regulation and reduced sympathetic activation. This is in agreement with the decreased subjective feeling of stress in TOP participants.[1] Furthermore, the better regulation of phasic EDA in TOP participants reinforces the concept of down-regulation of the amygdala observed with functional MRI after other cognitive therapy,[9] as the amygdala, part of the limbic system, controls the phasic component of the sympathetic nervous system.[10]

Using the components of EDA, we show for the first time that experience and stress management strategies may modulate two different pathways controlling the stress reaction.

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Declarations of interest

The authors declare that they have no conflicts of interest.

Appendix A. Supplementary data

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Brachial plexus blockade with anomalous location of the T1 ventral ramus at the supraclavicular fossa

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Editor—We would like to share with your readers an incidental finding of a rare anatomical variation of the T1 ventral ramus at the supraclavicular fossa, and how a successful supraclavicular brachial plexus block (BPB) was executed under these conditions. This anomaly was identified during a routine preview ultrasonography scan to identify the individual elements of the brachial plexus above the clavicle before a supraclavicular BPB, performed as we described.[1] The patient was a healthy male who consented to undergo elective wrist arthroscopy and open reduction and internal fixation surgery, for distal radioulnar joint injury and fractures of the 2nd, 3rd, and 4th metacarpal bones, under an ultrasound-guided supraclavicular BPB.

The unique sonomorphology of the C7 transverse process, with its prominent posterior tubercle and an absent or rudimentary anterior tubercle (Fig. 1a), was used as the key anatomical landmark to identify the individual elements of the brachial plexus.[2] This included identifying the C8 and T1 ventral rami and their fusion to form the inferior trunk at the supraclavicular fossa, since the latter is frequently spared during a supraclavicular BPB. On a transverse oblique sonogram of the lower neck, the C8 ventral ramus was seen lying caudal to the middle trunk (Fig. 1b) and on top of the 1st rib posteriorly (Fig. 1b).[1] Visualising the T1 ventral ramus is often more challenging,[1] and requires a steep (30–40°) caudal angulation of the transducer during the transverse oblique scan.[1] In this patient the T1 ventral ramus was seen to emerge from under the first rib and come to lie adjacent to the C8 ventral ramus and the pleura (Fig. 1c), but thereafter, instead of converging towards the C8 ventral ramus to form the inferior trunk, the T1 ventral ramus deviated medially (Fig. 1e) and came to lie medial to the subclavian artery (Fig. 1f, Supplementary Video 1). As a result, the inferior trunk was not normally formed and the subclavian artery now separated the T1 ventral ramus from the other components of the brachial plexus (i.e. the divisions of the superior and middle trunk and the C8 ventral ramus) (Fig. 1f).

Supplementary video related to this article can be found at https://doi.org/10.1016/j.bja.2020.07.023

Given the anatomic arrangement of the brachial plexus nerves, we decided to modify our subfascial supraclavicular BPB technique[3] by first performing a targeted injection of the C8 ventral ramus and then, depending on the spread of the local anaesthetic (LA), perform a separate injection for the T1 ventral ramus if necessary. Thereafter, the supraclavicular BPB technique was similar to that described.[3] Under strict aseptic precautions the block needle was inserted in-plane (Supplementary Fig. S1a), and from a lateral to medial direction, until its tip was adjacent to the C8 ventral ramus. After injecting 1 ml of normal saline to ensure correct needle tip position, 8 ml of an equal volume (1:1) mixture of levobupivacaine 0.5% and lidocaine 2% with epinephrine 1:200 000 was slowly injected in small aliquots (Supplementary Fig. S1a). The brachial plexus elements and the subclavian artery were seen to be displaced anteriorly by the injectate, but the LA did not spread to the T1 ventral ramus (Supplementary Fig. S1a). A hyperechoic layer of connective tissue, between the subclavian artery and the first rib (Supplementary Fig. S1a), seemed to impede the spread of the LA to the T1 ventral ramus (Supplementary Fig. S1a). Therefore, the block needle was gently advanced further medially, but still staying close to the first rib, until the needle tip breached the tissue barrier and a test injection of saline (1 ml) was seen to spread medially under the T1 ventral ramus (Supplementary Fig. S1b). The LA

