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A COMPARATIVE STUDY OF DEXMEDETOMIDINE AND CLONIDINE AS AN ADJUVANT TO ROPIVACAINE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

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KEYWORDS :

INTRODUCTION:

The first Brachial plexus block was performed in the year 1884 by applying cocaine to the brachial plexus1. Brachial plexus is primarily responsible for the innervation of the upper limb. Hence the brachial plexus block is an immensely important armament in the armoury of the anaesthetist as it avoids the undesired effects of general anaesthesia and the stress of laryngoscopy and tracheal intubation. The brachial plexus is formed by the ventral rami of the lower four cervical and first thoracic nerve roots (C5-C8, T1). It proceeds through the neck, the axilla into the arm. A number of approaches are employed to access the brachial plexus. However the supraclavicular approach is the easiest and most consistent method for anaesthesia and perioperative pain management in surgery below the shoulder joint. Supraclavicular brachial plexus block is an excellent technique in experienced hands. Pneumothorax (1-6%), Hemothorax, Horner's syndrome and phrenic nerve block are the potential complications2, 3, 4. The brachial plexus block is usually performed using commonly available local anesthetic agents like bupivacaine, lidocaine and ropivacaine of which the latter is a fairly recent addition. Bupivacaine is a local anaesthetic drug belonging to the amino amide group. It is indicated for local anaesthesia in nerve block. Compared to other local anaesthetics, bupivacaine is markedly cardiotoxic. Maximum dose of bupivacaine is 2mg/kg body weight in peripheral nerve blocks. Lidocaine is amino amide type local anaesthetic characterized by rapid onset of action and intermediate duration of efficacy. Therefore, lidocaine is suitable for peripheral nerve blocks. Maximum dose of lidocaine without adrenaline is 3 mg/kg body weight and with adrenaline is 7 mg/kg body weight. Ropivacaine is a long acting amide local anaesthetic agent. It causes reversible inhibition of sodium ion influx and thereby blocks impulse conduction in nerve fibres5. This action is potentiated by dose dependent inhibition of potassium channels.6 The incidence of cardiotoxicity and CNS toxicity as a result of inadvertent intravascular injection of ropivacaine appears to be low7. Dose of 0.75% Ropivacaine is 75-300mg (10-40 ml). 0.75% ropivacaine produces effective and well tolerated brachial plexus block of long duration and analgesia is better8. Many drugs are used as adjuvants like: Buprenorphine9, 10, Morphine10, Sufentanyl10, Fentanyl11, Tramadol12 which have ability to achieve quick, dense and prolonged block. Since opiods like morphine13 are associated with side effects like sedation, respiratory depression, drugs with minimal of these side effects are always looked for. Recently dexmedetomidine and clonidine have been studied as an adjuvant to local anaesthetic in peripheral nerve blocks. Thus clonidine and dexmedetomidine are selected as adjuvants to local anaesthetics in brachial plexus block in the present study because they have been reported to prolong duration of action of local anaesthetics14, 15, 16 and respiratory depression is not a major problem. Dexmedetomidine, a potent α2 adrenoceptor agonist, is approximately eight-times more selective towards the α2 adrenoceptor than clonidine17. Clonidine was initially used for its antihypertensive properties. The central actions are mediated through α2 adrenoceptors, which are situated at locus coeruleus and dorsal horn of spinal cord. But, specific peripheral effects of clonidine appear to be less obvious because α2 adrenoceptors are not present on the axon of the normal peripheral nerve18. There have been four proposed mechanisms for the action of clonidine in peripheral nerve blocks. These mechanisms are centrally mediated analgesia, α2 β adrenoceptor-mediated vasoconstrictive effects, attenuation of inflammatory response and direct action on peripheral nerve blocks19.The direct action of clonidine on the nerve can be explained on the basis of a study conducted by Dalle et al. They proposed that clonidine, by enhancing activity-dependent hyperpolarization generated by the Na/K pump during repetitive stimulation, and increases the threshold for initiating the action potential causing slowing or blockage of conduction20.

Dexmedetomidine is an agonist of alpha 2 adrenergic receptors. The mechanism of action differs from clonidine as it possess selective alpha 2 adrenoreceptor agonism which causes it to be a much more analgesic agent than clonidine. Dexmedetomidine prolongs the duration of sensory and motor block and enhances the quality of block as compared with clonidine when used as an adjuvant in peripheral nerve block21. In a study, perineural dexmedetomidine added to ropivacaine for sciatic nerve block in rats prolonged the duration of analgesia by blocking the hyperpolarization-activated cation. This effect was reversed by a hyperpolarization-activated cation channel enhancer but not by a α2 adrenoreceptor antagonist. This shows that the analgesic effect of peripheral perineural dexmedetomidine was caused by enhancement of the hyperpolarization-activated cation current, which prevents the nerve from returning from a hyperpolarized state to resting membrane potential for subsequent firing22

METHODS AND MATERIAL:

After obtaining approval from hospital ethics committee and written, informed consent, 90 patients were enrolled in the study. The study was carried out from 2012-2014 in a tertiary care hospital. The study population included patients of either sex, ASA physical status grade I and II in the age range of 18-60 years. All patients posted for upper extremity surgeries below the shoulder joint were given brachial plexus block by supraclavicular approach.

