Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Clinical Anaesthesia

Journal homepage: www.ijca.in

Original Research Article

A prospective comparative study of USG guided interscalene block with superficial cervical plexus block vs general anaesthesia for fixation of clavicular fractures

Ramya D V[1], Renuka Ashok[2], Arpitha Ramalingaiah[1*]

[1]Dept. of Anaesthesiology, MVJ Medical College and Research Hospital, Hoskote, Karnataka, India
[2]Dept. of Anaesthesiology, MR Medical College, Kalaburagi, Karnataka, India

Abstract

Background and Objectives: Effective management of intraoperative anaesthesia and postoperative analgesia is crucial for successful outcomes in clavicular fixation surgeries. The combination of Interscalene Brachial Plexus Block (ISBP) with Superficial Cervical Plexus Block (SCPB) has gained attention as a potential alternative to General Anaesthesia (GA) due to its efficacy and safety profile. This randomized controlled trial aimed to compare ISBP with SCPB (Group B) and GA (Group G) regarding intraoperative vitals, 24-hour analgesic requirements, and time for discharge from the Post-Anaesthesia Care Unit (PACU).

Methodology and Aims: This prospective randomized controlled trial included 60 patients classified of ASA category I, II, or III, aged 16–65 years, undergoing clavicular fixation surgery. The participants were randomly divided into two groups: Group B (ISBP with SCPB, n=30) and Group G (General Anesthesia, n=30). Ultrasound guidance was utilized for administering nerve blocks. Primary outcome measures included intraoperative vital parameters and 24-hour analgesic requirements. Secondary outcome measures included sensory and motor block characteristics, PACU discharge time, and any complications. Results: Baseline characteristics (age, sex, ASA classification) showed no statistically significant differences between groups ($p > 0.05$). However, Group B demonstrated significantly better outcomes compared to Group G in terms of Mean Arterial Pressure (MAP), 24-hour opioid requirement, and time spent in PACU ($p < 0.05$).

Conclusion: Ultrasound-guided ISBP with SCPB provides an effective and safe alternative for intraoperative anaesthesia and postoperative analgesia in clavicular fixation surgeries, with superior outcomes compared to General Anaesthesia.

Keywords: Clavicle fracture, General anaesthesia, Interscalene brachial plexus block, Superficial cervical plexus block.

Received: 20-08-2024; **Accepted:** 20-02-2025; **Available Online**: 16-04-2025

This is an Open Access (OA) journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Clavicle fractures due to road traffic accidents and sports injuries are prevalent among young adults accounting for 35% of shoulder girdle injuries.[1] Clavicle fractures with more than 2 cm of shortening, should be managed with surgical procedures like open reduction and internal fixation.[2]

Internal fixation can be done under general anaesthesia; however, it is associated with risk of aspiration, nausea, vomiting, and laryngeal spasm.[3] Furthermore, the cost of anaesthesia increases the financial burden on patients. General anaesthesia involves the use of multiple anaesthetic agents which causes hemodynamic instability, but it is suitable option for uncooperative, anxious and for patients with contraindications for regional anesthesia.[4]

Regional anaesthesia provides good postoperative analgesia, faster recovery, better compliance with physiotherapy and good option to avoid complications in general.[5,6] Superficial cervical plexus block (SCPB) combined with interscalene brachial plexus blocks (ISB) are two different regional anaesthesia techniques. Combining these two techniques has shown very good efficacy with minimum complications.[7]

Ultrasound-guided interscalene block (ISB) is particularly advantageous due to its lower requirement for local anaesthetic volume, faster onset, and longer duration of

*Corresponding author: Arpitha Ramegouda
Email: dr.groundwork6@gmail.com

https://doi.org/10.18231/j.ijca.2025.044
© 2025 The Author(s), Published by Innovative Publications.

anaesthesia when compared to nerve-stimulation techniques.[8] Additionally, this approach reduces the risk of complications such as hemi diaphragmatic paresis.[9] While numerous studies have explored the analgesic efficacy of various regional anaesthesia techniques, only a limited number have directly compared regional anaesthesia with general anaesthesia.

