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Original Article

Comparative Study of Ropivacaine with Dexmedetomidine versus Ropivacaine Alone in Supraclavicular Brachial Plexus Block for Upper Limb Surgery

Vinit Khemka, Priti D Jadeja

Department of Anaesthesia, Shri M.P Shah Medical College, Jamnagar, Gujarat, India

Abstract

Background and Aims: Supraclavicular plexus block, as a regional anesthesia has taken over as principal technique for upper limb surgeries. Ropivacaine is long acting local anesthetic drug considered to produce less neurotoxicity and cardiotoxicity. Dexmedetomidine has been reported as an effective adjuvant for regional anesthetic agents. The present study was conducted to compare and evaluate the effectiveness of ropivacaine with dexmedetomidine versus ropivacaine alone in supraclavicular brachial plexus block for upper limb surgeries.

Materials and Methods: Sixty patients aged between 19 and 50 years with ASA grade 1 or 2 posted for elective upper limb orthopedic surgeries were included in the study and were randomly divided into 2 groups with 30 patients in each group. Group R: 0.75% ropivacaine (30 cc) and Group RD: 0.75% ropivacaine (30 cc) + dexmedetomidine 1 μg/kg. Both groups were compared for complete onset time and total duration of sensory blockade, complete onset time and total duration of motor blockade and total duration of analgesia.

Result: The mean onset time for a complete sensory block in Group R was 20.1 ± 1.62 min, in Group R + D was 17.6 ± 1.25 min (P = 0.001) and the mean onset time for complete motor block in Group R was 24.5 ± 1.48 min, and in Group R + D was 22.5 ± 1.50 min (P = 0.00001) which was statistically significant. The mean duration of sensory block in Group R was 561.0 ± 33.87 min and in Group R + D was 790.3 ± 41.23 min and the mean duration of motor block in Group R was 508.0 ± 17.89 min, and in Group R + D was 680.7 ± 69.38 min which was statistically significant (P = 0.00001). The mean duration of analgesia in Group R was 298.33 ± 70.36 min and in Group R + D was 406.17 ± 73.15 min which was statistically significant (P = 0.00001).

Conclusion: Dexmedetomidine as an adjuvant to ropivacaine in the supraclavicular brachial block for upper limb surgery significantly shortens the onset time for sensory and motor block and prolongs the duration of sensory and motor blocks with longer duration of post-operative analgesia.

Key words: Analgesia, Dexmedetomidine, Ropivacaine, Supraclavicular brachial plexus block, Upper limb surgeries

INTRODUCTION

Regional anesthesia is an important part of the anesthesiologist's armamentarium. Regional anesthesia is particularly indicated for patients undergoing peripheral limb surgery because it provides effective intraoperative anesthesia and post-operative pain control. Brachial plexus block is a versatile and reliable regional anesthetic technique and a suitable alternative to general anesthesia for upper limb surgical procedures. Supraclavicular approach of brachial plexus block is the most commonly used approach and provides the most complete and reliable anesthesia for upper limb surgery. For brachial plexus block, a drug that has a fast onset, long duration and minimal toxicity could be an advantage. The quest for safer local anesthetics began toward the end of the 19th century. Ropivacaine is long acting local anesthetic drug belonging to amino amide group. They are pure S(−) enantiomer, unlike

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Corresponding Author: Dr. Vinit Khemka, Ward No. 14, Khetrimore, Neemkathana, Sikar, Rajasthan, India. E-mail: vinitkhemka@gmail.com

bupivacaine which is racemate. These S enantiomers are considered to produce less neurotoxicity and cardiotoxicity than racemic mixtures or the R-enantiomers of local anaesthetics.[1] Local anesthetics alone for supraclavicular brachial plexus block provide good operative conditions but have a shorter duration of post-operative analgesia. Hence, various drugs such as opioids,[2] clonidine,[3] dexamethasone,[4] midazolam,[5] and magnesium[6] were used as an adjuvant with local anesthetics in brachial plexus block. Recently, dexmedetomidine has been reported as an effective adjuvant for regional anesthetic agents to shorten the onset time of the block, prolong the duration of the block, and increase the quality of analgesia without neurologic sequelae. Mixing dexmedetomidine as an adjuvant with local anesthetics during peripheral nerve and nerve plexus blockade has recently been practiced by anesthesiologists.[7] The present study was undertaken to compare analgesia and effectiveness regarding onset and duration of complete motor and sensory block of 0.75% ropivacaine alone versus 0.75% ropivacaine with dexmedetomidine in patients undergoing supraclavicular brachial plexus block.

MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval and written informed consent from the close relatives of the patients, 60 patients aged between 19 and 50 years with ASA grade 1 or 2 posted for elective upper limb orthopedic surgeries were included in the study. The study patients were randomly divided into 2 groups with 30 patients in each group.

Group R: 0.75% ropivacaine (30 cc)

Group RD: 0.75% ropivacaine (30 cc) + dexmedetomidine 1 μg/kg.

Inclusion Criteria

Normal adult patients of either sex, without any comorbidity, admitted for elective upper limb orthopedic surgeries.

1. Patient age: 19-50 years
2. ASA grade: 1 or 2
3. Weight: 50-70 kg
4. Duration of surgery: 2 h.

Exclusion Criteria

1. Infection at site of block
2. H/O any previous reaction to the local anesthetic
3. Patients with injury to any of nerves of the upper limb
4. Patient with hemorrhagic disorder
5. Patient below 19 or above 50 years
6. Pregnancy
7. Patient with a neurological disorder
8. Patients with alcohol abuse
9. H/O underlying cardiovascular, psychiatric disease, renal, or hepatic disease.

Preanesthetic assessment was done on evening before surgery. A routine examination was done by assessing general condition, nutritional status, weight, airway assessment, complete examination of cardiovascular, respiratory system, site of block, and investigation in all patients. All patients were kept electively nil per oral 6-8 h before surgery, and before operation patients were explained about the procedure and a written informed consent taken. Intravenous line secured. Standard monitors such as electrocardiogram, pulse oximeter, blood pressure cuff were applied, and patient's baseline parameter such as pulse, blood pressure, respiratory rate, and SPO_2 was recorded. All patients were premedicated with (on operation table):

- Injection glycopyrrolate 0.2 mg iv
- Injection ondansetron 4 mg iv
- Injection midazolam 1 mg iv.

For performing brachial plexus blockade through supraclavicular approach, the patients were placed in the dorsal recumbent position with the head turned away from the site of brachial block, under all aseptic and antiseptic precautions midclavicular point, external jugular vein, and subclavian artery pulsation were identified. About 1 cm above the midclavicular point just lateral to subclavian artery pulsation, a 23×1½" G needle was introduced and directed caudal, downward, and medially toward the first rib until paraesthesia was noted along radial and ulnar distribution or motor response was elicited. Here, anesthetic solution is injected before every incremental dose negative aspiration for blood was performed to avoid any intravascular injection.

Immediately after block, patients were evaluated for the assessment of onset of sensory and motor blockade. Vitals were recorded before and after the procedure, at 5 min, and there after every 10 min till the end of the procedure and postoperatively at every 1 h till 7 h. If the block was considered to be adequate, surgeons were allowed to apply tourniquet and start the surgery. If the block was considered to be inadequate for surgery, the patient was given general anesthesia. Patients were monitored for nausea, vomiting, hypersensitivity reaction, any sign of cardiovascular or central nervous system toxicity, evidence of pneumothorax, hematoma, and post block neuropathy during the study.[8]

In post-operative period, when the patient complained of pain at the operative site, injection diclofenac sodium 1.5 mg/kg intravenously and the time for rescue analgesia noted (visual analog scale ≥4).