Inclusion criteria

- Age group 18-60 years
- ASA physical status grade I and II
- Upper limb surgery below shoulder joint (both elective and emergent surgery)

Exclusion criteria

- Unwilling patients
- ASA physical status grade III and IV
- Any bleeding disorder or patient on anticoagulants
- Severe respiratory disease
- Neurological deficit involving brachial plexus
- Local infection at the injection site
- Bloodstream infection
- History of allergy to local anesthetic
- History of peptic ulcer disease, diabetes mellitus, hepatic or renal

failure
- Pregnancy

Patients were randomly allocated to one of the three groups. In each patient, thorough history was elicited. Patient was clinically examined in detail and investigated.

Group I Ropivacaine (R) : Patients in this group were administered 0.75% Ropivacaine (30-40ml).

Group II Ropivacaine plus Clonidine (RC): Patients in this group were administered 0.75% Ropivacaine (30-40ml) plus clonidine 0.5mcg/kg.

Group III Ropivacaine plus Dexmedetomidine (RD): Patients in this group were administered 0.75% Ropivacaine (30-40ml) plus dexmedetomidine 0.5mcg/kg.

Investigations
- Complete haemogram
- Chest radiogram
- Blood urea nitrogen, Blood Sugar
- Electrocardiogram, if >45 years
- Coagulation profile

Drug solution used and dosage
- 0.75% Ropivacaine 30-40 ml was used along with 0.5 mcg/kg dexmedetomidine or 0.5 mcg/kg clonidine in two groups while the third group received 0.75% Ropivacaine 30-40 ml only. The dose of 0.75% Ropivacaine was not allowed to exceed 300 mg

- Total volume of solution in all groups was 30-40ml

Drug solutions were prepared by an independent anaesthesiologist not involved in the study.

Monitoring
- Pulse oximetry for oxygen saturation (SpO2)
- Cardioscope for rate and rhythm
- Non invasive blood pressure monitoring

An intravenous drip was established before undertaking the procedure and continued throughout the length of surgery. Vital parameters were observed throughout the procedure and oxygen at the rate of 4 lit/min administered through Hudson mask.

Instruments
A set containing following were used:
- Insulated Stimulator needle: Locoplex® 22 G 50 mm VYGYON® (ITALIA)

- Peripheral nerve stimulator: VYGYON® (ITALIA).
- ECG electrodes
- Two 20 ml leur-lock syringes with desired local anesthetic solution
- Skin marker pencil
- Two stainless sterile bowls
- Sterile gauze pieces
- One sterile swab holding forceps and one sterile drape

Statistical analysis used:
The study was a randomized, prospective, double blinded study.

The data obtained in this study was analysed using chi-square test and one way ANOVA followed by TUCKEY"S POST HOC test which gives p value to be applied as follows:

If p> 0.05, it means that there is no significant difference between the means of three groups studied.

If p=0.05, it indicates that there is a significant difference at 5% level of significance (i.e. out of 100, in 95 cases there is a significant difference).

Group	Mean Age (Yrs)	SD	SE (Mean)	95% CI for Mean		Min	Max
				Lower Bound	Upper Bound		
Control Group	27.83	10.58	1.93	23.88	31.78	18.00	60.00
Study Group (RC)	33.47	8.82	1.61	30.17	36.76	19.00	51.00
Study Group (RD)	33.63	10.05	1.83	29.88	37.39	19.00	56.00

If p < 0.01, it indicates that the data is significant at 1% level of significance (i.e. out of 100, in 99 cases there is a significant difference).

If p < 0.001, it is highly significant.
Mean difference between two drugs are calculated to check the potency of each drug separately.

RESULTS:
The effect of addition of dexmedetomidine and clonidine to local anaesthetics in brachial plexus block were analyzed. Brachial plexus block by supraclavicular approach was performed in 90 patients of American Society of Anaesthesiology Physical Status Class I and II posted for upper limb surgeries below shoulder joint. The patients were randomly allocated into three groups. Group I Ropivacaine ®: Patients in this group were administered 0.75% Ropivacaine (30-40ml). Group II Ropivacaine plus Clonidine (RC): Patients in this group were administered 0.75% Ropivacaine (30-40ml) plus clonidine 0.5 mcg/kg. Group III Ropivacaine plus Dexmedetomidine (RD): Patients in this group were administered 0.75% Ropivacaine (30-40ml) plus dexmedetomidine 0.5 mcg/kg.

