

Ultrasound Guided Combined Superficial Cervical Plexus Block-Interscalene Block for Anesthesia in Clavicular Fractures: A Retrospective Observational Cohort Study

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Abstract

Background: Even though various peripheral nerve blocks are used for analgesia in clavicular fractures. The use of ultrasound guided combined superficial cervical plexus block and interscalene blocks as a sole anaesthetic technique for surgical fixation of clavicular fractures are not well, established. **Materials and Methods:** A retrospective chart review of patient undergoing clavicular fracture surgeries was performed. Patients received combined superficial cervical plexus block and interscalene block were included in the study. Block success and complication rate were evaluated. **Results:** Of the 20 patients underwent clavicular fracture surgery, 12 of them received ultrasound guided combined superficial cervical plexus block and interscalene block. Block success rate was found to be 100%. Time for rescue analgesia found to be 6.66 ± 0.84 hours. And there were no occurrence of any Complications. **Conclusion:** We concluded that ultrasound guided combined superficial cervical plexus block and interscalene block can be used as a sole anaesthetic technique in clavicular fracture repair.

Keywords: Interscalene Block; Clavicular Fractures; Brachial plexus

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Introduction

Clavicle fractures comprised up to 4% of all fractures among all age groups¹. Isolated clavicle fractures comprising 44.1% of all fractures in shoulder girdle².

Surgical treatment of clavicular fractures had show significant advantages like increased postoperative strength³, quicker time to return

to normal activities and low re-fracture rates^{4,5,6}. Traditionally the clavicular fracture surgeries were performed under general anesthesia. Analgesia for clavicular fractures can be challenging for anaesthesiologist secondary to complex and varied innervation. Literatures describing heterogeneous innervation of clavicle and overlying skin. The sensory innervation of clavicle have contribution from both cervical and brachial plexus⁷.

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The contemporary literature surrounding the optimal regional anaesthetic technique for clavicular surgery which can provide superior postoperative analgesia and minimizing symptoms intra-operatively is lacking. The various nerve blocks that are used to anaesthetize the clavicle superficial cervical plexus block, interscalene brachial plexus block, supraclavicular block, and a combination of both interscalene and superficial cervical plexus block⁸.

Many factors play a role in selecting the optimal regional anaesthetic methods like fracture location and complexity, incision over mixed innervation and surgical positioning and manipulations.

Even though interscalene blocks were used for shoulder surgeries, the dual innervation of the clavicular area suggest that a single interscalene block may not be sufficient for the surgical pain⁹.

With the advent of point of care ultrasonography reports of successful usage of combined peripheral nerve blocks are emerging. Ultrasound guided techniques increased the success rates and reduce the complications associated with the procedures as well as drugs. The reduction of local anaesthetics with ultrasound guided techniques had helped us to perform multiple blocks without the risk for toxicity.

Herring AA *et al.*¹⁰ and vandepitte *et al.*¹¹ reported a successful use of superficial cervical plexus block and interscalene block for clavicular surgery. Gray *et al.*¹² stated that clavicular surgery also a indication for superficial cervical plexus block.

The objective of our retrospective cohort study is to demonstrate the effectiveness of combined superficial cervical plexus block and interscalene block as a sole anaesthetic that can be used for patients undergoing clavicular fractures repair.

Materials and Methods

After obtaining approval from the hospital institutional review board, a retrospective chart review of patients undergoing shoulder surgery over a period of 3 years starting from July 2015 was performed. The anaesthetic records including preoperative evaluation, intraoperative records and post anesthesia records were obtained from the medical records department. The postoperative records including hospital course, physician notes also obtained, patient demographics, surgical procedure, intraoperative anaesthetics and PACU course were recorded.

Patients with clavicular fractures repair under interscalene and superficial cervical plexus block were recorded. Among those the local anaesthetic used, concentration of the drug, volume used were noted. Block success and acute complications if any also noted from the charts.

