Research Article

Estimation of Duration of Analgesia in Patients Being Administered With 0.25% Levobupivacaine: A Cross Sectional Observational Study in a Medical College Of Trans-Himalayan Region

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Abstracts: Various local anaesthetic agents like bupivacaine, levobupivacaine, ropivacaine and lignocaine have been used with safety and efficacy in performing such blocks. Out of various agents which are used for brachial plexus block, levobupivacaine is the agent which not only prolongs motor and sensory blockade but is also less cardiotoxic and neurotoxic. The study was done with an objective to estimate the duration of analgesia and the requirement of rescue analgesia post operatively. We also intended to study the intra-operative cardiovascular stability by assessing the heart rate and mean arterial pressure of the study participants. There were 30 study participants who were provided with 0.25% Levobupivacaine plus dexamethasone 4 mg. The mean duration of the surgery was 41.6 (SD=11.64) minutes. The mean duration of the pain free period was 229 minutes (95% Confidence Interval: 222.75 -243.5). Our study also observed that requirement of rescue analgesia was 4 with a range from 3.0 -4.0. In conclusion, the use of 0.25% levobupivacaine with dexamethasone (4 mg) as adjuvant in USG guided supraclavicular brachial plexus block resulted in smooth induction of analgesia, with a pain free period of nearly 4 hours. The requirement for rescue analgesia is delayed. This anaesthetic has also been found to maintain cardiovascular stability. Further studies are required to assess the relative efficacy of this anaesthetic.

Key Words: Effectiveness, Levobupivacaine 0.25%, Dexamethasone, Analgesia.

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INTRODUCTION

Recent years have witnessed increasing interest in postoperative pain management. The aim of postoperative pain management is to provide subjective comfort in addition to inhibiting trauma-induced nociceptive impulses to blunt autonomic and somatic reflex responses to pain.

Brachial plexus block remains the only practical alternative to general anaesthesia for significant surgery in the upper limb. It provides a superior quality of anaesthesia and avoids the common side-effects associated with general anaesthesia such as postoperative nausea and vomiting. The brachial plexus supraclavicular block is extremely useful in patients with significant co-morbidities such as severe respiratory and cardiovascular disease, morbid obesity and in those with potential airway difficulties.

These blocks are therefore particularly useful in the ambulatory surgical setting for a wide variety of patients and procedures.1 Various local anaesthetic agents like bupivacaine, levobupivacaine, ropivacaine and lignocaine have been used with safety and efficacy in performing such blocks.2 Local anaesthetic preferentially binds to the inactivated state of voltage gated sodium channels, but has also been found to bind potassium channels, G-protein coupled receptors, N-methyl-D-aspartate (NMDA) receptors, and calcium channels in vitro.3 Concentration of local anaesthetic which has been used for a blockade of different local anaesthetics varies from 0.5%, 0.25% and 0.375%. It has been observed that it is not the concentration but volume that affects the effective dose of local anaesthetic.4

Out of various agents which are used for brachial plexus block, levobupivacaine is the agent which not
only prolongs motor and sensory blockade but is also less cardiotoxic and neurotoxic. The study was done with an objective to estimate the duration of analgesia and the requirement of rescue analgesia post operatively after inducing the patient with 0.25% of levobupivacaine and adjuvant 4mg dexamethasone. We also intended to study the intra-operative cardiovascular stability by assessing the heart rate and mean arterial pressure of the study participants.

**METHODOLOGY**

**Study design**
Observational Cross-sectional study

**Study Site**
Department of Anaesthesia, Dr RPGMC Kangra at Tanda

**Inclusion criteria**
1. Males and females between the age group 18-60 years.
2. ASA physical class I-II.
3. Body Mass Index 18.5-29.9 kg/m2
4. Patients who underwent open reduction and internal fixation for fractures of lower end humerus and forearm bones

**Exclusion criteria**
1. Patients on steroids
2. Body Mass Index>30 kg/m2
3. Local infections or anatomic deformities
4. Coagulation disorder and allergy to local anaesthetics

**Randomization**
Randomization was done by computer generated randomized number table. Random numbers were enclosed in a sealed opaque envelope and opened by one of the investigators to know the study drug/combination to be administered, only after shifting of patient inside operation theatre. Observer anaesthesiologist who collected the postoperative data was blinded to the test.

**Statistical Analysis**
The data was collected and cleaned using MS Excel 2010 and statistical analysis was done using SPSS software 21. The One-Sample Kolmogorov-Smirnov Test was used for assessing the data distribution in the study. The quantitative data was expressed using mean and standard deviation. The qualitative data was expressed in frequencies and proportions.

