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Original Research

Compare two brachial plexus block approaches, Infraclavicular with supraclavicular approach in upper limb surgeries

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Abstract

Aims and objectives: The present study was to compare two brachial plexus block approaches, Infraclavicular with supraclavicular approach in upper limb surgeries.

Material and methods: The total patients were divided in 2 groups: Infraclavicular Group (Group A) (n=29) and Supraclavicular Group (Group B): (n =29). Time interval between the end of total local anaesthetic administration and complete sensory block. time from complete block to the return of the paraesthesia, duration from the end of injection to decresed finger movements, modified bromage scale, paitent satisfaction and duration of analgesia were measured

Results and conclusion:

Infraclavicular approach of brachial plexus block is rapidly performed as compared to supraclavicular approach of brachial plexus block.Infraclavicular approach of brachial plexus block provide early onset of sensory and motor block as well as higher success rate & better patient's satisfaction as compared to supraclavicular approach of brachial plexus block.In both the groups duration of analgesia remain same.In both the groups hemodynamic parameter remained stable.supraclavicular approach of brachial plexus block having higher incidence of vascular puncture than Infraclavicular approach of brachial plexus block.

Introduction

The blocks like supraclavicular, infraclavicular, axillary blocks provide surgical and post operative analgesia for forearm surgeries. Regional anesthesia given by local anesthetic agents have been increasingly preferred, safe and highly beneficial. It has many advantages over general anaesthesia like effective analgesia with good motor blockade, remaining consciousness of patient, good hemodynamic stability,[1] analgesia without sedation, early mobilization of patient, spontaneous breathing of patient, no airway manipulation & allows early discharge. It decreases the opioids requirement and reduces the incidences of post- operative nausea and vomiting.[2]

Upper extremity blocks are more frequent than block of lower extremity. Interscalene, supraclavicular, infraclavicular and axillary techniques can all be used to block the brachial plexus.[3] In past, Brachial plexus blocks have been accomplished using the surface landmark technique, but advancements in technology have led to a shift towards more precise methods such as for better localization of the nerves and surrounding structures peripheral nerve stimulator and ultrasound guided block are commonly used nowadays. It provides rapid onset with higher success rate.

Supraclavicular block is a regional anesthetic technique which is used as alternative or adjuant to general anaesthesia for upper extremity surgery distal to shoulder. It provides reliable regional anesthesia and good post-operative analgesia, so it is commonly referred as the "spinal of the arm".[4] Supraclavicular block is performed at the level of brachial plexus trunck where entire sensory and motor innervations of upper extremities is carried so it provides dense block with rapid onset, but it may cause complications like

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vascular injections, pneumothorax, phrenic nerve palsy and Horner's syndrome.

Infraclavicular block is simple, easy to perform and an effective alternative to supraclavicular approach.it is performed at the level of cords of brachial plexus. There are three approaches to give infraclavicular block:1] corocoid approach 2] costoclavicular approach 3] lateral saggital approach.

The corocoid approach was first described by Whiffler in British journal of anaesthesia in 1981. This techanique was most commonly used with nerve stimulation. It can provide good analgesia for tourniquet pain but it is not suitable for shoulder area. Infraclavicular block is regional anesthetic technique design to prevent the side effect and complication of supraclavicular block particularly pneumothorax. injury to neurovascular structure in neck and incidence of pleural puncture is less as compare to supraclavicular block.

Peripheral electric nerve stimutation is one of the standard applications in peripheral regional anaesthesia. In the past, clinicians used anatomical landmarks, haptic feedback (pops, clicks and loss of resistance) or patient reported paraesthesia to estimate needle position in relation to target nerve. clinicians could now the establish more quantitative inference about the needle/nerve association by inducing a motor response of the muscle associated with the nerve (trunk, division, cord) by advancing the needle until the response was present and below a specific threshold current intensity. This innovation decreases block failure rate compared with landmark or paresthesia technique.[5]

Brachial plexus block has been achieved using variety of local anaesthetics. Recent advancement in anesthetic agent further enhances the safety and efficacy of these techniques. Previously bupivacaine is most popular one of them because of its higher potency and prolonged duration of action. But cardiotoxicity is one of its drawbacks, particularly when accidentally injected in to subclavian artery. The resulting dysrhythmia are resistant to all commonly used antiarrhythmic, suggesting that cardiotoxicity may be life threatening. Hence there is need for drug which can have all the advantage of bupivacaine without its cardiotoxicity.