Standard contraindications to placement of nerve blocks included patient refusal, coagulopathy and drug allergy and infection of intended site.

In accordance with the hospital protocol appropriate informed consent were obtained from the patients.

Block success is defined as one which did not necessitate conversion to general anesthesia. Rescue analgesia time noted from the records. Hemodynamic parameters were also noted.

Patients who were converted to general anesthesia (block failure) and those patients were block duration are not recorded are excluded from the study.

Anaesthetic Methods

Ultrasound guided combined interscalene and superficial cervical plexus block were performed under ultrasound guidance (LOGIQ GE Health Care), 12MHz linear transducer was used.

The transducer positioned in transverse plane and the carotid artery was identified at the level of cricoid. Then the transducer was moved laterally to identify the anterior and middle scalene muscles and we can able to found the brachial plexus in between. A Lateral to medial, in-plane needle insertion was done. Once inside the interscalene groove and after careful aspiration and needle tip confirmation 15 ml of 0.25% ropivacaine was injected.

After the performance of the interscalene block the needle was withdrawn and redirected to the cervical plexus. The hyperechoic fascia of the sternocleidomastoid muscle on its posterolateral border was identified and the cervical plexus will be identified as small hypoechoic nodules superficial to pre vertebral fascia overlies the interscalene groove. The needle tip was adjusted to inject 10 ml of 0.25% ropivacaine adjacent to the plexus.

Statistical analysis

Descriptive statistics of the study are calculated and data emerged were analysed using SPSS statistics software. Continuous quantitative data were expressed as numbers, mean and standard deviation and qualitative data were expressed as numbers and percentage.

Results

The retrospective chart review conducted on all clavicular fracture surgeries over the 3 year period yielded a total of 12 patients for analysis. Patient inclusion detailed in consort diagram (Fig. 1).

Among the 20 patients who had clavicular fracture at the review period only 12 of them underwent a combined interscalene and superficial cervical plexus block as a sole anaesthetic technique for clavicular fracture repair. The patient characteristics are summarized in Table 1.

Of the 12 patients, 10 patients underwent open reduction and internal fixation while 2 of them had implant removal. All the 12 patients didn't necessitate any systemic analgesic supplementation or conversion to general anesthesia intraoperatively. None of these patients had developed any complication in the intra and postoperative period

(horner syndrome, respiratory compromise). Mean duration for rescue analgesia was found to be 6.6 ± 0.849 hrs. Inj Tramadol 50 mg had been used as rescue analgesia in these patients. The outcomes of surgery and anesthesia are summarized in Table 2.

Table 1: Patient Characteristics

	Mean \pm Standard deviation
Age	49.91 \pm 13.93
Height (m)	1.62 \pm 0.08
Weight (kg)	65.16 \pm 6.45
BMI (kg/m ²)	25.24 \pm 4.56

Table 2: Outcomes of Anesthesia and Surgery

Surgery Duration (Minutes)	94.16 \pm 10.57
Time For Rescue Analgesia(Hrs)	6.66 \pm 0.84
Acute complications	none
Block success rate	100%

