

7. INTERSCALENE BLOCK

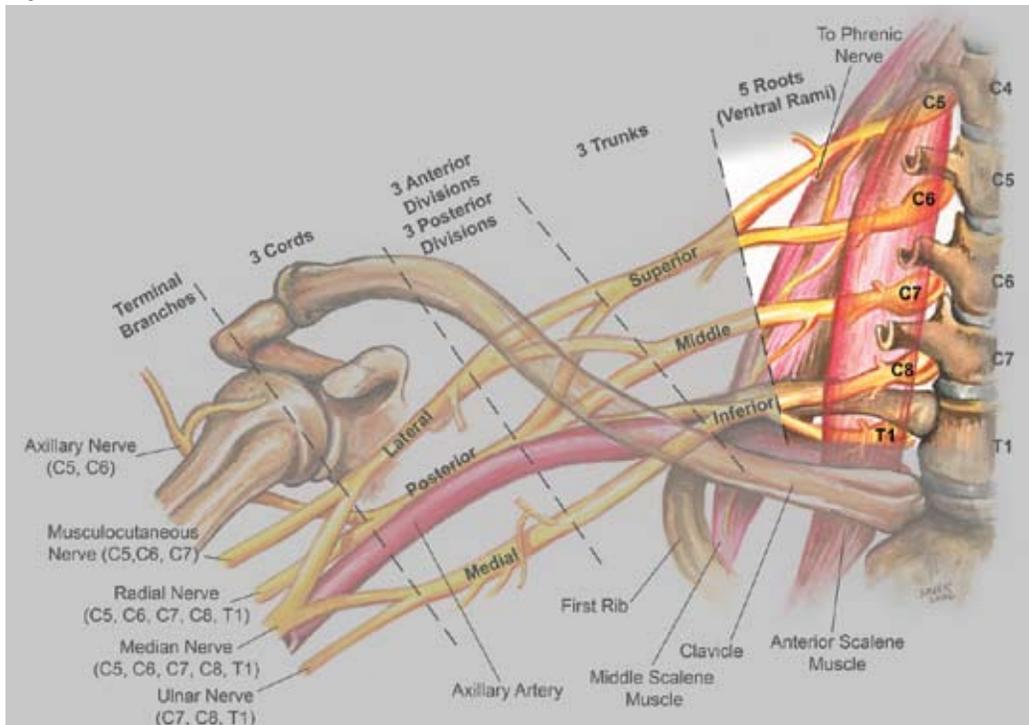
INTRODUCTION

The interscalene approach to the brachial plexus is particularly well suited for operations on the shoulder, clavicle, or upper arm. The approach preferentially blocks nerves of the brachial plexus (C5–C7), with variable proximal spread to the cervical plexus (C3–C4), while usually sparing the ulnar nerve (C8–T1). The nerves of the brachial plexus emerge from their respective intervertebral foramina and course posterior to the vertebral artery. They then pass between the anterior and middle scalene muscles as the trunks (superior C5–C6, middle C7, inferior C8–T1) of the brachial plexus.

ANATOMY

The interscalene block is performed at the level of the C6 vertebral body (Chassaignac's tubercle)

Figure 7-1



between the anterior and middle scalene muscles; C6 corresponds to the level of the cricoid cartilage. By blocking the plexus at this level, the local anesthetic is deposited around the upper roots (C5, C6) that innervate the muscles of the shoulder, specifically the deltoid, supraspinatus, infraspinatus, and teres major (Figure 7-1 through 7-3). Occasionally, there may be proximal spread to the cervical plexus (C3, C4) and cervical sympathetic chain, which can result in Horner's syndrome and hoarseness post block; this is not considered a complication, but the patient should be made aware of these possible side effects before the procedure is performed.

The interscalene block always results in hemidiaphragm paresis because of the close proximity of the phrenic nerve (C3–C5) to the interscalene groove. Any patient who cannot tolerate a reduction in pulmonary function greater than 30% should not receive this block. Even healthy patients may need reassurance that their feeling of dyspnea is transient.

The interscalene block is not appropriate for surgery of the hand and forearm, specifically in the ulnar distribution of C8, T1. Because it is performed at the upper roots of the plexus, the block typically spares the ulnar aspect of the hand. Additionally, C3, C4 nerve roots (cape area) are not consistently blocked.

