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STUDY TO EVALUATE THE EFFECT ON THE ONSET OF SENSORY & MOTOR BLOCK UNDER SPINAL ANAESTHESIA: A RANDOMISED COMPARISON BETWEEN BUPIVACAINE VERSUS COMBINATION OF BUPIVACAINE AND CLONIDINE

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ABSTRACT

Clonidine is considered as an efficient spinal anesthesia that enhances the sensory and motor blockade thereby prevention of post-spinal shivering, anxiolytic properties, and sedation. We have analyzed the effect of preoperative clonidine on the onset of sensory & motor block under spinal anesthesia. Ninety cases were registered to carry out this prospective, randomized double-blinded, placebo-controlled, single center comparative study at medical college level. Each thirty patients were placed in to two groups B and C, administered with 0.5% hyperbaric bupivacaine 3ml (15mg) & 25 micrograms Clonidine intrathecally and 0.5% hyperbaric bupivacaine 3ml (15mg) & 50 micrograms Clonidine intrathecally respectively. Control group A received 0.5% hyperbaric bupivacaine 3ml (15mg) & 0.5ml normal saline intrathecally. Patients were monitored for occurrence of side effects and complications during intra operative & postoperative period. Since the cases were randomly allocated to the respective groups, physical parameters like age, height, weight, duration of surgery and sex ratio in all the 3 groups was comparable and statistically not significant. Difference in onset of sensory and motor blockade was observed to be not significant on analysis.

Keywords: Spinal anesthesia, Clonidine, Bupivacaine, Onset of motor and sensory block

INTRODUCTION

Spinal anesthesia has become a preferred technique for lower limb surgeries due to its simplicity, 90% effectiveness in achieving consistent sensory and motor blocks in awake patients, and its safety profile, which includes minimal systemic and local anesthetic toxicity. [1, 2] It also suppresses the neuroendocrine stress response, lowers the risk of gastric aspiration, and ensures continued postoperative pain relief. Hyperbaric bupivacaine is commonly used in spinal anesthesia for lower limb procedures because of its lower risk of neurotoxicity. Depending on the dosage, concentration, or volume of the local anesthetic, it effectively induces sympathetic block, sensory analgesia, and motor block.[3]

Clonidine, an alpha-2 adrenergic agonist, was initially administered intravenously and intrathecally for surgeries below the umbilical region. Research has shown that adding intrathecal clonidine as an adjuvant to hyperbaric bupivacaine enhances the

sensory and motor blockade of spinal anesthesia, reduces the required dose of local anesthetics, and extends postoperative analgesia. Additional benefits of clonidine include antiemetic effects, prevention of post-spinal shivering, anxiolytic properties, and sedation.[4-6]
Our study aims to analyze the effect of preoperative effect on the onset of sensory & motor block under spinal anesthesia.

METHODOLOGY

Present study was a prospective, randomized double-blind, placebo-controlled, single center study conducted on 90 cases were posted electively for lower abdominal and lower limb surgeries with ASA grade I-II in Mahatma Gandhi College & Research Centre, Jaipur after approval from Ethical committee. Patients were thoroughly in examined & investigated in pre-anesthetic clinic and all vitals were recorded. Informed written consent was obtained from the patients prior to joining the study.

Patients (both males and females) were included in the study if they were confirmed diagnosis of ASA physical status class I-II with age between 18-60 years of planned to undergo lower limb and lower abdominal surgery. Patients were not included in the study if they had chronic diseases like hypertension, cardiac disease, Diabetes mellitus & other neurological disorders and any contraindications for spinal analgesia.
Patients were randomly allocated to one of 3 groups. Each group consisted of 30 patients.

Group A (CONTROL) received 0.5% hyperbaric bupivacaine 3ml (15mg) & 0.5ml normal saline intrathecally.
Group B received 0.5% hyperbaric bupivacaine 3ml (15mg) & 25 micrograms Clonidine intrathecally.
Group C received 0.5% hyperbaric bupivacaine 3ml (15mg) & 50 micrograms Clonidine intrathecally.
Under all aseptic precautions lumbar puncture was done with 25G Quinckes spinal needle in sitting position in L3-L4 space. Inj. Bupivacaine 0.5% Heavy (15mg) and Injection Bupivacaine Heavy (15mg) +Inj. Clonidine in two different doses of 25µg & 50µg was injected into subarachnoid space according to groups allotted to them by double blind technique. Supine position was given immediately. Motor & sensory block was assessed every minute. Sensory block was assessed by a pin prick test performed with 22g short bevelled needle. Motor block was assessed by asking the subject to lift his lower limbs. Complete motor block is when no voluntary movement is possible. During surgery patient did not receive any sedative. I.V. fluids were administered perioperatively calculated by maintenance fluids, blood loss & haemodynamic instability.

MONITORING

Sensory level of anaesthesia was assessed by pinprick test. Degree of motor blockade was assessed by Bromage scale.

Table 1: Bromage scale

Sr. No	Grade Criteria	Degree of block
1.	Free movement of legs and feet	Nil (0%)
2.	Just able to flex knees with free movement of feet	(33%)
3.	Unable to flex knees, but with free movement of feet	(66%)
4.	Unable to move legs or feet	Complete (100%)

- The time for 2 dermatomal segment regressions for sensory blockade was noted.
- Intensity of pain was assessed by using a 10 point visual analogue scale.
    1) Grade 0 (0-1) Good analgesia
    2) Grade 1 (1-4) Moderate analgesia
    3) Grade 2 (4-7) Mild analgesia
    4) Grade 3 (7-10) No analgesia
- Supplement analgesia, Inj. Diclofenac 75mg i.m. was given when VAS >4.
- Duration of analgesia was measured as time interval between intrathecal injections to patients 1st request of analgesic.
- Sedation was assessed by Ramsay Sedation Score
    1) Anxious & agitated, restless, or both.
    2) Co-operative, oriented & tranquil.
    3) Responding to commands only.

