

Low-volume ultrasound-guided supraclavicular block in a multicomorbid patient for emergency vascular surgery – In COVID-19 era

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Abstract

Supraclavicular block is the most commonly used block in upper limb surgeries, right from the day it was introduced into clinical practice in Germany by Kulenkampff in 1911. The block underwent many changes in its application due to the advent of peripheral nerve stimulator and ultrasonographic application in regional anesthesia. This case report focuses on supraclavicular block's application in a multicomorbid patient, the drug dose required, and how the scope of regional anesthesia can be extended in times of pandemic, like coronavirus disease 2019 (COVID-19), in coming future.

Keywords: COVID-19, low volume, multicomorbid, supraclavicular block

Introduction

A good collateral around shoulder decreases the incidence of ischemia in upper limb.^[1] Acute upper limb ischemia is a true emergency scenario as the ischemic tolerance of upper limb is much less than the lower limb. In a coronavirus disease 2019 (COVID-19) era, we report the case of a multicomorbid female who underwent successful exploration of axillary artery under a supraclavicular brachial plexus block.

Case History

A 50-year-old female got admitted in casualty with acute-onset excruciating throbbing pain in the left arm for 1 day. Preoperative evaluation in casualty revealed a tachypneic patient with a short neck. She suffered from uncontrolled hypertension, diabetes mellitus, and hypoadrenalism. Prior

in-hospital admission notes revealed cardiologist diagnosed a preserved heart failure with ejection fraction of 55%. A known case of interstitial lung disease for 8 years, she was dependent on bi-level positive airway pressure in semisitting position. On examination, her blood pressure (BP) was 150/100 mmHg, right radial pulse was 104 beats/min, and respiratory rate (RR) was around 26 breaths/min with abdominothoracic pattern of breathing and saturation (SpO₂) being 96%–98% on 2 liters per minute (LPM) of oxygen (O₂) via nasal cannula. The left radial pulsation was undetectable. She was comfortable in propped up position. Hemogram results showed hemoglobin (Hb)- 11 g%, platelets 2.87 lakhs/mm³, serum creatinine 0.9 mg/dl, Prothrombin time (PT)-15.4s, and International Normalised Ratio (INR) 1.1. Chest radiograph revealed prominent bronchovascular markings and cardiomegaly. Color Doppler of left upper limb demonstrated a sluggish flow in the brachial artery and decreased or no flow in radial and ulnar arteries. High-resolution computed

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How to cite this article: Lonikar AV, Diwan SM, Sancheti PK. Low-volume ultrasound-guided supraclavicular block in a multicomorbid patient for emergency vascular surgery – In COVID-19 era. *J Anaesthesiol Clin Pharmacol* 2022;38:S125-7.

Submitted: 16-Sep-2020 **Accepted:** 29-Nov-2020
Published: 30-Jun-2022

Access this article online	
Quick Response Code:	Website: https://journals.lww.com/joacp
	DOI: 10.4103/joacp.JOACP_545_20

tomography (HRCT) performed at the time of vascular angiography was reported normal by a senior radiologist.

After obtaining informed consent and after counseling, the patient was shifted to the operating room in a semisitting position and oxygen was delivered at 2 LPM through a nasal cannula. A 20-gauge (G) intravenous line was secured, Ringer's lactate was initiated, and oxygen delivery was changed to mask with reservoir bag with an oxygen flow of 4 LPM. The BiPAP was kept ready in case the need arises. Surgeons informed about an extensive incision on the medial arm. Standard monitors in the form of SpO₂, noninvasive BP, heart rate, and electrocardiography were attached. It was planned to execute an ultrasound-guided supraclavicular brachial plexus block. As the accessory muscles of respiration were in use, a difficulty in identification of brachial trunks and needle tip visualization was anticipated. With the patient in semisitting position at 30°, a scout scan was performed (Sonosite M-Turbo®, Bothell, WA, USA), under all aseptic precautions for a supraclavicular brachial plexus block using a linear probe (Sonosite M-Turbo, 6–13 MHz), which was wrapped in sterile Tegaderm biofilm (3MTM Tegaderm™). To obtain a better needle tip image, a 22-G, 50-mm echogenic needle (Sonoplex®; PAJUNK Medical Systems, Tucker, GA, USA) was chosen. The brachial divisions were identified superior and lateral to the subclavian artery (SCA). The corner pocket formed by the SCA and the first rib was visualized. The echogenic needle was inserted under ultrasound guidance in real time from lateral to medial side through the middle scalene muscle. The tip of the needle was carefully positioned at the corner pocket and 6 ml of 0.5% bupivacaine was injected. This was followed by 3 ml each at the middle and upper trunk divisions. Neurostimulation was not used during the procedure. A cephalad scan did not reveal spread of local anesthetic (LA) in the interscalene area. A 0.5% bupivacaine 2 ml was instilled distal at the ulnar nerve in the axillary region to block the medial cutaneous nerve of arm.

