was comparable with respect to height, weight, age, sex, mean duration of the surgery and type of surgery.

In our study onset of sensory blockade was taken as the time taken from injection of the drug to sensory block up to T10 level, the mean onset of sensory block was 3.76+/- 0.86 min in Nalbuphine group and 3.53+/-0.75 min in control group. The difference was statistically insignificant. The findings of our study are in accordance with the results in a study by Jyothi B et al,[6] with the mean onset of sensory block of 3.5+/-0.7min in Nalbuphine group and 3.6+/-0.8min in control group.

In a similar study, Mukharjee et al,[7] compared three different doses of nalbuphine namely 0.2mg (B), 0.4mg (C), 0.8mg (D) with 0.5ml of normal saline and observed that the mean onset of sensory blockade was comparable in all the 4 groups with 1.75+/-0.27min in control group and1.69+/-0.2min, 1.63+/-0.24min,1.59+/-0.18min in B, C, D groups respectively.

In our study, the mean onset of motor blockade was defined as time taken from injection of the drug to the time taken to reach modified bromage scale of 3.

In our study, we observed that the mean onset of motor blockade was comparable in both nalbuphine group (6.33+/-12min) and control group (6.42+/-0.86min). The difference was statistically not significant. The findings of our study are in accordance with the results in the study by Rashmi Dubey et al,[8] who observed similar mean onset of motor block in both nalbuphine group and control group was similar (1.54+/-0.5 min).

In a similar study by Mukharjee et al,[7] the mean onset of motor block was comparable in all the 4 groups namely A(5.9+/-0.5min), B(5.8+/- 0.75min), C(5.7+/- 0.62min), D(5.6+/- 0.53min) administered normal saline, 0.2mg, 0.4mg, 0.8mg of nalbuphine respectively.

The mean duration of sensory blockade in our study in Nalbuphine group was 118.93+/- 8.37 min and 96.93+/- 7.10min in control group, the difference was statistically significant. The findings of our study are in accordance with results of the study by Jyothi B et al,[6] who observed that the mean duration of sensory blockade was comparatively more in nalbuphine group (122.2+/- 5.5 min) than in control group (86.0+/- 4.4min).

In a similar study, by Padma T et al., comparing effect of bupivacaine with nalbuphine and bupivacaine alone for lower limb surgeries under spinal anaesthesia observed that duration of sensory blockade was prolonged in nalbuphine (115.32±9.12min) group compared with control group (103.32±16.65 min).

In our study, we observed that the mean duration of motor blockade in nalbuphine group was 144.28+/-8.94 min and in control group was 121.21+/- 5.19 min the difference was statistically significant. Finding of our study are in accordance with results of the study by Devendra v. et al,[9] who observed that duration of motor block was significantly prolonged in Nalbuphine group (150±10.4min) compared with control group (129+/- 7.4 min).

In our study, duration of postoperative analgesia was defined as the time at which patients VAS score reached more than 3 from the time of injection of the drug in subarachnoid space.

CONCLUSION

Addition of Inj. Nalbuphine (400mcg) to 3 ml of 0.5% hyperbaric bupivacaine has similar onset of sensory and motor blockade but significantly prolongs duration of sensory and motor blockade.

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