So, newer an anesthetic drug ROPIVACAINE developed with properties similar to bupivacaine, having lower lipid solubility and less cardiotoxicity.[6]

In our study we are using nerve stimulator techanique for brachial plexus block which will give high success rate and less complication. It is safe and effective techanique than anatomical landmark guided techanique.

Our aim in this study is comparission of supraclavicular and infraclavicular approach by using nerve stimulation in the patient undergoing upper limb surgery.

AIM OF THE STUDY:

The aim of this study is to compare two brachial plexus block approaches, Infraclavicular with supraclavicular approach in upper limb surgeries.

OBJECTIVES:

- **Primary objectives**

1. To compare the Block performance time and success rate of infraclavicular and supraclavicular approaches to brachial plexus block using peripheral nerve stimulator

- **Secondary objectives**

1. To compare Onset and duration of sensory and motor blocks and patient's satisfaction, duration of analgesia.
2. To asses complication associated with each group like vascular injections, pneumothorax, phrenic nerve palsy and Horner's syndrome.

MATERIAL AND METHODS

Written informed consent from all the patient before surgery was obtained, After approval from Institutional Ethical Committee.

Study design: observational type

Sample Size: Sample size (n=29 cases per each group) was calculated by using Open EPI software version 3.0 application considering onset of sensory blockage in Infraclavicular and Supraclavicular Block base on Abhinaya RJ et al.[7]

Group I: onset of sensory blockage in Infraclavicular Block (6.43±2.61 min)

Group II: onset of sensory blockage in Supraclavicular Block (8.45±2.87min)

Power: 80%

Confidence Interval: 95%

Sample size: 58(n1=29, n2=29)

Sample size: 58(n1=29, n2=29)

Selection of patients who was posted in routine surgery list for upper limb surgery under brachial plexus block, was decided by odd and even dates on the day of surgery, odd being Infraclavicular approach group and even being supraclavicular approach based study group.

Inclusion Criteria:

- ASA class I, II and III posted for upper limb surgeries below shoulder
- Age: 18 to 60years
- Sex: Male or Female

Exclusion criteria:

- Any bleeding disorder or patient on anticoagulants
- Neurological deficit involving brachial plexus
- History of Allergy to local anesthetics
- Patients with chest deformity, fracture of clavicle and pregnancy
- Local infection at the injection site

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- Patients on any sedatives or antipsychotics
- Patient's refusal to participate in study

Groups:
Total patients were divided in 2 groups
Infraclavicular Group (Group A) (n=29)
Infraclavicular block was given by peripheral nerve stimulator guided technique. Patients received 20ml of Ropivacaine 0.5% + 10ml lignocaine with adrenaline 2% to make total volume of 30 ml.
Supraclavicular Group (Group B): (n =29)
Supraclavicular block was given by peripheral nerve stimulator guided technique. Patients received 20ml of Ropivacaine 0.5% +10 ml of lignocaine with adrenaline 2% to make total volume of 30 ml.

Regional Anaesthesia technique:
- The blocks was performed in supine position with his/her head turned in the direction opposite the limb to be anaesthetized. The arm to be anaesthetized kept in neutral position along the side of body. Skin cleansing will be done with povidone iodine.
- In group A, there are three approaches to give infraclavicular block: 1] Coracoid approach 2] Costoclavicular approach 3] lateral saggital approach.

The block was given by coracoid approach as it seemed better to locate and easy to perform. The coracoid process was identified by palpation. A point of 2cm medial and 2 cm caudal to coracoid process was established and 2ml of 0.5% lignocaine is infiltrated. A 22-gauze with 5cm Insulated needle was inserted perpendicular to the skin. Peripheral nerve stimulator was used to elicit posterior cord motor response of finger and hand extension.
- In group B, Under the block side's shoulder, a 2 cm thick pillow was placed. As a result, the intervention zone wasclear of the lung apex. The head wasextended to stretch the neck muscles and Local infiltration wasdone with 1-2 ml of 2 % lignocaine.

