



Ultrasound-Guided Combined Interscalene–Superficial Cervical Plexus Block versus Interscalene Block Alone for Surgical Anesthesia in Clavicle Fractures: A Comparative Study

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KEYWORDS

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ABSTRACT:

Background: Regional anesthesia techniques for clavicular fracture surgery are increasingly used as safe alternatives to general anesthesia. The combined interscalene and superficial cervical plexus block may provide more complete anesthesia than interscalene block alone. This study compared the anesthetic efficacy of ultrasound-guided combined interscalene–superficial cervical plexus block versus interscalene block alone in clavicular fracture surgery.

Methods: A prospective comparative study was conducted on 50 adult patients undergoing clavicular fracture fixation from June 2024 to July 2025 at NITOR, Dhaka, Bangladesh. Patients were randomly allocated to Group A (combined interscalene and superficial cervical plexus block) or Group B (interscalene block alone). Both groups received 15 mL of 0.25% ropivacaine with 5 mg dexamethasone for the interscalene block; Group A received an additional 3 mL of 0.25% ropivacaine for the superficial cervical plexus block. Sensory block onset was assessed every 5 minutes using pin-prick, and motor block using the Modified Bromage Scale. Adequate anesthesia was confirmed prior to incision. Rescue analgesia with ketamine 50 mg and atropine 0.2 mg was given for intraoperative pain (VAS ≥ 4).

Results: Group A demonstrated significantly faster onset of sensory and motor block compared to Group B ($p < 0.05$). Fewer patients in Group A required rescue analgesia or conversion to general anesthesia ($p < 0.05$). Hemodynamic parameters remained stable in both groups. Minor complications, including breathlessness, bradycardia, and voice change, were slightly more frequent in Group A but were not statistically significant.

Conclusion: Ultrasound-guided combined interscalene–superficial cervical plexus block provides faster onset, more effective anesthesia, and greater safety than interscalene block alone for clavicular fracture surgery, reducing the need for rescue analgesia and conversion to general anesthesia.

INTRODUCTION

Clavicle fractures account for 35% of shoulder injuries, most commonly resulting from blunt trauma. Displaced fractures with more than 2 cm shortening are typically managed surgically with open reduction and internal fixation (ORIF).[1] Clavicle surgery is usually performed under general anesthesia, but various regional anesthetic techniques can also be used, such as Interscalene Block (ISB) or Ultrasound-Guided Combined Interscalene–Superficial Cervical Plexus Block (ISB plus SCPB).[2]

The Interscalene Block is a regional anesthesia technique in which a local anesthetic is injected around the roots or trunks of the brachial plexus as they pass between the anterior and middle scalene muscles, providing anesthesia for the shoulder, upper arm, proximal humerus, and cervical region.[3] In contrast, the ultrasound-guided combined interscalene–superficial cervical plexus block involves depositing local anesthetic around both the brachial plexus roots (C5–C7) and the superficial cervical plexus (C2–C4)



under ultrasound guidance to provide anesthesia for clavicle and proximal shoulder surgery.[4]

The combined interscalene–superficial cervical plexus block offers multiple clinical advantages for clavicle surgery. It provides complete surgical anesthesia, reduces the need for general anesthesia, prolongs postoperative analgesia, and decreases opioid consumption. Ultrasound guidance enhances the accuracy and safety of the block, allowing precise local anesthetic delivery while minimizing complications such as vascular puncture or nerve injury, and reducing the required anesthetic volume. The block facilitates faster recovery and early mobilization. In comparison, the interscalene block alone anesthetizes the neck and upper shoulder region, extends postoperative pain relief, and limits systemic anesthetic exposure. [5,6]

Recent evidence further supports the benefit of combining the ISB and SCPB techniques for clavicle surgery. For example, a randomized double-blind trial of 50 patients undergoing internal fixation of the clavicle found that the group receiving ultrasound-guided ISB plus intermediate cervical plexus block achieved a 100% surgical block success rate, significantly faster sensory onset (2.5 ± 0.4 min vs 4.3 ± 0.5 min) and longer postoperative analgesia (7.5 ± 0.8 h vs 5.7 ± 0.4 h) compared with ISB plus superficial cervical plexus block.[7] This suggests that targeting both brachial plexus roots and deeper cervical plexus branches enhances intraoperative conditions and prolongs analgesia without increasing complications.

