

The Effects of Dexamethasone with Lignocaine and Bupivacaine in Brachial Plexus Block for Upper Limb Orthopaedic Surgery Cases: A Retrospective Cohort Study

Dr. K.P. Polaiiah M.D.¹, Dr. T. Venu Gopala Rao M.D., D.A²

1. Assistant Professor, Department of Anaesthesiology, Guntur Medical College, Guntur, AP, India

2. Professor & HOD, Department of Anaesthesiology, Guntur Medical College, Guntur, AP, India

Abstract: Background: Most of the orthopaedic surgeries are of uncertain duration, so the usage of adjuvants to local anaesthetics in Brachial Plexus block had improved block characteristics. The Dexamethasone have been used as an adjuvant to local anaesthetics in brachial plexus block, because it had been reported to prolong duration of action of local anaesthetics.

Objectives: This study was under taken to assess (1) Onset and duration of sensory and motor block. (2) Complications and adverse effects.

Study Design: It is a retrospective Study.

Study Area: Government General Hospital, Guntur Medical College, Guntur, AP.

Study Subjects: Patients of Upper Limb orthopaedic cases admitted in Govt. General Hospital for Surgery.

Sample Size: 60 upper limb orthopaedic cases.

Study Period: August 2014 to February 2015.

Methods: 60 adult ASA Grade I and Grade II patients were matched into two cohorts, study cohort (Dexamethasone (2ml) + Xylocaine (1.5%, 20ml) + Bupivacaine(0.5%, 16ml) and control cohort (Xylocaine (1.5%, 20ml) + Bupivacaine (0.5%, 16ml) + Normal saline (2ml) of either sex posted for upper limb orthopaedic surgeries.

Results: Mean onset of sensory block in study cohort (5.738±0.1230 minutes) and control cohort (6.967±0.1282 minutes), mean onset of motor block in study cohort (9.845±0.1460 minutes) and control cohort (17.10±0.1626 minutes), mean duration of motor block in study cohort (383.7±2.222 minutes) and control cohort (184.2±1.697 minutes), mean duration of analgesia in study cohort (832.8±4.136 minutes) and control cohort (282.7±1.621 minutes).

Conclusion: We observed there was significant of faster onset of action and prolong duration of motor block and analgesia in (Dexamethasone) study cohort than in the other control cohort.

Keywords: Dexamethasone, Xylocaine, Bupivacaine, Supraclavicular Brachial Plexus Block.

I. Introduction

The surgeries of upper limb orthopaedic cases are usually done by Brachial plexus block with local anaesthetic drugs. Local anaesthetic agents alone had short duration of anaesthesia, for prolongation of anaesthesia different drugs have been used as adjuvants with local anaesthetics in brachial plexus block. Now a days, Dexamethasone has been studied as an adjuvant to local anaesthetics in peripheral nerve block [1,2]. Dexamethasone in bupivacaine microspheres has been shown to prolong peripheral nerve block in animals. [3]. It has been suggested that Dexamethasone may prolong block duration by increasing the activity of inhibitory potassium channels on Nociceptive C fibers [4] or by causing vasoconstriction via gluco corticoid receptor mediated nuclear transcription modulation [5].

Many authors believe that the block prolonging effect of dexamethosone is due to its local action and not a systemic one [6]. Local application of methyl prednisolone has been found to block transmission in c fibers but not in a and b fibers. The effect was reversible, suggesting a direct membrane action of steroids. Steroids might bring about this effect by altering the function of potassium channels in the excitable cell [7,8]. The safety of Dexamethasone use in a nerve sheath may raise some concerns. In animal experiments, repeated intrathecal injections of small dose Dexamethosone [9] and triamcinolone acetate [10] did not induce spinal neurotoxicity.

II. Methods

It is a retrospective cohort study the patients were matched into two cohorts, study cohort (Lignocaine + Bupivacaine + Dexamethasone) and control cohort (Lignocaine + Bupivacaine + Normal Saline). The medical records were reviewed by the authors following inclusion criteria were taken.

