JMSCR Vol||05||Issue||11||Page 30231-30236||November 2017

www.jmscr.igmpublication.org
Impact Factor 5.84
Index Copernicus Value: 71.58
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossrefDOI: https://dx.doi.org/10.18535/jmscr/v5i11.72

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

A Comparative Study between the Effect of Addition of Dexamethasone to Bupivacaine and Bupivacaine alone in Supraclavicular Brachial Plexus Block for Upper Limb Surgeries

Authors
Dr A.V.Aswin[1], Dr S.K.Srinivasan[2]
[*1]Post Graduate Student, Dept of Anaesthesia, Rajah Muthiah Medical College and Hospital, Chidambaram, Tamil Nadu, India
[2]Professor, Dept of Anaesthesia, Rajah Muthiah Medical College and Hospital, Chidambaram, Tamil Nadu, India
Corresponding Author
Dr A.V.Aswin
Email: *doctor.aswin@gmail.com*

Abstract
Objective: *Assessing the effectiveness of addition of dexamethasone to bupivacaine (0.5 %) in comparison to bupivacaine (0.5 %) alone for supraclavicular brachial plexus block.*
Methods: *A prospective, randomized controlled study was conducted at RMMCH, Annamalai University, Chidambaram, from April 2016 to August 2017 on forty ASA I and II patients posted for upper limb surgeries under supraclavicular brachial plexus block and were randomly divided into 2 groups of 20 each. Group I received 28 ml of 0.5 % bupivacaine with 2 ml of distilled water, while group II received 28 ml of 0.5% bupivacaine with 2 ml (8mg) of dexamethasone. Haemodynamic parameters and neuromuscular blockade were noted and compared using unpaired students t- test with significance at p < 0.05.*
Results: *Group II subjects had a significantly quicker onset of sensory and motor block in comparison to group II subjects (p<0.05).*
Conclusion: *Onset of brachial plexus block was quickened by adding dexamethasone (8mg) to bupivacaine (0.5%).*
Keywords: *Supraclavicular block, Bupivacaine, Dexamethasone.*

Introduction

Optimal usage of peripheral nerve blockade provides an ideal operation condition. In 1884 Dr Karl Koller used local anaesthesia for the first time on patients for ophthalmic surgeries.

Kulenkampf demonstrated first, the supraclavicular approach of brachial plexus blockade for surgeries of the upper limb. The blockade of the plexus is where it is most compactly arranged and requires less amount of the anaesthetic solution, with quicker onset of action. Because of its prolonged action bupivacaine is preferred over other local anaesthetics. Opioids, Clonidine, Neostigmine, and Midazolam among others have been added to brachial plexus block to prolong the analgesic

effect (Brummett and Williams, 2011). Dexamethasone is a synthetic compound with glucocorticoid and anti – inflammatory activity.

The objective of this study was assessing the effectiveness of addition of dexamethasone to bupivacaine (0.5 %) in comparison to bupivacaine (0.5 %) alone for supraclavicular brachial plexus block.

Methodology

A randomized controlled study was conducted at the RMMCH, Annamalai University, Chidambaram from April 2016 to August 2017. Prior approval was obtained from hospital academic and ethics committee. 40 respondents were enrolled in the study and written, valid informed consent was obtained. The subjects were of both sex, ASA grade I and II aged between 20 and 60 years, posted for upper limb surgeries below the shoulder joint. ASA grade III and IV, pregnant women, patients with history of any bleeding disorder, on anticoagulants, with severe respiratory compromise and any neurological disorders were excluded.

The block was performed by an experienced anaesthetist. The patients were in supine position, arms by their side and head turned to the opposite side. Under strict asepsis part of the neck cleaned and draped. The lateral border of the sternocleidomastoid muscle was identified and distally followed to its point of insertion on the clavicle. Needle entrance was about an inch lateral to the insertion of the muscle. Landmark was confirmed by subclavian artery palpation. 2% lignocaine used for local infiltration at the proposed puncture site. A 22G short bevel 3.5 cm needle was used to perform the technique. The needle was inserted caudally in the horizontal plane, parallel to the neck to enter the fascial sheath 1 to 2 cm deep to the skin. Once paraesthesia was elicited, careful negative aspiration for blood excluded intravascular placement and then the drug solution was injected. Group I subjects received 0.5% bupivacaine (28ml) + distilled water (2ml) while group II received 0.5% bupivacaine (28 ml) + dexamethasone 8mg (2ml) making a total volume of 30 ml. Using the blunt edge of a 27 gauge needle sensory block, assessed by pin prick method at 0, 2, 5, 10, 15, 20 and 30 minutes and graded as follows, 0 = no block (normal sensation), 1 = partial block (diminished sensation), and 2 = complete block (nil sensation). Motor block was measured at 0, 10, 20 and 30 min and graded as follows, 0 = no block (full muscle activity), 1 = partial block (decreased muscle activity), and 2 = complete block (no muscle activity). Haemodynamic parameters were measured throughout. The data obtained was analysed using unpaired ‘t’ test to give the ‘p’ value.