4) Brisk response to light glabellar tap.
5) Sluggish response to light glabellar tap.
6) No response to light glabellar tap.

- Patients were monitored for occurrence of side effects and complications during intra operative & postoperative period.
- Greater than 20% decrease in mean arterial pressure was treated with boluses of 6mg of ephedrine and i.v. fluids appropriately. 20% decrease in heart rate was treated with atropine 0·6mg intravenously.

Statistical analysis

The demographic data were analyzed using either Student's t-test or Chi-.square test. Quantitative data was analyzed by student's t test and qualitative data was analyzed by Chi-square test and ANOVA. All values were expressed as mean ± standard deviation. $P < 0.05$ was considered statistically significant.

RESULTS

Demographic and baseline characteristics: A total of 90 subjects were enrolled in this study

- Average age of the subjects was 40.57 years $\pm$ 11.38 SD with a range of 18 to 59 years (Table1).
- The average weight of the subjects was 52.2 kg $\pm$ 7.6 SD a range of 44 to 76 kg (Table 1).
- The average height of the subjects was 158.88 cm $\pm$ 7.18 SD with a range of 145 to 177 cm as expressed in Table 1.

Table 1: Descriptive Statistics for demographic and baseline characteristics of the patients.

	N	Mean	SD	Minimum	Maximum
Age (in Yrs.)	90	40.57	11.38	18	59
Weight (in kg)	90	52.2	7.6	44.00	76.00
Height (in cm)	90	158.88	7.18	145.00	177.00

As our study was randomized, difference in age, weight height and sex was not statistically significant among the 3 groups (table 2).

Table 2: Comparison of age distribution between the 3 groups

Group	**N**	**Mean Age in Yrs.**	**SD**	**ANOVA F- value**	**P**
Group B	30	42.00	11.389	0.496	0.611 NS
Group C	30	40.66	9.792		
Group A	30	39.06	12.937		
Group	**N**	**Mean wt in Kg**	**SD**	**ANOVA F- value**	**P**
Group B	30	57.13	7.440	1.595	0.209 NS
Group C	30	60.60	7.789		
Group A	30	58.83	7.316		
Group	**N**	**Mean Ht in cms**	**SD**	**ANOVA F- value**	**P**
Group B	30	158.73	6.389	0.575	0.565 NS
Group C	30	159.53	8.174		
Group A	30	157.57	6.745		

Group	**N**	**Sex**	**$\chi 2$**	**P**	
		Males	**Females**		
Group B	30	15	15	1.69	0.43 NS
Group C	30	12	18		
Group A	30	17	13		

Table 3: Comparison of time of onset of sensory action

Group	**N**	**Onset of sensory action**		**Anova F-value**	**P**
		Mean in Minutes	**SD**		
Group B	30	95.33	21.613	1.88	0.158 NS

Group C	30	97.00	28.303		
Group A	30	107.67	29.558		

Table 4: Comparison of time of onset of Motor action

Group	N	Onset of Motor action		Anova F-value	P
		Mean in Minutes	SD		
Group C	30	138.67	29.330	0.90	0.41 NS
Group B	30	132.33	29.906		
Group A	30	142.67	30.954		

Time of onset of sensory and motor action was also compared. Difference in 3 groups was not statistically significant.

DISCUSSION

Local anesthetics are the commonest agents used for spinal anesthesia, but their relatively short duration of action may lead to early analgesic intervention in the postoperative period.[7, 8] A number of adjuvants to local anesthetics have been used intrathecally to prolong the intraoperative as well as postoperative analgesia.[9] Opioids are commonly used as intrathecal adjuvants to improve the quality of intraoperative analgesia and prolong it in the postoperative period without significant motor or autonomic blockade. However, side effects such as pruritus, nausea, vomiting, urinary retention and delayed respiratory depression have prompted further research toward non-opioid analgesics with less serious side effects.[10]

Several studies have shown that clonidine administered in the epidural space or intrathecally has a substantial antinociceptive effect by its action on the alpha2 receptor in the dorsal horn of the spinal cord.[11, 12] The alpha2 adrenoreceptors are located on the afferent terminals of both peripheral and spinal neurons, on neurons in the superficial laminae of the spinal cord, and within several brainstem nuclei implicated in analgesia. The possible sites of analgesic action of Clonidine is one or more these locations.[12] The analgesic effect of Clonidine is more potent after neuraxial administration indicating a spinal site of action and favors neuraxial (intrathecal or epidural) administration although it is possible to achieve analgesia from systemic administration as well.[12]

Our study is a prospective, randomized double-blind, placebo-controlled, single center study. 90 patients were divided in 3 groups of 30 each. Group A received 0.5%. Hyperbaric bupivacaine 3ml (15mg) & 0.5 ml normal saline intrathecally. Group B received 0.5% Hyperbaric bupivacaine 3ml (15mg) & 25 micrograms Clonidine intrathecally. Group C received 0.5% Hyperbaric bupivacaine 3 ml (15 mg) & 50 micrograms Clonidine intrathecally. Since the cases were randomly allotted to the respective groups, physical parameters like age, height, weight, duration of surgery and sex ratio in all the 3 groups was comparable and statistically not significant. Difference in Onset of sensory and motor blockade was not significant.

CONCLUSION

This randomized controlled comparative at study proves that no difference in the onset of sensory and motor action is observed when compared between pre-op bupivacaine and a combination of bupivacaine and clonidine given spinally as anaesthetic agent.

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