Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

Comparison of Ultrasound Guided Supraclavicular Block and Costoclavicular Block for Forearm and Hand Surgeries.

Dr. Bhishwar.R[1], Dr.Mohana Sundaram.M[2], Dr. Anand Subramaniam[3]

[1]Postgraduate, Department of Anaesthesia, Chettinad Hospital & Research Institute, Chettinad Academy of research and education, Kelambakkam, Chengalpattu.

[2]Postgraduate, Department of Anaesthesia, Chettinad Hospital & Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Chengalpattu.

[3]Professor, Department of Anaesthesia, Chettinad Hospital & Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Chengalpattu.

(**Received**: 14 June 2024 **Revised**: 01 July 2024 **Accepted**: 18 August 2024)

KEYWORDS
Brachial plexus, supraclavicular, costoclavicular, ropivacaine.

ABSTRACT:

BACKGROUND: Effective brachial plexus blocks depend on accurate methods of nerve location, needle placement,local anesthetic. An emerging technique for procedures on the upper limb surgeries is costoclavicular approach to infraclavicular brachial plexus block. Utilizing ultrasound guided technique in both approaches, this study aids in comparing the block properties and the incidence of diaphragm involvement.

MATERIALS AND METHODS:For forearm and hand surgeries, 50 patients with ASA physical status 1, 2, and 3 were enrolled. A supraclavicular block (20 ml of 0.75% ropivacaine and 8 mg of dexamethasone) will be administered to one group, while a costoclavicular block of the same drug concentration will be administered to other group. After the procedures, the two groups differences in analgesia duration, onset of motor and sensory blockade, block performance time, and hemi diaphragmatic paralysis were compared and analyzed using data analysis.

RESULTS: In our study, it was found that the two groups motor blockage onset were comparable. In comparison to the supraclavicular group, the costoclavicular group that received ropivacaine experienced significantly longer analgesia duration. The hemodynamic parameters weren't significantly different between the two groups. When compared to supraclavicular block, the costoclavicular block significantly reduced the risk of hemidiaphragmatic paralysis during forearm and hand procedures.

CONCLUSION: According to this study, as compared to the ultrasound guided supraclavicular approach of blockade for forearm and hand procedures, the costoclavicular block technique has a faster onset of sensory blockade, a lower incidence of hemi diaphragmatic paralysis, and a longer duration of analgesia.

INTRODUCTION

One of the most popular and straightforward methods of administering anaesthetics and pain relief during upper-extremity surgery is a regional brachial plexus block(1) under ultrasound guidance. Patients undergoing surgery on their upper limbs benefit greatly from regional anaesthesia, as evidenced by studies of the procedure's effectiveness in terms of its outcomes. Depending on the dermatomes involved and how quickly the necessary dermatomes can be blocked, there are different approaches to the brachial plexus. There are numerous ways to obstruct the brachial plexus, ranging from neck muscles to particular hand nerves. The use of ultrasound technology in nerve blocks is a rapidly developing field. Most commonly, the brachial plexus is blocked at the supraclavicular, infraclavicular, costoclavicular, axillary, interscalene character nerves, and at the wrist, forearm, and fingers(2).

In order to provide effective and safe regional anaesthesia, anaesthetists frequently employ the supraclavicular nerve block(3) of the brachial plexus for upper limb surgeries. It's often called as the "spinal anaesthesia of the arm" because of this. The success rate of the supraclavicular block has risen steadily over the years. Before the invention of contemporary anaesthetic monitoring systems, this technique was a landmark-based strategy that depended on paraesthesia to assure correct needle insertion. A block needle is placed at the point where the thickest part of the clavicle meets the lateral issue of the sternocleidomastoid muscle. One may

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

now go to the first rib in this manner.After the needle has been entered to the plexus, it is slowly moved cranially and caudally in the same sagittal plane in which it was put. Paraesthesia is a sign that the needle is in the correct location.

