

COMPARISON BETWEEN CONVENTIONAL TECHNIQUE AND ULTRASOUND GUIDED SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK IN UPPER LIMB SURGERIESM. Veeresham¹, Upender Goud², P. Surender³, Pavan Kumar⁴**HOW TO CITE THIS ARTICLE:**

M. Veeresham, Upender Goud, P. Surender, Pavan Kumar. "Comparison between Conventional Technique and Ultrasound Guided Supraclavicular Brachial Plexus Block in Upper Limb Surgeries". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 37, May 07; Page: 6465-6476, DOI: 10.14260/jemds/2015/939

ABSTRACT: BACKGROUND: Brachial plexus block is commonly employed for upper limb surgeries. The classical approach using paraesthesia technique is a blind technique and associated with higher failure rate and injury to the nerves and surrounding structures, especially vascular structures, nerves, and pleura. Ultrasound for supraclavicular brachial plexus block has improved the success rate of block with excellent localization as well as improved safety rates and also brought down the complication rates. **OBJECTIVES:** Of this study were to compare the effects of supraclavicular brachial plexus using conventional technique and ultrasound technique in terms of time taken for the procedure, Onset and duration of sensory and motor blockade, Success rate and complication rate. **MATERIAL AND METHODS:** In this prospective, randomized control study 60 patients between 18-50 years, either sex, belonging to ASA grade I & II undergoing elective upper limb surgeries were divided into 2 groups of 30 patients each. Group C (conventional technique), Group US (Ultrasound technique). Each patient received 25 ml of 0.5% bupivacaine, 5 ml distilled water, 0.25ml sodium bicarbonate. **RESULTS:** Success rate was higher in U. S. Group with longer duration of block than conventional group. Although time taken for procedure was longer in U. S. group, complications were nil. **CONCLUSION:** US guided supraclavicular block has higher success rate with fewer complications and longer duration of block compared to Conventional technique.

KEYWORDS: Brachial Plexus block, Conventional, Regional Anaesthesia, Ultrasound.

INTRODUCTION: Brachial plexus blockade is a time tested technique for upper limb surgeries. Brachial plexus blockade can provide an excellent anaesthetic outcome. There is a possibility of prolonged post-operative analgesia. The classical approach using paraesthesia technique is a blind technique and associated with higher failure rate and injury to the nerves and surrounding structures,¹ Especially vascular structures, nerves,² and pleura leading to pneumothorax.³ The application of ultrasound technique for exact localization of nerves/plexus has revolutionized the regional anaesthesia field where in ultrasound probes with suitable frequencies have been successfully tried.

Ultrasound for supraclavicular brachial plexus block has improved the success rate of block with excellent localization as well as improved safety rates,⁴ and also brought down the complication rates.

Hence present randomised study was planned for comparing the efficacy of conventional supraclavicular brachial plexus block with ultrasound guided technique.

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OBJECTIVES: The objectives of this study were to compare the effects of supraclavicular brachial plexus using conventional technique and ultrasound technique in terms of:

- Time taken for the procedure.
- Onset and duration of sensory blockade.
- Onset and duration of motor blockade.
- Success rate.
- Incidence of complications.

MATERIAL AND METHODS: The study was conducted after obtaining approval from institutional ethical committee and written informed consent from each patient. Sixty patients aged between 18 years and 50 years, undergoing upper limb surgery lasting more than thirty minutes were included in the study.

Method of Collection of Data: The patients were randomly divided into two groups of 30 patients each:

Group C (Conventional) –To receive conventional supraclavicular brachial plexus block.

Group US (Ultrasound guided) – to receive ultrasound guided supraclavicular brachial plexus block.

Inclusion Criteria: Patients of either sex, aged between 18-50 years, patients with American society of Anaesthesiologists grade I and II physical status, elective upper limb surgeries.

Exclusion Criteria: Patient refused regional anaesthesia, infection at the proposed site of block, coagulopathies, allergy to local anaesthetic agents, pulmonary pathology, pre-existing neuropathy. Pregnant and emergency surgical patients.

