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Dr. Munender Mamidi
Associate Professor, Department of Anaesthesiology, S.V.S. Medical College, Mahabubnagar, Telangana, India

Dr. D Shiva Prasad
Professor, Department of Anaesthesiology, Mamatha Academy of Medical Sciences, Bachupally, Hyderabad, Telangana, India

Corresponding Author:
Dr. D Shiva Prasad
Professor, Department of Anaesthesiology, Mamatha Academy of Medical Sciences, Bachupally, Hyderabad, Telangana, India

Evaluation of analgesic properties of verapamil as an adjuvant with 0.25% bupivacaine in USG guided supraclavicular brachial plexus block

Dr. Munender Mamidi and Dr. D Shiva Prasad

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Abstract
Background: Peripheral nerve blocks are extensively preferred in perioperative pain management. Adding calcium blockers to local anesthetics agents can prolong the duration of analgesia. Verapamil, a calcium channel blocker is used extensively as an adjunct to lignocaine or bupivacaine for brachial plexus block due to its prolonged duration of action. This study was designed to evaluate whether additional anaesthetic and analgesic effect could be derived from administration of verapamil to 0.25% bupivacaine in supraclavicular brachial plexus block.
Material and Methods: A total of 76 cases underdoing upper limb surgeries between age group 21 to 65 years belong to ASA grade I and II were recruited. Cases were randomly divided into 2 groups i.e. group 1 with USG guided brachial plexus block using 30ml of 0.25% bupivacaine with 2ml of normal saline and group 2 with 30 ml of 0.25% bupivacaine with 5mg of verapamil diluted to 2ml. Parameters like pulse rate, blood pressure, Spo2 were recorded before and after the block.
Results: The mean difference of onset and duration of sensory and motor blockade between two study groups was statistically significant ($P<0.005$). The mean difference of duration of rescue analgesia was statistically significant between two study groups ($P<0.003$). The mean pulse rate, systolic blood pressure, diastolic blood pressure and oxygen saturation levels was comparable between two study groups and mean difference was statistically not significant ($p>0.005$).
Conclusion: Verapamil as an adjunct to 0.25% bupivacaine in supraclavicular brachial plexus block acts efficiently in maintaining prolonged duration of analgesia.

Keywords: Supraclavicular brachial plexus block, verapamil, 0.25% bupivacaine, duration of analgesia

Introduction
Peripheral nerve blocks are attaining extensive reputation in perioperative pain management globally. Local anaesthetic agent provides analgesia not more than 4-8 hours [1]. Drugs belonging to calcium blockers, opioids, ketamine, adrenaline, alpha2 adrenergic agonist are used as adjuvants to increase analgesic ability and decrease the incidence of side effects [2]. Supraclavicular brachial plexus block is carried out at the division level, which had rapid onset and deep level of block. In recent time, supraclavicular block has gained extensive fame with addition of adjuncts to local anaesthetic solution to increase its efficacy and duration [2, 3]. Verapamil is a drug of calcium channel blocker that is used as adjuvant to local anaesthetic agents in peripheral nerve block. It is commonly used as adjuvant to lignocaine or bupivacaine for brachial plexus block due to its prolonged duration of action. Verapamil is an efficient drug to maintain longer duration of sensory block. Studies suggested that Verapamil is an efficient adjuvant to levobupivacaine in supraclavicular brachial plexus block [4, 5]. The present study was designed to evaluate whether additional anaesthetic and analgesic effect could be derived from administration of verapamil to 0.25% bupivacaine in supraclavicular brachial plexus block.

Materials and Methods
The present prospective randomized double blind study was conducted in the department of Anaesthesiology at SVS medical College, Mahabubnagar, Telangana from September 2019 to October 2020. A total of 76 cases underdoing upper limb surgeries between age group 21 to 65 years were recruited. Cases of ASA grade I and II, cases of both sexes undergoing upper limb surgeries of 21-65 years and cases willing to participate were included.

