ORIGINAL RESEARCH

Comparison Between Clonidine And Dexmedetomedine As Adjuvant to Levobupivacaine In Ultrasound- Guided Supraclavicular Brachial Plexus Block For Upper Limb Surgeries

[1]Dr. Vandna Bharti, [2]Dr. Raghavendra Vagyannavar, [3]Dr. Aneeta Singh, [4]Dr. Saransh Tyagi

[1]Assistant Professor, Anesthesia, Prasad Institute of Medical Sciences, Lucknow, U.P., India;
[2]Associate Professor, Department of Anaesthesiology, Mayo Institute of Mechanical Science(MIMS), Gadia, Barabanki, UP India
[3]Assistant Professor, Anesthesia, Prasad Institute of Medical Sciences, Lucknow, U.P., India;
[4]Junior Resident, Anesthesia, PrasadInstitute of Medical Sciences, Lucknow, U.P., India;

Corresponding Author
Dr. Vandna Bharti
Mail id- doc.mevanna@gmail.com
Address- B-104, IndraprasthaGrand ,Sector-4a, Vrindavanyojna, Lucknow 226029

Received: 28 October, 2023 Accepted: 07 November, 2023

ABSTRACT

Background: Brachial plexus block is the most commonly practiced peripheral nerve block. The present study was conducted to compare levobupivacaine withclonidine and levobupivacaine with dexmedetomidine in ultrasound- guided supraclavicular brachial plexus block for upper limb surgeries.

Materials & Method: A prospective randomized double blind study was done in 90 patients with ASA physical status I or II to be operated under supraclavicular brachial plexus block of both genders were divided into 2 groups of 45 patients each. Group L+C, patients received levobupivacaine 0.5% (20 ml) 100 mg and 1.0 ml (150 mcg)clonidine. Group L+D, patients received levobupivacaine 0.5% (20 ml) 100 mg and 1.0 ml (100 mcg) dexmedetomidine. Parameters such as duration of surgery, onset of sensory blockade, motor block, duration of sensory blockade, motor blockade and duration of analgesia were recorded.

Results: Group L+C had 28 males and 17 females and group L+D had 22 males and 23 females. The mean duration of surgery was 115.2 minutes in group L+C and 118.4 minutes in group L+D. The onset of sensory blockade was 6.1 minutes in group L+C and 3.7 minutes in group L+D. The onset of motor blockade was 9.2 minutes in group L+C and 8.3 minutes in group L+D. The mean duration of sensory blockade was 254.6 minutes and 435.8 minutes, duration of motor blockade was 290.2 minutes and 517.9 minutes. The duration of analgesia was318.5 and 752.1 minutes in group L+C and group L+D respectively. The difference was significant ($P < 0.05$).

Conclusion: Dexmedetomedineis betterthan clonidine in terms of hemodynamic stability, analgesia as adjuvant tolocal anesthetic agent in supraclavicular brachial plexus block as it has prolonged duration of sensory and motor blockade alongwith increased duration of analgesia.

Key words: clonidine, dexmedetomidine, ultrasound

INTRODUCTION

Brachial plexus block is the most commonly practiced peripheral nerve blocks. It was first injected by Halsted in brachial plexus under direct vision in 1885. Brachial plexus block is especially intended for the upper limb surgeries.[1]Brachial plexus block is more advantageous for routine as well as emergency surgery in upper limb. Brachial plexus block avoids unwanted complications due to administration of various drugs in general anesthesia and in the process of upper airway instrumentation. There are various approaches to brachial plexus block, but the supraclavicular approach is the most common approach to brachial plexus because of compact arrangement of the nerve trunks.[2]Since ultrasound usually has no difficulties and allows the doctor to place the local anesthetic close to the nerves in real-time, it has become the gold standard for performing

