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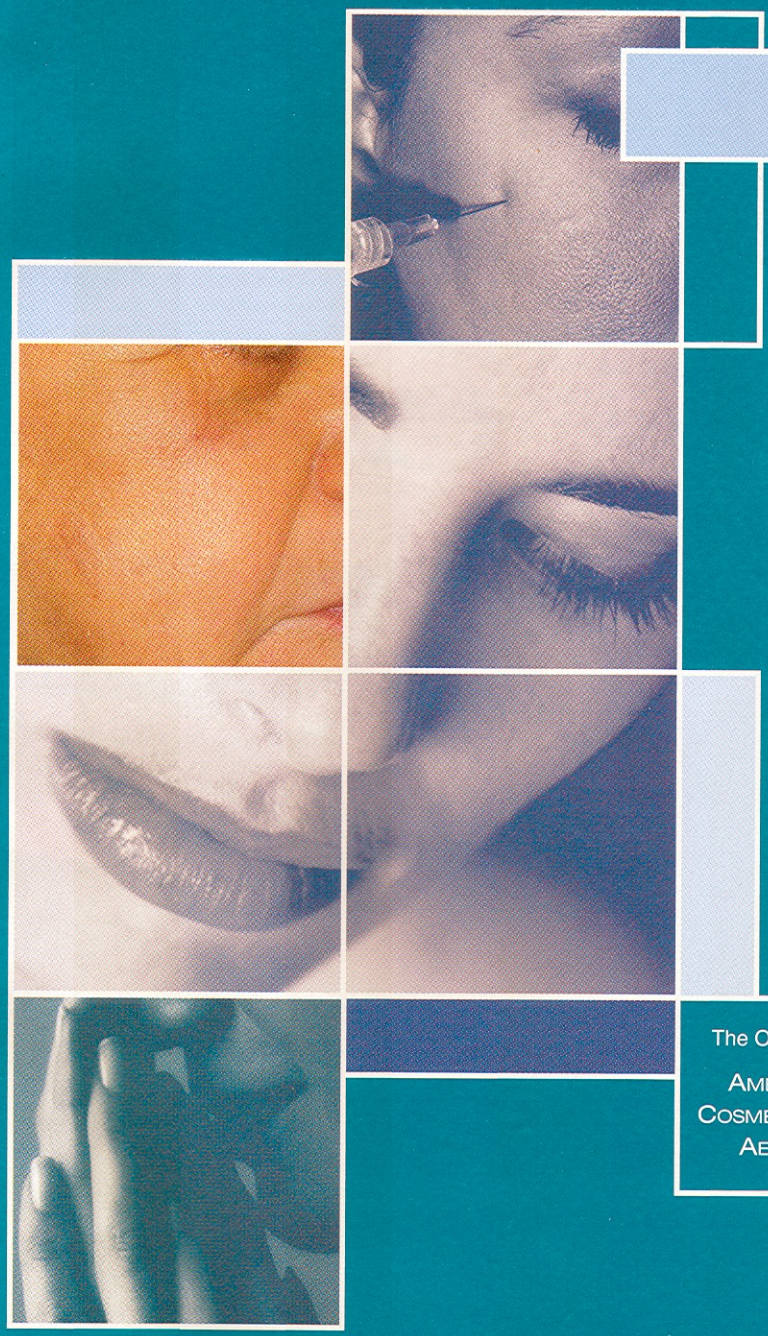

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Local Anesthetic Blocks of the Head and Neck for Cosmetic Facial Surgery, Part V: Techniques for the Head and Neck Region

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This is the final article in a 5-part series detailing local anesthetic block techniques of the head and neck region. The ability to provide local anesthesia to the head and neck is important to both physician and patient. There is no doubt that cosmetic surgeons can perform superior work on patients who are comfortable. Additionally, a pain-free patient is a testament to the skill and compassion of the physician. This article reviews the sensory neuroanatomy of the cervical plexus and details local anesthetic block techniques to enhance the practice of cosmetic facial surgery. Additionally, sensory dermatomes are illustrated along with graphic and photographic examples of specific local anesthetic block procedures of the head and neck.

