



Chapter 4



Supraclavicular Block

- **Single-Injection Supraclavicular Block**



SINGLE-INJECTION SUPRACLAVICULAR BLOCK

Introduction

The supraclavicular approach to the brachial plexus is a technique usually associated with rapid-onset, predictable, and dense anesthesia (1,2). This is because the block is performed at the level of the plexus trunks, where the entire sensory, motor, and sympathetic innervation of the upper arm is carried in just three nerve structures confined to a small space between the first rib and the clavicle in the cephalocaudal axis, and the anterior and middle scalene muscles along the anteroposterior orientation.

The supraclavicular block can be used to provide anesthesia for any surgery on the upper extremity that does not involve the shoulder (1). It is a good choice for elbow, wrist, and hand surgery. The block is ideal for adult patients, but may be considered in pediatric patients older than 10 years of age on a case-by-case basis. This block is not performed bilaterally because of the potential risk of respiratory emergency from pneumothorax or phrenic nerve block (2). However, although this recommendation seems logical, it has not been substantiated in the published literature.

Specific Anatomic Considerations

The gross anatomy is described in detail in Chapter 1, but it is important to review the anatomy of the pleura as it relates to the supraclavicular block. There are two potential places where the pleura could be injured during performance of this block: the pleural dome and the first intercostal space (Figs. 4-1 and 4-2). The pleural dome is the apex of the parietal pleura (inside lining of the rib cage), circumscribed by the first rib. The first ribs are short, broad, flattened, “C”-shaped bones located on each side of the upper chest with their concavities facing medially toward each other. This concavity or medial border forms the outer boundary of the pleural dome. The anterior scalene muscle, by inserting in the medial border of the first rib, comes in contact medially with the pleural dome and becomes an important landmark to locate it.

There is no pleural dome lateral to the anterior scalene muscle. Because the anterior scalene is located in almost the same parasagittal plane as the sternocleidomastoid muscle, the parasagittal plane of the lateral insertion of this muscle on the clavicle can be used as a landmark to locate the lateral boundary of the pleural dome in the neck.

The use of ultrasound for this block has effectively eliminated the potential danger of pneumothorax.

Technique

The patient is positioned supine or semi-sitting with the head turned slightly away from the side to be blocked. The ipsilateral elbow is flexed and the forearm is placed on the patient’s lap or held in the anesthesiologist’s nonoperative hand. If possible, the patient’s wrist is supinated so the fingers are not leaning against the patient and are free to move (Fig. 4-3).

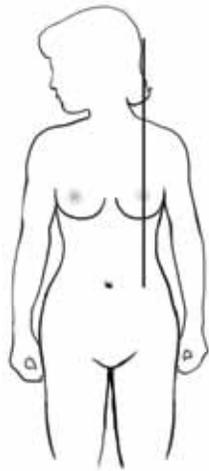
The point at which the lateral border of the sternocleidomastoid muscle meets the clavicle is marked as shown in Figure 4-4 (*medial arrow*). The point of needle entry is approximately 2.5 cm lateral to the insertion of the sternocleidomastoid muscle to the clavicle or the width of the clavicular head of the patient’s sternocleidomastoid muscle (see Fig. 4-4, *lateral arrow*), and approximately 1 cm above the clavicle (see Fig. 4-4, *dot*).

A 50-mm, short-bevel, 22-gauge insulated needle is used. After a small skin wheal is raised, the stimulating needle is inserted perpendicular to the skin (Fig. 4-5).

The needle is advanced for a few millimeters, then turned caudad, remaining in the parasagittal plane in a direction parallel to the patient’s midline. The nerve stimulator is initially set at a current output of 0.8 mA, a pulse width of 100 to 300 μ sec, and a frequency of 1 Hz (3).

Good results with this block may be obtained when a flexion or extension motor response in the fingers is elicited (1-3). When this motor response in the fingers is observed, the injection is started without decreasing the nerve stimulator output (3).

