Original Research Paper

Volume - 14 | Issue - 11 | November - 2024 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Anaesthesiology

# A COMPARATIVE STUDY OF 0.75% HYPERBARIC ROPIVACAINE WITH BUPRENORPHINE VERSUS 0.75% HYPERBARIC ROPIVACAINE WITH FENTANYL ON MOTOR AND SENSORY PARAMETERS IN PATIENTS UNDERGOING INFRAUMBILICAL SURGERIES

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**ABSTRACT** **Introduction:** Spinal anaesthesia is widely used for infra-umbilical surgeries which results in sympathetic blockade, sensory analgesia/anaesthesia, motor blockade depending on the volume of the drug, concentration/volume of local anaesthetics. **Aims:** To compare the efficacy and safety of intrathecal 0.75% ropivacaine hyperbaric with buprenorphine v/s 0.75% ropivacaine hyperbaric with fentanyl in infra-umbilical surgeries. **Materials and methods:** A Randomized prospective controlled study of 90 patients undergoing infraumbilical surgery randomly divided into 3 groups.

1. Group A: 0.75% Hyperbaric Ropivacaine with buprenorphine 60mcg
2. Group B: 0.75% Hyperbaric Ropivacaine with Fentanyl 15mcg
3. Group C: 0.75% Hyperbaric Ropivacaine with saline

**Result:** In our study, the mean duration of analgesia was significantly higher in patients receiving 0.75% Hyperbaric Ropivacaine with buprenorphine 60mcg (11.1±3.9) and 0.75% Hyperbaric Ropivacaine with Fentanyl 15mcg (8.7±1.1) compared with 0.75% Hyperbaric Ropivacaine with saline (6.8±1.4) with p value < 0.01. **Conclusion:** Opioids (fentanyl and buprenorphine) are potent adjuvants. It provides faster onset of action and significantly have longer duration of postoperative analgesia. But on comparing 2 opioids as adjuvant to 0.75% hyperbaric ropivacaine, buprenorphine appears to be superior with longer duration of postoperative analgesia.

**KEYWORDS :** Intrathecal opioids, 0.75% hyperbaric ropivacaine, infraumbilical surgeries

## INTRODUCTION

Spinal anaesthesia is widely used for infra-umbilical surgeries which results in sympathetic blockade, sensory analgesia/anaesthesia, motor blockade depending on the volume of the drug, concentration/volume of local anaesthetics.[1]

Ropivacaine is a new amide type long acting, pure S enantiomer, local anaesthetic, and analgesic[2], similar efficacy but safer with less risk of cardiotoxicity, neurotoxicity, and rapid recovery of motor function compared to bupivacaine[3].

Use of ropivacaine results in differential nerve blockade with recovery of motor function earlier than sensory function[4].

Dose of local anaesthetics can be reduced by adding adjuvants i.e, opioids. Adding opioids to hyperbaric ropivacaine allows reduction of dose of hyperbaric ropivacaine, may provide hemodynamic stability, and prolong duration of post operative analgesia[5].

Buprenorphine is an opioid with an extremely high binding affinity at the mu and kappa receptor. It has partial agonist activity at the mu and kappa receptor[6].

Fentanyl is a synthetic opioid and is mu receptor agonist. It has rapid onset, short duration of action and less chances of respiratory depression when used as an adjuvant for intrathecal injection[7].

## MATERIALS AND METHODS

Based on the study "Singh AP, Kaur R, Gupta R, Kumari A Intrathecal buprenorphine versus fentanyl as adjuvant to 0.75% ropivacaine in lower limb surgeries. J Anaesthesiol Clin Pharmacol 2016;32:229-33.". Duration of analgesia/time to first rescue analgesic (h) Group I (3.50±1.102), Group II (7.44±1.69) and Group III (5.68±1.19).
Based on the above parameter with an alpha of 0.05 (2 sided) and power of 95 % the estimated sample size using the sample size formula for two means comparison.