This study aimed to address this gap by comparing the efficacy of general anaesthesia (GA) with a combination of two newer regional anaesthesia techniques, interscalene brachial plexus block (ISBP) and superficial cervical plexus block (SCPB), for clavicular fixation surgeries. The combination of ISBP and SCPB has shown promise in providing effective intraoperative anaesthesia and postoperative analgesia, making it a compelling alternative to GA. The objectives of this study were to compare interscalene brachial plexus block with superficial cervical plexus block (Group B) and general anaesthesia (Group G) in terms of intraoperative vital parameters, analgesic requirements over 24 hours, and time for discharge from the Post-Anesthesia Care Unit (PACU).

2. Materials and Methods

This prospective comparative interventional study was conducted on patients admitted to the orthopaedic department with a history of clavicle fracture. The study protocol was approved by the Institutional Ethical Committee (IEC) before initiation, and informed consent was obtained from all participants. Sixty patients aged between 16 and 65 years, of either sex, belonging to ASA class I, II, or III, and with normal pulmonary function tests were included. Patients with ASA physical status IV, a history of alcohol or drug abuse, known allergies to local anaesthetic drugs or test drugs, coagulation disorders, use of anticoagulant drugs, or respiratory diseases with decreased respiratory reserve were excluded.

The sample size was calculated based on a recent randomized controlled trial by Guangmin Xu et al.[4] This open-label study included no blinding, and a computer-generated randomization process was used to divide the 60 patients into two groups of 30 each. Group G received general anaesthesia, and Group B received ultrasound-guided interscalene brachial plexus block combined with superficial cervical plexus block (**Figure 1**).

A detailed clinical history was obtained, and general and systemic examinations were conducted for all patients. Basic laboratory investigations and chest X-rays were performed to rule out accompanying injuries. Patients were counseled in their regional language about the anaesthesia procedure and postoperative pain assessment using the Visual Analog Scale (VAS). Patients in Group G received general anaesthesia, during which vitals including blood pressure, heart rate, mean arterial pressure, and oxygen saturation were recorded. Patients in Group B were administered ultrasound-guided interscalene brachial plexus and superficial cervical plexus blocks. Fifteen minutes after administration, motor blockade was assessed using a modified Bromage scale, and sensory blockade was assessed using the pinprick sensation test. The duration of analgesia, defined as the time from drug administration to the first rescue analgesic, was recorded in both groups.

Postoperative pain and discomfort were assessed using the VAS score. For patients experiencing moderate pain (VAS > 4), intramuscular diclofenac 75 mg was administered for effective analgesia. Observations included the time spent in the post-anaesthesia care unit (PACU), postoperative analgesic consumption, side effects of the interscalene block, and postoperative VAS scores. Patients were discharged from the PACU only after meeting predefined discharge criteria.

Data was recorded using Microsoft Excel and analysed using SPSS software version 20. Continuous variables were analysed using the Student's t-test or Mann-Whitney U test, and categorical variables were analysed using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