Definitions of Study Parameters

1. Onset of sensory complete block onset of sensory block was assessed by pin prick test, in areas innervated by radial, ulnar, and median nerve. Sensory block was graded as:
   Grade 0 - Normal sensation to pin prick
   Grade 1 - Dull response to pin prick (onset)
   Grade 2 - No response to pin prick (peak).
   Onset time of complete sensory block was defined as the time taken from the end of injection of study drug to the complete development of anesthesia in all three sensory nerve of the upper limb.
2. Onset of complete motor block onset of the complete motor block was the time from the end of injection of study drug to loss of motor power at the shoulders. Motor block at shoulder was assessed by asking the patient to hand raise above head with a movement of arm and forearm.
   Bromage scale for motor block:
   Grade 0 - Normal motor function (no effect)
   Grade 1 - Decrease motor strength compared to contra lateral limb
   Grade 2 - Complete motor block.
3. Duration of motor block: It is the time from the onset of motor block to complete recovery of motor block (able to hand raise above head with a movement of arm and forearm).
4. Duration of sensory block: It is the time from onset of sensory block to onset of pain at the surgical site with a pin prick.
5. Duration of analgesia: It is the time from onset of sensory blockade (grade 1) to pain at the surgical site. Tourniquet inflation and deflation time and duration of surgery were noted.

Both groups were compared for complete onset time and total duration of sensory blockade, complete onset time and total duration of motor blockade and total duration of analgesia. All the data were filled in pro forma and were statistically analyzed by Students' *t*-test and *P* value calculated by SPSS software and $P < 0.05$ was considered statistically significant.

RESULT

Table 1 summarizes demographic profile. There was no statistically significant difference between both groups of patients in terms of age, weight and male/female ratio ($P > 0.05$) (Table 1).

The mean onset time for a complete sensory block in Group R was 20.1 ± 1.62 min and in Group R + D was 17.6 ± 1.25 min the difference was statistically significant ($P < 0.05$, Table 2).

The mean onset time for a complete motor block in Group R was 24.5 ± 1.48 min and in Group R + D was 22.5 ± 1.50 min, the difference was statistically significant ($P < 0.05$, Table 3).

The mean duration of sensory block in Group R was 561.0 ± 33.87 min and in Group R + D was 790.3 ± 41.23 min, the difference was statistically significant ($P < 0.05$, Table 4).

The mean duration of motor block in Group R was 508.0 ± 17.89 min and in Group R + D was 680.7 ± 69.38 min, the difference was statistically significant ($P < 0.05$, Table 5).

Table 1: Mean demographic data in Group R and Group R+D

Variable	Study group		*t*-test	Significance
	Group R	Group R+D		
	Mean±SD	Mean±SD		
Age (years)	29.9±8.62	29.3±8.61	0.792	>0.05
Weight (kg)	64.07±4.88	63.8±4.81	0.834	>0.05
Gender (M/F)	26/4	27/3		
ASA grading (I/II)	4/26	3/27		

SD: Standard deviation

Table 2: Comparison of complete onset time of sensory block in patients of Group R and Group R+D

Variable	Study group		*t*-test	Significance
	Group R	Group R+D		
	Mean±SD	Mean±SD		
Onset of complete sensory block (in min)	20.1±1.62	17.6±1.25	0.001	<0.05

SD: Standard deviation

Table 3: Comparison of complete onset of motor block in patients of Group R and Group R + D

Variable	Study group		*t*-test	Significance
	Group R	Group R+D		
	Mean±SD	Mean±SD		
Onset of complete motor block (in min)	24.5±1.48	22.5±1.50	0.00001	<0.05

SD: Standard deviation

Table 4: Comparison of mean duration of sensory block in patients of Group R and Group R+D

Variable	Study group		*t*-test	Significance
	Group R	Group R+D		
	Mean±SD	Mean±SD		
Duration of sensory block (in min)	561.0±33.87	790.3±41.23	0.00001	<0.05

SD: Standard deviation

The mean duration of analgesia in Group R was 298.33 ± 70.36 min and in Group R + D was 406.17 ± 73.15 min, the difference was statistically highly significant ($P < 0.05$, Table 6).

Figure 1 shows the changes in mean pulse rate at a different time interval (pre-operative and intraoperative). After applying *t*-test, the difference was statistically significant most of the time ($P < 0.05$).

Figure 2 shows the changes in mean systolic blood pressure at a different time interval (pre-operative and intraoperative). After applying *t*-test, the difference was statistically significant ($P < 0.05$).

Figure 3 shows the changes in mean diastolic blood pressure at a different time interval (pre-operative and intraoperative). After applying paired *t*-test, the difference was statistically significant ($P < 0.05$).

