

ORIGINAL RESEARCH

A Clinical Comparison Between 0.5% Levobupivacaine and 0.5% Levobupivacaine with Dexamethasone 8 Mg Combination in Brachial Plexus Block by the Supraclavicular Approach: An Institutional Based Prospective Analysis

¹Dr. Sharad Srivastava, ²Dr. Keshav Dev Jagar

^{1,2}Assistant Professor, Department of Anaesthesia, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

Corresponding author

Dr. Keshav Dev Jagar

Assistant Professor, Department of Anaesthesia, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

Email: dr.kdjagar2004@gmail.com

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ABSTRACT

Background: A clinical comparison between 0.5% levobupivacaine and 0.5% levobupivacaine with dexamethasone 8 mg combination in brachial plexus block by the supraclavicular approach. **Materials & Methods:** A total of 20 subjects were enrolled. Ultrasound- guided supraclavicular brachial plexus (SCBP) block was given. Time for the first rescue analgesia, number of rescue analgesics required in 24 h and different block characteristics was assessed. Chi-square test and Student's t-test were used for statistical analysis. The results were analysed using SPSS software. P – value < 0.05 was considered as statistically significant. **Results:** A total of 20 subjects were enrolled. The request for first rescue analgesic was significantly earlier in Group S than Group D. In Group S, motor block- onset showed 10.42 min and in group D depicted 6.47 min. **Conclusion:** The addition of dexamethasone to levobupivacaine in SCBP blockade prolonged time for first rescue analgesia with prolonged duration of sensory and motor block.

Keywords: Levobupivacaine, Supraclavicular, Brachial Plexus.

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INTRODUCTION

Brachial plexus block is good alternative to general anesthesia for upper limb surgery. This avoids the unwanted effect of anesthetic drugs used during general anesthesia and the stress of upper airway instrumentation.¹ Various additives such as opioids, clonidine, and verapamil were added to local anesthetics to achieve quick, dense, and prolonged block, but the results are either inconclusive or associated with side effects.²⁻⁴ Steroids have powerful anti-inflammatory as well as analgesic property. They relieve pain by reducing inflammation and blocking transmission of nociceptive C-fibers and by suppressing ectopic neural discharge.⁵

Use of steroids as adjuvant to local anaesthetic drug in brachial plexus block is gaining popularity. Recently,

dexamethasone has been studied as an adjuvant to local anaesthetic in peripheral nerve block.⁶ Steroids have nerve block prolonging effects by blocking transmission of nociceptive myelinated c-fibres and suppressing ectopic neuronal discharge. They are also thought to alter the function of potassium channels in the excitable cells. Thus, dexamethasone was selected as an adjuvant to local anaesthetic (levobupivacaine) in this study because it has been reported to prolong duration of action of local anaesthetics with no respiratory depression.⁷ Levobupivacaine has less systemic toxicity than bupivacaine.⁸ Its limiting factors are late onset and limited duration of analgesia even when used with adjuvants like opioids that produce opioid-related side effects.⁹ Studies have shown that dexamethasone can prolong the effect of

regional anaesthesia.¹⁰ Dexamethasone as an adjuvant may avoid opioid-related side effects. There is very limited literature available regarding the use of dexamethasone as an adjuvant to levobupivacaine. Hence, this study was conducted to compare 0.5% levobupivacaine and 0.5% levobupivacaine with dexamethasone 8 mg combination in brachial plexus block by the supraclavicular approach.

MATERIALS & METHODS

A total of 20 subjects were enrolled. Ultrasound-guided supraclavicular brachial plexus (SCBP) block was given. They were divided into two groups. Group S (10 patients) received 2 mL normal saline with 25 mL levobupivacaine (0.5%) and Group D (10 patients) received 2 mL of dexamethasone (8 mg) with 25 mL of levobupivacaine (0.5%), respectively. Pre-anaesthetic evaluation was performed on the day

Table 1: Variables

Parameters	Group S	Group D	P – value
Age (year)	35.21	37.44	0.41
Gender (M/F)	8/2	7/3	0.28
Weight (kg)	62.5	64.9	0.32
Duration of surgery (min)	120.56	125.85	0.75

Table 2: Characteristics of brachial plexus block

Variables	Group S	Group D	P – value
Sensory block-onset (min)	6.23	3.18	0.000*
Motor block- onset	10.42	6.47	0.005*
Sensory block- duration (min)	185.20	450.84	0.001*
Motor block- duration (min)	155.85	315.74	0.007*
Time to request for first rescue analgesia	375.05	650.85	0.000*