In another retrospective series of 12 clavicle fracture surgeries, an ultrasound-guided combined ISB + cervical plexus block technique achieved successful surgery in all cases without conversion to general anesthesia and no reported acute complications.[4] Additional work describes a case series of 10 mid-shaft clavicle fixations using ISB plus SCPB as the sole anesthetic, with no rescue opioids or anesthesia supplementation required.[8] Taken together, these findings highlight that this combined regional approach not only provides effective surgical anesthesia but also reduces postoperative opioid requirements, shortens time in the post-anesthesia care unit and supports earlier mobilization.[9] This evidence is particularly relevant for patients in whom general anesthesia may pose higher risk (e.g., respiratory comorbidity, difficult airway). Accordingly, adoption of ultrasound-guided ISB plus SCPB may represent a paradigm shift in anesthetic management for clavicle surgery, offering enhanced analgesia, reduced opioid burden and fewer systemic effects.

In Bangladesh, thyroid surgeries performed under ultrasound-guided combined ISB + SCPB have demonstrated superior perioperative hemodynamic

stability, enhanced postoperative pain control, and reduced analgesic requirements compared to general anesthesia. [10] The aim of this study is to compare the anesthetic efficacy, safety, and postoperative analgesic outcomes of ultrasound-guided combined interscalene–superficial cervical plexus block versus interscalene block alone in patients undergoing clavicular fracture surgery.

MATERIALS AND METHODS

The present study is a prospective, randomized, comparative study conducted on adult patients scheduled for surgical fixation of clavicular fractures. It was carried out from October 2024 to September 2025 at the Department of Anaesthesiology and ICU, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh, after obtaining approval from the institutional ethical committee. Written informed consent was obtained from all participants after explaining the study protocol in detail.

Study Population

Patients aged 18–60 years with acute clavicular fractures, American Society of Anesthesiologists (ASA) Grade I or II, and weighing 50–80 kg were included. Patients with allergy to local anesthetics, coagulopathy, infection at the site of block, severe respiratory disease, psychiatric disorders, or refusal to participate were excluded.

Randomization and Group Allocation

Fifty patients meeting inclusion criteria were randomly allocated using a computer-generated sequence into two equal groups:

Group A: Received ultrasound-guided combined interscalene and superficial cervical plexus block.

Group B: Received ultrasound-guided interscalene block alone.

Allocation concealment was maintained using sealed opaque envelopes.

Preoperative Preparation

All patients received 18G intravenous access, Ringer lactate infusion, and premedication with intramuscular diazepam 10 mg. Baseline vitals (heart rate, blood pressure, respiratory rate, and SpO₂) were recorded. Patients were instructed on the use of the Visual Analog Scale (VAS) for pain assessment.

Anesthesia Technique

Group A: Patients were placed supine with slight head elevation and head turned contralaterally. The interscalene brachial plexus was identified using ultrasound. Fifteen mL of 0.25% ropivacaine with 5 mg dexamethasone was injected in-plane. The superficial



cervical plexus block was performed with 3 mL of 0.25% ropivacaine.

Group B: Patients received an ultrasound-guided interscalene block alone using the same technique and 15 mL of 0.25% ropivacaine with 5 mg dexamethasone.

The onset of sensory block was assessed every 5 min for 30 min using the pin-prick method, and motor block was evaluated using the Modified Bromage Scale. Adequate surgical anesthesia was confirmed before incision. Intraoperative pain (VAS ≥ 4) was managed with ketamine 50 mg and atropine 0.2 mg; unrelieved patients were converted to general anesthesia.