SCALP BLOCK

As outlined in part 2 of this series, the anterior scalp is anesthetized by injecting a local anesthetic solution in the branches of V1 (supraorbital and supratrochlear nerves) and V2 (the zygomaticotemporal nerve). The posterior scalp is innervated by the greater and lesser occipital nerves, and the greater auricular nerve supplies the lateral scalp (Figure 1).[1]

By performing the cervical plexus block and the zygomaticotemporal block, known as *brow blocks*, the entire scalp is anesthetized except for the posterior area, which is anesthetized by blocking the greater occipital nerve. A ring block also can be performed by injecting a local anesthetic every several centimeters around the entire scalp at about the level of the eyebrows. Approximately 30 cc of a local anesthetic solution is required to perform a ring block around the scalp.

Greater Occipital Nerve Block Technique for Posterior Scalp

The greater occipital nerve arises from the dorsal rami of the second cervical nerve and travels deep to the cervical musculature until it becomes subcutaneous slightly inferior to the superior nuchal line.[2] The greater occipital nerve emerges on the superior nuchal line in association

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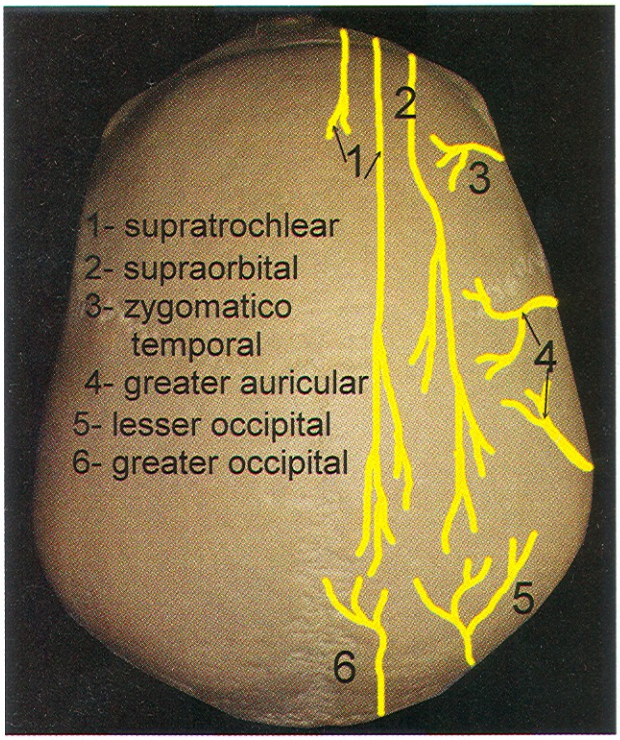

Figure 1. Innervation of the scalp. 1 indicates supratrochlear nerve; 2, supraorbital nerve(s); 3, zygomaticotemporal nerve; 4, greater auricular nerve; 5, lesser occipital nerve; 6, greater occipital nerve. Adapted from Brown.[1]

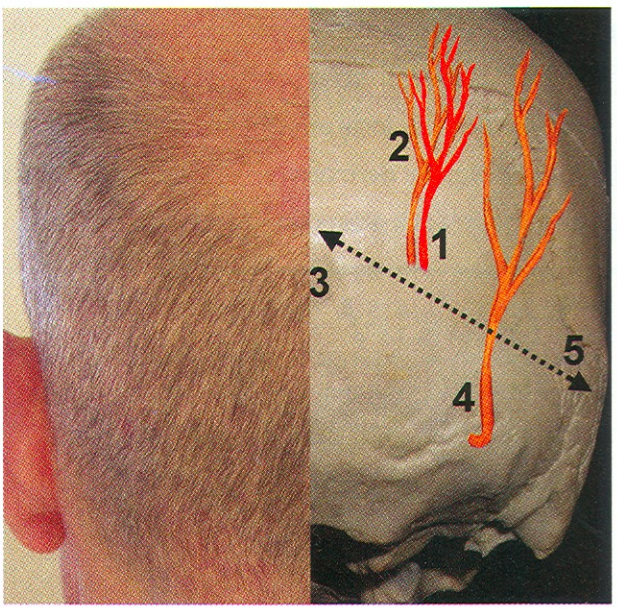

Figure 2. The greater occipital nerve is in close proximity to the occipital artery (1). The nerve can be located by palpating the artery. The injection should be performed just medial to the artery (2). Injection also can take place on the superior nuchal line, which is one third to one half the distance between the mastoid prominence and occipital protrubence (3 and 5). Number 4 in the diagram shows the lesser occipital nerve.