supraclavicular blocks. These days, peripheral neural blocking is a widely recognized part of post-operative pain treatment.[3] In addition to providing intraoperative anesthesia and post-operative analgesia, ultrasound-guided supraclavicular brachial plexus (SCBP) block also lessens a number of problems, such as intravascular injection. In addition to confirming the cardiac toxicity of racemic bupivacaine, numerous pharmacokinetic, animal, and clinical investigations also show reduced central nervous system toxicity and a decreased cardiovascular depressive impact when levobupivacaine is used in experiments.[4] Compared to bupivacaine, levobupivacaine is less harmful to the body. The late onset and short duration of analgesia, even when combined with adjuvants such opioids that cause opioid-related adverse effects, are its limiting characteristics. Dexmedetomedine is more potent alpha 2 adrenergic agonists than clonidine[5] ·Addition of adrenergic agonists may enhance the quality and prolong the duration of brachial plexus block, these may also help prevent opioid-related adverse effects[6]. The aim of presentconducted study was to compare levobupivacaine with dexmedetomidine and levobupivacaine with clonidine in ultrasound- guided supraclavicular brachial plexus block for upper limb surgeries

MATERIALS & METHODS

After the institutional ethical committee clearance, this prospective randomized double blind study was conducted at Prasad Institute of Medical Sciences, Lucknow in the department of Anesthesiologyover the period of 12 months among 90 patients of ASA physical status I or II to be operated under supraclavicular brachial plexus block. Patients were selected from Orthopedic department. All patients were informed regarding the study and their consent was obtained.Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 45 each. The patients were randomly assigned using "computer generated random number table" to one of the following groups:

Group L+C patients received levobupivacaine 0.5% (20 ml) 100mg and 1.0 ml (150mcg)clonidine.

Group L+D- patients received levobupivacaine 0.5% (20 ml) 100 mg and 1.0 ml(100mcg) dexmedetomidine.

EXCLUSION CRITERIA

1. ASA III & IV
2. Hypersensitivity of drugs
3. Pregnant and nursing mother
4. Infection at the injection site

ANESTHESIA TECHNIQUE

After Preanesthetic clearance, patient was informed about the procedure. Anxiolytic tab alprazolam 0.5 mg was given a night before. On the day surgery IV line secured and fluid was started. all standard monitoring devices connected oxygen saturation, NIBP, ECG. Premedication with inj. Midazolam 0.05mg/kg body weight was given before the procedure. Baseline parameters were recorded. Drug solution was prepared by another anesthesiologist who was not involved in the case and the procedure. After aseptic preparation of skin and probe, high frequency linear ultrasound probe was positioned in supraclavicular fossa and pulsating subclavian artery was located. Brachial plexus was identified as honey comb pattern just lateral and superficial to subclavian artery. Skin wheel was raised with local anesthetic lateral to probe . Now the needle was inserted from lateral side of probe and advanced inside the ultrasound beam by in plane technique. After negative aspiration 20 ml of prepared drug solution was injected in 3-5 ml aliqots separating the plexus .

The onset of sensory blockade was defined as the time between injection and complete loss of pin prick sensation in dermatomal distribution of C2 to T2 .The time noted when complete sensory blockade was achieved. motor blockade was assessed by bromage three point score. Duration of sensory blockade till appearance of pin prick sensation, duration of motor blockade till complete return of muscle power. and duration of analgesia (first feel of pain by patient) was recorded. Duration of surgery was also recorded.

Statistical analysis was performed using Microsoft Excel 2022 and statistical software plug ins. Continuous data was analysed by student 's t-test (unpaired). Data are being represented as mean +-SD. Any possible significance has been determined considering it statistical significant if p value of <0.05.

RESULTS

Table I: Distribution of patients

Groups	Group L+C	Group (L+D)
Method	levobupivacaine 0.5% (20 ml) 100 mg and 1.0 ml clonidine	levobupivacaine 0.5% (20 ml) 100 mg and 1.0 ml Dexmedetomidine
M:F	28:17	22:23

Table I and Graph 1 shows that group (L+C) had 28 males and 17 females and group (L+D) had 22 males and 23 females.

