



ORIGINAL RESEARCH PAPER

Anaesthesiology

SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK WITH OR WITHOUT DEXAMETHASONE AS AN ADJUVANT TO LIGNOCAINE + ADRENALINE : A COMPARATIVE STUDY

KEY WORDS:

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ABSTRACT

INTRODUCTION : Brachial plexus blocks are a good alternative to general anesthesia in upper limb surgeries by producing complete muscular relaxation, maintaining hemodynamic stability and the associated sympathetic block. It also provides extended postoperative analgesia. Different adjuvants have been described in literature to hasten the onset and prolong the duration of the block. The present study was conducted to study the effect of adding dexamethasone as an adjuvant to Lignocaine + Adrenaline 1.5% in USG guided supraclavicular Brachial plexus block.

AIM : To study the effect of dexamethasone on the onset and duration of Supraclavicular brachial plexus block when used as an adjuvant to Lignocaine + adrenaline 1.5%.

MATERIALS and METHODS : Total 50 patient of either sex aged between 18 to 60 years with American society of anesthesiology grading of I & II, scheduled for elective or emergency orthopedic surgery of upper limb below the shoulder. Patients were randomly divided in two groups; i.e. Group A and Group B. Group A received- Injection Lignocaine + Adrenaline 1.5% 15 ml. Group B received- Injection Lignocaine + Adrenaline 1.5% 15 ml + Injection Dexamethasone 2 ml (8 mg).

RESULT : The results showed that the onset of sensory and motor blockade was significantly faster in group B and the duration of the sensory and motor blockade was significantly longer in group B.

CONCLUSION : To conclude, the addition of 8mg of dexamethasone to Lignocaine + adrenaline 1.5% effectively and safely fastens the onset of sensory and motor blockade, increases the duration of sensory and motor blockade and decreases need of postoperative analgesia with hemodynamic stability.

INTRODUCTION:

Brachial plexus blocks are a good alternative to general anesthesia in upper limb surgeries by producing complete muscular relaxation, maintaining hemodynamic stability and the associated sympathetic block. It also provides extended postoperative analgesia with minimum side effect. It also decreases risk of aspiration as pharyngeal and laryngeal reflexes are intact and it also prevent postoperative complications associated with intubation.

There are various approaches for brachial plexus block but the supraclavicular approach is easy and consistent method for upper limb surgery below shoulder. Potential complications include pneumothorax (1-6% incidence), hemothorax, Horner's syndrome.

There are many drugs which have been tried as adjuvant with local anesthetic. i.e. Sufentanyl, Fentanyl, Tramadol, Morphine, Clonidine, Verapamil, etc. Recently use of steroids as adjuvant to local anesthetic is gaining popularity. Dexamethasone has been used as adjuvant in peripheral nerve blocks. It is potent and highly selective steroid. Various studies have been done using dexamethasone as an adjuvant. This study was carried out to evaluate the efficacy of dexamethasone in the onset of sensory and motor blockade as well as duration of analgesia.

MATERIAL AND METHODS:

SELECTION CRITERIA : After obtaining approval from institutional ethics committee, this study was conducted in orthopedic operation theater in our institute between 15th June 2019 to 15th October 2019. Total 50 patient of either sex aged between 18 to 60 years with American society of anesthesiology grading of I & II, scheduled for elective or emergency orthopedic surgery of upper limb below the shoulder.

EXCLUSION CRITERIA : Patient refusal, history of uncontrolled diabetes, renal and liver disease, pregnant patient and patient having inability to give informed consent were excluded from the study.

A written informed consent was obtained from each patient after explaining them about the study and techniques before their inclusion in this study in their own language which they understood. Pre anesthetic evaluation was done including detailed medical, surgical, past, personal and family history and thorough physical and systemic examination and all relevant investigations were done for all the patients.

Patients were randomly divided in two groups; i.e. Group A and Group B Group A received- Injection Lignocaine + Adrenaline 1.5% 15 ml

Group B received- Injection Lignocaine + Adrenaline 1.5% 15 ml + Injection Dexamethasone 2 ml (8 mg).