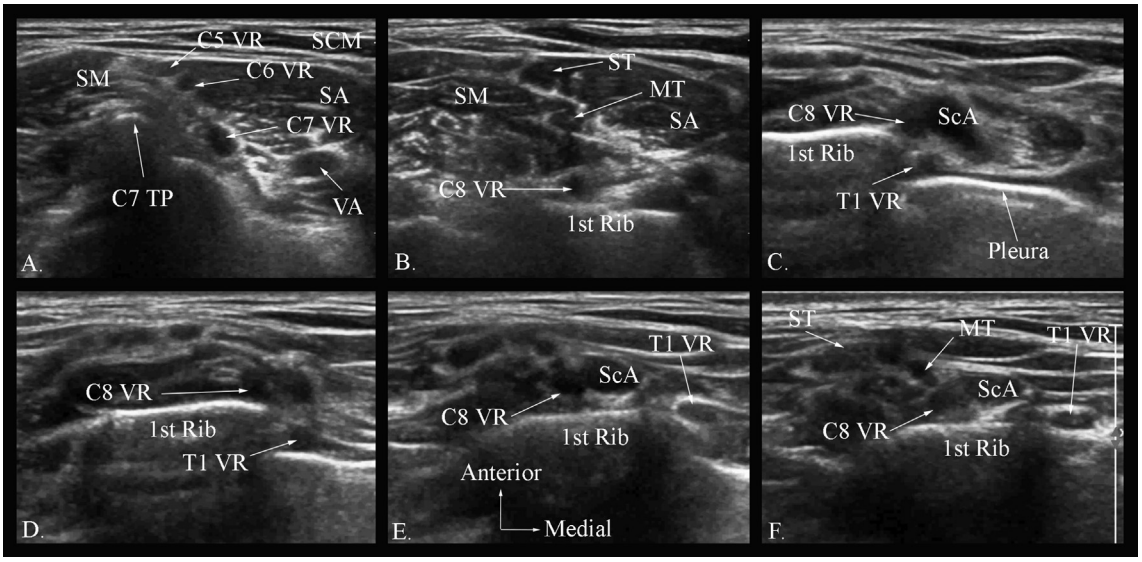

Fig 1. Sequence of transverse oblique ultrasonograms of the neck showing; (a) sonoanatomy of the C7 transverse process with a single prominent posterior tubercle. Note the relationship of the C7 ventral ramus to the transverse process and the vertebral artery; (b) the C8 ventral ramus lying caudal to the middle trunk and on top of the first rib; (c) the T1 ventral ramus emerging from under the first rib and coming to lie next to the C8 ventral ramus; (d–f) the T1 ventral ramus diverging from the C8 ventral ramus and coming to lie medial to the subclavian artery. MT, middle trunk; SA, scalenus anterior; ScA, subclavian artery; SCM, sternocleidomastoid muscle; SM, scalenus medius; ST, superior trunk; TP, transverse process; VA, vertebral artery; VR, ventral ramus.

mixture (5 ml) was injected slowly and its spread monitored closely. The needle was then withdrawn and redirected to a subfascial location and within the hyperechoic connective tissue matrix between the divisions of the superior and middle trunk. The LA mixture (8 ml) was injected slowly at a single site without further needle redirections (Supplementary Fig. S1c). The total volume of LA used for the supraclavicular BPB was 21 ml. Sensorimotor blockade, consistent with a successful supraclavicular BPB, developed within 15–20 min, and surgery was successfully completed under the BPB. Recovery from the BPB was also uneventful.

The success rate of ultrasound-guided supraclavicular BPB is reassuringly high (~95%),[4] but despite our expertise and best efforts, there is the occasional failure or incomplete sensorimotor blockade. The causes for such block failure are multifactorial, but unrecognised anatomical variations such as the one described here play a role since anatomical variations of the brachial plexus are relatively common (53%).[5–7] Despite this they rarely involve the trunks of the brachial plexus (11.3%)[7] and when they do the inferior trunk may not form as in this case,[6] the T1 ventral ramus may continue as the inferior trunk,[8] or the T1 ventral ramus may join the T2 ventral ramus to form the inferior trunk.[6] Since we were unable to depict the sonoanatomy of the C8 and T1 ventral ramus immediately below the supraclavicular fossa, we are unable to comment on the type of morphological variant in this patient. To the best of our knowledge this is the first report to demonstrate sonographically an anomalous location of the T1 ventral ramus *in vivo*.

The exact identity of the hyperechoic connective tissue impeding the spread of LA to the T1 ventral ramus (Supplementary Fig. S1a) is not clear, but may represent one of the Zuckerkandl-Sebileau ligaments[9,10] that make up the 'suspensory apparatus of the pleura'.[10] Anatomical variations of the attachment of the Zuckerkandl-Sebileau ligaments have been described[10] and in particular the attachment of the costopleural ligament,[10] which may prevent the T1 ventral ramus from converging towards the C8 ventral ramus to form the inferior trunk (C8-T1) and attain its usual topographical position on top of the first rib.

In conclusion, this case underscores the significance of performing a systematic ultrasound examination to identify the individual elements of the brachial plexus before BPB. The preview scan not only helped us identify a rare anatomical variation of the inferior trunk, but also modify our BPB technique to ensure success where a traditional supraclavicular BPB may have resulted in incomplete blockade with sparing the T1 ventral ramus. Given that anatomical variations of the brachial plexus are relatively common, we recommend that systematic ultrasound examination, to identify the individual elements of the brachial plexus, should become an integral part of the pre-block routine before any BPB.

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Declarations of interest

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Appendix A. Supplementary data

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