An analytical study and comparison of ultra-sound supraclavicular brachial plexus block with nerve stimulator

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Abstract

Present was aimed at contrasting supraclavicular brachial plexus block by utilizing nerve incitement and ultrasound guided procedures for upper appendage medical procedures. This examination was done with the target of looking at the supraclavicular brachial plexus block by utilizing nerve incitement and ultrasound guided methods for upper appendage medical procedures as far as square execution time, season of beginning of tactile and engine block, time to accomplish total square, achievement pace of square methodology, term of tangible and engine block, rate of complexities, time to first pain relieving demand. Hundred patients, matured 18-60 years, ASA grade I and II of either sex posted for elective upper appendage medical procedures were arbitrarily isolated into two sets, set US (n=50) and set NS (n=50). Information were broke down utilizing IBM SPSS Statistics programming. The parametric information were broke down with unpaired "t" test and the nonparametric information were examined with Chi-square test.

Keywords: Supraclavicular brachial plexus block, nerve stimulator, ultra-sound guidance, upper limb surgeries

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1 Introduction:

In 1912, Kulenkampff [1-2] first depicted the traditional supraclavicular method to deal with the brachial plexus. Supraclavicular brachial plexus block gives reliably viable territorial sedation to the furthest point. The brachial plexus square can be performed by ordinary, nerve trigger (NS) guided or ultrasound (US) guided procedure. The old style of approach - paraesthesia method is a visually impaired strategy related with higher disappointment rate and injury to nerves and vascular structures [3]. Peripheral nerve stimulator was introduced in 1962 [4] allowing better localization of the nerves/plexus [5-6]. However, also had diligent danger of injury to encompassing structures particularly vascular structures nerves and pleura prompting pneumothorax [7,8].

Thus, this examination was intended to think about nerve trigger guided method and ultrasound guided procedure of supraclavicular brachial plexus block for upper limb surgeries.

AIMS OF THE STUDY

This study was carried out with to compare supraclavicular brachial plexus block by using nerve stimulation and ultrasound guided techniques for upper limb surgeries in terms of

1. Block execution time

2. Time of commencement of sensory and motor block
3. Time to attain whole block
4. Achievement rate of block procedure.
5. Duration of sensory and motor block.
7. Time to first analgesic request.

MATERIALS AND METHODS
Subsequently agreement by the IRB group all,100 patients who satisfied the inclusion were selected.

Equipment’s prepared: A portable sterile tray containing:

a. Disposable syringes of 10 ml
b. Disposable 23G 60 mm needle (set US) or insulated needle (setNS)
c. Bowls containing povidone iodine, spirit and normal saline solutions.
d. Sponge holding forceps.
e. Sterile towel and towel clip.
f. Drugs injection 1.5% lignocaine with 1:200000 adrenaline 20 ml and injection 0.5% bupivacaine 10ml.

No calm is assumed till assessment of the block is finished.

Inclusion criteria:
➢ All Patients irrespective of gender
➢ Patient should have age of more than 18 years
➢ Patients who are willing to participate

Exclusion Criteria:
➢ Patients who are treating on OP basis
➢ Pediatric patients and Pregnant women are excluded from this study
➢ Patients who are not willing to participate

PROCEDURE
Set US: - A Sonosite Micromax straight probe (6- 13 MHz) have utilized for leading those pieces. Those probes might have embedded under An sterile plastic sheath should support sterility. It has afterward set in the coronal angled plane in the supraclavicular fossa. Those subclavian arteries, vein, and the brachial plexus were imagined. The brachial plexus and its relationship of the encompassing structures were scanned. The plexus might have identifier superolateral of the subclavian supply route reliably On the whole those cases. Next, a 23 G 60 mm needle was connected to a 10 cm extension line and primed with the drug. It was inserted using in-plane approach and the needle movement was observed in real time.