Cases of ASA grade III&IV, systemic disorders, allergic to the study drugs; diabetes, circulatory instability and not willing to participate were excluded. The written informed consent was obtained from all the study participants and study protocol was approved by institutional ethics committee. Study participants were randomly divided in to two groups i.e. group 1 administered with ultrasound guided supraclavicular brachial plexus block using 30ml of 0.25% bupivacaine with 2ml of normal saline and group 2 administered with ultrasound guided supraclavicular brachial plexus block using 30 ml of 0.25% bupivacaine with 5mg of verapamil diluted to 2ml. Parameters like pulse rate, blood pressure, Spo2 were recorded before and after the block. Instructed patient to lie in supine or semilateral position with head turned away from side to be blocked. Transducer was oriented transversely at midpoint immediately superior or parallel to the clavicle. By 25 gauge needle, 1-2 ml of local anaesthetic was injected into the skin. The block needle was then inserted in plane towards the brachial plexus in lateral to medial direction. After a careful aspiration, 1 to 2 mL of local anaesthetic is injected to document the proper needle placement. an additional advancement of the needle 1 to 2 mm deeper may be required to accomplish adequate spread of the local anaesthetic. After procedure, patients were pinpricked at every minute to assess sensory blockade. Sensory blockade was assessed by Hollmen scale. Modified Lovett rating scale was used to assess the motor blockade. Pain was evaluated by visual analogue scale and it was monitored postoperatively for every 2 hours. The level of sedation was evaluated by Ramsay sedation score. Descriptive statistics were used to analyse demographic data. Chi-square test and unpaired student 't' test was used to compare the group. Statistical analysis was conducted by using SPSS statistical software version 23.0.

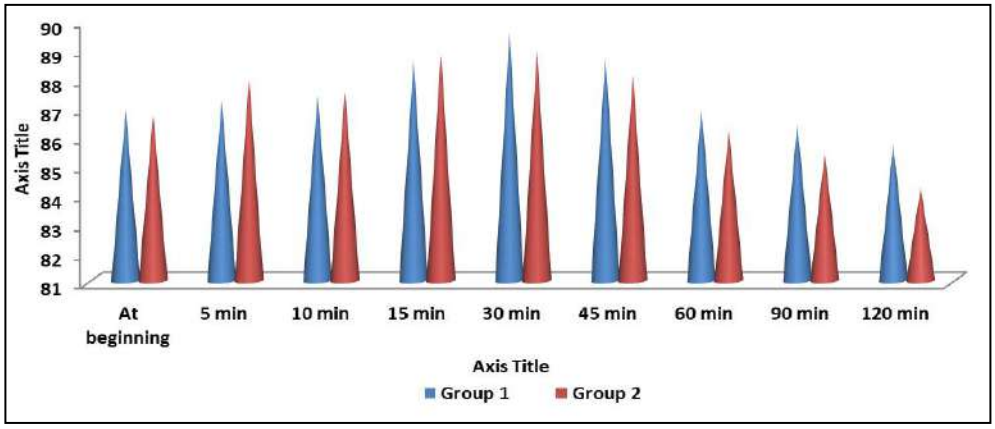
Results

Table 1: Demographic details of the study groups (n=76).

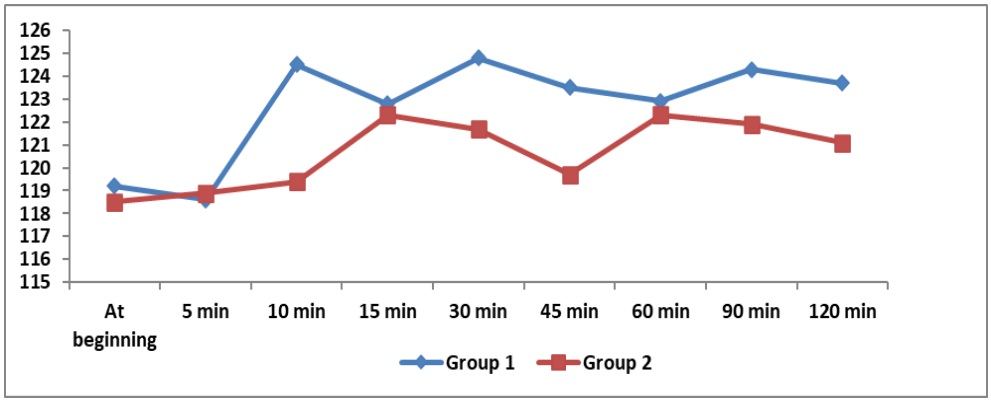
Parameters	Group 1	Group 2	p-value
	Mean ± SD	Mean ± SD	
Age	47.32 ± 8.86	47.28 ± 9.54	0.424
Gender			
Male	20 (52.63%)	22 (57.89%)	-
Female	18 (47.36%)	16 (42.1%)	
Weight	62.4 ± 7.35	63.21 ± 7.48	0.286
ASA Distribution			
Grade-I	17 (44.73%)	20 (52.63%)	-
Grade-II	21 (57.89%)	18 (47.36%)	
Duration of surgery	101.6 ± 10.81	99.24 ± 11.32	0.619

