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Prospective Study of Dexmeditomidine versus Clonidine as an Adjuvant to Ropivacaine in Supraclavicular Brachial Plexus Block

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Abstract

Aim: Supraclavicular approach is one of the easiest and most consistent method for performing brachial plexus block. The aim of the present study is to compare the effect, block characteristics and hemodynamic effects of clonidine and dexmedetomidine administration as an adjuvant with ropivacaine in the patients undergoing upper limb surgery under USG guided supraclavicular brachial plexus block.

Material and methods: A prospective study was conducted in 100 patients of age group 18-70 years, of either sex requiring elective or emergency upper limb surgeries after obtaining an informed consent. The patients were randomly allocated into two groups: Group [C+R] received 0.5% injection ropivacaine with 1 ug/kg clonidine and Group [D+R] received 0.5% injection ropivacaine with 0.75ug/kg dexmedetomidine.

Results: The mean age of Clonidine group was 43.3 years while that of Dexmedetomidine group was 42.6 years. The onset of sensory (6.5±1.3 minutes) and motor blockade (9.7±1.4 minutes) was significantly earlier with dexmedetomidine. The mean duration of analgesia (860.4±44.5 minutes) was significantly longer in dexmedetomidine group. The mean duration of sensory blockade (709.7±26.5 minutes) and motor blockade (613.3±33 minutes) were significantly longer in dexmedetomidine group. Intraoperative heart rate, SBP and DBP were significantly lower in group D+R. Significant difference ($p<0.001$) was seen in post operative SBP between the two groups as D+R group had lower SBP from 0 min to 2 hours.

Conclusion: While the higher cost of dexmedetomidine can be suggested as reason for preference for clonidine, the increased requirement of supplementary analgesia and sedation with clonidine may balance this. The

addition of dexmedetomidine with 0.5% ropivacaine as an adjuvant causes early onset of sensory motor blockade, is highly effective in prolonging the duration of sensory and motor blockade and post-operative analgesia with better quality of block as compared to clonidine.

Keywords: Supraclavicular brachial plexus; Dexmeditomidine; Clonidine; Ropivacaine.

Introduction

Supraclavicular brachial plexus block is commonly practiced for upper limb surgeries. Once described as the “spinal of arm” a supraclavicular block offers dense anesthesia for surgical procedures at sites at (or) distal to elbow, forearm and hand. It can be used as the sole anesthetic technique or in combination with general anesthesia for intraoperative and post operative analgesia.

Supraclavicular block is a low cost anesthesia technique. It provides satisfactory/optimal operative conditions due to both sensory and motor blockade without any systemic side effects. Brachial plexus block also leads to sympathetic block with resultant improvement in blood flow, reduction in vasospasm and oedema which is more favourable for acute hand injury and reconstructive plastic surgery.

Common sites of approach to brachial plexus block are interscalene, supraclavicular, infraclavicular, axillary and posterior approach, of which supraclavicular approach is one of the easiest and most consistent method. It is a must for all practicing anesthesiologist to be familiar with all the above approaches as well as their advantages and limitations.

Ropivacaine is an amino amide local anesthetic prepared as pure S-enantiomer. Ropivacaine has lesser lipid solubility and also produce less central nervous toxicity and cardio toxicity with less arrhythmogenic potential.[1] The purpose of adding an adjuvant to local anesthetics for peripheral nerve block is to have early onset of sensory and motor block and to prolong the duration of post operative analgesia with lesser adverse effect.[2]

Several clinical investigations have shown that Clonidine prolongs the post operative analgesia. Clonidine is an α2 agonist. Although it had been used originally as an anti hypertensive agent, it has sedative, sympatholytic and analgesic properties.[3] The use of clonidine, a partial α2 adrenoreceptor agonist, in peripheral nerve blocks, has been reported to be safe and beneficial.[4,5] Dexmedetomidine is also a α2 receptor agonist, and its α2/α1 selectivity is 8 times more than clonidine. It has been reported to improve the quality of intrathecal and epidural anesthesia.[6,7]

Successful brachial plexus block depends on proper nerve localization, needle placement, local anesthetic injection i.e., right drug, right dose, placed in the right place, by the right technique. Traditional land mark approach and elicitation of paraesthesia necessitates multiple attempts, resulting in procedure related complications such as pain, injury to blood vessels and pneumothorax.

Ultrasound guided supraclavicular brachial plexus block has become popular currently, owing to detection of anatomical variation of brachial plexus, accuracy of needle placements and avoidance of needle related complications such as injury to blood vessels, pneumothorax and local anesthetic toxicity.[8,9]

In the present study USG guided supraclavicular approach is used to compare the effects of clonidine and dexmedetomidine administration as an adjuvant with ropivacaine in supraclavicular brachial plexus block.

