

8. SUPRACLAVICULAR BLOCK

INTRODUCTION

The supraclavicular nerve block is ideal for procedures of the upper arm, from the midhumeral level down to the hand (Figure 8-1). The brachial plexus is most compact at the level of the trunks formed by the C5–T1 nerve roots, so blockade here has the greatest likelihood of blocking all of the branches of the brachial plexus. This results in rapid onset times and, ultimately, high success rates for surgery and analgesia of the upper extremity (excluding the shoulder).

ANATOMY

At the trunk level of the brachial plexus, the C5 and C6 nerve roots join to form the superior trunk, the C7 nerve root forms the middle trunk, and the C8, T1 nerve roots join to form the inferior trunk (the C4 and T2 nerve roots may also contribute significantly at these points) (Figure 8-2). Because the plexus is compactly arranged at this location, local

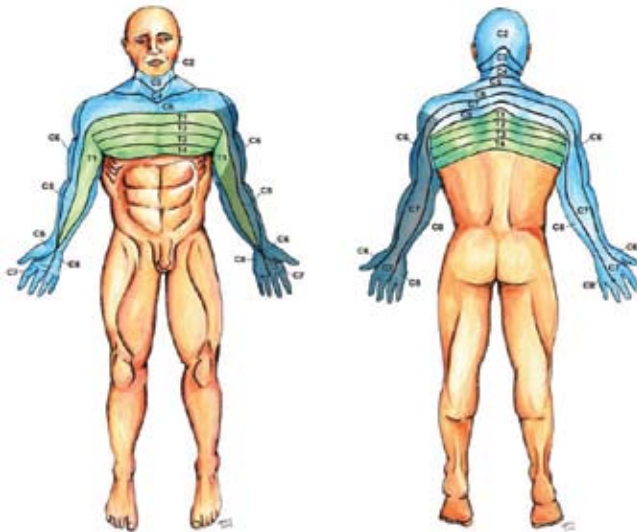


Figure 8-1. Dermatomes anesthetized with the supraclavicular block (dark blue)

anesthesia easily covers all the plexus nerves, which results in a rapid, dense block.

To locate the brachial plexus at the supraclavicular level, gently palpate the interscalene groove down to the mid-point of the clavicle (Figure 8-3). Note that the groove can occasionally be obscured near the clavicle by the omohyoid muscle. Palpation or ultrasound visualization of the subclavian artery just superior to the clavicle provides a useful anatomic landmark for locating the brachial plexus, which is lateral to the artery at this level.

The complication most often associated with this block is pneumothorax. When manipulating the needle in this region, remember that the apex of the lung is just medial and posterior to the brachial plexus as well as deep to the first rib. Using a shorter needle (5 cm) can decrease the incidence of pneumothorax. Unlike an interscalene block, the supraclavicular block causes diaphragmatic hemiparesis in approximately 50% of patients, with minimal accompanying reduction in forced vital capacity (FVC). Signs and symptoms of a large pneumothorax include sudden cough and shortness of breath.