Results

No appreciable differences were found among the subjects with respect to mean age, gender, weight, haemodynamics and duration of surgery.

Table 1: Comparison of Age

Groups	N	Mean Age(years)	Standard Deviation
Group I	20	37.20	9
Group II	20	34.30	11.2

Table 2: Comparison of Weight

Groups	N	Mean Weight(Kg)	Standard Deviation
Group I	20	66.4	11.4
Group II	20	60.5	6.29

Table 3: Comparison of Heart Rate

Heart Rate (Minutes)	Group I (beats/min)	Group II (beats/min)	P value Group I Vs Group II
0 min	76±7.9	73±6.6	0.20
5 min	74±7.8	75±6.7	0.67
15 min	76±8.8	73±8	0.266
30 min	76±8.7	76±6.7	0.978
60 min	75±9.1	75±6.6	0.545
90 min	74±7.4	73±6	0.641
120 min	76±9.5	76±6.9	0.729

Table 4: Comparison of Systolic Blood Pressure (mm Hg)

Time (Minutes)	Group I (mm Hg)	Group II (mm Hg)	P value Group I Vs Group II
0 min	108±9.7	106±6	0.437
5 min	113±9.7	111±8.5	0.492
15 min	121±11	119±12	0.585
30 min	120±11	120±8.6	0.782
60 min	115±11	115±13	0.654
90 min	117±11.4	115±12	0.592
120 min	113±11	112±10	0.765

Table 5: Comparison of Diastolic Blood Pressure (mm Hg)

Time (Minutes)	Group M (mm Hg)	Group B (mm Hg)	P value Group I Vs Group II
0 min	75±6.5	73±4.4	0.261
5 min	77±7	76±5.1	0.608
15 min	78±7.7	79±6.7	0.663
30 min	81±7.9	79±4.5	0.331
60 min	76±6	76±6.9	1.000
90 min	76±6.1	76±7.5	0.878
120 min	75±8.9	77±5.7	0.402

Table 8: Comparison of Onset of Motor Block

Groups	N	Mean Onset(min)	Standard Deviation	P value
Group I	20	12	2	0.0001
Group II	20	5.5	1.8	

Table 9: Comparison of Onset of Sensory Block

Groups	N	Mean Onset(min)	Standard Deviation	P value
Group I	20	11	2.2	0.0001
Group II	20	4.8	1.5	

The mean time for onset of sensory and motor blockade in group I was 11 ± 2.2 and 12 ± 2 minutes respectively, while the same for group II was 4.8 ± 1.5 and 5.5 ± 1.8 minutes respectively. A quicker onset was observed in group II when compared to group I. The p value for both the parameters was <0.05 and hence statistically significant.