Objectives

1. To determine any difference in block characteristics of combination of Dexmedetomidine (0.75 µg/kg) plus 0.5% Ropivacaine, and Clonidine (1µg/kg) plus 0.5% Ropivacaine in supraclavicular brachial plexus block between two groups in terms of:
   a. Duration of sensory and motor blockade.
   b. Onset of sensory and motor blockade
   c. Duration of post operative analgesia.
2. To determine any difference in hemodynamic characteristics between the two groups in terms of intra operative and post operative mean heart rate, SBP, DBP.

Material and methods

Study area: Department of anaesthesiology, Department of Plastic and Reconstructive Surgeries and Department of Orthopedics, at Santokba Durlabhji Memorial Hospital cum Medical Research Institute, Jaipur.

Study design: A prospective study was conducted in patients of age group 18-70 years, of either sex requiring elective or emergency upper limb surgeries after obtaining an informed consent.

Sample size: 100

Allocation of study groups

The patients were randomly allocated into two groups:

a. Group [C+R] received 0.5% injection ropivacaine with 1 ug/kg clonidine.

b. Group [D+R] received 0.5% injection ropivacaine with 0.75ug/kg dexmedetomidine.

All the solutions were diluted with isotonic normal saline to make a total volume of 30 ml.

Inclusion criteria

1. Patients in the age group of 18-70 years of age.
2. Having ASA [American Society of Anaesthesiologists] grade I to III.
3. Patients scheduled for elective or emergency upper limb surgeries.

Exclusion criteria

1. Age less than 18 years.
2. Having ASA grade IV / Pregnant / lactating women.
3. Patients on any adrenoreceptor agonist or antagonist therapy.
4. Patients on anticoagulants or with any bleeding disorder.
5. Patients with known allergy to the above drugs
6. Patients with anticipated difficult airway.
7. Neurological deficits involving brachial plexus.
8. Patient with haemodynamic instability.
9. History of local pathology at the site of injection or disability limiting the performance of block.

Complete history of patient including any known drug allergy, general examination and local examination of supraclavicular area, pulse rate, blood pressure, respiratory rate and weight of patient were noted. Informed consent was obtained prior to the procedure.

Anesthesia technique

In the preparation room, anaesthetic procedure and VAS score was thoroughly explained to the patients. The patient was shifted to the operation theatre. Intravenous access was secured with 18/20G intravenous cannula in the non-operating limb followed by ringer lactate. Baseline heart rate, blood pressure and oxygen saturation were recorded.

The supraclavicular brachial plexus block was performed under strict aseptic precautions by ultrasound guided approach with M mode and in-plane technique. After real time visualization of brachial plexus by ultrasound, needle was placed near the

plexus, following negative aspiration of blood and drug solution was injected around the brachial plexus. Time at the end of drug injection was taken as zero minute.

Assessment of sensory block was done by **pin pricking method** every 3 minutes until the feeling of dull sensation to pinprick. Complete sensory block known as total loss of sensation to pin prick and motor blockade was assessed every 3 minutes by "3 point modified bromage scale'' for upper limb.

Grading of sensory block:[10]

Grade 0: Sharp pin felt

Grade 1: Analgesia and dull sensation felt.

Grade 2: Analgesia and no sensation felt.

Modified Bromage scale for upper limb: (3 point scale)[10]

Grade 0: Normal motor function with full extension and flexion of elbow, wrist, finger

Grade 1: Decreased motor strength with ability to move finger only

Grade 2: Complete motor block with inability to move finger.

If any one of the nerve segment supply (Median, Radial, Ulnar Musculocutaneous nerves) did not get blocked even after 30 minutes after drug injection, the block was considered incomplete. If more than one nerve segment was not anesthetized, the block was considered as failed block. These patients under went general anesthesia.

Hemodynamic parameters such as Blood pressure, heart rate, Oxygen saturation every 5 minutes till 30 minutes then every 15 minutes during the surgery and at 30 minutes, 1st, 2nd, 4th, 8th, 12th, 16th hour post-operatively were monitored. The blood loss and fluid status were assessed and replaced during the surgery.

During intra operative and postoperative period all the patients were observed for any side effects and complications at the site of injection.

Sensory block duration: From the time of injection of study drug solution to complete sensory recovery of all nerves.

Motor block duration: Time interval between the injection of study drug solution to complete recovery of motor function of hand and forearm.

