Original Research Paper

Volume-9 | Issue-3 | March-2019 | PRINT ISSN - 2249-555X

Anesthesiology

A RANDOMIZED COMPARATIVE STUDY OF ANESTHETIC TIME IN ULTRASOUND GUIDED AXILLARY BLOCK VERSUS INFRACLAVICULAR BLOCK

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ABSTRACT

INTRODUCTION: Brachial plexus block for upper limb surgeries is devoid of side effects such as somnolence, nausea, vomiting, hemodynamic instability and voiding difficulties encounterd to general anesthesia.

Aim: To compare the anaesthetic time of ultrasound guided axillary and infraclavicular approach of brachial plexus block

MATERIALS & METHODS: Sixty patients of ASA grade I and II posted for upper extremity surgeries were randomly assigned into two groups, GroupA and Group I

group A: received Axillary block,

group I: received Infraclavicular block.

Surgeries below the level of elbow were selected for this study.

Parameters observed were – block performance time, time of onset of sensory and motor blockade

RESULTS: Ultrasound-guided infraclavicular block can reduce the performance time compared to ultrasound-guided axillary block and there was no significant difference in the success rate. As the block onset time in infraclavicular approach was longer, there were no differences found between the total anesthetic times between the two groups.

CONCLUSION: From our study it is concluded that under ultrasound guidance, infraclavicular block was faster to perform than the axillary approach. But the block onset was slower with the infraclavicular approach

KEYWORDS :

INTRODUCTION

Many approaches can be used for brachial plexus block; axillary, supraclavicular and infraclavicular approaches. They were commonly performed by blind techniques or neurostimulation or using ultrasound guidance. supraclavicular block is fast and the blockade is deep as the nerves are very tightly packed but pneumothorax can occur due to the proximity of the pleura. Pneumothorax can be avoided by ultrasonic visualization of the pleura and by proper technique. Infra clavicular brachial plexus block was first described by Bazy in the early 20th century and was even included in LABAT's text book: regional anesthesia in 1922.[1] In 1998 WILSON et al[2]described infraclavicular coracoid technique –In the past few years infraclavicular block has become a method of increased interest. This block targets the musculocutaneous and axillary nerves at the level of the cords before these nerves leave the brachial plexus "sheath". This block carries no risk of accidental intrathecal, epidural, intravertebral injection, stellate ganglion block or paralysis of hemi diaphragm. Peripheral nerve stimulator technology utilizes objective end points for nerve localization and does not depend on patient's subjective feeling for effective nerve localization when used along with ultrasound it increases block success rate.

In our study we compared the clinical efficacy of axillary and infraclavicular approach of brachial plexus block by ultrasound.

AIM OF THE STUDY

To compare anaesthetic time between axillary and infraclavicular approaches for brachial plexus block through ultrasound guidance.

MATERIALS AND METHODS

This is a prospective randomized study conducted at Government Stanley Hospital, attached to Stanley Medical College, Chennai. Sixty patients of ASA grade I or II of either sex undergoing surgery on the elbow, forearm or hand were randomly allocated into two equal groups.

Randomization techniques: computer generated random numbers
Blinding not done as the two different procedures are used and all the cases were done by the investigator.

group A- Surgery was done under ultrasound guided axillary approach
group I- Surgery was done under ultrasound guided Infraclavicular approach.

Procedure

Informed consent was signed by the patients. Intravenous access was obtained. Anaesthesia machine checked resuscitative equipment's and drugs were kept ready.

Inclusion criteria:

- Age 18 - 60 yrs
- Both sex
- PS I & II undergoing surgery for both elective/emergency
- Hand, wrist, Fore arm and elbow

Exclusion criteria

- Infection at the puncture site
- Coagulopathy
- Allergy to amide local anaesthetics
- Pregnancy
- Severe pulmonary pathology
- Mental incapacity or language barrier
- BMI more than 35
- Anatomical variations
- Standard monitoring was applied, an IV line was secured and sedation (midazolam 1-2mg iv) and analgesia (fentanyl 50-100mic iv) were given.(The dose titrated depending on the patient's age, weight and degree of anxiety.

Technique

Axillary Block: Patients in Group A were laid in the supine position with the arm to be blocked externally rotated more than 90 degrees and the elbow flexed to expose the armpit. Under sterile precautions, a high frequrncy probe of the ultrasound was placed perpendicular to the axillary skin crease. After confirming the axillary artery position using Doppler a local anaesthesia the block needle was inserted in-plane above the ultrasound probe for injection of 6 ml of the anesthetic to the back of the axillary artery. , then 6 ml of the anesthetic was injected to the side of the axillary artery confirming that spread of local anaesthetic is around the artery and not toward the surrounding muscle. Next, the block needle was removed and re-inserted in-plane below the ultrasound probe for injection of 6 ml of the anesthetic to the other side of the axillary artery. Finally 6 ml of anesthetic was infiltrated around the musculocutaneous nerve, which runs between the coracobrachialis or coracobrachialis and biceps. Thus three pricks were made : twice for infiltrating around the artery and once for blocking the musculocutaneous nerve.

