ORIGINAL RESEARCH PAPER

Volume-8 | Issue-8 | August - 2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARISON OF DEXMEDETOMIDINE AND DEXAMETHASONE AS AN ADJUVANT TO LOCAL ANAESTHETIC IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

Anaesthesiology

Dr. Santosh Kumar Assistant Professor, Department of Anaesthesiology, Rama Medical College & Hospital, Mandhana, Kanpur

Dr.Yogesh Verma* Senior Resident, Department of Anaesthesiology, Rama Medical College & Hospital, Mandhana, Kanpur *Corresponding Author

ABSTRACT

Background- Supraclavicular brachial plexus block is a commonly employed regional nerve block technique for upper extremity surgery.
Objective- To compare dexamethasone and dexmedetomidine as an adjuvant to local anaesthetic agent in supraclavicular brachial plexus block with respect to onset and duration of sensory and motor block.
Methods- Forty ASA I and II patients scheduled for elective upper limb surgeries under supraclavicular brachial plexus block were divided into two equal groups in a double- blinded fashion. Group one was given 0.25% Bupivacaine 2 milligram/kg as local anaesthetic and Dexmedetomidine 1microgram/kg as adjuvant. Group two was given 0.25% Bupivacaine 2 milligram/kg and Dexamethasone 100microgram/kg as adjuvant. All data were recorded, and statistical analysis was done.
Results- Sensory block and motor block onset was earlier in dexmedetomidine group. The duration of blockade was also prolonged in dexmedetomidine group when compared with dexamethasone group and is not associated with any major side-effect.
Conclusion- Dexmedetomidine is a better adjuvant than dexamethasone in supraclavicular brachial plexus block.

KEYWORDS

Dexmedetomidine, dexamethasone, bupivacaine, supraclavicular brachial plexus block.

INTRODUCTION-

Brachial plexus block is a popular and widely employed regional nerve block technique for perioperative anesthesia and analgesia for surgery of the upper extremity. Various approaches have been described such as supraclavicular, interscalene, transscalene, infraclavicular and axillary. Regional nerve block minimizes the stress response and using minimal anesthetic drugs is always beneficial for the patients with various cardio- respiratory comorbidities.[1] Bupivacaine is used frequently for supraclavicular nerve block as it has long duration of action from 3 to 6 h. So various adjuvant like opioids, clonidine, neostigmine, midazolam, dexamethasone etc. were added to local anaesthetics in brachial plexus block to achieve quick, dense and prolonged block, but the results are either inconclusive or associated with side effects.[2] Dexmedetomidine is highly specific to α -2 adrenoceptors, yielding an α -2/ α-1 ratio of 1620 6 In humans, dexmedetomidine has shown to prolong the duration of block and post-operative analgesia when added to local anaesthetic in various regional blocks.[3,4,5,6]The significantly prolonged duration of analgesia obviates the need for any additional analgesics.[7,8] So, the rationale behind the study was to test the hypothesis that dexmedetomidine when added as an adjuvant to local anaesthetic in supraclavicular brachial plexus block enhanced the duration of sensory and motor block, duration of analgesia and quality of block as compared with dexamethasone.

MATERIALS AND METHODS-

Study design- A double-blind prospective study.

Study setting- Tertiary care teaching hospital-major operation theatre, Dept of Anaesthesiology, Rama Medical College, Hospital and Research centre, Mandhana, Kanpur (U.P.)

Study Population- 40 patients of the age group 18-60years belonging to ASA Grade I and II who were posted for upper limb orthopaedic surgeries under supraclavicular brachial plexus block. Selection was based on inclusion and exclusion criteria.

Sample size- With 80% power and 95% confidence, assuming equal number in both groups, to estimate a difference of four hours of sensory and motor blockade between dexmedetomidine and dexamethasone with pooled variants of 16, a sample size of 17 per group was estimated. For accounting drop outs the sample size is rounded to 20.

Inclusion criteria-

1. Age between 18– 60 years
2. Physical status American Society of Anaesthesiologist (ASA) I and II.

Exclusion criteria-

1. ASA grade more than two
2. Known hypersensitivity to local anaesthetic drugs
3. Bleeding disorders
4. Pregnant women

Ethical Considerations- The study was conducted after attaining approval from research and ethical committee of Rama Medical College, Hospital and Research Centre.

METHODOLOGY

Patients were assigned to two groups of 20 each as follows
Group 1: Dexmedetomidine group. Injection 0.25% Bupivacaine 2 milligram/kg as local anaesthetic andDexmedetomidine 1microgram/kg as adjuvant.

Group 2: Dexamethasone group. Injection 0.25% Bupivacaine 2 milligram/kg and Dexamethasone 100microgram/kg as adjuvant.