Duration of analgesia: Time of return of pain minus the time of onset of pain.

Results

The mean age of Clonidine group was 43.3 years while that of Dexmedetomidine group was 42.6 years (Table 1). This difference was however not found to be statistically significant (p=0.767). There were more males in both Clonidine group (64%) and Dexmedetomidine group (62%) (p=0.001) (Table 2). The mean duration of surgery of Clonidine group was 77.9 minutes while that of Dexmedetomidine group was 81.2 minutes. This difference was however not found to be statistically significant (p=0.405) (Table 3). Most of the subjects in Clonidine group had ASA I (48%) and ASA II (46%) and only 3 subjects had ASA III. Similarly in Dexmedetomidine group, most subjects had ASA I (50%) and ASA II (42%) and only 8% had ASA III (Table 4).

The mean time to onset of sensory blockade in Clonidine group was higher (10.1 minutes) as compared to Dexmedetomidine group (6.5 minutes) and this difference was found to be statistically significant (p<0.001) (Graph 1). Similarly the mean time to onset of motor blockade in Clonidine group higher (14.8 minutes) as compared to Dexmedetomidine group (9.7 minutes) and this difference was found to be statistically significant

(p<0.001) (Graph 2). It can be inferred that onset of sensory and motor blockade was significantly earlier with Dexmedetomidine.

The mean duration of sensory block in Clonidine group was shorter (477.4 minutes) as compared to Dexmedetomidine group (709.7 minutes) and this difference was found to be statistically significant (p<0.001) (Graph 3). The mean duration of motor block in Clonidine group was shorter (393.8 min) as compared to Dexmedetomidine group (613.3 min) and this difference was found to be statistically significant (p<0.001) (Graph 4). It can be inferred that duration of both sensory and motor block was significantly longer with Dexmedetomidine.

Table 5 shows the baseline characteristics of study groups. All the hemodynamic parameters including heart rate, systolic and diastolic blood pressure were comparable in both groups. There was decline in heart rate thereafter in both groups, but the decline was more in Group D+R as compared to Group C+R. HR was found to be significantly lower in Group D+R as compared to Group C+R (p<0.001). From 5 to 120 minutes, HR in Group C+ R varied slightly between 75 to 78.74 bpm, while in Group D+R it ranged from 66.33 to 73.42 bpm. At all times HR was significantly lower in Group D+R as compared to Group C+R.

The mean HR varied from 75.20 to 78.06 per minute in Group C+R, while in Group D+R mean HR varied from 71.64 to 78.33 per minute post operatively. No significant difference was seen in post operative HR between the two groups at any time during the post operative period (Table 6).

Table 7 depicts the post-operative SBP varied from 113.72-117.16 mmHg in Group C+R, while in Group D+R mean from 107.0-113.96 mmHg. Significant difference (p < .001) was seen in post operative SBP between the two groups at 0 min (immediately at the end of surgery) to 2 hour during the post operative period. After that no significant difference was seen in post operative SBP between the two groups during the post operative period.

Table 8 depicts the post operative diastolic blood pressure among study groups. DBP was found to be significantly lower in Group D+R as compared to Group C+R (p<0.001). DBP in Group C+ R varied between 72.68 to 75.92 mmHg, while in Group D+R it ranged from 65.14 to 71.56 mmHg. DBP was significantly lower in Group D+R as compared to Group C+R at post operative period.

Table 9 shows that the mean duration of analgesia in Clonidine group was shorter (580 min) as compared to Dexmedetomidine group (860.4 min) and this difference was found to be statistically significant (p<0.001). It can be inferred that duration of analgesia was significantly longer with Dexmedetomidine.

Discussion

Brachial plexus block is the cornerstone of regional anaesthesia practice, is one of the approaches to sensorimotor neural blockade by which surgical anaesthesia is achieved. It has a high success rate, is rapid and most consistent and time efficient. It provides more complete anaesthesia to the plexus particularly the axillary and musculocutaneous nerves, and does not require abduction of the arm to be performed.

Nerve block with long acting local anaesthetic agents such as ropivacaine or bupivacaine are beneficial for improved post operative pain therapy, but its duration of block is still not sufficient to avoid post operative opiods so various adjuvants like epinephrine, clonidine, dexemedetomidine, neostigmine, bicarbonates, have been added as adjuvant which not only improve quality

of block but also improve duration of analgesia which decrease the need of post operative analgesics.