A Randomized prospective controlled (double blinded) study was carried out between February 2023 and August 2023 following approval from the Institutional Ethical Committee. The study included 90 patients who were undergoing infraumbilical surgeries. Patient who is willing to give written informed consent, patients aged between 18 years to 60 years, and belonging to ASA 1 to 2 were included in the study. Exclusion criteria were refusal to participate, patients with any contraindications for neuraxial blockade, allergy to the study drug, opioid dependency.

Patients were randomly allocated into one of the three groups – Group A, Group B, Group C using numbers generated from www.randomizer.org.

Group A: 0.75% Hyperbaric ropivacaine with 60mcg buprenorphine (Total volume 3ml).

Group B: 0.75% Hyperbaric ropivacaine with fentanyl 15mcg (Total volume 3ml).

Group C: 0.75% Hyperbaric ropivacaine with saline (0.3ml) (Total volume 3ml)

All patients were kept fasting for 8 hours.

On arrival to the operating room, Non-Invasive Blood Pressure (NIBP), Plethysmography (SpO2) and Electrocardiogram (ECG) monitors were connected and baseline hemodynamic parameters were recorded.

On arrival to the operating room, patients will be preloaded with 10ml/kg of ringer lactate.

Under strict aseptic precautions subarachnoid block was performed using 25G Quincke Babcock spinal needle in the L3– L4 space with patient in left lateral position.

The study drug was injected. The time at which injection is completed will be considered as zero time of the study and all measurements were recorded from this point. Following subarachnoid block, patients was made to lie supine.

Time of onset of sensory blockade was assessed by loss sensation to cold swab and dermatome levels was tested every 2 minutes until the highest level (T10) has been achieved and stabilized for four consecutive tests.

Time of onset of motor block was assessed using Modified Bromage Scale.

Hemodynamic variables were recorded every 5 minutes for half an hour after the administration of subarachnoid block and every 30 minutes up to 120 minutes after the block. Postoperatively patients were monitored every 1hr for the first 6 hours.

Sedation was monitored according to Ramsay sedation score

The incidence of any adverse effects such as hypotension, bradycardia, shivering, nausea, vomiting, pruritis, respiratory depression, were recorded and accordingly managed.

Hypotension is defined as 20% fall in Systolic Blood Pressure from baseline. Treated with intravenous fluids and intravenous injection of Ephedrine 6mg.

Bradycardia is defined as 20% fall in heart rate from baseline and will be treated with intravenous injection of Atropine 0.6 mg

Nausea and Vomiting was treated with intravenous injection of Ondansetron 4mg

## RESULT

The study included 90 patients, 30 in Group A, who received 0.75% Hyperbaric ropivacaine with 60mcg buprenorphine (Total volume 3ml), 30 in Group B, who received 0.75% Hyperbaric ropivacaine with fentanyl 15mcg (Total volume 3ml) and 30 in Group C who received 0.75% Hyperbaric ropivacaine with saline (0.3ml) (Total volume 3ml). There were no significant differences between the three groups in terms of demographic characteristics such as age, weight, and height (Table 1). Additionally, there were no statistically significant differences between the groups regarding heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate, ramsay sedation score or time for onset of motor block.

**Table 1:** Demographic data were comparable between all three groups

| PARAMETER | GROUP A Mean ±SD | GROUP B Mean ±SD | GROUP C Mean ±SD |
|---|---|---|---|
| Age (years) | 42.09±12.50 | 41.42±12.86 | 36.67±13.83 |
| Weight (kg) | 54.16±6.02 | 58.63±7.11 | 59.45±8.4 |
| Height (cm) | 164±3.05 | 155.5±3 | 159±4.15 |