with the occipital artery, which is the most useful landmark for locating the greater occipital nerve (Figure 2). The optimal position for the patient to receive the injection is sitting upright with the chin flexed to the sternum.[3]

The nerve is identified at its point of entry to the scalp along the superior nuchal line, which is one third to one half the distance between the mastoid process and the occipital protuberance in the midline (Figure 2). Another measurement for locating the artery is 2.5 to 3.0 cm lateral to the occipital protrubence.[4] Patients will report pain upon compression of the nerve; the point at which maximal tenderness is elicited can be used as the injection site. A 5/8-in 25-gauge needle is used for the block. The occipital artery is located just lateral to the greater occipital nerve and can be used as a pulsatile landmark. To ensure proximity to the nerve, 2 to 4 cc of a local anesthetic solution can be infiltrated on either side of the artery. Figure 3 shows the dermatomes anesthetized by blocking the greater occipital nerve.

LOCAL ANESTHESIA OF THE NECK

Innervation of the Cervical Plexus

The cervical plexus is formed from the ventral rami of the upper 4 cervical nerves (Figure 3B). The dorsal and ventral roots of the upper 4 cervical nerves combine to form spinal nerves as they exit through the intervertebral foramen. The anterior rami of C2 through C4 form the cervical plexus.[5] The cervical plexus lies just behind the posterior border of the sternocleidomastoid muscle, giving off both superficial (superficial cervical plexus) and deep (deep cervical plexus) branches. The branches of the superficial cervical plexus supply the skin and superficial structures of the head, neck, and shoulder. The deep branches of the cervical plexus innervate the deeper structures of the neck, including the muscles of the anterior neck and the diaphragm (phrenic nerve) and are not blocked for local anesthetic procedures.

Superficial Branches of the Cervical Plexus

The lesser occipital nerve arises from the second (and sometimes third) cervical nerve and emerges from the deep fascia on the posterior lateral portion of the head behind the auricle, supplying the skin and communicating with the greater occipital nerve, the great auricular, and the posterior auricular branch of the facial nerve.[5]

The greater auricular nerve arises from the second and third cervical nerves and divides into an anterior and a posterior branch. The anterior branch is distributed to the skin of the face over the parotid gland and communicates in the substance of the gland with the facial nerve.

The posterior branch supplies the skin over the mastoid process and on the back of the auricle, except at its

upper part; a filament pierces the auricle to reach its lateral surface, where it is distributed to the lobule and lower part of the concha. The posterior branch communicates with the lesser occipital nerve, the auricular branch of the vagus nerve, and the posterior auricular branch of the facial nerve.[5]

The cutaneous cervical nerve (cutaneous colli nerve, anterior cervical nerve) arises from the second and third cervical nerves and provides sensation to the anterolateral parts of the neck (Figure 3B).

Cervical Plexus Block

The cervical plexus block technique is used in cosmetic facial surgery to block the superficial branches of the cervical plexus to anesthetize skin of the lateral or anterior neck, the posterior lateral scalp, and portions of the periauricular area (Figure 3).

The technique involves having the patient lie back with the sternocleidomastoid muscle flexed. The mastoid process and the transverse process of C6 (Chassaignac tubercle)(approximate level of the cricoid cartilage) (Figure 3A). This line is divided in half at the posterior border of the sternocleidomastoid muscle to determine the injection point.[1,6] Another technique without osseous landmarks can be used. In this technique, the distance between the origin and insertion of the sternocleidomastoid is drawn with a skin marker and then bisected. The anesthetic solution is then injected at the posterior border of the sternocleidomastoid. The success of this blocking technique involves a larger volume of local anesthesia diffusing and spreading out over a larger area rather than absolute accuracy of the nerve position. For this technique, 3 to 5 cc of a local anesthetic solution is injected subcutaneously with the needle positioned perpendicular to the skin. The needle is then redirected superiorly and another 3 to 5 cc of the solution is injected. The needle is then directed inferiorly and another 3 to 5 cc of solution is injected. Figure 3B shows the areas anesthetized by a cervical plexus block.