All the patients underwent thorough pre-anaesthetic evaluation on the day prior to surgery. All systems were examined including airway and the surface anatomy where the block was going to be given, and the procedure to be carried out was explained and relevant investigations done.

They were informed about development of paraesthesia. Patients were reassured to alleviate their anxieties. All the patients were kept nil per oral as per the fasting guidelines. All of them received Tab. Diazepam 10 mg and Tab. Ranitidine 150 mg night before the surgery.

In the operation theatre, patients were monitored with pulse oximetry, non-invasive blood pressure and electrocardiogram. After establishing an intravenous access, the patients received inj. Midazolam 1 mg intravenously. No other sedation was given till evaluation of the block was completed.

Local anaesthetic used: 25 ml bupivacaine 0.5%.+0.25ml Sodium bicarbonate +5cc normal saline.

EQUIPMENTS:

a) For the procedure:

A Portable Tray Covered with Sterile Towels Containing:

1. Disposable Syringe – 20 ml, 10 ml, 5 ml.
2. Disposable hypodermic needles of 5 cm length 22G-1 and 24 G-1.
3. Bowl containing iodine.

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4. Sponge holding forceps.
5. Towels and towel clips.
6. Drugs: 0.5% bupivacaine 25 ml.
7. Normal saline.
8. Sodium bicarbonate (7.5%).

b) For Emergency Resuscitation:

The anaesthesia machine, emergency oxygen source, pipeline O₂ supply, working laryngoscope appropriate size endotracheal tubes and connectors:

- Working suction apparatus with suction catheter.
- Airways (oropharyngeal).
- Intravenous fluids.

Anaesthetic Agents: Thiopentone, ketamine, diazepam, succinylcholine, Resuscitation drugs Hydrocortisone, atropine, adrenaline, aminophylline, mephentermine, calcium gluconate and sodium bicarbonate.

Ultrasound machine and probe are prepared for the procedure under all aseptic precautions.

Position: Patient was made to lie supine with head turned opposite to side of intended block and arm adducted and pulled down gently. A small pillow or folded sheet was placed below the shoulder to make the field more prominent.

Land marks: A point 1cm above the midpoint of clavicle and pulsations of subclavian artery.

PROCEDURE: The patients were allocated to each group by computerized randomization. Parts are prepared for the block to be performed with iodine solution. Anatomical landmarks are identified and skin wheal is raised using lignocaine 1% 3ml solution. In group C, Conventional supraclavicular brachial plexus was performed by eliciting paraesthesia and when paraesthesia was obtained the needle was withdrawn about 1 to 2mm, then the drug is injected. In group US, block is performed after real-time visualization of the vessels, nerve and bone. In plane approach using 10ml syringe containing local anaesthetic is injected and the drug distribution is noted. This procedure was done by using LOGIQ-GE ultrasound machine with 12LMHz transducer by in-plane approach using 22G needle.



Fig. 1: Ultrasound guided technique for supraclavicular brachial plexus block

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The time taken for the procedure, the onset of sensory blockade and motor blockade were noted. Intra-operatively, hemodynamics was monitored at regular intervals. Following completion of surgery, the patients were monitored to assess the quality and duration of post-operative analgesia. Thus, the patients were asked to classify analgesia as no pain, mild pain, moderate pain or severe pain every hour for the first 6 hours and then again at 8 and 10hrs. At the time of each subsequent assessment, patients were observed and/or questioned about any subjective and/or objective side effects (sedation, nausea, vomiting or respiratory depression, neurological injury).

The Various Parameters were noted:

- Time taken for the procedure.
- Onset and duration of sensory blockade.
- Onset and duration of motor blockade.
- Success rate.
- Incidence of complications.

DEFINITIONS OF PARAMETERS: Time taken for the procedure- defined as the interval between preparations of the parts to the administration of total dose of local anaesthetic.

Onset of sensory blockade- defined as interval between the time of injection of test drug to reduction of pain at the site of surgery or loss of sensation too cold at the site of surgery.