Initial use of this "blind" method was associated with risks like injection intravascularly, block of phrenic nerve, Horner syndrome, pneumothorax and failure of block. Multiple needle insertions and corrections may be required, increasing the duration of the treatment and the likelihood of patient pain. Supraclavicular blocks (4) are less risky and may be maintained for longer because to ultrasonography's real-time imaging. It used to be standard practice to make your way from the side to the Centre of the patient's neck using the ultrasonic guidance while doing a supraclavicular block.(4).

An alternative to the traditional costoclavicular BPB technique is the ultrasound-guided infraclavicular brachial plexus block. Beginning at the clavicular midpoint and extending dorsally and posteriorly, the costoclavicular space (CCS) is an intermuscular region. The use of ultrasound in medical imaging allows very precise anatomical localization. Larger slips of the serratus anterior muscle may be seen between the second rib and the pectoralis major's clavicular head and subclavius muscle in certain persons. Thanks to their closeness to axillary artery and similar triangular form, all 3 cords of the brachial plexus may be seen on a single transverse ultrasound of CCS (5). The plexus's centre may be reached with a block needle, sparing the patient any unnecessary discomfort. (5)

All three brachial plexus cords cluster together while doing a costoclavicular brachial plexus block because they are all superficial. Ideal for single shot injections and catheter placement, which varies from supraclavicular block in that a needle redirection is required (6).

The ulnar nerve is less likely to be injured by the traditional supraclavicular approach because the subclavian artery is blocked by the brachial plexus. The danger of vascular rupture and pleural puncture is minimized with a brachial plexus block when the costoclavicular route is used(7).

AIMS AND OBJECTIVES:

- To compare the onset of action of sensory blockade in bothapproaches.
- To compare the onset of action of motor blockade in both approaches.
- To compare the duration of analgesia in both approaches.
- To assess the Block performance time in both approaches.
- To assess the Hemi diaphragmatic dysfunction usingultrasound guided technique.

METHODOLOGY

It was a prospective randomized controlled study in 50 patients divided into two groups. **GROUP 1** supraclavicular block (scb)-(n=25)- Patient will receive 20ml of ropivacaine 0.75% + dexamethasone(8mg) and **GROUP 2** Costoclavicular block(ccb)-(n=25)- Patient will receive 20ml of ropivacaine 0.75% + dexamethasone(8mg).

Patients with ASA grade I ,IIand III, age 18 to 60 years, Patients posted for forearm and hand surgical procedures were included. Patients who were refused for the procedure, uncooperative sufferers, clinically vast pulmonary pathology, known neuropathy concerning the forearm present process surgery, infection on the needle insertion site and coagulopathies were excluded.

Ethical considerations:

The Institutional Human Ethical Committee reviewed and approved the entitled COMPARISON OF ULTRASOUND GUIDED SUPRACLAVICULAR BLOCK AND COSTOCLAVICULAR BLOCK FOR FOREARM AND HAND

SURGERIES. in patients undergoing surgeries under brachial plexus block. Ⅱ - IHEC No: 059/IHEC/JAN 2021, CTRI/2021/10/037682. Prior to enrolment all study participants were explained the risks and benefits associated with the study in a language they understand, following which an informed written consent was obtained. Secrecy was maintained with regards to information of study participants.

All the patients undergoing upper limb surgeries will undergo pre-operative check up in the pre-anaesthetic assessment clinic. After receiving the patient's written agreement, it will be recommended that they abstain from eating or drinking anything other than water or clear liquids for eight hours before to surgery.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

An independent Anaesthesiologist who is not involved in the study will prepare the study solution. A pulse oximeter, electrocardiogram (ECG), and non- invasive heart rate cuff will be used as soon as the patient is brought into the operation room for regular monitoring. Intravenous access will be assessed for patency, if not present new access will be established and patient will be preloaded with Ringer lactate or Normal saline. Patient will be premedicated with Inj. Fentanyl (1 mcg/kg) and Inj.Midazolam (0.02mg/kg).