A 22-gauze with 5cm insulating needle wasinserted through skin wheal caudally and, slightly medial and posterior direction just lateral to subclavian artery pulsation along with posterior border of sternocleidomastoid muscle. After confirming needle placement with Peripheral nerve stimulatorin brachial plexus sheath drug injected at two places to displace trunks and divisions.
- In both the groups, the block wasperformed using peripheral nerve stimulator. Proximal end of insulated needle wasconnected to nerve stimulator and it wasadvanced until a muscle distal to deltoid wasstimulated. The initial stimulating Current will be set to 2.0 mA, it wasgradually decreased up to 0.05 mA to elicit distal motor response.
- A response wasconsidered proximal if contraction of triceps, biceps, flexor carpi radialis or flexor carpi ulnariswaselicited and distal if flexion or extension of wrist or finger waselicited in each patient. Distal response wasdesired but if it could not be obtained, proximal response was taken as satisfactory. 30ml of prepared solution (20ml ropivacaine 0.5%+ 10ml lignocaine with adrenaline 2%) wasinjected slowly. Accidental intravascular injection waschecked by frequent aspiration through the syringe.
- Time of injection of drug noted.
- If after 30mins complete blockade wasnot achieved and patient perceived pain then it was taken as failed block, and then general anesthesiawasadministered.

MONITORING:
BLOCK PERFOMANCE TIME (MIN): The block performance time wasdefined as the time interval from insertion of peripheral nerve stimulator needle to removal of needle after injection of local anesthetic.
Onset of sensory and motor block wasassessed every 5 minutes after the end of injection till peak effects occur.

Onset of Sensory blockade: By pin prick method Assessment wasdone along the distribution of nerves as follows:
- Median nerve: Thenar eminence
- Radial nerve: lateral side of dorsum of hand
- Ulnar nerve: little finger
- Musculocutaneous nerve: Lateral border of forearm over the site of radial artery

Sensory block wasassessed by a 3-point scale:
0 - normal sensation,
1 - Loss of sensation of pinprick (analgesia),
2 - Loss of sensation of touch (anaesthesia).

Onset time: Time interval between the end of total local anaesthetic administration and complete sensory block (sensory score 2).
Duration of sensory block: Time from complete block to the return of the paraesthesia (Sensory score 1).
Onset of Motor Blockade: Time duration from the end of injection to decresed finger movements.
Assessment wasdone as follows:
- Median nerve: Thumb opposition
- Radial nerve: Thumb abduction
- Ulnar nerve: Thumb adduction
- Musculocutaneous nerve: Flexion at elbow

Modified Bromage Scale:
0- Normal motor function,
1- Ability to move only fingers,
2- Complete motor block with inability to move elbow, wrist and finger administration and complete motor block (MBS score 2).

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Successful block: Block success was considered as complete, partial and failed after considering the sensory and motor effects in all four nerves. Complete Sensory and motor block in all the regions were achieved within 30 minutes of LA Injection which allowed pain free Surgery without any Supplementation.

The block wasconsidered incomplete when any of the segments supplied by median, radial, ulnar and musculocutaneous nerve do not have analgesia even after 30 min of drug injection. When more than one nerve remained unaffected, it wasconsideraincomplete block.

In this case, general anaesthesia wasgiven

Intra-operative period:

Pulse rate, Blood pressure, Oxygen saturation and level of sedation wasmonitor, immediately after giving the block, 5 min, 10 min, 15 min, then every 15 min up to 60 min, then every 30 min up to completion of surgery in intra-operative periods.

Paitent satisfaction:

The paitentswere asked for their satisfaction level during the performance of block and surgery by the two-point assessment scale

0-unsatisfied

1-satisfied.

Duration of Analgesia: The time interval from giving of brachial plexus block to the time duration for first reserve analgesia. Time to first rescue analgesia was noted and patients were allowed to receive intravenous diclofenac 75 mg as rescue analgesia

Side effects:

Patients were observed for any Respiratory, cardiovascular or central nervous toxicity by changes in hemodynamic:

- Hypotension- Fall in blood pressure of more than 20% of pre-operative value.
- Pneumothorax, Horner's syndrome, Diaphragmatic paralysis, vascular puncture.
- Bradycardia- Fall in pulse rate less than 60/min.
- Nausea and vomiting
- Hypersensitivity
- Local anesthetic toxicity

OBSERVATION AND RESULTS

Patients in infraclavicular group had average weight of 55±9.6 years. Patients in supraclavicular group had average of 55±9 years. The weight distribution across the two groups did not differ significantly (P>0.05).

