

Distorted supraclavicular brachial plexus anatomy due to cervical rib with a knuckle—Usefulness of ultrasound in planning a regional anaesthesia strategy

Ultrasound-guided supraclavicular block (SCB) was planned for fixation of forearm fracture in an otherwise healthy 40-year-old male patient. The patient was an active manual labourer and did not have any symptoms suggestive of neurological or vascular compromise of the upper limb. On scanning the supraclavicular fossa, the classic bunch of grapes posterolateral to the subclavian artery (SCA) could not be identified [Figure 1a]. The ultrasound probe was slid cephalad and 2 cm above the clavicle, the bunch of grapes was identified lateral to the SCA [Figure 2]. Here, sliding sign of pleura was seen posteromedial to the SCA and a bony structure was seen lateral to it. To clearly delineate the anatomy, the brachial plexus (BP) was scanned systematically from the level of the roots. C5, C6 and C7 roots were identified based on the anatomical features of their respective transverse process (TP). Formation of upper, middle and lower trunks did not show any anatomical variation. Transverse cervical and dorsal scapular arteries were identified between the middle and lower trunks [Online Video 1]. The neural elements were however seen to curve laterally over a bony structure and finally came to lie lateral to it in the supraclavicular area. Colour Doppler was used to confirm that the structures seen were not vascular structures. A bony hard structure with parallel margins corresponding to that of a rib could be appreciated on palpation of the

supraclavicular fossa [Figure 2 inset (b)]. On scanning of the right side of neck, the bunch of grapes could be identified in the usual position posterolateral to the SCA [Figure 1b]. The patient was informed that the supraclavicular anatomy was not clear and performing an axillary brachial plexus block was an alternative. Axillary brachial plexus scan showed a normal anatomy. Hence, an axillary brachial plexus block was performed.

A chest-X-ray was taken post-operatively. Radiological opinion was sought and bilateral cervical ribs was diagnosed. Chest-X-ray also showed pseudoarthrosis of the cervical ribs with the first rib, presence of an additional knuckle and a more laterally displaced cervical rib on the left side [Figure 3] with widening of left apical area of chest cage.

Depending on whether cervical rib is rudimentary, complete or incomplete, the BP anatomy also varies. Liu and Peng have reported a wide separation of the lower trunk from the rest of the plexus by a cervical rib,^[1] while the plexus was identified as a single cluster by Watanabe *et al.*^[2] In the present patient, the plexus was seen as a single bunch initially medial to the cervical rib and then lateral to it in the supraclavicular fossa.

The diagnosis of cervical rib in this patient was made post-operatively. Intra-operatively, SCB was deferred as the neural elements appeared to curve around a bony structure and performance of a block at a point where the nerves are prone to be mechanically stretched can result in neurological injury.

Although uneventful SCB have been performed in patients with diagnosed cervical rib, we personally

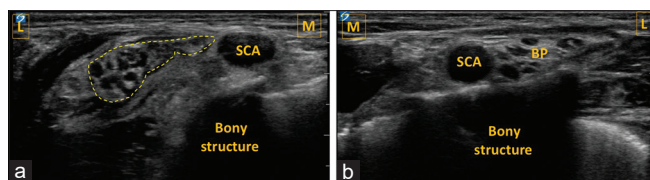


Figure 1: Sono-anatomy of the supraclavicular area on the left side (a) and right side (b). The brachial plexus elements are seen to lie much lateral to the subclavian artery than normally on the left side. On the right side, it is oriented posterolateral to the artery. (BP: Brachial plexus, SCA: Subclavian artery, M: medial, L: lateral)

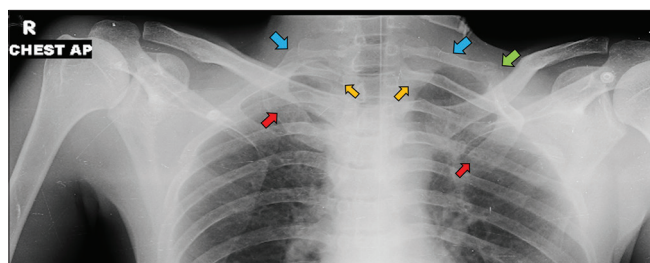


Figure 3: CXR of the patient. The yellow arrows indicate the upward slanting transverse process of T1 vertebra. The blue arrows indicate the cervical ribs. They are seen to join the first rib (red arrows). The green arrow shows the abnormal knuckle on the left cervical rib

suggest avoiding it when distal blocks are possible. Sharma *et al.* have reported an incidence of cervical rib among Indian population as 1.12%. Unilateral cervical ribs (0.78%) are more common than bilateral cervical ribs (0.44%).^[3] The percentage of these patients requiring a SCB is a further smaller fraction. The evidence so far is insufficient to endorse the safety of this block in patients with cervical rib. The targeted intracluster approach or multipoint subfascial injection technique, which is commonly used to block the BP at this level, causes an increase in diameter and volume of the clusters and in the presence of mechanical constraint has the possibility of inciting an ischemic injury.^[4,5]

This case highlights the usefulness of ultrasound in identifying anatomical variations and abnormalities and helping us plan a regional anaesthesia strategy, thereby avoiding complications.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not

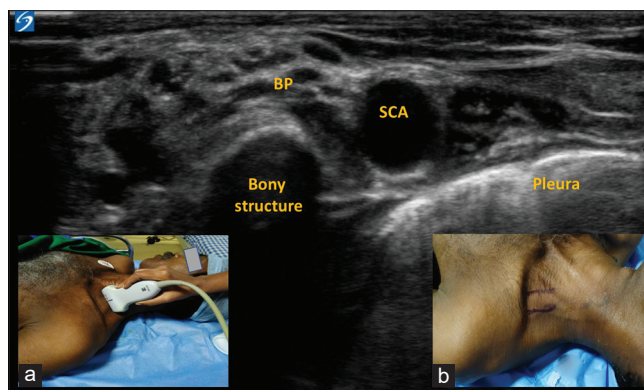


Figure 2: Brachial plexus elements as one cluster curving above a bony structure about 2 cm above the clavicle (Inset a). A bony hard structure with parallel margins corresponding to that of a rib could also be palpated (Inset b). (BP: Brachial plexus, SCA: Subclavian artery)

be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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