Table No.1 Age Distribution
Majority of patients were in age groups of 25-35 yrs.

F (2.87) = 3.375, p-value > 0.05, Not Significant

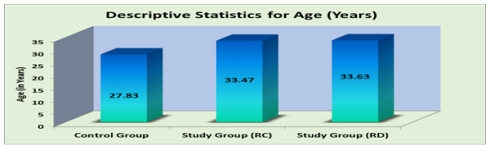


Table No.2 Weight Distribution
Descriptive Statistics for Weight (kg)

Group	Mean	SD	SE Mean)	95% CI for Mean		Min	Max
				Lower Bound	Upper Bound		
Control Group	60.17	4.53	.83	58.47	61.86	52.00	69.00
Study Group (RC)	62.67	6.19	1.13	60.36	64.98	51.00	74.00
Study Group (RD)	61.90	6.51	1.19	59.47	64.33	50.00	72.00

Majority of patients weighing 60-70 Kgs.

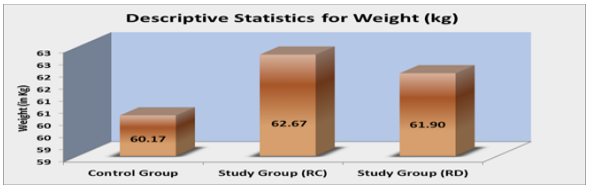
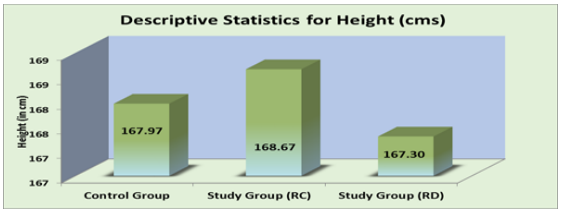


Table No.3 Height Distribution
Descriptive Statistics for Height (cm)

Group	Mean	SD	SE Mean	95% CI for Mean		Min	Max
				Lower Bound	Upper Bound		
Control Group	167.97	4.57	.83	166.26	169.67	161.00	176.00
Study Group (RC)	168.67	4.93	.90	166.83	170.51	160.00	178.00
Study Group(RD)	167.30	4.62	.84	165.58	169.02	160.00	178.00

F (2,87) = 0.632, p-value > 0.05, Not Significant

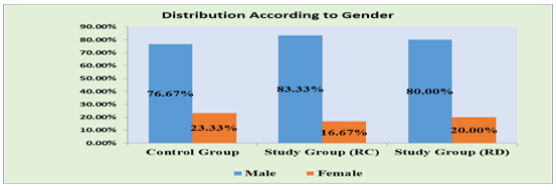


In majority of patients, average height was between 160-170 cms.

Table No.4 Sex Distribution / Gender wise Distribution

Gender	Control Group	Study Group (RC)	Study Group (RD)	Total
Male	23	25	24	72
	76.67%	83.33%	80.00%	
Female	7	5	6	18
	23.33%	16.67%	20.00%	
Total	30	30	30	90

P > 0.05, No significant difference in proportion

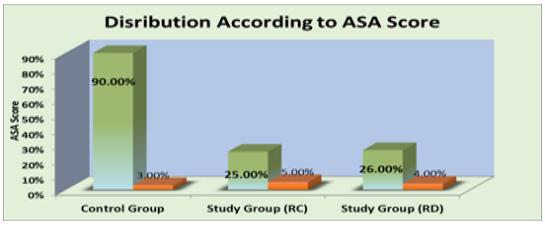


Thus it can be seen from Table I and IV that males formed majority of the study group.

Table No.5 ASA score Distribution / Distribution According to ASA Score

ASA	Group			Total
	Control Group	Study Group (RC)	Study Group (RD)	
I	27	25	26	78
	90.0%	83.3%	86.7%	86.7%
II	3	5	4	12
	10.0%	16.7%	13.3%	13.3%
Total	30	30	30	90
	100.0%	100.0%	100.0%	100.0%

P > 0.05, No significant difference in proportion



Majority of patients were in ASA group I

Table No.6 Distribution according to duration of surgery / Descriptive Statistics for Duration of Surgery (in minutes)

	N	Mean	SD	SE Mean	95% CI for Mean		Min	Max
					Lower Bound	Upper Bound		
Control Group	30	175.17	36.54	6.67	161.52	188.81	120.00	240.00
Study Group (RC)	30	182.83	22.43	4.09	174.46	191.21	150.00	240.00
Study Group (RD)	30	191.83	26.60	4.86	181.90	201.77	150.00	240.00

Duration of surgery (in min)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% CI	
					Lower Bound	Upper Bound
Control Group	Study Group (RC)	-7.67	7.52	.57	-25.60	10.27
	Study Group (RD)	-16.67	7.52	.09	-34.60	1.27
Study Group (RC)	Control Group	7.67	7.52	.57	-10.27	25.60
	Study Group (RD)	-9.00	7.52	.46	-26.94	8.94
Study Group (RD)	Control Group	16.67	7.52	.09	-1.27	34.60
	Study Group (RC)	9.00	7.52	.46	-8.94	26.94