Supraclavicular block

- A local anaesthetic was administered superficially and behind the subclavianartery. [BRACHIAL PLEXUS].
- Situated transversely across the top of the neck, just above the collarbone.

Costoclavicular block

- Near the parasagittal line, medial to the coracoid process, and under theclavicle.
- local anaesthetic spread around axillary artery.

After the operation, a cold cotton swab test is used to determine when the sensory blockage has taken effect.

The distinguishing feature of sensory blockage is the length of cold temperature awareness in the regions supplied by the radial, ulnar, median, and musculocutaneous nerves.

The sensory blockage of the median nerve will be evaluated on the thumb's volar side, the dorsum's lateral side, the area immediately below the fifth digit, and the forearm's musculocutaneous nerve, which is located above the cubital fossa. It is assessed by comparing it with the contralateral upper limb. It is assessed every 2 minutes for 15 minutes.

When a local anaesthetic has been injected to its full capacity, motor blockage is said to have occurred when all motor function suddenly stops.

It will be assessed by assessing the specific action of the muscles supplied by radial, ulnar, median and musculocutaneous nerves and comparing it with the contralateral upper limb. Assessing the power of the muscle supplied by radial nerve–to oppose the thumb with other fingers, median nerve – patient should push the hand against gravity, ulnar nerve – wriggling the little finger and musculocutaneous nerve – patient should pull the hand against gravity. It is assessed every 2 minutes for 15 minutes.

If the patient complaints of pain in any area after the block it is considered as a patchy analgesia. Analgesia should be supplemented to that area and considered as rejected from the study. If there is no decrease in pain after local analgesic supplementation or if there is any need for an alternate anaesthesia (General anaesthesia or Intravenous sedation), it is considered as block failure.

In the postoperative phase, the duration of action is measured by the time it takes from when the local anaesthetic injection is finished until when the analgesic is given. It is determined by noting down the time at which the patient first requests for analgesia post operatively.

If the patient complaints of pain in any area after the block it is considered as a patchy analgesia. It is considered as block failure. The anaesthetist in charge in the case will take decision whether to continue block or converted into General anaesthesia. In the postoperative phase, the duration of action is measured by the time it takes from when the local anaesthetic injection is finished until when the analgesic is given.

It is determined by noting down the time at which the patient first requests for analgesia post operatively. The rescue analgesia given will Inj.Morphne (3mg).

DIAPHRAGMATIC INVOLVEMENT-

The incidence of diaphragmatic involvement will be measured using an M-Mode ultrasonography.(Anterior subcostal view).

In M-mode, diaphragm is seen as a single thick echogenic line. Diaphragmatic excursion(displacement, expressed in cm) was measured during a sniff test.

Diaphragmatic paralysis was considered total in cases where a >75% reduction in diaphragmaticexcursion-severe.

partial with a diaphragmatic excursion of 25---75%-Moderate.

During inspiration, paradoxical movement of the diaphragm, highlighted by a cephalic movement, defined total HDP.

RESULTS AND OBSERVATIONS

IBM SPSS Statistics for Windows, Version 23.0 was used for the statistical analysis in this research. (IBM

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

Corporation, Armonk, New York) The data was summarized using descriptive statistics, which included computing measures like the mean and standard deviation for categorical and continuous variables. T-tests were performed on bivariate samples from independent groups to see whether there was a statistically significant difference.