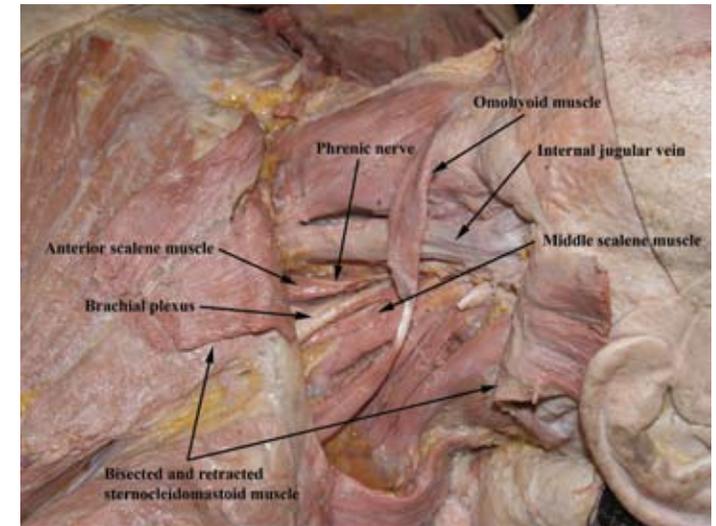
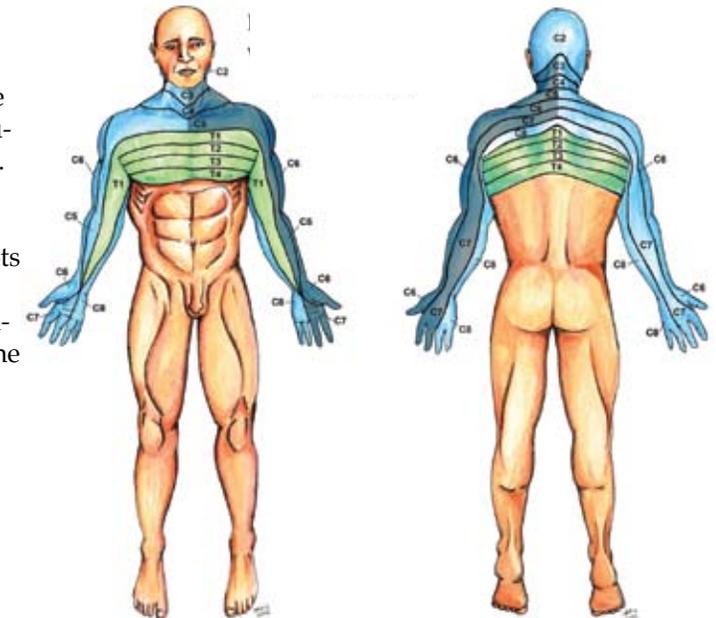


Figure 7-2

Figure 7-3. Dermatomes anesthetized with the interscalene block (dark blue)



PROCEDURE

Landmarks. Place the patient supine with the head turned toward the nonoperative side. Identify the cricoid cartilage, which indicates the C6 level. Palpate the lateral border of the sternocleidomastoid muscle (SCM), and move your fingers laterally into the interscalene groove (between the anterior and middle scalene muscles). Ensure that the clavicular head of the SCM, rather than the more medial sternal head, is being palpated. The external jugular vein often crosses the border of the SCM muscle at this point. If this is the case, the initial needle insertion should be posterior to the vessel (Figure 7-4). Initial needle insertion (at the level of C6) is indicated by an "X" (Figure 7-5).

Needles

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

Stimulation. The nerve stimulator is initially set at 1.0 to 1.2 mA. Muscle twitch in the shoulder, biceps, or triceps at 0.5 mA or less indicates adequate proximity to the brachial plexus for local anesthetic injection. Stimulation below the elbow suggests a needle position that is too caudal in the brachial plexus for shoulder surgery. In most adults, the brachial plexus is rarely deeper than 1 to 2 cm below the skin. Stimulation of the trapezoid muscle suggests that the needle tip is too posterior to the plexus. Conversely, stimulation of the diaphragm indicates phrenic nerve stimulation, and the needle tip is anterior to the plexus.