*: Significant at 1 % level of Significance

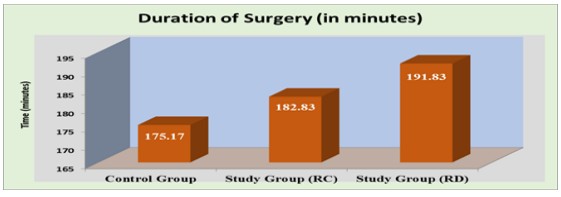


Table No.7: Mean onset of sensory block
Descriptive Statistics for onset of Sensory Block (in mins)

	N	Mean	SD	SE Mean	95% CI for Mean		Min	Max
					Lower Bound	Upper Bound		
Control Group	30	10.77	2.30	.42	9.91	11.63	7.00	15.00
Study Group (RC)	30	1.98	.72	.13	1.71	2.25	1.00	4.00
Study Group (RD)	30	1.95	.70	.13	1.69	2.21	1.00	4.00

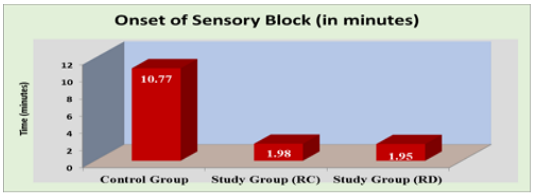
Onset of Sensory Block (in mins)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% CI	
					Lower Bound	Upper Bound
Control Group	Study Group (RC)	8.78*	.37	<.001	7.89	9.68
	Study Group (RD)	8.82*	.37	<.001	7.92	9.71
Study Group (RC)	Control Group	-8.78*	.37	<.001	-9.68	-7.89
	Study Group (RD)	.03	.37	1.00	-.86	.93
Study Group (RD)	Control Group	-8.82*	.37	<.001	-9.71	-7.92
	Study Group (RC)	-.03	.37	1.00	-.93	.86

*: Significant at 1 % level of Significance

Mean onset of sensory analgesia in Control (R) group was 10.77 minutes, RC group was 1.98 minutes, RD group was 1.95 minutes. There was statistical significant difference in onset of sensory block between group I with Ropivacaine (control) with other two study groups RC and RD. But no statistical significant difference in onset of sensory block between two study groups RC and RD. On application of chi-square test and one way ANOVA followed by TUCKEY"S

POST HOC test for comparing R, RC, RD gps. (p >0.05) the difference was found to be statistically significant.



Inference: Onset of sensory analgesia was faster in RD than RC than R.

Table No.8: Mean onset of motor block
Descriptive Statistics for Onset of Motor Block (in mins)

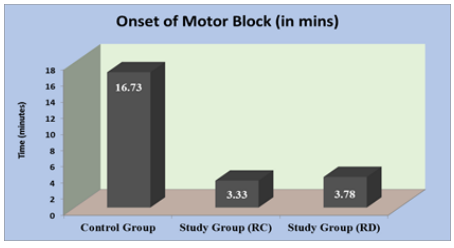
	N	Mean	SD	SE Mean	95% CI for Mean		Min	Max
					Lower Bound	Upper Bound		
Control Group	30	16.73	2.35	.43	15.86	17.61	12.00	20.00
Study Group (RC)	30	3.33	.74	.13	3.06	3.61	2.00	5.00
Study Group (RD)	30	3.78	.80	.15	3.49	4.08	2.00	5.00

Onset of Motor Block (in mins)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% CI	
					Lower Bound	Upper Bound
Control Group	Study Group (RC)	13.40*	.39	<.001	12.48	14.32
	Study Group (RD)	12.95*	.39	<.001	12.03	13.87
Study Group (RC)	Control Group	-13.40*	.39	<.001	-14.32	-12.48
	Study Group (RD)	-.45	.39	.48	-1.37	.47
Study Group (RD)	Control Group	-12.95*	.39	<.001	-13.87	-12.03
	Study Group (RC)	.45	.39	.48	-.47	1.37

*: Significant at 1 % level of Significance

There was statistical significant difference in onset of motor block between group I with Ropivacaine (control) with other two study groups RC and RD. But no statistical significant difference in onset of sensory block between two study groups RC and RD. On application of chi-square test and one way ANOVA followed by TUCKEY'S POST HOC test for comparing R. RC. RD grps., (p >0.05) the difference was found to be statistically significant.



Inference: Onset of motor block was faster in RC than in RD, than in R.