Table 2: Details of sensory and motor blockade in study groups

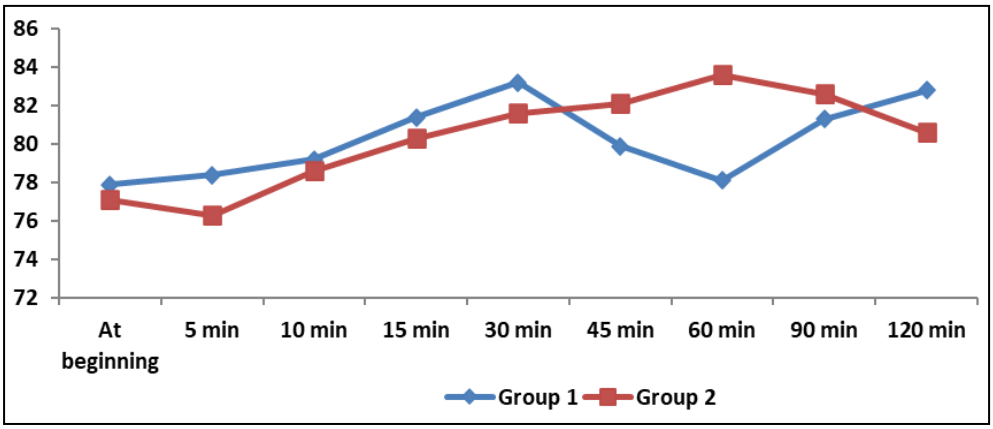
Parameters	Group 1	Group 2	p-value
	Mean ± SD	Mean ± SD	
Sensory blockade			
Onset	11.69 ± 2.06	9.88 ± 1.82	0.002
Duration	318.1 ± 16.4	386.4 ± 18.6	0.002
Motor blockade			
Onset	14.76 ± 1.65	12.18 ± 1.30	0.003
Duration	297.2 ± 20.12	331.3 ± 20.65	0.002
Details of rescue analgesia			
Duration	379.3 ± 21.58	436.5 ± 27.3	0.003
No of additional doses			
< 1 dose	7 (18.4%)	24 (63.1%)	-
2-3	10 (26.3%)	8 (21.01%)	
> 3 doses	18 (47.3%)	6 (15.8)	



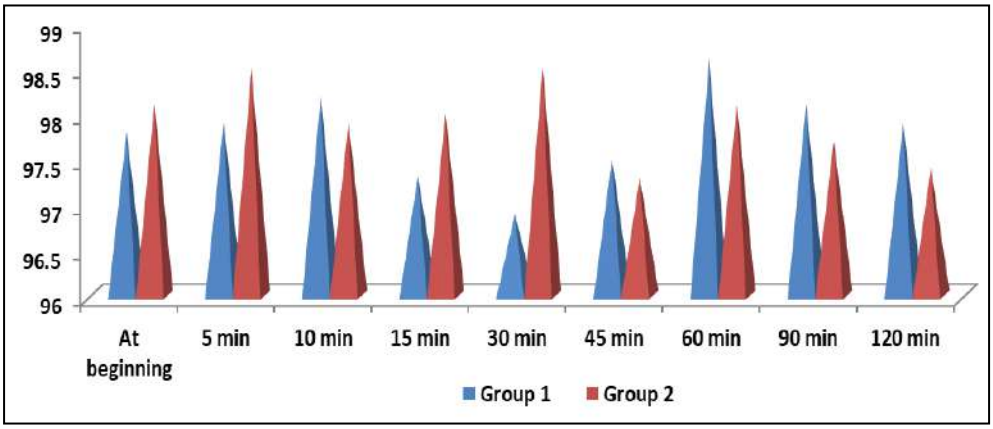
Graph 1: Mean pulse rate between the study groups.



Graph 2: Mean systolic blood pressure between the study groups.



Graph 3: Mean diastolic blood pressure between the study groups.



Graph 4: Mean oxygen saturation levels between study groups.