Block efficacy was tested with light ether swab and light pin prick on the medial side of arm from the axillary fossa to the medial epicondyle humerus. Intraoperatively, the patient was stable with BP- 150/100 mmHg, P- 96/min, SpO₂- 94%–98% on O₂ mask, and RR varied between 18 and 22/min. An abdominothoracic breathing pattern was maintained throughout the surgical procedure. Surgical incision was in the distribution of C5 and T1 dermatome [Figure 1], followed by left brachial artery exploration, and thrombectomy was performed using Fogarty catheter [Figure 2]. Intraoperative Doppler was performed under sterile conditions and an improved blood flow was noted in the left radial, ulnar, and brachial arteries. The surgical procedure lasted for 3 h, and postsurgery, the patient was shifted to intensive care unit. Intravenous paracetamol 1 g was prescribed for postoperative pain management. Heparin was started the next day morning after 12 h.

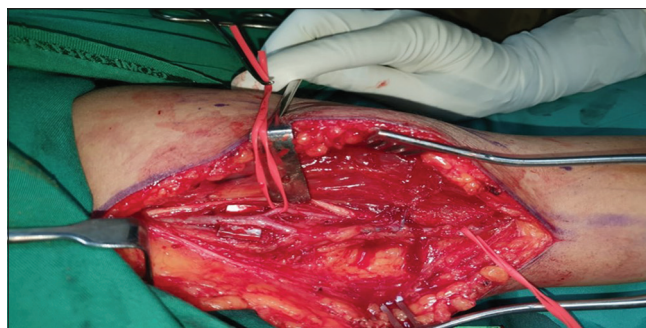


Figure 1: Incision in dermatomal level C5-T1

Discussion

Regional anesthesia helps to attenuate adverse effects of general anesthesia, along with providing better postoperative analgesia and helps in faster recovery from anesthesia. Multiple comorbidities in our patient in a COVID-19 era made it mandatory to implement regional anesthesia in the form of supraclavicular block. A negative HRCT is true negative in 25%–33% of the suspected patients of COVID-19.^[2]

Brachial blocks are site specific (e.g., interscalene for shoulder surgery). Each of the approaches (supraclavicular and infraclavicular) has its own particular advantages, disadvantages, and complications. In this case, we chose supraclavicular brachial plexus block as the incision was in dermatomal distribution of C5 and T1. Ultrasound guidance has been reported to decrease the risk of pneumothorax in supraclavicular approach and increases the accuracy of the block.^[3] Since ulnar sparing is noted in a supraclavicular brachial plexus block, we administered LA at the medial cutaneous nerve of arm in the axilla.^[4]

Our departmental protocol is to inject 12–15 ml of 0.5% bupivacaine in routine clinical practice. In our case, we injected the lower limit of volume, that is, 12 ml of 0.5% bupivacaine. The ED₅₀ for supraclavicular block is 8.9–13.4 ml.^[5] We divided the LA injections into 6, 3, and 3 ml for inferior (corner pocket – formed by the SCA and the rib), middle and superior trunks, respectively. A cephalad scan was performed to exclude spread of LA close to the C5–C6 trunks, though a phrenic nerve paresis is reported in up to 30% of patients.^[6] The medial cutaneous nerve of arm was blocked distal to the ulnar nerve in the proximal part of the axilla with an extra 5 ml of 0.5% bupivacaine.

In normal healthy individuals, the functional residual capacity decreases in recumbent position by 35%–40%.^[7] Since the patient was comfortable in semisitting position, the block and surgery were performed with back-up at 30°. Considering COVID-19 conditions and emergency situations, we took

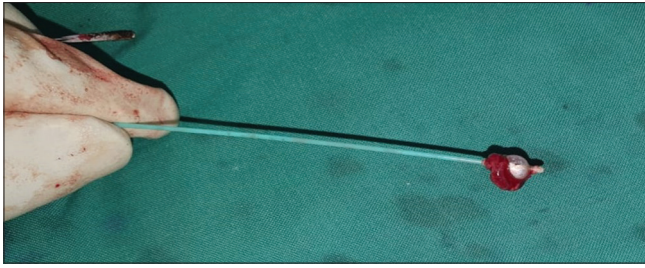


Figure 2: Thrombus engulfing the tip of Fogarty catheter

appropriate precautions: application of oxygen mask,^[8] employing plastic drape over the head, neck, and upper torso.^[9]

Despite anticipating difficult visualization of brachial sonoanatomy in the supraclavicular area, the needle was appropriately positioned and LA could be visualized circumventing the brachial plexus.

Conclusion

We report successful management of a multicomorbid patient for upper limb emergency vascular surgery in COVID-19 conditions under a low-volume supraclavicular brachial plexus block.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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