Table No.9: Mean duration of motor block
Descriptive Statistics for Duration of Motor Block (in min)

	N	Mean	SD	SE Mean	95% CI for Mean		Min	Max
					Lower Bound	Upper Bound		
Control Group	30	519.83	49.23	8.99	501.45	538.21	450.00	630.00
Study Group (RC)	30	608.23	56.25	10.27	587.23	629.24	465.00	690.00
Study Group (RD)	30	794.00	66.52	12.14	769.16	818.84	660.00	900.00

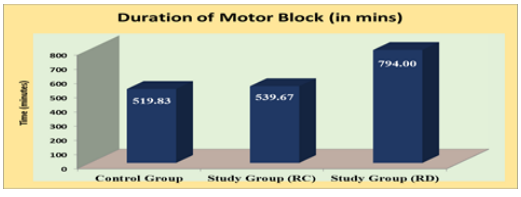
Mean duration of motor block in R group was 519.83 minutes, RC group was 608.23 minutes, RD group was 794.00 minutes.

Duration of Motor Block (in min)

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% CI	
					Lower Bound	Upper Bound
Control Group	Study Group (RC)	-88.4*	14.92	<.001	-123.97	-52.83
	Study Group (RD)	-274.17*	14.92	<.001	-309.73	-238.60
Study Group (RC)	Control Group	88.40*	14.92	<.001	52.83	123.97
	Study Group (RD)	-185.77*	14.92	<.001	-221.33	-150.20
Study Group (RD)	Control Group	274.17*	14.92	<.001	238.60	309.73
	Study Group (RC)	185.77*	14.92	<.001	150.20	221.33

*: Significant at 1 % level of Significance

The duration of motor block in study group III RD was significantly prolonged than in study group II RC than in group I R (control). RD>RC>R



Inference: Duration of motor block was maximum in RD than in RC than in R.

Table No. 10: Mean duration of sensory block
Descriptive Statistics for Duration of Sensory Block (in mins)

	N	Mean	SD	SE Mean	95% CI for Mean		Min	Max
					Lower Bound	Upper Bound		
Control Group	30	701.33	53.61	9.79	681.32	721.35	600.00	840.00
Study Group (RC)	30	743.33	54.98	10.04	722.80	763.86	630.00	870.00
Study Group (RD)	30	928.67	45.84	8.37	911.55	945.78	810.00	990.00

Mean duration of motor block in R group was 701.33 minutes, RC group was 743.33 minutes, and RD group was 926.67 minutes.

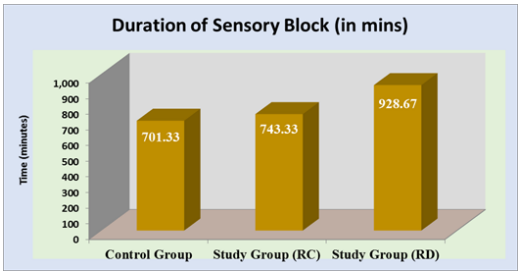
Duration of Sensory Block (in min)

(I) Group	(J) Group	Mean Difference (I-J)	SE Mean	Sig.	95% CI	
					Lower Bound	Upper Bound
Control Group	Study Group (RC)	-42*	13.33	<.01	-73.79	-10.21

	Study Group (RD)	-227.33*	13.33	<.01	-259.12	-195.54
Study Group (RC)	Control Group	42.00*	13.33	<.01	10.21	73.79
	Study Group (RD)	-185.33*	13.33	<.00	-217.12	-153.54
Study Group (RD)	Control Group	227.33*	13.33	<.00	195.54	259.12
	Study Group (RC)	185.33*	13.33	<.00	153.54	217.12

*: Significant at 1 % level of Significance

The duration of sensory block in study group III RD was significantly prolonged than in study group II RC than in group I R (control), RD>RC>R.



Inference: Duration of sensory block was maximum in RD than in RC than in R.

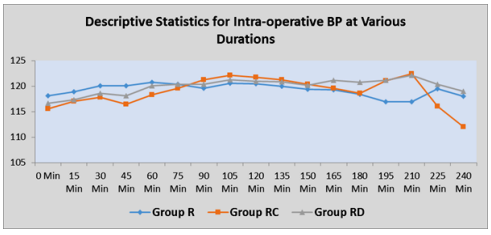
Comparative study of intraoperative mean systolic blood pressure

Observations: On application of chi-square test and one way ANOVA followed by TUCKEY"S POST HOC test for comparing R, RC, RD, (p >0.05) the difference was found to be statistically insignificant.