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

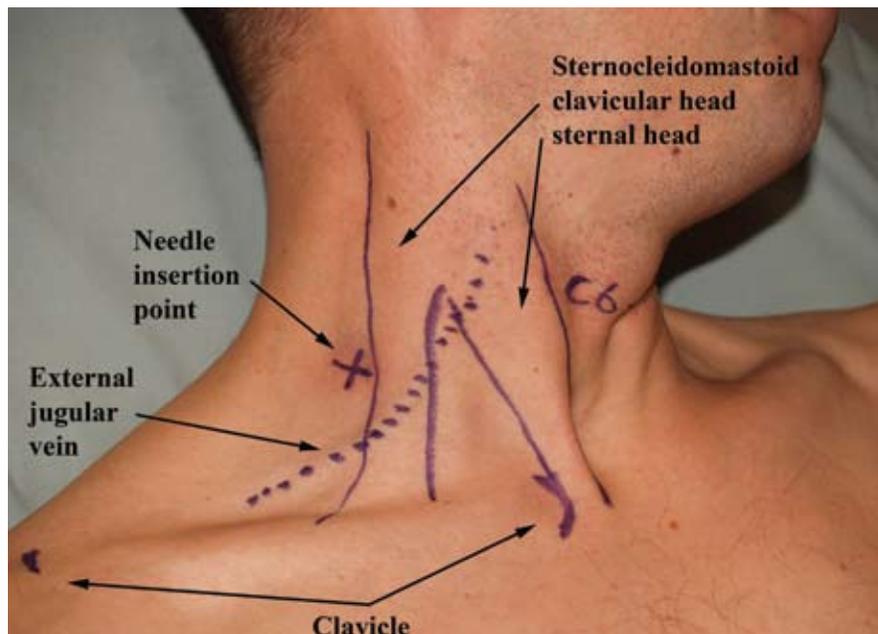


Figure 7-4

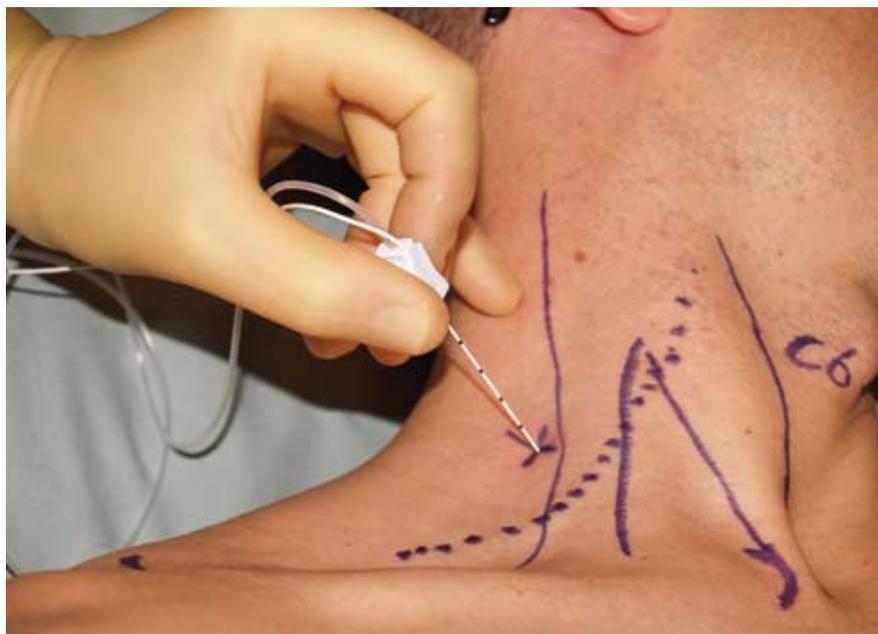


Figure 7-5

Additional Procedures.

An intercostobrachial nerve block (subcutaneous injection of local anesthetic from the axilla to the midpoint of the clavicle on the anterior chest) should be performed for major shoulder procedures. Paravertebral nerve blocks of T1–T2 may supplement the interscalene block for procedures involving significant posterior dissections.

Teaching Points. Injection of local anesthetic into the neighboring vertebral artery can result in a devastating complication of this block. Proper injection technique with frequent, gentle aspiration for blood is critical for safe block placement.

BLOCK WITH ULTRASOUND PROBE

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

Probe Position. The oblique plane gives the best transverse view of the brachial plexus; a cross-sectional (axial) view displays the nerves as hypoechoic circles with hyperechoic rings. Position the probe on the neck at the level of C6 (Figure 7-6).

Approach. The plexus can be approached from either a posterior or anterior position. To use the posterior approach, begin the needle insertion at the lateral aspect of the probe; the needle will traverse the middle scalene muscle as the plexus is reached. For the anterior approach, insert the needle at the medial aspect of the probe, taking care to avoid the carotid artery and internal jugular vein; the needle will traverse the anterior scalene muscle on the way to the plexus (Figure 7-7).

Injection. Once the needle is adjacent to the nerve trunks, injection of local anesthetic may begin. The “donut sign” (created by the local anesthetic surrounding the nerves) is a positive indicator that the anesthetic is being properly distributed. Proper needle positioning should ensure local anesthetic spread around the superior and middle trunks.

Teaching Points. For ease of anatomic identification, locate the plexus at the level of a supraclavicular block (identify the subclavian artery, and the plexus will be just lateral to it). Once the plexus is located, slowly move the probe cephalad to observe the bundled nerve structures coalescing into the three major trunks, aligned superior to inferior. This is the transition from the more caudad divisions to the more cephalad trunks (Figure 7-8). Injection of local anesthetic should be directed toward the superior trunk of the plexus.