DISCUSSION

Regional anesthesia is practiced in most developing countries. Regional nerve blocks are based on the concept that pain is conveyed by nerve fibers, which are amenable to interruption anywhere along their pathway. Supraclavicular blocks are performed at the level of the brachial plexus trunks. As with other fields, regional anesthesia has undergone major developments both in technique and drugs availability. Gradually ropivacaine was introduced into clinical practice. Local anesthetics alone for supraclavicular brachial plexus block provide good operative conditions but have a shorter duration of post-operative analgesia. Recently, dexmedetomidine has been reported as an effective adjuvant for regional anesthetic agents. On reviewing the literature, the present study was undertaken to compare analgesia and effectiveness regarding onset and duration of complete motor and a sensory block of 0.75% ropivacaine alone versus 0.75% ropivacaine with dexmedetomidine in patients undergoing supraclavicular brachial plexus block.

Table 5: Comparison of duration of motor block in patients of Group R and Group R+D

Variable	Study group		*t*-test	Significance
	Group R	Group R+D		
	Mean±SD	Mean±SD		
Duration of motor block (in min)	508.0±17.89	680.7±69.38	0.00001	<0.05

SD: Standard deviation

Table 6: Comparison of duration of analgesia of patients in Group R and Group R+D

Variable	Study group		*t*-test	Significance
	Group R	Group R+D		
	Mean±SD	Mean±SD		
Duration of rescue analgesia given (min)	298.33±70.36	406.17±73.15	0.00001	<0.05

SD: Standard deviation

Onset of Complete Sensory Block

In our study, the mean onset time for a complete sensory block in Group R was 20.1 ± 1.62 min and in Group R + D was 17.6 ± 1.25 min ($P < 0.05$).

These results are comparable to other studies:

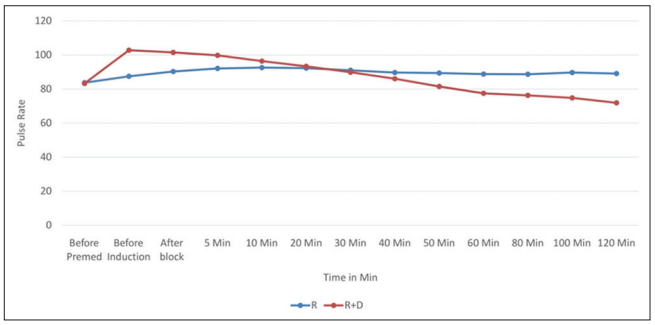

Figure 1: Comparison of perioperative mean pulse rate between the two groups

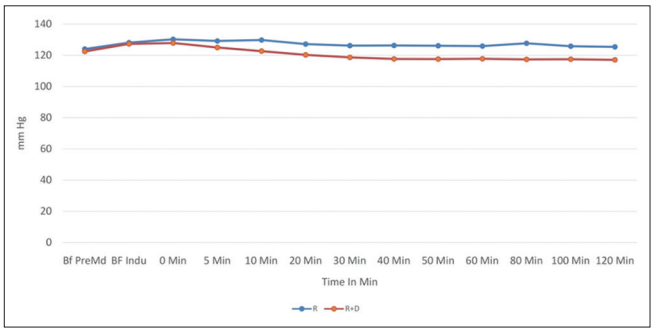

Figure 2: Comparison of perioperative mean systolic blood pressure between the two groups

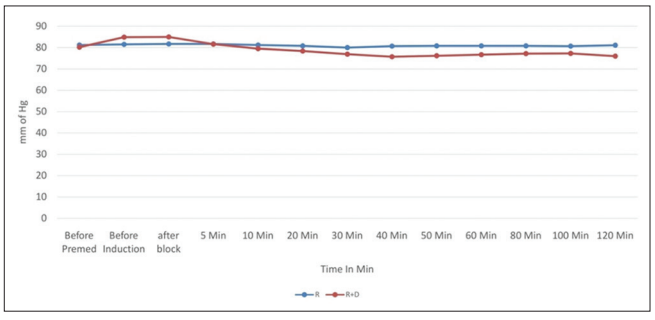

Figure 3: Comparison of perioperative mean diastolic blood pressure between the two groups.

