

## Use of a pre-injection technique to identify neural elements in the costoclavicular space for brachial plexus block for upper limb orthopaedic surgery

Sir,

Costoclavicular (CC) approach to brachial plexus block is a recently discovered yet promising approach for anaesthesia for surgeries of upper limb below shoulder.<sup>[1]</sup> This approach targets the cords of the brachial plexus (BP) which lie lateral to the axillary artery in the costoclavicular space (CCS). The CCS lies deep and posterior to the midpoint of the clavicle. It is bound anteriorly by subclavius and clavicular head of the pectoralis major muscle and posteriorly by anterior chest wall. The space is continuous cranially with supraclavicular (SC) fossa and caudally with medial infraclavicular fossa. Even though recent studies provide thorough knowledge of the anatomy of CC-BP and its block dynamics,<sup>[2,3]</sup> there is still a challenge in identification of BP elements in the CCS because of the lack of technical skill and the depth of the space. Thus, we present a pre-injection technique to improve the identification of BP elements in the CCS which can aid for CC-BP block for anaesthesia for a distal forearm Orthopaedic Surgery.

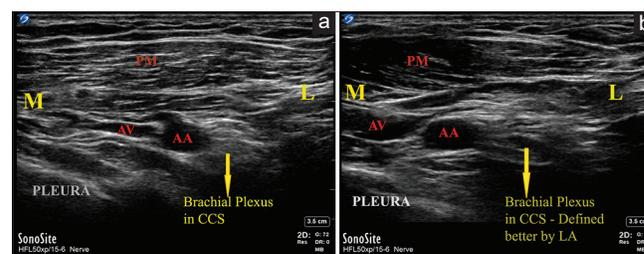
A thirty-seven-year-old 70 kg healthy male, with no comorbidities, came to our hospital with alleged history of slip and fall on outstretched hand from a two-wheeler. There was no history suggestive of head injury, chest and pelvic injuries. General and systemic examination was normal. He was posted for open reduction and internal fixation of the distal radius.

On the day of surgery, the patient was shifted to operating room and connected to standard monitors. Our anaesthetic plan was regional anaesthesia with ultrasound-guided CC-BP block. Injection Midazolam 2 mg and injection Buprenorphine 150 mcg were given intravenously for procedural sedation. The patient was positioned supine, with head turned to opposite side, with the arm abducted and externally rotated. The ultrasound machine used was SonoSite X-porte with nerve preset and high-frequency linear probe

(HFL 50/6–15 MHz) was used with the probe marker facing medially. A pre-block ultrasound examination was performed in both SC level for the classical “bunch of grapes appearance” and CC level for BP elements [Figure 1a]. In order to aid the identification of the BP elements in the CCS, an initial 3 ml of local anaesthetic (LA) solution of 0.5% bupivacaine was injected in the SC-BP into the “Classical bunch of grapes” followed which the CC-BP was then visualised. It was found in the next 5 min, that a thin rim of LA was present around to the CC-BP making it more well defined and easier for identification [Figure 1b]. Later, 12 ml of 0.5% bupivacaine was administered in the CC-BP. Post block vitals were normal. The onset of sensory and motor blockade were almost immediate. The surgical duration was 45 min with blood loss of 100 ml. Intraoperative and post-operative courses were uneventful.

The advantages of CC-BP block are all the three cords are visualised in single ultrasound window and are clustered together and share a probable consistent anatomical position.<sup>[2]</sup> The speed of onset of blockade is similar to SC-BP blockade with increased success rate of blockade with single point injection and this is the best site for securing catheter to have a probable consistent blockade for perioperative anaesthesia and analgesia for the upper limb.<sup>[3-5]</sup> The CC-BP block is slowly replacing SC-BP block for anaesthesia for upper limb surgeries below shoulder because of the unwanted side effects of SC-BP block like increased incidence of phrenic nerve palsy and ulnar nerve sparing if corner pocket is not addressed.<sup>[6,7]</sup>

Although we have many advantages, the drawbacks of CC-BP block are difficulty in identification of BP elements in the CCS because of the need for the high-resolution ultrasound machine and warrants



**Figure 1:** (a) Costoclavicular brachial plexus (CC-BP) before deposition of 3 ml of LA in supraclavicular brachial plexus (SC-BP). M - Medial, L - Lateral, AA - Axillary artery, AV - Axillary Vein, PM - Pectoralis major. (b) Costoclavicular brachial plexus (CC-BP) after deposition of 3 ml of LA in supraclavicular brachial plexus (SC-BP). M - Medial, L - Lateral AA - Axillary artery, AV - Axillary Vein, PM - Pectoralis major

performer expertise. The former can be addressed by using an in-plane lateral to medial needle approach and the latter can be addressed with the help of our pre-injection technique where we deposit an initial 3 ml of LA in the SC brachial plexus which surrounds around the BP elements in the CC space because of the caudad tracking of LA from the SC fossa, enhancing the neural elements in the CC space which makes identification easy and thereafter actual CC block can be performed with ease. This caudad local anaesthetic tracking occurs because of the anatomical communication with SC and CC space.<sup>[4]</sup>

Costoclavicular approach to brachial plexus has got distinct clinical advantages, yet it's relatively deeper and needs more expertise for identification. Hence, we propose that an initial deposition of 3 ml of LA in the SC area will delineate the cords in the CCS for better visualisation and can be performed by beginners.

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#### Conflicts of interest

There are no conflicts of interest.

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