

# A Study of Supraclavicular Brachial Plexus Block by Paresthesia Technique Success Rate and Complications: An Hospital Based Study

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## ABSTRACT

**Background:** The advantage of regional anaesthesia over general anaesthesia are many and well documented. Brachial plexus can be blocked by various methods including paresthesia technique, nerve stimulation technique and ultra sound guided. The present study was undertaken for assessing time taken to perform block, Successful blockade, complication of supraclavicular brachial plexus block by paresthesia technique.

**Methods:** The present study was undertaken in the department of Anaesthesia, Government Medical College, Barmer, Rajasthan, India with aim of assessing success rate and Complications of brachial plexus block. A total of 100 patients were enrolled in the present study. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail of the entire research process. Complete demographic details of all the patients were obtained. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

**Results:** Mean time to perform block was 5.35 minutes and successful blockade in 92% patients, in 6% patient's partial blockade and in 2% patient's complete failure of block.

Incidence of complications were vessels puncture 8 % patients and pneumothorax 1% patients.

**Conclusion:** Supraclavicular brachial plexus block by paresthesia technique is an easy and relatively safe procedure for the upper limb surgeries below mid shaft of humerus with few complications and provide good post-operative analgesia.

**Keywords:** Supraclavicular Brachial Plexus Block, Paresthesia, Complications.


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## Article History:

Received: 08-01-2020, Revised: 05-02-2020, Accepted: 01-03-2020

## Access this article online

Website: <a href="http://www.ijmrp.com">www.ijmrp.com</a>	Quick Response code 
DOI: 10.21276/ijmrp.2020.6.2.003	

## INTRODUCTION

Pain is an unpleasant effect associated with significant psychological and physiological changes during surgery and postoperative period. This can be overcome by the use of suitable drugs and techniques. Regional anesthetic techniques have specific advantages both for standalone anesthesia and as analgesic supplements for intraoperative and postoperative care. The advantage of regional anaesthesia compared to general anaesthesia are many and have been well documented. The pain relief during the post-operative period can be maintained by regional anaesthesia, reducing the occurrence of side effect caused by opioids.<sup>1,2</sup> Brachial plexus blockade is a time-tested technique for the upper limb surgeries. The first supraclavicular brachial plexus block was performed by Kulenkampff in 1912.<sup>3</sup> Brachial plexus block is administered by various approaches viz. supraclavicular, interscalenous, infraclavicular and axillary routes. The brachial plexus block can be performed by blind; nerve stimulator guided or ultrasound guided technique.

## SUBJECTS AND METHODS

The present study was undertaken in the department of Anaesthesia, Government Medical College, Barmer, Rajasthan, India to get time taken to perform block, assessing success rate and Complications of supraclavicular brachial plexus block. A total of 100 patients were enrolled in the present study. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research process.

### Inclusion Criteria

- Either sex male or female.
- Age between 16 and 60 years.
- American Society of Anesthesiologists (ASA) physical Classes I and II.
- Elective upper limb surgeries below mid shaft of humerus.

### Exclusion Criteria

- Patient's refusals.

- Peripheral neuropathy.
- ASA physical Classes III and IV patients.
- Allergy to local anesthetics (LAs).
- Coagulopathy.

All the patients were fasted as per guideline and were premedicated with tablet alprazolam 0.5 mg and tablet ranitidine 150 mg in the night before surgery. In the operation theatre, patients were monitored with pulse oximetry (SpO<sub>2</sub>), noninvasive blood pressure (NIBP), and electrocardiogram (ECG). No other sedation was given till the evaluation of the block. Local anaesthetic test dose was given to all patients using 0.1 ml of lignocaine 1%.

The patient was placed in a supine position, with the head turned away from the side to be blocked. The arm to be anesthetized was kept in adducted position and the hand in extended along the side. The site of the block was aseptically prepared and draped. The supraclavicular block can be performed by two landmark-based techniques, classic approach and plumb-bob approach. We were using classic approach in this study. In the classic technique, the midpoint of the clavicle identified and marked. The needle entry point is 1 cm superior to the clavicle. It is advanced approximately parallel to the patient's neck and head, from cephalad to caudad toward the first rib. The paresthesia was obtained to determine the endpoint for injection. After confirming paresthesia aspiration for blood performed before injecting local anesthetic. The drug used was a 1.5 mg/kg bupivacaine and 3 mg/kg lignocaine to make volume 30ml by adding distilled water.