Sudani *et al.*[9] in their prospective, randomized and double-blinded study included total 60 patients of either sex with age between 18 and 60 years posted for various elective upper limb surgery and randomly allocated into two equal groups of 30 each. Control Group R received injection ropivacaine (0.75%) 30 ml plus 1 ml normal saline and Group RD received injection ropivacaine (0.75%) 30 ml plus dexmedetomidine 25 μg (1 ml) for supraclavicular brachial plexus block. The onset of sensory blockade was faster in Group RD than Group R. Onset of sensory block in Group R was14.133 ± 1.676 min and in Group RD was 12.667 ± 1.213 min ($P < 0.001$).

Gurajala *et al.*[10] assessed the influence of dexmedetomidine added to 0.5% ropivacaine on the characteristics of supraclavicular brachial plexus block Patients were randomly allocated using a computer generated randomization sequence to receive either 35 mL of ropivacaine 0.5% with 0.5 mL of isotonic sodium chloride solution (Group R, n =18) or 35 mL of ropivacaine 0.5% with 0.5 ml (50 μg) of dexmedetomidine (Group RD, n = 18). The onset of sensory blockade was faster in the RD group. However, there was no statistical significance ($P = 0.133$). The median onset time of a sensory block in Group R was 36 (20-45) min and 24 (15-30) min in Group RD.

Kwon Y, Hwang S, Lee J J *et al.*[11] studied sixty patients (ASA status 1 or 2, aged 20–65 years) undergoingwrist and hand surgery under supraclavicular Brachial plexus block were randomly allocated to two groups. Ultrasound-guided supraclavicular Brachial plexus block was performed with 40 ml of Ropivacaine 0.5% and 1 μg/kg of DEX (Group RD) or 0.01 ml/kg of normal saline (Group R).The median onset time of sensory block in Group RD was shorter(8.3±4.4) than in Group R (13.0±5.6)

Onset of Complete Motor Block

The data from our study reveals the mean time for onset of the complete motor blockade in Group R was 24.5 ± 1.48 min and in Group R + D was 22.5 ± 1.50 min ($P < 0.05$).

Sudani *et al.*[9] their prospective, randomized and double-blinded study included total 60 patients of either sex with age between 18 and 60 years posted for various elective upper limb surgery and randomly allocated into two equal groups of 30 each. Control Group R received injection ropivacaine (0.75%) 30 ml plus 1 ml normal saline and Group RD received injection ropivacaine (0.75%) 30 ml plus dexmedetomidine 25 μg (1 ml) for supraclavicular brachial plexus block. The onset of motor blockade was faster in Group RD than Group R. Onset of motor block in Group R was 25.967 ± 2.748 min and in Group RD was 23.333 ± 3.467 min ($P < 0.05$).

Das *et al.*[12] studied a total of 84 patients (20-50 years) posted for elective forearm and hand surgery under supraclavicular brachial plexus block was divided into two equal groups (Group R and RD) in a randomized, double-blind fashion. In Group RD (n = 42) 30 ml 0.5% ropivacaine +1 ml (100 μg) of dexmedetomidine and Group R (n = 42) 30 ml 0.5% ropivacaine +1 ml normal saline were administered in supraclavicular block Although with similar demographic profile they recruited 42 subjects per group, more than the calculated sample size. There were no dropouts. However, excluding subjects who failed blocks, 40 patients in the dexmedetomidine Group (RD) and 40 in the normal saline Group (R) were eligible for effective analysis. The difference in the number of valid blocks in the two groups was not statistically significant. In both groups, motor block in Group RD (P = 0.40) was earlier than Group R. Time taken to achieve motor blockade was 19.96 ± 1.28 min in Group RD while it was 20.26 ± 1.28 min in Group R.

Duration of Sensory Block

The data from our study reveals that duration of sensory blockade in Group R was 561.0 ± 33.87 min and in Group R + D was 790.3 ± 41.23 min ($P < 0.05$).

