

# A comparative study of intrathecal clonidine and midazolam as an adjuvant to bupivacaine for lower limb and lower abdominal surgeries

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## Abstract

**Background:** Various adjuvants are being used with local anaesthetics to prolong intra operative and post operative analgesic effects of spinal anaesthesia. Clonidine, a highly selective  $\alpha$ -2 adrenergic agonist and Midazolam, a benzodiazepam derivative modulate the spinal analgesia by different mechanism. Aim of the study is to compare and evaluate the onset and duration of sensory and motor blockade, hemodynamic effect, post operative analgesia and adverse effects of clonidine and midazolam given intrathecally with 0.5% hyperbaric bupivacaine. **Materials And Methods:** In this randomized controlled trial, sixty patients aged between 18 to 65 years of ASA grade I and II allocated into two groups (30 in each group) posted for lower limb and lower abdominal surgeries were studied. Group C received 3mL of 0.5% hyperbaric bupivacaine + 75mcg (0.5mL) clonidine. Group M received 3mL of 0.5% hyperbaric bupivacaine + 2.5mg (0.5mL) midazolam. The two groups were compared with respect to onset of sensory and motor block, regression time of sensory and motor block, rescue analgesia, hemodynamic data and adverse effects. Sample size was taken for convenience. Statistical package for social science (SPSS 18.0 evaluation version) was used for the analysis to obtain the data. Microsoft Word and Excel have been used to generate graphs, tables etc. **Results:** Group C patients showed significant prolonged sensory and motor block than Group M patients. The sensory block regression to S1 was  $324.62 \pm 27.26$  in Group C and  $253.50 \pm 20.44$  in Group M. The time of motor block regression to Bromage 0 was  $314.30 \pm 23.44$  in Group C and  $212.30 \pm 11.35$  in Group M. Rescue analgesia time was significantly prolonged in Group C ( $419.05 \pm 21.80$ ) as compared to Group M ( $271.05 \pm 30.14$ ). **Conclusion:** Clonidine (75mcg) as an adjuvant to bupivacaine in subarachnoid blockade is associated with longer sensory, motor block and duration of analgesia in comparison to midazolam (2.5mg) with a comparable incidence of side effects.

**Key Word:** Spinal anaesthesia, Bupivacaine, Clonidine, Midazolam

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have been used to prolong the effects of spinal anaesthesia<sup>1 2</sup>. Clonidine, an  $\alpha$ -2 adrenergic agonist as an adjuvant to hyperbaric bupivacaine in spinal anaesthesia provides good quality of block intra operative and prolonged post operative analgesia with minimal side effects. This prolongation of post operative analgesia is by hyperpolarization of A $\delta$  and C fibres in the substantia gelatinosa of the spinal cord.<sup>3</sup> Midazolam, a benzodiazepine derivative has been used for potentiating the analgesic effect of local anaesthetic induced neural blockade.

## INTRODUCTION

**Background:** Subarachnoid blockade is the most commonly used regional anaesthetic technique in lower limb and lower abdominal surgeries as it is very economical and easy to administer with the advantage of providing surgical anaesthesia. Different adjuvants such as opioids, magnesium sulphate, clonidine and others

## MATERIALS AND METHODOLOGY

After obtaining ethical committee approval and with written informed consent, 60 adult patients aged between 18 to 65 years belonging to ASA grade I and II posted for lower limb and lower abdominal surgeries were enrolled in this comparative clinical study. Sample size taken for

convenience. A computer generated random allocation sequence was obtained and patients were allocated based on that list. All patients were randomly divided into two groups (Group C and Group M) with 30 patients in each group respectively. All patients advised fasting for 6 hours, received Pantoprazole 40mg the night before surgery and were familiarized with visual analog scale (VAS). In the operation theater, pulse oximetry, ECG and non invasive blood pressure were attached, baseline parameters were recorded and monitoring was initiated. IV access was secured and all patients were pre loaded with ringer lactate 10mL/Kg under all aseptic precaution. Patient in sitting position lumbar puncture was performed at L3-L4 interspinous space using 27G quincke’s spinal needle. **Group C:** received 3mL of 0.5% hyperbaric bupivacaine and 0.5mL of 75mcg clonidine. **Group M:** received 3mL of 0.5% hyperbaric bupivacaine and 2.5mg of midazolam. Patients were made supine following the block. Oxygen at 5 liters per minute was given through face mask. The onset and duration of sensory block, time for the highest level of sensory block, time for the highest level of motor block, time for complete motor block recovery and duration of spinal anaesthesia were recorded. The onset of sensory block was defined as time between injection of the drug and absence of pain to pin prick to the highest dermatome level. Testing was conducted every 10 minutes until the two segment regression of the block was observed. Modified bromage scale was used to assess the motor level.