This study analysed gender distribution between two groups, A and B. Female comprised 44.82% of group A and 41.37% of group B,While males made up 55.1% of group A and58.6% of group B.There was no significant difference in sex distribution between two groups (P>0.05).

TABLE 1: BLOCK PERFORMANCE TIME (MINUTES)

	Group A (mean ± SD)	Group B(mean ± SD)	p value
Block performance time	5.1±0.8	7.6±1.2	<0.02

Patients in infraclavicular group had average block performance time of 5.1±0.8 mins. Patients in supraclavicular group had average of 7.6±1.2 mins. Block performance time was quicker in Infraclavicular Group, which is highly significant(p<0.02).

TABLE 2: ONSET OF SENSORY AND MOTOR BLOCK (MINUTES)

Onset time	Group A (mean ± SD)	Group B (mean ± SD)	p value
Sensory	5.45±0.49	8.17±1.03	0.0001
Motor	7.76±0.67	8.0±1.0	0.03

Patient who received Infraclavicular block, the mean onset time of sensory block was 5.45±0.49minutes. It was 8.17±1.03minutes in supraclavicular block.Who received infraclavicular block, the mean onset of motor block was 7.76±0.67 minutes and 8.0±1 minutes in supraclavicular block.Patients who receivedinfraclavicular Group Onset time of sensory and motor block was quick. It was slower in supraclavicular group as compare to infraclavicularGroup which was statistically significant (P<0.05).

The supraclavicular approach led to significantly poorer block of the ulnar and median nerves than infraclavicular approach.Good effective block of radial and musculocutaneous nerve were achieved by both approach of brachial plexus block.

Successful block was achieved in 93.33% in Infraclavicular Group and 82.75% in supraclavicular Group. Which is statistically significant (p<0.05).In case of Incomplete block general anaesthesia is givento the patient.

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TABLE 3: DURATION OF ANALGESIA

Duration ofAnalgesia	Group - A (n=29)		Group B(n=29)		P Value
	Mean	SD	Mean	SD	
Duration ofAnalgesia(hrs)	7.79	1.02	7.76	0.89	0.942

DURATION OF ANALGESIA: Time from start of sensory block until the need for the first rescue analgesia is duration of analgesia.

Patients in infraclavicular group had average duration of analgesia is7.79±1.02hrs. Patients in supraclavicular group had average of 7.76±0.89hrs. The mean duration of analgesia across the two groups was statically not significant. (P>0.05).

TABLE 4: PATIENT SATISFACTION

	Group A n=29 (%)	Group Bn=29 (%)
satisfactory	28(96.5%)	27(93.33 %)
unsatisfactory	1	2(6.66)

Patient satisfaction was achieved 96.5% in group A and 93.33% in group B.three out of 58 patients were unsatisfied. Two in supraclavicular group due to vascular puncture and one in Infraclavicular group was unhappy due to prlong sensory and motor block with ropivacaine.

There was no statistically difference in mean heart rate,systolic blood pressure and diastolic blood pressure were observed among both groups at all different time intervals (p>0.05). overall, there were no significant difference in heart rate, systolic blood pressure and diastolic blood pressure between the groups at any time point.

TABLE 5: COMPLICATIONS

	Group A n=29 (%)	Group Bn=29 (%)
Vascular puncture	NIL	2 (6.66)
Haematoma	NIL	NIL
Pneumothorax	NIL	NIL

There were two inadvertent vascular punctures, both in supraclavicular group but no adverse sequalae occurred in either patient. No other complications were reported.

DISCUSSION

Surgeries of the upper extremities can be performed under general anaesthesia or regional anaesthesia. Brachial plexus blocks avoid the risks of complications like airway manipulation, hemodynamic instability, cognitive dysfunction and postoperative nausea and vomiting[8] and provides good postoperative analgesia. The need for an anaesthetic approach that would offer residual analgesia in the postoperative phase has been emphasised in order to ensure that the immediate postoperative time is pain-free.

Brachial plexus is blocked by various approaches like supraclavicular, infraclavicular, interscalene and the axillary approach. Regional aesthetic technique with brachial plexus block enables the patient to be discharged on the same day thus facilitating day care surgery.