Although phrenic nerve involvement is rare with superficial cervical plexus blocks (it is more common with deep cervical blocks), it is possible because C3, C4, and C5 innervate the diaphragm. Healthy patients can tolerate a hemiparalysis of the diaphragm; however, caution must be used in patients with cardiopulmonary disease because assisted ventilation may be required. It must be kept in mind that a bilateral block could potentially deinnervate the entire diaphragm. To prevent unwanted spread of local anesthetic solution, it must be injected just subcutaneously and never bilaterally.

EAR BLOCK

Four nerve branches supply sensory innervation to the ear. The anterior half of the ear is supplied by the auriculotemporal nerve, which is a branch of the mandibular portion of the trigeminal nerve. The posterior half of the ear is innervated by 2 nerve branches derived from the cervical plexus: the great auricular nerve and the lesser occipital nerve (Figure 3B). The auditory branch of the vagus nerve innervates the concha and external auditory canal.

Although these nerves can be individually targeted with blocks, a circumferential infiltration (ring block)

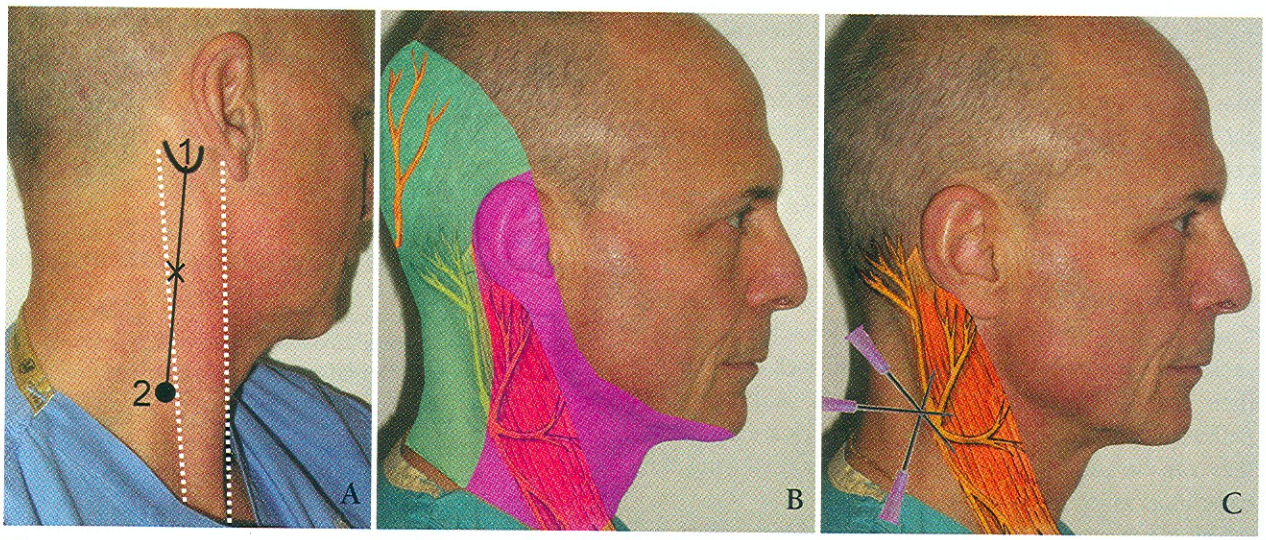

Figure 3. The cervical plexus block is performed by making a line from the mastoid process (1) to the level of the transverse process of C6 (2) and then finding the point halfway between these 2 marks (X) just posterior to the sternocleidomastiod muscle (dotted line). The local anesthetic solution is then perpendicularly injected superiorly and inferiorly in this region (B also shows the greater occipital nerve, which is not part of the cervical plexus).