Set NS: - In this set, the optimistic conductor of the NS is attached to an ECG principal and stuck on the Ipsilateral arm. That subclavian supply route might have been then palpated and instantly parallel will it, a 23G insulated needle appended of the negative cathode of the NS might have been embedded in a backward, inward, Also descending course. NS has set on convey a current about 2 mA in the interior mode.
After finger flexion have inspired with stimulation, the current might have been lessened over steps about 0.2 mA till the vicinity of a muscle twitch for 0.5 mA have watched and no twitch with An present for 0.2 mA have watched. This confirms the vicinity of the needle tip of the nerve and the drug has injected after negative desire. for air or blood. Hemodynamic monitoring was carried out at every 5 minutes interval up to 15 minutes and from 30 up to 300 minutes at every 30 minutes.

Following parameters were noted:

**Block execution time:** 1. In the situated US, it will be computed from the long haul of beginning examining of the evacuation of the needle.

2. In the situated NS, it is from those occasion when by insertion of the needle with its evacuation.

**Commencement by tactile blockade:** It have evaluated Toward pin prick each 2 min till the onset of tangible piece. The time starting with those evacuation of piece needle of the period At the tolerant To begin with says he/she need diminished sensation The point when contrasted with those inverse appendage.

**Commencement for engine blockade:** Those onset by engine barricade have evaluated each 2 mins. It will be those long run of evacuation of the square needle of the chance. The point when the tolerant needed shortcoming by whatever of the three joints − Shoulder, elbow, alternately wrist, upon attempting will perform dynamic developments.

**Factual Analysis:** information were broke down utilizing IBM SPSS detail programming. The parametric information were investigated with unpaired “t” test and the nonparametric information with Chi-square test.

**Perceptions and results**

Contemplate for 100 cases of supraclavicular brachial plexus square might have been done with nerve stimulator strategy (set NS) Furthermore ultrasonography guided system (set US). Perception and outcomes are summarized for tabulated type And depicted underneath.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Set US n=50</th>
<th>Set NS n=50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>32.7±9.80</td>
<td>32.8±10.3</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>60±6.2</td>
<td>59±6.4</td>
</tr>
<tr>
<td>Sex (M:F)</td>
<td>37:13</td>
<td>35:15</td>
</tr>
<tr>
<td>ASA grade (I:II)</td>
<td>38:12</td>
<td>40:10</td>
</tr>
<tr>
<td>Surgical Duration (min)</td>
<td>92.6±23.19</td>
<td>95±23.23</td>
</tr>
</tbody>
</table>

This table shows the non-substantial alteration among both sets as regard age, sex, body weight, ASA grade and surgical duration. (p>0.05)
Table-II Features of block

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Set US n=50</th>
<th>Set NS n=50</th>
<th>P value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block execution time (min)</td>
<td>4.02±0.96</td>
<td>7.56 ± 1.05</td>
<td>&lt;0.0001</td>
<td>HighlySignificant</td>
</tr>
<tr>
<td>Commencement of sensory block (min)</td>
<td>2.72 ± 0.99</td>
<td>6.05 ± 0.90</td>
<td>&lt;0.0001</td>
<td>HighlySignificant</td>
</tr>
<tr>
<td>Commencement of motor block (min)</td>
<td>6.06 ± 1.41</td>
<td>11.30 ± 0.84</td>
<td>&lt;0.0001</td>
<td>HighlySignificant</td>
</tr>
</tbody>
</table>

This table II shows that block execution time as well as time of sensory and motor block were shorter in set US than set NS.

Chart-I: Characteristics of block

Table III-Success Rate of the block

<table>
<thead>
<tr>
<th>Assessment of block</th>
<th>Set US</th>
<th>Set NS</th>
<th>P value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful</td>
<td>49 (98%)</td>
<td>46 (92%)</td>
<td>0.169</td>
<td>Non Significant</td>
</tr>
<tr>
<td>Failed</td>
<td>1</td>
<td>4</td>
<td>(Chi square test)</td>
<td>Significant</td>
</tr>
</tbody>
</table>

This table III shows that failure of block resulted in 1 patient in set US and 4 patients in set NS and are supplemented with general anesthesia.