**Table 2:** Hemodynamic parameters were comparable between all three groups

| PARAMETER | GROUP A Mean ±SD | GROUP B Mean ±SD | GROUP C Mean ±SD | P VALUE |
|---|---|---|---|---|
| Heart rate (/min) | 88.04±4.2 | 74.68±3.46 | 92.8±4.15 | >0.05 |
| SBP (mmHg) | 123.43±5.87 | 121.91±5.58 | 122.2±5.32 | >0.05 |
| DBP (mmHg) | 72.24±3.50 | 75.18±4.20 | 74.37±4.25 | >0.05 |
| RR (per minute) | 15.2±2.1 | 15.6±2.6 | 16.1±3.3 | >0.05 |

SBP-systolic blood pressure, DBP-Diastolic blood pressure, RR – respiratory rate

**Table 3:** Sensory and motor parameters were comparable between all three groups

| PARAMETER | GROUP A Mean ±SD | GROUP B Mean ±SD | GROUP C Mean ±SD | P VALUE |
|---|---|---|---|---|
| Onset of sensory block (in minutes) | 1.8±0.40 | 3.1±0.76 | 3.3±0.97 | 0.004 |
| Onset of motor block (in minutes) | 3.25±1.07 | 2.98±3.25 | 3.87±2.08 | >0.05 |
| Duration of motor block (in minutes) | 237.5±20.5 | 220.0±33.6 | 214.5±31.2 | 0.0047 |
| Duration of sensory block (in hours) | 11.1±3.9 | 8.7±1.1 | 6.8±1.4 | 0.0005 |

## DISCUSSION

A.Chaudhary, et al, conducted study for the efficacy of intrathecal ropivacaine alone and in combination with fentanyl in transurethral resection surgery. Group A received 2ml of 0.75% ropivacaine and group B received 1.8ml of ropivacaine with fentanyl 10mcg.The study concluded that duration of motor block was longer in group of ropivacaine with fentanyl than group of ropivacaine alone.

In our study, duration of analgesia was longer in group of 0.75% hyperbaric ropivacaine with buprenorphine and in group of 0.75% hyperbaric ropivacaine with fentanyl than patients receiving 0.75% hyperbaric ropivacaine alone.

Arvinder pal Singh, et al, conducted randomized double blinded study in three groups for intrathecal buprenorphine 60mcg versus fentanyl 10mcg as adjuvant to 0.75% isobaric ropivacaine in lower limb surgeries which concluded that addition of adjuvant significantly prolongs the duration of action and better quality of postoperative analgesia than ropivacaine alone.

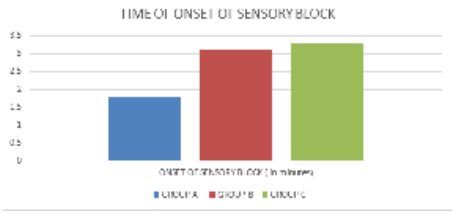
In our study, duration of analgesia was longer in group of 0.75% hyperbaric ropivacaine with buprenorphine and in group of 0.75% hyperbaric ropivacaine with fentanyl than patients receiving 0.75% hyperbaric ropivacaine alon

## CONCLUSION

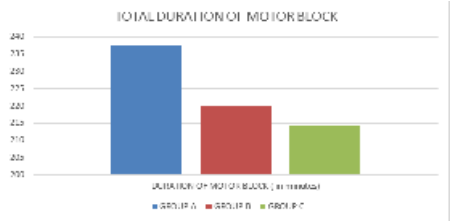
Opioid as an adjuvant to 0.75% hyperbaric ropivacaine intrathecally produces longer duration of analgesia.

However, on comparing fentanyl 15 mcg and buprenorphine 60 mcg, buprenorphine appears to be superior with longer duration of postoperative analgesia

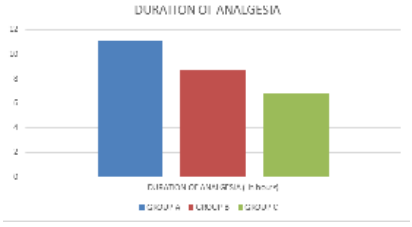
**Graph 1:** Time of onset of sensory block (in minutes)




**Graph 2:** Total duration of motor block (in minutes)




**Graph 3:** Duration of analgesia

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