Table 3: Post-operative VAS score between two groups

Time	Group 1	Group 2	p-value
	Mean ± SD	Mean ± SD	
At 60min	3.4 ± 1.8	3.7 ± 0.8	<0.005
At 120 min	3.6 ± 1.7	3.9 ± 0.10	<0.005
At 240 min	4.7 ± 1.8	4.2 ± 1.2	0.892
At 360 min	5.1 ± 1.5	4.5 ± 1.7	0.658
At 480 min	5.6 ± 1.7	4.8 ± 0.9	0.412
At 600 min	5.9 ± 1.2	5.1 ± 1.2	0.856

Discussion

Calcium channel blockers potentiate the effects of local anesthetics. There is extensive usage of adjuvant drugs with local anesthetics in order to decrease the duration of onset and prolong the duration and quality of regional blocks. The present study was designed to evaluate verapamil as an adjuvant to local anesthesia in USG guided supraclavicular brachial plexus block for upper limb surgery. The Study participants were randomly divided into two groups. The mean age in group 1 was 47.32 years and in group 2 was 47.28 years. The mean difference of age and weight between two groups was statistically not significant (p=0.424). Male participants were more in both the study groups. The mean duration of surgery in group 1 was 101.6 min and in group 2 was 99.24 min. The mean difference between two study groups was statistically not significant (p=0.619). A study by Sidharth SR *et al*. noticed that the mean difference of age, weight and duration of surgery was statistically not significant between the study groups [6].

The onset of sensory blockade in group 1 was 11.69 min and in group 2 was 9.88min. The duration of sensory blockade in group 1 was 318.1 min and in group 2 was 386.4 min. The mean difference of onset and duration of sensory blockade between two study groups was statistically significant (P<0.002). The onset of motor blockade in group 1 was 14.76 min and in group 2 was 12.18 min. The duration of motor blockade in group 1 was 297.2 min and in group 2 was 331.3 min. The mean difference of onset and duration of motor blockade between two study groups was statistically significant (P<0.005). A study by Sidharth SR *et al*. noticed that the onset and duration of sensory blockade and motor blockade was statistically highly significant between study groups (P<0.001) [6]. A study by Salah M, Jonbu S found significant longer duration of action in study group receiving 10 ml of 2% lignocaine and 20 ml of .5% bupivacaine with 1ml inj. verapamil [7]. The duration of sensory blockade was statistically significant, whereas onset of sensory blockade and duration of motor blockade were statistically not significant [7]. Lalla RK *et al*. stated that onset and duration of sensory blockade was higher in group administered with 40ml 1% lignocaine and 0.25% bupivacaine and 2.5mg verapamil as adjuvant (Group B) than lignocaine and bupivacaine alone (Group A). Duration of motor blockade was higher in group B than group A (8).

The duration of rescue analgesia is 379.3min in group 1 and 436.5min in group 2. The mean difference was statistically significant between two study groups (P<0.003). In group 1, 18.4%, 26.3% and 47.3% cases required less than 1 dose, 2-3 doses and more than 3 doses respectively. In group 2, majority cases need less than 1 dose (Table 2). A study by Sidharth SR *et al*. found that the mean difference of rescue analgesia between both the study groups was statistically

highly significant (P<0.001) [6]. Lalla RK *et al*. stated that the prolonged analgesic duration in 40ml 1% lignocaine and 0.25% bupivacaine and 2.5mg verapamil as adjuvant (Group B) that lignocaine and bupivacaine alone (Group A) [8].

The mean pulse rate, systolic blood pressure, diastolic blood pressure and oxygen saturation levels was comparable between two study groups and mean difference was statistically not significant (p>0.005). A study by Sidharth SR *et al*. found that the values of heart rate, SBP and DBP were comparable in both study groups, which was statistically not significant (6). A study by Salah M, Jonbu S did not found significant difference in between the groups regarding SBP, DBP, pulse rate and mean blood pressure [7]. The mean visual analogue score at 60 min and 120 min was statistically significant (P<0.005). Mosaffa F *et al*. stated that cases administered with verapamil showed variation in blood pressure and heart rate not more than 20% [3].