Descriptive Statistics for Intra-operative BP at Various Durations

Duration	Group R		Group RC		Group RD		p-Value
	Mean	SD	Mean	SD	Mean	SD	
0 Min	118.133	5.431	115.600	4.375	116.600	4.760	> 0.05
15 Min	118.867	6.361	117.067	4.748	117.333	5.616	> 0.06
30 Min	120.067	5.789	117.800	5.641	118.600	5.757	> 0.07
45 Min	120.067	5.884	116.400	9.633	118.067	5.496	> 0.08
60 Min	120.733	5.907	118.333	10.466	120.067	4.913	> 0.09
75 Min	120.333	6.059	119.600	7.379	120.400	5.210	> 0.10
90 Min	119.533	5.348	121.267	4.593	120.400	4.825	> 0.11
105 Min	120.533	5.631	122.133	4.200	121.200	4.536	> 0.12
120 Min	120.467	4.776	121.733	4.631	120.933	4.354	> 0.13
135 Min	120.000	5.154	121.267	4.799	120.867	4.539	> 0.14
150 Min	119.360	5.219	120.400	5.443	120.133	5.251	> 0.15
165 Min	119.263	4.483	119.538	4.709	121.143	4.231	> 0.16
180 Min	118.375	4.689	118.636	4.953	120.783	5.248	> 0.17
195 Min	116.889	4.372	121.077	4.051	121.111	4.129	< 0.05*
210 Min	116.889	3.887	122.444	4.667	122.154	4.279	< 0.05*
225 Min	119.500	3.000	116.000	2.828	120.333	3.882	> 0.05
240 Min	118.000	3.464	112.000	2.717	119.000	4.163	> 0.05

*: Significant at 5% level of Significance



Inference: From the above observation it is concluded that addition of either Clonidine or Dexmedetomidine with Ropivacaine does not cause significant alteration in blood pressure.

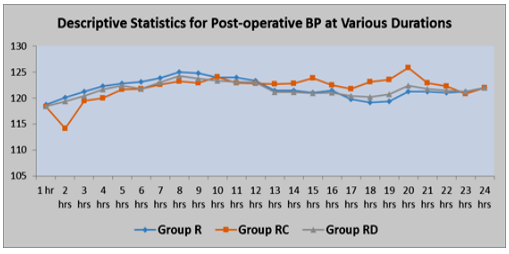
Comparative study of postoperative mean systolic blood pressure

Observations: On application of chi-square test and one way ANOVA followed by TUCKEY"S POST HOC test for comparing R, RC, RD, (p >0.05) the difference was found to be statistically insignificant.

Descriptive Statistics for Post-operative BP at Various Durations

Duration	Group R		Group RC		Group RD		P-Value
	Mean	SD	Mean	SD	Mean	SD	
1 hr	118.733	4.741	118.333	4.302	118.467	4.805	> 0.05
2 hrs	120.067	4.968	114.133	19.889	119.333	5.128	> 0.06
3 hrs	121.200	5.423	119.467	4.637	120.400	5.928	> 0.07
4 hrs	122.267	4.948	119.933	5.521	121.667	5.561	> 0.08
5 hrs	122.800	5.081	121.667	3.717	122.400	4.500	> 0.09
6 hrs	123.067	4.719	121.733	3.269	121.800	4.080	> 0.10
7 hrs	123.867	4.869	122.600	2.978	123.000	4.720	> 0.11
8 hrs	125.000	4.661	123.200	3.305	124.267	4.835	> 0.12
9 hrs	124.733	4.085	122.933	2.716	123.733	4.354	> 0.13
10 hrs	123.933	3.947	124.067	2.318	123.333	3.536	> 0.14
11 hrs	123.933	3.877	122.867	2.270	123.133	3.511	> 0.15
12 hrs	123.333	3.252	122.800	2.657	123.000	3.184	> 0.16
13 hrs	121.467	4.100	122.733	3.129	121.133	4.384	> 0.17
14 hrs	121.467	5.117	122.800	3.773	121.133	5.673	> 0.05
15 hrs	121.000	5.502	123.800	3.458	120.933	5.426	< 0.05*
16 hrs	121.400	5.562	122.533	3.104	121.067	5.324	> 0.05
17 hrs	119.800	3.614	121.733	2.016	120.400	3.379	> 0.05
18 hrs	119.133	4.091	123.067	1.363	120.200	3.943	< 0.05*
19 hrs	119.400	4.492	123.533	.860	120.667	4.080	< 0.05*
20 hrs	121.200	2.809	125.800	.610	122.400	3.255	< 0.05*
21 hrs	121.200	4.254	122.867	2.145	121.800	3.690	> 0.05
22 hrs	121.000	4.060	122.267	2.016	121.467	3.481	> 0.05
23 hrs	121.200	5.268	120.867	1.008	121.200	4.567	> 0.05
24 hrs	121.933	6.247	122.000	.000	122.000	5.458	> 0.05

*: Significant at 5% level of Significance



Inference: From the above observation it is concluded that addition of either Clonidine or Dexmedetomidine with Ropivacaine does not cause significant alteration in blood pressure.

