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Clinical performance of ultrasound-guided combined interscalene-superficial cervical plexus block in clavicle and proximal humerus surgery

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Abstract:

The efficacy of combined ultrasound-guided interscalene brachial plexus block and superficial cervical plexus block for proximal humerus and clavicle surgery. This prospective single-arm observational study included 50 patients aged 18-65 years and assessed block characteristics, haemodynamic changes, rescue analgesia and adverse events. Sensory and motor block onset was 8.04 ± 0.98 and 14.20 ± 1.59 minutes, while their duration was 386.80 ± 43.45 and 422.60 ± 46.02 minutes, respectively. Thus, data shows the feasibility of combined ultrasound-guided interscalene and superficial cervical plexus blocks for proximal humerus and clavicle surgery.

Keywords: Interscalene brachial plexus block, superficial cervical plexus block, clavicle surgery, proximal humerus surgery, ultrasound-guided regional anaesthesia

Background:

Regional anaesthesia is a useful approach for clavicle surgery, although the optimal block combination remains uncertain [1]. Ultrasound-guided interscalene block provides effective analgesia for proximal humerus surgery but may cause diaphragmatic paresis [2]. Recent clavicle studies have evaluated selective supraclavicular nerve block with superior trunk or clavipectoral fascial plane block [3]. Selective C3–C5 nerve root blockade may preserve diaphragmatic motion better than interscalene with cervical plexus block [4]. Site-specific SCUT and clavipectoral approaches have also been evaluated to reduce unnecessary motor and phrenic nerve blockade [5]. Superficial cervical plexus with clavipectoral block has shown longer analgesia and fewer respiratory effects than its combination with ISBPB [6]. In proximal humerus surgery, modified SCPB with ISBPB showed comparable block quality with fewer diaphragmatic and neurological adverse effects [7]. A recent meta-analysis also found that clavipectoral block reduced opioid use and better preserved diaphragmatic excursion [8]. A 2026 randomized trial reported complete block success with modified clavipectoral plus superficial cervical plexus block [9]. Therefore, it is of interest to evaluate the block characteristics, analgesic duration, haemodynamic changes and adverse events with combined ISBPB and SCPB

Materials and Methods:

This prospective single-arm observational study was conducted in the Department of Anaesthesiology at MGM Medical College and M.Y. Hospital, Indore, over 12 months. Ethical approval was obtained and written informed consent was taken from all participants. Fifty patients aged 18–65 years with ASA physical status I–III undergoing proximal humerus or clavicle surgery were included. Patients with coagulopathy, local anaesthetic allergy, brachial plexus injury, local infection or psychiatric illness were excluded. Ultrasound-guided interscalene block was performed using 10 mL of 0.5% bupivacaine with 10 mL of 2% lignocaine containing adrenaline. This was followed by superficial cervical plexus block using 10 mL of 0.25% bupivacaine. Sensory and motor block were assessed every 5 minutes using the Hollmen and Modified Bromage scales. Failed blocks at 30 minutes were converted to general anaesthesia and

excluded from analysis. Block onset, block duration, time to first rescue analgesia, haemodynamic parameters and adverse events were recorded. Data were analysed using SPSS version 25.0. Continuous variables were expressed as mean $\pm$ standard deviation and categorical variables as number and percentage. Paired t-test was used for serial haemodynamic comparisons and $p < 0.05$ was considered significant.

Table 1: Patient characteristics and surgical duration

Parameter	Category	Value
Age, years	Mean $\pm$ SD	39.74 $\pm$ 11.42
	Range	23–65
Age group, n (%)	18–30 years	15 (30.0)
	31–40 years	15 (30.0)
	41–50 years	10 (20.0)
	51–60 years	9 (18.0)
Sex, n (%)	>60 years	1 (2.0)
	Male	37 (74.0)
ASA physical status, n (%)	Female	13 (26.0)
	Grade I	6 (12.0)
	Grade II	44 (88.0)
Duration of surgery, minutes	Mean $\pm$ SD	90.00 $\pm$ 16.87

Table 2: Sensory and motor block characteristics

Block characteristic	Mean $\pm$ SD, minutes
Onset of sensory block	8.04 $\pm$ 0.98
Duration of sensory block	386.80 $\pm$ 43.45
Onset of motor block	14.20 $\pm$ 1.59
Duration of motor block	422.60 $\pm$ 46.02
Time to first rescue analgesia	386.80 $\pm$ 43.45

Table 3: Adverse events following the combined block

Adverse event	Number, n (%)
Nausea	3 (6.0)
Vomiting	0
Hypotension	0
Bradycardia	0
No recorded adverse event	47 (94.0)

Results and Discussion:

The present study included 50 patients with a mean age of 39.74 ± 11.42 years (Table 1). Sensory and motor block onset was 8.04 ± 0.98 and 14.20 ± 1.59 minutes, respectively (Table 2). Sensory block lasted 386.80 ± 43.45 minutes, while motor block lasted 422.60 ± 46.02 minutes. This pattern is also shown in Figure 1, with earlier sensory onset and longer motor blockade. Nausea

occurred in 6%, while vomiting, hypotension and bradycardia were not recorded (Table 3).

