



**ORIGINAL RESEARCH PAPER**

**Anaesthesiology**

**Lateral versus Classical Approach of Supraclavicular Brachial Plexus Block: A Comparative Study**

**KEY WORDS:**

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**Introduction**

As compared to general anaesthesia, brachial plexus block for upper limb surgery gives fewer side effect and better postoperative analgesia. Brachial plexus can be blocked by different approaches such as interscalene, transscalene, supraclavicular, Infraclavicular and axillary.<sup>[1]</sup> Supraclavicular brachial plexus block gives complete anaesthesia below mid arm as nerves are tightly packed in this area.<sup>[2]</sup> In 1911, Kulenkamff described the classical approach of supraclavicular brachial plexus block.<sup>[3]</sup> Volker Hempel has described that supraclavicular brachial plexus block can be done by inserting needle longitudinal to brachial plexus from lateral to medial.<sup>[4]</sup> Dr. Dilip Kothari described that lateral approach is associated with high success rate and minimal complications.<sup>[5]</sup>

The aim of our study was to compare lateral approach with classical approach of supraclavicular brachial plexus block. Parameters of comparison were -

- (a) Time taken for the procedure
- (b) Onset and duration of sensory block
- (c) Onset and duration of motor block
- (d) Duration of effective analgesia
- (e) Success and failure rate
- (f) Any complications

**Material and Methods**

After taking prior approval from institutional ethical committee, 60 patients of ASA grade 1 & 2 of both sex, between age 20 to 50 years undergoing elective below elbow surgery were enrolled in this study. Written informed consent was taken from each patients. Exclusion criteria was, patients with any comorbidity, patients with history of psychiatric illness, patients allergic to local anaesthetic and those patients who refused the procedure. Randomization was done by closed envelop method and allocated into two groups.

Group A (n=30) :- (Brachial block done by lateral approach)  
 Group B (n=30) :- (Brachial block done by classical approach)

One observer performed the brachial plexus block in each patients and assessment of parameters of study was done by another observer who was blinded to both, approach of brachial plexus block and study drug. The study was prospective, randomized, double blinded and controlled.

All patients are kept nil per orally for at least 6 hours before procedure and premedicated with injection glycopyrrolate 5 µg/kg and midazolam 0.05 mg/kg. After shifting on operation table, a multipara monitor was attached and baseline parameters pulse rate, noninvasive blood pressure, respiratory rate and O<sub>2</sub> saturation

were recorded.

Study drug was same in both groups i.e. 30 ml of 0.5% levobupivacaine. In group A, all the blocks were given through lateral approach. The patients were laid down supine with head turned to opposite side and arm by side of the chest. A folded sheet was placed below the shoulder to make the field more prominent. After all aseptic precaution, an intradermal wheal was raised with 1% lignocaine at needle entry point. With standing at the head end, slightly towards the side, a 5 cm 22 G needle was inserted at angle of 200 to the skin 1 cm above the clavicle, at the junction of inner two third and outer one third of clavicle, which is approximately 1 cm medial to trapezius muscle. The needle was then directed from lateral to medial side behind the omohyoid muscle and parallel to clavicle till paraesthesia in hand was elicited. Once the paraesthesia was elicited the study drug was injected slowly with constant negative aspiration.

In group B, all blocks were given through classical approach. Position of patients was same as in Group A. After all aseptic precaution an intradermal wheal was raised with 1% lignocaine at 1 cm above the midclavicular point. With standing on the head end, subclavian artery pulsation was palpated and displaced medially with the help of thumb. The needle was inserted 1 cm above the clavicle at midclavicular point and directed caudal, medial and downward direction till paraesthesia in hand was elicited. Once paraesthesia was elicited, the study drug was injected slowly with constant negative aspiration.

Sensory blockade was grade as –

- Grade 0 (No block) - Normal sensitivity
- Grade 1 (Onset) - Reduced sensitivity compared to same territory in opposite side.
- Grade 2 (Partial) - Analgesia or loss of sharp sensation of pinprick.
- Grade 3 (Complete) - Anaesthesia or loss of sensation to touch.

Onset time of sensory block was from the time of injection of drug to time of first detection of diminished sensation. Completion time of sensory block was from the time of injection of drug to time of loss of pain on pinprick. Duration of sensory block was the time from the onset of analgesia to the recurrence of pain to pinprick.

Motor blockade was graded as –

- Grade 0 - No block
- Grade 1 (onset) - Decreased movement with loss of strength
- Grade 2 (Partial) - Decreased movement with

inability to move limb against resistance. Grade 3 (complete) - Paralysis

Onset time of motor block was from the time of injection to time of first detection of diminished power. Completion time of motor block was from the time of injection of drug to complete loss of movement. Duration of motor block was the time from onset of paresis to the recurrence of motor movement.

Duration of effective analgesia was from the time between the end of local anaesthesia administration to the time when visual analogue score (VAS) was less than 4.

