

## Original Research Article

## Supraclavicular Block Performance with Comparison between Ultrasound Guidance and Traditional Paraesthesia Elicitation Technique

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**Abstract:** Ultrasound guided brachial plexus blocks have gained popularity. This observational study compared block performance time, time of onset of sensory and motor block, success and failure rates, need of rescue block and intraoperative analgesic supplementation and complications rate between ultrasound guided and traditional paraesthesia elicitation techniques. Methods: Total 70 ASA I-II adult patients undergoing elective upper limb surgery excluding shoulder were observed for supraclavicular plexus block performed routinely by different anaesthesiologists using either traditional technique with 35 ml anaesthetic agent or ultrasound guidance with 25 ml anaesthetic agent and were equally divided into two groups. Parameters noted were block performance time, onset of sensory and motor block, failure rate, success rate, need of supplementation and complications. Results: Block performance time was lower in traditional group as compared to USG group (5.78±0.97 vs 7.41±1.40, p=0.844). Onset of sensory block was in lesser time in USG group as compared to traditional group (12.8±4.60 vs 17.0±8.28, p=0.821) and similar for motor block (14.06±5.21 vs 18.86±9.58, p=0.880). More block failure in traditional group (2.85% vs 0) and more need of supplementation (14.7% vs 5.7%) in traditional group compared to USG group. USG group had higher success rate (94.3% vs 82.85%) than traditional group. Vessel puncture was more in traditional group (22.8% vs 8.57%) along with mild chest pain/pneumothorax (2.85%) as compared to USG group. Conclusion: Ultrasound guidance allows use of lesser anaesthetic drug, earlier onset of sensory and motor effect, more success blocks, less need of supplementation, lesser block failure and lesser complications compared to traditional technique.

**Keywords:** Supraclavicular block, Ultrasound, paraesthesia

### INTRODUCTION

For upper extremity procedures which do not involve shoulder, most preferred anaesthesia technique by anaesthesiologists is brachial plexus block, out of which supraclavicular block is most commonly used because it is easy to perform, high success rate and rapid onset of action [1]. Its major disadvantage is more chances of pneumothorax and vessel puncture [2]. Real time ultrasonographic (USG) guidance has recently gained tremendous popularity for nerve localization and it hastens block performance and onset times as well as improves block quality and duration [3,4]. In our institute, earlier supraclavicular block was performed only by traditional paraesthesia elicitation method but since two years both ultrasound guided and traditional methods are used based on individual

anaesthesiologist preference. The aim of this study is to examine success rates of USG guided nerve blocks compared to traditional paraesthesia elicitation technique for supraclavicular block.

### MATERIALS AND METHODS

This was an observational study of elective upper limb procedures which do not involve shoulder performed between April 2016 to July 2016 under supraclavicular block in ASA grade I- II 70 adult patients between age 18-70 years. Choice of anaesthesia either traditional technique by paraesthesia or by ultrasound guided was the decision of individual anaesthesiologist. First 35 Patients of both techniques performed in these four months were observed and parameters were noted.

**Exclusion criteria**

Refusal by the patient, infection at procedure site, coagulopathy, allergy to Local Anaesthetic agents, emergency surgery

Routine Pre anaesthetic checkup was done for all patients one day before surgery and informed written consent was taken. Patients were kept fasting for eight hours. After shifting to procedure room, routine monitors electro cardiogram, NIBP, and SPO2 attached. Intravenous fluid with ringer lactate started. All patients were premedicated with midazolam 1 mg and 50 micg fentanyl intravenously. Routinely in our institute local anaesthetic drug solution consisting of 2% lignocaine with adrenaline , 0.5% plain bupivacaine and normal saline in the ratio 2:2:1 total 35 ml was used for traditional technique and 25 ml for USG guided supra clavicular blocks.

**Traditional method**

Patient made to lie supine with head turned opposite side of intended block, arm adducted and pulled down slightly. Small pillow or folded sheet placed below shoulder to make the field more prominent. Parts prepared with iodine solution. Anatomical landmark 1 cm above mid clavicle and pulsation of subclavian artery was identified. Skin wheal with 2 ml of 1% lignocaine was raised and 22G needle introduced backward, inward and downward to subclavian artery till paraesthesia elicited. After withdrawing needle about 1-2 mm, 35 ml anaesthetic drug solution was injected after negative aspiration.

**USG guided technique**

Patient position was made as described above. An ultrasound device(Micromaxx; SonoSite) with 5-10 MHz linear array transducer was used. Ultrasound linear probe draped with sterile tegaderm and plastic sheet and patient parts prepared with iodine . Using water based sterile gel, landmarks like subclavian artery, brachial plexus, clavicle and pleura identified. Under direct visualization 22 G needle was introduced in plane and 25 ml anaesthetic drug solution was injected around target supraclavicular plexus in graded manner after negative aspiration.