Onset of motor blockade- defined as interval between times of injection of drug to development of motor weakness in the blocked limb.

Duration of analgesia- defined as interval between onset of analgesia/sensory blockade to the time patient first complains of pain at wound site.

Duration of motor blockade- defined as the interval between the onsets of motor blockade to the time patient first experiences movement of the blocked limb.

Failure of block- it is defined as inadequate or patchy analgesia even after 30 mins of the drug administration. Depending on the effectiveness of the block the patient was being administered sedative and analgesic in the form of IV midazolam and Inj Fentanyl. In case of complete failure general was administered.

Totally Effective/no Analgesia: When the procedure is completed without the need of supplementation/ analgesia.

Partially Effective: When there is need of supplementary analgesia with inj fentanyl 1µg/kg.

Grading of sensory blockade:

I= No difference

II= Some difference but cold still sensed in blocked arm

III= No cold sensation in blocked arm

Grading of Motor Blockade:

I= Normal power

II= Reduced power

III= Complete loss of power

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Following Nerves were Tested for Motor Block:

- Musculocutaneous nerve-by flexion of arm.
- Radial nerve by extending the flexed arm and wrist.
- Median nerve by asking the patient to flex wrist and also opposing the thumb to 2nd and 3rd fingers.
- Ulnar nerve by flexing 4th and 5th fingers.
- Data will be collected every 3mins for first 15 mins. next every 5 mins for 15mins and later every 10 mins for 30 mins and every 15 mins till the end of surgery and at least for 8 hours post-operatively.
- Assessment of complete recovery of both sensory and motor blockade will be done for at least 8 hrs postoperatively.

STATISTICAL ANALYSIS: Results were statistically analysed using chi-square and Fisher exact test. Nonparametric values were analysed using student t test.

OBSERVATION AND RESULTS: The prospective, randomized, comparative study was conducted on 60 patients aged between 18-50 years posted for upper limb surgeries to compare the conventional and Ultrasound guided supraclavicular brachial plexus block in terms of time taken for the procedure, onset and duration of sensory and motor blockade respectively, success rate and complications.

There were no clinical or statistically significant differences in the demographic profile of patients in either group.

Age and weight

	Group	Group C	Group US	P Value
AGE (years)	Mean	33.7	33.53	0.946
	SD	10.10343	9.004	
WEIGHT (kgs)	Mean	60.53333	61.53	0.686
	SD	10.09518	8.977	

Table 1: Comparison of age and weight distribution between the two groups

The average age was 33.7 ± 10.10 yrs in group C, and 33.53 ± 9.00 yrs in group US. The average weights of the patients were 60.53 ± 10.09 kgs in group C and 61.53 ± 8.97 in group US respectively. There was no significant difference in age and weight between the two groups.

Sex Distribution:

Group		Group C	Group US	Test	P Value
Sex	Male	23	19	Fischer's Exact Test	0.398509
	Female	7	11		

Table 2: Sex distribution between the two groups

Table 2 shows sex distribution. There was no significant difference in sex distribution between the two groups.

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Parameters		Group C	Group US	P Value
Time taken for the procedure(min)	Mean	5.366667	9.966666	0.0001
	SD	1.449931	2.442205	
Onset of sensory block (min)	Mean	11.26667	11	0.750058
	SD	3.483294	2.947822	
Onset of motor block (min)	Mean	16.06667	14.9	0.272926
	SD	4.494697	3.623201	
Duration of sensory block (min)	Mean	393.2	444.16	116.27
	SD	95.33	116.27	
Duration of motor blockade	Mean	393.6	409.16	0.633859
	SD	86.49	91.03	

Table 3: Parameters in Group C and Group US

Time Taken for the Procedure: The mean time taken for the procedure to administer a block by eliciting paraesthesia (group C) was 5.33 min, whereas using an ultrasound (group US), the time required for the same was 9.96 min. This was clinically and statistically significant.

Onset of Sensory Blockade: The mean time of onset of sensory blockade in group C was 11.26±3.48min. In group US it was 11±2.94 min. The slightly delayed onset of sensory blockade in group C is however not statistically significant.