All patients selected belonged to age group between 18 to 70 years. A random allocation of the patients was done in the two groups. The mean age in group R+C and group R+D was 43.3± 10.3 years, and 42.6 ±11.8 years respectively. There was no statistically significant difference between the groups with regard to age (p>0.05). So that groups were evenly matched with respect to age. This helped to judge the clinical significance of the study as the distribution; metabolism, excretion and action of drug show variation in different age groups. Thus, clinically insignificant variation in age simply aided to overcome these confounding factors.

The mean duration of surgery of Clonidine group was 77.9 minutes while that of Dexmedetomidine group was 81.2 minutes. This difference was however not found to be statistically significant (p=0.405).

In the present study, the onset time of sensory blockade was significantly decreased in R+D group when compared to R+C group. So addition of dexmedetomidine as an adjuvant to ropivacaine provides early onset of sensory block as compared to clonidine significantly. Similarly Esmaoglu A et al[11] also found that onset time of sensory block was shorter in group LD than in group L (P<0.05) (10.46±1.30 in group L and 9.03±1.15 in group LD). Kaygusuz K et al[12] also showed that dexmedetomidine when added with levobupivacaine (7.75±2.22) was found to decrease the time of onset of sensory block as compared to levobupivacaine (10.75± 2.55) alone. Sidharth SR et al[13] showed that the mean onset time of sensory blockade in their study group was 10.44 ± 5.7 minutes and in control group was 15.85 ± 6.55 minutes. The delayed onset of sensory block in the study by Sidharth et al., inspite of adding clonidine would have been due to the landmark technique used in administering the block. In our study we administered the block under ultrasound guidance which has helped in deposition of the local anesthetic in close proximity to the plexus contributing to the early onset of the sensory block.

The mean onset time of motor blockade in R+D group was 9.7 ± 1.4 minutes as compared to R+C group (14.8± 1.7) minutes which was statistically significant (p< 0.001). Karthik GS et al[14] found onset of motor block in group LD (11.81±0.44) and group LC (15.94±0.32) and p value of <0.001. Kirubahar R et al[15] found onset of motor block in group C (13.1 ± 1.42) and in group D (9.63 ± 0.89) and p-value of <0.001. They both found early onset in levobupivacine and dexmedetomidine group than levobupivacaine and clonidine group.

Swami SS et al[16] and Hosalli V et al[17] found no significant difference in onset of motor block with clonidine and dexmedetomidine when added as an adjuvant in their respective studies. This was in contrast with the results of the present study. The reason for early onset of motor blockade in the present study would have been due to accuracy of needle placements close to the plexus.

In group R+D the duration of sensory block was 709.7 ± 26.5 minutes, while in R+C group 477.4 ± 56.8 minutes, this difference was found to be statistically significant (p <0.001). Similarly Swami SS et al[16] also found significant difference in duration of sensory block. Karthik GS et al[67] reported duration of sensory block significant in group LD (517.08±15.09) and group LC (396.43±13.68). Kirubahar R et al[15] also reported significant difference in duration of sensory block in dexmedetomidine as compared to clonidine.

The mean duration of motor block in Clonidine group was shorter (393.8 ± 54.2 minutes) as compared to Dexmedetomidine group (613.3±33 minutes) and this difference was found to be statistically significant (p<0.001). Similarly Esmaoglu A et al[11] found significant prolongation of duration of motor block in group LD (773.00±67.62) as compared to group L (575.00±65.00**).** Gandhi R et al[18] also observed prolongation in duration of motor block when 30 microgram dexmedetomidine was added to bupivacaine. Swami SS et al[16] also found significant difference. Karthik GS et al[14] reported duration of motor block significant in group LD (415.60±19.22) and group LC (299.30±19.21). Hosalli V et al[17] also reported significant difference in duration of motor block.

The duration of motor block was less than the duration of sensory block due to increased requirement of local anesthetic for larger motor fibre than small sensory fibre. Gupta et al.[19] have shown earlier onset of sensory and motor blockade and prolonged duration of sensory and motor blockade with ultrasound versus other nerve localization techniques.

Most of the subjects in Clonidine group achieved sensory grade II 64% and only 36% subjects achieved sensory grade I. While in Dexmedetomidine group, most subjects achieved sensory grade II 76% and 24% subjects achieved sensory grade I. The patients in Clonidine group achieved motor grade III 58% and 42% patients achieved motor grade II. In Dexmedetomidine group, most patients achieved motor grade III 68% and 32% patients achieved motor grade II. This is consistent with the study of Swami SS et al[56] who found that addition of dexmedetomidine to local Anaesthetic improves both the quality of anaesthesia as well as intraoperative and post-operative analgesia.