Infraclavicular Block: The patients in Group I were laid in a supine position with their arms beside their body with only the head turned toward the opposite direction of the block area. Under sterile technique the axillary artery was located in the infraclavicular fossa and the probe was positioned perpendicular to the axillary artery. The artery was confirmed using color Doppler, and after local anesthesia, the block needle was inserted above the ultrasound probe. The needle tip was positioned at the bottom of the axillary artery (patient's back area) and 2 ml of anesthetic was injected. After confirming the "double bubble sign" where hypoechoic bubbles appear due to the medication, the remaining 22 ml was injected

Parameters Observed

1. **Time to perform block-** from the time of skin disinfection to the end of injection, including remova; of needle. If adequate response was not obtained within 20 minutes the procedure was taken as a failure with performance time of 20 minutes.
2. **Successful block-** defined as a blockade in the four nerves to the elbow (musculocutaneous, median, ulnar and radial). If a nerve territory was spared a rescue block was administered. If the patient still experiences pain or discomfort general anaesthesia was administered.
3. **Onset of sensory block -** Onset of sensory block was taken as abolition of temperature sensation using ice over the distribution of musculocutanoeus, radial, ulnar and median nerves compared to the contralateral side was assessed every minute after the performance of the block. Surgery was allowed after all the four nerves were completely blocked.
4. **Onset of motor blockade -** Onset of motor blockade was assessed every 2 minute after the block using four point scale Normal power, weakness but able to move arm, not able to move arm but the fingers & complete motor Blockade. Attaining a score of 2 was considered as the onset of motor Block
5. **Duration of motor Blockade -** When (3) in the four point scale changes to (2) the motor blockade is said to be reversed. The duration of motor block is noted from the time from scale (3) to scale (2).
6. **Post op analgesia -** The time interval between the onset of sensory block to the first requirement of post op analgesia was recorded in every patient.

The patient was observed every 30 minutes after the surgery is over till the motor block reverses and thereafter hourly for 6 hrs; second hourly for next 6 hrs and then at 24 hours.

7. **Vital parameters:** Pulse rate, Blood pressure, oxygen saturation & ECG
8. **Complications:** Pneumothorax, Accidental vessel puncture, Haematoma & Paraesthesia in the post-operative period.

OBSERVATION AND RESULTS

Statistical Tools: The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done with the help of computer using SPSS software. Data was expressed as mean +/- of Standard deviation. Quantitative Analysis was compared with Student's 't' test and the Fisher's exact test for 2 x 2 contingency tables were used. A 'p' value < 0.05 was considered significant.

There was no statistically significant difference among the two groups with respect to the age, sex and weight. The block was successful in all patients for both groups so there were no cases needing an additional block or general anesthesia.

Time to Perform Block: Time to perform block in Group A(781± 129 sec), and in Group-I (621±105sec) was significant with the 'p' value < 0.05.

Time of onset of Motor Block: Time of onset of motor block in Group_A 1.6 min ±2.5 and in Group-I, 7.4min ±8.7 min. P value < 0.05 and significant.

Time for onset of sensory block: Time for onset of sensory block in Group-A 2..2 min± 2.1, and in group_I, 8.13min± 2.189. P value < 0.05 and significant..

Total Anaesthetic time: This includes the time to perform block and the onset of block. When hypoesthesia occurred in the radial, median, ulnar and musculocutaneous nerves, this was defined as the start of the nerve block onset time. Group A 856±184 sec and Group I 1044±531 sec. The 'p' value is insignificant.

Motor block time: Total duration of motor blockade in Group-A, 136.88min±12.79, and in Group-I, 134.79min± 13.21 .P value insignificant

Post-Operative Analgesia time: Total duration of post-operative analgesia in Group-A, 11.55 ±1.32hrs, and in Group-I 11.73 ±1.65 hrs. P value insignificant.

Complications: No complications like vessel pumcture and hematoma or paraesthesia was noted in both groups.

DISCUSSION

Our prospective randomized comparative study, demonstrated that ultrasound-guided infraclavicular block had a shorter anesthetic performance time than the axillary approach. Since there were no block failures in both groups, there were no differences found in the success rate. The difference in the performance time was because the infraclavicular approach required only one injection of local anesthetic while the axillary approach requires three around the axillary nerve and one in the musculocutaneous nerve area for a total of four injections. In our study, there was approximately a 2.8 minute difference in the performance time. But unlike performance time, the onset time of the infraclavicular technique was longer. The reason behind the longer onst time in infraclavicular block is that the local anaesthetic is injected at the promimal area of the nerve as against the periphery in axillary approach. This difference was more pronounced in the motor blockade of musculocutaneous nerve. But when the performance time and onset time were added together total anesthetic time was not significantly different. These results concur with existing research that compared the infraclavicular approach and the humeral approach using a nerve stimulator by *Minville B et al* . Another study by In *Ae Song et al* shows similar results to our study. We used a larger sample and a different local anesthetic at a higher volume. Yet the performance time, time of onset and total anaesthetic time were similar and comparable.

Due to the fact that infraclavicular approach only requires one injection of the local anesthesia, there is also no need to abduct the patient's arm. This is very important for patients who cannot move their arm or shoulder due to injury or fracture.