These results are comparable to other studies:

Nema *et al.*[13] conducted study which was a single center, prospective, randomized, double-blinded trial, in 60 patients undergoing various elective forearm surgeries under brachial plexus block through supraclavicular approach. The patients were of ASA grade 1 and 2, of either sex, between 18 and 50 years of age were randomly divided into two equal groups of 30 patients. Group A (n = 30) received brachial plexus block with 30 ml ropivacaine (0.75%.) and Group B (n = 30) received brachial plexus block with 29 ml ropivacaine (0.75%) + 1 ml dexmedetomidine (50 μg) the average duration of sensory blockade was 310.37±66.359 min in Group A and 435.87 ± 102.309 min in Group B, respectively ($P < 0.05$).

Zhang *et al.*[14] found similar results in their study of axillary brachial plexus block in 45 ASA I or II patients, aged 25-60 years who were scheduled for elective forearm and hand surgery. They randomly divided patients into three equal groups of Group DR1, 40 ml of 0.33% ropivacaine + 1 ml dexmedetomidine (50 μg), Group DR2, 40 ml of 0.33% ropivacaine + 1 ml dexmedetomidine (100 μg), and Group R 40 ml of 0.33% ropivacaine + 1 ml saline. The duration of sensory block was 689 ± 269 min, 804 ± 340 min, 1190 ± 456 min, respectively, in Group R, DR1, and DR2. In this study, the duration of sensory block was longer and statistically significant ($P < 0.05$) in Group DR2 when compared to Group R and DR1.

Duration of Motor Block

The data from our study, reveals that duration of motor blockade was longer in case of Group R + D (680.7 ± 69.38) compared to Group R (508.0 ± 17.89) ($P < 0.001$).

Bangera *et al.*[15] studied a total of 80 patients belonging to ASA status I, II, and III, scheduled for elective forearm and/or hand surgeries were randomly allocated into one of the two groups to receive either 39 ml of 0.375% ropivacaine and 1 ml normal saline (Group R) or 39 ml of 0.375% ropivacaine and 1 μg/kg dexmedetomidine diluted to 1 ml with normal saline (Group RD), according to the group allocated by computer-generated random table. Duration of motor block in Group RD was 712.88 ± 89.32 min and in Group R was 526.25 ± 70.229 min and was clinically significant ($P < 0.0001$).

Duration of Analgesia

The data from our study reveals that mean duration of analgesia in Group R was 298.33 ± 70.36 min and in Group R + D was 406.17 ± 73.15 min ($P < 0.05$).

These results are comparable to other studies:

Gurajala *et al.*[10] assessed the influence of dexmedetomidine added to 0.5% ropivacaine on the characteristics of supraclavicular brachial plexus block patients were randomly allocated using a computer-generated randomization sequence to receive either 35 mL of ropivacaine 0.5% with 0.5 mL of isotonic sodium chloride solution (Group R, $n = 18$), or 35 mL of ropivacaine 0.5% with 0.5 ml (50 μg) of dexmedetomidine (Group RD, $n = 18$). The mean duration of analgesia in Group R was 480 (420-570) min while in Group R + D it was 960 (820-1190) min ($P < 0.05$).

Bangera *et al.*[15] studied a total of 80 patients belonging to ASA status I, II, and III, scheduled for elective forearm and/or hand surgeries were randomly allocated into one of the two groups to receive either 39 ml of 0.375% ropivacaine and 1 ml normal saline (Group R) or 39 ml of 0.375% ropivacaine and 1 μg/kg dexmedetomidine diluted to 1 ml with normal saline (Group RD), according to the group allocated by computer-generated random table. Duration of analgesia in Group RD was 764.38 ± 110.275 min and that in Group R was 576.88 ± 76.306 min and was clinically significant ($P < 0.0001$).

Hemodynamic Changes

In our study, blood pressure, heart rate, respiratory rate, and SPO_2 remained stable throughout the procedure and postoperatively as they did not differ clinically significant during the study period, but statistically, significant difference was observed in both groups, in heart rate and systolic blood pressure ($P < 0.05$).

Complications and Side Effects

There was no incidence of headache, nausea, vomiting, hypotension, bradycardia, chest pain, coughing, convulsion and respiratory depression, and procedure related complication. There was no CNS and CVS toxicity seen in either group in our study.

