

with a group of selected test subjects, is also advocated. The American Society of Anesthesiologists has also amended its statement on creating labels of pharmaceuticals for use in anesthesiology. But we could not find similar literature on ampoules. Several ampoules carry information which is difficult to read by naked eye (Figure 1A). This becomes especially important for ampoules that are looking similar as they carry potential of drug being administered wrongly.⁴ One solution to the problem is to use a magnifying glass to read it but this would necessitate carrying one during practice. Mobile phones are now routinely carried by everyone. Hence an easy and feasible alternate is to have a photograph of the ampoule with the mobile camera and zoom to read it (Figure 1B). The photo could easily be shared with others to have it cross-checked by several persons simultaneously, and any discrepancy in judgment can be resolved. It will also provide complete details at single glance unlike several adjustments required with the magnifying lens (Figure 1C). The image quality will undoubtedly depend on the pixels of camera but it will definitely be an aid to naked eye examination.

Conflicts of interest

The authors declare no conflicts of interest.





Acknowledgement

Authors acknowledge Dr. Anamika Purohit for technical assistance in preparing the manuscript

and Mr. Satyanarayan Tripathi for digital art work.

References

1. Kothari D, Gupta S, Sharma C, Kothari S. Medication error in anaesthesia and critical care: A cause for concern. *Indian J Anaesth.* 2010;54:187–92.
2. The National Coordinating Council for Medication Error Reporting and Prevention. NCC MERP: The First Ten Years 'Defining the Problem and Developing Solutions'; 2005. p. 4.
3. Glavin RJ. Drug errors: consequences, mechanisms, and avoidance. *Br J Anaesth.* 2010;105:76–82.
4. Paliwal B, Purohit A, Sethi P. Apnoea during Spinal Anesthesia: A Medication Error. *Karnataka Anaesth J.* 2016;2:37–8.

Bharat Paliwal , Manoj Kamal , Pradeep Bhatia , Sadik Mohammed 

All India Institute of Medical Sciences, Department of Anesthesiology and Critical Care, Jodhpur, India

* Corresponding author.

E-mail: docbpali@gmail.com (B. Paliwal).

Received 2 October 2020; accepted 29 November 2020

<https://doi.org/10.1016/j.bjane.2020.11.009>

0104-0014/ © 2021 Sociedade Brasileira de Anestesiologia.

Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Expanding the horizon of costoclavicular block – shouldering new responsibility!



Dear Editor,

Ultrasound-guided costoclavicular block (CCB) is a variant of infraclavicular brachial plexus block. The advantages of local anesthetic (LA) deposition at costoclavicular space (CCS) include the requirement of low volume as the cords are densely packed, reduce the possibility of pneumothorax and ipsilateral phrenic nerve palsy (PNP).¹ It has been shown to produce effective anesthesia/analgesia in various upper limb surgeries below the shoulder joint. Continuous CCB using a perineural catheter can be used for intraoperative surgical anesthesia and/or postoperative analgesia. Aliste et al. first used CCB for analgesia in arthroscopic shoulder surgery and compared its efficacy with interscalene block (ISB).² CCB provided early-onset equipotent analgesia without any incidence of ipsilateral PNP. The rostral spread of the LA from CCS towards the roots of brachial plexus could block the neural innervation of the shoulder in a retrospective manner without causing PNP.

A recent human cadaveric study also supported these clinical findings.³ Ultrasound-guided injection of 20 mL dye (0.1% methylene blue) in the CCS was found to spread towards cephalad part of brachial plexus. It stained all trunks and cords of the brachial plexus, including the

suprascapular nerve, while sparing the phrenic nerve. The reported incidence of PNP in clinical settings following the CCB is low but variable. Ipsilateral PNP was observed in 0% or 5% with 20 ml and 8.9% with 35 ml of LA following ultrasound-guided CCB in various clinical settings.^{1,2,4} Bilateral use of CCB with 15 ml of LA for each side was also reported without any clinical or sonographic evidence of PNP.¹ We have been using CCB in our daily practice since its first description in the literature and observed a relatively very low incidence of clinically significant PNP. Still, a greater number of clinical trials on a large number of patients is the need of the hour to push its boundaries for shoulder anesthesia/analgesia.

The understanding of dermatomal, myotomal, and osteotomal innervations are essential to provide procedure-specific optimal anesthesia or analgesia of the shoulder area. Suprascapular and axillary nerves supply a significant part of the osteotome and myotome around the shoulder and proximal humerus. Subscapular, medial pectoral, lateral pectoral, musculocutaneous, thoracodorsal, and radial nerves also contribute to supply myotomes. Although ISB is considered as the gold standard in shoulder analgesia, the inherent risks of ipsilateral PNP limit its use in patients with pre-existing pulmonary compromise.⁵ Several modifications of ISB or other diaphragm-sparing nerve blocks have been investigated for shoulder surgeries but failed to achieve either surgical anaesthesia or 0% incidence of PNP. The various innervations of shoulder joint covered and spared in ISB, selective superior trunk block (STB), and CCB are mentioned in Table 1. It is now evident from anatomical and

Table 1 Innervations covered and spared of shoulder area in different blocks.