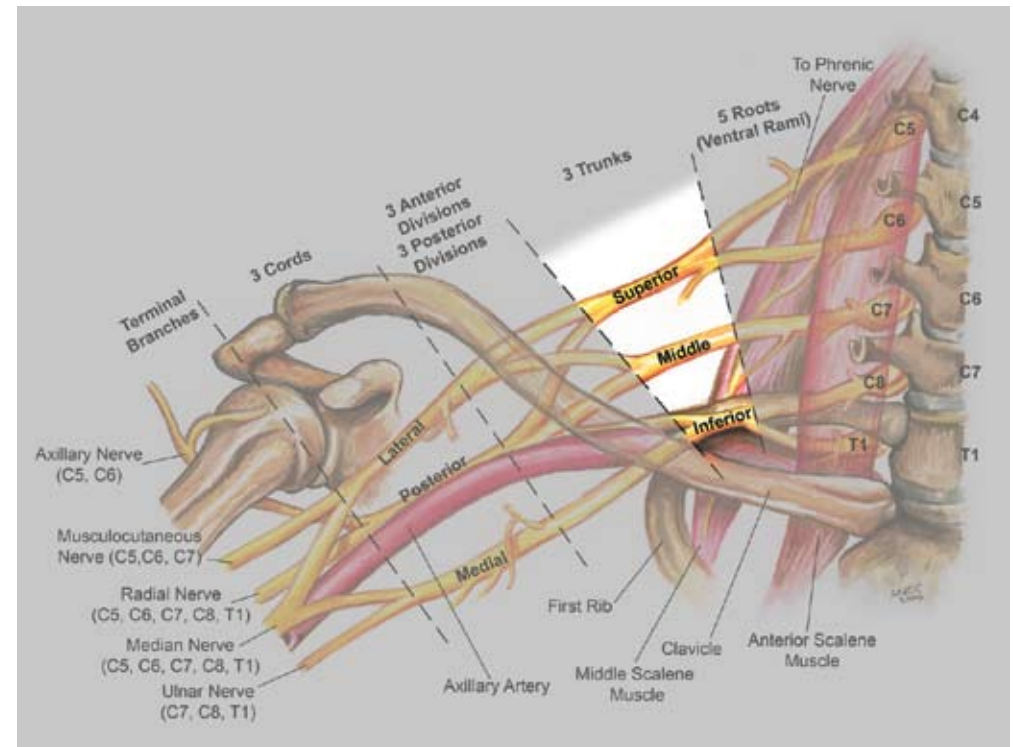


Figure 8-2

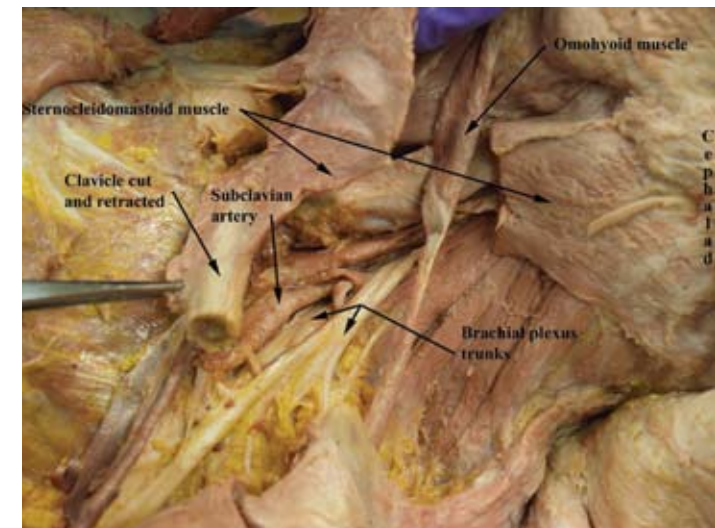


Figure 8-3

PROCEDURE

Landmarks. Place the patient in a supine position with the head turned toward the non-operative side. Palpate the posterior border of the sternocleidomastoid muscle at the C6 level and roll your fingers laterally over the anterior scalene muscle until they lie in the interscalene groove (the groove may be harder to identify below the C6 level because of the overlying omohyoid muscle). Then move your fingers laterally down the interscalene groove until they are approximately one centimeter from the mid-clavicle. This location is the initial insertion site for the needle (Figure 8-4). Standing at the patient's head, direct the needle toward the axilla, as demonstrated in Figure 8-5.

Needles

- 22-gauge, 5-cm, insulated needle.
- 18-gauge, 5-cm, insulated Tuohy needle for catheter placement. Catheters introduced 3 to 5 cm beyond needle tip.

Stimulation. The nerve stimulator is initially set at 1.0 to 1.2 mA. Proper needle placement is indicated by flexion or extension of the digits at 0.5 mA or less. The brachial plexus can be deep at this location, but is often reached at 2 to 4 cm. Aspiration of bright red blood suggests subclavian artery penetration, indicating the needle is too medial. Stimulation of the musculocutaneous nerve (biceps contractions) usually indicates the needle is too lateral. Pectoralis muscle contraction indicates the needle is anterior, and scapular movement indicates the needle is posterior to the plexus.

Local Anesthetic. In most adults, 30 to 40 mL of local anesthetic is sufficient to block the plexus.