Fisher's Exact test was used to establish statistical significance for categorical data, and the Chi-Square test was used for the 22 tables where the projected cell frequencies were less than 5. All of these statistical methods agree that a probability value of 0.05 is statistically significant.Table 1: Comparison of Time of Block Performance Time between the Groups by Independent sample t-test

Variable	Groups	N	Mean	SD	t-value	p-value
Time of Block Performance Time	Group I	25	15.6	3.2	7.225	0.0005 **
	Group II	25	9.8	2.4		
** Highly Statistical Significance at p < 0.01 level						

The above table shows comparison of Time of Block Performance Timebetween Groups by Independent sample t-test were t-value=7.225, p- value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 2 : Comparison of Onset of Sensory Blockade between the Groups byIndependent sample t-test

Variable	Groups	N	Mean	SD	t-value	p-value
Onset of Sensory Blockade	Group I	25	16.4	1.9	0.075	0.941 #
	Group II	25	16.3	1.9		
# No Statistical Significance at p > 0.05 level						

The above table shows comparison of Onset of Sensory Blockade between Groups by Independent sample t-test were t-value=0.075, p-value=0.941>0.05 which shows no statistical significance difference at p > 0.05 level.

Table 3: Comparison of Musculocutaneous Nerve of Sensory Blockade betweenthe Groups by Independent sample t-test

Variable	Groups	N	Mean	SD	t-value	p-value

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

MusculocutaneousNerve of Sensory Blockade	Group I	25	10.6	2.1	3.377	0.001 **
	Group II	25	9.0	1.2		
** Highly Statistical Significance at p < 0.01 level						

The above table shows comparison of Musculocutaneous Nerve of Sensory Blockade between Groups by Independent sample t-test were t-value=3.377, p- value=0.001<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 4: Comparison of Onset of Motor Blockade between the Groups byIndependent sample t-test

Variable	Groups	N	Mean	SD	t-value	p-value
Onset of Motor Blockade	Group I	25	20.9	1.6	0.192	0.894 #
	Group II	25	20.8	1.3		
# No Statistical Significance at p > 0.05 level						

The above table shows comparison of Onset of Motor Blockade between Groups by Independent sample t-test were t-value=0.192, p-value=0.894>0.05 which shows no statistical significance difference at p > 0.05 level.

Table 5: Comparison of Musculocutaneous Nerve of Motor Blockade betweenthe Groups by Independent sample t-test

Variable	Groups	N	Mean	SD	t-value	p-value
MusculocutaneousNerve of Motor Blockade	Group I	25	12.4	3.1	1.613	0.113 #
	Group II	25	11.1	2.2		
# No Statistical Significance at p > 0.05 level						

The above table shows comparison of Musculocutaneous Nerve of Motor Blockade between Groups by Independent

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

sample t-test were t-value=1.613, p- value=0.113>0.05 which shows no statistical significance difference at p > 0.05 level.

Table 6: Comparison of Duration of Analgesia (In Hours) between the Groupsby Independent sample t-test

Variable	Groups	N	Mean	SD	t-value	p-value
Duration Of Analgesia (In Hours)	Group I	25	17.7	1.3	3.351	0.002 **
	Group II	25	19.0	1.4		
** Highly Statistical Significance at p < 0.01 level						

The above table shows comparison of Duration of Analgesia (In Hours) between Groups by Independent sample t-test were t-value=3.351, p- value=0.002<0.01 which shows highly statistical significance difference at p < 0.01 level.

DISCUSSION

We compared the costoclavicular and supraclavicular approach for brachial plexus block using ultrasound guidance in this prospective randomized, observer blinded analysis. The CCS (costoclavicular space) was observed as a distinct intermuscular area deep to the posterior midpoint of the clavicle. By using an infraclavicular approach, which maintains the posterior, medial, and lateral brachial plexus nerve cords in a triangle configuration in the proximal half of the retro pectoralis minor region, the costoclavicular space can be examined.

In our study group it was found that there was a considerable statistical difference between the supraclavicular vs costoclavicular groups-in block performance time. The costoclavicular group analgesia lasted substantially longer than that of the supraclavicular group .Additionally, it was seen that the costoclavicular block significantly decreased the probability of hemi diaphragmatic paralysis during forearm and hand procedures as compared to supraclavicular block.

Quehua Luo et al(8) conducted study to Comparing ultrasound-guided supraclavicular and costoclavicular brachial plexus block using a modified double-injection technique found that mean age group in Supra clavicular block group as 44.5 ±14.2 while in costoclavicular block 40.3±13.3was identified there were no statistically significantdifferences identified.