Graph 1: Gender distribution in both the groups

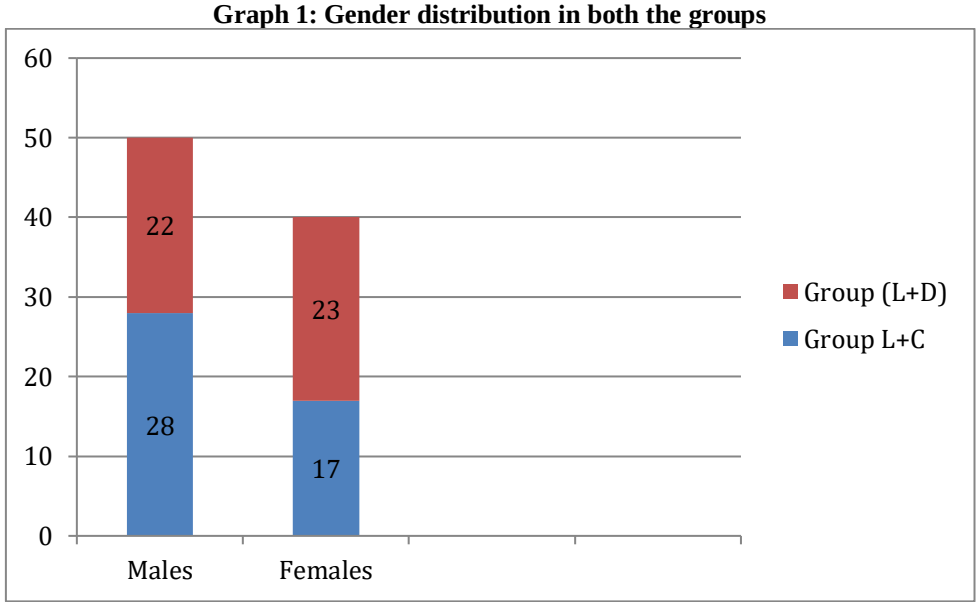

Table II: Comparison of parameters

Parameters	Group (L+C)	Group (L+D)	P value
Duration of surgery (min)	115.2	118.4	0.82
Onset of sensory blockade (min)	6.1	3.7	0.05
Onset of motor blockade (min)	9.2	8.3	0.05
Duration of sensory blockade (min)	254.6	435.8	0.05
Duration of motor blockade (min)	290.2	517.9	0.03
duration of analgesia (min)	318.5	752.1	0.01

