Clinical Communication

Cervical rib: A barrier to supraclavicular brachial plexus block

INTRODUCTION

Ultrasonography is a safe and excellent method of imaging peripheral nerves and has revolutionised regional anaesthesia practice.[1] Ultrasound-guided supraclavicular brachial plexus block [US-SCBPB] has become a very popular technique due to its rapid, reproducible, and predictable characteristics, which can be attributed to the compact arrangement of the plexus in the area.[2] However, apart from vascular structures, bone-like structures such as calcified cervical lymph nodes have also been detected on scanning the supraclavicular area.[3] The presence of a cervical rib, reported in literature, either remained a bony obstruction to the needle path, without a distortion of the brachial plexus elements[3] or separated[4] and stretched[5] the brachial plexus, which may warrant a change in approach to brachial plexus blocks. Here, we describe three cases of cervical rib incidentally detected under ultrasound and confirmed by neck X-rays in the post-operative period.

CASE REPORT

US-SCBPB was attempted for upper limb surgical procedures. Laboratory investigations, electrocardiograms and echocardiography were normal in all patients. Written informed consent was obtained in all patients, which incorporated a statement of a 'possible change in regional anaesthesia technique/ general anaesthesia' if necessary. In all patients, a linear probe [MTurbo, Sonosite-Fuji 13-6 MHz] was deployed above the clavicle in the coronal oblique plane to identify the supraclavicular brachial plexus, lateral to the subclavian artery, overlying the first rib. The corner pocket access (the angle formed by the subclavian artery and the first rib) was identified lateral to the subclavian artery. A cephalad scan was performed from this point to identify the C7, C6 and C5 cervical roots. All brachial plexus elements from caudal to cephalad – divisions, trunks and roots were recognised.

Case 1

A 52-year-old American Society of Anesthesiologists physical status (ASA-PS) I lady suffered a right distal end radius fracture and was posted for a closed reduction and internal fixation with K wires. A US-SCBPB was planned. A real-time scan depicted the brachial elements sandwiched between a hyperechoic hump superiorly and the first rib inferiorly [Figure 1a]. We assumed it to be a cervical rib which presented as a small lateral hump leading to a slope of the bony structure medially towards the corner pocket, as depicted [Figure 1a]. The patient had some discomfort with a bent needle technique[6] [bent at 30° from needle tip]. Subsequently, the surgery was performed under an uneventful infraclavicular block[7] with 20 ml of 0.5% bupivacaine. A post-operative neck X-ray divulged a non-ossified cervical rib [Figure 1b].

Case 2

A 60-year-old ASA-PS II gentleman suffered a fracture of the shaft of the left radius and was posted for an open reduction and fixation with a plate. AUS-SCBPB was planned. The scout scan in the supraclavicular area divulged the brachial plexus elements above two hyperechoic shadows, one being the first rib and the other presumed to be a cervical rib [Figure 1c]. There was no obvious obstacle in the needle trajectory. A SCBPB was performed with 0.5% bupivacaine, 7 ml at corner pocket, and 8 mL as multipoint sub-fascial injections around the superior and middle trunks. Post-operative neck X-ray revealed a left-sided complete cervical rib [Figure 1d].

Case 3

A 70-year-old ASA-PS III lady suffered a fracture of the left proximal humerus and was posted for an open reduction and fixation with plate and screw. An ultrasound guided combined interscalene [10 ml] and supraclavicular block was planned. On deploying a linear frequency ultrasound probe in the supraclavicular area, the brachial plexus elements were seen perched on the cervical rib [Figure 1e] [confirmed with neck X-ray – Figure 1f]. In real-time, the needle could easily slide over the cervical rib to reach the corner pocket [10 ml] without any modification. The combined block was achieved with 0.5% bupivacaine.

None of the patients complained of neuro-vascular symptoms related to the cervical rib. Blocks were successful in all patients, and none required supplementation in the form of intravenous sedation, opioids or local anaesthesia by the surgeon. All three patients had a complete return of sensory and motor function within 8–10 h post-operatively, as documented by the performing anaesthesiologist and surgeon.

