

Serratus anterior plane block for pain relief in multiple fractured ribs (mfrs); Injection of local anaesthetic above the serratus or below the serratus? - A case report

Volume 7 Issue 2 - 2017

Ashok Jadon

Chief Consultant & Head of Department, Department of Anaesthesia & Pain Relief Service, India

Correspondence: Ashok Jadon, Chief Consultant & Head of Department, Department of Anaesthesia & Pain Relief Service, Duplex-63, Vijaya Heritage Phase-6, Kadma, Jamshedpur-831005, Jharkhand, India, Tel +91-9234554341, Email jadona@rediffmail.com

Received: January 13, 2017 | **Published:** January 24, 2017

Introduction

Chest trauma is commonest cause of Multiple fractured ribs (MFRs). Intense pain due to MFRs continue to be a challenging problem as it is associated with increased morbidity and mortality. Proper analgesia is required for early ambulation and to prevent respiratory failure.^{1,2} There are several regional analgesic methods used in treating MFRs.^{3,4}

Serratus anterior plane (SAP) block has been used successfully to treat pain of multiple fractured ribs (MFRs)^{5,6} however, the optimal point of needle tip or catheter to inject local anaesthetic is still debatable.^{6,7} Blanco described this block and suggested that local anaesthetic injected above or under the serratus anterior muscle results in almost similar distribution of sensory block.⁸ However, Fajardo et al.⁹ have recommended the injection of local anaesthetic below the serratus anterior muscle.

We report a case of MFRs which was managed with serratus anterior plane block by two catheters inserted simultaneously in fascial planes above the serratus and below the serratus muscle. The objective was to find out the relative efficacy to relieve the pain due to MFRs.

Case

A 42-year-old female was admitted with multiple fractured ribs after road traffic accident. She had severe pain which was managed initially with injectable NSAIDs, and Injection Tramadol. However, due to poor pain relief serratus plane block was given after informed consent. Under ultrasound guidance using high frequency linear probe (HFL-38, 13-6 MHz, Sono Site®) and using inline approach, 18G Tuohy needle was inserted at mid-axillary line (from posterior to anterior direction) either below or above the serratus anterior muscle (Figures 1 & 2) and catheter was inserted 3cm beyond needle tip. Position of needle and catheter were confirmed with injection of 2-5 ml saline. Both the catheters were secured over skin with an adhesive plaster (Figure 3) and were tagged to identify from outside.

First injection of 20 ml of 0.25% bupivacaine with adrenaline (5µg/ml) was given as bolus through catheter placed below the serratus muscle. After 15minutes patient reported good pain relief as observed by VAS (Visual Analogue Scale) score 2/10. This pain relief lasted till 6 hrs. When score returned to 5/10. A second bolus of similar drugs was given through catheter placed above the serratus muscle which resulted in similar pain relief (VAS 2/10) after 15 minutes. After 6hrs patient noticed increasing discomfort (VAS 4/10 on rest) then 10ml 0.125% bupivacaine was injected through the same catheter (above serratus anterior muscle) and a continuous infusion of 0.125% bupivacaine plus fentanyl 1.0 µg/ml was started @rate

of 5ml/hr. by using elastomeric infusion pump (DOSI-FUSER®, LEVENTON, Spain). Good pain relief continued for next 20hrs. (VAS 2/10 on rest and 3-4/10 on movement and coughing. However, she noticed gradually increasing pain (VAS 5/10 on rest) and also noticed that her bed sheet and dress along with dressing over the catheter insertion site is wet. Dressing was changed and it was found that catheter which was inserted above the serratus anterior muscle was migrated out of skin and other catheter was still in place (Figure 4). The migrated catheter was removed and infusion was re-started with catheter which was inserted below the serratus muscle after a repeat bolus of 10 ml 0.25% bupivacaine. After 20 minutes adequate pain relief was observed (VAS 2/10 on rest and 3-4 on coughing or movements). Next 6 days patient was comfortable with this infusion (VAS 0-2 on rest and 2-3 on movement). Along with SAP block patient also received Paracetamol infusion 1g 8hrly which was stopped after 3days and then she received oral Tab. Diclofenac retard 50mg twice daily and Injection Tramadol 50mg IV on request (total 3 injections during treatment period). Catheter was removed after 7th day of insertion because patient was discharged. No complication related to technique or local anaesthetic agent was noted.

Discussion

“Serratus anterior plane block” is an Ultrasound guided facial block described by Blanco and colleagues.⁸ In this block cutaneous branches of the intercostal nerves are blocked as they pass through these planes, before dividing into anterior and posterior branches to supply sensation to most of the chest wall.¹⁰ Blanco et al.⁸ recommended that local anaesthetic can be deposited either above or below the serratus anterior muscle with equal effectiveness and coverage of sensory block.⁸ There was an additional observation that

an injection superficial to the serratus anterior muscle spreads wider and lasts longer than an injection deep to it.⁸ Primarily this block was described for breast surgery however; as it provides analgesia for hemithorax it has also been used successfully to relieve pain in patient with thoracotomy,⁷ and multiple rib fractures.^{5,6}

Contrary to Blanco's belief Fajardo et al.⁹ have recommend that LA should be injected below the serratus muscle because there is a greater caudal spread of local anaesthetic between serratus-intercostal plane due to poor dispensability of the space. Moreover, respiratory movements allow the LA to be dispersed along the space. They also argued against the Blanco's approach by stating that, long thoracic nerve (LTN) may be affected if drug is injected above serratus and as this is a pure motor nerve to SAM may cause winged scapula syndrome and may produce temporary palsy of the LTN. In present case we observed that adequate pain relief was achieved through both the catheters and quality of pain relief was equal among two different planes (above or below the serratus muscle) of local anaesthetic injections.