Onset of Motor Blockade: The onset of motor block was within 16.06±4.49 min in group C and 14.9±3.62 min in US group. This was not clinically or statistically significant

Duration of Sensory Blockade: In group C the mean duration of sensory blockade was 393. 2 min and in group US 444. 16 min. The duration of sensory blockade was shorter in group C when compared to group US. However it was not statistically significant.

Duration of Motor Blockade: In group C the mean duration of motor blockade was 393. 6±86. 49 min where as in group US it was 409.16±94.03 min. The duration of motor blockade was slightly shorter in group C when compared to group US and it was not statistically significant

Haemodynamic parameters

There were no clinically and statistically significant differences in pulse rate, systolic and diastolic blood pressures between the two groups during all periods of the study.

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OVERALL EFFECTIVENESS OF THE BLOCK:

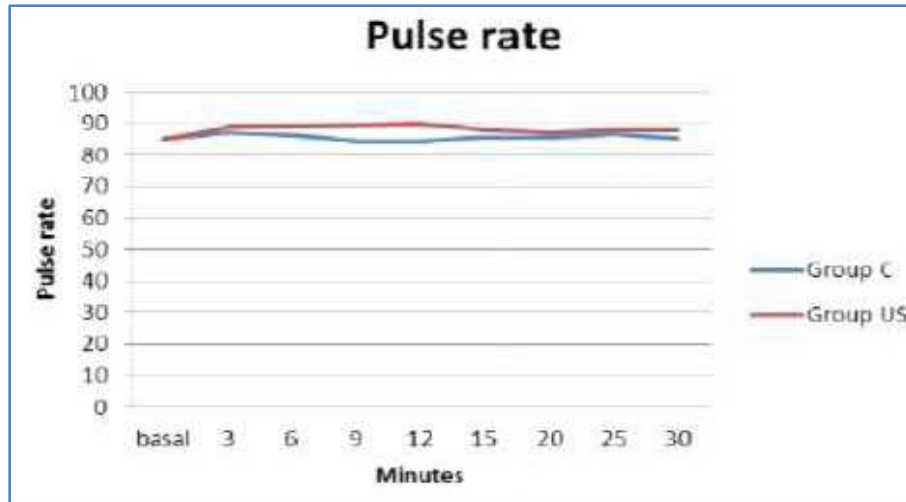


Fig. 2: Pulse rate Changes

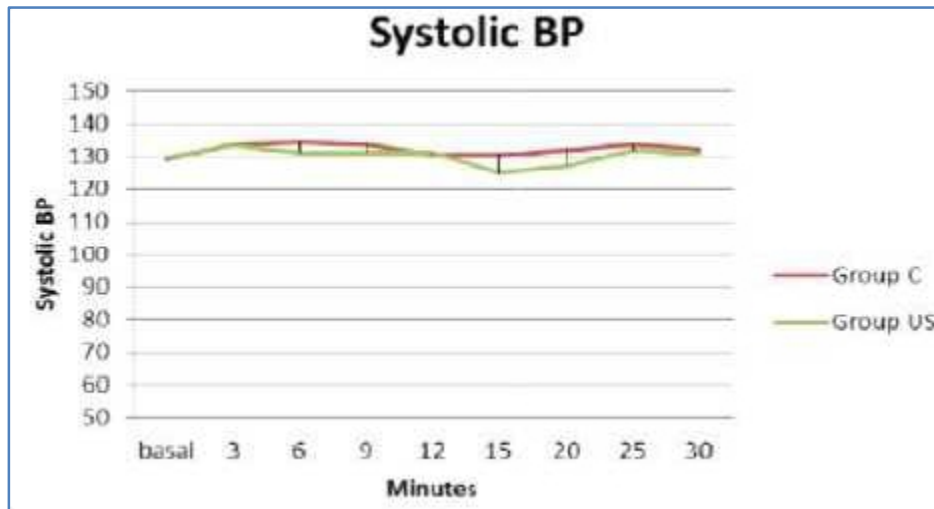


Fig. 3: Blood Pressure Changes

Figure 2 & 3 showing pulse rate and blood pressure changes in both groups.