The mean duration of analgesia in Clonidine group was shorter (580 ± 62.2 minutes) as compared to Dexmedetomidine group (860.4 ± 44.5 minutes) and this difference was found to be statistically significant (p<0.001). Duration of analgesia was significantly longer with Dexmedetomidine.

In group R+C, HR was found to be significantly lower in Group R+D as compared to Group R+C (p<0.001). From 5 to 120 minutes, HR in Group C+ R varied slightly between 75 to 78.74 bpm, while in Group R+D it ranged from 66.33 to 73.42 bpm). However from the baseline there was decline in heart rate in both groups, but the decline was more in Group R+D as compared to Group R+ C. There was no significant change in the heart rate in the postoperative period. The mean HR varied from 75.20 to 78.06 / minute in Group R+C, while in Group R+D mean HR varied from 71.64 to 78.33 / minute. No significant difference was seen in post operative HR between the two groups at any time during the post operative period.

This is consistent with the findings of Swami SS et al[16], who found no change in heart rate with clonidine in supraclavicular brachial plexus block. Esmaoglu A et al[11] found heart rate levels in group LD, except basal measurements, were significantly lower than those in group L (P <0.05). Karthik GS et al[14] reported that the heart rate levels in both the groups were low but did not fall below 60beats/minute.

Intraoperatively, mean SBP in Group R+C varied between 114.38 to 117.48 mmHg, while in Group R+D it ranged from 105.68 to 113.44 mmHg. Postoperatively mean SBP varied from 113.72to 117.16 mmHg in Group C+R, while in Group D+R mean SBP varied from 107.0 to 113.96 mmHg. SBP was significantly lower in Group D+R as compared to Group C+R at all times during intraoperative and at 0

min (immediately at the end of surgery) to 2 hour during the post operative period. After that no significant difference was seen in post operative SBP between the two groups during the post operative period.

DBP was found to be significantly lower in Group D+R as compared to Group C+R ($p<0.001$) during the intra-operative period, wherein, DBP in Group C+ R varied between 75.8 to 72.94 mmHg, while in Group D+R it ranged from 75.74 to 64.24 mmHg. DBP was significantly lower in Group D+R (65.14 to 71.56 mmHg) as compared to Group C+R (72.68 to 75.92 mmHg) at post operative period.

In the study done by Swami SS et al[16] the systolic and diastolic blood pressure were found to be significantly lower in dexmedetomidine group as compared to clonidine group. Similar results were observed by Kirubahar R et al[15] in terms of SBP and DBP which reported except at the 5th minute, the intraoperative MAP values were lower in Group D, when compared to Group C which was statistically significant ($p<0.05$).

In group R+C: out of 50 patients 13 patients were drowsy but none of the patients had hypotension, bradycardia, vomiting or any other side effects. In group R+D, out of 50, 34 patients were drowsy and none of the patients had vomiting, significant hypotension and bradycardia or any other side effects significant to requiring intervention.

The limitations of our study are that we did not use peripheral nerve stimulator which could have helped us using lower dose and volume of local anaesthetics. In spite of an intensive search of the published literature, we were unable to identify an ideal scale for assessment of quality of block achieved. We suggest that a larger study should be carried out in future to compare the effects of dexmedetomedine and clonidine or other adjuvants in supraclavicular block and their advantages and disadvantages over one another should be more clearly delineated.

Conclusion

In this study comparison of clonidine and dexmedetomidine as an adjuvant to 0.5% ropivacaine in upper limb surgeries under the influence of supraclavicular block has been done. The addition of dexmedetomidine (0.75µg/kg) as an adjuvant was found to be highly effective in comparison to clonidine (1µg/kg) in causing early onset of sensory and motor blockade, is highly effective in prolonging the duration of sensory and motor blockade and postoperative analgesia without any potential side effects.

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Legend Tables and graphs

Group	N	Mean	Std. Deviation
Group C+R	50	43.3	10.3
Group D+R	50	42.6	11.8
t = 0.297 with 98 degree of freedom; p = 0.767 (NS)			

Table 1: Comparison of mean age (years) of study groups

Gender	Group C+R		Group D+R		Total	
	N	%	N	%	N	%
Female	18	36	19	38	37	37
Male	32	64	31	62	63	63
Total	50	100	50	100	100	100
Chi-square = 0.000 with 1 degree of freedom; P = 1.000 (NS)						