A Peripheral nerve stimulation was introduced which has significantly better results compared to paraesthesia techniques. Hence it proved to be a safe and better alternative to the conventional methods.

This study was designed to compare the peripheral nerve stimulator guided supraclavicular block with infraclavicular block for upper limb forearm surgeries in reference to Blockperformance time, Onset of sensory and motor blockade, Duration of sensoryand motor blockade, Success of blocks, patient's satisfaction & Any complications.

A total of 58 adult patients were randomized in two groups. Each group included 29 patients.

1. **Infraclavicular Group (Group A) (n=29)**

Infraclavicular block will be given by peripheral nerve stimulator guided technique. Patients received 20ml of Ropivacaine 0.5% + 10ml lignocaine with adrenaline 2% to make total volume of 30 ml.

2. **Supraclavicular Group (Group B): (n =29)**

Supraclavicular block will be given by peripheral nerve stimulator guided technique. Patients received 20ml of Ropivacaine 0.5% +10 ml of lignocaine with adrenaline 2% to make total volume of 30 ml.

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DEMOGRAPHICAL DATA

Individual patient characteristic like age, gender and weight are important factors influencing any pharmacologic therapy.

In present study, mean age in group A was 37.79+11.2 years and in group B it was 37.83+10.95 years (p=0.989). There was statistically no significant difference in terms of mean age between both the groups (p > 0.05).

Mean weight of patients in Group A was (55+9.6 kg) and (55+9 kg) in Group B, and was comparable in both the groups. There was no statistically significant difference in terms of weight distribution between both the groups (p>0.05).

In present study, gender distribution between two groups, A and B. Female comprised 44.82% of group A and 41.37% of group B, while males made up 55.1% of group A and58.6% of group B. There was no significant difference in sex distribution between two groups (P>0.05).

All the demographic parameters were comparable in both the groups and there was no statistically significant difference observed (p>0.05).

Block Performance Time

In our study, the infraclavicular block demonstrated a faster performance time compared to the supraclavicular block. This difference can be attributed to the technique employed for each block. The infraclavicular block involved a single, targeted injection of local anaesthetic, which allowed for quicker completion. In contrast, the supraclavicular block required the administration of two aliquots of local anaesthetic drug at separate locations within the brachial plexus sheath. Consequently, the mean block performance time was (5.1±0.8 mins) for the infraclavicular block versus (7.6±1.2mins) minutes for the supraclavicular block(p<0.02). This finding supports the hypothesis that the infraclavicular block can be performed more efficiently due to the simplified technique and fewer injection sites required.

In 2005 Dr, Genevieve arcand[1]stated that significant difference present in block performance time between both the groups. It was shorter in infraclavicular group (4±3.3)mins compared supraclavicular group(4.7±4)mins. These findings are consistent with our study.

In 2009, Dr.Koscielnak-Nielsen B S Frederiksen[2]found that block performance time is faster with infraclavicular approach compared with supraclavicular approach. Themean block performance time significantly less in infraclavicular Group (5minutes) than supraclavicular group(5.7minutes) with p value <0.05 and these findings are similar with our study.

In 2017 Abhinaya RJ[7]observed that mean block performance time (9.57 ± 3.19 min) was achieved earlier with infraclavicular group compared with supraclavicular group (11.53 ± 2.90 min). This difference was statistically significant with p value <0.05. Infraclavicular group provides quicker block performing time than supraclavicular group, these finding are consistent with our study.

In 2017 Dr. Alan D. Kaye & Varsha allampalli[9]did comparative study between supraclavicular and Infraclavicular brachial plexus nerve blocks & it's clinical, pharmacological, anatomical considerations and unlike our study no significant difference found forblock performance time in both groups (p=0.05) These finding are comparable with our study.

In 2019Dr. Siddharth Sarkar and Shilpa Mitul Doshi[10]**in** conducted astudy in which they aimed to compare supraclavicular versus infraclavicular brachial plexus nerve blocks for upper limb orthopaedic surgeries.Supraclavicular group block performance time was faster than Infraclavicular group (4.8±4.4 min vs. 6.3±1.39 min, p<0.001) which is due to factors as Multi neurostimulation technique, unfamiliar methodology and inexperience in performing infraclavicular brachial plexus block. This finding is inconsistent with our study.