Comparative study of intra-operative mean Pulse Rate

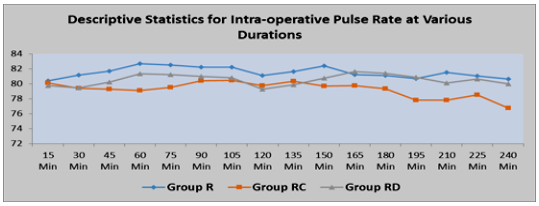
Observations: On application of chi-square test and one way ANOVA followed by TUCKEY"S POST HOC test for comparing R, RC, RD (p >0.05) the difference was found to be statistically insignificant

Descriptive Statistics for Intra-operative Pulse Rate at Various Durations

Duration	Group R		Group RC		Group RD		P-Value
	Mean	SD	Mean	SD	Mean	SD	
15 Min	80.400	3.255	80.067	3.877	79.733	5.166	> 0.05
30 Min	81.133	3.137	79.400	4.875	79.467	7.143	> 0.06
45 Min	81.667	3.241	79.267	4.828	80.200	4.405	> 0.07
60 Min	82.667	3.166	79.067	5.552	81.333	4.405	> 0.08
75 Min	82.533	2.460	79.533	4.776	81.200	4.156	< 0.05*
90 Min	82.200	3.253	80.400	4.825	81.000	3.851	< 0.05*
105 Min	82.200	2.941	80.467	4.833	80.800	4.413	> 0.05
120 Min	81.067	3.095	79.733	4.540	79.267	4.118	> 0.06
135 Min	81.600	3.500	80.333	4.671	79.867	4.696	> 0.07
150 Min	82.400	3.802	79.667	4.581	80.733	4.741	> 0.08

165 Min	81.241	4.290	79.733	4.571	81.600	3.802	> 0.05
180 Min	81.103	4.678	79.333	4.080	81.400	4.523	> 0.05
195 Min	80.690	5.217	77.800	4.498	80.867	3.589	< 0.05*
210 Min	81.517	4.059	77.800	3.978	80.067	4.623	< 0.05*
225 Min	81.034	3.986	78.533	4.392	80.600	4.903	> 0.05
240 Min	80.621	2.624	76.733	5.239	80.000	3.965	< 0.05*

*: Significant at 5% level of Significance



Inference: From the above observation it is concluded that addition of either Clonidine or Dexmedetomidine with Ropivacaine does not cause significant alteration in intra-operative heart rate.

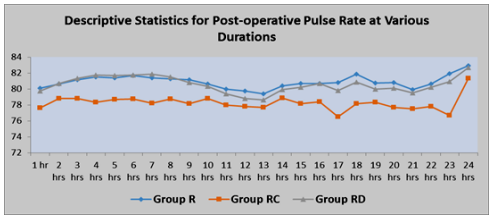
Comparative study of post-operative mean Pulse Rate

Observations: On application of chi-square test and one way ANOVA followed by TUCKEY"S POST HOC test for comparing R, RC, RD (p >0.05) the difference was found to be statistically insignificant.

Descriptive Statistics for Post-operative Pulse rate at Various Durations

Duration	Group R		Group RC		Group RD		P-Value
	Mean	SD	Mean	SD	Mean	SD	
1 hr	80.067	2.490	77.600	3.944	79.733	3.183	< 0.05*
2 hrs	80.600	3.244	78.800	4.189	80.667	3.651	> 0.05
3 hrs	81.133	3.550	78.800	4.859	81.333	3.977	< 0.05*
4 hrs	81.533	3.848	78.333	5.307	81.733	4.025	< 0.05
5 hrs	81.400	4.174	78.667	4.852	81.667	4.270	< 0.05*
6 hrs	81.667	4.397	78.733	4.799	81.733	4.748	< 0.05*
7 hrs	81.400	5.636	78.200	4.795	81.867	5.457	< 0.05*
8 hrs	81.267	6.136	78.733	4.683	81.533	5.865	> 0.05
9 hrs	81.133	5.244	78.133	4.455	80.800	5.696	> 0.05
10 hrs	80.600	4.039	78.800	4.536	80.333	4.138	> 0.05
11 hrs	80.000	4.034	78.000	4.394	79.400	3.865	> 0.05
12 hrs	79.733	4.631	77.800	4.468	78.800	4.773	> 0.05
13 hrs	79.400	5.487	77.660	5.423	78.600	5.069	> 0.05
14 hrs	80.400	5.263	78.867	5.002	79.933	4.683	> 0.05
15 hrs	80.667	4.678	78.133	4.485	80.200	5.182	> 0.05
16 hrs	80.667	4.405	78.400	4.280	80.667	4.908	> 0.05
17 hrs	80.800	2.552	76.533	5.303	79.800	3.872	< 0.05*
18 hrs	81.867	2.569	78.133	4.840	80.867	3.665	< 0.05*
19 hrs	80.733	2.377	78.333	3.790	80.000	2.924	< 0.05*
20 hrs	80.800	2.759	77.667	5.307	80.067	3.877	< 0.05*
21 hrs	79.933	3.769	77.533	3.431	79.533	3.776	< 0.05*
22 hrs	80.600	4.368	77.800	3.377	80.200	4.080	< 0.05*
23 hrs	81.933	5.212	76.667	4.180	80.933	5.085	< 0.05*
24 hrs	82.933	5.577	81.333	2.537	82.667	4.649	> 0.05

*: Significant at 5% level of Significance



Inference: From the above observation it is concluded that addition of either Clonidine or Dexmedetomidine with Ropivacaine does not cause significant alteration in post-operative heart rate.