A number of studies have been done to compare the significance of ultrasound guided and using nerve stimulation to achieve upper limb blocks . a study conducted by Dingemanset al.[47] , Gurkan et al. have shown that the block success rate was high and comparable in both groups. There was a improved block quality in the US group, although not significant.

Due to high success rate of two blocks in this study were done using ultrasound guided technique. The costoclavicular approach with ultrasound guidance produced a more precise block than the landmark technique and caused the patient less discomfort.

Anu Kewlani, M.D et al conducted a study to assess the median effective volume of

ropivacaine for ultrasound guided costo clavicular block and observed that A 19-ml dose of 0.5% ropivacaine is likely to produce an effective and providing adequate surgical anesthesia .Hence in our study we have chosen the two groups with 20 ml of 0.75%ropivacaine .(9)

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

The costoclavicular brachial plexus block was a single point injection lateral to axillary artery, whereas supraclavicular approach required multiple point injections around the subclavian artery.

Visualization and needling time are combined to generate block performance time. The costoclavicular group's block performance time in our research is 9.8 minutes and the block performance time for the supraclavicular group is 15.6 minutes. This has been found to be significant statistically.(t=7.225, p=0.00050.01, where p <0.01)

This shows that costoclavicular block requires lesser time to perform than supraclavicular block when done using ultrasound guided technique.

This observation is comparable with the previous study conducted by Abhinaya et al. where the block performance time was relatively quicker in Infraclavicular group (9.57 ± 3.19 min) than Supraclavicular group (11.53 ± 2.90 min). This has been foundto be significant statistically.

On the contrary Quehua Luo et al(8), conducted a study - Comparing ultrasound-guided supraclavicular and costoclavicular brachial plexus block using a modified double-injection technique found that the block performance time in the supraclavicular group was shorter, while the costoclavicular group was longer.

The duration of analgesia is the period of time between the administration of LA and the patient's request for pain medication. In our study it is observed that ,in the supraclavicular group analgesia lasts an average of 17.7 hours. While in the costoclavicular group lasts an average analgesia is 19.0 hours, which is found to be statistically significant.

Shubha M Ramesh et al's conducted a study Comparing the ultrasound guided costoclavicular brachial plexus block versus supraclavicular brachial plexus block, with 0.5 % ropivacaine 20ml , among 50 patients which showed that duration of analgesia requirement of rescue analgesics were comparable in both the groups.(but not statistically significant.[52])

However ,Feroz ahmad dar et al (10) conducted a study showing the Effect of addition of dexamethasone to ropivacaine in supraclavicular brachial plexus block. Observed that dexamethasone added to ropivacaine, prolongs the duration of the block and the

duration of postoperative analgesia.

Similarly in our study it was found that dexamethasone along with 0.75% ropivacaine helped in significantly prolonging the duration of block and post operative analgesia .

The onset times of overall sensory or motor blockade time in our study results shows there was no statistically significant difference between the two groups.(costoclavicular approach/supraclavicular approach)

This observation is comparable with the previous study conducted by **Quehua Luo et al** found that the proportion of overall sensory blockade at 15 min after injection in the CC (costoclavicular) group was non-inferior to that in the SC(supraclavicular) group (87 vs 91%; absolute difference: −3%). There was no statistically significant difference in the onset times of overall sensory or motor blockade between the two groups.[55]

According to this study the results between the two groups(supraclavicular/ costoclavicular block) which compared the onset of motor blockade was not found to be statistically significant. (t=0.192, p=0.894>0.05).

In our study it was also shown that the onset of motor blockade when compared between different nerves of upper limb such as median nerve (t-value=0.652, p- value=0.517>0.05). ,ulnar nerve(t-value=1.130, p-value=0.264>0.05), musculocutaneous nerve(t=1.613, p=0.113>0.05 , radial nerve (t-value=0.000, p-value=1.000>0.05) Independent sample T-test findings revealed no statistically significant difference between two groups.