Figure 1 Comparison of onset of sensory and motor blockade among study groups

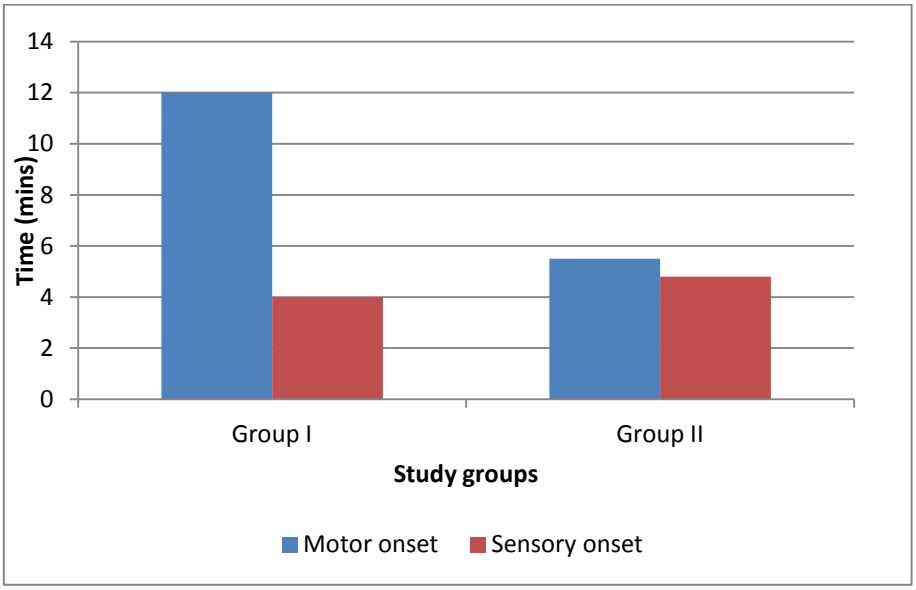
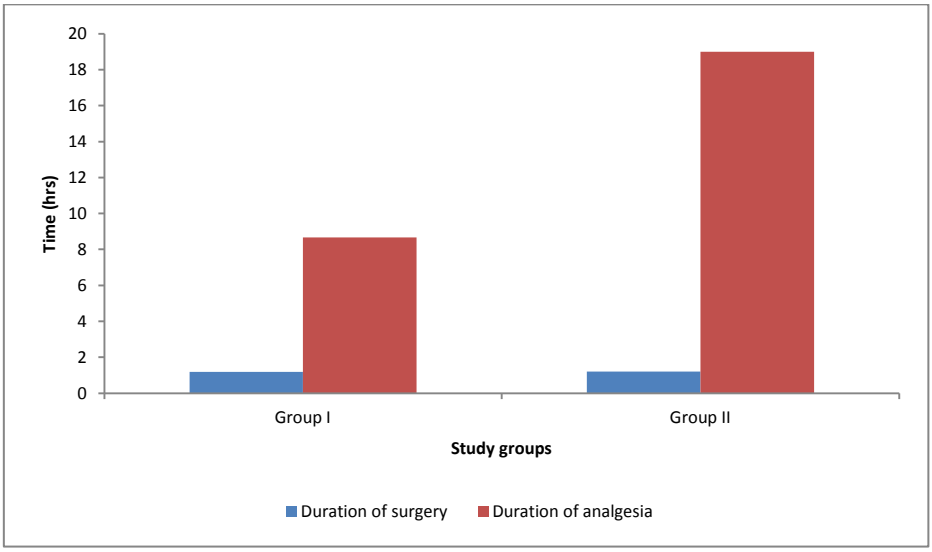


Table 10: Comparison of Duration of Analgesia

Groups	N	Mean Duration(Hours)	Standard Deviation	P value
Group I	20	8.66	2.03	0.0001
Group II	20	19	3.1	

The duration of analgesia for group I was 8.66 ± 2.03 hours and for group II was 19 ± 3.1 hours. Time of analgesia when compared to group I was prolonged in group II. The p value is 0.0001 < 0.05 and considered to be statistically significant.

Figure 2 Comparison of duration of surgery and analgesia (in hrs)



Discussion

Ours was a randomised, prospective, double blinded and controlled study. Brachial plexus block by supraclavicular approach was performed on 40 patients scheduled for surgeries on upper limb. Division of respondents among groups was done using standard randomisation code.

Group I (control group) received 0.5% bupivacaine (28 ml) with distilled water (2 ml) while group II (study group) received 0.5% bupivacaine (28 ml) with dexamethasone8 mg (2 ml) amounting to a total volume of 30 ml for each group.

Six patients failed to achieve satisfactory levels of blockade and required induction of general anaesthesia and hence were excluded from the trial. Assessment of onset and duration of block was done by a principal investigator blinded about the drugs used in the study. Parameters observed included time to onset and sensory and motor block duration, time of analgesia and side effects if any.

No appreciable differences noted between the study groups in heart rate, systolic blood pressure, diastolic blood pressure and saturation perioperatively.

A trial conducted by **Faraj W. Abdallah et al** concurred that heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, oxygen saturation were comparable between the groups and showed no observable differences perioperatively.

In this study, it was observed that the time to onset of motor block was earlier in the study group in comparison to controls with, a mean value of 5.5 ± 1.8 minutes against 12 ± 2 minutes respectively and is statistically significant.