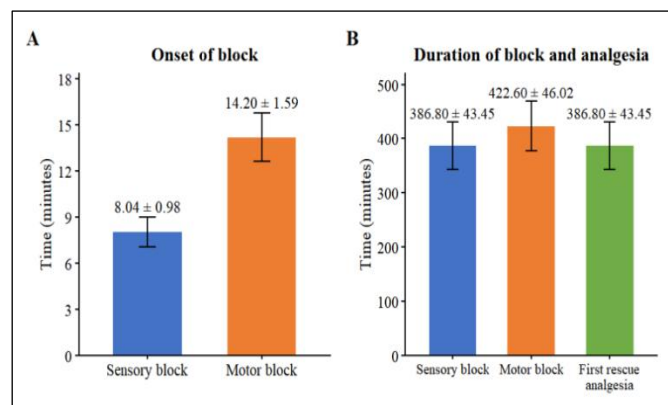


Figure 1: Onset and duration of sensory and motor block following combined ultrasound-guided interscalene and superficial cervical plexus block

These findings indicate acceptable block characteristics in the studied patients. Most patients were male and 88% belonged to ASA Grade II (Table 1). Sayed *et al.* also studied predominantly young ASA I-II patients undergoing clavicle fixation [10]. They reported better postoperative analgesia with clavipectoral block than superficial cervical plexus block. Nah *et al.* reported that interscalene analgesia facilitated pain control after proximal humerus fracture surgery [11]. However, clavicle and proximal humerus procedures were not presented separately in the present study. This limits interpretation according to surgical site. Sensory block developed earlier than motor block in the present study (Figure 1). Mean sensory block duration was about 6.45 hours and motor block lasted about 7.04 hours. Tang *et al.* reported analgesic durations of approximately 510–724 minutes with different ropivacaine concentrations during ISBPB [12]. Differences in drug concentration, dose and surgical procedure may explain the longer duration in their study. Block duration can also be influenced by adjuvants. Wu *et al.* found that perineural dexamethasone prolonged interscalene analgesia compared with intravenous administration [13]. The present study used bupivacaine and lignocaine without dexamethasone. This may partly explain the observed duration of sensory and motor blockade. The mean time to first rescue analgesia was 386.80 ± 43.45 minutes (Table 2). Figure 1 clearly shows the difference in sensory and motor block characteristics. However, superiority over other regional techniques or general anaesthesia cannot be concluded from this study. This was identical to the reported duration of sensory block. Both variables may therefore reflect the same clinical endpoint. Their operational definitions should remain clearly separated in the final methodology. Local anaesthetic volume is important when interpreting ISBPB efficacy and respiratory safety. Renard *et al.* reported longer analgesia with 20 mL than 10 mL during extrafascial ISBPB [14]. However, hemidiaphragmatic paralysis was more frequent with the higher volume. Zhang *et al.* found that lower-volume superior trunk block reduced diaphragmatic impairment but

shortened sensory blockade [15]. Wang *et al.* also reported that low-volume superior trunk block may better preserve diaphragmatic function [16]. The present technique used 20 mL for ISBPB in addition to 10 mL for SCPB. Only nausea was recorded in three patients (Table 3). This suggests few recorded short-term adverse events but does not establish respiratory safety. Büyükgebiz Yeşil *et al.* reported greater diaphragmatic and pulmonary impairment with ISBPB than superior trunk block [17]. Analgesic efficacy was comparable between the techniques. Phrenic-sparing alternatives have gained interest in shoulder and clavicle surgery. Bravo *et al.* compared ISBPB with combined infraclavicular and anterior suprascapular blocks [18]. Such approaches may be useful in patients with limited respiratory reserve. However, these findings cannot be directly compared with the present single-arm study. Evidence regarding combined regional techniques remains variable. Da Conceicao *et al.* found no significant reduction in immediate morphine use after adding clavipectoral block to intermediate cervical plexus block [19]. Sandya and Sriramka reported onset times of 5–6 minutes with SCUT and clavipectoral-suprascapular techniques [20]. Analgesic duration also differed considerably between the techniques. These findings show that block characteristics depend on technique and drug volume. Biswas *et al.* compared classical and low interscalene approaches with SCPB for clavicle and proximal humerus surgery [21]. Both approaches produced effective sensory and motor blockade, while the low approach showed fewer respiratory and neurological complications. Aliyu *et al.* reported complete sensory and motor anaesthesia within 15 minutes using a combined interscalene-supraclavicular technique for humeral neck surgery [22]. However, this evidence was based on a single case. Ramya *et al.* reported lower post-operative opioid requirement and shorter recovery stay with ISBPB plus SCPB than general anaesthesia for clavicle fixation [23]. Xu *et al.* found longer analgesia with SCPB plus clavipectoral block than with SCPB plus ISBPB [24]. Diaphragmatic paralysis was more frequent with the ISBPB combination. These findings highlight the need to balance block coverage with respiratory safety. The present study has important limitations. It was conducted at a single centre with a small sample and no comparator group. Failed blocks were excluded, which may overestimate clinical effectiveness. Surgical-site subgroup results were not available. Diaphragmatic movement and specific neurological complications were not systematically assessed. Thus, combined ultrasound-guided ISBPB and SCPB showed acceptable onset, prolonged blockade and few recorded adverse events.

Conclusion:

Combined ultrasound-guided interscalene and superficial cervical plexus blocks provided satisfactory anaesthesia for clavicle and proximal humerus surgery. The technique showed rapid onset, prolonged blockade and few recorded adverse events. However, Controlled studies are needed to confirm comparative effectiveness and safety.

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