

A Comparison between Ultrasound Guided and Conventional Technique of Brachial Plexus Blockade by Infraclavicular Approach

Megha GH¹, Kamala GR²

^{1,2}Associate Professor, Department of Anesthesiology, Basaveswara Medical College Hospital and Research Center, Chitrdurga, Karnataka 577501, India

Abstract

We conducted a study, in a prospective, randomized, comparative study, we compared the ultrasound guided technique with conventional technique for brachial plexus block by the infraclavicular approach. Brachial plexus block by infraclavicular approach was performed in 60 patients of ASA Grade I and II posted for upper limb surgeries below the mid arm. The patients were randomly allocated into two Groups. In Group USG, block was performed under ultrasound real time image guidance and in Group CT, block was performed by manual conventional technique. Aim of the study was to compare the performance time, number of attempts, onset of sensory anesthesia and motor block, success rate, duration of action (post-operative first analgesia required), complications and patient compliance during procedure with ultrasound (USG) guided and conventional technique (CT) brachial plexus block by infraclavicular approach^{1,2,3}.

Keywords: Ultrasonography; Infra clavicular block; Supraclavicular block; Versus; Conventional technique.

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Introduction

In recent year, there has been growing interest in the development of ultrasound guided brachial plexus blocks mainly because of advancement in the technology that has led to the development of USG real time images with higher success rate, less patient discomfort and minimal complications.

There is also high chance of Pneumothorax that can result from puncture of pleura. Inadvertent epidural, subarachnoid or subdural injection can occur with interscalene and supraclavicular approaches. The above mentioned complications

are very less with infraclavicular block that has been shown by many studies.⁴⁻⁷

Hence in our institution we decided to compare the ultrasound *v/s* conventional technique brachial plexus block by infraclavicular approach. In the present study, brachial plexus blockade by infraclavicular approach was compared between ultrasound guidance and conventional technique with regards to:

- Block performance time;
- Number of attempts;
- Patient compliance during block performance;

Corresponding Author: Kamala GR, Associate Professor, Department of Anesthesiology, Basaveswara Medical College Hospital and Research Center, Chitrdurga, Karnataka 577501, India

E-mail: drvenurp@gmail.com

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- Onset of sensory anesthesia and motor block;
- Success rate;
- Duration of action (post-operative first analgesia required).^{8,9}

Materials and Methods

Inclusion Criteria

- The study population included pts of either sex, ASA Grade I and II in the age range of 18–65 yrs, all patients were in patients with written informed consent;
- All pts were posted for upper extremity surgeries distal to mid arm and received a brachial plexus block by infraclavicular approach.

Exclusion Criteria

- Patients refusal;
- With local site infection;
- Pts with coagulopathies;
- ASA Grade 3 and 4.

Sample size and sample technique

Sixty patients (30 in each group). It is a Prospective Randomized selection of cases.

Group USG (30 cases): Performance of the brachial plexus blockade by infraclavicular approach was done under ultrasound guided imaging technique using high frequency (12 Hz) linear probe.

Group CT (30 cases): Performance of the brachial plexus blockade by infraclavicular corocoid process approach was done under conventional technique (2 cm medial and caudal to rocoid process). Nerve stimulation of posterior cord (radial nerve stimulation) was sort by observing extensor response in the wrist and fingers.⁷

Data collection technique and tools

It is an observational study, in which parameters like patient compliance, block performance time, number of needle attempts, onset of action, duration of analgesia and complications were considered.

Data analysis

The information collected regarding all the selected cases were recorded in a Master Chart. Data

analysis was done with the help of computer using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta.

Using this software range, frequencies, percentages, means, standard deviations, Chi-square and 'p' values were calculated. Kruskal Wallis Chi-square test was used to test the significance of difference between quantitative variables and Yate's Chi-square test for qualitative variables. A 'p' value less than 0.05 is taken to denote significant relationship.

Results

- Block performance time and needle attempts were significantly less in USG Group in comparison to CT Group ($p < 0.0001$ for both).
- Patient compliance during performance of block was also better with USG Group compared to CT Group ($p < 0.0001$).
- Patient in USG Group had an early onset of sensory block ($p < 0.0001$) with a longer duration of analgesia ($p < 0.0001$) and higher success rate compared to CT Group. More number of patients in USG Group developed dense block (*i.e.*, muscle power 0) compared to NS Group which is statistically highly significant ($p < 0.0001$).
- More number of Patients in CT Group required supplemented analgesia compared to USG Group ($p = 0.0727$, not significant statistically).
- Vascular punctures (pricks) and hematoma formation were higher in CT Group compared to USG Group ($p = 0.609$, not significant statistically).
- No patient had pneumothorax, local anesthesia toxicity or nerve damage in either of the group.

Hence we conclude that ultrasound guided technique has numerous advantages over conventional technique for brachial plexus blockade by infraclavicular approach like less block performance time, minimal needle attempts, better patient compliance, early onset of sensory anesthesia and motor block, longer duration of sensory analgesia, higher success rate with less requirement of supplementary analgesia and less complications.

Discussion

Ultrasound guided technique in comparison to the conventional technique is associated with less block performance time, minimal needle attempts, better patient compliance, early onset of sensory anesthesia and motor block, longer duration of sensory analgesia, and a higher success rate.¹⁰ It was also found to have less requirement of supplementary analgesia and with an overall lower complication rate though not statistically significant compared conventional technique for brachial plexus block by infraclavicular approach.¹¹⁻¹³

1. Use of USG real-time images in infraclavicular approach increases accuracy of optimal spread of local anesthetic.
2. Patient compliance is shown to be better with titrated dose of I.V. fentanyl and I.V. midazolam prior to block.
3. Local anesthetic deposition at posterior cord and subsequent 'U' shaped spread of local anesthetic guarantees higher success rate.
4. Higher level of safety is ensured under real time image as you can avoid pneumothorax and intravascular injections.
5. Redirecting block needle under real time image to individual nerves is possible if favourable spread not seen at initial attempt.
6. Use of infraclavicular approach would be preferred in situations like cervical cord injury with Philadelphia collar and in cases of burns involving neck region¹⁴.

Abbreviations

- USG - Ultrasonography;
ICB - Infra clavicular block;
SCB - Supraclavicular block;
vs - Versus;
CT - Conventional technique.

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