Chart-II: Success rate of block
Table IV- Time to achieve complete block

<table>
<thead>
<tr>
<th>Duration (min)</th>
<th>Group US n=49</th>
<th>Group NS n=46</th>
<th>P value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.92 ± 1.11</td>
<td>17.07 ± 1.08</td>
<td>&lt;0.0001</td>
<td>Highly Significant</td>
<td></td>
</tr>
</tbody>
</table>

This table IV shows that time to attain whole block was shorter in set US than set NS and was statistically significant.

Chart-III: Time to attain whole block

Table V Period of anaesthesia and analgesia

<table>
<thead>
<tr>
<th>Time (Minutes)</th>
<th>Group US n=49</th>
<th>Group NS n=46</th>
<th>P value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of motor block</td>
<td>196.04±19.81</td>
<td>174.76±15.45</td>
<td>&lt;0.0001</td>
<td>Highly Significant</td>
</tr>
<tr>
<td>Duration of sensory block</td>
<td>230.57±19.73</td>
<td>195.85±15.00</td>
<td>&lt;0.0001</td>
<td>Highly Significant</td>
</tr>
<tr>
<td>Time to 1&lt;sup&gt;st&lt;/sup&gt; analgesic request</td>
<td>269.59±17.01</td>
<td>237.32±15.99</td>
<td>&lt;0.0001</td>
<td>Highly Significant</td>
</tr>
</tbody>
</table>

This table V shows that mean duration of sensory block and motor block and period to 1<sup>st</sup> analgesic request are suggestively lengthier in set US as associated to set NS (p<0.0001).

DISCUSSION

This study evaluated the benefit of two techniques: Ultrasound or Nerve Stimulator. In our study both sets were comparable in terms of heart rate, systolic and diastolic blood pressure, breathing rate and oxygen capacity of the patients and found to be stable. Our data correlated with studies done by M.Veeresham et al [12] and Singh G et al [13]. The mean block execution time was significantly less in set US, 4.02±0.96 min as compared to set NS, 7.56 ± 1.05 min. (p < 0.0001)14-17. The mean commencement period for sensory and motor block is initiated meaningfully less for set US, 2.72 ± 0.99 min and 6.06 ± 1.41 min as compared to set NS ,6.05 ± 0.90 min and 11.30 ± 0.84 min respectively.(p<0.0001)18-19. In our study, we found that time to attain whole block is 12.92±1.12 min in set US which was shorter as compared to 17.07±1.08 min in set NS. (p < 0.0001). The block is efficacious in 98% of patients in set US associated to 92% in NS set. The mean period of sensory and motor block is 230.57±19.73 minutes and 196.04±19.81 minutes in US set was found significantly prolonged compared to 195.84±15.00 minutes and 174.76±15.45 minutes in NS set.(p<0.0001) Ru pera KB et al [14] initiate that mean period of sensory and motor block in US set is 5.29 ± 0.82 hours and 5.05 ± 0.67 hrs and in PNS group, it was 4.73 ± 0.81 hours and 4.58 ± 0.73 hours. In our study, time to primary pain-relieving request in cluster US was 269.59±17.01 minutes which was more than 237.33±15.99 notes in the assembly NS. This is statistically important (p<0.0001)20-21. William SR et al[11] also conducted comparable learning by means of the same drug amalgamation and the duration is 846 ± 531 min and 652 ± 473 min in the sets US and NS, respectively.

COMPLICATIONS22-23:  
By our investigation not a solitary muddling might have been recognized for us gathering similarly as contrasted with aggregation NS; in that occurrence by channel puncture might have been 4%.

CONCLUSION
Ultrasound guided technique was more effective than nerve stimulator guided technique for supraclavicular brachial plexus lump in relations of block execution time, commencement and period of corporeal and motorized lab, period to achieve complete block, achievement rate, spell to first analgesic request and incidence of complications.

References
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