Additional Procedures. The intercostobrachial nerve lies anterior and slightly superior to the axillary artery; it innervates the skin along the upper medial border of the arm. To block this

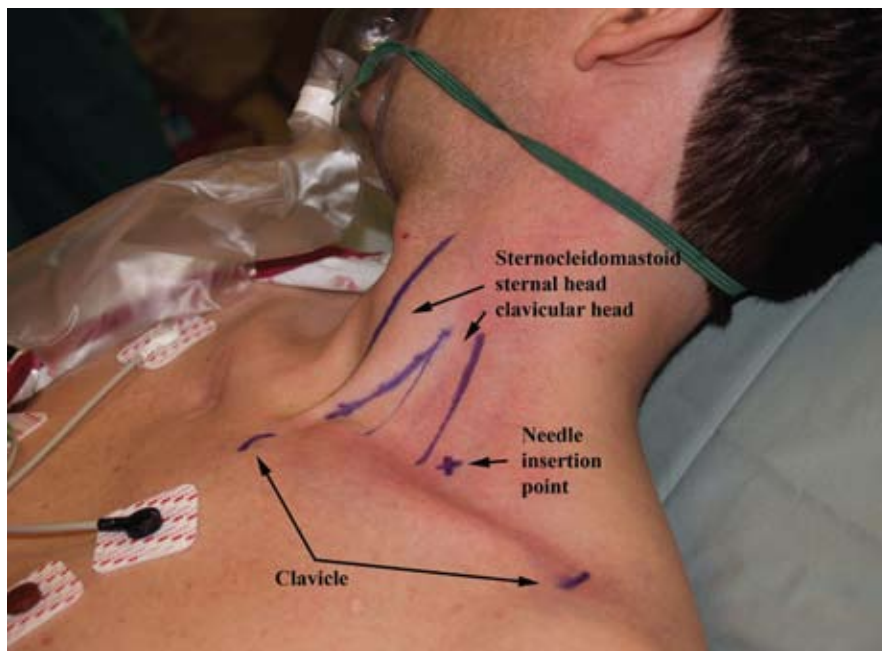


Figure 8-4



Figure 8-5

nerve, place a subcutaneous “wheal” of local anesthetic from the border of the pectoralis muscle insertion on the humerus to the inferior border of the axilla. The skin wheal should be placed as proximal on the arm as possible.

Teaching Points. Because of the close proximity of the lung, the needle should never be directed medially. If a tourniquet is being used for surgery, consider intercostobrachial blockade.

BLOCK WITH ULTRASOUND PROBE

Probe. High frequency (5-12 MHz), linear.

Probe Position. The coronal oblique plane gives the best transverse view of the brachial plexus; again, a cross-sectional (axial) view displays the nerves as hypoechoic circles with hyperechoic rings (“bundle of grapes”). Position the probe on the neck directly above the clavicle in the supraclavicular fossa. At this level, the plexus will be configured as trunks or divisions and is typically located lateral and slightly superior to the subclavian artery at a depth of 2 to 4 cm (Figure 8-6).

Approach. Insert the needle at the lateral end of the ultrasound probe and advance it parallel to the ultrasound beam until it approaches the plexus. Take care to maintain the needle within the ultrasound beam plane; this maneuver helps ensure that you can constantly visualize the entire needle shaft to the tip. If the image of the needle is lost during the block procedure, cease advancing the needle until it can be re-visualized through probe manipulation (Figure 8-7).

Injection. It is important to observe the spread of the local anesthetic during the injection, allowing real-time readjustment of the needle tip position if the spread is not appropriate. The “donut sign” (created by the local anesthetic surrounding the nerves) is a positive indicator that the anesthetic is being properly distributed (see section on interscalene ultrasound injection). Precise application of the local anesthetic can be achieved by injecting small aliquots (5 mL) and observing the local anesthetic spread (Figure 8-8).

Teaching Points. Be aware that this block is performed with the needle passing from a lateral to medial direction. It is very important to always keep the tip and shaft of the needle in clear view to ensure that the needle is not penetrating too deep into the supraclavicular fossa; deep penetration can result in an inadvertent pneumothorax or vascular puncture. If the needle image is maintained above the level of the first rib and pleura, the risk of pneumothorax is minimal.