Onset of Sensory and Motor block

Our study observed that the onset of both sensory and motor blockade was slightly earlier in the infraclavicular group compared to the supraclavicular group. The sensory blockade was achieved rapidly in Infraclavicular Group (5.45 ±0.49 min) than supraclavicular Group (8.17±1.03 min) andthe onset of motor blockade was also earlier in Infraclavicular Group (7.76 ± 0.67 min) than Group B (8±1.0min) which were statistically significant(P<0.05),although the clinical relevance of this difference may be limited. Faster onset times in the Infraclavicular group may be attributed to the more direct targeting of the axillary artery, which could enhance the rapid diffusion of LA agents. Conversely, the Supraclavicular group showed longer latency, which may be affected by variations in LA spread and anatomical factors.

In 2017 Dr. Ranganathan Jothi Abhinaya[7]conducted a study comparing the onset times of sensory and motor blockade between infraclavicular and supraclavicular brachial plexus blocks. The study found that sensory blockade was achieved significantly faster in the infraclavicular group, with an average onset time of 6.43 ± 2.61 minutes compared to 8.45 ± 2.87 minutes in the supraclavicular group. This difference was statistically significant, with a P-value of 0.006, indicating a meaningful advantage of the infraclavicular approach in terms of the speed of sensory analgesia.

However, the study did not find a statistically significant difference in the onset of motor blockade between the two techniques. This suggests that while the infraclavicular block provides quicker sensory relief, the time required to achieve motor blockade is similar for both infraclavicular and supraclavicular blocks, which is similar with our study.

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In 2022 Rathod J et al[11]found that the onset of sensory block was significantly faster in the infraclavicular group, with an average time of 10.1 ± 1.1 minutes, compared to 13.3 ± 1.3 minutes in the supraclavicular group ($p < 0.05$). Similarly, the onset of motor block also occurred more quickly in the infraclavicular group, averaging 11.97 ± 1.97 minutes, versus 17.9 ± 2.0 minutes in the supraclavicular group ($p < 0.05$). Both differences in onset times were statistically significant, indicating that the infraclavicular block provides faster onset of both sensory and motor blockade compared to the supraclavicular block which is consistent with our study.

In 2019 Sarkar S and Doshi S[10]found thatSupraclavicular block was associated with quicker onset of sensory block than Infraclavicular group (6.9±1.58 min vs. 7.6±1.34 min, p=0.019).which is not consistent with our study.

Success of Block and Individual Nerve Blockade

During the course of our study, it was found that the Ulnar nerve was the most supplemented nerve in Group B (4 patients), followed by the median nerve (2 patients).In Group B blockade was done at the level of distal trunk-proximal division, whereas Group A blockade was done at the level of cord. The targets for LA injections were also different in both Groups, and so some parts of the plexus in the Group B might have not been surrounded by LA injection. Particularly in Group B, we might have missed anatomical variations of the inferior trunk behind or belove the Subclavian artery. This could explain the poorer analgesia of the ulnar and the median nerves, which originate from this cord in Group B patients. Plexus cords identification was not necessary in the Group A, where the target was the axillary artery.

In 2009Koscielnak-Nielsen et al[2],observed that the ulnar nerve was the most commonly supplemented nerve in Group A (10 patients), followed by the median nerve (6 patients). Success of block was achieved in 27 patients (93.33%) in Group A and 24 patients (82.75%) in Group B similarly with our study.

In 2009Fredrickson MJ et al[3] found that the infraclavicular block had a higher success rate than the supraclavicular block highlights the potential advantages of the infraclavicular technique. A higher success rate is particularly significant in clinical practice, as it directly impacts the reliability and effectiveness of regional anaesthesia, which is corelate with our study.

In 2017 Abhinaya RJ[7]observed that success rate for brachial plexus block was high for both the infraclavicular and supraclavicular groups, with 93.3% of cases achieving successful blockade and 6.7% experiencing block failure in each group,which is inconsistent with our study.

Haemodynamic changes

There were no significant differences to both study groups with respect to the pattern of changes in pulse rate, systolic blood pressure, diastolic blood pressure and oxygen saturation perioperatively. The above-mentioned parameters were recorded at regular intervals up to 120mins.