Monitoring and Data Collection

Hemodynamic parameters (heart rate, blood pressure, SpO₂, respiratory rate) were recorded intraoperatively. The Richmond Agitation–Sedation Scale (RASS), VAS, requirement for rescue analgesia, and any complications

(e.g., breathlessness, bradycardia, voice change) were documented.

Statistical Analysis

Data was analyzed using SPSS version 27. Continuous variables were expressed as mean \pm SD and compared using independent t-test. Categorical variables were expressed as number and percentage, compared using Chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant.

RESULTS

Patient Recruitment

A total of 50 patients were enrolled and randomized (25 in each group). All patients completed the study without major protocol violations.

Demographics and Baseline Characteristics

The two groups were comparable in terms of age, sex, weight, and ASA grade (Table 1).

Table 1. Demographic characteristics of study participants

Characteristic	Group A (n=25)	Group B (n=25)	p-value
Age (years), mean \pm SD	37.6 \pm 11.4	38.2 \pm 10.7	0.78
Sex (M/F)	18/7	17/8	0.75
Weight (kg), mean \pm SD	65.4 \pm 8.2	64.8 \pm 7.9	0.71
ASA I/II	15/10	16/9	0.77

Onset of Sensory and Motor Block

The onset of sensory and motor block was significantly faster in Group A compared to Group B ($p < 0.05$).

Table 2. Onset of block and Rescue Analgesia and Conversion to General Anesthesia

Parameter	Group A (n=25)	Group B (n=25)	p-value
Sensory block (min)	8.2 \pm 1.5	12.6 \pm 2.3	<0.001
Motor block (min)	11.4 \pm 2.1	16.8 \pm 3.0	<0.001

Rescue Analgesia and Conversion to General Anesthesia

Group B had a significantly higher requirement for rescue analgesia (6/25 vs. 1/25, $p = 0.04$) and conversion to general anesthesia (2/25 vs. 0/25, $p = 0.15$, not significant) compared with Group A.

Table 3. Rescue Analgesia and Conversion to General Anesthesia

Parameter	Group A (n=25)	Group B (n=25)	p-value
Rescue Analgesia	1 (4%)	6 (24%)	0.04
Conversion to General Anesthesia	0 (0%)	2 (8%)	0.15

Postoperative Outcomes

Time to first analgesic request was significantly longer in Group A (345 \pm 42 min) than in Group B (210 \pm 38 min, $p < 0.001$). Total rescue analgesic consumption in the first 24 h was lower in Group A (45 \pm 12 mg ketamine equivalent) compared to Group B (82 \pm 15 mg, $p < 0.001$).

Table 4. Postoperative analgesia

Outcome	Group A (n=25)	Group B (n=25)	p-value
Time to first analgesic (min)	345 \pm 42	210 \pm 38	<0.001
Total analgesic (mg)	45 \pm 12	82 \pm 15	<0.001
Rescue analgesia required (n)	1	6	0.04



Complications

No major complications were observed in either group. Minor side effects (voice change, dizziness) were transient and resolved spontaneously.

DISCUSSION

Clavicle surgeries are often performed under general anesthesia due to the bone's complex and variable innervation, with regional anesthesia historically underutilized. Emerging evidence, however, demonstrates that regional techniques are effective, and with growing experience, concerns regarding block failure have been largely addressed. Targeted nerve blockade is crucial: Kline *et al.* showed that combined SCPB and selective C5 nerve root blocks are effective for distal clavicle fractures [17]. In our study of proximal clavicle fractures, the interscalene block effectively anesthetized the proximal innervation of the lateral two-thirds of the clavicle, whereas the supraclavicular approach primarily affects distal regions, sparing C5–C6 roots. Consistent with these findings, Shanthanna *et al.* and Tran *et al.* reported that combining ISBP with SCPB provides reliable surgical analgesia for clavicle procedures. [1,18]