	Group C	Group US	Test	P Value
Totally effective	20	24	Chisquaretest	0.489118
Partially Effective	4	2		
Failure	6	4		
Total	30	30		

Table 4: Overall effectiveness of the block

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The block was successful in 66.6 % of patients in group C compared to 80% in US group. These were comparable both clinically and statistically. This was not statistically significant.

COMPLICATIONS:

Groups	Complications	Count	Percent
Group C	Nerve injuries	1	3.33
	Vessel puncture	5	16.67
	Pneumothorax	0	0
	Nil	24	80.0
Group US	Nil	30	100

Table 5: Complications between two groups

Incidence of vessel puncture/ hematoma was 16.67% in C group compared to nil in US group which was significant with a p value = 0.037. Incidence of nerve injury was 3.33% in group C compared to nil in groups US. Incidence of pneumothorax was nil in both groups.

DISCUSSION: Peripheral nerve blocks are cost effective anaesthetic techniques used to provide good quality anaesthesia and analgesia while avoiding airway instrumentation and hemodynamic consequences of general anaesthesia. Patient satisfaction, a growing demand for cost effective anaesthesia and a favourable postoperative recovery profile have resulted in increased popularity for regional techniques. Brachial plexus block is an easy and relatively safe procedure for upper limb surgeries. Supraclavicular approach to brachial plexus block is associated with rapid onset and reliable anaesthesia.^{5,6} It can be given either after eliciting paraesthesia or using nerve stimulator. Frequently cited disadvantages of paraesthesia technique include patient discomfort on eliciting paraesthesia and that its success is highly dependent on the cooperation of the patient. The prevalence of pneumothorax after a supraclavicular block is 0.5% to 6% and diminishes with experience. The supraclavicular approach is best avoided when the patient is uncooperative or cannot tolerate any degree of respiratory compromise because of underlying disease. Other complications include frequent phrenic nerve block (40% to 60%), Horner's syndrome, and neuropathy.

The paraesthesia based method and nerve stimulator based methods are both blind methods; an advanced technique like use of ultrasound allows direct visualization of the nerves, the block needle, and local anaesthetic distribution. This imaging modality has proven highly useful to guide targeted drug injections and catheter placement. The last several years have witnessed a tremendous increase in the use of ultrasound guidance for regional anaesthesia.

This study is intended to compare the conventional method by eliciting paraesthesia with ultrasound guided supraclavicular brachial plexus block in terms of time taken for the procedure, onset and duration of sensory blockade, onset and duration of motor blockade, success rate and the incidence of complications. This study was done in patients undergoing upper limb surgeries with similar demographic profile.

Mean time to perform the block with ultrasound (9.96±2.44 min) was significantly longer when compared to conventional group (5.36±1.44 min). The longer time for the block performance

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found in group US can be explained by the lesser experience and skills in using the ultrasound. The study done by Morros C, Pérez-Cuenca MD, Sala-Blanch X, Cedó F,⁷ suggest that the use of ultrasound in regional anaesthesia requires the acquisition of new knowledge and skills not only by anaesthesiologists in training but also by anaesthesiologists experienced in neurostimulation-guided peripheral nerve blocks.

Ultrasonic guidance, by specifying for each patient the location of the target nerves, their relation to neighbouring structures, and the path of the needle by which local anaesthetic will be injected, could allow trainees to become more safe and successful in nerve blockade within the limited exposure provided by a typical residency program.

The onset of sensory blockade in all the major nerve distributions was similar in the conventional and ultrasound groups in our study. This is similar to the study done by Danelli G et al. (2012). In contrast Marhofer P et al.⁸ They found that onset time was significantly shorter in the US-guided group compared with both NS--guided groups. Similar findings also reported by Singh G, Saleem MY.⁹

Various criteria have been used by different authors to determine the success rate of a block. A block is considered successful by most authors when analgesia is present in all areas subjected to surgical intervention. This definition is sufficient from a clinical point of view, but implies a falsely high success rate and makes comparison of the different block techniques difficult. Therefore, to standardize the criteria of success, we considered our block successful when analgesia was present in all areas supplied by the four major nerves incomplete block was defined as the absence of sensory block in at least one neural distribution and/or the need of another anaesthetic technique to allow surgery.

