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COMPARISION OF ANALGESIC EFFECTS OF DIFFERENT DOSES OF CLONIDINE AS AN ADJUVANT TO 0.5% HYPERBARIC BUPIVACAINE IN LOWER LIMB ORTHOPEDICS SURGERIES UNDER SPINAL ANESTHESIA

Anaesthesiology

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ABSTRACT

Introduction- Spinal anaesthesia provided by bupivacaine alone may be too short for the planned surgery. The addition of clonidine to bupivacaine provides a prolonged anaesthetic action. Aim of this study to compare analgesic effects of different doses of clonidine (50 mcg vs 75 mcg) as an adjuvant to 0.5% hyperbaric bupivacaine for onset and duration of sensory and motor block, duration of analgesia, sedation and to evaluate the side effects, if any.

Methods- The study was carried out in 75 adult patients of American Society of Anaesthesiologist (ASA) grade I and II between the age of 20-60 year, undergoing lower limb surgeries in orthopaedic patients under subarachnoid block. 75 patient were divide into 3 group. Group A (n=25)- 2 ml of (10mg) 0.50% hyperbaric bupivacaine+ 1ml normal saline. Group B (n=25)- 2 ml of (10mg) 0.50% hyperbaric bupivacaine+ 50mcg(1ml) clonidine. Group C (n=25)- 2 ml of (10mg) 0.50% hyperbaric bupivacaine+ 75mcg(1ml) clonidine.

Results- Onset time of sensory block in Group A was 6.28±0.56 mint, Group B was 6.01±0.67 mint. Group C was 5.72 ± 0.78 mint. Onset time of motor block in Group A was 11.64±1.32 mint., Group B was 5.96±1.02 mint. and Group C was 5.36 ± 0.96 mint. Time to two segment regression in Group A was 162.35±8.23 mint., Group B was 182.60±6.24 mint. and Group C was 220.30 ± 8.24 mint. Motor block duration was maximum in Group C as compared to Group A and Group B. Duration of analgesia was maximum in Group C as compared to Group A and Group B.

Conclusion- We concluded that Injection clonidine 50 and 75µg given intrathecally along with Injection bupivacaine 10 mg causes prolonged analgesia compared with bupivacaine alone. Analgesia provided by clonidine 75 µgas an adjuvant to bupivacaine 10 mg significantly prolongs the duration of analgesia with hemodynamic stability compared with 50 µg.

KEYWORDS

Bupivacaine, Clonidine, Lower limb surgery

INTRODUCTION

Pain is one of the most uncomfortable sensation in the body. Though it is highly subjective, still even a small amount of debilitating pain can make a normal person fretful. Good analgesia can reduce this deleterious effect. The advantages of good postoperative pain management also include patient comfort and therefore patient satisfaction, earlier mobilization, fewer pulmonary and cardiac complications, a reduced risk of deep vein thrombosis, faster recovery with less likelihood of the development of neuropathic pain, and reduced cost of care[2].

Bupivacaine is three to four times more potent than lignocaine and has longer duration of action. Its disadvantages are slow onset of action and decreased motor block.Hyperbaric bupivacaine 0.5% is extensively used in India for spinal anaesthesia. Though the duration of action of bupivacaine is prolonged, it does not produce prolonged post-operative analgesia. Hence an adjuvant is required for producing prolonged post-operative analgesia.[3]

Clonidine, an α-2 adrenergic agonist, has a variety of different actions. Oral clonidine was used to prolong spinal anaesthesia. Hypotension was more pronounced after oral than intrathecal clonidine.[4] Addition of intrathecalclonidine to bupivacaine prolongs analgesia and decreases morphine consumption postoperatively more than oral clonidine.

So we undertook this study with aim to compareanalgesic effects of different doses of clonidine (50 mcg vs 75 mcg) as an adjuvant to 0.5% hyperbaric bupivacainefor onset and duration of sensory and motor block, duration of analgesia, sedation and to evaluate the side effects, if any.

MATERIALAND METHOD

After ethical committee approval and written informed consent from patients and/or attendant, the present study was carried out in 75 adult patients of American Society of Anaesthesiologist (ASA) grade I and II between the age of 20-60 year, undergoing lower limb surgeries in orthopaedic patients under subarachnoid block in Department of Anaesthesia in Jhalawar Medical College and SRG Hospital Jhalawar.