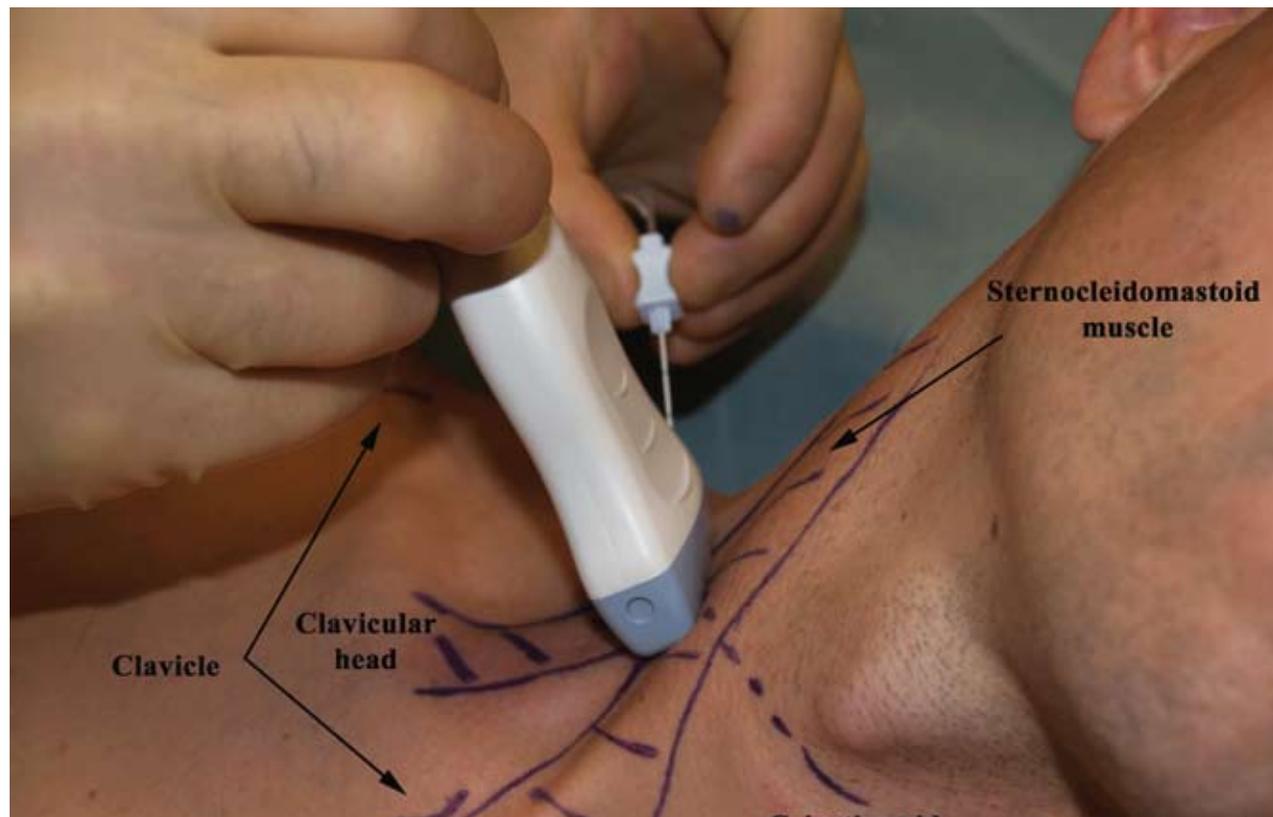


Figure 7-6



Figure 7-7

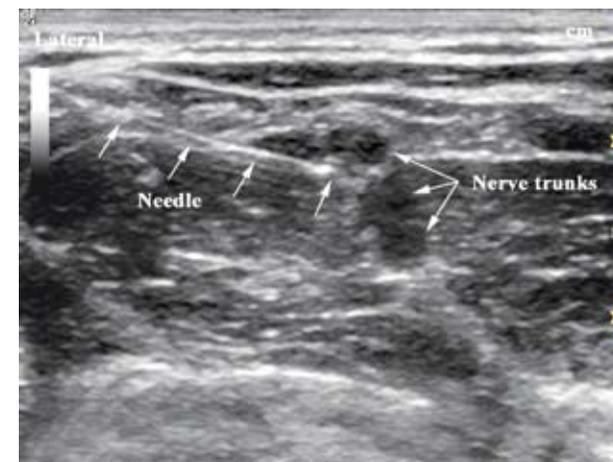


Figure 7-8