Graph 2:Bar Graph showing comparisonof Block characteristics

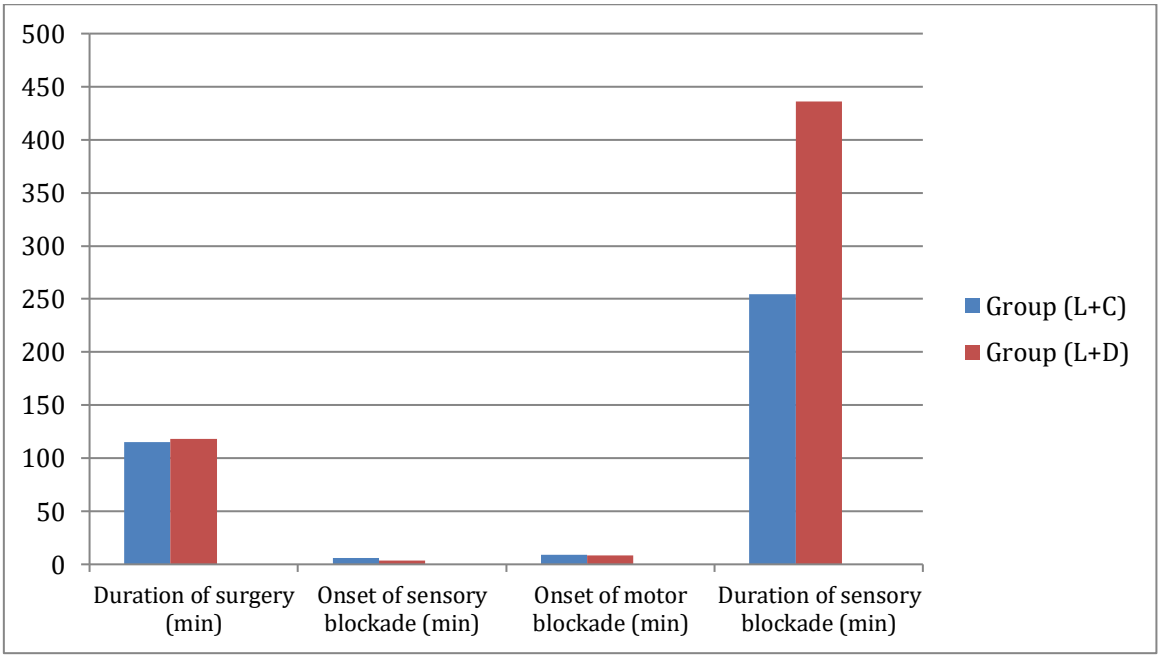

Table II and Graph 2 showed duration of surgery was 115.2 minutes in group (L+C) and 118.4 minutes in group (L+D). The onset of sensory blockade was 6.1 minutes in group (L+C) and 3.7 minutes in group (L+D). The onset of motor blockade was 9.2 minutes in group (L+C) and 8.3 minutes in group (L+D). The mean duration of sensory blockade was 254.6 minutes and 435.8 minutes, duration of motor blockade was 290.2 minutes and 517.9 minutes. The duration of analgesia was 318.5 and 752.1 minutes ingroup (L+C) and group (L+D) respectively. The difference was significant (P< 0.05).

DISCUSSION

Because brachial plexus block produces total muscular relaxation, maintains hemodynamic stability, and causes the related sympathetic block, it is a great way to achieve optimal operating circumstances for upper limb procedures.[7,8] They also offer minimally side effect prolonged postoperative analgesia. Furthermore, it provides improved mental function preservation for the elderly; intact laryngeal and pharyngeal reflexes reduce aspiration risk.[9,10] In brachial plexus block, the alpha 2 adrenergic agonists has demonstrated its effectiveness as an adjuvant to local anesthetics. It causes vasoconstriction, which lessens the local anestheticsabsorption and extends their duration of effect.[11,12] The present study was conducted to compare levobupivacaine with dexmedetomidine and levobupivacaine with clonidine in ultrasound- guided supraclavicular brachial plexus block for upper limb surgeries.Krishan et al[13] in their study selected 90 patients of ASA Grade I or II undergoing upper limb surgery. Onset and duration of both sensory and motor blockade and duration of analgesia were studied in both the groups. It was observed that in group L+C, onset of motor and sensory blockade was faster than group L+D. We also got the similar result. A significant difference was not observed in heart rate and blood pressure in any of the Groups. Group L+D had longer duration of analgesia in comparison of group L+C.We observed that the mean duration of surgery was 115.2 minutes in group L+C and 118.4 minutes in group L+D. The onset of sensory blockade was 6.1 minutes in group L+C and 3.7 minutes in group L+D. The onset of motor blockade was 9.2 minutes in group L+C and 8.3 minutes in group L+D. The mean duration of sensory blockade was 254.6 minutes and 435.8 minutes, duration of motor blockade was290.2 minutes and 517.9 minutes. The duration of analgesia was 318.5 and 752.1 minutes ingroup L+C and group L+D respectively. Duma et al. [14] and Kohli et alconcluded that 150 mcg of clonidine can be used as adjuvant to mixture of local anaesthetic drugs in the brachial plexus block through supraclavicular approach with hemodynamic stability. In many studies dexmedetomidine had been reported to reduce the onset time of sensory and motor blockade and prolonged the duration of postoperative analgesia and motor blockade. [15,16]

S. chakra borty et al[17] used clonidine 30 mcg as an adjuvant to bupivacaine in supraclavicular brachial plexus block and found that duration of sensory and motor blockade (279.1±28.98 and 330.4 ±31.68 min.) was significantly prolonged as compared to bupivacaine alone (116.0±17.16 and 144.8±17.31 min.). Duration of analgesia (415.4 ± 38.18) was also significantly longer in comparison to bupivacaine alone (194.2±28.74 min.).

CONCLUSION

In conclusion our study shown that dexmedetomedine isbetter to clonidine as an adjuvant to local anesthetic agent in supraclavicular brachial plexusblock. in terms of hemodynamic stability and analgesia as it has prolonged duration of sensory and motor blockade alongwith increased duration of analgesia.