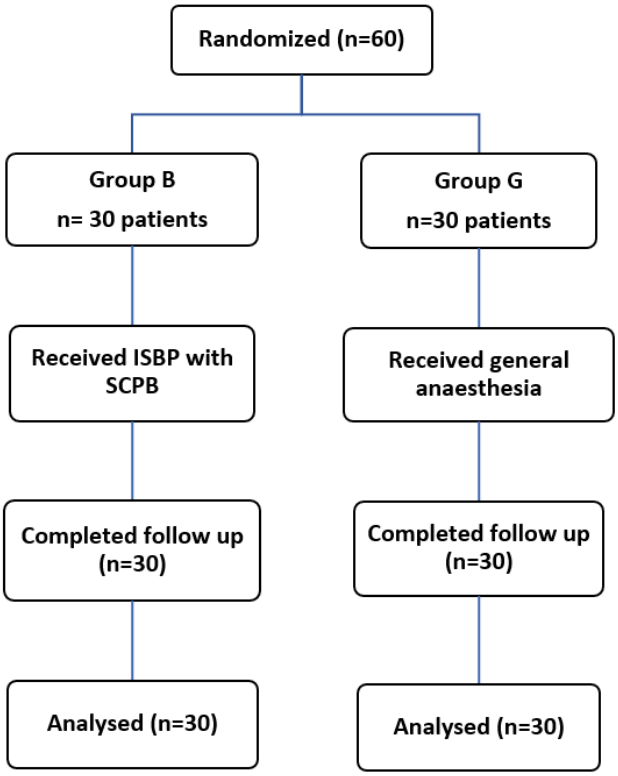

Figure 1: Consolidated standards of reporting trial flow diagram

3. Results

A total of 60 patients were included in the study, divided equally into two groups, Group B and Group G. There was no statistically significant difference in the age distribution between the two groups ($p > 0.05$), (**Figure 2**). Similarly, the sex distribution was also comparable between the two groups, with no statistically significant difference observed ($p >$

0.05). The distribution of ASA grades revealed that 73.33% of patients in Group G and 66.67% in Group B belonged to ASA Grade 1, while the remaining patients fell into ASA Grade 2. This difference was not statistically significant (p = 0.57), indicating that both groups were comparable in terms of baseline ASA grading (**Table 1**).

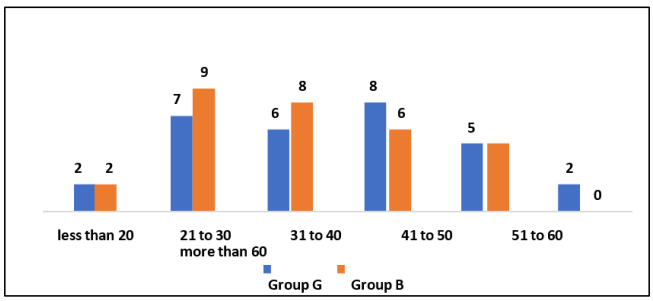

Figure 2: Comparison of age-wise distribution of patients in both groups

Table 1: Comparison of ASA-wise distribution between Group B and Group G

ASA Grade	Group G N (%)	Group B N (%)	Total	p-value
1	22(73.33%)	20(66.67%)	42(70%)	0.57
2	8(26.67%)	10(33.33%)	18(30%)	
Total	30(100%)	30(100%)	60(100%)	

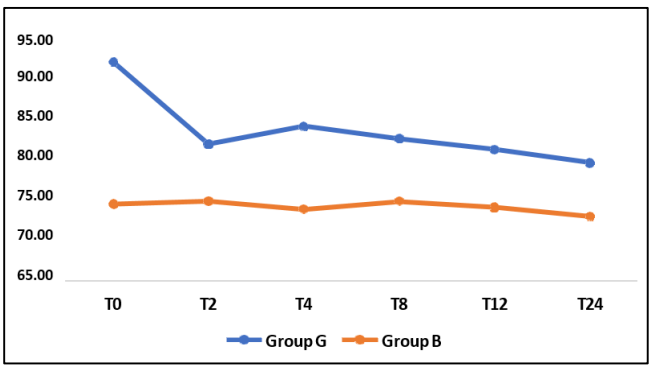

Figure 3: Comparison of Mean Arterial pressure (MAP) between Group B and Group G

The analysis of Mean Arterial Pressure (MAP), depicted in **Figure 3**, highlighted a highly significant difference between the two groups (p = 0). Group G exhibited higher MAP values, indicating better perfusion to vital organs. Meanwhile, Group B demonstrated slightly lower MAP values that remained consistent and stable throughout the procedure, suggesting effective hemodynamic control.

Heart rate trends during the procedure, showed a significant difference between the two groups at the time of intubation (p = 0). Group G experienced a spike in heart rate during intubation, whereas Group B maintained a more stable heart rate, reflecting better tolerance to the anaesthesia technique (**Figure 4**). From the hemodynamic parameters, it is evident that Group B provided better stability during clavicle surgeries, as the block techniques avoided the fluctuations seen with general anaesthesia.