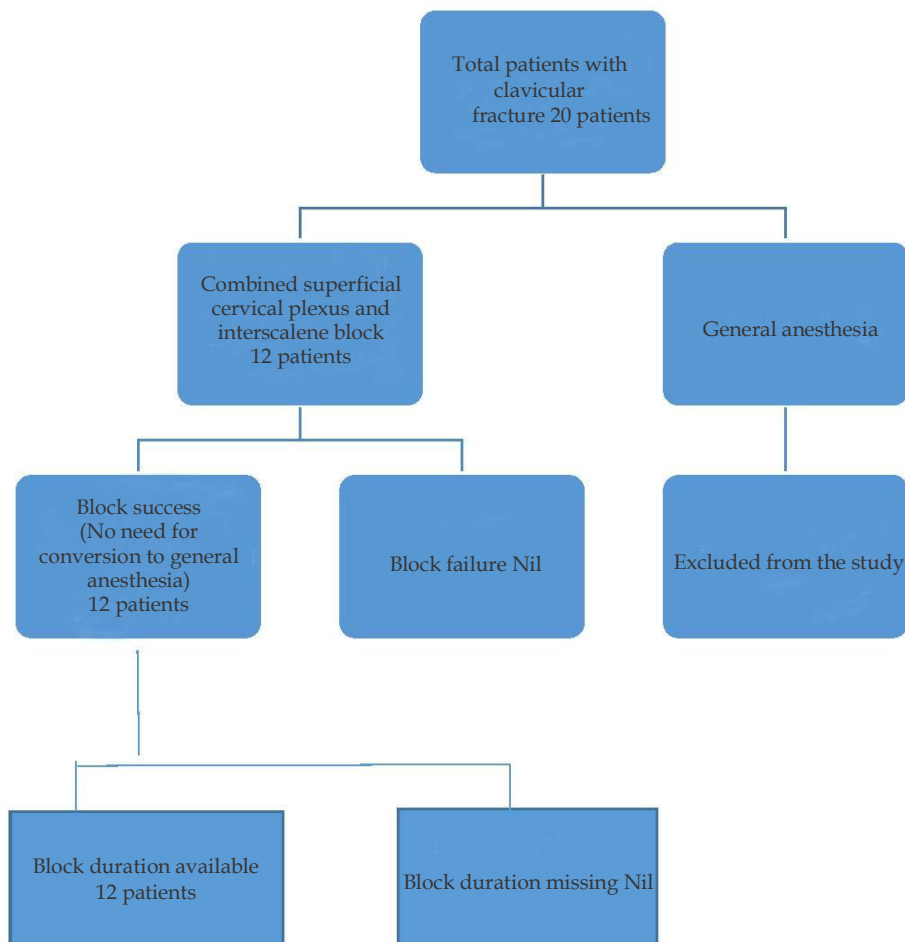


Fig. 1:

Discussion

The combined interscalene and superficial cervical plexus block has been shown to be promising anaesthetic technique for clavicular fracture surgeries.

Since clavicle received innervation both from cervical plexus as well as from brachial plexus the combined interscalene and superficial cervical plexus block may be the best option for the surgical fixation of clavicle fractures.

Herring *et al.*¹⁰ reported the the ultrasound guided superficial cervical plexus block for analgesia and anesthesia in emergency settings.

Ushema *et al.*¹³ reported the successful use of supraclavicular along with C5, C6 nerve blocks for clavicular surgery. This supports the innervation of clavicular surface by supraclavicular nerve a branch of superficial cervical plexus.

Vandepitte *et al.*¹¹ also reported successful combined interscalene and superficial cervical plexus block usage in surgical repair of clavicular fracture in a pregnant women.

Balban O *et al.*¹⁴ in their retrospective study found that ultrasound guided combined superficial cervical plexus and interscalene blocks had been successfully used as a sole anesthesia for clavicular fracture patients without any complications. This was further confirmed by seni pot sangbam *et al.*¹⁵ in their prospective observational study.

Contractor *et al.*¹⁶ reported horner syndrome and hoarsness of voice in some patients and also the usage dexmedtomidine 1 mcg/kg.

But in our study we didn't found any side effects. And in our study we didn't use any additional sedatives and analgesics other than the nerve block. The duration of rescue analgesia was found to be 6 hrs, which is comparable to other studies.

Reverdy *et al.*¹⁷ reported a high patient satisfaction rate in patient who underwent surgery for clavicular fracture under combined superficial cervical plexus block interscalene block.

The use of ultrasonography in the study had further reduced the complication associated with these nerve blocks.

Limitations

This study is limited by the small number of cases as hospital admissions for clavicular surgeries are usually low. A randomized controlled trial of larger sample size comparing the two groups will have a stronger implication on the outcome of the study.