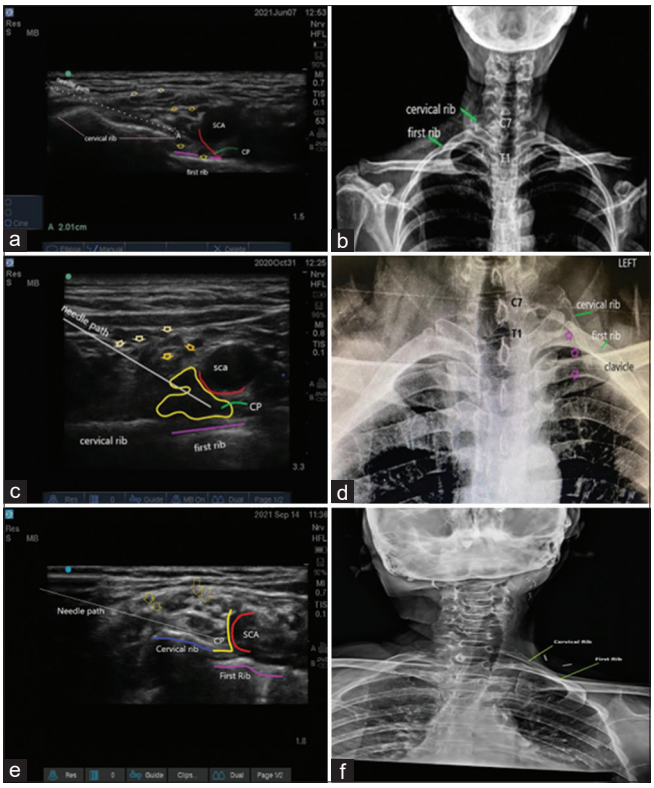

Figure 1: (a): Ultrasound image showing the right supraclavicular scan with the orientation marker laterally. The dotted line shows the proposed needle trajectory for a supraclavicular block. SCA = Subclavian artery; CP = Corner pocket; Yellow arrows = depict brachial plexus elements; A-Needle path (b): Neck X-ray depicting the non-ossified cervical rib on the right side. (c): Ultrasound image of the left supraclavicular fossa with orientation marker laterally. CP = Corner pocket; sca = Subclavian artery; Yellow arrows = Upper and middle trunks and divisions of brachial plexus. (d): X-ray depicting left-sided cervical rib. (e): Ultrasound image of the left supraclavicular area with orientation marker laterally. CP = Corner pocket; SCA = Subclavian artery; Yellow arrows = Upper and middle trunks and divisions of the brachial plexus. (f): X-ray depicting left-sided cervical rib

DISCUSSION

The cervical rib is a supernumerary rib arising from the seventh cervical vertebra. Its prevalence varies, with an incidence of about 1.12 percent in the Indian population,[8] being more commonly unilateral.[8] Most cases of the cervical rib are asymptomatic and incidentally detected, while a few may present with symptoms of Thoracic outlet syndrome (TOS).

TOS may be caused due to neurologic or vascular compression and can be easily diagnosed using bedside clinical tests.[9] Various anatomical reasons [fully formed cervical rib, fibrous bands, accessory scalene muscles and variable scalene muscle insertions] may be responsible for the symptoms of TOS. These may be detected by X-ray of chest and cervical spine, computed tomography imaging, or magnetic resonance imaging.[9]

Undetected, a cervical rib may pose technical difficulties while performing a US-SCBPB. SCBPB with real-time ultrasound has been employed by some in cervical ribs,[3,4] while others refrain from performing the block, fearing neurologic sequelae.[5,10]

We refrained from administering an US-SCBPB when the brachial plexus elements were found sandwiched between the cervical and the first rib in real-time. Moreover, the bent needle technique described by Cornish[6] was inadequate to reach the corner pocket. However, in the second and third cases, where the brachial plexus elements remained free of compression, US-SCBPB was implemented. All cases were discharged sans complications.

Though ultrasound has proved a boon to recognise aberrant anatomy, this calls for a standardised protocol for identifying any obvious cervical ribs and TOS. Routine palpation of the supraclavicular area for abnormal hard swellings, a clinical examination for neurovascular symptoms and signs prior to a block, followed by a neck X-ray if clinical findings are positive, would be an appropriate algorithm.

We conclude that supraclavicular blocks may be performed in cases of cervical rib if the patient does

not have symptoms of neurovascular compression and the anatomy appears feasible on ultrasound, without any obvious compression of neural elements.

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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