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Case Series

Analgesic Efficacy of Ultrasound Guided Supraclavicular Brachial Plexus Block with Levobupivacaine and Dexmedetomidine for Forearm and Hand Surgeries – A Case Series

Dr. Vineet Reddy G[1], Dr. Krishnapriya K[2], Dr. Manasa Vijay[3], Dr. Girija Kumari B[4*]
[1,2,3,4*]Assistant professor, Dept. of Anaesthesiology, BIRRD(T) Hospital, Tirupati, India.
Corresponding author: Dr. Girija kumari B.
Email: vinimbbs@gmail.com
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ABSTRACT
Periphery nerve blockade is the most common technique used for upper limb surgeries. Newer local anesthetics like levobupivacaine and ropivacaine are gaining popularity as they cause less hemodynamic changes. So, we conducted this case series to know the efficacy of ultrasound guided supraclavicular brachial plexus block with 20ml 0.5% levobupivacaine along with 20µg dexmedetomidine. After obtaining institutional ethics committee approval and written informed consent, we included 15 patients, belonging to ASA PS 1,2, posted for elective forearm and hand surgeries. After getting shifted to ot, 18G intravenous cannula was secured, monitors – ECG, saturation probe, non- invasive blood pressure were connected. Then ultrasound guided supraclavicular block was given using 20ml of 0.5% levobupivacaine with 20µg dexmedetomidine. Motor and sensory block was assessed 30 minutes after giving the block. General anesthesia was given if the block was failed. Hemodynamic parameters were noted every 5min for the first 30min, then every 10 minutes till the end of the procedure. After shifting to postoperative icu, analgesia was assessed using VAS score at 0,6,12,24 hrs. Tramadol 1mg/kg intravenous was given when the score was more than 5. Duration of analgesia was defined as the time between the block and the request for first analgesic in the postoperative period. We observed that the mean duration of analgesia was 938.67 ± 147.9 (mean ± SD). We concluded that ultrasound guided supraclavicular block using 0.5% levobupivacaine with 20 µg dexmedetomidine provides prolonged and effective analgesia without any haemodynamic changes.

Keywords: Supraclavicular, Ultrasound, Levobupivacaine, Dexmedetomidine.

INTRODUCTION

Brachial plexus blockade is considered as one of the most widely and successfully used anesthetic technique for upper limb surgeries [1]. It is also cost effective and can provide effective postoperative analgesia, thereby reducing the hospital stay, increased patient satisfaction and also reduces the hospital expenses. Use of ultrasound helps to visualize the anatomical structures clearly, helps to deposit the local anesthetic precisely at the required site [2], [3]. It helps in reducing the volume of local anesthetic to be injected and also inadvertent intraneural drug injection. Among the different approaches of brachial plexus blockade, supraclavicular technique is the most commonly used for forearm and hand surgeries [4], [5].

Various local anesthetics like bupivacaine, ropivacaine, levobupivacaine have been used in different concentrations for the brachial plexus blockade. In the last few years, levobupivacaine has been gaining popularity because of its less cardio toxicity. So, we conducted this case series to assess the efficacy of ultrasound guided supraclavicular blockade with 20ml of 0.5% levobupivacaine with 20µg of dexmedetomidine. Our primary aim was to assess the duration, which was defined as time between the block and the time of first analgesic request in the first 24hrs of postoperative periods.

MATERIALS AND METHODS

After obtaining institutional ethics committee approval, we included 15 patients, belonging to American Society of Anaesthesiologists Physical status [1], [2], posted for elective forearm and hand surgeries in our hospital. Patients with mental illness, coagulopathy, chronic obstructive pulmonary diseases, myopathy and neuropathy were excluded from the study. Failed block defined as able to touch the pulp of the little finger with thumb (Bromage scale 0) was also excluded from the study. Written informed consent was

obtained from all the patients. After shifting to the operation theatre, 18G intravenous cannula was secured, connected to monitors – 5 electrode Electrocardiogram, non-invasive blood pressure and saturation probe. Then the patient in supine, head tilted to other side, supraclavicular fossa was cleaned with betadine, under sterile aseptic precautions, patients received ultrasound (using high frequency linear probe) guided supraclavicular block with 20ml 0.5% levobupivacaine with 20µg dexmedetomidine, after intermittent negative aspiration for blood. Haemodynamic parameters were monitored every 5minutes for the first 30 minutes and every15 min till the end of procedure. After the procedure was over, patient was shifted to postoperative ICU. Pain was assessed using visual analog scale (VAS) at 0,6,12,24 hrs and the time at which the score was > 5 was noted and tramadol 1 mg/kg iv was given. The total dose of tramadol given in the first 24hrs postoperative was noted.

