

ULTRASOUND IMAGING OF THE INFRACLAVICULAR BRACHIAL PLEXUS FOR POST-OPERATIVE PAIN CONTROL

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Introduction: Anatomical surface landmarks and peripheral nerve stimulators are traditionally used to locate the brachial plexus during nerve blockade for regional anesthesia. Using this method, repeat passages of the probing needle can cause severe discomfort and potential injury to the patient. In this study, non-invasive ultrasound was used to evaluate the course and depth of the infraclavicular portion of the subclavian artery around which the nerves of the brachial plexus reside. The study comprised two parts, with initial experience being gained in part one with identification of the infraclavicular brachial plexus with the help of ultra sound imaging. Part two consisted of actual placement of continuous infraclavicular brachial plexus catheters using the technique learned during the part one of the study.

Methods: Part 1: After IRB approval, 10 healthy volunteers were scanned using a multi-MHz linear ultrasound transducer at 7 MHz. The infraclavicular subclavian artery was located and, when possible, the nerves of the brachial plexus were identified. Using ultrasound, depth of the subclavian artery from the skin point of maximum ultrasound visualization was measured using the depth calipers.

Part 2: We present a case report of one of our patients from the ongoing study. Intra and post-op pain control by placement of an infraclavicular brachial plexus catheter was chosen as the method of choice for a 40 y/o with CRPS type II undergoing surgical resection of a radial nerve neuroma at the wrist. After induction of general anesthesia, ultra-sound imaging was used to guide the tip of a 17G Tuohy needle adjacent to the brachial plexus in the infraclavicular region. A single pass was sufficient to visualize brachial plexus anatomy and accurately place the catheter. Pain control post-op was done by self-administration of local anesthetic (5 mls of Bupivacain 0.1%) 4-5 times daily at home for one week.

Results: The average depth from skin to the subclavian artery (A) was 1.32 cm (range = 0.9-2.3 cm). The nerve bundles (see arrows) around the infraclavicular subclavian artery were visible in all except one individual. Distances were also measured between the best ultrasound visualization site of the subclavian artery and the following anatomical locations: mid-clavicular point, average = 4.86 cm, (range = 2.5-7.0 cm) point of junction of the lateral 1/3rd and medial 2/3rd of the clavicle, average = 4.01 cm, (range = 2.8-7.5 cm) coracoid process, average = 5.75 cm, (range = 5.0-8.7 cm) **Discussion:** Complete dependence on anatomical surface landmarks and peripheral nerve stimulation can be challenging and time-consuming for the operator performing regional anesthesia of the brachial plexus, especially in patients with abnormal or altered anatomy. Ultrasound offers a quick, painless, non-invasive, and safe alternative technique to enhance visualization of the location of the infraclavicular subclavian artery and nerve bundles of the brachial plexus. Ultra-sound guidance for nerve blocks is useful in patients under general anesthesia and those requiring sedation for procedures, for example young children. Ultrasound guidance helps to avoid unnecessary passage of the seeking needle in and out of tissue. Ultrasound imaging will help avoid inadvertent puncture of the blood vessels in the area. This technique also increases the safety factor for the patient by decreasing tissue damage and increases the fear factor for the anesthesiologist who is no longer blind to the passage of the needle next to vital structures. Further study continues in utilizing ultrasound to locate the infraclavicular brachial plexus and evaluate this as a method to safely and successfully do brachial plexus blocks.

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