In a study by **Quehua Luo et al(8)** found motor blockade onset time in Supraclavicular group was 9 to 15 minutes in ulnar nerve, 12 to 18 minutes in median nerve, 12 to 18 minutes in radial nerve while in musculo cutaneous nerve it was 9 to 18 minutes. In Costoclavicular block the onset time for ulnar nerve was 8.25 to 12 minutes, for median nerve was 12 to 21 minutes, for radial nerve was 12 to 18 minutes while in musculo cutaneous nerve was 9 to 18 minutes which are not statistically significant in both groups. This study showed similar results with our study with regard to onset of motor blockade between the two groups at the various nerves.

According to my study the results between the two

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

groups(supraclavicular / costoclavicular which compared the onset of sensory blockade was not found to be statistically significant. t-value=0.075, p-value=0.941>0.05.

In our study it was also shown that the onset of motor blockade when compared between different nerves of upper limb such as median nerve t-value=1.650, p-value=0.105>0.05 ,ulnar nerve t-value=0.150, p-value=0.881>0.05, radial nerve t-value=0.330, p-value=0.743>0.05 Independent sample T-test findings revealed no statistically significant difference between two groups.

however musculocutaneous nerve t-value=3.377, p-value=0.001<0.01 shows statistical significant difference in costoclavicular group when compare to supraclavicuar group.

In a study by **Quehua Luo et al(8)** found sensory blockade onset time in SC group was 6 to 9 minutes in ulnar nerve, 6 to 12 minutes in median nerve, 9 to 15 minutes in radial nerve while in musculo cutaneous nerve it was 9 to 12 minutes. In CC block the onset time for ulnar nerve was 6 to 10.5 minutes, for median nerve was 6 to 12 minutes, for radial nerve was 9 to 15 minutes while in musculo cutaneous nerve was 9 to 15 minutes which are not statistically significant in both groups.This study showed similar results with our study with regard to onset of sensory blockadebetween the two groups.

In a related study by Banchobporn Songthamwat et al., it was found that using 25ml of 0.5% ropivacaine, the costoclavicular approach led to a quicker onset (10 min) andsupraclavicular approach (20 min) commencement of sensory blocking. However it isalso insignificant.

In our study, we discovered that there was a significant difference in the percentage of diaphragmatic paralysis between two groups using an independent sample t-test, with a t-value of 26.693 and a p-value of 0.0005 and 0.01 respectively.

Similarly, Chahun Oh conducted a retrospective study of Costoclavicular brachial plexus block (ccb) reduces hemi diaphragmatic paralysis more than supraclavicular brachial plexus block(scb) to determine the incidence of hemi diaphragmatic paralysis is significantly lower with costoclavicular than with supraclavicular brachial plexus block by using pre- and post-operative chest radio-graphs .In our study we using ultrasound to determine the incidence of hemi diaphragmatic paralysis in both groups.(scb/ccb).

Additionally a study by **Boohwi Hong et al** found that incidence of HDP was 11.4% in Costoclavicular group and in SupraClavicular group was 47.5% which is significant statistically. In Hemi diaphragmatic paralysis cases, complete paralysis was 2.9% in Costoclavicular group while 22.5% in Supraclavicular group significant

statistically(11)

Hemi diaphragmatic paralysis is strongly correlated with the quantity of local anesthetic injected and the brachial plexus block method used. When compared to supraclavicular brachial plexus blocks, costoclavicular blocks significantly reduce the risk of hemi diaphragmatic paralysis.

Since this was a small-group being investigated , additional testing in more exclusive groups ,such as forearm surgeries is required to validate our findings.

Despite the fact that both blocks (USG guided real time method) showed dependable results in the commencement of action and maintained a safety profile, a comparison between the blockade and the blind technique needs to be assessed in order to underline the benefits of the USG guided approaches even more.