Mosafffa *et al*. concluded that verapamil with bupivacaine decreased the onset duration of sensory and motor block and increased that duration of analgesia [4]. A study by Sidharth SR *et al*. concluded that verapamil as adjuvant to levobupivacaine in supraclavicular block reduced the onset of sensory and motor block and increased the duration of sensory and motor block [6]. A study by Salah M, Jonbu S stated that addition of verapamil to lignocaine bupivacaine solution for brachial plexus block can increasing duration of sensory block [7]. Lalla RK *et al*. concluded that verapamil as an adjunct to brachial plexus block can prolong sensory anaesthesia without any effect on analgesic duration [8]. Choe *et al*. stated that verapamil as adjuvant to bupivacaine resulted less postoperative pain and less analgesic requirement [9]. Reuben and Reuben stated that verapamil as adjuvant to brachial plexus block had no effect on duration of analgesia [10]. Studies by by Hasegawa and Zacny Miranda *et al*. and Carta *et al*. suggested that calcium channel blockers combined with local anesthetics could increase analgesic effects [11, 12]. Deepa Allolli *et al*. concluded that adding verapamil to brachial plexus block can prolong sensory block. However, there was no change in analgesic property and hemodynamic changes [13].

Conclusion

The onset of sensory and motor block was less in verapamil group than bupivacaine alone. The duration of sensory block and motor block was more in verapamil group. The duration of analgesia was more in verapamil group and majority cases were not required additional dose of rescue analgesia. There was no significant change in pulse rate, DBP, SBP and oxygen saturation among two study groups. The results of this study concluded that verapamil as an adjunct to 0.25% bupivacaine in supraclavicular brachial plexus block acts efficiently in maintaining prolonged duration of sensory block and motor block with less hemodynamic side effects and early onset of sensory and motor block.

References

1. Neal JM, Gerancher JC, Hebl JR, Ilfeld BM, McCartney CJ, Franco CD, *et al*. Upper extremity regional anesthesia: essentials of our current understanding, 2008.Regional anesthesia and pain medicine 2009;34(2):134.
2. Ali MA, Rahman ML, Hassan M, Rahman R, Asfia KM. Eect of Verapamil Adjuvant with Local Anaesthetic Mixtures in Supraclavicular Brachial Plexus Block. Bangladesh Med J 2017;46(2):43-47.
3. Mosaffa F, Salimi A, Lahiji F, Kazemi M, Mirkheshti A. Evaluation of the analgesic effect of 2 dosesof verapamil with bupivacaine compared with bupivacaine alone in supraclavicular brachial plexus block.Med J Islam Repub Iran 2007;21:87-90.
4. Routray SS, Mishra D, Routray D, Nanda K. Effect of verapamil as an adjuvant to levobupivacaine insupraclavicular brachial plexus block. Anesth Essays Res 2017;11:656-60.
5. Krishna Prasad GV, Khanna S, Jaishree SV. Review of adjuvants to local anesthetics in peripheral nerve blocks: Current and future trends. Saudi J Anaesth 2020;14:77-84.
6. Sidharth Sraban Routray, Debasis Mishra, Daityari Routray, and Kasturi Nanda. Effect of Verapamil as an Adjuvant to Levobupivacaine in Supra-clavicular Brachial Plexus Block. Anesth Essays Res. 2017;11(3):656-660.
7. Salah M, Jonbu S. Investigation of Verpamil Effect as Adjuvant Anaesthetic Drug, Medbiotech J 2017;1(1):39-44.
8. Lalla RK, Anant S, Nanda HS. Verapamil as an adjunct to local anaesthetic for brachial plexus blocks. Medical Journal Armed Forces India 2010;66(1):22-24.
9. Choe H, Kim JS, Ko SH, Kim DC, Han YJ, Song HS, *et al*. Epidural verapamil reduces analgesicconsumption after lower abdominal surgery. Anesth Analg 1998;86:786-90.
10. Reuben SS, Reuben JP. Brachial plexus anesthesia with verapamil and/or morphine. Anesth Analg 2000;91:379-83.
11. Miranda HF, Bustamante D, Kramer V, Pelissier T, Saavedra H, Paeile C, *et al*. Antinociceptive effectsof Ca2+channel blockers. Eur J Pharmacol 1992;217:137-41.
12. Carta F, Bianchi M, Argenton S, Cervi D, Marolla G, Tamburini M, *et al*. Effect of nifedipine onmorphine-induced analgesia. Anesth Analg. 1990;70:493-8.
13. Deepa Allolli, Mahishale GS, Rajendra Kumar B, *et al*. Verapamil as an Adjunct to Local Anesthetic Solution for Supraclavicular Brachial Plexus Block. Indian J Anesth Analg 2019;6(6 Part -I):1925-1929.