Brachial plexus		ISB	Selective STB	CCB
Roots	C5	✓	✓	X
	C6	✓	✓	X
	C7	✓	X	✓
	C8	X	X	✓
	T1	X	X	✓
Trunk	Upper	✓	✓	✓
	Middle	✓	X	✓
	Lower	X	X	✓
Cords	Medial	✓	X	✓
	Lateral	✓	✓/ X	✓
	Posterior	✓	✓/ X	✓
Branches	Suprascapular nerve (C5–C6)	✓	✓	✓
	Subscapular nerve (C5–C6)	✓	✓	✓
	Axillary nerve (C5–C6)	✓	✓	✓
	Musculocutaneous nerve (C5–C7)	✓	X	✓
	Lateral pectoral nerve (C5–C7)	✓	X	✓
	Medial pectoral nerve (C8–T1)	X	X	✓
	Radial nerve (C5–C8,T1)	X	X	✓
	Superior lateral cutaneous nerve	✓	✓	✓
Dermatomal innervation	Intercostobrachial nerve (T1–T2)	X	X	X
	Intercostal nerves (T2–T4)	X	X	X

ISB, Interscalene block; STB, Superior trunk block; CCB, Costoclavicular block; Tick (✓), Innervation covered; Cross (X), possible sparing.

clinical studies that CCB can be used as an alternative to ISB for shoulder joint analgesia as both covers almost all the myotome and osteotome innervations of the shoulder joint.^{2,3}

The majority of the shoulder joint innervations come from C5, C6 nerve roots except for the contribution from lateral pectoral and musculocutaneous nerves that originates from C5–C7. Although low volume (5 mL) ISB and selective STB decrease the incidence of PNP to 45% and 4.8% respectively,⁵ the lower roots or trunks of brachial plexus may get spared. Sparing of C7 root could be due to low LA volume, the distant location from C5 and intervening connective tissue barrier between C6 and C7 roots. As described in the cadaveric study, all cords were stained, but upper roots were not involved.³ Hence, branches coming out from the cords which are supplying the shoulder will also get blocked. Thus, the rostral spread of injected LA from CCS to C5 and C6 roots are not needed.

Dermatomal innervation comes from the supraclavicular nerve, anterior cutaneous branches of intercostal nerves (T2–T4), and superior lateral cutaneous nerve (Table 1). For which additional supplementary block or infiltrations required as per the surgical approach. This supplementation is needed when these blocks are used for sole anaesthesia purpose. Hence, CCB may be considered as a promising option to avoid ipsilateral PNP in patients for shoulder surgery with compromised lung function.

Conflicts of interest

The authors declare no conflicts of interest.

References

- Mistry T, Balavenkatasubramanian J, Natarajan V, et al. Ultrasound-guided bilateral costoclavicular brachial plexus blocks for single-stage bilateral upper limb surgeries: Abstain or indulge. *J Anaesthesiol Clin Pharmacol*. 2019;35:556–7.
- Aliste J, Bravo D, Layera S, et al. Randomized comparison between interscalene and costoclavicular blocks for arthroscopic shoulder surgery. *Regional Anesthesia & Pain Medicine*. 2019;44:472–7.
- Koyyalamudi V, Langley NR, Harbell MW, et al. Evaluating the spread of costoclavicular brachial plexus block: an anatomical study. *Regional Anesthesia & Pain Medicine*. 2021;46:31–4.
- Sivashanmugam T, Maurya I, Kumar N, et al. Ipsilateral hemidiaphragmatic paresis after a supraclavicular and costoclavicular brachial plexus block: A randomised observer blinded study. *Eur J Anaesthesiol*. 2019;36:787–95.
- Tran DQ, Layera S, Bravo D, et al. Diaphragm-sparing nerve blocks for shoulder surgery, revisited. *Reg Anesth Pain Med*. 2020;45:73–8.

Kartik Sonawane^a, Tuhin Mistry^{id a,*}

^a Ganga Medical Centre & Hospitals Pvt Ltd, Department of Anaesthesiology, Coimbatore, India

* Corresponding author.

E-mail: tm.tuhin87@gmail.com (T. Mistry).

Received 19 October 2020; accepted 29 November 2020

<https://doi.org/10.1016/j.bjane.2020.11.006>

0104-0014/ © 2021 Sociedade Brasileira de Anestesiologia.

Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).