Conclusion

Based on our experience we suggest that the combined superficial cervical plexus block and interscalene block can be used as a sole anaesthetic method for patients with clavicular fracture repair. A further randomized control studies are required to determine which constitute the better method for clavicular fracture repairs.

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Conflict of interest: NIL

References

1. Nordqvist A, and Petersson C. The incidence of fractures of the clavicle. *Clin. Orthop.* 1994;300:127-132.
2. Postacchini FS, Gumina P, De Santis, *et al.* Epidemiology of Clavicle Fractures. *J. Shoulder Elbow Surg.* 2002;11:452-56.
3. Witzel K. [Intramedullary osteosynthesis in fractures of the mid-third of the clavicle in sports traumatology]. *Z OrthopUnfall.* 2007; 145(5):639-42.
4. Jubel A, Andemahr J, Bergmann H, *et al* Elastic stable intramedullary nailing of midclavicular fractures in athletes *British Journal of Sports Medicine.* 2003;37:480-84.
5. Meier C, Grueninger P, Platz A. Elastic stable intramedullary nailing for midclavicular fractures in athletes: indications, technical pitfalls and early results. *ActaOrthop Belg.* 2006;72:269-75.
6. Morgan RJ, Bankston LS, Hoening MP, & Connor PM. Evolving Management of Middle-Third Clavicle Fractures in the National Football League. *The American Journal of Sports Medicine.* 2010;38(10):2092-96. <https://doi.org/10.1177/0363546510372795>.
7. Dejerine J. Syndromes sensitifs. In: Dejerine J, ed. *Semeiologie des Affections du SystemeNerveux.* Paris, France: Masson; 1914.
8. Tran DQ, Tiyaprasertkul W, and Gonzalez AP. Analgesia for clavicular fracture and surgery: a call for evidence. *Regional Anesthesia and Pain Medicine,* 2013;38(6):539-43.
9. Jonathan P. Kline, Ultrasound-Guided Placement of Combined Superficial Cervical Plexus and Selective C5 Nerve Root Catheters: A Novel

- Approach to Treating Distal Clavicle Surgical Pain. AANA Journal. 2013 Feb;81(1):19-22.
10. Herring AA, Stone MB, Frenkel O, *et al.* The ultrasound-guided superficial cervical plexus block for anesthesia and analgesia in emergency care settings. *Am J Emerg Med.* 2012;30:263-67.
 11. Vandepitte C, Latmore M, O'Murchu E *et al.* Combined interscalene and superficial cervical plexus blocks for surgical repair of a clavicular fracture in a 15 week pregnant woman. *International journal of obstetric anesthesia.* 2014 May;23(2):194-5.
 12. Gray AT. Superficial cervical plexus block. In: Gray AT, ed. *Atlas of Ultrasound-Guided Regional Anesthesia.* 2nd ed. Philadelphia, PA: Saunders; 2012.
 13. Ueshima H, Otake H. Successful clavicle fracture surgery performed under selective supraclavicular nerve block using the new subclavian approach. *JA Clinical reports.* 2016;2:34.
 14. 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;Article ID 7842128, 6 page.
 15. Seni P, Jonan PK. Efficacy of Combined Interscalene Block and Superficial Cervical Plexus Block for Surgeries of the Clavicle: A Prospective Observational Study. *Journal of Clinical and Diagnostic Research.* 2019 Feb;13(2):UC05-UC08.
 16. Contractor HU, Shah VA, Gajjar VA. Ultrasound guided superficial cervical plexus and interscalene brachial plexus block for clavicular surgery. *Anaesth Pain and Intensive Care.* 2016;20(4):447-450.
 17. Fabien Reverdy; Combined interscalene-superficial cervical plexus block for clavicle surgery: an easy technique to avoid general anesthesia, *BJA: British Journal of Anesthesia.* 2015 Dec 22;Volume 115, Issue e Letters Supplement.