In the operation theatre, all parameters were attached (ECG, Pulse oximeter, NIBP). Baseline vitals were recorded. Oxygen at the rate of 2 litre/minute was administered through O2 mask. IV access was established in contralateral hand and drip (RL 500ml) was started. The procedure of the block was carried out under strict aseptic and antiseptic precaution with patient lying down in supine position, with arms at his/her side with head turned towards opposite side of the hand being blocked. Ring and sandbag were used. Landmarks such as Mid clavicular point, EJV, subclavian artery pulse were identified. With the help of USG machine, Supraclavicular brachial plexus was identified and 23 G 1.5 inch needle was introduced and directed caudally and medially and 15 ml LA with or without dexamethasone was injected after negative aspiration to prevent intravascular injection of drug.

Sensory and motor blocks of the median, radial, ulnar and musculocutaneous nerves were recorded at regular interval after the block.

Sensory block was assessed by pin prick and compared with the same stimulation on the contralateral hand.

Sensory block was graded as:
 Grade-0 – No sensation felt
 Grade-1 – Dull sensation felt
 Grade-2 – sharp pain felt

Motor block was assessed by thumb adduction (ulnar nerve). Thumb abduction (radial nerve), flexion of the elbow and pronation of forearm (musculocutaneous nerve) and thumb opposition (median nerve):

Scale used for motor block was modified Lovett rating scale

MODIFIED LOVETT RATING SCALE:

- Grade 6 - Normal muscular force
- Grade 5 - Slightly reduced muscular force
- Grade 4 - Pronounced reduction of muscular force
- Grade 3 - Slightly impaired mobility
- Grade 2 - Pronounced mobility impairment
- Grade 1 - Almost complete paralysis
- Grade 0 - Complete Paralysis

Onset of sensory block: Time between completion of Local anesthetic injection and loss of pain in pin prick test.

Onset of motor block: Time between completion of local anesthetic injection and complete paralysis.

Duration of sensory block: Time between complete sensory block and return of normal sensation.

Duration of motor block: Time between complete paralysis and complete recovery of motor function.

Note: At the end of surgery, vitals, response to command and duration of surgery was noted. Vitals were monitored post operatively every two hour and analgesia were assessed by visual analogue scale.

VAS - 0 (No Pain)
VAS - 8-10 (Worst Pain)
VAS - >4 (Rescue analgesia in form of injection diclofenac sodium 1.5 mg/kg was given.)

STATISTICAL ANALYSIS

Sample size calculation was done before patient recruitment based on a previous study.

All results were expressed in Mean±Standard Deviation (SD) or percentage as applicable. Statistical analysis was carried

out using Statistical package for social science for windows version 13.0. Statistical results were considered statistically significant where p value were less than 0.05.

RESULTS

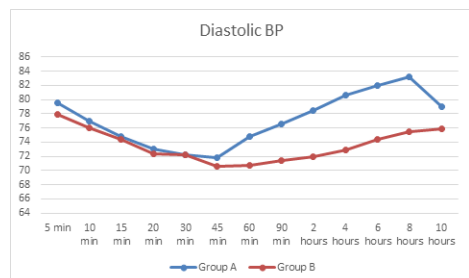
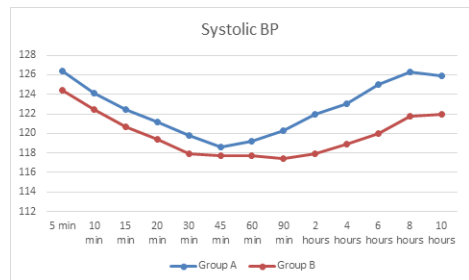
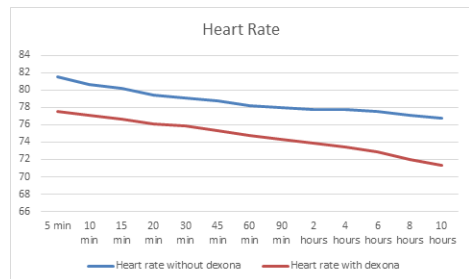
Demographic characteristics and duration of surgery were comparable in both the study groups.