In the present study, baseline (0 min) pulse rate in group A was 82.73 ± 7.05 per min and in group B 81.86± 6.32 per min which was comparable between both the groups ($p>0.05$).Throughout the observation period, pulse rates remained stable in both groups, with no notable changes. The difference in fall in PR was statistically insignificant ($p>0.05$).

At baseline, the systolic blood pressure (SBP) was 130.33 ± 6.88 mmHg in Group A and 130.46 ± 5.84 mmHg in Group B, with no significant changes observed in SBP in either group throughout the study period ($p > 0.05$). Similarly, the baseline diastolic blood pressure (DBP) was comparable between the groups, with Group A at 82 ± 6.17 mmHg and Group B at 84.06 ± 5.18 mmHg ($p > 0.05$). Diastolic blood pressure remained statistically insignificant both intraoperatively and postoperatively ($p > 0.05$). No cases of tachycardia or bradycardia were detected in either group. Overall, patients in both groups maintained hemodynamic stability throughout the procedure.

Duration of Analgesia

In this study comparing supraclavicular and infraclavicular blocks using Peripheral nerve stimulator, the duration of analgesia was an important factor, though not the primary focus of our investigation. The results suggest that both techniques provide effective pain relief. There was no significant difference found in Duration of analgesia($P>0.05$) between both the groups, this finding was found to be consistent with **Geneviève Arcand, Stephan R Williams, Philippe Chouinard[1]**in which duration of analgesia between each group was insignificant.

Patient's satisfaction

Patient satisfaction was achieved 96.5% in group A and 93.33% in group B. three out of 58 patients were unsatisfied. two in supraclavicular group due to vascular puncture and one in Infraclavicular group was unhappy due to prong sensory and motor block with ropivacaine.While the study did not directly measure patient satisfaction, the findings suggest that the infraclavicular block might lead to quicker onset of pain relief and fewer complications, potentially contributing to higher patient satisfaction.

In 2013 Timsi S et al[12]observed that two out of 97 patients were unsatisfied. One in supraclavicular group and one in infraclavicular group which is comparable with our study.

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In 2017Abhinaya RJ[7]found that the satisfactory score was better in infraclavicular group (93.3%) in comparison to supraclavicular group with satisfaction score of 90% which is consistent with our study.

In 2019 Sarkar S and Doshi S[10]observed that 4 patients from each group were overall not satisfied with the block procedure due to block failure, which is inconsistent with our study.

Complications

In terms of complications, the supraclavicular block had a higher incidence of adverse effects compared to the infraclavicular block. There were 2(6.66%) patients who had vascular puncture in Group B,while no such complications were observed in the infraclavicular group.

In 2013 TimsiS et al[12]did study in which vascular puncture while performing block in supraclavicular group was 8 and infraclavicular group was 7 patients which is consistent with our study.

In 2017 Abhinaya RJ[7]conducted a study in which supraclavicular Group, one patient experienced a pneumothorax, three patients acquired Horner syndrome, and a fourth patient experienced clinically evident diaphragmatic paresis. There were 3 cases of vascular puncture in supraclavicular group to 1 case in Infraclavicular group which is correlate with our study.

In 2019 Sarkar S and Doshi S[10]observed thatfive subjects in Supraclavicular block had incidents of vascular puncture while performing block, only one subject in infraclavicular block was seen with vascular puncture similarly with our study.

CONCLUSION

We concluded that:

- Infraclavicular approach of brachial plexus block is rapidly performed as compared to supraclavicular approach of brachial plexus block.
- Infraclavicular approach of brachial plexus block provide early onset of sensory and motor block as well as higher success rate & better patient's satisfaction as compared to supraclavicular approach of brachial plexus block.
- In both the groups duration of analgesia remain same.
- In both the groups hemodynamic parameter remained stable.
- Supraclavicular approach of brachial plexus block having higher incidence of vascular puncture than Infraclavicular approach of brachial plexus block.

Based on above findings we concluded thatthe peripheral nerve stimulator guided infraclavicular brachial plexus block is superior compared to supraclavicular block in terms of shorter block performance time, faster onset of sensory and motor blockade, and fewer complications. Thus, the infraclavicular approach of brachial plexus block is preferred over the supraclavicular approach of brachial plexus block in terms of efficiency and safety.

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