



**“A COMPARATIVE STUDY TO EVALUATE THE EFFECT OF DEXMEDETOMIDINE AND NORMAL SALINE AS AN ADJUVANT TO 0.5% ROPIVACAINE ON SENSORY, MOTOR AND POSTOPERATIVE ANALGESIA IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCKADE”**

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**ABSTRACT**

**AIMS AND OBJECTIVES:** To evaluate and compare the onset and duration of sensory and motor blockade and efficacy in prolonging postoperative analgesia of 0.5% ropivacaine with dexmedetomidine in supraclavicular brachial plexus blockade and to observe undesirable effects and complications of drug used.

**MATERIAL AND METHOD:** 60 patients ASA grade I & II undergoing elective upper limb surgery under supraclavicular brachial plexus blockade. Patients were classified randomly into 2 groups (thirty patients in each group). Group R patients received 30 ml of 0.5% ropivacaine with 0.5 ml normal saline and Group RD patients received 30 ml of 0.5% ropivacaine with 50 µg (0.5 ml) dexmedetomidine hydrochloride. And we compare the onset and duration of sensory and motor blockade and efficacy in prolonging postoperative analgesia of 0.5% ropivacaine with dexmedetomidine in supraclavicular brachial plexus blockade and to observe undesirable effects and complications of drug used, if any.

**RESULT:** Analysis revealed that there were no significant differences between the patients with respect to age, sex, weight and duration and type of surgery. Onset of sensory and motor block fasten in RD group and duration of sensory and motor block is more prolong in RD group as compare to R group. time of rescue analgesia was more in group RD as compare to group R. There were no complication in both the groups.

**CONCLUSION:** Dexmedetomidine when added to ropivacaine fastens the onset of sensory and motor blockade, prolongs the duration of sensory and motor blockade and prolonged the time for rescue analgesia without any side effect.

**KEYWORDS :** Dexmedetomidine, brachial plexus block and rescue analgesia

**INTRODUCTION:**

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.<sup>1</sup> Peripheral nerve block not only provides intraoperative anesthesia but also extends analgesia in the postoperative period without major systemic side effects by minimizing stress response and using minimal anesthetic drugs.<sup>2</sup>

Supraclavicular block provides a rapid, dense, and predictable anesthesia of the entire upper extremity in most consistent manner of any brachial plexus technique.<sup>3</sup> Brachial plexus is blocked where it is most compact i.e. at the middle of brachial plexus, resulting in homogenous spread of anaesthetic throughout the plexus with a fast onset and complete block.<sup>3</sup> Dexmedetomidine a newer α<sub>2</sub>-adrenoreceptor agonist is currently in focus for its sedative, anxiolytic and analgesic properties. Pre- and intra-operative intravenous dexmedetomidine administration has shown to prolong the duration of sensory block with local anesthetics during peripheral nerve blocks.<sup>4</sup> Dexmedetomidine has also shown to prolong the duration of block and postoperative analgesia when added to local anesthetic in various regional blocks.<sup>7</sup>

**MATERIAL AND METHODS:**

60 patients ASA grade I & II undergoing elective upper limb surgery under supraclavicular brachial plexus blockade. After obtaining approval from ethical committee 60 patients who fulfilled the eligibility criteria were chosen, explained about the procedure and written consent was taken. Patients were classified randomly into 2 groups (thirty patients in each group). Group R patients received 30 ml of 0.5% ropivacaine with 0.5 ml normal saline and Group RD patients received 30 ml of 0.5% ropivacaine with 50 µg (0.5 ml) dexmedetomidine hydrochloride. And we compare the onset and duration of sensory and motor blockade and efficacy in prolonging postoperative analgesia, Postoperative Pain was assessed using a visual analogue score scale which consists of a 10 cm horizontal scale with gradations marked as '0' means no pain at all and '10' means unbearable pain. (VAS score rating)<sup>8</sup>

Also observe undesirable effects and complications of drug used, if any.

**RESULT AND ANALYSIS:**

**TABLE 1: SHOWING DEMOGRAPHIC PROFILE OF PATIENTS IN TWO GROUPS**

S.no.	Parameters	Group R		Group RD		p value
		Mean	±SD	Mean	±SD	
1.	Age (yrs)	42.5	10.33	40.0	8.27	0.44#
2.	Weight (kgs)	58.5	4.83	57.0	5.95	0.45#
3.	Sex (M:F)	25:5		24:6		

Table 1 showing demographic profile of patients in three groups according to age, weight and sex.

Statistical analysis of Mean ±SD of Age and Weight of the groups were comparable in both groups and statistically insignificant (p>0.05).

**TABLE 2: SHOWING COMPARISON OF SENSORY BLOCKADE (MIN) IN THE TWO GROUPS.**

Parameters	Group R		Group RD		p value
	Mean	±SD	Mean	±SD	
Onset time of sensory blockade (min)	19.02	3.34	9.66	2.35	<.00\$
Duration of Sensory blockade (min)	325.13	62.32	501.08	34.70	<.00\$

Table 2 Showing mean ±SD of onset and duration of sensory blockade.