Although both groups were tested with 0.75% ropivacaine as the major local anesthetic, further research is needed to determine how effectively the block acts at other concentrations.

The effectiveness of employing any other additives or a suitable alternative where dexamethasone is contraindicated needs to be compared because both blocks are performed with an additive added (8mg dexamethasone).

The loss of fine touch and the sensory and motor components of the block were assessed using classifying techniques, but more research is needed to fully understand the role of the perfusion index and its relation to the onset of the block.

CONCLUSION

The costoclavicular block approach with 0.75% ropivacaine and dexamethasone has been shown in this study to have a faster onset of sensory blockade, a lower incidence of hemi diaphragmatic paralysis, and a longer duration of analgesia when compared to ultrasound guided supraclavicular technique of blockade for forearm and hand procedures. Our results support the costoclavicular approach to infraclavicular brachial

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(4), 2141-2149 | ISSN:2251-6727

plexus block as a potential therapy for upper limb surgery.

REFERENCES:

[1] Neal JM, Brull R, Chan VW, Grant SA, Horn JL, Liu SS, et al. The ASRA evidence-based medicine assessment of ultrasound-guided regional anesthesia and pain medicine: Executive summary. Reg Anesth Pain Med. 2010;35:S1–9.[PubMed]

[2] Brachial plexus blocks: a review of approaches and techniques. Quang Hieu De Tran et al. Can J Anaesth. 2007 Aug.

[3] Kulenkampff D. BRACHIAL PLEXUS ANAESTHESIA: ITS INDICATIONS, TECHNIQUE, AND DANGERS. Ann Surg. 1928 Jun;87(6):883-91. [PMC free article] [PubMed]

[4] la Grange P, Foster PA, Pretorius LK. Application of the Doppler ultrasound bloodflow detector in supraclavicular brachial plexus block. Br J Anaesth. 1978 Sep;50(9):965-7. [PubMed]

[5] Kapral S, Krafft P, Eibenberger K, Fitzgerald R, Gosch M, Weinstabl C. Ultrasound-guided supraclavicular approach for regional anesthesia of the brachial plexus. Anesth Analg. 1994 Mar;78(3):507-13. [PubMed]

[6] Ultrasound-Guided Costoclavicular Brachial Plexus Block: Sonoanatomy, Technique, and Block Dynamics;Jia Wei Li, PhD*, Banchobporn Songthamwat, MD*, Winnie Samy, MSc, BN*, Xavier Sala-Blanch, MD†,‡ and Manoj Kumar Karmakar, MD, FRCA, FHKCA, FHKAM*

[7] randomized comparison between costoclavicular and paracoracoid ultrasound- guided infraclavicular block for upper limb surgery;Prangmalee Leurcharusmee et al. Can J Anaesth. 2017 Jun.

[8] Quehua Luo et al Comparison of ultrasound-guided supraclavicular and costoclavicular brachial plexus block using a modified double-injection technique: a randomized non-inferiority trial Bioscience Reports (2020) 40 BSR20200084 https://doi.org/10.1042/BSR20200084

[9] Anu Kewlani, Nidhi Bhatia, Jeetinder Kaur Makkar, Vishal Kumar; Median Effective Volume of 0.5% Ropivacaine for Ultrasound-guided Costoclavicular Block: **A Dose-finding Study**. *Anesthesiology* 2021; 134:617–625

[10] Waldron NH, Jones CA, Gan TJ, Allen TK, Habib A. Impact of perioperative dexamethasone on postoperative analgesia and side-effects: systematic review and meta-analysis. British journal of anaesthesia. 2013 Feb 1;110(2):191-200.

[11] Boohwi Hong, Soomin Lee, Chahyun Oh, Seyeon Park, Hyun Rhim et al Hemidiaphragmatic paralysis following costoclavicular versus supraclavicular brachial plexus block: a randomized controlled trial.Scientific reports. November 2020; Accepted: 30 August, 2