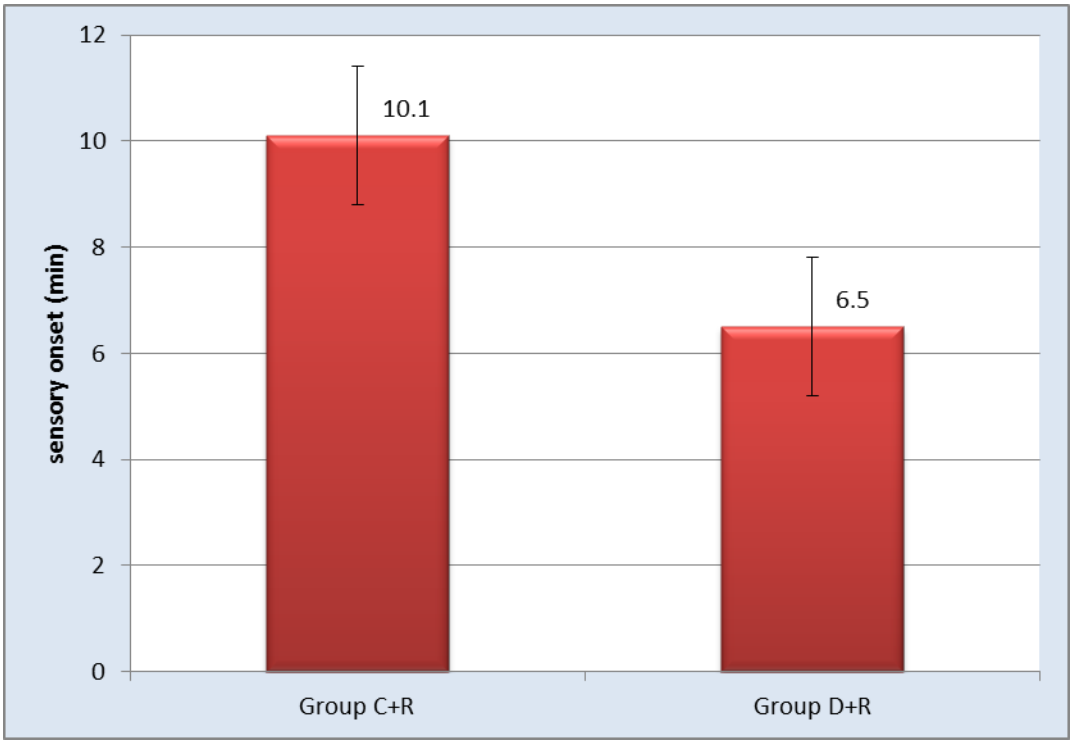
Table 2: Gender distribution of study groups

Group	N	Mean	Std. Deviation
Group C+R	50	77.9	20.9
Group D+R	50	81.2	18.4
t = -0.836 with 98 degree of freedom; p = 0.405 (NS)			

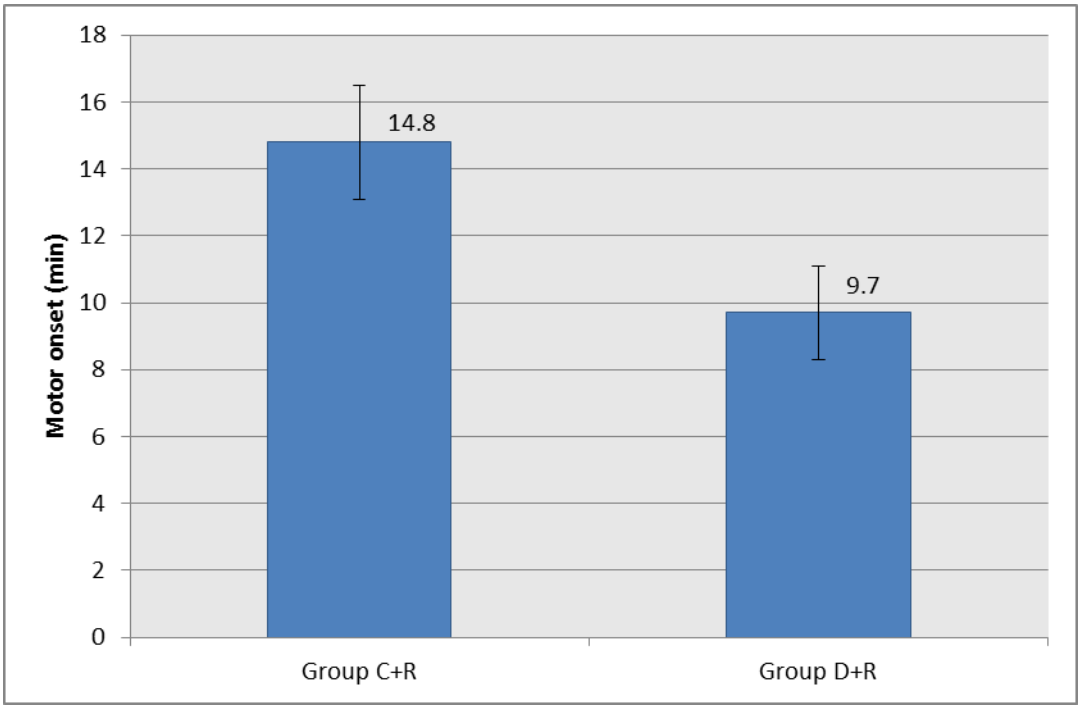
Table 3: Comparison of mean duration of surgery (minutes) between study groups