The catheter which was inserted above the serratus muscle was displaced or migrated out after 30 hrs. of insertion while catheter inserted below the serratus muscle remain in place and effective for 7days. There is no report about catheter migration in serratus plane block although tunneling has been suggested as a precautionary measure to prevent possible migration.⁶ We presume that, the catheter which was under serratus muscle had better hold due narrow space and its sandwiching between rib and serratus muscle. Therefore, it was better maintained its position. Other studies have used low concentration of local anaesthetic with higher volume.⁵⁻⁷ However, we were able to achieve an adequate pain relief with infusion of 0.125% plus 1µgm/ ml fentanyl @5ml/hr. probably due to, almost equal amount of total drug used and use of co-analgesics.

An important issue which is necessary to discuss here is that, if injection is given below serratus anterior muscle can be called "serratus anterior plane block" or not. Blanco et al.⁸ did not distinguished the difference in their article which used term "Serratus anterior plane block" first time. However, their injection of local anaesthetic below the serratus anterior muscle as "Serratus anterior plane block" was challenged by Fajardo.⁹ He mentioned that he is already using this interfascial technique and called it "Serratus intercostal Plane block" (SIFP) as it was given between serratus anterior muscle and intercostal muscles.

As this juncture we do not know the consenses about the nomenclature therefore still calling it serratus anterior plane block (injection below serratus muscle). There is no clinical study to demonstrate the superiority of one technique to other when block is performed below or above the serratus anterior muscle. Therefore, we have used two catheters in one patient because clinically it is almost impossible to replicate two similar patients in terms of clinical presentation (amount, distribution of injury and response to level of pain i.e. pain threshold). This case has worked as a model to compare the efficacy of block and catheter related technical issues. Moreover, technically also it was not difficult to observe two different planes of serratus plane block while inserting the needle or catheter.

Limitation

This is the first and only case report addressing the issue of relative efficacy when local anesthesia injected above or below the serratus muscle. However, more randomized studies are required to substantiate the findings of presented case report.

Conclusion

In presented case of MFRs, both the approaches of local anaesthetic injection that is above the serratus anterior muscle as well as below the serratus anterior muscle provided adequate and effective analgesia. The catheter which was inserted above the serratus muscle was migrated out and the catheter inserted below the serratus muscle stayed longer. However, more studies are warranted before making any conclusion for superiority of one technique over other.

Conflicts of interest

There is no conflict of interest.

Acknowledgements

None.

Funding

None.

References

1. Karmakar MK, Critchley LA, Ho AM, et al. Continuous thoracic paravertebral infusion of bupivacaine for pain management in patients with multiple fractured ribs. *Chest*. 2003;123(2):424–431.
2. Easter A. Management of patients with multiple rib fractures. *Am J Crit Care*. 2001;10(5):320–327.
3. Ho AM, Karmakar MK, Critchley LA. Acute pain management of patients with multiple fractured ribs: a focus on regional techniques. *Curr Opin Crit Care*. 2011;17(4):323–327.
4. Mohta M, Verma P, Saxena AK, et al. Prospective, randomized comparison of continuous thoracic epidural and thoracic paravertebral infusion in patients with unilateral multiple fracture ribs—a pilot study. *J Trauma*. 2009;66(4):1096–1101.
5. Lopez-Matamala B, Fajardo M, Estebanez-Montiel B, et al. A new thoracic interfascial plane block as anesthesia for difficult weaning due to ribcage pain in critically ill patients. *Med Intensiva*. 2014;38(7):463–465.
6. Kunhabdulla NP, Agarwal A, Gaur A, et al. Serratus anterior plane block for multiple rib fractures. *Pain Physician*. 2014;17(4):E651–E653.
7. Madabushi R, Tewari S, Gautam SKS, et al. Serratus Anterior Plane Block: A New Analgesic Technique for Post-Thoracotomy. *Pain Pain Physician*. 2015;18(3):E421–E424.
8. Blanco R, Parras T, McDonnell JG, et al. Serratus plane block: a novel ultrasound-guided thoracic wall nerve block. *Anaesthesia*. 2013;68(11):1107–1113.
9. Fajardo MP, Torre ADL, López S, et al. Serratus–intercostal Plane block. An encouraging approach for breast surgery. *Anaesthesia*. 2011;66(9).
10. Mayes J, Davison E, Panahi P, et al. An anatomical evaluation of the serratus anterior plane block. 71(9):1064–1069.