The block was successful in 66.6% of patients in group C compared to 80% in US group. These were comparable both clinically and statistically. This was not statistically significant. Our results are similar to study by Singh G, Saleem MY.⁹

In the present study the onset of motor blockade occurred within 15±5 min in both the groups. Stephan R. Williams et al (2003) found that the onset of motor blockade paralleled that of sensory blockade.¹⁰ Lanz. E, Theiss. D, Jannkovic. D compared the extent of blockade by interscalene and supraclavicular brachial plexus block using 50ml of 0.5% bupivacaine and they found that motor blockade developed faster than sensory blockade.¹¹ They explained this to arrangement of motor fibers in the mantle and sensory fibers in the core of the trunks and cords.

In the present study the duration of sensory blockade was more in ultrasound group than the conventional group which was not statistically significant. The duration of motor blockade was almost equal in both groups. In contrast Kapral S et al (2008) compared ultrasound and nerve stimulator guided supraclavicular brachial plexus block in 160 patients and found that sensory, motor, and extent of blockade was significantly better in the ultrasound group when compared with the nerve stimulation group.¹²

Yuan Jia-min et al (2012) studied complications of US and Peripheral nerve stimulator guidance for upper-extremity peripheral nerve blocks (brachial plexus) and he found that US decreases risks of complete hemi-diaphragmatic paresis or vascular puncture and improves success rate of brachial plexus nerve block compared with techniques that utilize PNS for nerve localization. Larger studies are needed to determine whether or not the use of US can decrease risk of neurologic complications.

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Neurological complications following peripheral nerve blocks i. e. post block Neuralgia,¹³ show an incidence of 1.7% upto 12.5%.¹⁴ Symptoms mostly are moderate and transitory with a tendency of spontaneous recovery within times related to nerve regeneration and repair mechanisms. Interestingly, Kaufman et al,¹⁵ reported a series of seven patients suffering from severe, debilitating chronic pain states after peripheral nerve blocks. In all seven cases, painful paraesthesia were elicited at the time of nerve block, be they voluntary or accidental with a progress to severe chronic pain condition. However, in our study there was one case of neuropraxia and weakness in radial nerve distribution of the blocked arm post operatively. This patient was in conventional group and the patient was started on steroids. The patient followed up for 1 month and the patient recovered well.

Fear of pneumothorax limits the use of supraclavicular technique. The incidence of pneumothorax with the classic supraclavicular technique ranges from 0.5% to 6%.¹⁶ Many authors have studied the anatomy of brachial plexus and analysed methods to prevent pneumothorax. These include use of several modifications of supraclavicular block such as modified lateral technique or plumb bob approach.

Ultrasound gives a real-time visualization of the structures including not only the blood vessels, bone, nerve but also pleura. No patients in our study showed any clinical evidence of pneumothorax in both groups.

In the present study we found that vessel puncture/hematoma formation occurred only in the conventional group (16.67%) whereas ultrasound group did not have any of the mentioned complications because ultrasound provides direct visualization of vessels around the plexus and also needle path. We can also take the help of Doppler to visualize the vessels. Dilip Kothari (2003) administered supraclavicular block in 250 patients by eliciting paraesthesia, he found that 6% cases had vessel puncture during the procedure but block could be performed successfully in these patients once pressure stopped the bleeding. Stephan Kapral et. al in 1994¹⁷ observed no complications such as pneumothorax, puncture of a major blood vessel, paresis, or irritation of the plexus, the recurrent laryngeal nerve, or the phrenic nerve in his study of ultrasound guided supraclavicular approach brachial plexus blockade.