CONCLUSION

Dexmedetomidine as an adjuvant to ropivacaine in the supraclavicular brachial block for upper limb surgery significantly shortens the onset time for sensory and motor block and prolongs the duration of sensory and motor blocks with longer duration of post-operative analgesia, causes a decrease in need for rescue analgesia in patients with no side effects.

REFERENCES

1. McClellan KJ, Faulds D. Ropivacaine: An update of its use in regional anaesthesia. Drugs 2000;60:1065-93.
2. Bazin JE, Massoni C, Groslier D, Fenies V, Bittar M, Schoeffler P. Brachial plexus block: Effect of the addition of sufentanil to local anesthetic mixture on postoperative analgesia duration. Ann Fr Anesth Reanim 1997; 16:9-13.
3. Kohli S, Kaur M, Sahoo S, Vajifdar H, Kohli P. Brachial plexus block: Comparison of two different doses of clonidine added to bupivacaine. J Anaesthesiol Clin Pharmacol 2013;29:491-5.
4. Yadav RK, Sah BP, Kumar P, Singh SN. Effectiveness of addition of neostigmine or dexamethasone to local anaesthetic in providing perioperative analgesia for brachial plexus block: A prospective, randomized, double blinded, controlled study. Kathmandu Univ Med J 2008;6:302-9.
5. Jarbo K, Batra YK, Panda NB. Brachial plexus block with midazolam and bupivacaine improves analgesia. Can J Anaesth 2005;52:822-6.
6. Dogru K, Yildirim D, Ulgey A, Aksu R, Bicer C, Boyaci A. Adding magnesium to levobupivacaine for axillary brachial plexus block in arteriovenous fistule surgery. Bratisl Lek Listy 2012;113:607-9.
7. Swami SS, Keniya VM, Ladi SD, Rao R. Comparison of dexmedetomidine and clonidine (a2 agonist drugs) as an adjuvant to local anesthesia in supraclavicular brachial plexus block: A randomised double-blind prospective study. Indian J Anaesth 2012;56:243-9.
8. Morgan GE Jr, Mikhail MS, Murray MJ. Clinical Anesthesiology. 4th ed. Philadelphia, PA: Elsevier; 2006.
9. Sudani C, Rao SM, Munta K. A comparative study of ropivacaine alone versus ropivacaine with dexmedetomidine in supraclavicular brachial plexus block. Anesthesiol Open J 2016;1:28-34.
10. Gurajala I, Thipparampall KA, Padmaja D, Gopinath R. Effect of perineural dexmedetomidine on the quality of supraclavicular brachial plexus block with 0.5% ropivacaine and its interaction with general anaesthesia. Indian J Anaesth 2015;59:89-95.
11. Kwon Y, Hwang SM, Lee JJ, Kim JH. The effect of dexmedetomidine as an adjuvant to ropivacaine on the bispectral index for supraclavicular brachial plexus block. Korean J Anesthesiol 2015;68:32-6.
12. Das A, Majumdar S, Halder S, Chattopadhyay S, Pal S, Kundu R, *et al.* Effect of dexmedetomidine as adjuvant in ropivacaine-induced supraclavicular brachial plexus block: A prospective, double-blinded and randomized controlled study. Saudi J Anaesth 2014;8 Suppl 1:S72-7.
13. Nema N, Badgaiyan H, Raskaran S, Kujur S, Vaskle P, Mujalde M, *et al.* Effect of addition of dexmedetomidine to ropivacaine hydrochloride (0.75%) in brachial plexus block through supraclavicular route in upper limb surgeries: A clinical comparative study. J Evol Med Dent Sci 2014;55:12612-21.
14. Zhang Y, Wang CS, Shi JH, Sun B, Liu SJ, Li P, *et al.* Perineural

administration of dexmedetomidine in combination with ropivacaine prolongs axillary brachial plexus block. Int J Clin Exp Med 2014;7:680-5.
15. Bangera A, Manasa M, Krishna P. Comparison of effects of ropivacaine with and without dexmedetomidine in axillary brachial plexus block: A prospective randomized double-blinded clinical trial. Saudi J Anaesth 2016;10:38-44.

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