PROCEDURE-

After allowing the patients to settle down in the operative room for a period of five minutes, baseline parameters like heart rate, blood pressure, and oxygen saturation were measured and recorded. All the patients were given brachial plexus through supraclavicular approach by an experienced anaesthesiologist different from one assessing the patient intra and postoperatively. Each patient was made to lie supine, arms at the side, head turned slightly to the opposite side. The nerve stimulator is initially set at 1.0 to 1.2 Ma. Onset and duration of sensory and motor blockade and hemodynamic stability were measured and recorded at specified time intervals. Sensory block was assessed by the pin prick method. Assessment of sensory block was done in the dermatomal areas at specified time intervals after completion of drug injection. Sensory onset was considered when there was a dull sensation to pin prick.

Motor blockade was determined according to a modified Bromage scale for upper extremities on a 3- point scale:

Grade 0: Normal motor function with full flexion and extension of elbow, wrist and fingers.

Grade1 : Decreased motor strength with ability to move the fingers only
Grade 2: Complete motor block with inability to move the fingers

Statistical Analysis-

Collected data were compiled, entered and subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) Version

20. For all statistical evaluation, an independent sample t test was applied with probability value of <0.05 was considered significant.

RESULTS-

Table 1- Age wise Distribution of study participants

Group	Sample	Mean	Standard Deviation	P value
Dexmedetomidine	20	41.20	14.443	0.22>0.05
Dexamethasone	20	36.00	11.938	

As per table 1 Mean age in group 1(Dexmedetomidine) and group 2(Dexamethasone) were 41.20±14.443 years and 36.00±11.938 years respectively. This difference in the ages between the two groups was statistic indicates that the two groups are homogenous with respect to age and are hence comparable.

Table 2- Gender wise Distribution of the study participants

Group	PERCENTAGE	
	Male	Female
Dexmedetomidine	65	35
Dexamethasone	50	50

There is no significant difference (p value=0.337>0.05) between group 1 (Dexmedetomidine) and group 2(Dexamethasone) with respect to gender of the patients included in the study. This indicates that the two groups are more or less homogenous with respect to gender and are hence comparable.

Table 3- Onset of Sensory Block

Group	Sample	Mean	Standard Deviation	T value (with degrees of freedom)	P value
Dexmedetomidine	20	11.40	3.575	2.343(38)	0.024<0.05
Dexamethasone	20	14.45	4.594		

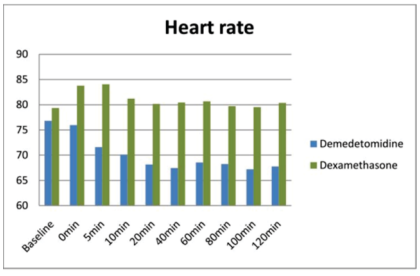
Onset of sensory block was earliest in group 1(Dexmedetomidine) and this was statistically significant when compared to group 2 (Dexamethasone) (p-value=0.024<0.05). though the mean values of Group 1 is higher than group 2.

Table 4- Onset of Motor Block

Group	Sample	Mean	Standard Deviation	T value(with degrees of freedom)	P value
Dexmedetomidine	20	15.57	4.575	2.918(38)	0.006<0.01
Dexamethasone	20	20.25	5.159		

Onset of motor block was earliest in group 1(Dexmedetomidine) and this was statistically significant when compared to group 2 (Dexamethasone)(p value=0.006<0.01).

Figure 1- Comparison of Heart rate among two groups



Comparison of baseline Heart rate in the two groups indicates that there is no significant difference between the two groups. The mean heart rate is lower in group 1(Dexmedetomidine) as compared to group 2 (Dexamethasone) at zero minute, five minutes, ten minutes, twenty minutes, forty minutes, sixty minutes, eighty minutes, hundred minutes and one hundred and twenty minutes. Statistical analysis proved that there is significant difference in mean heart rate of the two groups at various time periods (p value<0.05).