We also observed that the onset time of sensory block was earlier in study group with a mean of 4.8 ± 1.5 minutes against the control group with a mean of 11 ± 2 minutes and significant statistically.

Two different studies done by **Safiya I Shaikh et al** and **Ali Movafegh et al** concurred that the onset of sensory and motor blockade was much quicker when an adjuvant like dexamethasone is added to bupivacaine.

The above observations were consistent to this study results. Hence we concur that bupivacaine 0.5% with dexamethasone (8mg) has an advantage of quick onset of sensory and motor blockade in comparison to bupivacaine 0.5% alone for supraclavicular brachial plexus blockade at equal volumes.

In this study the duration of motor block was 7.5 ± 1.8 hours and 16 ± 2.7 hours for groups I and II respectively, while the sensory block duration was 7 ± 1.9 hours and 15 ± 3.1 hours for groups I and II respectively. Duration of both sensory and motor blockade was increased in group II in comparison to group I and the results were statistically significant.

S. Choi, R. Rodseth and C. J. L. McCartney inferred based on their study that the duration of sensory and motor blockade were prolonged when dexamethasone was mixed to bupivacaine rather than bupivacaine used alone.

The above observations were consistent to our study results. Hence, we concur that bupivacaine added with dexamethasone to it has an advantage of increased duration of sensory and motor blockade in comparison to bupivacaine 0.5% alone for supraclavicular brachial plexus blockade at equal volumes.

The duration (time) of analgesia was 8.66 ± 2.03 hours for group I and 19 ± 3.1 hours for group II. Duration of analgesia was prolonged in group II when compared to group I.

Cummings et al in his study 'Effect of dexamethasone on the duration of interscalene nerve blocks with ropivacaine or bupivacaine' concluded that duration of pain relief in the study group was significantly prolonged than the control group (805.04 ± 175.75 min vs 502.24 ± 52.68 min).

Shrestha BR, Maharjan SK, Tabedar S also noticed that supplementation of dexamethasone to bupivacaine, for brachial plexus block significantly prolongs the duration of analgesia without appreciable unwanted effects.

The above observations were consistent with our study results. Hence, we concur that dexamethasone added to bupivacaine has an advantage of prolonged duration of analgesia when compared to bupivacaine 0.5% alone for supraclavicular brachial plexus blockade at equal volumes.

Conclusion

Based on this study, we concur that at equal volumes, dexamethasone added to bupivacaine 0.5% has an advantage over bupivacaine 0.5% alone for supraclavicular brachial plexus block perioperatively in terms of,

- Quick onset of sensory and motor blockade.
- Prolonged duration of analgesia.

Bibliography

1. Faraj W. Abdallah et al, "Intravenous Dexamethasone and Perineural Dexamethasone Similarly Prolong the Duration of Analgesia After Supraclavicular Brachial Plexus Block A Randomized, Triple-Arm, Double-Blind, Placebo-Controlled Trial", Regional Anesthesia and Pain Medicine, March-April 2015
2. Collins VJ editor. Principles of anaesthesiology general and regional Anaesthesia. 3rd ed. Lea and Febiger (USA):1993. p. 1233-81.
3. Kulenkampff D (1911). "Zur anästhesierung des plexus brachialis" [On anesthesia of brachial plexus]. 38: 1337–40.
4. K. C. Cummings et al, "Effect of dexamethasone on the duration of interscalene nerve blocks with ropivacaine or bupivacaine" British Journal of Anaesthesia Page 1 of 8, June 14, 2011.
5. S. Choi, R. Rodseth and C. J. L. McCartney, "Effects of dexamethasone as a local anaesthetic adjuvant for brachial plexus block: a systematic review and meta-analysis of randomized trials" British Journal of Anaesthesia 112 (3): 427–39
6. Ali Movafegh et al, "Dexamethasone Added to Lidocaine Prolongs Axillary Brachial Plexus Blockade" Anesth Analg 2006;102:263–7
7. Shrestha BR, Maharjan SK, Tabedar S, "Supraclavicular brachial plexus block with and without dexamethasone - A comparative study", Kathmandu University Medical Journal (2003) Vol. 1, No. 3, 158-160
8. Brummett CM, Williams BA. Additives to local anaesthetics for peripheral nerve blockade. Int Anesthesiol Clin 2011; 49:104-116.