Figure 4: Comparison of Heart Rate between Group B and Group G

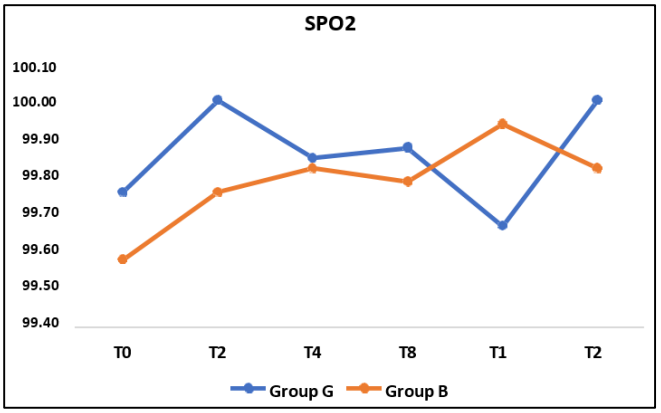

Figure 5: Comparison of SPO2 between Group B and Group G

The SpO_2 levels as illustrated in **Figure 5**, were comparable between the two groups, with no statistically significant difference observed. This indicates that both anesthesia methods maintained adequate oxygenation levels throughout the procedure.

In terms of opioid requirements, Group G required significantly more analgesics at frequent intervals, as shown in **Table 2**. Group G patients were administered injections of Diclofenac 75 mg intramuscularly and Paracetamol 1 g intravenously when their VAS scores exceeded 4. In contrast, only three patients in Group B required additional analgesics (Paracetamol 1 g intravenously) between T8 and T12, and ten patients required it between T12 and T24. The differences in opioid requirements between the groups were statistically significant at all-time intervals (T0, T2, T4, T8, T12, T24) with p < 0.05.

VAS scores showed consistently lower values in Group B compared to Group G at all-time points, except at 24 hours, where no statistically significant difference was observed (p = 0.694). This demonstrates the longer-lasting analgesic effect of ISBP combined with SCPB (**Table 3**). Recovery scores, measured using the Modified Aldred scale, revealed

significantly higher scores in Group B at T2 ($p < 0.01$), indicating a faster recovery and earlier discharge readiness when compared to Group G (**Table 4**).

Table 2: Comparison of opioid requirement in 24 hours between Group B and Group G

24-hour opioid requirement (T= time in hour)	Group G N (%)	Group B N (%)	Total	p-value
T0				
0	0(0%)	30(100%)	30(50%)	
1	18(60%)	0(0%)	18(30%)	<0.01
2	12(40%)	0(0%)	12(20%)	
Total	30(100%)	30(100%)	60(100%)	
T2				
0	0(0%)	30(100%)	30(50%)	
1	28(93.33%)	0(0%)	28(46.67%)	
2	2(6.67%)	0(0%)	2(3.33%)	<0.01
Total	30(100%)	30(100%)	60(100%)	
T4				
0	0(0%)	30(100%)	30(50%)	
1	3(10%)	0(0%)	3(5%)	<0.01
2	27(90%)	0(0%)	27(45%)	
Total	30(100%)	30(100%)	60(100%)	
T8				
0	9(30%)	27(90%)	36(60%)	
1	21(70%)	3(10%)	24(40%)	<0.01
Total	30(100%)	30(100%)	60(100%)	
T12				
0	0(0%)	30(100%)	30(50%)	
1	30(100%)	0(0%)	30(50%)	<0.01
Total	30(100%)	30(100%)	60(100%)	
T24				
0	11(36.67%)	20(66.67%)	31(51.67%)	
1	19(63.33%)	10(33.33%)	29(48.33%)	0.02
Total	30(100%)	30(100%)	60(100%)	