DISCUSSION-

The brachial plexus block for upper limb surgery has proved to be a safer and effective method of regional anaesthesia. But it is a common observation that surgeries on upper limb are still being performed mainly under general anaesthesia despite unanimous consensus toward regional anaesthesia, due to one or the other reasons. It has the reputation of providing most complete and reliable anaesthesia for upper limb surgery. It is performed at the trunk level where the plexus is presented most compactly. In our study there were 13 male patient and 7 female patients in group 1 (Dexmedetomidine) and 10 male and 10 female patients in group 2(Dexamethasone). Our study revealed that there is no significant difference (p value =0.337>0.05) between group 1 (Dexmedetomidine) and group 2(Dexamethasone) with respect to gender of the patients included in the study. In our study mean duration of motor block in group 1 (Dexmedetomidine) is 983.10±196.756minute and in group 2 (Dexamethasone) 833.25±187.633 minute. Mean duration of motor block was higher in group 1(Dexmedetomidine) and this was statistically significant when compared to group 2 (Dexamethasone)(p value=0.018<0.05). Swami et al. in 2012 concluded that dexmedetomidine (1 µg/kg) when added to local anesthetic (bupivacaine 0.25%) in supraclavicular brachial plexus block enhanced the duration of sensory and motor block and also the duration ofanalgesia.[9] Zhang et al. in 2014 also reported prolonged sensory and motor blockadeduration patients who received dexmedetomidine.[10] Agarwal, et al.concluded, that dexmedetomidine when added to bupivacaine for supraclavicular brachial plexus block shortens the onset times for sensory and motor blocks and prolongs their duration.[7] Kathuria, et al.in2015 concluded that in supraclavicular brachial plexus block addition of dexmedetomidine as adjuvant shortens the sensory and motor block onset time, prolongs both sensory and motor block duration. It also significantly delays the first demand for analgesia supplementation, decreases 24h analgesic consumption and is not associated with any major side-effect. The action of dexmedetomidine is most probably peripheral than centrally mediated.[11] Gandhi et al reported that dexmedetomidine has better hemodynamic stability and greater postoperative analgesia.[12] Shrestha et al. reported that dexamethasone when added as adjuvant to mixture of local anaesthetics resulted in significantly early onset and longer duration of analgesia.[13]

CONCLUSION-

We conclude that in supraclavicular brachial plexus block addition of dexmedetomidine as adjuvant to 0.25% bupivacaine shortens the sensory and motor block onset time, prolongs both sensory and motor block duration and is not associated with any major side-effect. The added advantage of conscious sedation and hemodynamic stability makes it a potential adjuvant for nerve blocks. Thus, it can be concluded that dexmedetomidine is a better adjuvant than dexamethasone in supraclavicular brachial plexus block.

REFERENCES-

1. Shrestha BR, Maharjan SK, Shrestha S, Gautam B, Thapa C, Thapa PB et al. Comparative study between tramadol and dexamethasone as an admixture to bupivacaine in supraclavicular brachial plexus block. J Nepal Med Assoc2007; 46(168):158-64.
2. Golwala MP, Swadia VN, Dhimar AA, Sridhar NV. Pain relief by dexamethasone as an adjuvant to local anaesthetics in supraclavicular brachial plexus block. J Anaesth Clin Pharmacol 2009; 25(3):285- 8.
3. Esmaoglu A, Yegenoglu F, Akin A, Turk CY. Dexmedetomidine added to levobupivacaine prolongs axillary brachial plexus block. Anaesth Analg 2010;111 :1548-51.
4. Obayah GM, Refaie A, Aboushanab O,Ibraheem N,Abdelazees M.Addition of dexmedetomidine to bupivacaine for greater palatine nerve block prolongs postoperative analgesia after cleft palate repair. Eur J Anaesthesiol 2010;27:280-4.
5. Kanazi GE, Aouad MT, JAbbour- Khoury SL, Al Jazzar MD, Alameddine MM, Al-Yaman R, et al. Effects of low dose Dexmedetomidine or clonidine on characteristics of spinal block. Acta Anaesthesiol Scand 2006;50:222-7.
6. Memis D, Turan A, Karamanlioglu B, Pamukçu Z, Kurt I. Adding dexmedetomidine to lignocaine for IVRA. Anesth Analg 2004;98:835-40.
7. Agarwal S, Aggarwal R, Gupta P. Dexmedetomidine prolongs the effect of bupivacaine in supraclavicular brachial plexus block. J Anaesthesiol Clin Pharmacol 2014;30:36-40.
8. Shaikh M, Majumdar S, Das A, Saha T, Bandyopadhyay S, Mukherjee D, Mahawar S. Role of Dexamethasone In Supraclavicular Brachial Plexus Block. IOSR Journal of Dental and Medical Sciences2013;12(1):1-7.
9. Swami SS, Keniya VM, Ladi SD, Rao R. Comparison of dexmedetomidine and clonidine (a2 agonist drugs) as an adjuvant to local anaesthesia in supraclvicular brachial plexus block: A randomized double-blind prospective study. Indian J Anaesth 2012;56:243-9.
10. 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.
11. Kathuria S, Gupta S, Dhawan I. Dexmedetomidine as an adjuvant to ropivacaine in supraclavicular brachial plexus block. Saudi J Anaesth 2015;9:148-54.
12. Gandhi R, Shah A, Patel I. Use of Dexmedetomidine along with bupivacaine for brachial plexus block. Natl J Med Res. 2012; 2(1): 67-69.
13. Shrestha BR, Maharjan SK, Tabedar S: Supraclavicular brachial plexues block with and without dexamethasone- A comparative study. KUMJ 2003; 1 (3): 158-160.