A limitation of this study was that it could not a completely blinded method. The anesthetist performing the procedure also knows the patients' group while applying the Betadine and preparing for the block; therefore, there is a possibility of bias during these procedures which could affect the preparation time according to the group.

Tran et al. compared the supraclavicular approach, infraclavicular approach, and axillary approach for ultrasound-guided block. In their study, the performance time was also shorter for the infraclavicular approach compared to the axillary approach, but there were no differences in the onset times. Difference in the onset time in our study can be due to measurement error caused by the delay in the performance time of the axillary approach. The fact that residents who had a learning curve, also took part in our study could have affected the performance time.

CONCLUSION

In conclusion, ultrasound-guided infraclavicular block reduces the performance time compared to ultrasound-guided axillary block and there was no significant difference in the success rate. Since the block onset time was longer in infraclavicular approach, there were no differences found between the total anesthetic times of both approaches

ACKNOWLEDGEMENT

All authors affirm that they have no financial affiliation or involvement with any commercial organization with direct financial interest in the subject or materials discussed in this manuscript, nor have any such arrangements existed in the past 3 years.

Conflicts of Interest

The authors deny any conflicts of interest related to this study.

TABLE - 1

Time to perform block (in seconds)	Group A	Group I
Range	840-710	650-510
Mean	781	621
S.D.	129	105
'p'	**< 0.05 Significant**	

Table:2

Time for onset of motor block (in minutes)	Group A	Group I
Range	4- 8	3-10
Mean	1.6	7.4
S.D.	2.5	8.7
'p'	**< 0.05 Significant**	

Table:3

Time for onset of sensory block (in minutes)	Group A	Group I
Range	7- 10	5-15
Mean	2.2	8.13
S.D.	2.1	2.18
'p'	**< 0.05 Significant**	

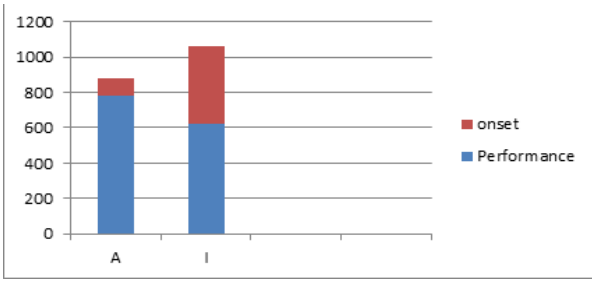

Table 1(Time in seconds) for performance and onset of block A-Axillary I-infraclavicular

REFERENCES

1. Minville V, Amathieu R, Luc N, Gris C, Fourcade O, Samii K, et al. Infraclavicular brachial plexus block versus humeral approach: comparison of anesthetic time and efficacy. Anesth Analg. 2005;101:1198–1201. [PubMed]
2. Labat G: Regional Anesthesia: Its Technic and Clinical Application. Philadelphia, WB Saunders, 1922.
3. Halsted WS: Practical comments on the use and abuse of cocaine: Suggested by its invariably successful employment in more than a thousand minor surgical operations. N Y Med J 1885;42:294
4. Tran de QH, Russo G, Muñoz L, Zaouter C, Finlayson RJ. A prospective, randomized comparison between ultrasound-guided supraclavicular, infraclavicular, and axillary brachial plexus blocks. Reg Anesth Pain Med. 2009;34:366–371. [PubMed]
5. Axillary approach versus the infraclavicular approach in ultrasound-guided brachial plexus block: comparison of anesthetic time In Ae Song et al Korean J Anesthesiol 2011 Jul
6. Kapral S et al lateral infraclavicular plexus block vs axillary block for fore arm and hand surgeries. Acta anaesthesiol Scand 1999,43;1047-52.
7. Niemi TT, Salmela L, Aromaa U, Pöyhiä R, Rosenberg PH. Reg Anesth Pain Med. 2005 Jan-Feb;32(1):55-9. Single-injection brachial plexus anesthesia for arteriovenous fistula surgery of the forearm: a comparison of infraclavicular coracoid and axillary approach.
8. Wedel DJ, Horlocker TT. Nerve blocks. In: Ronald DM, editor. Miller's Anesthesia. 7th ed. Philadelphia: Churchill Livingstone; 2010. pp. 1639–1675.
9. Infraclavicular brachial plexus block for regional anaesthesia of the lower arm KJ Chin, VTW Chee, B Lee. Cochrane Database of Systematic Reviews 2008 Issue 4
10. Genevieve Arcand, Stephen Williams CHUM hospital Montreal Canada. Anaesth; Analg 2005;101:886 -90 Ultrasound guided Infraclavicular vs Supraclavicular Block.
11. Cornish PB, Greenfield LJ. Brachial plexus Anatomy Reg Anaesth 1997,22:106-107.
12. William PL, Warwich R, Dyson M. The Brachial plexus. In Gray's Anatomy 37th edition 1989:1131-53.
13. Good man & Gilman's – The pharmacological basis of therapeutics. 10th edition.223-38,358-78
14. Kadzung Basic & Clinical pharmacology 6th edition.165-72.