Patients were observed for any systemic side effects and complications of the procedure. Data were analyzed by student t-test, and chi-square test. Data was expressed as mean, standard deviation, absolute number and percentage, P-value <0.05 was considered significant and P-value > 0.05 was considered insignificant.

**Result**

Demographic variables like age, sex, weight, ASA grading, type of surgeries and duration of surgery were comparable between the both groups (P>0.05). The mean time taken for the procedure was 8.27+2.93 minutes in group A compared to 6.81+2.15 minutes in group B (P<0.05). The mean times of onset and duration of sensory and motor block were comparable in both the groups (P>0.05) (Table 1). Mean duration of analgesia was 13.47+1.18 in group A and 13.09+1.26 in group B (P>0.05). In group A, out of 30 patients, in 22 patients block was complete, however there was partial block in 6 patients and in 2 patients block was failed (Table 2). In group B, in 17 patients block was complete however there was partial block in 8 patients and in 5 patients block was failed (Table 2). In patients of partial block injection ketamine was given 1 mg/kg intravenously before skin incision and surgeries completed without need of supplementation of other analgesic. Sensory and motor blockade of grade 2 and 3 were considered as successful block. Vessel puncture was encountered in 10% of patients in group A and in 23% of patients in group B. In 2 patients of group B, Horner's syndrome was observed. No other significant complications like respiratory distress, pneumothorax, phrenic nerve palsy, local anaesthesia toxicity were observed in any patients of either group.

**Table 1 – Mean time of onset and duration of sensory and motor block**

	Onset time (Mean+SD) [In Minutes]		Duration (Mean+SD) [In Hours]	
	Group A	Group B	Group A	Group B
	Sensory block	11.82+1.36	11.98+2.34	12.53+1.41
Motor block	12.87+2.44	13.15+2.63	11.67+1.73	11.45+1.17

**Table –2 Success and failure rate of block**

	Group A (n=30)	Group B (n=30)
Complete block	22 (73%)	17 (56%)
Partial block	6 (20%)	8 (27%)
Failed block	2 (7%)	5 (17%)

**DISCUSSION**

Peripheral nerve blocks have been important in clinical practice because of their role in postoperative pain relief, early recovery and avoiding risks and adverse effects of general anaesthesia. Brachial plexus block provides excellent anaesthesia without loss of consciousness and protective airway reflex. In supraclavicular approach, we block the trunks of brachial plexus. It is often called spinal of upper limb because of rapid onset of anaesthesia, high success rate, complete and predictable anaesthesia.<sup>[6]</sup> The patient's cooperation is very important to locate nerve plexus because false appreciation of paraesthesia may lead to failure. In our study, mean time taken to perform brachial block by lateral approach was 8.27 minutes while by classical approach it was 6.81 minutes, which was significantly more. As lateral approach was newer technique, initially it took more time. In our study, success rate in lateral approach was 93% and in classical approach was

83%. Dr. Dilip Kothari assessed the effectiveness of lateral approach by paraesthesia technique with success rate of 98% and only one complication, vessel puncture in 6%.<sup>[9]</sup> DK Sahu and Anjana Sahu observed that 92% of patients had successful block<sup>[7]</sup>. A Kumar, B Shadangi et al, reported success rate in classical approach was 88% while in lateral approach was 96%. [8] Moore et al [9] and Dupre et al [10] had 8% and 11% failure rate in lateral approach. In Leonard Brand and E.M. Papper study, Supraclavicular block by classical approach success rate was 84.4%.<sup>[10]</sup> 7 (23%) patients in group B and 3 (10%) patients in group A had vascular puncture but bleeding stopped after continuous pressure in both the groups. Except 2 patients of group B, in which Horner's syndrome developed no other complication like pneumothorax, phrenic nerve palsy local anaesthetic toxicity etc was observed in either of the groups in our study. Hempel V, Fink MV et al and Dupre LJ, Danien V et al reported Horner's syndrome as a complication.<sup>[4,11]</sup> Pham Dang C, Gunst JP et al, observed asymptomatic phrenic nerve palsy (60%), Horner's syndrome (10%) and transient recurrent laryngeal nerve palsy (1.5%) in their study.<sup>[12]</sup> Brand and Papper found 6.1% incidence of pneumothorax in their study.<sup>[10]</sup> In lateral approach, as the needle passes from lateral to medial side at an angle of 200 to the skin and parallel to clavicle, needle will first meet brachial plexus nerve and will elicit paraesthesia in hand before reaching to the other structure, so chance of complication like vessel puncture, Horner's syndrome, recurrent laryngeal nerve palsy, in advertant injection into vertebral artery or in subarachnoid space are very rare.

**Conclusion**

Lateral approach of supraclavicular block is associated with high success rate and is less traumatic with minimal adverse effect. So, lateral approach of supraclavicular brachial plexus block is better alternative to classical approach.

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