**RESULTS**
There were 30 study participants who were provided with 0.25% Levobupivacaine plus dexamethasone 4 mg. The mean age group of the study participants was 41.6 (SD=11.64) years. There were 50% females and 50% males, in a male to female ratio of 1:1. The mean duration of the surgery was 40.93 (SD=17.90) minutes.

The mean duration of the pain free period was 229 minutes (95% Confidence Interval: 222.75-243.5). Our study also observed that requirement of rescue analgesia was 4 with a range from 3.0-4.0. Intra-operatively the mean heart rate in beats per minute at the baseline was 82, the mean heart rate 5 minutes after the induction of anaesthesia was 81 which further reduced to 80 after 15 minutes, 78 after 25 minutes, 78 after 35 minutes, 77 after 45 minutes, and 78 after one hour. There was a slight rise in the mean heart rate after 90 minutes after which the heart rate further increased to 80 beats per minute 2 hours after the induction.(Table 1)

Table 1: Mean Heart Rate (In Beats per Minute) Of the Study Participants during the Intraoperative Period (N=30)

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>82.17</td>
<td>10.68</td>
</tr>
<tr>
<td>5 min</td>
<td>81.23</td>
<td>10.08</td>
</tr>
<tr>
<td>10 min</td>
<td>81.13</td>
<td>9.52</td>
</tr>
<tr>
<td>15 min</td>
<td>80.10</td>
<td>8.98</td>
</tr>
<tr>
<td>25 min</td>
<td>78.73</td>
<td>8.92</td>
</tr>
<tr>
<td>35 min</td>
<td>78.73</td>
<td>8.80</td>
</tr>
<tr>
<td>45 min</td>
<td>77.19</td>
<td>8.66</td>
</tr>
<tr>
<td>60 min</td>
<td>78.70</td>
<td>9.22</td>
</tr>
<tr>
<td>90 min</td>
<td>79.82</td>
<td>10.49</td>
</tr>
<tr>
<td>120 min</td>
<td>80.00</td>
<td>9.41</td>
</tr>
</tbody>
</table>

Furthermore, the mean arterial pressure in mm of Hg was 91.57 at the baseline which further decreased to 89.7 mm Hg, 5 minutes after the induction of anaesthesia. The Mean arterial pressure decreased to 82.1 after 10 minutes, was 90.37 after 15 minutes, 89.30 after 25 minutes, 87 after 45 minutes, and 94.4 after 2 hours. (Figure 1).
DISCUSSION

In our study, time from completing block to the time to first rescue analgesia demanded (VAS>3) was taken as total duration of analgesia. In our study, median duration of analgesia was 567.00 minutes. In a study by Pani et al, duration of analgesia in patients who received 0.25% levobupivacaine and 4mg dexamethasone was 695 minutes. However, they administered analgesia only if VAS was more than 5 as compared to more than 3 as in our study. In a study by Mankad et al., duration of analgesia was 12.56 hours in the patients who received 30 mL of 0.5% levobupivacaine. In our study, median dose of total doses of rescue analgesia was 150 mg. In the study by Hashim and Hassan, mean total dose of rescue analgesia was 84.1 mg, 110.5 mg, and 170 mg in group DB (dexametomidine and bupivacaine), KB (ketamine and bupivacaine), and FB (fentanyl and bupivacaine). In their study, they have used VAS more than 4 for administration of rescue analgesia. We observed that with levobupivacaine 0.25% in USG guided supraclavicular block with 4 mg dexamethasone as perineural adjuvant, patients started complaining discomfort at the site of tourniquet application after 30 minutes approximately. Therefore, we used 0.25% levobupivacaine in superficial surgeries with duration lasting less than 60 minutes, and in surgeries where tourniquet application was not required.

In another study, when patients were administered with bupivacaine 0.5%, duration was 1053 min (802–1304 min); in levobupivacaine 0.5% group, duration was 1001 min (844–1158 min); and levobupivacaine 0.25% group had duration of 707 min (551–863 min) [P=0.01]. The authors recommended levobupivacaine 0.5% instead of bupivacaine 0.5% for the three-in-one block as supplement to spinal or general anaesthesia.

Similarly, Raj et al., evaluated the efficacy of tramadol or dexamethasone as an adjuvant to levobupivacaine in low volume ultrasound-guided supraclavicular brachial plexus block. The mean duration of analgesia was 1300.83 ±336 min and 820.47 ±239 min in patients administered with 0.25% of levobupivacaine with Tramadol and Dexamethasone, respectively.

CONCLUSION

In conclusion, the use of 0.25% levobupivacaine with dexamethasone (4 mg) as adjuvant in USG guided supraclavicular brachial plexus block resulted in smooth induction of analgesia, with a pain free period of nearly 4hours. The requirement for rescue analgesia is delayed. This anaesthetic has also been found to maintain cardiovascular stability. Further studies are required to assess the relative efficacy of this anaesthetic.

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