Statistical analysis was done using SPSS software version 15. Demographic data were compared using student's t test and normal distribution values were presented as mean ± SD, patient's VAS score was presented with ANOVA test. P value <0.01 was considered statistically significant.

RESULTS

Fifteen patients belonging to ASA PS 1,2 were included in the study. Mean age was 35.7 ± 18.1 years (mean ± SD), 11 were male and 4 were female. They were posted for forearm fractures, hand deformity correction procedures.

Mean duration of analgesia was defined as time between the block and time of request for first analgesic and it was 938.67 ± 147.9 (mean ± SD) minutes. The total tramadol consumption in the first 24hrs was 63.5 ± 18.98 mg.

VAS score was less at 0 hour (1.36 ± 0.85), 6^{th} hour (3.38 ± 0.89), 12^{th} hour (4.87 ± 0.73) and 24^{th} hour (6.80 ± 0.79), which was statistically significant.

Table 1: Distribution of Cases

	Frequency	Percent
LT DER #	3	20.0
LT DER PLATING	1	6.7
LT RADIUS & ULNA #	1	6.7
RT 3rd PIP JOINT #	1	6.7
RT DEQUERIAINS TENOSYNOVITIS	1	6.7
RT DER #	1	6.7
RT DER PLATING	1	6.7
RT HAMIPLEGIA, S/P MAXPAGE	1	6.7
RT HEMIPLEGIA S/P RT PRONATOR REROUTING	1	6.7
RT RADIUS & ULNA #	2	13.3
RT RING & MIDDLE FINGER SYNDACTYLY	1	6.7
RT ULNA #	1	6.7
Total	15	100.0

DISCUSSION

In this case series, the block was given by an experienced Anesthesiologist, who had more than 10 years of experience in ultrasound guided nerve blocks. None of the patient had failed block, which was defined as ability to touch the pulp of the little finger with thumb, after 30minutes of giving the block. We decided the volume of 20ml levobuoivacaine, based on the maximum dose limit for toxicity of 3mg/kg. Previous studies had demonstrated using large volumes like 30 to 40 ml [6], [7]. Under the guidance of ultrasound, we were able to achieve adequate motor blockade with less volume of 20ml.

There are numerous studies that compared the effectiveness of the blockade with levobupivacaine and ropivacaine. Watanabe et al [8] compared ropivacaine and levobupivacaine for supraclavicular blocks and concluded that there was no significant difference in the duration of analgesia between the groups. Thalamati et al [9] compared the efficacy of ropivacaine and levobupivacaine in supraclavicular block and concluded that levobupivacaine had longer duration of analgesia and sensory blockage was also longer with levobupicaine. Cline et al [10] compared levobupivacaine with ropivacaine in axillary blockade and concluded that levobupivacaine had prolonged sensory blockade. We also found that levobupivacaine with dexmedetomidine provided longer duration of analgesia with the

mean duration of 938.67 ± 147.9 (mean ± SD) minutes.

There are numerous studies that proved that adding additives like dexmedetomidine (alpha2 agonist) prolongs the sensory and motor blockade when given in periphery nerve blocks [11], [12], [13] . Dexmedetomidine, the pharmacologically active d-isomer of medetomidine is a highly selective alpha2 agonist with α2: α1 binding capacity of 1620:1. Esmaoglu *et al* observed that sensory and motor block onset time were significantly shorter, with prolonged duration in levobupivacaine with dexmedetomidine group [13]. Agarwal *et al* also concluded that dexmedetomidine prolongs the effect of bupivacaine in supraclavicular brachial plexus block [14]. We also found that levobupivacaine with dexmedetomidine prolonged the duration of analgesia in supraclavicular block, with the mean duration of 938minutes. VAS score was statistically significant at 0,6,12 hours. We also observed that adding dexmedetomidine to levobupivacaine did not cause any significant hemodynamic changes.

CONCLUSION

We concluded that levobupivacaine with dexmedetomidine in ultrasound guided supraclavicular block provides prolonged analgesia with less haemodynamic changes.

Conflict of interest – none

- Ethical approval - approved
- Acknowledgement - none
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