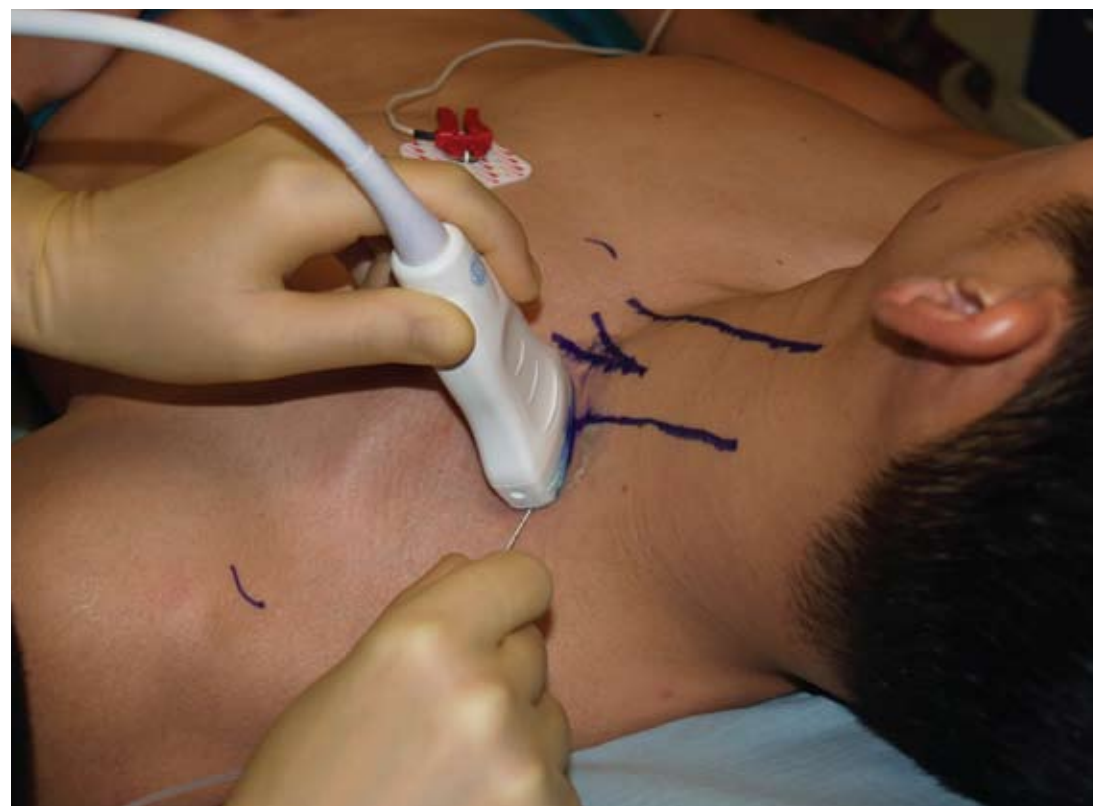


Figure 8-6

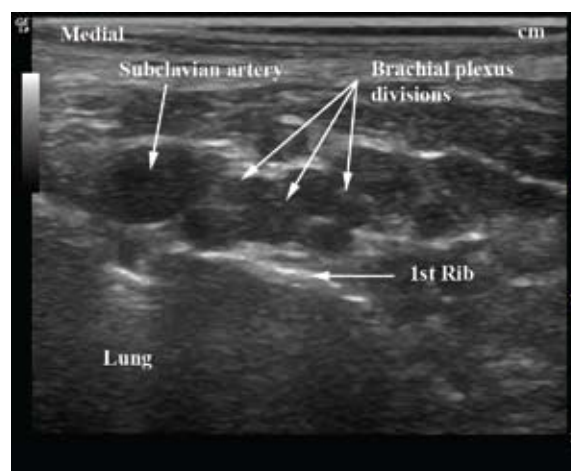


Figure 8-7

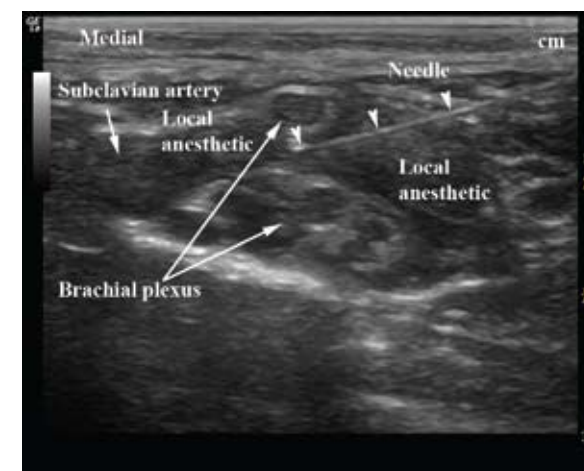


Figure 8-8