Table 3: Comparison of VAS SCORE between two groups

Variable	Group G [Median (IQR)]	Group B [Median (IQR)]	p value (Mann Whitney U test)
T0 VAS	4(4-4.25)	4(3-4)	0.03
T2 VAS	0(0-0)	0(0-0)	0.01
T4 VAS	6(6-7)	0(0-0)	<0.01
T8 VAS	4(4-5)	0(0-0)	<0.01
T12 VAS	1(1-2)	0(0-0)	<0.01
T24 VAS	1(1-1)	1(1-1)	0.694

Table 4: Comparison of Modified aldred score between two groups

Variable	Group G [Median (IQR)]	Group B [Median (IQR)]	p value (Mann Whitney U test)
T2 Modified Aldred Score	8(8-9)	9(9-9)	<0.01

4. Discussion

The use of ultrasound for the interscalene brachial plexus blocks made the procedure comfortable for the patients and avoided paraesthesia, overdose of local anaesthetics and inadvertent intravascular injection which was routinely encountered by the conventional technique.[10]

The findings of this study align with previous research, demonstrating that ISBP combined with SCPB is an effective alternative to general anaesthesia for clavicular fixation surgeries. The use of Ropivacaine in this study proved to be a significant factor in achieving superior pain control and a longer pain-free interval. Ropivacaine, being a long-acting local anaesthetic with a better safety profile compared to Bupivacaine, contributed to the observed outcomes, including a pain-free interval of more than 18 hours ($p < 0.01$ at intervals 0, 2, 4, 8, 12 hours and $p < 0.02$ at the 24th hour). This finding is consistent with prior research, such as the study by Herring AA et al., where Bupivacaine was used for SCPB alone,[11] and the study by Choi SD et al., which demonstrated the efficacy of Bupivacaine for up to 14 hours postoperatively.[12]

Our study's results support the superiority of the ISBP+SCPB combination, as indicated by significantly lower opioid requirements and VAS scores in Group B compared to Group G. These findings are comparable to those of Dash S et al., who found that SCPB combined with ISB provided better postoperative pain control and hemodynamic stability during surgery compared to general anaesthesia.[13] While studies comparing ISBP+SCPB to general anaesthesia are limited, this combination has been shown to be a safe and effective option for clavicle surgeries in studies comparing SCPB to other types of regional anaesthesia.

The importance of targeting specific nerve innervations in clavicle surgeries is underscored by the work of Kline J et al., who demonstrated that combined SCPB and selective C5 nerve root blocks with catheters are useful for distal clavicle fractures.[14] Our study, focusing on the proximal clavicle fractures, highlighted the efficacy of the interscalene block, which primarily targets the proximal innervation of the lateral two-thirds of the clavicle. The supraclavicular approach, on the other hand, spares the C5 and C6 roots and blocks more distally. This distinction reinforces the utility of ISBP for surgeries involving the clavicle's proximal portions. Similar conclusions were reached in studies by Shanthanna H et al. and Tran DQ et al., which found that ISBP+SCPB effectively provided surgical pain relief in clavicle procedures.[15,16]

While these findings add valuable insights, there are limitations to this study. The lack of blinding for patients and investigators may have introduced bias in the assessment of outcomes. Additionally, this was a single-centre study with a relatively small sample size, limiting the generalizability of the results. Future studies with larger sample sizes and multicenter participation are needed to validate these findings and explore further enhancements in anaesthesia techniques for clavicle fixation surgeries.

5. Conclusion

Ultrasound-guided interscalene brachial plexus block combined with superficial cervical plexus block offers superior vital stability, reduced opioid requirements, prolonged pain-free intervals, and shorter post-anesthesia care unit stay compared to general anesthesia in clavicular fixation surgeries. This regional anesthesia technique ensures improved patient outcomes and faster recovery. Its safety profile and efficacy make it a reliable alternative to general anesthesia for clavicular surgeries.

6. Author's Contribution

Dr. Ramya D V, Dr. Renuka Ashok and Dr. Arpitha R designed the entire work. All the authors have contributed to making the required corrections and revising the manuscript. The final draft was checked by all the authors.

7. Source of Funding

Nil.