	Group A (n=25) (M+SD)	Group B (n=25) (M+SD)
Age (Years)	37.56+4.014	38.2+4.036
Sex (Male/Female)	14/11	14/11
Weight (Kg)	69.8+4.067	70.16+3.882
Duration of surgery (minutes)	88+3.047	89+4.182

The mean time of onset of sensory blockade was 7.82 minutes (mean) in group A and 4.54 minutes (mean) in group B while the onset time of motor blockade was 11.28 minutes (mean) in group A and 7.5 minutes (mean) in group B.

	Group A (n=25) (Mean+SD)	Group B (n=25) (Mean+SD)	p value
Onset of sensory blockade (minute)	7.82+0.218	4.54+0.304	<0.0000001
Onset of motor blockade (minute)	11.28+0.31	7.5+0.299	<0.0000001
Duration of sensory blockade (minute)	334+8.982	524.8+14.184	<0.0000001
Duration of motor blockade (minute)	245.2+7.516	317.2+9.435	<0.0000001

The mean duration of sensory blockade was 334 minutes in group A and 524.8 minutes in group B while the duration of motor blockade was 245.2 minutes in group A while in group B it was 317.2 minutes.



DISCUSSION

Upper limb orthopedic surgeries are known to cause severe postoperative pain. Supraclavicular Brachial plexus block is conducted with anaesthetic agents for upper limb surgeries. It is not only an anaesthetic method that allows easier homeostatic control during surgery, but it also allows easier postoperative pain control. It is desirable both for surgeon and for anaesthesiologist to have prolonged analgesia. It provides a rapid, dense and predictable anesthesia for the entire upper extremity in the most consistent manner of any brachial plexus technique. It is the most effective block for all the portions of the upper extremity and is carried out at the "division" level of the brachial plexus; with high volume the "trunk" level of the plexus may also be blocked in this approach^[2,3,20]. The addition of Dexamethasone effectively produced earlier onset and longer duration of analgesia^[14]. Dexamethasone might bring about this effect by altering the function of potassium channels in excitable cells^[22]. Dexamethasone is not known to have any imminent effect on heart rate. Complications with a single dose of dexamethasone are rare and previous studies have determined that short-term use of dexamethasone was safe. In the present randomized study on comparison of heart rates, systolic and diastolic blood pressure in both groups at different time intervals, no statistically significant difference was observed. None of the patients had bradycardia or tachycardia, hypertension or hypotension following administration of Dexamethasone along with local anaesthetic agent. Our findings were similar with that of Shrestha et al^[13] who also found no significant difference in hemodynamic parameters on addition of dexamethasone to LA.

We demonstrated that the addition of dexamethasone to Lignocaine + adrenaline 1.5% in supraclavicular brachial plexus block makes sensory and motor onset earlier than plain local anaesthetic agent used. It may be due to synergistic action of dexamethasone with local anaesthetics on blockage of nerve fibres. Our findings correlated with different studies^[13,14,16,23]. In current study, prolonged duration of sensory and motor blockade was seen in group B than group A. The block prolonging effect may be due to its local action on nerve fibres and a systemic one^[24]. We observed that sensory block last longer as compared to motor block which was the same as observed by De Jong et al^[25].

CONCLUSION

To conclude, the addition of 8mg of dexamethasone to Lignocaine + adrenaline 1.5% effectively and safely fastens the onset of sensory and motor blockade, increases the duration of sensory and motor blockade and increases the duration of postoperative analgesia with hemodynamic stability.