Onset time of sensory blockade was **19.02±3.34** min in Group R and **9.66±2.35** min in Group RD.

Duration of sensory blockade is **325.13±62.32** min in Group R and **501.08±34.70** min in Group RD.

Difference between group R and RD were statistically significant (p <0.05) for onset of sensory blockade. Difference between R vs RD

were statistically significant (p <0.05) for duration of sensory blockade.

**TABLE 3: SHOWING COMPARISON OF MOTOR BLOCKADE (MIN) AMONGTWO GROUPS.**

Parameters	Group R		Group RD		P value
	Mean	±SD	Mean	±SD	
Onset time of motor blockade(min)	22.83	3.68	16.34	2.51	<.00\$
Duration of blockade (min)	300.58	35.39	437.73	42.38	<.00\$

Table 3 Showing the onset time (Mean ±SD) of motor blockade was **22.83±3.68** min in Group R & **16.34±2.51** min in Group RD.

The duration of motor blockade (Mean ±SD) was found to be **300.58±35.39** min in Group R & **437.73± 42.38** min in Group RD . Difference between Group R and Group RD statistically significant (p <0.05) for onset of motor blockade Difference between group R vs RD was statistically significant (p <0.05) for duration of motor blockade.

**TABLE 4: SHOWING TIME FOR RESCUE ANALGESIA (MIN) AMONGTWO GROUPS.**

Parameters	Group R		Group RD		p value
	Mean	±SD	Mean	±SD	
Time of Rescue Analgesia (in min)	398.93	95.89	790.22	133.79	<.00\$

Table 4 showing time of rescue analgesia (Mean ±SD) of three groups.

Time of rescue analgesia was **398.93±95.89** min in Group R and **790.22±133.79** min in Group RD.

Difference was statistically significant for Group R and Group RD .

**TABLE 5: STATISTICAL ANALYSIS OF VAS SCORE (MEAN ± SD) AMONGTWO GROUPS.**

VAS SCORE (MIN)	GROUP R		GROUP RD		P value
	MEAN	±SD	MEAN	±SD	
10	0	0	0	0	1.0#
15	0	0	0	0	1.0#
30	0	0	0	0	1.0#
60	0	0	0	0	1.0#
90	0	0	0	0	1.0#
120	0	0	0	0	1.0#
150	0	0	0	0	1.0#
180	0	0	0	0	1.0#
210	0	0	0	0	1.0#
270	0	0	0	0	1.0#
300	0	0	0	0	1.0#
330	0	0	0	0	1.0#
360	2.84	0.58	0	0	<.00\$
390	3.47	0.55	0	0	<.00\$
420	4.08	0.57	0	0	<.00\$
450	4.78	0.55	1.67	0.16	<.00\$
480	5.13	1.12	1.91	0.19	<.00\$
510	5.94	0.65	2.14	0.15	<.00\$
540	6.58	0.68	2.38	0.22	<.00\$
570	7.12	0.77	2.69	0.28	<.00\$
600	7.6	0.71	2.95	0.24	<.00\$
630	8.0733	0.66	3.24	0.32	<.00\$
660	8.58	0.66	3.43	0.750	<.00\$
690	9.0167	0.58	3.84	0.38	<.00\$
720	9.4067	0.42	4.14	0.45	<.00\$
750	9.74	0.32	4.54	0.61	<.00\$

Difference is statistically significant for time intervals 360min, 390min, 420 min, 450min, 480min, 510min, 540min, 570min, 600min, 630min, 660min, 690min, 720min and 750 min between Group R and Group RD.

**TABLE 6 SHOWING COMPLICATIONS IN ALL TWO GROUPS**

Complications	Group R		Group RD	
	N	%	N	%
Nausea	-	-	-	-
Vomiting	-	-	-	-
Respiratory depression	-	-	-	-
Bradycardia	-	-	-	-
Sedation	-	-	-	-

Table 6 showing there was no complication in Group R and Group RD respectively.

**DISCUSSION**

The hypothesis of this study was adding dexmedetomidine to Ropivacaine in supraclavicular brachial plexus block enhanced the duration of sensory and motor block

**DEMOGRAPHIC DATA:**

In our study there is even distribution of age, weight and sex in both groups.(Table-1) and we find that it was statistically insignificant (p >0.05)

**SENSORY BLOCKADE:**

**Onset and duration of sensory of block:**

In our study, the onset time of sensory blockade (mean ±SD) which was 19.02 ± 3.34 min in Group R and 9.66 ± 2.35min in Group RD.(table-2)

Mean (±SD) of sensory blockade duration was 325.13±62.32 min in group R and 501.08± 34.70min in group RD.(table-2)

The onset of sensory blockade was found to be rapid and duration of sensory block is more in group RD as compared to group R the difference was statistically significant (p <0.05).