Inclusion Criteria

1. Patients belonging to ASA grade I and II.
2. Patients posted for elective lower limb surgeries under spinal anesthesia.
3. Patients of either sex, between the age group 20-60 years.
4. Patients who are not having any systemic disease and approved Pre anaesthetically were included.
5. Informed consent were taken for surgery under subarachnoid block.

Exclusion Criteria

1. Patients belonging to ASA grade III, IV or V & emergency cases.
2. Pregnant or lactating females.
3. Patients with known hypersensitivity or contra-indications to study drugs.
4. Patients on anti coagulants or with bleeding disorders.
5. Patient refusal for subarachnoid block.
6. Local infection at injection site.
7. Patients having cardio respiratory dysfunction or renal, hepatic or metabolic derangements or history of epilepsy
8. Patients with neurological and psychiatric disorders.
9. Those on sedative or antipsychotics.
10. Body mass index (BMI)>35
11. Patients on other vasodilator or negative chronotropic agents.
12. Patients have altered sensorium.

Study Group;

75 patients were divided into 3 group . 25 patients (n=25)each

Group A -Bupivacaine 2 ml of (10mg) 0.50% hyperbaric bupivacaine+ 1ml normal saline, given intrathecally.

Group B-Group B(n=25)- 2 ml of (10mg) 0.50% hyperbaric bupivacaine+ 50mcg(1ml) clonidine, given intrathecally.

Group C-Group C(n=25)- 2 ml of (10mg) 0.50% hyperbaric bupivacaine+ 75mcg(1ml) clonidine, given intrathecally.

RESULTS

The socio-demographic variable were comparable. In our study mean age in Group A was 36.72±3.99 yrs , Group B was 38.12±2.45 yrs and Group C was 38.16±2.54 yrs. In group-A & B male was 60.00% and female was 40.00%. In group-C male was 64.00% and female was 36.00%. In group-A & C ASA Grade I was 60.00% and ASA Grade II

was 40.00%. In group-B ASA Grade I was 52.00% and ASA Grade II was 48.00%. Mean weight in Group A was 69.21±9.21 kg,Group B was 68.45±10.01 kg and Group C was 68.02±9.35 kg. Mean duration of surgery in Group A was 106.32±6.31 mint., in Group B was 108.36±5.92 mint. and in Group C was 107.25±6.01 mint.

Table 1.Mean Onset time of Sensory Block with group-wise comparison

Groups	Group-A	Group-B	Group-C	p-value		
				A&B	A&C	B&C
Mean onset time of sensory block (min)	6.28	6.01	5.72	0.01	0.01	0.056
SD	0.56	0.67	0.78			

In our study mean onset time of sensory block in Group A was 6.28±0.56 mint., in Group B was 6.01±0.67 mint. and in Group C was 5.72 ± 0.78 mint. The differences among the groups were found to be statistically highly significant between A&B, A&C with regard to onset of sensory block. There was faster onset in Group C compared to Group A&B

Table 2. Mean Onset of Motor Block with group-wise comparison.

Groups	Group-A	Group-B	Group-C	p-value		
				A&B	A&C	B&C
Mean onset of motor block (min)	11.64	5.96	5.36	0.01	0.01	0.321
SD	1.32	1.02	0.96			

In our study mean onset time of motor block in Group A was 11.64±1.32 mint., in Group B was 5.96±1.02 mint. and in Group C was 5.36 ± 0.96 mint.

Table 3. Mean time to two segment regression with Group-wise comparison

Groups	Group-A	Group-B	Group-C	p-value		
				A&B	A&C	B&C
Mean time to two segment regression (min)	162.35	182.60	220.30	0.01	0.01	0.01
SD	8.23	6.24	8.24			

In our study mean time to two segment regression in Group A was 162.35±8.23 mint., in Group B was 182.60±6.24 mint. and in Group C was 220.30 ± 8.24 mint

Table 4. Motor block-duration with Group-wise comparison.

Groups	Group-A	Group-B	Group-C	p-value		
				A&B	A&C	B&C
Mean duration of motor block (min)	113.21	117.98	170.23	0.01	0.01	0.01
SD	11.32	12.36	17.56			

In our study motor block duration in Group A was 113.21±11.32 mint., in Group B was 117.98±12.36 mint. and in Group C was 170.23 ± 17.56 mint.