The various parameters noted include time taken to perform block, successful blockade rate (successful when it does not need any supplementation) and complication include vessel puncture (haematoma), nerve injury and pneumothorax. For assessing nerve injury and pneumothorax patients were followed 24 hour postoperatively. Intraoperatively, hemodynamics was monitored at regular intervals. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

**Table 1: Demographic details**

Parameter	Age Group (Year)	Number of Patients
Age	16-29	32
	30-50	41
	>50	27
Gender	Male	78
	Female	22

**Table 2: Time taken to perform block**

Time taken to perform block	Mean time (minutes)
	5.35

**Table 3: Successful blockade rate**

Supraclavicular block	No of patients (%)
Successful	92(92%)
Partial	6(6%)
Complete failure	2(2%)

**Table 4: Complications**

Complications	No of patients (%)
Nerve injury	0
Pneumothorax	1(1%)
Vessel puncture	8(8%)

**RESULTS**

In the present study 100 patients were analysed. There were 78 males and 22 females. Time taken to perform block ranges from 3 to 9 minutes with mean of 5.35 min .Block was sufficient to perform surgery in 92 (92%) patients and insufficient in 8 (8%) patients and complete failure in 2 (2%) patients. Complications like vascular puncture occurred in 8 (8%) patients, pneumothorax in 1(1%) patients. No incidence of nerve injury.

**DISCUSSION**

The supraclavicular block is one of several techniques used to anesthetize the brachial plexus. The block is performed at the level of the brachial plexus trunks where almost the entire sensory, motor, and sympathetic innervation of the upper extremity is carried in just three nerve structures confined to a very small surface area. This technique typically provides a predictable, dense block with rapid onset.<sup>4,5</sup> Diedrich Kulenkampff, in Germany, performed the first percutaneous supraclavicular approach, reportedly on himself. The technique was published in 1928 by Kulenkampff and Persky.<sup>6</sup> Patient satisfaction, a growing demand for cost-effective anesthesia and a favourable postoperative recovery profile have resulted in increased popularity for regional techniques.

Lanz et al.<sup>7</sup> showed that blockade of the brachial plexus with a technique directed near the first rib (at the level of trunks and divisions of brachial plexus) provides the most reliable, uniform, and predictable anesthesia for the upper extremity. It can be given either after eliciting paresthesia or using nerve stimulator. Honnannavar KA et al.<sup>8</sup> were found that time taken to perform block 5.23 minutes. In our study range from 3 to 9 minutes with mean 5.35 minutes which was comparable.

In our study we found that successful blockade in 92 (92%) patients, in 6 (6%) patients partial blockade and in 2 (2%) patients complete failure of block which were converted into general anaesthesia. In partial blockade supplemented with fentanyl 2mcg/kg and diazepam.

Neurological complications following peripheral nerve blocks, i.e., post block neuralgia<sup>9</sup> show an incidence of 1.7% up to 12.5%.<sup>10</sup> 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. reported a series of seven patients suffering from severe, debilitating chronic pain states after peripheral nerve blocks.<sup>11</sup>

In our study there were no evidence of nerve injury. Frequently cited disadvantages of paresthesia technique include patient discomfort on eliciting paresthesia and that its success is highly dependent on the cooperation of the patient. The presence of phrenic or cervical sympathetic nerve blockade normally requires only reassurance. Although nerve damage can occur, it is uncommon and usually self-limited.<sup>12</sup>

Fear of pneumothorax limits the use of the supraclavicular technique. The incidence of pneumothorax with the classic supraclavicular technique ranges from 0.5% to 6%.<sup>13</sup> In our study 1 patient was developed pneumothorax and managed by intercoastal chest drainage (ICD).

In our study vessels puncture (haematoma) in 8 (8%) patients were found.

## CONCLUSION

From the above study, supraclavicular brachial plexus block by paresthesia technique is an easy and relatively safe procedure for the upper limb surgeries below mid shaft of humerus where lack of availability of ultrasound. However, further studies are recommended.

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**Source of Support:** Nil.

**Conflict of Interest:** None Declared.

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**Cite this article as:** Bharat Choudhary, Mahendra Kumar, Jagdish Kumar. A Study of Supraclavicular Brachial Plexus Block by Paresthesia Technique Success Rate and Complications: An Hospital Based Study. *Int J Med Res Prof*. 2020 Mar; 6(2): 9-11. DOI:10.21276/ijmrp.2020.6.2.003