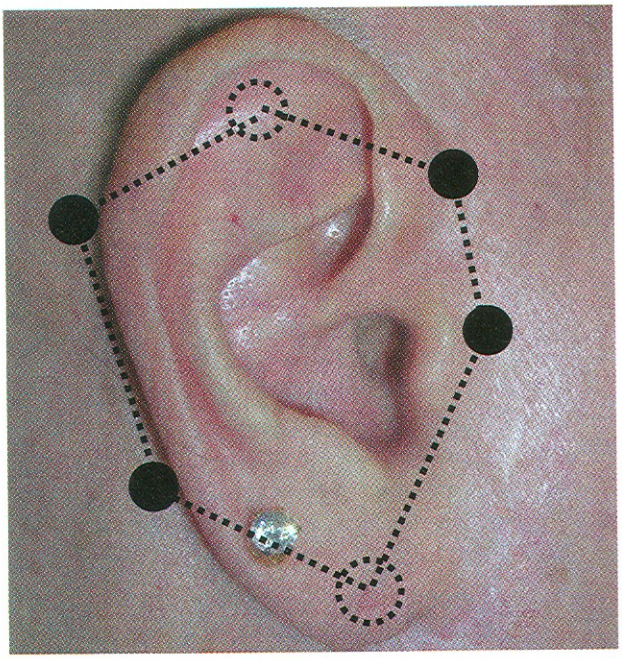

Figure 4. Blocking the entire ear (with the exception of the area supplied by the vagus nerve) can be performed by inserting the needle at the black dots and infiltrating along the dotted lines. This will anesthetize the terminal branches of the auriculotemporal nerve, the lesser occipital nerve, and the anterior and posterior branches of the greater auricular nerve. The main trunks of these nerves could be blocked, but the terminal infiltration technique shown may be more convenient.

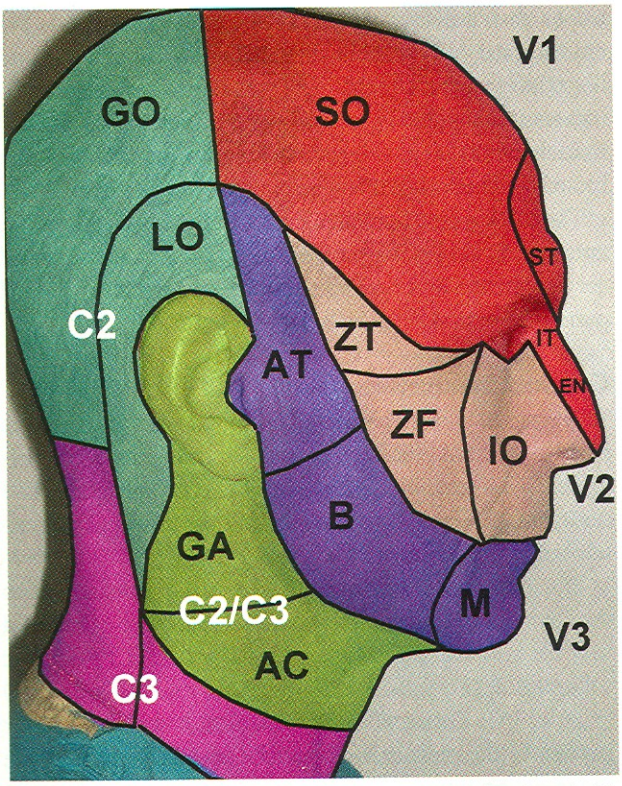

Figure 5. The major sensory dermatomes of the head and neck. AC indicates anterior cervical cutaneous colli; AT, auriculotemporal; B, buccal; EN, external (dorsal) nasal; GA, greater auricular; GO, greater occipital; IO, infraorbital; IT, infratrochlear; LO, lesser occipital; M, mental; SO, supraorbital; ST, supratrochlear; ZF, zygomaticofacial; ZT, zygomaticotemporal. Adapted from Larrabee.[7]

will anesthetize the entire ear, with exception of the concha and the external auditory canal, which are innervated by the vagus nerve. The needle is inserted into the skin at the junction where the earlobe attaches to the head. The anesthetic should be infiltrated while the needle is advanced to the subcutaneous plane. Infiltration is made in a hexagonal pattern around the entire periphery of the ear (Figure 4). The conchal bowl and external auditory canal will need separate infiltration. As with all injections, the syringe should be aspirated prior to injection to prevent intravascular injection.

CONCLUSION

Cosmetic surgeons who have a firm knowledge of the sensory neuroanatomy of the head and neck can benefit their practice, as well as their patients. Although the pathways of sensation for the head and neck are complex, they can be easily and safely blocked by reviewing the basic innervation patterns.

The entire sensory apparatus of the face is supplied by the trigeminal nerve and several cervical branches. Many patterns of nerve distribution anomaly, cross innervation, and individual patient variation exist; however, by following the basic techniques outlined in this article, the cosmetic surgeon should be able to achieve pain control of the major dermatomes of the head and neck. A basic dermatomal distribution is illustrated in Figure 5 and can serve as a road map to local anesthesia of the head and neck.[7]

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