ASA grade	Group C+R		Group D+R		Total	
	N	%	N	%	N	%
Grade I	24	48	25	50	49	49
Grade II	23	46	21	42	44	44
Grade III	3	6	4	8	7	7
Total	50	100	50	100	100	100
Chi-square = 0.254 with 2 degrees of freedom; P = 0.881 (NS)						

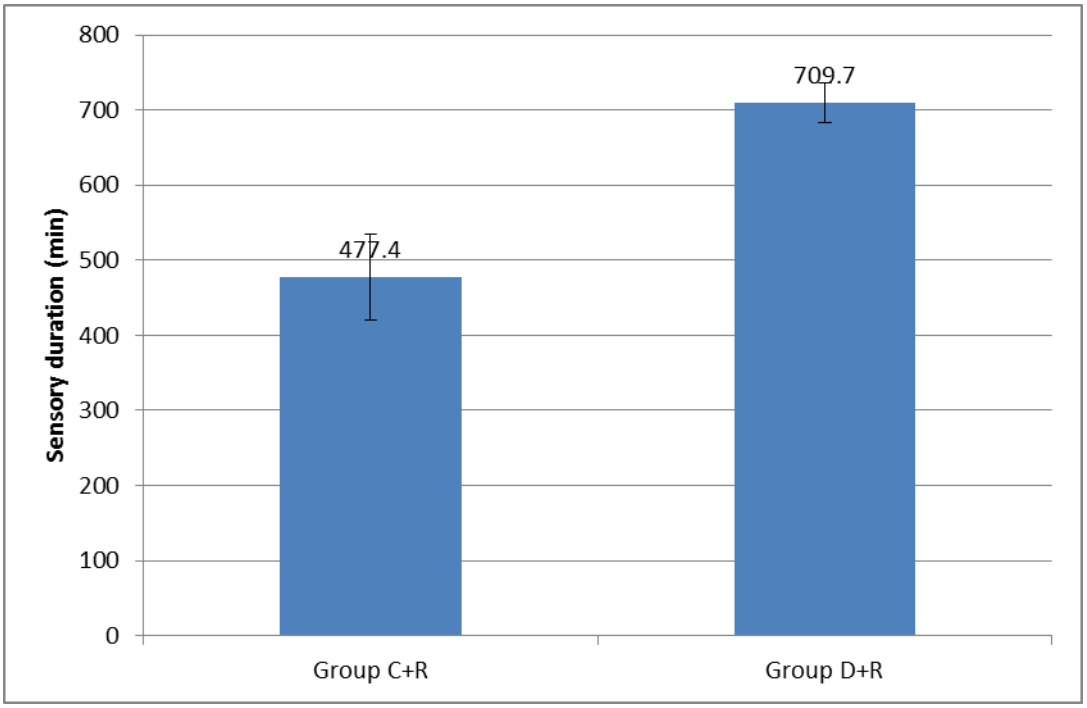
Table 4: Distribution of study subjects according to ASA grade