1. ASA Grade I and Grade II Patients
2. Patients aged between 18 and 70 years.

The following parameters were observed

1. Time for onset of sensory block
2. Time for onset of motor block
3. Duration of Motor Block
4. Duration of Analgesia
5. Complications / Side Effects if any
(Drowsiness, Pruritis, Nausea/ vomiting, Horner's syndrome, phrenic nerve palsy, Respiratory depression, Sign and symptoms of local anaesthetics toxicity etc),

Study Cohort Received : 1.5% Xylocaine (20 ml) + 16 ml of 0.5% Bupivacaine + 2ml of Dexamethasone (8mg)

Control Cohort Received : 1.5 % Xylocaine (20 ml) + 16 ml of 0.5% Bupivacaine + 2ml of Normal Saline.

III. Results

Table No : 1 Patient Demography

Characteristic	Study Cohort (Mean + SEM)	Control Cohort (Mean + SEM)	P value	Significance
Age (Years)	36.40 ± 2.156	40.27 ± 2.578	0.2546	Not Significant
Weight (Kg)	65.77 ± 1.814	65.03 ± 1.458	0.7538	Not Significant
Height (cm)	165.7 ± 1.539	167.5 ± 1.360	0.4023	Not Significant
Gender Distribution Male : Female	22 : 8	25:5		

Table No. 2 : Characteristics of Brachial Plexus Block

Characteristic	Study Cohort (Mean + SEM)	Control Cohort (Mean + SEM)	P value	Significance
Onset of Sensory Block (min)	5.738±0.1230	6.967±0.1282	<0.0001	Significant
Onset of Motor Block (min)	9.845±0.1460	17.10±0.1626	<0.0001	Significant
Duration of Motor Block	383.7±2.222	184.2±1.699	<0.0001	Significant
Duration of Analgesia	832.8±4.136	282.7±1.621	<0.0001	Significant

Data & Statistical Analysis :

A case report form was filled for each included patients with the following data extracted from the medical cohort : Gender, Age, Weight, Height, Diagnosis, Time of onset of sensory block, Time of onset of Motor block, duration of Motor Block, duration of Analgesia and complications / side effects.

The collected data was entered into Microsoft office excel – 2007 and data analysis was performed by using the statistical graph pad prism -6. The analysed data was presented as mean, standard error of Mean, data between study cohort and control cohort was analysed by using unpaired 't' test, to find out the differences between the two means of Two Cohorts. A p value <0.05 was considered as significant statistically.

Table I : Demographic characteristics were similar in both cohorts. Male: Female ratio observed in study cohort 22:8 and 25 :5 in control cohort.

Table II : We Observed. Mean onset of sensory block in study cohort was shorter (5.738 ± 0.1230 minutes) when compared with control cohort (6.967 ± 0.1282 minutes), which was statistically significant (P value <0.0001). Mean onset of motor block in study cohort was shorter (9.845 ± 1.460 minutes), when compared with control cohort (17.10 ± 0.1626 minutes), which was statistically significant (p value <0.0001). Mean duration of motor block was significantly more in study cohort (383.7 ± 2.222 minutes) than control cohort ($184. \pm 1.699$ minutes), which was statistically significant (p value <0.0001). Mean duration of analgesia time was significantly longer in study cohort (832.8 ± 4.136 minutes) than control cohort (282.7 ± 1.621 minutes).

There were no complications observed.

IV. Discussion

Regional anaesthesia has been increasing in popularity because it can be utilized for analgesia not only during the operative period, but during the post operative period as well and avoids complications of general anaesthesia and it is a simple, safe and effective technique. In this study Dexamethasone was used as an adjuvant in local anaesthetics the patients were matched and divided into two cohorts. Age, sex, height, weight

were similar in both groups. Mean onset of sensory block in study cohort was shorter (5.738 ± 0.1230 minutes) when compared with control cohort (6.967 ± 0.1282 minutes), which was statistically significant (P value <0.0001). Mean onset of motor block in study cohort was shorter (9.845 ± 1.460 minutes), when compared with control cohort (17.10 ± 0.1626 minutes), which was statistically significant (p value <0.0001). Mean duration of motor block was significantly more in study cohort (383.7 ± 2.222 minutes) than control cohort ($184. \pm 1.699$ minutes), which was statistically significant (p value <0.0001). Mean duration of analgesia time was significantly longer in study cohort (832.8 ± 4.136 minutes) than control cohort (282.7 ± 1.621 minutes).