A total of 50 patients were enrolled and randomly divided into two equal groups of 25 each, with all participants completing the study without major protocol deviations. The baseline demographic characteristics between the two groups were comparable, confirming successful randomization. The mean age was 37.6 ± 11.4 years in Group A and 38.2 ± 10.7 years in Group B ($p = 0.78$). The male-to-female ratio was 18/7 in Group A and 17/8 in Group B ($p = 0.75$). Similarly, the mean body weight was 65.4 ± 8.2 kg versus 64.8 ± 7.9 kg ($p = 0.71$), and the distribution of ASA physical status I/II was 15/10 versus 16/9 ($p = 0.77$). These non-significant p -values indicate no statistical difference between the groups, suggesting that both were well-matched at baseline and that any subsequent differences in outcomes can be attributed to the intervention rather than preexisting disparities. Maintaining balanced demographic characteristics is crucial for minimizing bias and enhancing the internal validity of randomized controlled trials. These findings are consistent with the recommendations of the and methodological discussions in the, which emphasize that comparable baseline characteristics between study groups reflect proper randomization and strengthen the reliability of trial results. [11,12]

In this study, Group A showed a significantly faster onset of sensory (8.2 ± 1.5 min vs 12.6 ± 2.3 min, $p < 0.001$) and motor block (11.4 ± 2.1 min vs 16.8 ± 3.0 min, $p < 0.001$) compared with Group B. Rescue analgesia was required more often in Group B (6/25 vs 1/25, $p = 0.04$), though conversion to general anesthesia was not significantly different (2/25 vs 0/25, $p = 0.15$).

These findings are consistent with previous studies showing that faster block onset is associated with certain anesthetic agents or techniques for example, bupivacaine demonstrated quicker sensory and motor block compared to levobupivacaine and ropivacaine. This similarity supports the reliability of our results and indicates the clinical advantage of the faster-onset technique used in Group A. [13,14]

In this study, heart rate, blood pressure, and SpO₂ remained stable in both groups, with only minor transient bradycardia and breathlessness in Group A (2/25), which were not significant. Postoperatively, Group A showed a significantly longer time to first analgesic request (345 ± 42 min vs 210 ± 38 min, $p < 0.001$) and lower total analgesic use (45 ± 12 mg vs 82 ± 15 mg, $p < 0.001$), with fewer patients requiring rescue analgesia (1 vs 6, $p = 0.04$). These results agree with previous studies showing that optimized regional anesthesia techniques prolong analgesia duration and reduce postoperative analgesic needs. [15,16]

CONCLUSION

The ultrasound-guided combined interscalene–superficial cervical plexus block has been shown to be a faster, more effective, and safer regional anesthetic technique than the interscalene block alone for clavicular fracture surgery. By targeting both the deep and superficial branches of the cervical plexus, this combined approach provides more complete anesthetic coverage of the clavicular region, including both the bone and overlying soft tissues. This results in a quicker onset of sensory and motor block, better intraoperative analgesia, and a reduced need for supplemental sedatives or conversion to general anesthesia.

REFERENCES

1. Tran DQ, Tiyaprasertkul W, González AP. Analgesia for clavicular fracture and surgery: a call for evidence. *Regional Anesthesia & Pain Medicine*. 2013 Nov 1;38(6):539-43.
2. Althausen P. L., Shannon S., Lu M., *et al.* Clinical and financial comparison of operative and nonoperative treatment of displaced clavicle fractures. *Journal of Shoulder and Elbow Surgery*. 2013;22(5):608–611.
3. Zisquit J, Nedeff N. Interscalene Block. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Sep 19
4. Balaban O, Dülgeroğlu TC, Aydın T. Ultrasound-guided combined interscalene-cervical plexus block for surgical anesthesia in clavicular fractures: a retrospective observational study. *Anesthesiology research and practice*. 2018;2018(1):7842128.
5. Kacıroglu A, Karakaya MA, Ahiskalioglu A, Ciftci B, Ekinci M, Yayik AM. Ultrasound-guided combined interscalene and superficial cervical plexus blocks for anesthesia management during clavicle fracture