Table 5.Duration of analgesia wise distribution of study subjects

Groups	Group-A	Group-B	Group-C	p-value		
				A&B	A&C	B&C
Mean duration of analgesia (min)	360.23	390.62	443.08	0.01	0.01	0.01
SD	23.62	25.36	19.02			

In our study duration of analgesia in Group A was 360.23±26.32 mint., in Group B was 390.62±25.36 mint. and in Group C was 443.08 ± 19.02 mint.

DISCUSSION

In our study mean onset time of sensory block in Group A was 6.28±0.56 mint., in Group B was 6.01±0.67 mint. and in Group C was 5.72 ± 0.78 mint.. The differences among the groups were found to be statistically highly significant with regard to onset of sensory block between the groups with faster onset in Group C compared to Group A & Group B.

Murthy KTV et al[5] found that time taken for onset of sensory block (3.93 ± 1.00 minutes in Group I, 3.83 ± 0.96 minutes in Group II, 3.68 ± 0.62 in Group III with a p-value of 0.439)

Shende et al [6] also concluded that the mean time for onset of sensory blockade was faster in clonidine group (BC group) 1.62±0.85 min compared to Group A (B group) 2.24±1.04 min which was highly significant with p value<0.01.

Similarly **Garg A et al** [7] ,also found that the onset of action was clinically and statistically significant with faster onset in Group C compared to Group A.

Thus, our result correlates with the above-mentioned study in terms of onset time of sensory block. The faster onset of sensory block may be due to α2 receptors activation at the level of spinal cord resulting in inhibition of nociceptive impulse transmission , when drug is injected intrathecally.

In our study mean onset time of motor block in Group A was 11.64±1.32 mint., in Group B was 5.96±1.02 mint. and in Group C was 5.36 ± 0.96 mint.

Murthy KTV et al[5] was found that that motor blockade (7.13 ± 0.88 minutes in group I, 7.00 ± 0.82 minutes in group II, and 6.88 ± 0.91 minutes in group III with a p-value of 0.441) was comparable between the groups.

Garg A et al, [7] also found that the onset of motor action was clinically and statistically significant with faster onset in Group C compared to Group A.

Thus, our result correlates with the above-mentioned study in terms of onset time of motor block. The effect can be explained also on the basis of binding of α2 adrenoceptor agonist to motor neurons in the dorsal horn. There may be a direct inhibtion of impulse conduction in large myelinated Aα- fibres, and the 50% effective concentration of α2 agent measured approximately four-fold that needed for C fibers.

In our study Motor block duration in Group A was 113.21±11.32 mint., in Group B was 117.98±12.36 mint. and in Group C was 170.23 ± 17.56 mint

Murthy KTV et al[5] was found that that the time taken for complete block was less in group III, which was strongly significant with a p-value of <0.01.

Shende et al et al [6]**f**ound that the mean time duration of motor block was longer with 223.20±45.89min in clonidine 15ug (group II) compared to 154.20 ±35.05 min in bupivacaine alone (group I) which was significant with P value<0.01.[73]

Murthy KTV et al[5] was found that that mean duration of analgesia was also prolonged in group III compared with other two groups (208.53 ± 31.07 minutes in group I, 236.98 ± 5.59 minutes in group II, and 368. 90 ± 8.27 minutes in group III) with p-value of <0.01.

Shende et al et al[6] found that the duration of first rescue of analgesia was significantly delayed in clonidine 60ug (BC60 group) as compared to the other two groups {clonidine 30ug & 15ug along with bupivacaine 10mg (598.7±140.47 vs. 436.65 ± 149.84 and 387.1 ± 97.05 minutes)} respectively.

CONCLUSION

Intrathecal clonidine has been known to increase the duration of sensory and motor block with excellent postoperative analgesia. In our study we have found that Injection clonidine 50 and 75µg given intrathecally along with Injection bupivacaine 10 mg causes prolonged analgesia compared with bupivacaine alone. Analgesia provided by clonidine 75 µg as an adjuvant to bupivacaine 10 mg significantly prolongs the duration of analgesia with hemodynamic stability compared with 50 µg.

Limitations:

We have not calculated the drug dosage as per the height and weight of the patients which might have given better variations in the hemodynamic response and postoperative complications.

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