8. Conflict of Interest

The authors declare no conflict of interest

9. Acknowledgement

I am indebted to Dr. Gurulingappa A Patil Professor & Head, Department of Anaesthesiology, M R Medical College, Gulbarga for his encouragement & constant help in the progression of the study.

References

1. Abdelghany MS, Ahmed SA, Afandy ME. Superficial cervical plexus block alone or combined with interscalene brachial plexus block in surgery for clavicle fractures: a randomized clinical trial. *Minerva Anestesiol*. 2021;87(5):523–32.
2. Balaban O, Dülgeroğlu TC, Aydın T. Ultrasound-guided combined interscalene-cervical plexus block for surgical anesthesia in clavicular fractures: a retrospective observational study. *Anesthesiol Res Pract.* 2018;2018(1):7842128.
3. Krishna AB, Chinnamaregowda NV, Jayanna P, Madappa CN. Ultrasound-guided interscalene block combined with intermediate or superficial cervical plexus block for clavicle surgery: a randomized double-blind study. *Eur J Anaesthesiol.* 2020;37(11):979–83.
4. Xu G, Su P, Cai B, Liu Y, Jiang D, He Y, et al. Ultrasound-guided superficial cervical plexus block combined with clavipectoral fascial plane block or interscalene brachial plexus block in clavicle surgery: a single-centre, double-blind, randomized controlled trial. *J Clin Monit Comput*. 2023;37(4):985–92.
5. Patel H, Shah N, Syed A, Shah P, Macwan S. Evaluating the analgesic efficacy of superficial cervical plexus block for head and neck surgeries: a comparative randomized control study. *Cureus.* 2023;15(5):e39303.
6. Balaban O, Dülgeroğlu TC, Aydın T. Ultrasound-guided combined interscalene-cervical plexus block for surgical anesthesia in clavicular fractures: a retrospective observational study. *Anesthesiol Res Pract.* 2018;2018(1):7842128.

7. Olofsson M, Taffé P, Kirkham KR, Vauclair F, Morin B, Albrecht E. Interscalene brachial plexus block for surgical repair of clavicle fracture: a matched case-controlled study. *BMC Anesthesiol.* 2020;20(1):91.
8. Kukreja P, Davis CJ, MacBeth L, Feinstein J, Kalagara H. Ultrasound-guided clavipectoral fascial plane block for surgery involving the clavicle: a case series. *Cureus.* 2020;12(7):e9072.
9. Shrestha BR, Sharma P. Regional anaesthesia in clavicle surgery. *JNMA J Nepal Med Assoc.* 2017;56(206):265-7.
10. Ghodki PS, Singh ND. Incidence of hemidiaphragmatic paresis after peripheral nerve stimulator versus ultrasound-guided interscalene brachial plexus block. *J Anaesthesiol Clin Pharmacol*. 2016;32(2):177–81.
11. Herring AA, Stone MB, Frenkel O, Chipman A, Nagdev AD. The ultrasound-guided superficial cervical plexus block for anesthesia and analgesia in emergency care settings. *Am J Emerg Med*. 2012;30(7):1263–7.
12. Choi DS, Atchabahian A, Brown AR. Cervical plexus block provides postoperative analgesia after clavicle surgery. *Anesth Analg*. 2005;100(5):1542–3.
13. Dash S, Pradhan C, Kar J. Superficial cervical plexus block with interscalene block vs. general anaesthesia for clavicle surgeries: a randomized comparative study. *Int J Pharm Clin Res.* 2023;15(3):1528–33.
14. 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. Badhan A, Chauhan G. Comparison between conventional technique and ultrasound-guided technique for interscalene brachial plexus block in upper limb surgeries. *Int J Recent Sci Res*. 2019;10(6):32746–50.
16. 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.

Cite this article: Ramya DV, Renuka A, Ramalingaiah A. A prospective comparative study of USG guided interscalene block with superficial cervical plexus block vs general anaesthesia for fixation of clavicular fractures. *Indian J Clin Anaesth*. 2025;12(2):272–277.