Intra-operative and Post-Operative Complications

Distribution According to Complications

Complication	Control Group	Study Group RC	Study Group RD
Nausea	0	0	0
Vomiting	0	0	0
Bradycardia	0	0	1
Hypotension	0	2	0
Respiratory Depression	0	0	0
Drowsiness	0	0	0
Horner's Syndrome	0	0	0
Total	0	2	1

DISCUSSION:

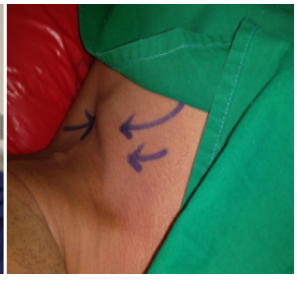
In a prospective, randomized, double blind, and controlled study, the effect of addition of dexmedetomidine and clonidine to local anesthetic in brachial plexus block was carried out. Brachial plexus block by supraclavicular approach was performed in 90 patients of American Society of Anaesthesiology Physical Status Class I and II posted for upper limb surgeries below shoulder joint. The patients were randomly allocated into three groups. Group I Ropivacaine ®: Patients in this group were administered 0.75% Ropivacaine (30-40ml), Group II Ropivacaine plus Clonidine (RC): Patients in this group were administered 0.75% Ropivacaine (30-40ml) plus clonidine 0.5mcg/kg. Group III Ropivacaine plus Dexmedetomidine (RD): Patients in this group were administered 0.75% Ropivacaine (30-40ml) plus dexmedetomidine 0.5mcg/kg. The study was to compare the onset and duration of action of sensory and motor blockade and incidence of complications. Results obtained are as follows: 1. Onset of sensory and motor blockade was similar in both the study groups (RC & RD), but the onset of sensory and motor blockade was prolonged with control (R) group 2. Duration of analgesia and motor blockade was significantly prolonged with the addition of dexmedetomidine as compared to clonidine 3. Both the study groups RC & RD had significant prolonged duration of sensory and motor blockade as compared to control (R) group 4. No significant systemic side effects occurred in any case. Hence, it was concluded that addition of dexmedetomidine or clonidine to local anaesthetic drugs in brachial plexus block is a safe and effective method of providing post-operative analgesia in patients undergoing upper limb surgery below shoulder joint. While addition of dexmedetomidine or clonidine to local anaesthetic drugs in brachial plexus block significantly prolonged the duration of analgesia and motor block in patients undergoing upper limb surgeries and is a remarkably safe and effective method of providing postoperative analgesia. The research paper stated that dexmedetomidine prolonged the duration of sensory and motor blockade more than clonidine.

CONCLUSIONS:

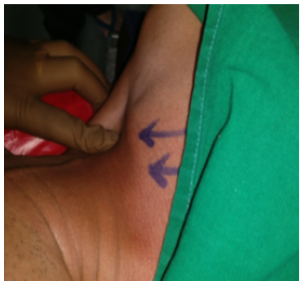
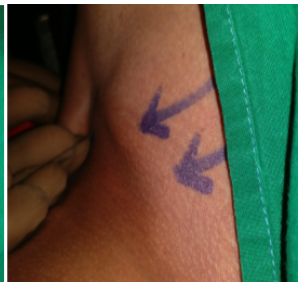
Addition of dexmedetomidine or clonidine to local anaesthetic drugs in brachial plexus block significantly prolonged the duration of analgesia and motor block in patients undergoing upper limb surgeries and is a remarkably safe and effective method of providing postoperative analgesia.

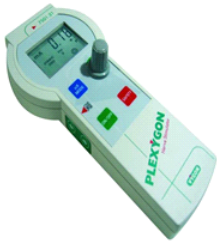
Our study showed that dexmedetomidine prolonged the duration of sensory and motor blockade more than clonidine.

PATIENT POSITION **LANDMARK IDENTIFICATION**



POINT OF NEEDLE ENTRANCE **NEEDLE DIRECTION**



Technical features:

Dimensions Length 200mm
Width max: 93mm min: 57mm
Heigth max: 40mm min: 23 mm
Pulse frequency 1 – 2 – 4 Hz
Pulse width 50 – 100 – 300µs
Steps 0.1mA increment above 0.5mA
0.02mA increment below 0.5mA
Maximum intensity
of charge
At 50µs: 6mA or 300nC
At 100µs: 5mA or 500nC
At 300µs: 4mA

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