If needle repositioning is necessary, it is redirected either anterior or posterior but in exactly the same original parasagittal plane (parallel to the midline of the patient). The tip of the needle is kept above the clavicle.



1. Superior trunk
2. Middle trunk
3. Inferior trunk
4. Anterior scalene muscle
5. Middle scalene muscle
6. Posterior scalene muscle
7. Subclavian artery
8. Subclavian vein
9. First rib
10. Clavicle
11. Levator scapulae muscle
12. Trapezius muscle

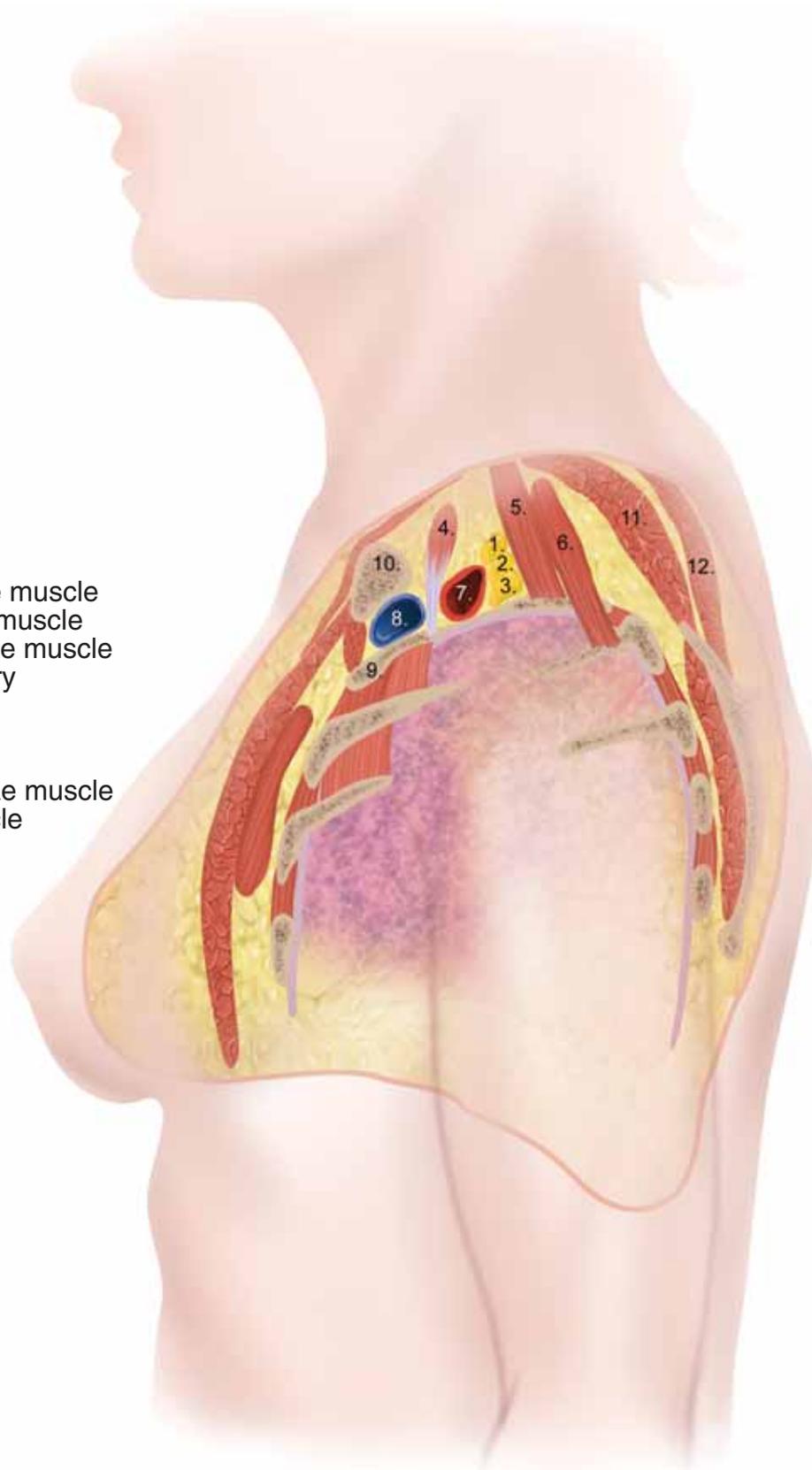


FIGURE 4-1 Section through the mid-clavicular line.