- Grade 0: patient able to move ankle, knee and hip
- Grade 1: patient able to move knee and ankle but is unable to move the hip

- Grade 2: patient is able to move the ankle but is unable to move the hip and knee
- Grade 3: patient unable to move the ankle, knee and hip

Hemodynamic data were recorded at 5, 20, 15, 25, 30 minutes and subsequently every 30 minutes. The incidence of nausea, vomiting and sedation were recorded.

Sedation was assessed by the modified Ramsay sedation scale.

1. Patient agitated, anxious and restless
2. Patient is oriented, cooperative and tranquil
3. Patient responds to verbal commands while sleeping
4. Patient exhibits brisk response to light, loud noise or glabellar tap while sleeping
5. Patient does not respond to light, loud noise or glabellar tap while sleeping

Sensory and motor block regression was recorded in the post anaesthesia care unit (PACU) along with the vital signs and visual analog scale (VAS) score. Any patient showing VAS score of more than or equal to 3 was considered for rescue analgesia with Inj. Diclofenac given intramuscularly.

**Statistical Analysis:** Statistical analysis was done using student’s t test and leven’s test Significance is assessed at 5% level of significance, P value < 0.05 was considered statistically significant. Statistical package for social science (SPSS 18.0 evaluation version) was used for the analysis to obtain the data. Microsoft word and Excel have been used to generate graphs, tables etc. Results on continuous measurement are presented on mean ± SD.

## RESULTS

The two groups were found to be comparable with respect to age, height, weight and ASA physical status (Table 1). The sensory, motor block characteristics and time for regression are summarized in Table 2

**Table 1: Demography**

Variable		Group C	Group M
Age (years)	Mean±SD	55.17±4.35	53.90±5.35
Height (cm)	Mean±SD	161.8±5.25	160.7±5.55
Weight (Kg)	Mean±SD	71.33±9.07	73.73±7.98

**Table 2: Characteristics of Block**

Variable	Group C Mean±SD	Group M Mean±SD	P value
Sensory block (min)	3.91±1.64	4.25±1.31	0.388
Motor block (min)	8.30±1.69	8.9±1.70	0.176
Time from Injection to highest sensory level	10.6±1.45	10.24±1.26	0.316
Two segment regression time	133.00±16.32	111.33±15.69	<0.001
Sensory regression time to S1 segment	324.62±27.26	253.50±20.44	<0.001
Motor block regression time to Bromage 0	314.30±23.44	212.30±11.35	<0.001
Rescue analgesia time (min)	419.05±21.80	271.05±30.14	<0.001

The onset of both sensory and motor block was found to be similar in both the groups. There was no statistically significant difference between the two groups with respect to highest level of block achieved. The two segment regression time and sensory regression time to S1 segment were significantly slower with clonidine (Group C) compared to midazolam (Group M), P value < 0.05. The motor block regression time to bromage 0 was significantly slower in Group C (314.30±23.44) when compared to Group M (212.30±11.35), P value <0.05. The rescue analgesia time was significantly prolonged in Group C (419.05±21.80) when compared to Group M (271.05±30.14). There was no statistically significant difference in the mean hemodynamic data in the first hour after performing the subarachnoid block and the first hour in PACU between the two groups. In our study hypotension and bradycardia was more in the clonidine group than in the midazolam group but it was not statistically significant. Degree of sedation was not statistically significant in the study group.

## CONCLUSION

Intrathecal clonidine supplemented as a spinal block provides earlier onset and prolongs duration of sensory and motor block without significant hemodynamic alterations as compared with midazolam as an adjuvant to spinal bupivacaine in lower limb and lower abdominal surgeries.

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