*: Significant

DISCUSSION

While performing SCBP block by paraesthesia technique, many anaesthesiologists tend to use large volume (30–40 mL) of local anaesthetics to improve success rates and prolong sensory and motor block. However, this leads to complications such as phrenic nerve palsy and Horner's syndrome due to unusual spread, and also increases the chances of systemic local anaesthetic toxicity. Lower volume of local anaesthetics may produce either shorter duration of block or incomplete block. Ultrasound guided SCBP block enables adequate block with lower volume of local anaesthetic compared to blind techniques. Use of adjuvants such as dexamethasone may increase the duration of block without increasing the volume injected, and with minimal side effects.¹¹ Hence, this study was conducted to compare 0.5% levobupivacaine and 0.5% levobupivacaine with dexamethasone 8 mg combination in brachial plexus block by the supraclavicular approach.

In the present study, a total of 20 subjects were enrolled. The request for first rescue analgesic was significantly earlier in Group S than Group D. In Group S, motor block- onset showed 10.42 min and in group D depicted 6.47 min. A study by Baloda R et al, the results showed that the onset of sensory and motor

block were faster in group 2 ($p < 0.05$). The duration of sensory and motor block was significantly longer in group 2 ($p < 0.05$). VAS score at 12 hours were significantly lower in group 2 ($p < 0.05$). None of the patients had bradycardia, hypotension or any other side effects. Dexamethasone added to levobupivacaine for supraclavicular brachial plexus block reduces the time to onset of sensory and motor blockage and prolongs the duration of analgesia.¹²

RESULTS

A total of 20 subjects were enrolled. The request for first rescue analgesic was significantly earlier in Group S than Group D. In Group S, motor block-onset showed 10.42 min and in group D depicted 6.47 min. Time to request for first rescue analgesia in group S shows 375.05 min and group D 650.85 min. This difference in both groups was statistically highly significant ($P < 0.001$).

In the present study, time to request for first rescue analgesia in group S shows 375.05 min and group D 650.85 min. This difference in both groups was statistically highly significant ($P < 0.001$). A study by Pani N et al, time for request of the first rescue analgesia was 396.13 ± 109.42 min in Group S and 705.80 ± 121.46 min in Group D ($P < 0.001$). The requirement for rescue analgesics was more in Group S when compared to Group D. The onset of sensory and motor block was faster in Group D when compared to Group S. The mean duration of sensory and motor block was significantly longer in Group D than Group S. The addition of dexamethasone to levobupivacaine in SCBP blockade prolonged time for first rescue analgesia and reduced the requirement of rescue analgesics with faster onset and prolonged duration of sensory and motor block.¹³ Many

adjuvants to local anaesthetics such as clonidine, tramadol, dexmedetomidine and neostigmine have been studied in brachial plexus block, but each drug has its own side effects.¹⁴ Recently, dexamethasone, a long-acting glucocorticoid has proven its efficacy as an adjuvant to local anaesthetics in brachial plexus block.¹⁵ It produces vasoconstriction and reduces the absorption of local anaesthetics and thereby prolongs the action of local anaesthetics.¹⁶ Many other studies reported the prolonged duration of sensory and motor block when dexamethasone was used as an adjuvant with bupivacaine and lignocaine in brachial plexus block, but they differed regarding the onset of sensory and motor block.^{17,18} Shrestha et al., confirmed that addition of dexamethasone leads to significantly faster onset of action and prolonged duration of analgesia for brachial plexus block, without any unwanted side effects.¹⁹ However, Movafegh et al., observed that the onset times of sensory and motor block were similar on adding dexamethasone to Lidocaine in Axillary Brachial Plexus Blockade.²⁰ Kpacz et al.²¹ reported that intercostals injection of dexamethasone containing bupivacaine microcapsules produces prolonged duration of anesthesia and analgesia in healthy human volunteers. They also concluded that there is a causative relationship between the suppression of inflammation and the remarkably longer duration action. The mechanism of action is not clearly understood when corticosteroids as an adjuvant to local anesthetics for peripheral nerve blocks. The block prolonging effect may be due to its local action of nerve fibers and not a systemic one.²¹ However, Baxender et al.²² concludes that analgesic properties of corticosteroids are the result of their systemic effect. According to the traditional theory of steroid action, steroids bind to intracellular receptors and modulate nuclear transcription.

CONCLUSION

The addition of dexamethasone to levobupivacaine in SCBP blockade prolonged time for first rescue analgesia with prolonged duration of sensory and motor block.

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