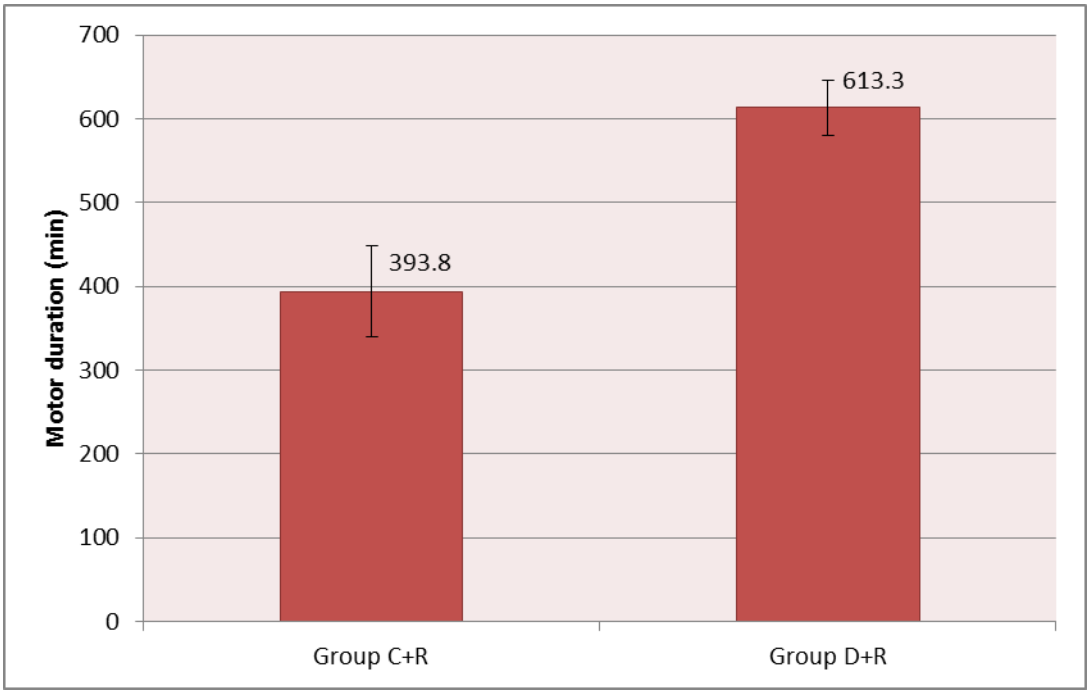
Graph 1: Comparison of mean time to onset of sensory blockade



Graph 2: Comparison of mean time to onset of motor blockade



Graph 3: Comparison of mean duration of sensory block



Graph 4: Comparison of mean duration of motor block

Variable	Group C+R	Group D+R	P value
Heart rate (bpm)	80.56 ± 6.29	79.02 ± 7.47	0.267
SBP (mmHg)	123.1 ± 8.53	121.4 ± 6.77	0.253
DBP (mmHg)	77.08 ± 8.06	75.74 ± 8.12	0.410

Table 5: Comparison of pre-operative vitals among study groups

Time point	Group C+R	Group D+R	P-value
0 min	78.06 ± 7.89	73.84 ± 6.73	0.005*
30 min	76.66 ± 7.01	71.64 ± 12.42	0.014*
1 hour	75.98 ± 5.96	72.71 ± 6.77	0.012*
2 hour	75.68 ± 6.03	73.12 ± 12.46	0.194
4 hour	76.52 ± 6.33	75.65 ± 5.58	0.472
8 hour	75.2 ± 6.02	75.44 ± 12.06	0.900
12 hour	75.48 ± 6.04	78.06 ± 4.5	0.018*
16 hour	76.32 ± 5.56	78.33 ± 5.42	0.072

Table 6: Comparison of post operative heart rate among study groups

Time point	Group C+R	Group D+R	P-value
0 min	115.04 ± 7.3	107 ± 6.21	<0.001
30 min	114.8 ± 6.18	109.06 ± 5.48	<0.001
1 hour	115.64 ± 6.15	108.68 ± 5.37	<0.001
2 hour	116.72 ± 6.06	109.76 ± 5.35	<0.001
4 hour	113.72 ± 15.19	111.5 ± 5.37	0.332
8 hour	115.64 ± 6.82	111.82 ± 6.09	0.004*
12 hour	116.16 ± 6.34	113.96 ± 6.95	0.101
16 hour	117.16 ± 4.8	113.44 ± 6.73	0.002*

Table 7: Comparison of post operative SBP among study groups

Time point	Group C+R	Group D+R	P value
0 min	72.68 ± 6.47	65.14 ± 6.56	<0.001
30 min	73.46 ± 6.15	65.4 ± 5.91	<0.001
1 hour	75.34 ± 4.72	67.68 ± 4.8	<0.001
2 hour	75.58 ± 5.41	68.98 ± 5.58	<0.001
4 hour	75.22 ± 4.72	68.24 ± 5.36	<0.001
8 hour	75.88 ± 5.05	69.7 ± 5.14	<0.001
12 hour	75.54 ± 5.44	71.24 ± 5.96	<0.001
16 hour	75.92 ± 4.2	71.56 ± 6.55	<0.001

Table 8: Comparison of Post op DBP among study groups

Group	N	Mean	Std. Deviation
Group C+R	50	580	62.2
Group D+R	50	860.4	44.5
t = -25.910 with 98 degree of freedom; p <0.001 (S)			

Table 9: Comparison of mean duration of analgesia (minutes) among study groups