REFERENCES

- (1) Nguyen HC, Fath E, Wirtz S, Bey T. Transscapular brachial plexus block: A new posterolateral approach for brachial plexus block. *Anesth Analg*. 2007; 105:872-875.
- (2) Lanz E, Theiss D, Jankovic D. The extent of blockade following various techniques of brachial plexus block. *Anesth Analg* 1983; 62:65-68.
- (3) Urmev W: Upper extremity blocks, in Brown D (ed): *Regional anesthesia and analgesia*. Philadelphia, W.B. Saunders Company, 1966; 254-278.
- (4) Kulenkampff D, Persky M. Brachial plexus anesthesia. Its indications, technique and dangers. *Ann Surg* 1928; 87:883-891.
- (5) Labat G: *Regional anesthesia. Its technique and clinical application*. Philadelphia, W.B. Saunders Company, 1922.
- (6) Vester-Andersen T, Christiannsen C, Hansen A, Sorensen M, Meisler C. Interscalene brachial plexus block: area of analgesia, complications and blood concentrations of local anesthetics. *Acta Anaesthesiol Scand* 1981; 25:81-84.
- (7) Wakhlo R, Gupta V, Raina A, Gupta SD, Lahori VU. Supraclavicular plexus block: Effect of adding tramadol or butorphenol as adjuncts to local anesthetics on motor and sensory block and duration of postoperative analgesia. *J Anaesth Clin Pharmacol* 2009; 25(1): 17-20.
- (8) Lalla RL, Anant S, Nanda HS. Verapamil as an adjunct to local anaesthetic for brachial plexus block. *MJAFI* 2010; 66:22-24.
- (9) Bezon HT. *Epidural steroids*. In: Raj PP, editor. *Pain medicine, a comprehensive review*. UK: Mosby Publication 1999; 259-263.
- (10) Glasser RS, Knego RS, Delashaw JB, Fessler RG. The perioperative use of corticosteroids and bupivacaine in the management of lumbar disc disease. *J Neurosurg* 1993; 78:383-387.
- (11) Mirzai H, Tekinl, Allincak H. Perioperative use of corticosteroids and

- bupivacaine combination in lumbar disc surgery, a randomised controlled trial. *Spine* 2002; 27:343-346.
- (12) Castillo J, Curley J, Hotz J et al. Glucocorticoids prolong sciatic nerve blockade in vivo from bupivacaine microsphere. *Anaesthesiology* 1996; 85:1157-1166.
- (13) 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 Assoc* 2007; 46(168):158-164.
- (14) 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): 285-288
- (15) Shrestha BR, Maharjan SK, Tabedar S. Supraclavicular brachial plexus block with and without dexamethasone - A comparative study. *Kathmandu University Medical Journal* 2003; 1:158-160.
- (16) Yadav RK, Sah BP, Kumar P, Singh SN. Effectiveness of addition of neostigmine or dexamethasone to local anaesthetic in providing perioperative analgesia following brachial plexus block: A Prospective Randomized double blinded, controlled study. *Kathmandu University Medical Journal* 2008; 6(23): 302-309.
- (17) Movafegh A, Razavian M, Hajimahomadi F, Meysami A. Dexamethasone added to lidocaine prolongs axillary brachial plexus blockade. *Anesth Analg* 2006; 102:263-267.
- (18) Parrington SJ, Donnell DO, Chan VWS, Shreves DE, Subramanyam R, Qu M, et al. Dexamethasone added with mepivacaine prolongs the duration of analgesia after supraclavicular brachial plexus blockade. *Reg Anesth Pain Med* 2010; 35:422-426.
- (19) Tandoc MN, Fan L, Kolesnikov S, Kruglov A, Nade ND. Adjuvant dexamethasone with bupivacaine prolongs the duration of interscalene block: a prospective randomised trial. *J anaesth* 2011; 25(5): 704-709.
- (20) Moore D: *Supraclavicular approach for block of the brachial plexus*, In Moore D (ed): *Regional block. A handbook for use in clinical practice of medicine and surgery*, 4th ed. Springfield, Charles C Thomas Publisher, 1981; 221-242.
- (21) Bromage PR and Gertel M. Improved brachial plexus blockade with Bupivacaine HCL and carbonated lidocaine. *Anesthesiology* 1972; 36:479-487.
- (22) Attardi B, Takimoto K, Gealy R et al: Glucocorticoid induced upregulation of a pituitary K+ channel mRNA in vitro and in vivo *Receptor Channels* 1993; 1:287-293.
- (23) Islam SM, Hossain MHMD, Maruf AA et al. Effect of addition of dexamethasone to local anaesthetics in supraclavicular Brachial Plexus block. *JAFMO Bangladesh*, 2011; 7(1).
- (24) Baxendale BR, Vater M, Lavery KM: Dexamethasone reduces pain and swelling following extraction of molar teeth. *Anaesthesia* 1993; 48:961-964.
- (25) De Jong RH, Wagman IH. Physiological mechanism of peripheral nerve block by local anaesthetics. *Anesthesiology* 1963; 24:684-727.