Our observations are also in accordance with the findings of **Bansal et al** <sup>9</sup> who compared the effect of dexmedetomidine 100 mcg added to ropivacaine 0.5% with ropivacaine 0.5% alone in brachial plexus block and found it to be statistically significant (p<0.01).

Our observations are in accordance with the findings **Mukherjee et al**<sup>10</sup> and **Reddy et al**<sup>11</sup>, **Patki et al**<sup>12</sup>, **Prasad et al**<sup>13</sup> and **Sudani et al**<sup>14</sup>, **Kathuria et al**<sup>15</sup>, **Chiruvella et al**<sup>16</sup>, **Goyal et al**<sup>17</sup> They observed significantly faster onset of sensory block in the group receiving dexmedetomidine hence supported our study.

**Sundaram et al**<sup>18</sup> evaluated effect of adding dexmedetomidine to ropivacaine in axillary brachial plexus block and found significant difference in onset of sensory duration.

**MOTOR BLOCKADE:**

**Onset of motor blockade:**

In our study, the onset time (Mean ±SD) of motor blockade was 22.83 ± 3.68 min in group R and 16.34± 2.51min in Group RD.(table-3)

The onset of motor blockade was found to be group RD as compared to group R, the difference was statistically significant (p <0.05).

Our findings are supported by **Patki et al**<sup>12</sup> who evaluated the effect of dexmedetomidine added to ropivacaine for brachial plexus block and observed that the onset of motor blockade was shorter (19.80±1.90 min) in Group RD than in Group R (24.10±2.40).

**Marhofer et al**<sup>19</sup> observed statistically significant difference in onset of motor blockade with added dexmedetomidine to ropivacaine in ulnar nerve block.

Our study is also in accordance with **Sundaram et al**<sup>18</sup> **Bansal et al**<sup>9</sup>, **Prasad et al**<sup>13</sup>, **Sudani et al**<sup>14</sup>, **Chinappa et al**<sup>20</sup>, **Kathuria et al**<sup>15</sup>, **Chiruvella et al**<sup>16</sup>, **Goyal et al**<sup>17</sup>.

Our findings are at variance with that of **Das et al**<sup>21</sup>, **Saraf et al**<sup>22</sup> and **Zhang et al**<sup>23</sup> in which they showed no statistically significant difference in onset of motor block.

#### Duration of motor blockade:

In our study the duration of motor blockade (mean  $\pm$ SD) was 300.58  $\pm$  35.39 min in group R and 437.73  $\pm$  42.38 min in Group RD. (table-3)

Motor blockade duration is significantly prolonged in RD as compared to Group R.

**Sudani et al**<sup>14</sup> compared dexmedetomidine added to ropivacaine. They observed that dexmedetomidine added to ropivacaine agent enhanced the duration of motor block (509.667 $\pm$ 24.703min in Group R vs 760.667 $\pm$  28.062 min in Group RD). Our findings are well supported by this study.

Our study is also in accordance with **Patki et al**<sup>12</sup> **Marhofer et al**<sup>19</sup>, **Saraf et al**<sup>22</sup>, **Bansal et al**<sup>9</sup>, **Prasad et al**<sup>13</sup>, **Chinappa et al**<sup>20</sup>, **Das et al**<sup>21</sup>, **Kathuria et al**<sup>15</sup>, **Chiruvella et al**<sup>16</sup>, **Goyal et al**<sup>17</sup>.

Our findings are at variance with that of **Reddy et al**<sup>11</sup> **Sundaram et al**<sup>18</sup>, and **Zhang et al**<sup>23</sup> in which they showed no statistically significant difference in duration of motor block.

#### TIME OF RESCUE ANALGESIA

In our study the time of rescue analgesia was 398.93 $\pm$  95.89min in group R and 790.22 $\pm$  133.79 min in Group RD. The time of rescue analgesia as assessed by VAS score was prolonged in Group RD as compared to Groups R.

On comparison these changes were found to be statistically significant ( $p < 0.05$ )

**Bansal et al**<sup>9</sup> observed that adding dexmedetomidine (100 mcg) to ropivacaine significantly increased the duration of analgesia from 584.76 $\pm$ 158.04min to 968.00 $\pm$ 138.54 min.

Our study is also in accordance with **Patki et al**<sup>12</sup>, **Saraf et al**<sup>22</sup>, **Prasad et al**<sup>13</sup>, **Chinappa et al**<sup>20</sup>, **Das et al**<sup>21</sup>, **Kathuria et al**<sup>15</sup>, **Chiruvella et al**<sup>16</sup>, **Goyal et al**<sup>17</sup> and **Sundaram et al**<sup>18</sup>

#### CONCLUSION

Dexmedetomidine when added to ropivacaine fastens the onset of sensory and motor blockade, prolongs the duration of sensory and motor blockade and prolonged the time for rescue analgesia without any side effect.

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