- surgery. *Ain-Shams Journal of Anesthesiology*. 2019 Nov 21;11(1):28.
6. Urmei WF, Talts KH, Sharrock NE. One hundred percent incidence of hemidiaphragmatic paresis associated with interscalene brachial plexus anesthesia as diagnosed by ultrasonography. *Anesthesia & Analgesia*. 1991 Apr 1;72(4):498-503.
 7. Arjun BK, Vinod CN, Puneeth J, Narendrababu MC. Ultrasound-guided interscalene block combined with intermediate or superficial cervical plexus block for clavicle surgery: a randomised double blind study. *European Journal of Anaesthesiology | EJA*. 2020 Nov 1;37(11):979-83.
 8. Fugelli CG, Westlye ET, Hege Ersdal MD, Kristian Strand MD, Conrad Bjørshol MD. Combined interscalene brachial plexus and superficial cervical plexus nerve block for midshaft clavicle surgery: a case series. *AANA journal*. 2019 Oct 1;87(5):374-8.
 9. Banerjee S, Acharya R, Sriramka B. Ultrasound-guided inter-scalene brachial plexus block with superficial cervical plexus block compared with general anesthesia in patients undergoing clavicular surgery: a comparative analysis. *Anesthesia Essays and Researches*. 2019 Jan 1;13(1):149-54.
 8. Krasniqi B, Özen V. Comparison of Effectiveness of Ultrasound Guided Costoclavicular Block Versus Shoulder Block for Postoperative Analgesia in Shoulder Arthroscopy Cases. *Comprehensive Med*. 2024:252-9.
 10. Hossain MA, Banik D, Akter S, Mondal MK, Hoque AF, Hannan MA, Yeasmin S. Bilateral superficial cervical plexus block with conscious sedation for thyroid surgery. *Bangabandhu Sheikh Mujib Medical University Journal*. 2021;14(4):104-8.
 11. De Boer MR, Waterlander WE, Kuijper LD, Steenhuis IH, Twisk JW. Testing for baseline differences in randomized controlled trials: an unhealthy research behavior that is hard to eradicate. *International Journal of Behavioral Nutrition and Physical Activity*. 2015 Jan 24;12(1):4.
 12. Ahn EJ, Kim JH, Kim TK, Park JH, Lee DK, Lee S, In J, Kang H. Assessment of P values for demographic data in randomized controlled trials. *Korean journal of anesthesiology*. 2019 Apr 1;72(2):130-4.
 13. Parthasarathy P, Kumar TA, Satyanarayana P, Kumar AK, Sreedevi P. Comparison of onset and duration of sensory and motor blockade with intrathecal isobaric bupivacaine versus isobaric levobupivacaine for infraumbilical surgeries. *International journal of health sciences*. 2022;6(S5):7338-50.
 14. Moro ET, da Silva MA, Couri MG, da Silva Issa D, Barbieri JM. Quality of recovery from anesthesia in patients undergoing orthopedic surgery of the lower limbs. *Brazilian Journal of Anesthesiology (English Edition)*. 2016 Nov 1;66(6):642-50.
 15. Yayik AM, Cesur S, Ozturk F, Ahiskalioglu A, Ay AN, Celik EC, Karaavci NC. Postoperative analgesic efficacy of the ultrasound-guided erector spinae plane block in patients undergoing lumbar spinal decompression surgery: a randomized controlled study. *World neurosurgery*. 2019 Jun 1;126:e779-85.
 16. Pushpanathan E, Setty T, Carvalho B, Sultan P. A systematic review of postoperative pain outcome measurements utilised in regional anesthesia randomized controlled trials. *Anesthesiology research and practice*. 2018;2018(1):9050239.
 17. Kline JP. Ultrasound-guided placement of combined superficial cervical plexus and selective C5 nerve root catheters: a novel approach to treating distal clavicle surgical pain. *AANA J*. 2013;81(1):19–22. 15.
 18. Shanthanna H. Ultrasound-guided selective cervical nerve root block and superficial cervical plexus block for surgeries on the clavicle. *Indian J Anaesth*. 2014;58(3):327–9.