Anatomical variations in brachial plexus on ultrasound: Reason for failure of supraclavicular block – Nerve stimulator along with ultrasound can play a major role for success

The supraclavicular approach of the brachial plexus block has a high success rate including blockade of the ulnar and musculocutaneous nerve, which can be missed respectively with the interscalene and axillary approach. In addition, ultrasound guidance has made it possible to reduce the risk of inadvertent puncture of the pleura while performing a supraclavicular block. However, sometimes anatomical variations in brachial plexus may be the cause of incomplete block even with ultrasound.

A 54-year-old male weighing 110 kg was scheduled for surgery to release contracture of the left little finger of hand. Airway evaluation revealed difficult airway. A difficult airway cart was kept standby whilst the primary plan was to administer ultrasound-guided supraclavicular block. Standard monitors were attached and intravenous line was secured. Scanning of brachial plexus using ultrasound revealed anatomical variation in brachial plexus [Figure 1] which was different from normal appearance. Nerve stimulator was not available. In plane needle was inserted from lateral to medial first at point 1 [Figure 2]. After visualisation of the needle tip at this point, hydrodissection was done with 1 ml of normal saline and after confirmation, 15 ml of drug was injected after aspiration and spread of the drug was observed. Similarly drug was injected at point 2 after redirecting the needle [Figure 2]. A total of

![Figure 1: Showing anatomical variation in brachial plexus](image1)

![Figure 2: Showing location of needle tip](image2)
30 ml of local anaesthetic was injected, 15 ml at point 1 and 15 ml at point 2 (12 ml of 0.5% plain bupivacaine, 12 ml of 2% xylocaime with adrenaline and 6 ml of normal saline). Although the patient was not able to move the limb and had no sensations in thumb and two fingers, but there was some sensation in the third and fourth fingers. As difficult airway was anticipated and patient had partial effect of block in the third and fourth fingers, 10 ml of 1% xylocaine was infiltrated at the site of contracture. Now the patient had no pain and was comfortable. Surgery lasted for 45 min. Postoperative course was uneventful.

Normally on ultrasound, the brachial plexus is visualised as a group of hypoechoic nodules frequently described as a ‘cluster of grapes’ typically positioned above and posterolateral to the artery. The optimal injection site has been described as being in the ‘corner pocket,’ which is bordered by the first rib inferiorly, the subclavian artery medially and the brachial plexus superiorly. This is the localisation of the C8 nerve (important for the ulnar nerve blockade). However, this corner pocket could not be clearly visualised in our patient, most likely due to anatomical variation. In 53.5% of the general population, a significant variation in the architecture of brachial plexus is seen. Understanding the complexities of the anatomy of the brachial plexus remains a cornerstone for effective regional anaesthesia. Ultrasound can be the perfect tool to identify these variations to facilitate plexus block performance. In such circumstances, nerve stimulator in addition to ultrasound can play a major role. Simultaneous flexion of the third and fourth digits with or without other digits after applying nerve stimulation is associated with the highest success rate of supraclavicular brachial plexus block. But we could not take its advantage due to non-availability.

Hence, it is prudent for all anaesthesiologists performing ultrasound-guided blocks to carefully evaluate the sonoanatomy of visualised structures. There is a significant incidence of anatomical variation which may lead to failure of block. The combination of nerve stimulation and ultrasound guidance is safer and better in these patients with anatomical variation.

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.

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Conflicts of interest
There are no conflicts of interest.

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