



Anatomy–ultrasound correlation for selected peripheral nerve blocks

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The practice of ultrasound guide blocks requires the development of new abilities, including the ability to recognize nerves and other structures from an ultrasound image. This ability depends on knowledge of cross-section anatomy, which is very different from the customary longitudinal anatomy. In this work, we present a correlation of anatomical and ultrasound cross-sections for select nerve blocks.

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The practice of ultrasound-guided peripheral nerve blocks requires the development of new abilities. On one hand, the anesthesiologist needs to recognize nerves and other structures from an ultrasound image, and on the other, he/she needs to learn how to handle the ultrasound probe with one hand and manipulate the needle with the other while looking at a screen. The ability to recognize nerves and other structures from an ultrasound image depends on knowledge of cross-section anatomy as opposed to the customary longitudinal anatomy.^{1,2} This interpretation is made more challenging by the fact that the ultrasound probe can be placed at any imaginable plane and not just the axial, coronal, and sagittal planes commonly used in computerized tomography and magnetic resonance imaging.

In this work, we present a correlation of anatomical and ultrasound cross-sections for some selected nerve blocks. The anatomical images were obtained from fresh cadavers

and were determined by ultrasound exploration. To facilitate the ultrasound visualization in cadavers, latex was injected through the arterial system. Once the appropriate image was obtained, a marker was used to delineate the section line. This was repeated until all the needed sections were determined. The cadavers were then frozen for 48 hours to facilitate a clean cut.

For the ultrasound images that match the anatomical images, we used a living subject. This is because the images obtained on a living model are superior in quality to the ones on a cadaver. The ultrasound images were obtained with portable ultrasound equipment (Logiq e®; General Electric, Wauwatosa, WI) and a multifrequency 5- to 13-MHz linear probe (12L-RS®; General Electric, Waukesha, WI).

Interscalene study

Patient position. Supine with a small pillow and the head turned to the opposite side.

Probe placement. Perpendicular to the neck, longitudinal axis at three different levels as shown in [Figure 1](#).

Figure 1: Position of the patient and probe for interscalene study.

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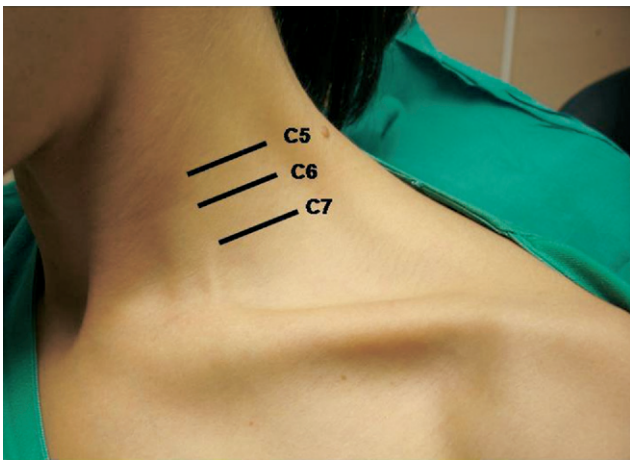


Figure 1 The patient is supine, the head is turned to the opposite side, and the shoulder is down. Three different levels of ultrasound exploration are shown, at C5, C6, and C7.

Figure 2A: Anatomical section at C5 level.

Figure 2B: Ultrasound section at C5 level.

Figure 3: Ultrasound section at C6 level.

Figure 4A: Anatomical section at C7 level.

Figure 4B: Ultrasound section at C7 level.

Pearls

- It is important to visualize the carotid artery and the jugular vein and use them as reference for the longitudinal axis of the neck.
- The transverse process of C7 does not have an anterior tubercle, which helps in its identification and, by extension, the identification of the rest of cervical vertebrae.
- The transverse process of C6 is clearly wider than C5.

Supraclavicular study

Patient position. Supine with a small pillow and the head turned to the opposite side.

Probe placement. Parallel to the clavicle with some internal and posterior rotation as shown in **Figure 5A**.

Figure 5A: Position of patient and supraclavicular probe.

Figure 5B: Anatomical cross-section above the clavicle.

Figure 5C: Ultrasound cross-section above the clavicle.

Pearls

- It is important to first identify the subclavian artery. The brachial plexus would be posterior and cephalad to it.
- Identifying the first rib is also important. Its acoustic shadow and position slightly above the pleura are helpful points.

Infraclavicular study

Patient position. Supine with shoulder down, arm in adduction and parallel to the body.

Probe placement. The probe is first placed below the clavicle perpendicular to the skin for an exploration medial to the pectoralis minor muscle and in an intermediate plane between horizontal and sagittal (parallel to the main axis of pectoralis minor) for an exploration around the coracoid

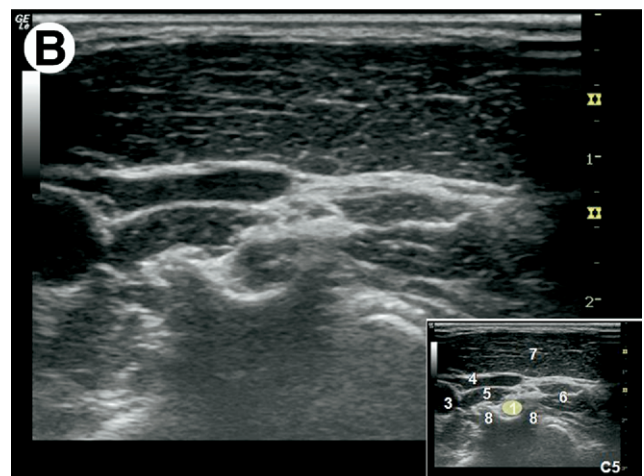


Figure 2 1: C5 root, 2: vertebral artery, 3: carotid artery, 4: internal jugular vein, 5: anterior scalene muscle, 6: middle scalene muscle, 7: sternocleidomastoid muscle, and 8: anterior and posterior tubercles of transverse process of C5.

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