During and after the procedure one anesthetist observed the following values:

- A) Demographic data Age, Gender , Weight
- B) Time taken for block procedure ( block performance time) includes time from disinfection

of patient /sterile covering of ultrasound probe till placement of whole anaesthetic drug around the plexus

- C) Time taken for complete sensory (touch and cold sensation) and motor effect( flexion-extension, thumb and second and fifth digit pinch) ready for surgical incision – checked every 3 minute interval
- D) Number of inadequate blocks- If repeat block or specific peripheral nerve supplementation required or any other intra operative supplementation by analgesics or ketamine required
- E) Number of failed blocks- converted to general anaesthesia ( GA)
- F) Number of Successful blocks- when surgery could be performed without further injection of LA or any other drug supplementation
- G) Complications due to the procedure

**RESULTS**

The two groups were similar regarding demographic profile i.e. age, weight and gender (Table 1). Block performance time with USG guidance was slightly higher (7.41+/\_1.40 minutes ) as compared to traditional technique ( 5.78+/\_ 0.97 minutes ) but that was non significant ( p=0.844). Time of onset of sensory block in traditional group was 17.01+/\_ 8.28 minutes and in USG guided group was 12.80+/\_ 4.61 minutes(p=0.821). Time of onset of motor block in traditional group was 18.88+/\_9.58 minutes and in USG group was 14.06+/\_5.21 minutes (p=0.880) (Table 2). In traditional technique, one patient had block failure and given general anaesthesia, five patients (5/34) had inadequate block and given repeat individual nerve block and supplemented with additional intraoperative analgesia with fentanyl and sedation with midazolam. In USG guided group, two patients (2/35) had inadequate block and supplemented with individual nerve block using sonography and analgesic supplementation with fentanyl and no patient required GA. In USG group 33 out of 35 patients had successful block as compared to 29 patients in traditional group. In traditional technique, during the procedure in eight patients (8/35) blood was aspirated which shows inadvertent vessel puncture and one patient (1/35) complained mild pain in one side of chest ipsilateral of block side. However that patient was managed conservatively. In USG group vessel puncture occurred in three patients (3/35) and no patient complained chest pain. Accidental intravascular LA injection was not given in any patient.

**Table 1: Demographic Data**

Group	Traditional(n=35)	USG n=(35)
Age(years)	45.2+/_15.3	41.6+/_17.39
Weight (Kg)	57.1+/_15.5	57.0+/_18.2
No. of Male patients	29	27
No. of Female patients	6	8

**Table 2: Block Parameters**

Group	Traditional (n=35)	USG (n=35)
Block performance time (min) p=0.844	5.78+/- 0.97	7.41+/- 1.40
Onset of sensory block (min) p=0.821	17.0 +/- 8.28	12.8+/- 4.60
Onset of motor block (min) p=0.880	18.86+/- 9.58	14.06+/- 5.21
Block failure	1 (2.85%)	0
Supplemented with additional nerve block and intra operative analgesia (inadequate block)	5 (14.7%)	2 (5.7%)
Successful blocks	29 (82.85%)	33 (94.3%)
Complications-		
1. Blood aspirated	8 (22.8%)	3 (8.57%)
2. Chest pain/ pneumothorax	1 (2.85%)	0

## DISCUSSION

Ultrasound guided blocks now-a-days are becoming popular as they facilitate direct visualization of needle and identification of nerves and surrounding structures, use of lesser amount of local anaesthetic drug and lesser complications and vessel puncture [4]. Still many blocks are placed with traditional method resulting in inconsistent success rate, need of supplemented block, unplanned GA and more complications. Many studies prove that USG guidance improves block performance, block quality, onset time and duration of block, while many studies found no difference between different techniques [5]. In our study the time to perform block was mean 7.41 minutes for USG technique and mean 5.78 minutes for traditional method. Singh *et al* [6] found block performance time for USG group as 8.14 and for nerve stimulator group as 10.63 minutes which is much similar to our results. Armstrong [7] found that a shorter duration of time spent in the block room may contribute to a reduction in perioperative costs. In our study, time of onset of sensory block in USG group was mean 12.8 minutes and in traditional group was mean 12.8 minutes. Similarly onset of motor block was earlier in USG group mean 14.06 minutes as compared to traditional group mean 18.86 minutes. We in our study found less time taken for block performance in traditional group as compared to USG group and more time taken for onset of block in traditional group as compared to USG group but these are statistically not significant and similar results were seen by Liu *et al* [1]. Singh *et al* [6] found onset of supraclavicular block ranged from a mean of 13.5 min in musculocutaneous nerve territory to a mean of 19 min in the ulnar group . Lo et al found that patients undergoing USG guided axillary block spent significantly less time in the block room compared to those who underwent traditional blocks. We were able to perform successful block in 94.3% in USG group and 82% in traditional method. There were more block failure with traditional method 2.8% as compared to USG technique and more need of supplementation with rescue block and analgesia in

traditional method. This may be explained due to precise needle location with real time image ultrasound which improves onset times, success rates and reduces complications [8, 9]. Lo *et al* [10] found 91% success block with USG group in axillary block and 81.9% success in traditional group and they supplemented 5% patients in USG group and 11% patients in traditional group which is similar to our study. Raghove *et al* [11] achieved successful block in 97% patients in USG group and 83% patients in landmark technique. Our study suggests that despite using smaller local anaesthetic volume in Ultrasound guidance technique, it increases the success rate of supraclavicular block and decreases the incidence of complications as compared to traditional paraesthesia elicitation technique. However, in our study more LA volume was used for traditional technique as compared to USG technique. If the volumes of LA were fixed among both groups, we may found a significant difference in success rate and onset of sensory and motor effect time.

Our study had certain limitations like we have not compared duration of block and our sample size was small.

## CONCLUSION

Ultrasound guided block permits use of lesser amount of anaesthetic drug, decreases time of onset of effective block, improves the success rate of block and decrease complications rate as compared to traditional paraesthesia technique.

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