It was compared and found similar with studies of Shrestha BR, Maharjan SK, Tabedar S, onset of action was 10 - 30 minutes in local anaesthetic group (mean 18.15 ± 4.25) and 10 - 20 minutes (mean 14.5 ± 2.10) in the local anaesthetic + steroid group. Duration of analgesia time of 2.30 - 4.00 hours (mean 3.16 ± 0.48) and in the steroid group 8.0 - 24 hours (mean 12.75 ± 5.33). They found statistically significant difference between two groups.

It was compared and results were near to the study of R.G. Pathak, Anand P. Satkar, Rajendra N Khade [11] et al were observed onset of sensory and motor block in local anaesthetic group was (6.6 ± 2.95 minutes) and (16.6 ± 5.11 minutes) and steroid group (5.92 ± 2.8 minutes) and (15.8 ± 5.6). Mean duration of analgesia in steroid group was (834 ± 78.1 minutes) and in local anaesthetic group was (276 ± 38.73 minutes). Statistically significant difference was observed between two groups.

V. Conclusion

In this study, addition of dexamethasone with local anaesthetic drugs in brachial plexus block, we observed early onset of sensory and motor block and significantly prolongs the duration of motor block and duration of analgesia in patients undergoing upper limb orthopaedic surgeries without significant side effects.

References

- [1]. 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
- [2]. Ali Movafegh, Mehran Razazian, Fatemeh Hajimaohamadi et al: Dexamethasone Added to Lidocaine Prolongs Axillary Brachial Plexus Blockade. *Anesth Analg* 2006; 102:263-7
- [3]. Lanz E, Theiss D, Jankovic D: The extent of blockade following various techniques of brachial plexus block. *Anesth Analg* 62:55-8, 1983
- [4]. Johansson A, Hao J, Sjölund B (1990) Local corticosteroid application blocks transmission in normal nociceptive C-fibres. *Acta Anaesthesiol Scand* 34: 335- 338.
- [5]. Marks R, Barlow JW, Funder JW (1982) Steroid-induced vasoconstriction: glucocorticoid antagonist studies. *J Clin Endocrinol Metab* 54: 1075-1077.
- [6]. Droger C, Benziger D, Gao F, Berde CB: Prolonged intercostals nerve blockade in sheep using controlled-release of bupivacaine and dexamethasone from polymer microspheres. *Anesthesiology* 1998; 89:969-74.
- [7]. Takimoto K, Levitan ES: Glucocorticoid induction of Kv1.5 K⁺ channel gene expression in ventricle of rat heart. *Circ Res* 75:1006-13, 1994
- [8]. Pennington AJ, Kelly JS, Antoni FA: Selective enhancement of an A type potassium current by dexamethasone in a corticotroph cell line. *J Neuroendocrinol* 6:305-15, 1994
- [9]. Latham JM, Fraser RD, Moore RJ, et al: The pathologic effects of intrathecal betamethasone. *Spine* 1997; 22:1558-62.
- [10]. Abram SE, Marsala M, Yaksh TL. Analgesic and neurotoxic effects of intrathecal corticosteroids in rats. *Anesthesiology* 1994; 81:1198-205.
- [11]. R. G. Pathak , Anand P. Satkar, Rajendra N. Khade : Supraclavicular brachial plexus block with and without Dexamethasone - A Comparative Study *International Journal of Scientific and Research Publications* , Volume 2, Issue 1 December 2012 ISSN 2250 - 3153 www.ijsrp.org.