Drawbacks of the Study: There was no blinding in data collection which was a possible source of bias in the present study. The moderate experience of the specialist may have contributed to more procedural times but this need not possibly affect the outcome with respect to major study parameters.

CONCLUSIONS: From present study it was concluded that:

- Success rate and effective quality of the block were more with ultrasound group than conventional.
- Time taken for the block performed by ultrasound was longer than the conventional technique.
- Onset of sensory and motor blockade was similar in both groups.
- Duration of sensory and motor blockade was similar in both groups.
- Incidence of complications like vessel puncture, nerve injury was seen only in conventional method.

REFERENCES:

1. Suzanne carty, Barry Nicholls, Ultrasound guided regional anaesthesia, oxford journals, medicine Br J Anaes; CEACCP; 2007; 7; 1: 20-24.
2. Mak P H, Irwin M G, Ooicg B F; Incidence of diaphragmatic paralysis following supraclavicular brachial plexus block and its effects on pulmonary function, Anesthesiology 2001, 56 (4); 352-6.
3. Brown DL, Cahill DR, Bridenbaugh LD. Supraclavicular nerve block: Anatomic analysis of a method to prevent pneumothorax. Anesth. Analg 1993; 76: 5304.
4. Vincent W. S. Chan, Anahi Perlas, Regan Rawson Ultrasound-Guided Supraclavicular Brachial Plexus Block Anesth. Analg 2003; 97: 1514 -7.
5. Moore DC. Traditional or supraclavicular technique. Reg Anesth 1980; 5: 3-5.
6. Brown DL. Brachial plexus anaesthesia: an analysis of options. Yale J Biol Med 1993; 66: 415-31.
7. Morros C, Pérez-Cuenca MD, Sala-Blanch X, CedóF. Ultrasound-guided axillary brachial plexus block: learning curve and results. Rev Esp Anesthesiol Reanim. 2011 Feb; 58 (2): 74-9.
8. Marhofer P, Schrogendorfer K, Wallner T, et al. Ultrasonographic guidance reduces the amount of local anesthetic for 3-in-1 blocks. Reg Anesth Pain Med 1998; 23: 584-8.
9. Singh G, Saleem MY. Comparison between Conventional Technique and Ultrasound Guided Supraclavicular Brachial Plexus Block in Upper Limb Surgeries. Int J Sci Stud 2014; 2 (8): 169-176.
10. Stephan R. Williams, Philippe Chouinard, et al, Ultrasound Guidance Speeds Execution and Improves the Quality of Supraclavicular Block Anesth. Analg. November 1, 2003; 97: 1518-1523.
11. EgonLanz E, Theiss D, Jankovic D et al. The extent of blockade following various techniques of brachial plexus block. Anesth. Analg 1983; 62: 55-8.
12. Kapral S, Krafft P, Eibenberger K, et al: Ultrasound-guided supraclavicular approach for regional anesthesia of the brachial plexus. Anesth. Analg 1994; 78: 507-513.
13. Reiss W, Kurapati S, Shariat A, Hadzic A. Nerve injury complicating ultrasound/electro-stimulation-guided supraclavicular brachial plexus block. Reg Aug; 35 (4): 400-1. Anesth Pain Med. 2010 Jul-Aug; 35 (4): 400.
14. Stan TC, Krantz MA, Solomon DL. The incidence of neurovascular complications following axillary brachial plexus block using transarterial approach: a prospective study of 1000 consecutive patients. Reg. Anesth 1995; 20: 486-92.
15. Kaufman BR, Nystrom E, Nath S. Debilitating chronic pain syndromes after presumed intraneural injections. Pain 2000; 85: 283-6.
16. Bridenbaugh LD. The upper extremity: Somatic blockade. In: Neural blockade in clinical anesthesia and management of pain, Cousins MJ, Bridenbaugh PO, eds. Philadelphia: J. B. Lippincott; 1988. pp. 387-416. 17.
17. Kapral S, Greher M, Huber G, et al. Ultrasonographic guidance improves the success rate of interscalene brachial plexus blockade. Reg Anes Pain Med 2008; 33 (3): 253-258.

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