REFERENCES

1. Jarbo K, Batra YK, Panda NB. Brachial plexus block with midazolam and bupivacaine improves analgesia. Can J Anaesth. 2005;52:822–26.
2. Islam SM, Hossain MHMD, Maruf AA. Effect of addition of dexamethasone to local anaesthetics in supraclavicular brachial plexus block. JAFMC Bangladesh. 2011;7(1):11-14.
3. Tandoc MN, Fan L, Kolesnikov S, Kruglov A, et al. Adjuvant dexamethasone with bupivacaine prolongs the duration of interscalene block: a prospective randomized trial. J Anaesth. 2011;25(5):704-09.
4. Gristwood R, Greaves J. Levobupivacaine: a new safer long acting local anaesthetic agent. Expert Opinion on Investigational Drugs. 1999;8(6):861-6.
5. Raimo V, Juha M, Veijo S, Leena N, Virtanen R. Characterisation of selectivity, specificity and potency of dexmedetomidine as alpha 2 adrenoreceptor agonist. Eur J Pharmacol. 1988;150:9-14.
6. Mazoit J, Boico O, Samii K. Myocardial Uptake of Bupivacaine. Anaesthesia & Analgesia. 1993;77(3):477-82.
7. Santos Ade Armas P. Systemic Toxicity of Levobupivacaine, Bupivacaine, and Ropivacaine during Continuous Intravenous Infusion to Nonpregnant and Pregnant Ewes. Anaesthesiology. 2001;95(5):1256-64.
8. Movafegh A, Razazian M, Hajimaohamadi F, Meysamie A. Dexamethasone Added to Lidocaine Prolongs Axillary Brachial Plexus Blockade. Anaesthesia & Analgesia. 2006;102(1):263-7.
9. Raghove P, Singh K, Taxak S, Ahlawat M, Hooda S. Comparison of ultrasound guided technique with conventional landmark technique for supraclavicular brachial plexus nerve block in patients undergoing upper limb surgery. Int J PharmacolClin Sci. 2016;5:1–4.
10. Cousins M, Bridenbaugh P, Lippincott P. Neural Blockade in Clinical Anaesthesia and Management of Pain. Anaesthesiology. 1981;55(4):490-4.
11. Chandni M Soni CM, Parikh H. Comparison of the motor and sensory block by ropivacaine and bupivacaine in combination with lignocaine in supraclavicular block. National Journal of Medical Research. 2013;3(4):353-57.
12. Shrestha BR, Maharjan SK, Shrestha S, Gautam B, Thapa C, Thapa PB. Comparative study between tramadol and dexamethasone as an admixture to bupivacaine in supraclavicular brachial plexus block. JNMA J Nepal Med Assoc. 2007;46(168):158-64.
13. Krishan G, Mitra S, Verma AP, Agrawal M, Singh RP, Ahmad S. A comparative study between levobupivacaine with dexmedetomidine versus levobupivacaine with clonidine in ultrasound- guided supraclavicular brachial plexus block for upper limb surgeries: A randomized double blind placebo controlled study. Int J Contemp Med Res. 2018;5(1):6-11.

14. Pathak RG, Satkar AP, Khade RN. Supraclavicular brachial plexus block with and without dexamethasone – A comparative study. Inter J Scie Rese Pub. 2012;2(12):1-7.
15. D. Marhofer, S.C. Kettner, P. Marhofer, S. Pils, M. Weber and M.Zeitlinger use of dexmedetomidine in ulner nerve block as an adjuvant with 0.5% ropivacaine. British Journal of Anaesthesia 2012;15:1-5.
16. Winnie et al. perivascular concept of supraclavicular approach , the hazard of develpoing pneumothorax is less than with the classical supraclavicular approach. Anaesthesiology. 1964;25:252.
17. SusmitaChakraborty, JayantChakrabarti, Mohan ChadraMandal, AvijitHazra, Sabyasachi Das. Effect of clonidine as adjuvant in a bupivacaine -induced supraclavicular brachial plexus block. A randoomized double blind controlled trial. Indian J. of Pharmacology 2010; 42: 74-77.