FIGURE 4-2 Dissection of the supraclavicular area showing the relationship between the lung and the brachial plexus at this level. (Photograph courtesy of Carlos D. Franco, MD.)



FIGURE 4-3 The patient is placed in a supine or semi-sitting position.



FIGURE 4-4 The *medial arrow* indicates the position of the clavicular head of the sternocleidomastoid muscle, and the *lateral arrow* is 2.5 cm lateral to the medial arrow. The uppermost lateral *dot* indicates the point of needle entry.



FIGURE 4-5 The needle is now aimed perpendicular to the skin.



FIGURE 4-6 Position of the ultrasound probe relative to the needle.

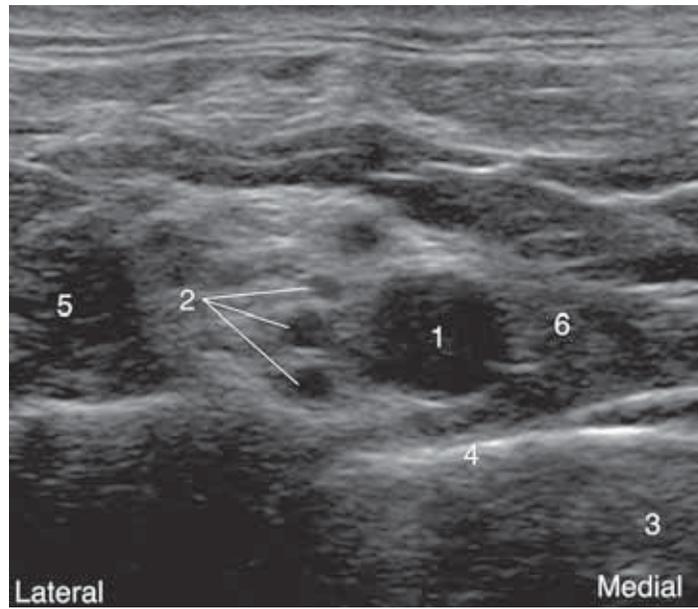
Ultrasonography is a very useful addition to this block. The probe is placed supraclavicularly, and the needle enters as shown in Figure 4-6.

Local Anesthetic Agent Choice

Twenty to 40 mL (1.5%) mepivacaine with 1:200,000 epinephrine is commonly used. This

provides approximately 3 to 4 hours of surgical anesthesia. The same anesthetic solution without epinephrine provides about 2 to 3 hours of surgical anesthesia. Other local anesthetic agents, such as ropivacaine (0.5% to 0.75%), bupivacaine (0.5%), and levobupivacaine (0.625%), are also commonly used. These drugs provide good anesthesia lasting 5 to 8 hours.

FIGURE 4-7 Ultrasonograph of the supraclavicular area: 1. Subclavian artery; 2. Brachial plexus trunks; 3. Lung; 4. First rib; 5. Middle scalene muscle; 6. Anterior scalene muscle.



REFERENCES

1. Boezaart AP, Franco CD: Blocks above the clavicle. In Boezaart AP (ed): *Anesthesia and Orthopaedic Surgery*. New York, McGraw-Hill, 2006, pp 291-309.
2. Franco CD, Gloss FJ, Voronov G, et al: Supraclavicular block in the obese population: An analysis of 2020 blocks. *Anesth Analg* 2006;102:1252-1254.
3. Franco CD, Domashevich V, Voronov G, et al: The supraclavicular block with a nerve stimulator: To decrease or not to decrease, that is the question. *Anesth Analg* 2004;98:1167-1171.

